



EMCON

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

Date December 22, 1995
Project 20805-134.002

To:

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

DEC 28 1995
JS

We are enclosing:

Copies	Description
<u>1</u>	<u>Third quarter 1995 groundwater monitoring results</u> <u>for ARCO service station 6113, Livermore, California</u>

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

Comments:

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

David Larsen
David Larsen
Project Coordinator

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





Date:

December 22, 1995

Re: ARCO Station #

6113 • 785 East Stanley Boulevard • Livermore, CA
Third Quarter 1995 Groundwater Monitoring Results

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

Submitted by:

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

Michael R. Whelan
Environmental Engineer



EMCON

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

November 30, 1995
Project 20805-134.002

Mr. Michael Whelan
ARCO Products Company
P.O. Box 612530
San Jose, California 95161

Re: Third quarter 1995 groundwater monitoring program results, ARCO service station 6113, Livermore, California

Dear Mr. Whelan:

This letter presents the results of the third quarter 1995 groundwater monitoring program at ARCO Products Company (ARCO) service station 6113, 785 East Stanley Boulevard, Livermore, California (Figure 1). The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

BACKGROUND

Ten on-site groundwater monitoring wells (MW-1 through MW-10), two off-site groundwater monitoring wells (MW-11 and MW-12), and four on-site vapor extraction wells (VW-1 through VW-4) were installed as part of a comprehensive site assessment conducted at this site between September 1989 and June 1993. Please refer to *Results of Vapor Extraction Well Installation at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California* (RESNA, June 2, 1994), and *First Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6113, Livermore, California* (EMCON, May 1995) for more details.

MONITORING PROGRAM FIELD PROCEDURES

A program of quarterly groundwater monitoring was initiated during the second quarter of 1999 to provide information concerning water quality, flow direction, and gradient consistent with ACHCSA and Regional Water Quality Control Board (RWQCB) requirements for underground fuel tank investigations. Water levels are measured quarterly in wells MW-1 through MW-12. Wells MW-1, MW-2, MW-3, MW-8, MW-9 and MW-10 are sampled annually, during the fourth quarter of the year. Wells MW-11 and MW-12 are sampled semiannually, during the second and fourth quarters. Wells MW-4 through MW-7 are sampled quarterly.



EMCON performed the third quarter 1995 groundwater monitoring event on August 31, 1995. Field work this quarter included (1) measuring depths to groundwater and subjectively analyzing groundwater for the presence of floating product in wells MW-1 through MW-4 and MW-6 through MW-12, (2) purging and subsequently sampling groundwater monitoring wells MW-4, MW-6, and MW-7 for laboratory analysis, and (3) directing a state-certified laboratory to analyze the groundwater samples. Well MW-5 was inaccessible; therefore, the well was not monitored during the third quarter of 1995. Copies of all field data sheets from the third quarter 1995 groundwater monitoring event are included in Appendix A.

ANALYTICAL PROCEDURES

Groundwater samples collected during third quarter 1995 monitoring were analyzed for total petroleum hydrocarbons as gasoline (TPHG), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl-tert-butyl ether (MTBE). 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 *Leaking Underground Fuel Tank (LUFT) Field Manual* (State Water Resources Control Board, October 1989). Samples were analyzed for BTEX and MTBE by USEPA method 8020, as described in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (EPA SW-846, November 1986, third edition). 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 third 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 analysis of petroleum hydrocarbons and their constituents. Table 4 summarizes historical laboratory data for halogenated volatile organic compounds (VOCs) and metals analyses. Copies of the third quarter 1995 analytical results and chain-of-custody documentation are included in Appendix B.

Groundwater elevation data collected on August 31, 1995, indicate that groundwater beneath the site flows north-northwest with an approximate hydraulic gradient of 0.03 foot per foot. Figure 2 illustrates groundwater contours and analytical data for the third quarter of 1995.

Groundwater samples from well MW-7 did not contain detectable concentrations of TPHG, benzene, or MTBE. Samples from well MW-4 contained 160 micrograms per liter ($\mu\text{g/L}$) TPHG and 1.2 $\mu\text{g/L}$ benzene; samples from well MW-6 contained 150 $\mu\text{g/L}$ TPHG and 9 $\mu\text{g/L}$ benzene. Samples from wells MW-4 and MW-6 did not contain detectable concentrations of MTBE. Well MW-5 was inaccessible and was not sampled during third quarter 1995.

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 third quarter of 1995 and those anticipated for the fourth quarter of 1995.

Third Quarter 1995 Activities

- Prepared and submitted quarterly groundwater monitoring report for second quarter 1995.
- Performed quarterly groundwater monitoring for third quarter 1995.

Work Anticipated for Fourth Quarter 1995

- Prepare and submit quarterly groundwater monitoring report for third quarter 1995.
- Perform quarterly groundwater monitoring for fourth quarter 1995.


Mr. Michael Whelan
November 30, 1995
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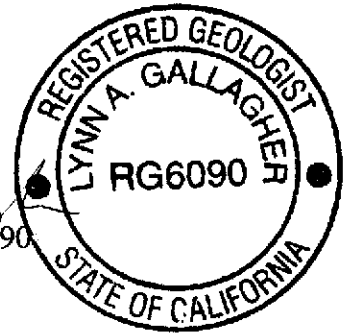
Please call if you have questions.

Sincerely,

EMCON


David Larsen
Project Coordinator


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



Attachments: Table 1 - Groundwater Monitoring Data, Third Quarter 1995
Table 2 - Historical Groundwater Elevation Data
Table 3 - Historical Groundwater Analytical Data, Petroleum
Hydrocarbons and Their Constituents
Table 4 - Historical Groundwater Analytical Data (VOCs and Metals)
Figure 1 - Site Location
Figure 2 - Groundwater Data, Third Quarter 1995
Appendix A - Field Data Sheets, Third Quarter 1995 Groundwater
Monitoring Event
Appendix B - Analytical Results and Chain-of-Custody Documentation,
Third Quarter 1995

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

Table 1
Groundwater Monitoring Data
Third Quarter 1995

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L	TRPH EPA 418.1 µg/L	TPHD LUFT Method µg/L	
MW-1	08-31-95	457.04	17.12	439.92	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-2	08-31-95	457.74	17.24	440.50	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-3	08-31-95	456.97	17.06	439.91	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-4	08-31-95	456.55	17.86	438.69	ND	NNW	0.03	08-31-95	160	1.2	0.7	<0.5	<2	<3	--	--	--	
MW-5	08-31-95	455.84	Not surveyed: well was inaccessible					0.03	08-31-95	Not sampled: well was inaccessible								
MW-6	08-31-95	454.93	16.71	438.22	ND	NNW	0.03	08-31-95	150	9	1.8	4	12	<3	--	--	--	
MW-7	08-31-95	454.92	16.53	438.39	ND	NNW	0.03	08-31-95	<50	<0.5	<0.5	<0.5	1.2	<3	--	--	--	
MW-8	08-31-95	456.97	15.68	441.29	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-9	08-31-95	456.18	14.40	441.78	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-10	08-31-95	456.85	14.40	442.45	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-11	08-31-95	455.07	20.20	434.87	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									
MW-12	08-31-95	455.04	18.23	436.81	ND	NNW	0.03	08-31-95	Not sampled: not scheduled for chemical analysis									

ft-MSL: elevation in feet, relative to mean sea level

MWN: ground-water flow direction and gradient apply to the entire monitoring well network

ft/ft: foot per foot

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: methyl-tert-butyl ether

TRPH: total recoverable petroleum hydrocarbons

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

ND: none detected

NNW: north-northwest

--: not analyzed

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-1	09-20-89	457.04	21.03	436.01	ND	NR	NR
MW-1	10-12-89	457.04	19.64	437.40	ND	NR	NR
MW-1	06-21-90	457.04	21.72	435.32	ND	NR	NR
MW-1	09-20-90	457.04	19.79	437.25	ND	NR	NR
MW-1	12-18-90	457.04	19.28	437.76	ND	NR	NR
MW-1	02-21-91	457.04	22.45	434.59	ND	NR	NR
MW-1	03-20-91	457.04	19.87	437.17	ND	NR	NR
MW-1	04-10-91	457.04	19.42	437.62	ND	NR	NR
MW-1	05-20-91	457.04	25.95	431.09	ND	NR	NR
MW-1	06-20-91	457.04	32.55	424.49	ND	NR	NR
MW-1	07-25-91	457.04	38.22	418.82	ND	NR	NR
MW-1	08-13-91	457.04	40.74	416.30	ND	NR	NR
MW-1	09-12-91	457.04	43.16	413.88	ND	NR	NR
MW-1	10-22-91	457.04	DRY	DRY	ND	DRY	DRY
MW-1	11-13-91	457.04	DRY	DRY	ND	DRY	DRY
MW-1	12-21-91	457.04	DRY	DRY	ND	DRY	DRY
MW-1	01-18-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	02-21-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	03-19-92	457.04	36.16	420.88	ND	NR	NR
MW-1	04-24-92	457.04	38.14	418.90	ND	NR	NR
MW-1	05-20-92	457.04	40.74	416.30	ND	NR	NR
MW-1	06-29-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	07-28-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	08-26-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	09-11-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	10-29-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	11-11-92	457.04	DRY	DRY	ND	DRY	DRY
MW-1	12-14-92	457.04 Not surveyed: inaccessible due to construction activities					
MW-1	01-27-93	457.04	30.10	426.94	ND	NR	NR
MW-1	02-26-93	457.04	24.72	432.32	ND	NR	NR
MW-1	03-30-93	457.04	20.87	436.17	ND	NR	NR
MW-1	04-30-93	457.04	19.46	437.58	ND	NR	NR
MW-1	05-14-93	457.04	19.27	437.77	ND	NR	NR
MW-1	06-17-93	457.04	19.21	437.83	ND	NR	NR
MW-1	07-27-93	457.04	19.95	437.09	ND	NR	NR
MW-1	08-30-93	457.04	20.72	436.32	ND	NR	NR
MW-1	11-04-93	457.04	20.61	436.43	ND	NR	NR
MW-1	03-25-94	457.04	17.54	439.50	ND	NR	NR
MW-1	06-02-94	457.04	21.30	435.74	ND	NR	NR
MW-1	09-16-94	457.04	19.98	437.06	ND	N	0.014
MW-1	11-29-94	457.04	19.12	437.92	ND	N	0.025
MW-1	03-23-95	457.04	14.12	442.92	ND	NW	0.035
MW-1	05-31-95	457.04	14.45	442.59	ND	NNW	0.028
MW-1	08-31-95	457.04	17.12	439.92	ND	NNW	0.03

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-2	09-20-89	457.74	20.67	437.07	ND	NR	NR
MW-2	10-12-89	457.74	18.98	438.76	ND	NR	NR
MW-2	06-21-90	457.74	21.88	435.86	ND	NR	NR
MW-2	09-20-90	457.74	19.90	437.84	ND	NR	NR
MW-2	12-18-90	457.74	19.32	438.42	ND	NR	NR
MW-2	02-21-91	457.74	23.02	434.72	ND	NR	NR
MW-2	03-20-91	457.74	20.01	437.73	ND	NR	NR
MW-2	04-10-91	457.74	19.81	437.93	ND	NR	NR
MW-2	05-20-91	457.74	26.62	431.12	ND	NR	NR
MW-2	06-20-91	457.74	33.15	424.59	ND	NR	NR
MW-2	07-25-91	457.74	37.10	420.64	ND	NR	NR
MW-2	08-13-91	457.74	37.20	420.54	ND	NR	NR
MW-2	09-12-91	457.74	DRY	DRY	ND	DRY	DRY
MW-2	10-22-91	457.74	DRY	DRY	ND	DRY	DRY
MW-2	11-13-91	457.74	DRY	DRY	ND	DRY	DRY
MW-2	12-21-91	457.74	DRY	DRY	ND	DRY	DRY
MW-2	01-18-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	02-21-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	03-19-92	457.74	35.82	421.92	ND	NR	NR
MW-2	04-24-92	457.74	36.64	421.10	ND	NR	NR
MW-2	05-20-92	457.74	37.23	420.51	ND	NR	NR
MW-2	06-29-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	07-28-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	08-26-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	09-11-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	10-29-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	11-11-92	457.74	DRY	DRY	ND	DRY	DRY
MW-2	12-14-92	457.74	Not surveyed: inaccessible due to construction activities				
MW-2	01-27-93	457.74	32.87	424.87	ND	NR	NR
MW-2	02-26-93	457.74	Not surveyed: inaccessible due to construction activities				
MW-2	03-30-93	457.74	20.47	437.27	ND	NR	NR
MW-2	04-30-93	457.74	19.02	438.72	ND	NR	NR
MW-2	05-14-93	457.74	18.65	439.09	ND	NR	NR
MW-2	06-17-93	457.74	18.21	439.53	ND	NR	NR
MW-2	07-27-93	457.74	17.95	439.79	ND	NR	NR
MW-2	08-30-93	457.74	18.43	439.31	ND	NR	NR
MW-2	11-04-93	457.74	19.73	438.01	ND	NR	NR
MW-2	03-25-94	457.74	17.26	440.48	ND	NR	NR
MW-2	06-02-94	457.74	21.23	436.51	ND	NR	NR
MW-2	09-16-94	457.74	19.64	438.10	ND	N	0.014
MW-2	11-29-94	457.74	18.89	438.85	ND	N	0.025
MW-2	03-23-95	457.74	14.15	443.59	ND	NW	0.035
MW-2	05-31-95	457.74	14.67	443.07	ND	NNW	0.028
MW-2	08-31-95	457.74	17.24	440.50	ND	NNW	0.03

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-3	09-20-89	456.97	20.98	435.99	ND	NR	NR
MW-3	10-12-89	456.97	19.66	437.31	ND	NR	NR
MW-3	06-21-90	456.97	21.72	435.25	ND	NR	NR
MW-3	09-20-90	456.97	19.72	437.25	ND	NR	NR
MW-3	12-18-90	456.97	19.21	437.76	ND	NR	NR
MW-3	02-21-91	456.97	22.36	434.61	ND	NR	NR
MW-3	03-20-91	456.97	19.79	437.18	ND	NR	NR
MW-3	04-10-91	456.97	19.35	437.62	ND	NR	NR
MW-3	05-20-91	456.97	25.86	431.11	ND	NR	NR
MW-3	06-20-91	456.97	32.45	424.52	ND	NR	NR
MW-3	07-25-91	456.97	38.06	418.91	ND	NR	NR
MW-3	08-13-91	456.97	38.40	418.57	ND	NR	NR
MW-3	09-12-91	456.97	DRY	DRY	ND	DRY	DRY
MW-3	10-22-91	456.97	DRY	DRY	ND	DRY	DRY
MW-3	11-13-91	456.97	DRY	DRY	ND	DRY	DRY
MW-3	12-21-91	456.97	DRY	DRY	ND	DRY	DRY
MW-3	01-18-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	02-21-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	03-19-92	456.97	36.03	420.94	ND	NR	NR
MW-3	04-24-92	456.97	37.92	419.05	ND	NR	NR
MW-3	05-20-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	06-29-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	07-28-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	08-26-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	09-11-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	10-29-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	11-11-92	456.97	DRY	DRY	ND	DRY	DRY
MW-3	12-14-92	456.97	Not surveyed: inaccessible due to construction activities				
MW-3	01-27-93	456.97	30.36	426.61	ND	NR	NR
MW-3	02-26-93	456.97	24.96	432.01	ND	NR	NR
MW-3	03-30-93	456.97	21.45	435.52	ND	NR	NR
MW-3	04-30-93	456.97	19.43	437.54	ND	NR	NR
MW-3	05-14-93	456.97	19.37	437.60	ND	NR	NR
MW-3	06-17-93	456.97	19.38	437.59	ND	NR	NR
MW-3	07-27-93	456.97	20.10	436.87	ND	NR	NR
MW-3	08-30-93	456.97	20.98	435.99	ND	NR	NR
MW-3	11-04-93	456.97	20.91	436.06	ND	NR	NR
MW-3	03-25-94	456.97	17.57	439.40	ND	NR	NR
MW-3	06-02-94	456.97	21.30	435.67	ND	NR	NR
MW-3	09-16-94	456.97	20.03	436.94	ND	N	0.014
MW-3	11-29-94	456.97	19.13	437.84	ND	N	0.025
MW-3	03-23-95	456.97	14.13	442.84	ND	NW	0.035
MW-3	05-31-95	456.97	14.46	442.51	ND	NNW	0.028
MW-3	08-31-95	456.97	17.06	439.91	ND	NNW	0.03

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-4	02-21-91	456.55	22.01	434.54	ND	NR	NR
MW-4	03-20-91	456.55	20.31	436.24	ND	NR	NR
MW-4	04-10-91	456.55	19.55	437.00	ND	NR	NR
MW-4	05-20-91	456.55	25.24	431.31	ND	NR	NR
MW-4	06-20-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	07-25-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	08-13-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	09-12-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	10-22-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	11-13-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	12-21-91	456.55	DRY	DRY	ND	DRY	DRY
MW-4	01-18-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	02-21-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	03-19-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	04-24-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	05-20-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	06-29-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	07-28-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	08-26-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	09-11-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	10-29-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	11-11-92	456.55	DRY	DRY	ND	DRY	DRY
MW-4	12-14-92	456.55	Not surveyed: inaccessible due to construction activities				
MW-4	01-27-93	456.55	DRY	DRY	ND	DRY	DRY
MW-4	02-26-93	456.55	23.60	432.95	ND	NR	NR
MW-4	03-30-93	456.55	20.87	435.68	ND	NR	NR
MW-4	04-30-93	456.55	19.73	436.82	ND	NR	NR
MW-4	05-14-93	456.55	19.75	436.80	ND	NR	NR
MW-4	06-17-93	456.55	19.69	436.86	ND	NR	NR
MW-4	07-27-93	456.55	20.40	436.15	ND	NR	NR
MW-4	08-30-93	456.55	21.10	435.45	ND	NR	NR
MW-4	11-04-93	456.55	21.60	434.95	ND	NR	NR
MW-4	03-23-94	456.55	18.59	437.96	ND	NR	NR
MW-4	06-02-94	456.55	21.41	435.14	ND	NR	NR
MW-4	09-16-94	456.55	20.51	436.04	ND	N	0.014
MW-4	11-29-94	456.55	19.77	436.78	ND	N	0.025
MW-4	03-23-95	456.55	15.39	441.16	ND	NW	0.035
MW-4	05-31-95	456.55	15.32	441.23	ND	NNW	0.028
MW-4	08-31-95	456.55	17.86	438.69	ND	NNW	0.03

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	foot/foot
MW-5	06-29-92	455.84	50.53	405.31	ND	NR	NR
MW-5	07-28-92	455.84	54.92	400.92	ND	NR	NR
MW-5	08-26-92	455.84	59.58	396.26	ND	NR	NR
MW-5	09-11-92	455.84	60.88	394.96	ND	NR	NR
MW-5	10-29-92	455.84	DRY	DRY	ND	DRY	DRY
MW-5	11-11-92	455.84	DRY	DRY	ND	DRY	DRY
MW-5	12-14-92	455.84 Not surveyed: inaccessible due to construction activities					
MW-5	01-27-93	455.84	29.08	426.76	ND	NR	NR
MW-5	02-26-93	455.84	23.56	432.28	ND	NR	NR
MW-5	03-30-93	455.84	20.32	435.52	ND	NR	NR
MW-5	04-30-93	455.84	19.57	436.27	ND	NR	NR
MW-5	05-14-93	455.84	19.29	436.55	ND	NR	NR
MW-5	06-17-93	455.84	18.66	437.18	ND	NR	NR
MW-5	07-27-93	455.84	20.16	435.68	ND	NR	NR
MW-5	08-30-93	455.84 Not surveyed:					
MW-5	11-04-93	455.84	21.05	434.79	ND	NR	NR
MW-5	03-25-94	455.84	17.95	437.89	ND	NR	NR
MW-5	06-02-94	455.84	21.32	434.52	ND	NR	NR
MW-5	09-16-94	455.84	20.41	435.43	ND	N	0.014
MW-5	11-29-94	455.84	19.72	436.12	ND	N	0.025
MW-5	03-23-95	455.84	13.97	441.87	ND	NW	0.035
MW-5	05-31-95	455.84 Not surveyed: well was inaccessible					
MW-5	08-31-95	455.84 Not surveyed: well was inaccessible					

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	
		ft-MSL	feet	ft-MSL	feet	MWN		foot/foot
MW-6	06-29-92	454.93	49.72	405.21	ND	NR	NR	
MW-6	07-28-92	454.93	54.63	400.30	ND	NR	NR	
MW-6	08-26-92	454.93	59.45	395.48	ND	NR	NR	
MW-6	09-11-92	454.93	^60.73	^394.20	0.04	NR	NR	
MW-6	10-29-92	454.93	62.14	392.79	ND	NR	NR	
MW-6	11-11-92	454.93	^62.42	^392.51	0.03	NR	NR	
MW-6	12-14-92	454.93 Not surveyed: inaccessible due to construction activities						
MW-6	01-27-93	454.93 Not surveyed: inaccessible due to construction activities						
MW-6	02-26-93	454.93	22.73	432.20	ND	NR	NR	
MW-6	03-30-93	454.93	19.53	435.40	ND	NR	NR	
MW-6	04-30-93	454.93	18.76	436.17	ND	NR	NR	
MW-6	05-14-93	454.93	^19.19	^435.74	0.01	NR	NR	
MW-6	06-17-93	454.93	18.54	436.39	ND	NR	NR	
MW-6	07-27-93	454.93	19.47	435.46	ND	NR	NR	
MW-6	08-30-93	454.93	^20.33	^434.60	0.01	NR	NR	
MW-6	11-04-93	454.93	^20.33	^434.60	0.01	NR	NR	
MW-6	03-25-94	454.93	17.13	437.80	ND	NR	NR	
MW-6	06-02-94	454.93	20.45	434.48	ND	NR	NR	
MW-6	09-16-94	454.93	19.62	435.31	ND	N	0.014	
MW-6	11-29-94	454.93	18.89	436.04	ND	N	0.025	
MW-6	03-23-95	454.93	13.38	441.55	ND	NW	0.035	
MW-6	05-31-95	454.93	13.96	440.97	ND	NNW	0.028	
MW-6	08-31-95	454.93	16.71	438.22	ND	NNW	0.03	

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	
		ft-MSL	feet	ft-MSL	feet	MWN		foot/foot
MW-7	06-29-92	454.92	49.57	405.35	ND	NR	NR	
MW-7	07-28-92	454.92	54.60	400.32	ND	NR	NR	
MW-7	08-26-92	454.92	59.60	395.32	ND	NR	NR	
MW-7	09-11-92	454.92	60.74	394.18	ND	NR	NR	
MW-7	10-29-92	454.92	62.23	392.69	ND	NR	NR	
MW-7	11-11-92	454.92	62.69	392.23	ND	NR	NR	
MW-7	12-14-92	454.92 Not surveyed: inaccessible due to construction activities						
MW-7	01-27-93	454.92	27.97	426.95	ND	NR	NR	
MW-7	02-26-93	454.92	22.57	432.35	ND	NR	NR	
MW-7	03-30-93	454.92	19.29	435.63	ND	NR	NR	
MW-7	04-30-93	454.92	18.79	436.13	ND	NR	NR	
MW-7	05-14-93	454.92	18.35	436.57	ND	NR	NR	
MW-7	06-17-93	454.92	18.36	436.56	ND	NR	NR	
MW-7	07-27-93	454.92	19.49	435.43	ND	NR	NR	
MW-7	08-30-93	454.92	20.26	434.66	ND	NR	NR	
MW-7	11-04-93	454.92	20.33	434.59	ND	NR	NR	
MW-7	03-25-94	454.92	16.91	438.01	ND	NR	NR	
MW-7	06-02-94	454.92	20.31	434.61	ND	NR	NR	
MW-7	09-16-94	454.92	19.47	435.45	ND	N	0.014	
MW-7	11-29-94	454.92	18.73	436.19	ND	N	0.025	
MW-7	03-23-95	454.92	13.29	441.63	ND	NW	0.035	
MW-7	05-31-95	454.92	13.72	441.20	ND	NNW	0.028	
MW-7	08-31-95	454.92	16.53	438.39	ND	NNW	0.03	

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	
		ft-MSL	feet	ft-MSL	feet	MWN		foot/foot
MW-8	06-29-92	456.97	50.40	406.57	ND	NR	NR	
MW-8	07-28-92	456.97	55.79	401.18	ND	NR	NR	
MW-8	08-26-92	456.97	60.79	396.18	ND	NR	NR	
MW-8	09-11-92	456.97	61.97	395.00	ND	NR	NR	
MW-8	10-29-92	456.97	63.51	393.46	ND	NR	NR	
MW-8	11-11-92	456.97	64.21	392.76	ND	NR	NR	
MW-8	12-14-92	456.97	Not surveyed: inaccessible due to construction activities					
MW-8	01-27-93	456.97	25.57	431.40	ND	NR	NR	
MW-8	02-26-93	456.97	19.86	437.11	ND	NR	NR	
MW-8	03-30-93	456.97	16.69	440.28	ND	NR	NR	
MW-8	04-30-93	456.97	15.83	441.14	ND	NR	NR	
MW-8	05-14-93	456.97	15.79	441.18	ND	NR	NR	
MW-8	06-17-93	456.97	15.79	441.18	ND	NR	NR	
MW-8	07-27-93	456.97	16.80	440.17	ND	NR	NR	
MW-8	08-30-93	456.97	17.37	439.60	ND	NR	NR	
MW-8	11-04-93	456.97	17.60	439.37	ND	NR	NR	
MW-8	03-25-94	456.97	15.04	441.93	ND	NR	NR	
MW-8	06-02-94	456.97	18.43	438.54	ND	NR	NR	
MW-8	09-16-94	456.97	17.02	439.95	ND	N	0.014	
MW-8	11-29-94	456.97	16.83	440.14	ND	N	0.025	
MW-8	03-23-95	456.97	11.55	445.42	ND	NW	0.035	
MW-8	05-31-95	456.97	12.37	444.60	ND	NNW	0.028	
MW-8	08-31-95	456.97	15.68	441.29	ND	NNW	0.03	

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	
		ft-MSL	feet	ft-MSL	feet	MWN		foot/foot
MW-9	06-29-92	456.18	50.29	405.89	ND	NR	NR	
MW-9	07-28-92	456.18	55.53	400.65	ND	NR	NR	
MW-9	08-26-92	456.18	60.62	395.56	ND	NR	NR	
MW-9	09-11-92	456.18	61.67	394.51	ND	NR	NR	
MW-9	10-29-92	456.18	63.17	393.01	ND	NR	NR	
MW-9	11-11-92	456.18	63.68	392.50	ND	NR	NR	
MW-9	12-14-92	456.18 Not surveyed: inaccessible due to construction activities						
MW-9	01-27-93	456.18	26.48	429.70	ND	NR	NR	
MW-9	02-26-93	456.18 Not surveyed: inaccessible due to construction activities						
MW-9	03-30-93	456.18	17.77	438.41	ND	NR	NR	
MW-9	04-30-93	456.18	17.01	439.17	ND	NR	NR	
MW-9	05-14-93	456.18	16.55	439.63	ND	NR	NR	
MW-9	06-17-93	456.18	16.68	439.50	ND	NR	NR	
MW-9	07-27-93	456.18	17.77	438.41	ND	NR	NR	
MW-9	08-30-93	456.18	18.74	437.44	ND	NR	NR	
MW-9	11-04-93	456.18	18.72	437.46	ND	NR	NR	
MW-9	03-25-94	456.18	15.78	440.40	ND	NR	NR	
MW-9	06-02-94	456.18	19.03	437.15	ND	NR	NR	
MW-9	09-16-94	456.18	17.84	438.34	ND	N	0.014	
MW-9	11-29-94	456.18	17.32	438.86	ND	N	0.025	
MW-9	03-23-95	456.18	13.18	443.00	ND	NW	0.035	
MW-9	05-31-95	456.18	12.66	443.52	ND	NNW	0.028	
MW-9	08-31-95	456.18	14.40	441.78	ND	NNW	0.03	
MW-10	03-30-93	456.85	21.33	435.52	ND	NR	NR	
MW-10	04-30-93	456.85	20.51	436.34	ND	NR	NR	
MW-10	05-14-93	456.85	20.26	436.59	ND	NR	NR	
MW-10	06-17-93	456.85	20.30	436.55	ND	NR	NR	
MW-10	07-27-93	456.85	20.29	436.56	ND	NR	NR	
MW-10	08-30-93	456.85	22.19	434.66	ND	NR	NR	
MW-10	11-04-93	456.85	22.11	434.74	ND	NR	NR	
MW-10	03-25-94	456.85	18.84	438.01	ND	NR	NR	
MW-10	06-02-94	456.85	22.40	434.45	ND	NR	NR	
MW-10	09-16-94	456.85	21.25	435.60	ND	N	0.014	
MW-10	11-29-94	456.85	20.50	436.35	ND	N	0.025	
MW-10	03-23-95	456.85	14.86	441.99	ND	NW	0.035	
MW-10	05-31-95	456.85	15.63	441.22	ND	NNW	0.028	
MW-10	08-31-95	456.85	14.40	442.45	ND	NNW	0.03	

Table 2
Historical Groundwater Elevation Data

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient
		ft-MSL	feet	ft-MSL	feet	MWN	
MW-11	03-30-93	455.07	20.78	434.29	ND	NR	NR
MW-11	04-30-93	455.07	20.71	434.36	ND	NR	NR
MW-11	05-14-93	455.07	20.01	435.06	ND	NR	NR
MW-11	06-17-93	455.07	20.18	434.89	ND	NR	NR
MW-11	07-27-93	455.07	21.31	433.76	ND	NR	NR
MW-11	08-30-93	455.07	21.09	433.98	ND	NR	NR
MW-11	11-04-93	455.07	21.40	433.67	ND	NR	NR
MW-11	03-25-94	455.07	18.28	436.79	ND	NR	NR
MW-11	06-02-94	455.07	21.78	433.29	ND	NR	NR
MW-11	09-16-94	455.07	20.98	434.09	ND	N	0.014
MW-11	11-29-94	455.07	20.67	434.40	ND	N	0.025
MW-11	03-23-95	455.07	17.34	437.73	ND	NW	0.035
MW-11	05-31-95	455.07	16.68	438.39	ND	NNW	0.028
MW-11	08-31-95	455.07	20.20	434.87	ND	NNW	0.03
MW-12	03-30-93	455.04	21.33	433.71	ND	NR	NR
MW-12	04-30-93	455.04	20.23	434.81	ND	NR	NR
MW-12	05-14-93	455.04	19.97	435.07	ND	NR	NR
MW-12	06-17-93	455.04	20.00	435.04	ND	NR	NR
MW-12	07-27-93	455.04	20.94	434.10	ND	NR	NR
MW-12	08-30-93	455.04	21.79	433.25	ND	NR	NR
MW-12	11-04-93	455.04	21.95	433.09	ND	NR	NR
MW-12	03-25-94	455.04	18.74	436.30	ND	NR	NR
MW-12	06-02-94	455.04	22.21	432.83	ND	NR	NR
MW-12	09-16-94	455.04	21.62	433.42	ND	N	0.014
MW-12	11-29-94	455.04	20.82	434.22	ND	N	0.025
MW-12	03-23-95	455.04	15.54	439.50	ND	NW	0.035
MW-12	05-31-95	455.04	15.66	439.38	ND	NNW	0.028
MW-12	08-31-95	455.04	18.23	436.81	ND	NNW	0.03

ft-MSL: elevation in feet, relative to mean sea level

MWN: ground-water flow direction and gradient apply to the entire monitoring well network

ND: none detected

NR: not reported; data not available

DRY: dry well; groundwater was not detected

N: north

NW: northwest

NNW: north-northwest

^: groundwater elevation (GWE) and depth to water (DTW) adjusted to include 80 percent of the floating product thickness (FPT):

$$[GWE: (TOC - DTW) + (FPT \times 0.8)]$$

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHC LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L	TRPH EPA 418.1 µg/L	TPHD LUFT Method µg/L
MW-1	09-20-89	80	3	1	0.7	1	--	--	<5000	<50
MW-1	06-21-90	<20	<0.5	0.66	<0.5	<0.5	--	--	13000	<100
MW-1	09-20-90	<50	<0.5	1	<0.5	1.8	--	--	<5000	<50
MW-1	12-18-90	<50	<0.5	1.8	<0.5	1.7	--	--	--	<5000
MW-1	02-21-91	<50	1.2	2.3	<0.5	2.2	--	--	--	<5000
MW-1	05-20-91	<30	<0.3	<0.3	<0.3	<0.3	--	--	--	<75000
MW-1	08-13-91	Not sampled: dry well								
MW-1	11-13-91	Not sampled: dry well								
MW-1	03-19-92	400	<3.5	<1.2	<0.8	<1.0	--	--	--	--
MW-1	06-29-92	Not sampled: dry well								
MW-1	09-11-92	Not sampled: dry well								
MW-1	11-12-92	Not sampled: dry well								
MW-1	03-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-1	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	120000	--
MW-1	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	900	--
MW-1	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	2900	--
MW-1	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	<600	--
MW-1	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	<500	--
MW-1	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	<500	--
MW-1	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	<500	--
MW-1	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-1	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-1	08-31-95	Not sampled: not scheduled for chemical analysis								

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113

785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHC	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
		LUFT Method	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240	EPA 418.1	LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-2	09-20-89	<50	<0.5	<0.5	<0.5	1	--	--	<5000	<50
MW-2	06-21-90	<20	<0.5	<0.5	<0.5	<0.5	--	--	<5000	<100
MW-2	09-20-90	<50	<0.5	0.7	<0.5	1.4	--	--	<5000	<50
MW-2	12-18-90	<50	0.6	1.5	<0.5	1.9	--	--	<5000	--
MW-2	02-21-91	<50	<0.5	<0.5	<0.5	<0.5	--	--	<5000	--
MW-2	05-20-91	<30	<0.3	<0.3	<0.3	<0.3	--	--	<75000	--
MW-2	08-13-91	Not sampled: dry well								
MW-2	11-13-91	Not sampled: dry well								
MW-2	03-19-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	06-29-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	09-11-92	Not sampled: dry well								
MW-2	11-12-92	Not sampled: dry well								
MW-2	03-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-2	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-2	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-2	08-31-95	Not sampled: not scheduled for chemical analysis								

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
		LUFT Method	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240	EPA 418.1	LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	09-20-89	170	8.9	0.6	1.1	<1	--	--	<5000	<50
MW-3	06-21-90	<20	<0.5	1	<0.5	<0.5	--	--	10000	<100
MW-3	09-20-90	<50	<0.5	1	<0.5	1.9	--	--	<5000	<50
MW-3	12-18-90	<50	<0.5	1.7	<0.5	2	--	--	<5000	--
MW-3	02-21-91	<50	<0.5	<0.5	<0.5	<0.5	--	--	<5000	--
MW-3	05-20-91	97	1.3	1.1	6.2	8.4	--	--	<75000	--
MW-3	08-13-91	Not sampled: dry well								
MW-3	11-13-91	Not sampled: dry well								
MW-3	03-19-92	220	<1.1	<1.9	<0.6	<0.8	--	--	<5000	<50
MW-3	06-29-92	Not sampled: dry well								
MW-3	09-11-92	Not sampled: dry well								
MW-3	11-12-92	Not sampled: dry well								
MW-3	03-30-93	200*	<4.0	<0.5	<0.5	<0.5	--	--	--	--
MW-3	05-14-93	72*	<3.0	<0.5	<0.5	<0.5	--	--	--	--
MW-3	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-3	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-3	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-3	08-31-95	Not sampled: not scheduled for chemical analysis								

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TRPH EPA 418.1	TPHD LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-4	02-21-91	3500	410	7.6	30	47	--	--	<5000	--
MW-4	05-20-91	1400	150	6	4.4	3.1	--	--	<75000	--
MW-4	08-13-91	Not sampled: dry well								
MW-4	11-13-91	Not sampled: dry well								
MW-4	03-19-92	Not sampled: dry well								
MW-4	06-29-92	Not sampled: dry well								
MW-4	09-11-92	Not sampled: dry well								
MW-4	11-12-92	Not sampled: dry well								
MW-4	03-31-93	680	110	5.2	3	7.4	--	--	--	--
MW-4	05-14-93	1200	200	6.2	15	9.2	--	--	--	--
MW-4	08-30-93	620	22	0.9	3.6	2.1	--	--	--	--
MW-4	11-04-93	320	11	<0.5	1.3	0.9	--	--	--	--
MW-4	03-25-94	480	5.4	<0.5	1.6	1.7	--	--	--	--
MW-4	06-02-94	270	4.2	<0.5	1	<1.7	--	--	--	--
MW-4	09-16-94	250	1	<0.5	<0.6	<1	--	--	--	--
MW-4	11-29-94	280	1.8	<0.5	<1.2	<0.8	--	--	--	--
MW-4	03-23-95	210	2.1	0.6	0.8	2.1	--	--	--	--
MW-4	05-31-95	190	1.6	<0.5	0.7	0.9	--	--	--	--
MW-4	08-31-95	160	1.2	0.7	<0.5	<2	<3	--	--	--
MW-5	06-29-92	8900	1700	640	310	1100	--	--	--	--
MW-5	09-11-92	13000	2200	1500	130	930	--	--	--	--
MW-5	11-12-92	Not sampled: dry well								
MW-5	03-31-93	9700	1700	430	220	880	--	--	--	--
MW-5	05-14-93	9800	1300	820	270	1100	--	--	--	--
MW-5	08-30-93	Not sampled: well inaccessible								
MW-5	11-04-93	41000	3500	3100	890	5400	--	--	--	--
MW-5	03-25-94	780	36	1.5	4.8	5.7	--	--	--	--
MW-5	06-02-94	500	25	7.4	6	33	--	--	--	--
MW-5	09-16-94	1500	370	28	110	120	--	--	--	--
MW-5	11-29-94	1100	280	11	82	31	--	--	--	--
MW-5	03-23-95	68	4.2	3.4	2.3	12	--	--	--	--
MW-5	05-31-95	Not sampled: well was inaccessible								
MW-5	08-31-95	Not sampled: well was inaccessible								

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
		LUFT Method	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240	EPA 418.1	LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-6	06-29-92	8600	1800	460	52	450	--	--	--	--
MW-6	09-11-92	Not sampled: well contained floating product								
MW-6	11-12-92	Not sampled: well contained floating product								
MW-6	03-31-93	Not sampled: well contained floating product								
MW-6	05-14-93	Not sampled: well contained floating product								
MW-6	08-30-93	Not sampled: well contained floating product								
MW-6	11-04-93	Not sampled: well contained floating product								
MW-6	03-25-94	530	<2.5	<2.5	<2.5	4.6	--	--	--	--
MW-6	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-6	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-6	11-29-94	<50	1.3	<0.5	<0.5	<0.5	--	--	--	--
MW-6	03-23-95	<50	1.5	<0.5	<0.5	0.9	--	--	--	--
MW-6	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-6	08-31-95	150	9	1.8	4	12	<3	--	--	--
MW-7	06-29-92	270	38	3.7	1.1	4.4	--	--	--	--
MW-7	09-11-92	420	20	0.7	<0.5	<0.5	--	--	--	--
MW-7	11-12-92	470	31	1	<0.5	0.8	--	--	--	--
MW-7	03-31-93	190	20	1	<0.5	<0.5	--	--	--	--
MW-7	05-14-93	170	17	0.6	<0.5	0.5	--	--	--	--
MW-7	08-30-93	<50	1.8	<0.5	<0.5	0.5	--	--	--	--
MW-7	11-04-93	<50	6.6	<0.5	<0.5	0.8	--	--	--	--
MW-7	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	03-23-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	08-31-95	<50	<0.5	<0.5	<0.5	1.2	<3	--	--	--

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
		LUFT Method	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240	EPA 418.1	LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-8	06-29-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	<500	<50
MW-8	09-11-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	<500	<50
MW-8	11-12-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	03-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-8	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-8	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-8	08-31-95	Not sampled: not scheduled for chemical analysis								
MW-9	06-29-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	09-11-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	11-12-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	03-31-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-9	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-9	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-9	08-31-95	Not sampled: not scheduled for chemical analysis								

Table 3
 Historical Groundwater Analytical Data
 Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
			EPA 8020 µg/L	EPA 8020 µg/L	EPA 8020 µg/L	EPA 8020 µg/L	EPA 8020 µg/L	EPA 8240 µg/L	EPA 418.1 µg/L	LUFT Method µg/L
MW-10	03-31-93	230*	<0.5	<0.5	<1	0.6	--	--	--	--
MW-10	05-14-93	440*	<10	<0.6	<0.9	<0.5	--	--	--	--
MW-10	08-30-93	280*	<4	<0.5	<1.3	0.6	--	--	--	--
MW-10	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-10	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-10	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-10	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-10	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-10	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-10	05-31-95	Not sampled: not scheduled for chemical analysis								
MW-10	08-31-95	Not sampled: not scheduled for chemical analysis								
MW-11	03-31-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-11	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-11	08-31-95	Not sampled: not scheduled for chemical analysis								

Table 3
Historical Groundwater Analytical Data
Petroleum Hydrocarbons and Their Constituents

ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California

Date: 11-28-95

Well Designation	Water Sample Field Date	TPHG	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	MTBE	TRPH	TPHD
		LUFT Method	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8240	EPA 418.1	LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-12	03-31-93	150	20	<0.5	<0.5	<0.5	--	--	--	--
MW-12	05-14-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	08-30-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	11-04-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	03-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	06-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	09-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	11-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	03-23-95	Not sampled: not scheduled for chemical analysis								
MW-12	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-12	08-31-95	Not sampled: not scheduled for chemical analysis								

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
 µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl-tert-butyl ether

TRPH: total recoverable petroleum hydrocarbons

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

-- : not analyzed

*: chromatogram does not match the typical gasoline fingerprint

Table 4
Historical Groundwater Analytical Data
Volatile Organic Compounds (VOCs) and Metals

ARCO Service Station 6113

785 East Stanley Boulevard, Livermore, California

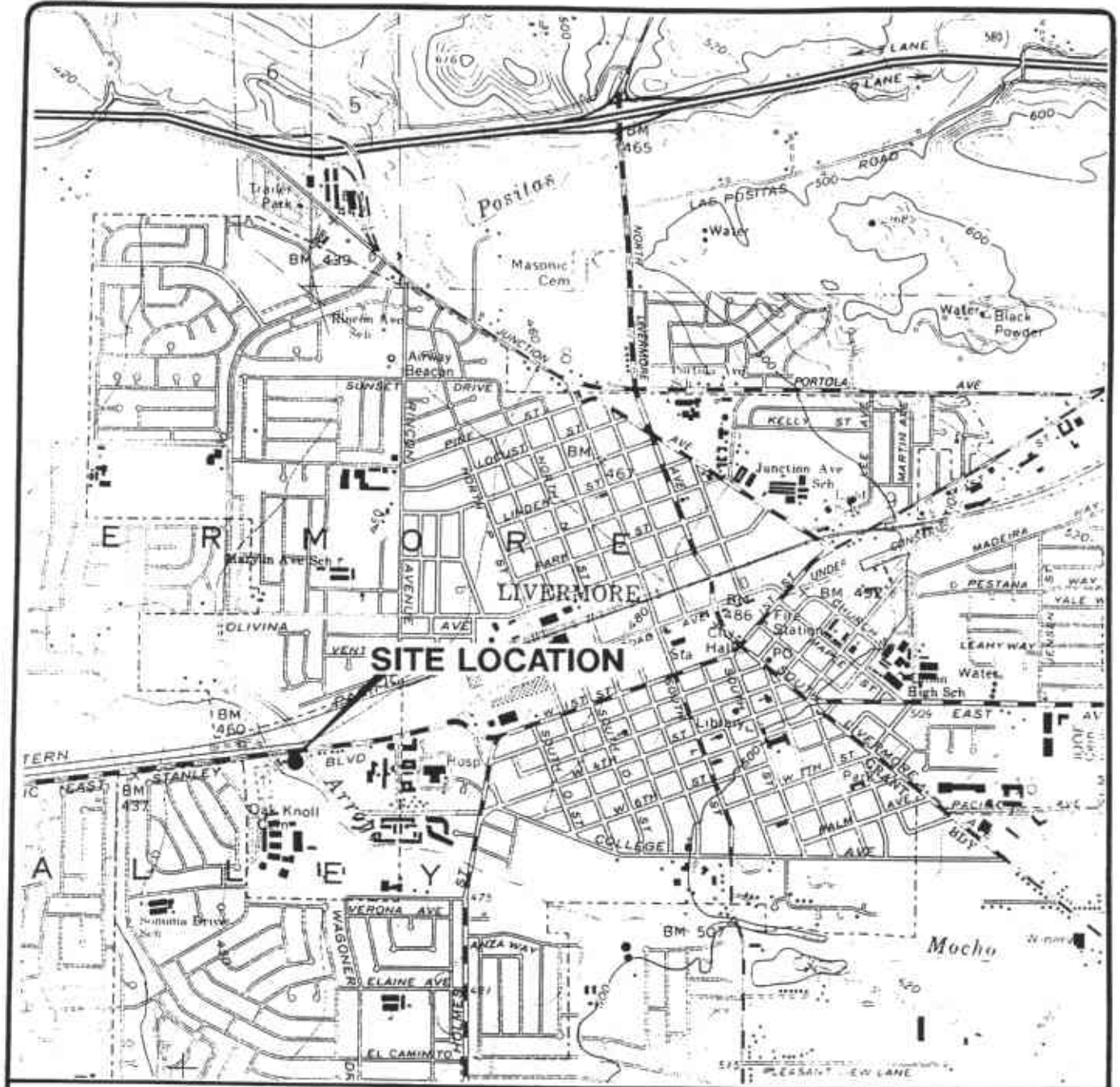
Date: 11-28-95

Well Designation	Water Sample Field Date	Total VOCs EPA 5030/601 µg/L	Cadmium EPA 6010 µg/L	Chromium EPA 6010 µg/L	Lead EPA 7421 µg/L	Zinc EPA 6010 µg/L	Nickel EPA 6010 µg/L
MW-1	09-20-89	Not analyzed: sampling for additional parameters was not initiated					
MW-2	09-20-89	Not analyzed: sampling for additional parameters was not initiated					
MW-3	09-20-89	Not analyzed: sampling for additional parameters was not initiated					
MW-4	02-21-91	Not analyzed: sampling for additional parameters was not initiated					
MW-5	06-29-92	Not analyzed: sampling for additional parameters was not initiated					
MW-6	06-29-92	Not analyzed: sampling for additional parameters was not initiated					
MW-7	06-29-92	Not analyzed: sampling for additional parameters was not initiated					
MW-8	06-29-92	ND	<3	1780	143	1310	5100
MW-8	09-11-92	--	13	3580	308	2620	10300
MW-8	11-12-92	--	28	3440	221	2550	9840
MW-8	03-30-93	Not analyzed: sampling for additional parameters was discontinued					
MW-9	06-29-92	--	--	--	--	--	--
MW-9	09-11-92	--	--	--	--	--	--
MW-9	11-12-92	--	10	1080	101	859	3070
MW-9	03-31-93	Not analyzed: sampling for additional parameters was discontinued					
MW-10	03-31-93	Not analyzed: sampling for additional parameters was not initiated					
MW-11	03-31-93	Not analyzed: sampling for additional parameters was not initiated					
MW-12	03-31-93	Not analyzed: sampling for additional parameters was not initiated					

µg/L: micrograms per liter

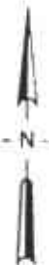
-- : not analyzed

ND: not detected (31 compounds tested for VOCs were nondetectable)



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

Scale : 0 2000 4000 Feet



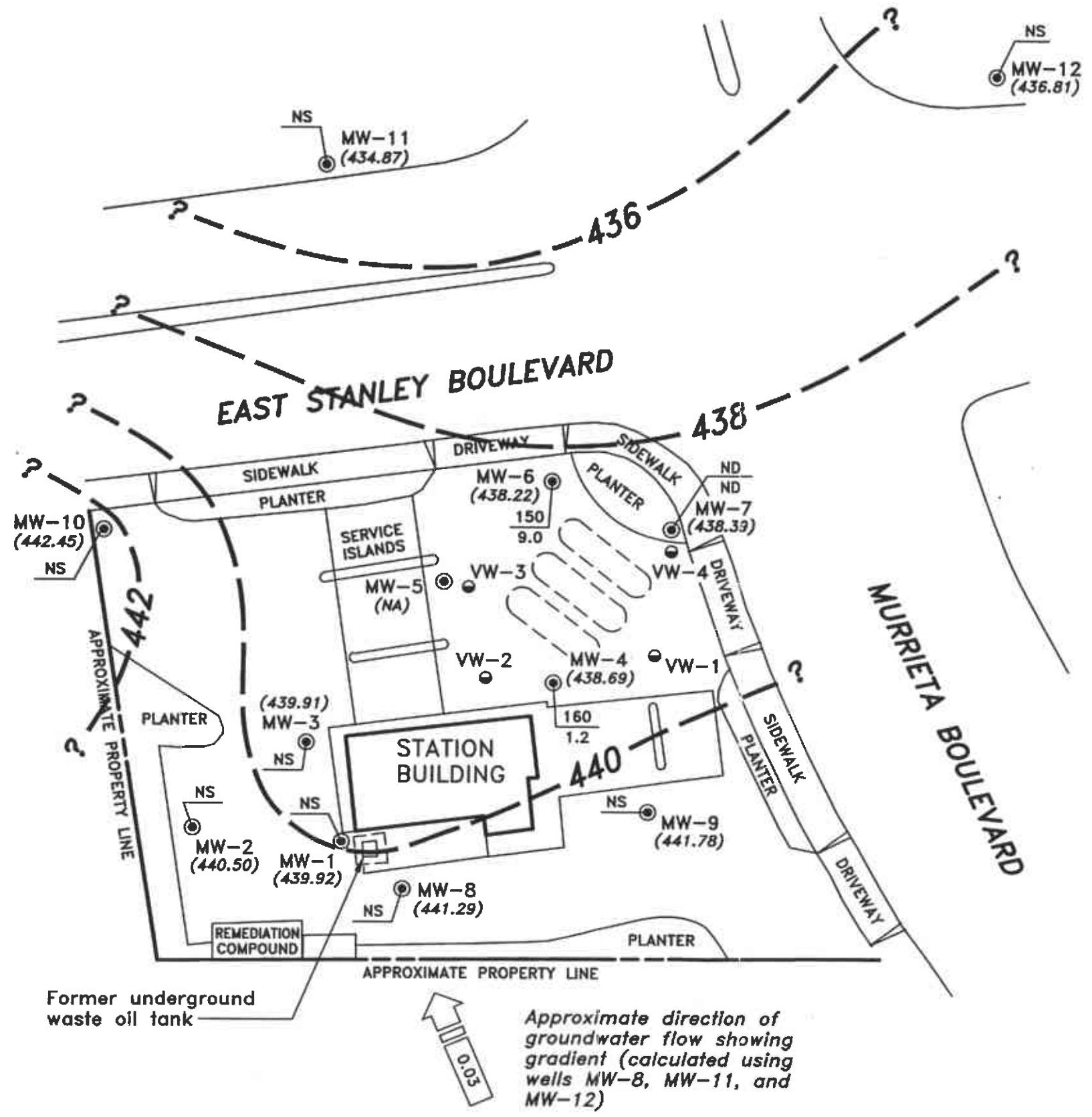
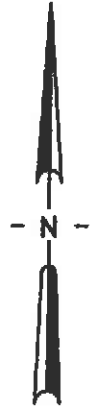
ARCO PRODUCTS COMPANY
SERVICE STATION 6113, 785 E. STANLEY BLVD.
QUARTERLY GROUNDWATER MONITORING
LIVERMORE, CALIFORNIA

SITE LOCATION

FIGURE

1

PROJECT NO.
805-134.02



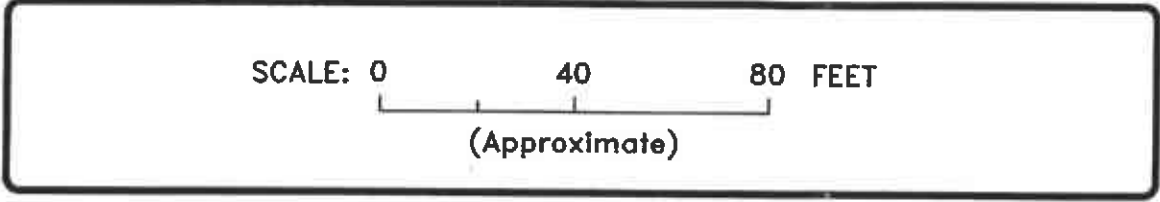
EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Existing underground gasoline storage tank
- (438.69) Groundwater elevation (Ft.-MSL) measured 8/31/95
- ? - - - Groundwater elevation contour (Ft.-MSL)
- 160 / 1.2 TPHG concentration in groundwater (ug/L); sampled 8/31/95
- 160 / 1.2 Benzene concentration in groundwater (ug/L); sampled 8/31/95
- NS Not sampled; not scheduled for chemical analysis
- ND Not detected at or above the method reporting limit for TPHG (50 ug/L) or benzene (0.5 ug/L)
- NA Not available; well was inaccessible

Former underground waste oil tank

Approximate direction of groundwater flow showing gradient (calculated using wells MW-8, MW-11, and MW-12)

Base map modified from RESNA, 1994.



ARCO PRODUCTS COMPANY
SERVICE STATION 6113, 785 E. STANLEY BLVD.
QUARTERLY GROUNDWATER MONITORING
LIVERMORE, CALIFORNIA
GROUNDWATER DATA
THIRD QUARTER 1995

FIGURE NO. **2**
PROJECT NO. 805-134.02

**FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : 1775-248.01

STATION ADDRESS : 785 East Stanley Blvd.

DATE : 8-31-95

ARCO STATION # : 6113

FIELD TECHNICIAN : Joe Williams

DAY : Thursday

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-1	OK	YES	OK	ARCO	OK	17.12	17.12	ND	ND	44.8	
2	MW-2	OK	YES	OK	ARCO	BAD	17.24	17.24	ND	ND	36.6	NEED NEW LWC
3	MW-3	OK	YES	OK	ARCO	OK	17.06	17.06	ND	ND	39.0	
4	MW-6	OK	YES	OK	ARCO	OK	16.71	16.71	ND	ND	65.7	
5	MW-7	BAD	YES	OK	3476	OK	16.69 16.53	16.63	ND	ND	67.6	WATER IN BOY
6	MW-8	OK	YES	OK	ARCO	OK	15.68	15.68	ND	ND	66.6	
7	MW-9	OK	YES	OK	ARCO	OK	14.40	14.40	ND	ND	67.9	
8	MW-10	OK	YES	OK	ARCO	OK	14.40	14.40	ND	ND	49.6	
9	MW-11	OK	YES	OK	ARCO	OK	20.20	20.20	ND	ND	44.5	
10	MW-12	OK	YES	OK	ARCO	OK	18.23	18.23	ND	ND	32.7	
11	MW-4	OK	YES	OK	ARCO	OK	17.86	17.86	ND	ND	26.7	
12	MW-5	BAB	YES	OK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NUT STRAP

SURVEY POINTS ARE TOP OF WELL CASINGS



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

PROJECT NO: 1775-248-08
PURGED BY: J WILLIAMS
SAMPLED BY: J WILLIAMS

SAMPLE ID: MW-4 (26)
CLIENT NAME: ARCO 6113
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.): 5.77
DEPTH TO WATER (feet): 17.86 CALCULATED PURGE (gal.): 17.32
DEPTH OF WELL (feet): 26.7 ACTUAL PURGE VOL. (gal.): 18

DATE PURGED: 08-31-95 Start (2400 Hr) 1457 End (2400 Hr) 1511
DATE SAMPLED: 08-31-95 Start (2400 Hr) End (2400 Hr) 1515

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. ($\mu\text{mhos/cm @ } 25^\circ\text{C}$)	TEMPERATURE ($^\circ\text{F}$)	COLOR (visual)	TURBIDITY (visual)
<u>1502</u>	<u>6</u>	<u>6.78</u>	<u>653</u>	<u>69.9</u>	<u>GRAY</u>	<u>HEAVY</u>
<u>1506</u>	<u>12</u>	<u>6.79</u>	<u>665</u>	<u>68.0</u>	<u>GRAY</u>	<u>HEAVY</u>
<u>1511</u>	<u>18</u>	<u>6.83</u>	<u>667</u>	<u>67.7</u>	<u>GRAY</u>	<u>HEAVY</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
D. O. (ppm): <u>NA</u>	ODOR: <u>STRONG</u>	_____	_____	_____	_____	_____
Field QC samples collected at this well: <u>NA</u>	Parameters field filtered at this well: <u>NA</u>	_____	_____	_____	(COBALT 0 - 500)	(NTU 0 - 200 or 0 - 1000)

PURGING EQUIPMENT

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

Other: _____

SAMPLING EQUIPMENT

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

Other: _____

WELL INTEGRITY: OK LOCK #: ARCO

REMARKS: _____

Meter Calibration: Date: _____ Time: _____ Meter Serial #: _____ Temperature $^\circ\text{F}$: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
Location of previous calibration: MW-6

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



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-248-01
PURGED BY: S WILLIAM
SAMPLED BY: L

SAMPLE ID: M/W-5
CLIENT NAME: ARGO 6113
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): _____ VOLUME IN CASING (gal.): _____
DEPTH TO WATER (feet): NA CALCULATED PURGE (gal.): _____
DEPTH OF WELL (feet): NA ACTUAL PURGE VOL. (gal.): _____

DATE PURGED: 8-31-95 Start (2400 Hr) _____ End (2400 Hr) _____
DATE SAMPLED: 8-31-95 Start (2400 Hr) _____ End (2400 Hr) _____

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
_____	_____	<u>NO SAMPLES</u>				_____
_____	_____					_____
_____	_____					_____
_____	_____					_____
_____	_____					_____
D. O. (ppm): <u>NA</u>	ODOR: <u>NA</u>	(COBALT 0 - 500)	(NTU 0 - 200 or 0 - 1000)			
Field QC samples collected at this well: <u>NA</u>	Parameters field filtered at this well: <u>NA</u>					

- | PURGING EQUIPMENT | | SAMPLING EQUIPMENT | |
|---|---|--|---|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: BAD NUT STRIP LOCK #: None

REMARKS: _____

Meter Calibration: Date: 8-31-95 Time: _____ Meter Serial #: _____ Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)

Location of previous calibration: MW-6

Signature: [Signature] Reviewed By: SA Page 2 of 4



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

Rev. 3, 2/94

PROJECT NO: 1775-248-01
PURGED BY: J WILLIAMS
SAMPLED BY: J WILLIAMS

SAMPLE ID: MW-6 (65)
CLIENT NAME: ARCO 6113
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.): 32.00
DEPTH TO WATER (feet): 16.71 CALCULATED PURGE (gal.): 96.02
DEPTH OF WELL (feet): 65.7 ACTUAL PURGE VOL (gal.): 96.5

DATE PURGED: 08-31-95 Start (2400 Hr) 1313 End (2400 Hr) 1347
DATE SAMPLED: 08-31-95 Start (2400 Hr) — End (2400 Hr) 1345

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1327</u>	<u>32.5</u>	<u>7.00</u>	<u>774</u>	<u>69.0</u>	<u>CLEAR</u>	<u>TRACE</u>
<u>1338</u>	<u>64.5</u>	<u>7.02</u>	<u>773</u>	<u>69.0</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1347</u>	<u>96.5</u>	<u>7.02</u>	<u>775</u>	<u>69.0</u>	<u>CLEAR</u>	<u>CLEAR</u>
—	—	—	—	—	—	—
—	—	—	—	—	—	—

D. O. (ppm): NR ODOR: SLIGHT NR NR
Field QC samples collected at this well: NR Parameters field filtered at this well: NR
(COBALT 0 - 500) (NTU 0 - 200 or 0 - 1000)

PURGING EQUIPMENT

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

Other: _____

SAMPLING EQUIPMENT

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

Other: _____

WELL INTEGRITY: OK LOCK #: ARCO

REMARKS: _____

Meter Calibration: Date: 8-31-95 Time: 1255 Meter Serial #: 9020 Temperature °F: 75.8
(EC 1000 7.66 / 10.00) (DI _____) (pH 7 6.95 / 7.00) (pH 10 9.99 / 10.00) (pH 4 3.99 / —)
Location of previous calibration: _____

Signature: [Signature] Reviewed By: [Signature] Page 3 of 4



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-248-08
 PURGED BY: J WILLIAMS
 SAMPLED BY: J WILLIAMS

SAMPLE ID: MW-7 (67)
 CLIENT NAME: ARCO 6113
 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.): 33.36
 DEPTH TO WATER (feet): 165.3 CALCULATED PURGE (gal.): 100.09
 DEPTH OF WELL (feet): 67.4 ACTUAL PURGE VOL. (gal.): 106.5

DATE PURGED: 08-31-95 Start (2400 Hr) 1406 End (2400 Hr) 1440
 DATE SAMPLED: 08-31-95 Start (2400 Hr) _____ End (2400 Hr) 1443

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1418</u>	<u>33.5</u>	<u>6.97</u>	<u>775</u>	<u>70.4</u>	<u>CLEAR</u>	<u>TRACE</u>
<u>1429</u>	<u>67</u>	<u>6.95</u>	<u>780</u>	<u>69.5</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1440</u>	<u>100.5</u>	<u>6.94</u>	<u>778</u>	<u>69.0</u>	<u>CLEAR</u>	<u>CLEAR</u>
_____	_____	_____	_____	_____	_____	_____

D. O. (ppm): NR ODOR: None _____
 Field QC samples collected at this well: NR Parameters field filtered at this well: NR
(COBALT 0 - 500) (NTU 0 - 200 or 0 - 1000)

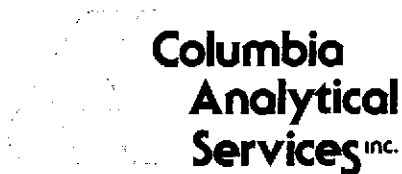
- | PURGING EQUIPMENT | | SAMPLING EQUIPMENT | |
|--|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input checked="" type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: WATER IN BOX LOCK #: 3476

REMARKS: _____

Meter Calibration: Date: _____ Time: _____ Meter Serial #: _____ Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
 Location of previous calibration: MW-6

Signature: [Signature] Reviewed By: SJA Page 4 of 4



September 18, 1995

Service Request No: S9501090

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **0805-134.02 / TO# 17075.00 / 6113 Livermore**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on September 1, 1995. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above - to help expedite our service please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 8, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

Please feel welcome to contact me should you have questions or further needs.

Sincerely:

A handwritten signature in black ink, appearing to read "Steven L. Green".

Steven L. Green
Project Chemist

A handwritten signature in black ink, appearing to read "Annelise J. Bazar".

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: ARCO Products Company
Project: 0805-134.02 / TO# 17075.00 /6113 Oakland
Sample Matrix: Water

Service Request: S951090
Date Collected: 8/31/95
Date Received: 9/1/95
Date Extracted: NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

Sample Name:	MW-6 (65)	MW-7 (67)	MW-4 (26)
Lab Code:	S951090-001	S951090-002	S951090-003
Date Analyzed:	9/9/95	9/9/95	9/9/95

Analyte	MRL			
TPH as Gasoline	50	150	ND	160
Benzene	0.5	9.0	ND	1.2
Toluene	0.5	1.8	ND	0.7
Ethylbenzene	0.5	4.0	ND	ND
Total Xylenes	0.5	12	1.2	<2 *
Methyl-tert-butyl ether	3	ND	ND	ND

* Raised MRL due to matrix interference.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 0805-134.02 / TO# 17075.00 /6113 Oakland
Sample Matrix: Water

Service Request: S951090
Date Collected: 8/31/95
Date Received: 9/1/95
Date Extracted: NA

BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ug/L (ppb)

Sample Name: Method Blank
Lab Code: S950908-WB
Date Analyzed: 9/8/95

Analyte	MRL	
TPH as Gasoline	50	ND
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
Methyl-tert-butyl ether	3	ND

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-134.02 / TO# 17075.00 /6113 Oakland
Sample Matrix: Water

Service Request: S951090
Date Collected: 8/31/95
Date Received: 9/1/95
Date Extracted: NA
Date Analyzed: 9/8,9/95

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

Sample Name	Lab Code	Percent Recovery
		α,α,α -Trifluorotoluene
MW-6 (65)	S951090-001	101
MW-7 (67)	S951090-002	98
MW-4 (26)	S951090-003	100
MS	S951078-005MS	104
DMS	S951078-005DMS	106
Method Blank	S950908-WB	94

CAS Acceptance Limits: 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-134.02 / TO# 17075.00 /6113 Oakland

Service Request: S951090
Date Analyzed: 9/8/95

Initial Calibration Verification (ICV) Summary
BTEX, MTBE and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	24.2	97	85-115
Toluene	25	24.1	96	85-115
Ethylbenzene	25	23.9	96	85-115
Xylenes, Total	75	72.1	96	85-115
Gasoline	250	246	98	90-110
Methyl-tert-butyl Ether	50	51.1	102	85-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-134.02 / TO# 17075.00 /6113 Oakland
Sample Matrix: Water

Service Request: S951090
Date Collected: 8/31/95
Date Received: 9/1/95
Date Extracted: NA
Date Analyzed: 9/8,9/95

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

Sample Name: Batch QC
Lab Code: S951078-005

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery			Relative Percent Difference
	MS	DMS		MS	DMS	MS	DMS	CAS Acceptance Limits	
Gasoline	250	250	ND	241	248	96	99	67-121	3

