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

Date June 18, 1996
Project 20805-122.003

To:

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

We are enclosing:

Copies	Description
1	First quarter 1996 groundwater monitoring results and remediation system performance evaluation report for ARCO service station 771, Livermore, California

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

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.

John C. Young
Project Manager

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

ARCO Products Company

Date: June 18, 1996

Re: ARCO Station # 771 • 899 Rincon Avenue • Livermore, CA
First Quarter 1996 Groundwater Monitoring Results 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

Michael R. Whelan
Environmental Engineer

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

June 4, 1996
Project 20805-122.003

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

Re: First quarter 1996 groundwater monitoring program results and remediation system performance evaluation report, ARCO service station 771, Livermore, California

Dear Mr. Whelan:

This letter presents the results of the first quarter 1996 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) and air-bubbling systems are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

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.

Please call if you have questions.

Sincerely,

EMCON

Sailaja Yelamanchili
Staff Engineer

John C. Young, R.G. 6407
Project Manager

REGISTERED GEOLOGIST
JOHN CHARLES YOUNG
Exp 7/96
NO. 6407
STATE OF CALIFORNIA

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June 4, 1996

ARCO QUARTERLY REPORT

Station No.: 771	Address: 899 Rincon Avenue, Livermore, California
EMCON Project No.	20805-122.003
ARCO Environmental Engineer/Phone No.:	Michael Whelan /(408) 453-1640
EMCON Project Manager/Phone No.:	John C. Young /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Susan Hugo
Reporting Period:	January 1, 1996 to April 1, 1996

WORK PERFORMED THIS QUARTER (First- 1996):

1. Conducted quarterly groundwater monitoring and sampling.
2. Prepared and submitted quarterly report for fourth quarter 1995.
3. Operation of air-bubbling system.

WORK PROPOSED FOR NEXT QUARTER (Second- 1996):

1. Perform quarterly groundwater monitoring and sampling.
2. Continue operation of air-bubbling system.
3. Prepare and submit quarterly report for first quarter 1996.
4. Discontinue TRPH analysis in well MW-6. Based on historical TRPH results, it appears that samples from this well contain lower boiling point hydrocarbons, possibly gasoline.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring and Operation and Maintenance of Remediation Systems Soil Vapor Extraction (SVE) system was shut down on 10-10-95, but air bubbling system pulses hourly.
Frequency of Sampling:	Quarterly (groundwater)
Frequency of Monitoring:	Quarterly (groundwater), Monthly (air-bubbling system)
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Cumulative FP Recovered to Date :	3.06 gallons, Wells MW-1, MW-2, and MW-5
FP Recovered This Quarter :	None (FP was last recovered in 1992.)
Bulk Soil Removed to Date :	1,700 cubic yards of TPH-impacted soil
Bulk Soil Removed This Quarter :	None
Water Wells or Surface Waters within 2000 ft., impacted by site:	None
Current Remediation Techniques:	Air-Bubbling
Approximate Depth to Groundwater:	19.0 feet
Groundwater Gradient (Average):	0.016 ft/ft toward northwest (consistent with past events)

SVE QUARTERLY OPERATION AND PERFORMANCE:

Equipment Inventory:	King Buck, 200 cfm, Model MMC-6A/E, Catalytic Oxidizer
Operating Mode:	Catalytic Oxidation
BAAQMD Permit #:	9051
TPH Conc. End of Period (lab):	NA (Not Available)
Benzene Conc. End of Period (lab):	NA
Flowrate End of Period:	NA

HC Destroyed This Period:	NA
HC Destroyed to Date:	56.9 pounds
Utility Usage This Period	
Electric (KWH):	NA
Gas/Propane (CF):	NA
Operating Hours This Period:	0.4 hours
Percent Operational:	NA
Operating Hours to Date:	1737.5 hours
Unit Maintenance:	Damaged relay on air bubbling system's blower motor replaced.
Number of Auto Shut Downs:	None
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	NA
Stack Temperature:	NA
Source Flow:	NA
Process Flow:	NA
Source Vacuum:	NA

ATTACHED:

- Table 1 - Groundwater Monitoring Data, First Quarter 1996
- Table 2 - Historical Groundwater Elevation Data
- Table 3 - Historical Groundwater Analytical Data
- Table 4 - Approximate Cumulative Floating Product Recovered (Wells MW-1, MW-2, and MW-5)
- Table 5 - Soil-Vapor Extraction System Operation and Performance Data
- Table 6 - Soil-Vapor Extraction Well Data
- Figure 1 - Site Location
- Figure 2 - Groundwater Data, First Quarter 1996
- Figure 3 - Soil-Vapor Extraction and Treatment System, Historical System Influent TVHG and Benzene Concentrations
- Figure 4 - Soil-Vapor Extraction and Treatment System, Historical Hydrocarbon Removal Rates
- Appendix A - Field Data Sheets, First Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, First Quarter 1996 Groundwater Monitoring Event
- Appendix C - SVE System Monitoring Data Log Sheets
- Appendix D - Field Data Sheets, Operation and Maintenance Visits, First Quarter 1996

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

Table 1
Groundwater Monitoring Data
First Quarter 1996

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	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	TPHD LUFT Method	TOG SM 5520F	TOG SM 5520C	TOG EPA 413.2	TRPH EPA 418.1
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
MW-1	02-20-96	451.73	22.26	429.47	ND	NW	0.016	02-20-96	21000	1500	1200	650	3500	<300	--	--	--	--	--	--
MW-2	02-20-96	449.49	19.00	430.49	ND	NW	0.016	02-20-96	22000	1200	240	590	2200	<300	--	--	--	--	--	--
MW-3	02-20-96	450.28	19.83	430.45	ND	NW	0.016	02-20-96	130	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-4	02-20-96	451.09	21.16	429.93	ND	NW	0.016	02-20-96	7000	360	22	180	160	<70	--	--	--	--	--	--
MW-5	02-20-96	451.40	21.63	429.77	ND	NW	0.016	02-20-96	4300	220	12	45	130	<50	--	--	--	--	--	--
MW-6	02-20-96	451.37	22.27	429.10	ND	NW	0.016	02-20-96	2500	120	16	73	12	<30	--	--	--	--	--	1.8
MW-7	02-20-96	450.33	20.25	430.08	ND	NW	0.016	02-20-96	39000	1200	140	640	1800	<400	--	--	--	--	--	--
MW-8	02-20-96	449.43	21.13	428.30	ND	NW	0.016	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-9	02-20-96	449.21	17.86	431.35	ND	NW	0.016	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-10	02-20-96	449.22	18.40	430.82	ND	NW	0.016	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-11	02-20-96	448.02	20.94	427.08	ND	NW	0.016	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
RW-1	02-20-96	451.67	21.45	430.22	ND	NW	0.016	02-20-96	6300	410	160	180	650	<40	--	--	--	--	--	--

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 Statest Environmental Protection Agency
MTBE: methyl-tert-butyl ether
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
TOG: total oil and grease
SM: standard method
mg/L: milligrams per liter
TRPH: total recoverable petroleum hydrocarbons
ND: none detected
NW: northwest
- - : not analyzed

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Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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 foot/foot
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
MW-1	08-23-95	451.73	29.04	422.69	ND	NNW	0.03
MW-1	12-04-95	451.73	31.31	420.42	ND	NNW	0.03
MW-1	02-20-96	451.73	22.26	429.47	ND	NW	0.016
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
MW-2	08-23-95	449.49	25.69	423.80	ND	NNW	0.03
MW-2	12-04-95	449.49	28.52	420.97	ND	NNW	0.03
MW-2	02-20-96	449.49	19.00	430.49	ND	NW	0.016
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
MW-3	08-23-95	450.28	26.55	423.73	ND	NNW	0.03
MW-3	12-04-95	450.28	29.52	420.76	ND	NNW	0.03
MW-3	02-20-96	450.28	19.83	430.45	ND	NW	0.016

Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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 foot/foot
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
MW-4	08-23-95	451.09	27.72	423.37	ND	NNW	0.03
MW-4	12-04-95	451.09	29.85	421.24	ND	NNW	0.03
MW-4	02-20-96	451.09	21.16	429.93	ND	NW	0.016
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
MW-5	08-23-95	451.40	28.10	423.30	ND	NNW	0.03
MW-5	12-04-95	451.40	29.83	421.57	ND	NNW	0.03
MW-5	02-20-96	451.40	21.63	429.77	ND	NW	0.016
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
MW-6	08-23-95	451.37	29.53	421.84	ND	NNW	0.03
MW-6	12-04-95	451.37	32.28	419.09	ND	NNW	0.03
MW-6	02-20-96	451.37	22.27	429.10	ND	NW	0.016

Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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 foot/foot
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
MW-7	08-23-95	450.33	27.13	423.20	ND	NNW	0.03
MW-7	12-04-95	450.33	29.45	420.88	ND	NNW	0.03
MW-7	02-20-96	450.33	20.25	430.08	ND	NW	0.016
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-8	08-23-95	449.43	30.94	418.49	ND	NNW	0.03
MW-8	12-04-95	449.43	31.99	417.44	ND	NNW	0.03
MW-8	02-20-96	449.43	21.13	428.30	ND	NW	0.016
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
MW-9	08-23-95	449.21	24.33	424.88	ND	NNW	0.03
MW-9	12-04-95	449.21	27.90	421.31	ND	NNW	0.03
MW-9	02-20-96	449.21	17.86	431.35	ND	NW	0.016

Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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 foot/foot
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-10	08-23-95	449.22	24.47	424.75	ND	NNW	0.03
MW-10	12-04-95	449.22	26.97	422.25	ND	NNW	0.03
MW-10	02-20-96	449.22	18.40	430.82	ND	NW	0.016
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
MW-11	08-23-95	448.02	30.15	417.87	ND	NNW	0.03
MW-11	12-04-95	448.02	31.63	416.39	ND	NNW	0.03
MW-11	02-20-96	448.02	20.94	427.08	ND	NW	0.016
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
RW-1	08-23-95	451.67	28.80	422.87	ND	NNW	0.03
RW-1	12-04-95	451.67	31.15	420.52	ND	NNW	0.03
RW-1	02-20-96	451.67	21.45	430.22	ND	NW	0.016

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
NNE: north-northeast
N: north
NW: northwest
NNW: north-northwest
*: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 771, Livermore, California*, (EMCON, March 1, 1996).

Table 3
Historical Groundwater Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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	TPHD LUFT Method	TOG SM 5520F	TOG SM 5520C	TOG EPA 413.2	TRPH EPA 418.1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
MW-1	03-26-94	29000	1000	290	610	3300	--	--	--	--	--	--	--
MW-1	06-13-94	25000	600	160	500	2500	--	--	--	--	--	--	--
MW-1	09-22-94	51000	1400	280	570	2800	--	--	--	--	--	--	--
MW-1	11-25-94	170000	990	1000	1700	9400	--	--	--	--	--	--	--
MW-1	03-20-95	90000	1800	1100	1000	5600	--	--	--	--	--	--	--
MW-1	06-03-95	81000	2000	1400	990	4600	--	--	--	--	--	--	--
MW-1	08-23-95	44000	2400	1900	670	3800	<300	--	--	--	--	--	--
MW-1	12-04-95	22000	870	660	390	2200	--	100	--	--	--	--	--
MW-1	02-20-96	21000	1500	1200	650	3500	<300	--	--	--	--	--	--
MW-2	03-26-94	22000	1100	1400	190	3700	--	--	--	--	--	--	--
MW-2	06-13-94	71000	4100	4600	1700	9900	--	--	--	--	--	--	--
MW-2	09-22-94	42000	1200	620	710	2000	--	--	--	--	--	--	--
MW-2	11-25-94	60000	3900	4100	1400	7400	--	--	--	--	--	--	--
MW-2	03-20-95	54000	2600	1600	1200	7600	--	--	--	--	--	--	--
MW-2	06-03-95	37000	2200	800	980	4800	--	--	--	--	--	--	--
MW-2	08-23-95	65000	1100	310	840	3000	<500	--	--	--	--	--	--
MW-2	12-04-95	19000	680	150	410	1600	--	--	--	--	--	--	--
MW-2	02-20-96	22000	1200	240	590	2200	<300	--	--	--	--	--	--
MW-3	03-26-94	54	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	11-25-94	54	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	03-20-95	94	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	06-02-95	72	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	08-23-95	98	<0.5	<0.5	<0.6	0.5	<3	--	--	--	--	--	--
MW-3	12-04-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-3	02-20-96	130	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--

Table 3
Historical Groundwater Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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	TPHD LUFT Method	TOG SM 5520F	TOG SM 5520C	TOG EPA 413.2	TRPH EPA 418.1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
MW-4	03-26-94	27000	1800	830	1300	2900	--	--	--	--	--	--	--
MW-4	06-13-94	17000	1300	620	670	1600	--	--	--	--	--	--	--
MW-4	09-22-94	10000	700	61	420	570	--	--	--	--	--	--	--
MW-4	11-25-94	13000	1400	250	490	1200	--	--	--	--	--	--	--
MW-4	03-20-95	12000	1000	100	450	700	--	--	--	--	--	--	--
MW-4	06-02-95	9000	850	56	380	430	--	--	--	--	--	--	--
MW-4	08-23-95	5300	400	25	240	170	<100	--	--	--	--	--	--
MW-4	12-04-95	6700	100	<10	90	38	--	--	--	--	--	--	--
MW-4	02-20-96	7000	360	22	180	160	<70	--	--	--	--	--	--
MW-5	03-26-94	39000	4000	2300	1600	6200	--	--	--	--	--	--	--
MW-5	06-13-94	28000	2500	1700	1100	3900	--	--	--	--	--	--	--
MW-5	09-22-94	Not sampled: vehicle was parked on well											
MW-5	11-25-94	31000	2400	1100	1100	4400	--	--	--	--	--	--	--
MW-5	03-20-95	26000	1300	180	890	2900	--	--	--	--	--	--	--
MW-5	06-02-95	39000	940	160	740	1900	--	--	--	--	--	--	--
MW-5	08-23-95	14000	490	74	250	890	<300	--	--	--	--	--	--
MW-5	12-04-95	7600	230	13	61	80	--	--	--	--	--	--	--
MW-5	02-20-96	4300	220	12	45	130	<50	--	--	--	--	--	--
MW-6	03-26-94	3100	350	99	130	340	--	--	880	--	--	--	1.5
MW-6	06-13-94	2300	250	12	130	31	--	--	350*	--	--	--	0.8
MW-6	09-22-94	73	2.6	<0.5	1.7	0.7	--	--	<50	<0.5	--	--	--
MW-6	11-25-94	1100	78	<2.5	46	17	--	--	<50	--	--	--	<0.5
MW-6	03-20-95	2600	210	87	82	140	--	--	2000*	--	--	--	1.7
MW-6	06-02-95	1600	55	7.9	40	26	--	--	1200*	--	--	--	1
MW-6	08-23-95	1400	42	2.5	36	13	<20	--	530*	--	--	--	1.6
MW-6	12-04-95	2500	52	5.8	59	13	--	--	1100*	--	--	--	1.5
MW-6	02-20-96	2500	120	16	73	12	<30	--	--	--	--	--	1.8

Table 3
Historical Groundwater Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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	TPHD LUFT Method	TOG SM 5520F	TOG SM 5520C	TOG EPA 413.2	TRPH EPA 418.1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
MW-7	03-26-94	22000	2700	280	500	2600	--	--	--	--	--	--	--
MW-7	06-13-94	21000	1500	180	360	1900	--	--	--	--	--	--	--
MW-7	09-22-94	22000	1800	240	430	1900	--	--	--	--	--	--	--
MW-7	11-25-94	29000	2600	380	640	3300	--	--	--	--	--	--	--
MW-7	03-20-95	31000	2300	400	620	2900	--	--	--	--	--	--	--
MW-7	06-03-95	40000	1400	280	610	2400	--	--	--	--	--	--	--
MW-7	08-23-95	25000	1400	200	600	1600	350	--	--	--	--	--	--
MW-7	12-04-95	23000	1100	74	490	720	--	--	--	--	--	--	--
MW-7	02-20-96	39000	1200	140	640	1800	<400	--	--	--	--	--	--
MW-8	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-8	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-8	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-8	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-8	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-8	06-02-95	Not sampled: not scheduled for chemical analysis											
MW-8	08-23-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-8	12-04-95	Not sampled: not scheduled for chemical analysis											
MW-8	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-9	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-9	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-9	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-9	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-9	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-9	06-02-95	Not sampled: not scheduled for chemical analysis											
MW-9	08-23-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-9	12-04-95	Not sampled: not scheduled for chemical analysis											
MW-9	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--

Table 3
Historical Groundwater Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present*

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

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	TPHD LUFT Method	TOG SM 5520F	TOG SM 5520C	TOG EPA 413.2	TRPH EPA 418.1
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
MW-10	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-10	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-10	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-10	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-10	03-20-95	Not sampled: not scheduled for chemical analysis											
MW-10	06-02-95	Not sampled: not scheduled for chemical analysis											
MW-10	08-23-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-10	12-04-95	Not sampled: not scheduled for chemical analysis											
MW-10	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-11	03-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-11	06-13-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-11	09-22-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-11	11-25-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-11	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-11	06-02-95	Not sampled: not scheduled for chemical analysis											
MW-11	08-23-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-11	12-04-95	Not sampled: not scheduled for chemical analysis											
MW-11	02-20-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
RW-1	03-26-94	8100	780	100	360	340	--	--	--	--	--	--	--
RW-1	06-13-94	4900	510	32	150	170	--	--	--	--	--	--	--
RW-1	09-22-94	4900	390	30	190	210	--	--	--	--	--	--	--
RW-1	11-25-94	4900	550	68	200	230	--	--	--	--	--	--	--
RW-1	03-20-95	15000	1000	140	310	950	--	--	--	--	--	--	--
RW-1	06-02-95	12000	1300	280	420	1100	--	--	--	--	--	--	--
RW-1	08-23-95	8200	520	190	240	610	<50	--	--	--	--	--	--
RW-1	12-04-95	2600	140	59	83	210	--	--	--	--	--	--	--
RW-1	02-20-96	6300	410	160	180	650	<40	--	--	--	--	--	--

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA: United Statest Environmental Protection Agency
MTBE: methyl-tert-butyl ether
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
TOG: total oil and grease
SM: standard method
mg/L: milligrams per liter
TRPH: total recoverable petroleum hydrocarbons
- - : not analyzed
*: For previous historical analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 771, Livermore, California*, (EMCON, March 1, 1996).

Table 4
Approximate Cumulative Floating Product Recovered

ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 05-15-96

Well Designations	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
MW-1, MW-2, and MW-5	1996	0.00
	1991 to 1996 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: 12-01-94
To: 04-01-96
System was shut down on 10-10-95.

Date Begin:		12-01-94	01-01-95	02-01-95	07-01-95	08-01-95
Date End:		01-01-95	02-01-95	07-01-95	08-01-95	09-01-95
Mode of Oxidation:		Catalytic	Catalytic	Catalytic	Catalytic	Catalytic
Days of Operation:		11	11	0	8	14
Days of Downtime:		20	20	150	23	17
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline	100	<15	NA	54	33
	mg/m3 (3) as gasoline	300	<60	NA	218	120
	ppmv as benzene	<0.1	<0.1	NA	1.2	0.4
	mg/m3 as benzene	<0.5	<0.5	NA	3.6	1.2
System Influent:	ppmv as gasoline	<15	NA	NA	48	24
	mg/m3 as gasoline	<60	NA	NA	200	87
	ppmv as benzene	<0.1	NA	NA	1.2	0.3
	mg/m3 as benzene	<0.5	NA	NA	3.8	0.8
System Effluent:	ppmv as gasoline	<15	NA	NA	<15	<15
	mg/m3 as gasoline	<60	NA	NA	<60	<60
	ppmv as benzene	<0.1	NA	NA	<0.1	<0.1
	mg/m3 as benzene	<0.5	NA	NA	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):		27.3	13.0	0.0	83.3	104.3
Average System Influent Flow Rate (4), scfm:		201.7	180.7	0.0	163.4	170.9
Average Destruction Efficiency (6), percent (7):		NA (13)	NA	NA	70.0 (14)	31.0 (14)
Average Emission Rates (8), pounds per day (9)						
Gasoline:		1.09	0.97	0.00	0.88	0.92
Benzene:		0.01	0.01	0.00	0.01	0.01
Operating Hours This Period:		275.50	269.23	0.00	195.40	342.12
Operating Hours To Date:		275.5	544.7	544.7	740.1	1082.3
Pounds/ Hour Removal Rate, as gasoline (10):		0.03	0.00	0.00	0.07	0.05
Pounds Removed This Period, as gasoline (11):		8.4	0.8	0.0	13.3	16.0
Pounds Removed To Date, as gasoline:		8.4	9.2	9.2	22.5	38.5
Gallons Removed This Period, as gasoline (12):		1.4	0.1	0.0	2.1	2.6
Gallons Removed To Date, as gasoline:		1.4	1.5	1.5	3.6	6.2

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: 12-01-94
To: 04-01-96
System was shut down on 10-10-95.

Date Begin:		09-01-95	10-01-95	01-01-96
Date End:		10-01-95	01-01-96	04-01-96
Mode of Oxidation:		Catalytic	Catalytic	Catalytic
Days of Operation:		27	0	0
Days of Downtime:		3	92	91
Average Vapor Concentrations (1)				
Well Field Influent:	ppmv (2) as gasoline	20	NA	NA
	mg/m3 (3) as gasoline	89	NA	NA
	ppmv as benzene	<0.1	NA	NA
	mg/m3 as benzene	<0.5	NA	NA
System Influent:	ppmv as gasoline	18	NA	NA
	mg/m3 as gasoline	79	NA	NA
	ppmv as benzene	<0.1	NA	NA
	mg/m3 as benzene	<0.5	NA	NA
System Effluent:	ppmv as gasoline	<15	NA	NA
	mg/m3 as gasoline	<60	NA	NA
	ppmv as benzene	<0.1	NA	NA
	mg/m3 as benzene	<0.5	NA	NA
Average Well Field Flow Rate (4), scfm (5):		84.0	0.0	0.0
Average System Influent Flow Rate (4), scfm:		84.0	0.0	0.0
Average Destruction Efficiency (6), percent (7):		24.1 (14)	NA	NA
Average Emission Rates (8), pounds per day (9)				
Gasoline:		0.45	0.00	0.00
Benzene:		0.00	0.00	0.00
Operating Hours This Period:		654.88	0.00	0.40
Operating Hours To Date:		1737.1	1737.1	1737.5
Pounds/ Hour Removal Rate, as gasoline (10):		0.03	0.00	0.00
Pounds Removed This Period, as gasoline (11):		18.3	0.0	0.0
Pounds Removed To Date, as gasoline:		56.9	56.9	56.9
Gallons Removed This Period, as gasoline (12):		3.0	0.0	0.0
Gallons Removed To Date, as gasoline:		9.2	9.2	9.2

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: 12-01-94
San Jose, California	To: 04-01-96
	System was shut down on 10-10-95.

CURRENT REPORTING PERIOD:	01-01-96	to	04-01-96
DAYS / HOURS IN PERIOD:	91	2184.0	
DAYS / HOURS OF OPERATION:	0	0.0	
DAYS / HOURS OF DOWN TIME:	91	2184.0	
PERCENT OPERATIONAL:		0.0 %	
PERIOD POUNDS REMOVED:	9.2		
PERIOD GALLONS REMOVED:	0.0		
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		0.0	

1. Average concentrations are based on discrete sample results reported during the month; refer to Appendix C for discrete sample results.
2. ppmv: parts per million by volume
3. mg/m3: milligrams per cubic meter
4. Average flow rates (time weighted average) are based on instantaneous flow rates recorded during the month; refer to Appendix C for instantaneous flow data.
5. scfm: flow in standard cubic feet per minute at one atmosphere and 70 degrees Fahrenheit
6. Average destruction efficiencies are calculated using monthly average concentrations; refer to Appendix C for instantaneous destruction efficiency data.
7. 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
8. Average emission rates are calculated using monthly average concentrations and flow rates; refer to Appendix C for instantaneous emission rate data.
9. 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
10. pounds/ hour removal rate (as gasoline) = well field influent concentration (as gasoline in mg/m3) x well field influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
11. pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
12. gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1613 gallons/pound of gasoline
13. NA: not analyzed, not available, or not applicable
14. 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: 04-11-96

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
08-01-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
08-29-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-18-95	open	44.8 PID	53.7	open	10.7 PID	56.9	open	12.0 PID	52.8	open	13.3 PID	54.7
09-18-95	open (b)	66.8 PID	56.0	open (b)	113 PID	58.2	open (b)	25.9 PID	55.1	open (b)	21.8 PID	56.9
10-10-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
10-10-95	System shut down											
12-19-95	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
02-08-96	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
02-14-96	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
03-22-96	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	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
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
closed (b): closed to the system and atmosphere, but bubbling air at 1 scfm per well
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

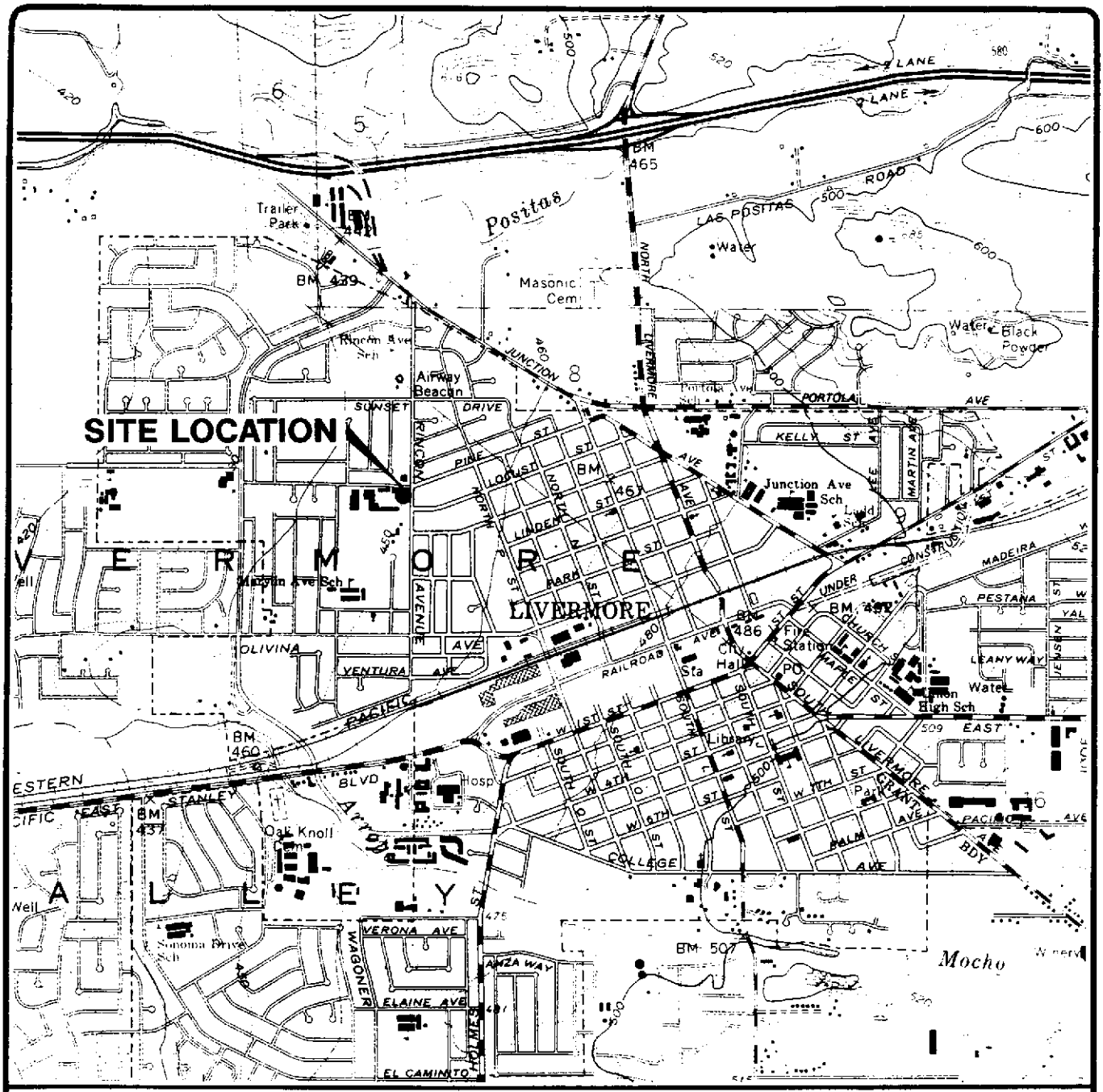
ARCO Service Station 771
899 Rincon Avenue, Livermore, California

Date: 04-11-96

Date	Well Identification							
	MW-5			MW-7			Bubbler-Only Well	
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	RW-1	
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		
08-01-95	open	NA	NA	open	NA	NA		
08-29-95	open	NA	NA	open	NA	NA		
09-18-95	open	11.2 PID	55.9	open	19.0 PID	53.9		
09-18-95	open (b)	117 PID	58.0	open (b)	20.0 PID	56.2		
10-10-95	open	NA	NA	open	NA	NA		
10-10-95	System shut down							
12-19-96	closed (b)	NA	NA	closed (b)	NA	NA		
02-08-96	closed (b)	NA	NA	closed (b)	NA	NA	bubbling	
02-14-96	closed (b)	NA	NA	closed (b)	NA	NA	bubbling	
03-22-96	closed (b)	NA	NA	closed (b)	NA	NA	bubbling	

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
closed (b): closed to the system and atmosphere, but bubbling air at 1 scfm per well
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

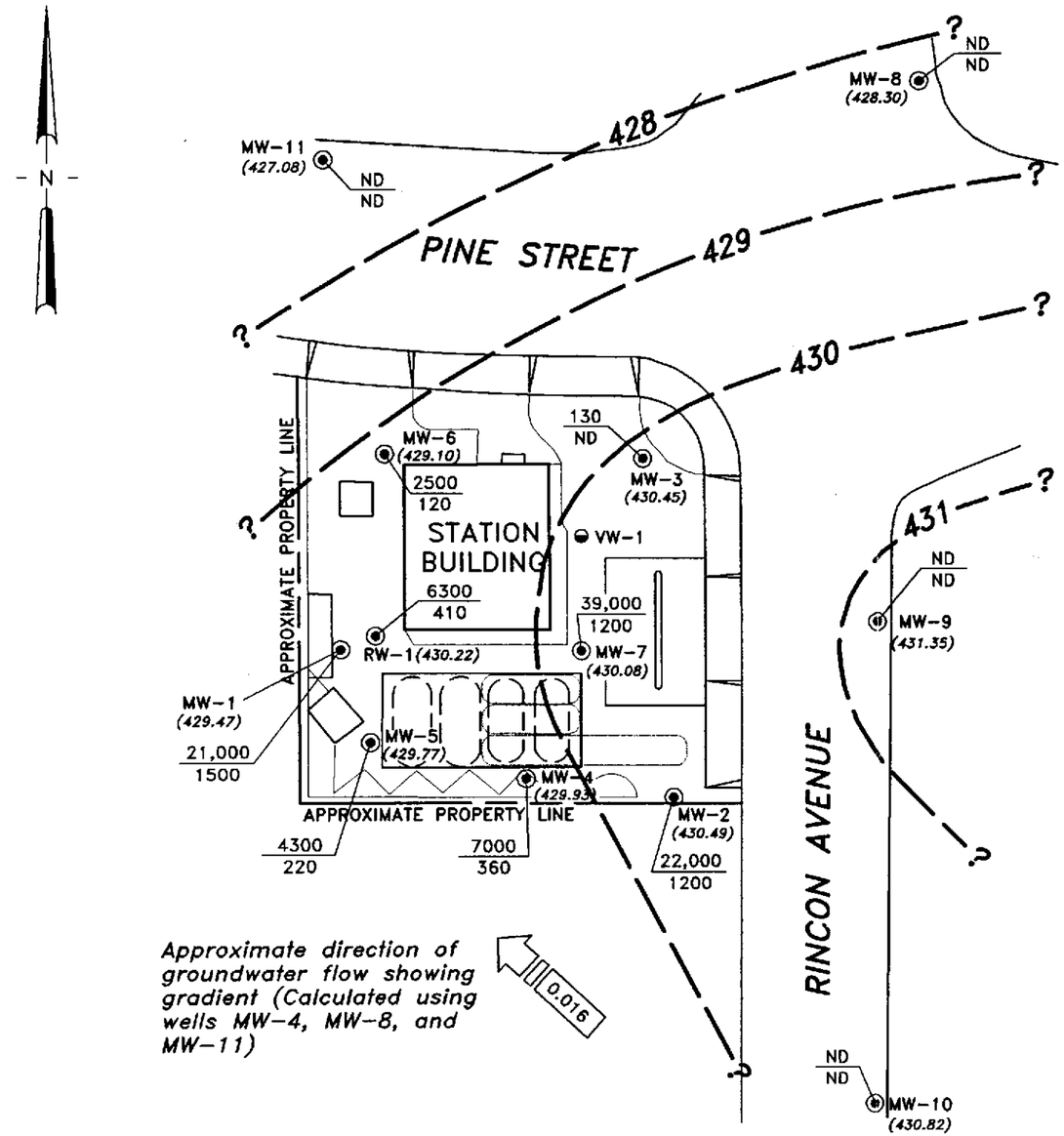


emcon

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-122.03



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Former underground gasoline storage tank
- Existing underground gasoline storage tank
- (430.08) Groundwater elevation (Ft.–MSL) measured 2/20/96
- Groundwater elevation contour (Ft.–MSL)
- 39,000 / 1200 — TPHG concentration in groundwater (ug/L); sampled 2/20/96; Benzene concentration in groundwater (ug/L); sampled 2/20/96
- ND — Not detected at or above the method reporting limit for TPHG (50 ug/L) and benzene (0.5 ug/L)
- NS — Not sampled

EMCON

SCALE: 0 40 80 FEET
(Approximate)

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

GROUNDWATER DATA
FIRST QUARTER 1996

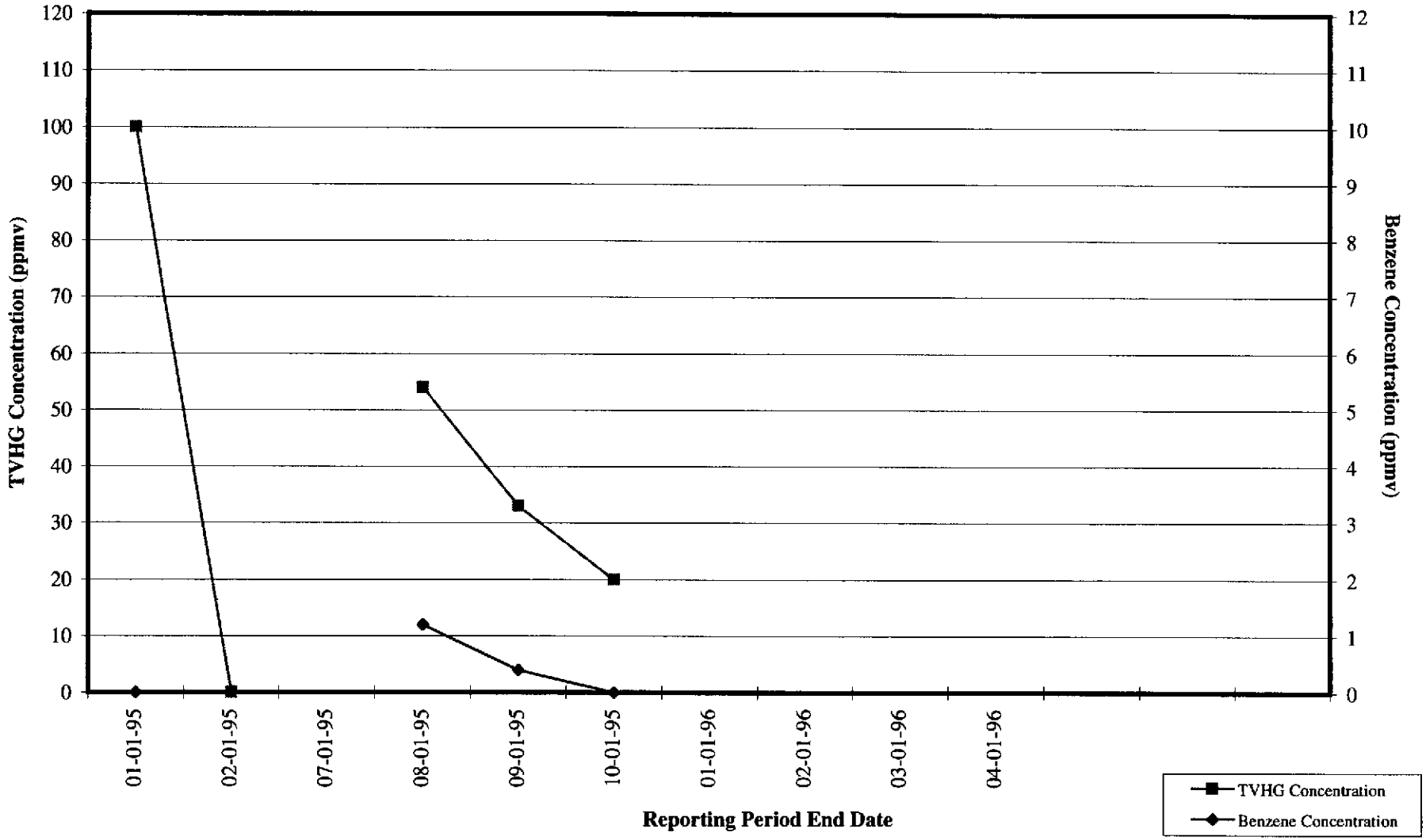
FIGURE NO. 2

PROJECT NO. 805-122.003

G:\805-122\G00 REV 0 05/08/96 16:19:43 DD DJ

Figure 3

ARCO Service Station 771
Soil-Vapor Extraction and Treatment System
Historical Well Field Influent TVHG and Benzene Concentrations

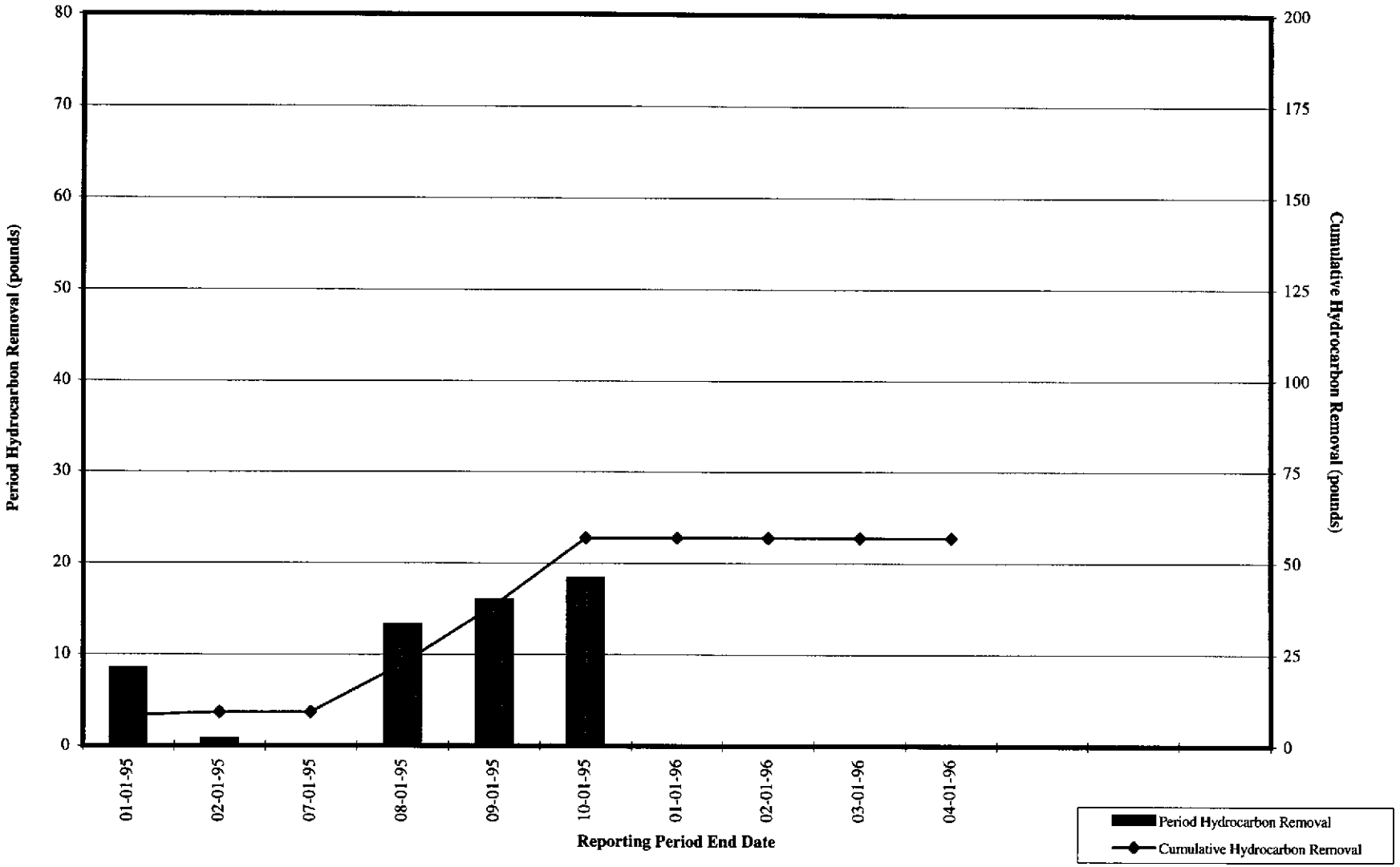


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/h:\0771\0771tdb.xls\SVE Model:imi
20805-122.003

Figure 4

ARCO Service Station 771
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



esj/h:\0771\0771tdb.xls\SVE Model:imi
20805-122.003

APPENDIX A

FIELD DATA SHEETS, FIRST QUARTER 1996 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-213.002** STATION ADDRESS : **899 Rincon Avenue, Livermore** DATE : 12-20-96

ARCO STATION # : **771** FIELD TECHNICIAN : M. Ross DAY : TUESDAY

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**	OK	Yes	Yes	Ye	Yes	21.13	21.13	NA	NA	41.8	water in BOX T.O.C
2	**MW-9**	OK	Yes	Yes	Yes	Yes	17.86	17.86	NA	NA	39.2	
3	**MW-10**	OK	Yes	Yes	Yes	Yes	18.40	18.40	NA	NA	36.1	
4	**MW-11**	OK	Yes	Yes	Yes	Yes	20.94	20.94	NA	NA	38.6	
5	**MW-3**	OK	Yes	Yes	Yes	Yes	19.73	19.83	NA	NA	39.7	water IN Box T.O.C.
6	**MW-6**	OK	Yes	Yes	Yes	Yes	22.27	22.27	NA	NA	43.3	
7	**MW-4**	OK	Yes	NO	Yes	Yes	21.16	21.16	NA	NA	41.3	OXY=(4-5)
8	**RW-1**	OK	Yes	Yes	NO	NO	21.45	21.45	NA	NA	39.7	slip cap OXY=(1)
9	**MW-5**	OK	Yes	NO	NO	NO	21.63	21.63	NA	NA	40.2	slip cap OXY=(3)
10	**MW-7**	OK	Yes	NO	NO	NO	20.25	20.25	NA	NA	39.7	slip cap OXY=(1-2)
11	**MW-2**	OK	Yes	NO	NO	NO	19.00	19.00	NA	NA	34.3	OXY=(3-4)
12	**MW-1**	OK	Yes	NO	NO	NO	22.26	22.26	NA	NA	36.70	OXY=(6)
13	**VW-1**	OK	Yes	NO	NO	NO	19.30	19.30	NA	NA	28.2	OXY=(2-3)

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-1(36.1)

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

SAMPLED BY: " LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): N/R VOLUME IN CASING (gal.): 9.43

DEPTH TO WATER (feet): 22.24 CALCULATED PURGE (gal.): 28.30

DEPTH OF WELL (feet): 36.70 ACTUAL PURGE VOL. (gal.): 28.5

DATE PURGED: 2-20-94 Start (2400 Hr) 1300 End (2400 Hr) 1310

DATE SAMPLED: " Start (2400 Hr) 1317 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1304	9.5	7.50	930	68.7	Clear	Clear
1307	19.0	7.14	1051	69.4	"	"
1310	28.5	7.12	1048	69.7	"	"

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

N/R (COBALT 0 - 500) N/R (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: N/R

Parameters field filtered at this well: N/R

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon &)

___ Centrifugal Pump ___ Bailer (PVC)

X Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump X Bailer (Teflon &)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: ___

WELL INTEGRITY: Good LOCK #: ARCO-KEY

REMARKS: All samples taken

Meter Calibration: Date: 2/20/94 Time: ___ Meter Serial #: 9024 Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: [signature] Reviewed By: SW Page 1 of 12

Rev 3.2.94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2175-213.002 SAMPLE ID: MW-2 (34')

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL):	NA	VOLUME IN CASING (gal.):	9.99
DEPTH TO WATER (feet):	19.00	CALCULATED PURGE (gal.):	29.97
DEPTH OF WELL (feet):	34.3	ACTUAL PURGE VOL. (gal.):	30.0

DATE PURGED: 2-20-96 Start (2400 Hr): 1555 End (2400 Hr): 1607

DATE SAMPLED: 2-20-96 Start (2400 Hr): 1620 End (2400 Hr): ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (F)	COLOR (visual)	TURBIDITY (visual)
1559	10.0	6.87	974	65.9	clr	clr
1603	20.0	6.88	989	67.4	clr	clr
1607	30.0	6.85	1061	68.1	clr	clr

D.O. (ppm): 3-4 ODOR: SLIGHT COBALT 0 - 500: NA NTU 0 - 200 or 0 - 1000: NA

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

___ 2" Bladder Pump ___ 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 #: —

REMARKS: ___

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 9972 Temperature (F): ___

EC 1000 ___ ___ DI ___ pH 7 ___ ___ pH 10 ___ ___ pH 4 ___ ___

Location of previous calibration: MW-9

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

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-3 (39)

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL):	NA	VOLUME IN CASING (gal.):	12.98
DEPTH TO WATER (feet):	19.83	CALCULATED PURGE (gal.):	38.94
DEPTH OF WELL (feet):	39.7	ACTUAL PURGE VOL. (gal.):	39.0

DATE PURGED: 2-20-96 Start (2400 Hr) 1420 End (2400 Hr) 1432

DATE SAMPLED: 2-20-96 Start (2400 Hr) 1445 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1424	13.0	7.21	1025	68.2	clr	clr
1427	26.0	7.14	1060	68.6	clr	clr
1432	39.0	7.16	1069	68.9	clr	clr

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

COLOR: NA (CCBALT 0 - 500)

TURBIDITY: NA (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
___ ODL Sampler
___ Dipper
___ Well Wizard™
✓ Bailer (Teflon®)
___ Bailer (Stainless Steel)
___ Submersible Pump
___ Dedicated
Other: ___

WELL INTEGRITY: Good LOCK #: —

REMARKS: —

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 9078 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: [signature] Page 3 of 12

Rev 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-4 (41')

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

SAMPLED BY: ↓ LOCATION: Livermore, CA

TYPE: Ground Water X 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.): 13.15

DEPTH TO WATER (feet): 21.16 CALCULATED PURGE (gal.): 39.47

DEPTH OF WELL (feet): 41.3 ACTUAL PURGE VOL. (gal.): 39.5

DATE PURGED: 2-20-96 Start (2400 Hr) 1531 End (2400 Hr) 1541

DATE SAMPLED: ↓ Start (2400 Hr) 1547 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1534	13.0	7.25	1000	68.5	Clear	Clear
1538	26.0	7.19	1058	69.6	↓	↓
1541	39.5	7.12	1062	69.0	↓	↓

D. O. (ppm): 4-5 ODOR: Strong

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO-key

REMARKS: All Samples to Lab

Meter Calibration: Date: 2-20-96 Time: ___ Meter Serial #: 9024 Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: [signature] Reviewed By: SH Page 4 of 12

Rev 3. 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-5 (40')

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

SAMPLED BY: ↓ LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): N/R VOLUME IN CASING (gal.): 17.13

DEPTH TO WATER (feet): 21.63 CALCULATED PURGE (gal.): 36.39

DEPTH OF WELL (feet): 40.2 ACTUAL PURGE VOL. (gal.): 26.0

DATE PURGED: 2/20/96 Start (2400 Hr) 1432 End (2400 Hr) 1440

DATE SAMPLED: ↓ Start (2400 Hr) 1446 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1435	12.0	8.11	941	68.6	Clear	Clear
1439	24.0	7.54	1045	69.7	↓	↓
1448	Recharge	7.50	1067	68.8	↓	↓

D. O. (ppm): 3 ODOR: Moderate

COLOR (COBALT 0 - 500): N/R

TURBIDITY (NTU 0 - 200 or 0 - 1000): N/R

Field QC samples collected at this well: N/R

Parameters field filtered at this well: N/R

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO-KEY

REMARKS: Well dried at 26.0 gallons

All samples taken

WL = 39.30

Meter Calibration: Date: 2/20/96 Time: ___ Meter Serial #: 9024 Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: [signature] Reviewed By: SA Page 5 of 12

Rev 3. 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-713.002 SAMPLE ID: MW-6 (43')

PURGED BY: M. Gallegos CLIENT NAME: ARCO 771

SAMPLED BY: " LOCATION: San Leandro, Ca.

TYPE: Ground Water X 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.): 13.73

DEPTH TO WATER (feet): 22.27 CALCULATED PURGE (gal.): 41.21

DEPTH OF WELL (feet): 43.3 ACTUAL PURGE VOL. (gal.): 35.0

DATE PURGED: 2-20-96 Start (2400 Hr) 1225 End (2400 Hr) 1236

DATE SAMPLED: " Start (2400 Hr) 1245 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1228	14.0	6.94	1006	68.8	Clear	Clear
1232	28.0	6.99	1145	68.8	"	Light
1247	recharge.	6.96	1164	69.2	"	Clear

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

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO-Key

REMARKS: well dried at 350 gallons

Gal Samples taken

WL - 42.63

Meter Calibration: Date: 2/20/96 Time: 1215 Meter Serial #: 9024 Temperature °F: 70.2

EC 1000 1015 / 1000) (DI ___) (pH 7 702 700) (pH 10 1004 / 1000) (pH 4 402 ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 6 of 12

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2175-213.02 SAMPLE ID: MW-7(39)

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL):	NA	VOLUME IN CASING (gal.):	12.70
DEPTH TO WATER (feet):	20.25	CALCULATED PURGE (gal.):	38.12
DEPTH OF WELL (feet):	39.7	ACTUAL PURGE VOL. (gal.):	38.5

DATE PURGED: 2-20-96 Start (2400 Hr) 1513 End (2400 Hr) 1531

DATE SAMPLED: 2-20-96 Start (2400 Hr) 1538 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1520	13.0	7.03	981	67.8	clr	clr
1526	26.0	6.98	1020	68.8	clr	clr
1537	38.5	6.91	1050	68.1	clr	clr

D. O. (ppm): 1-2 ODOR: NONE

COLOR: NA (COBALT 0 - 500)

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

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

WELL INTEGRITY: Good LOCK #: —

REMARKS: —

Meter Calibration: Date 2-20-96 Time: 1130 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: SA

Rev. 3,

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 | SAMPLE ID: MW-8(41)

PURGED BY: M. Ross | CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross | LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): NA | VOLUME IN CASING (gal.): 3.37

DEPTH TO WATER (feet): 21.13 | CALCULATED PURGE (gal.): 10.12

DEPTH OF WELL (feet): 41.8 | ACTUAL PURGE VOL. (gal.): 10.5

DATE PURGED: 2-20-96 | Start (2400 Hr) 1217 | End (2400 Hr) 1221

DATE SAMPLED: 2-20-96 | Start (2400 Hr) 1235 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1219	3.5	6.45	993	68.0	BRN	Heavy
1220	7.0	6.76	1024	67.7	BRN	Heavy
1221	10.5	6.82	1035	68.3	BRN	Heavy

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

COLOR (COBALT 0 - 500): NA

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good | LOCK #: —

REMARKS: ___

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 9072 Temperature °F: 64.4

(EC 1000 1036 / 1000) (DI —) (pH 7 6.99 / 7.00) (pH 10 9.94 / 10.00) (pH 4 ___ / —)

Location of previous calibration: —

Signature: Mike Ross | Reviewed By: [illegible] | Page 8 of 12

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2175-213.002 SAMPLE ID: MW-9(39)

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 3.48

DEPTH TO WATER (feet): 12.86 CALCULATED PURGE (gal.): 10.45

DEPTH OF WELL (feet): 39.2 ACTUAL PURGE VOL. (gal.): 10.5

DATE PURGED: 2-20-96 Start (2400 Hr) 1337 End (2400 Hr) 1342

DATE SAMPLED: 2-20-96 Start (2400 Hr) 1350 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1338	3.5	7.16	994	68.0	Light Brown	Mod
1340	7.0	7.11	1062	68.5	"	"
1342	10.5	7.14	1052	68.6	"	"

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

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: N/A

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

WELL INTEGRITY: Good LOCK #: —

REMARKS: ___

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Mike Ross Reviewed By: SA Page 9 of

Rev. 3. 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-10 (36)

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

CASING DIAMETER (inches): 2 ✓ 3 ___ 4 ___ 4.5 ___ 5 ___ Other ___

CASING ELEVATION (feet/MSL):	NA	VOLUME IN CASING (gal.):	2.87
DEPTH TO WATER (feet):	12.70	CALCULATED PURGE (gal.):	8.67
DEPTH OF WELL (feet):	36.1	ACTUAL PURGE VOL. (gal.):	9.0

DATE PURGED: 2-20-96 Start (2400 Hr) 1314 End (2400 Hr) 1319

DATE SAMPLED: 2-20-96 Start (2400 Hr) 1330 End (2400 Hr) —

TIME (2400 Hr)	VOLUME gal.)	pH (units)	E.C. (µmnos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1316	3.0	7.05	1300	67.5	BRN	HEAVY
1317	6.0	7.07	1373	67.9	BRN	HEAVY
1319	9.0	7.04	1376	68.0	BRN	HEAVY

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

COLOR: NA (COBALT 0 - 500)

TURBIDITY: NA (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: GOOD LOCK #: —

REMARKS: ___

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 9077 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: [signature] Reviewed By: [signature] Page 10 of 17

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 SAMPLE ID: MW-11(38)

PURGED BY: M. Ross CLIENT NAME: ARCO 771

SAMPLED BY: M. Ross LOCATION: Livermore, CA

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

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

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 2.88

DEPTH TO WATER (feet): 20.94 CALCULATED PURGE (gal.): 8.65

DEPTH OF WELL (feet): 38.6 ACTUAL PURGE VOL. (gal.): 9.0

DATE PURGED: 2-20-96 Start (2400 Hr) 1242 End (2400 Hr) 1246

DATE SAMPLED: 2-20-96 Start (2400 Hr) 1300 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1243	3.0	7.17	959	67.8	Light Brn	Mod
1245	6.0	7.08	1020	68.8	"	Mod
1246	9.0	7.07	974	69.1	↓	Trace

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

COLOR: NA (COBALT 0 - 500)

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

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

WELL INTEGRITY: Good LOCK #: ___

REMARKS: ___

Meter Calibration: Date: 2-20-96 Time: 1130 Meter Serial #: 5072 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: [signature] Reviewed By: [signature] Page 11 of 12

Rev 3. 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-213.002 | SAMPLE ID: RW-1 (39')

PURGED BY: M. GALLEGOS | CLIENT NAME: ARCO # 771

SAMPLED BY: ↓ | LOCATION: Livermore, CA

TYPE: Ground Water 1 | Surface Water ___ | Treatment Effluent ___ | Other ___

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

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): 26.82

DEPTH TO WATER (feet): 21.45 | CALCULATED PURGE (gal.): 80.48

DEPTH OF WELL (feet): 39.7 | ACTUAL PURGE VOL. (gal.): 62.0

DATE PURGED: 2-20-96 | Start (2400 Hr) 1329 | End (2400 Hr) 1346

DATE SAMPLED: ↓ | Start (2400 Hr) 1353 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1335	27.0	6.98	1035	69.4	Clear	Clear.
1342	54.0	6.87	1059	69.6	↓	↓
1355	recharge.	6.99	1049	68.7	↓	↓

D. O. (ppm): 1 | ODOR: Strong | NR (COBALT 0 - 500) | NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good | LOCK #: ARCO-key

REMARKS: Well dried at 62.0 gallons
All Samples taken

WL = 61.22

Meter Calibration: Date: 2/20/96 Time: ___ Meter Serial #: 9024 Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: [signature] Reviewed By: SM Page 12 of 12

APPENDIX B

ANALYTICAL RESULTS AND CHAIN OF CUSTODY DOCUMENTATION, FIRST QUARTER 1996 GROUNDWATER MONITORING EVENT

Columbia Analytical Services INC.

March 7 , 1996

Service Request No: S9600294

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **771 Livermore/20805-122.003/TO#19350.00**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on February 21, 1996. 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 13, 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,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

SLG/jk

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	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA

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

		Sample Name:	**MW-8(41)**	**MW-9(39)**	**MW-10(36)**
		Lab Code:	S9600294-001	S9600294-002	S9600294-003
		Date Analyzed:	2/26/96	2/26/96	2/26/96
Analyte	**MRL**				
TPH as Gasoline	50		ND	ND	ND
Benzene	0.5		ND	ND	ND
Toluene	0.5		ND	ND	ND
Ethylbenzene	0.5		ND	ND	ND
Total Xylenes	0.5		ND	ND	ND
Methyl-tert-butyl ether	3		ND	ND	ND

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA

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

		Sample Name:	**MW-11(38)**	**MW-3(39)**	**MW-6(43)**
		Lab Code:	S9600294-004	S9600294-005	S9600294-006
		Date Analyzed:	2/26/96	2/26/96	2/26/96
Analyte	**MRL**				
TPH as Gasoline	50		ND	130	2500
Benzene	0.5		ND	ND	120
Toluene	0.5		ND	ND	16
Ethylbenzene	0.5		ND	ND	73
Total Xylenes	0.5		ND	ND	12
Methyl-tert-butyl ether	3		ND	ND	<30*

* The MRL is elevated because the sample required diluting.

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA

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

		Sample Name:	**MW-4(41)**	**RW-1(39)**	**MW-5(40)**
		Lab Code:	S9600294-007	S9600294-008	S9600294-009
		Date Analyzed:	2/26/96	2/26/96	2/26/96
Analyte	**MRL**				
TPH as Gasoline	50		7000	6300	4300
Benzene	0.5		360	410	220
Toluene	0.5		22	160	12
Ethylbenzene	0.5		180	180	45
Total Xylenes	0.5		160	650	130
Methyl-tert-butyl ether	3		<70**	<40**	<50*

* The MRL is elevated because the sample required diluting.
** The MRL is elevated because of matrix interferences.

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA

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

		Sample Name:	**MW-7(39)**	**MW-2(34)**	**MW-1(36)**
		Lab Code:	S9600294-010	S9600294-011	S9600294-012
		Date Analyzed:	2/26/96	2/26/96	2/26/96
Analyte	**MRL**				
TPH as Gasoline	50		39000	22000	21000
Benzene	0.5		1200	1200	1500
Toluene	0.5		140	240	1200
Ethylbenzene	0.5		640	590	650
Total Xylenes	0.5		1800	2200	3500
Methyl-tert-butyl ether	3		<400**	<300**	<300*

* The MRL is elevated because the sample required diluting.
** The MRL is elevated because of matrix interferences.

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		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:	S9600226-WB
Date Analyzed:	2/26/96

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

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	L9601548
Project:	ARCO Products Company #771/#20805-122.003	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	2/26/96
		Date Analyzed:	2/26/96

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

Sample Name	Lab Code	MRL	Result
MW-6 (43)	L9601548-001	0.5	1.8
Method Blank	L9601548-MB	0.5	ND

Approved By: _____ Date: _____

1AMRL/120594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA
		Date Analyzed:	2/26/96

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

Sample Name	Lab Code	PID Detector Percent Recovery 4-Bromofluorobenzene	FID Detector Percent Recovery α,α,α-Trifluorotoluene
MW-8(41)	S9600294-001	100	102
MW-9(39)	S9600294-002	100	99
MW-10(36)	S9600294-003	101	102
MW-11(38)	S9600294-004	103	84
MW-3(39)	S9600294-005	104	101
MW-6(43)	S9600294-006	93	109
MW-4(41)	S9600294-007	90	106
RW-1(39)	S9600294-008	100	108
MW-5(40)	S9600294-009	98	107
MW-7(39)	S9600294-010	94	108
MW-2(34)	S9600294-011	96	99
MW-1(36)	S9600294-012	96	101
Batch QC MS	S9600288-002 MS	102	98
Batch QC DMS	S9600288-002 DMS	101	95
Method Blank	S9600226-WB	95	94
	CAS Acceptance Limits:	69-116	69-116

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Collected:**	2/20/96
Sample Matrix:	Water	**Date Received:**	2/21/96
		Date Extracted:	NA
		Date Analyzed:	2/26/96

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

Sample Name: Batch QC
Lab Code: S9600288-002

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	23.5	23.9	94	96	75-135	2
Toluene	25	25	ND	23.5	24.0	94	96	73-136	2
Ethylbenzene	25	25	ND	23.9	24.1	96	96	69-142	1

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600294
Project:	771 Livermore/20805-122.003/TO#19350.00	**Date Analyzed:**	2/26/96

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	23.2	93	85-115
Toluene	25	23.3	93	85-115
Ethylbenzene	25	23.2	93	85-115
Xylenes, Total	75	73.0	97	85-115
Gasoline	250	242	97	90-110
Methyl-tert-butyl Ether	50	46	92	85-115

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L9601548
Project:	ARCO Products Company #771/#20805-122.003	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	2/26/96
		Date Analyzed:	2/26/96

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			
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	CAS Acceptance Limits	**Relative Percent Difference**
TRPH	2.02	2.02	1.86	1.86	92	92	75-125	<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.

DLCS/032395

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 771	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.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	(BTEX/TPH) incl. MTBE EPA M8020/8020/8015	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 ☐		
MW-8(41')	1	2		X		X	HCL	2/20/96	1235		X											
MW-9(39')	2	2		X		X	HCL	"	1350		X											
MW-10(36')	3	2		X		X	HCL	"	1330		X											
MW-11(38')	4	2		X		X	HCL	"	1300		X											
MW-3(39')	5	2		X		X	HCL	"	1445		X											
MW-6(41')	6	4		X		X	HCL	"	1245		X			X*								
MW-4(41')	7	2		X		X	HCL	"	1547		X											
RW-1(35')	8	2		X		X	HCL	"	1353		X											
MW-5(40')	9	2		X		X	HCL	"	1446		X											
MW-7(39')	10	2		X		X	HCL	"	1538		X											
MW-2(34')	11	2		X		X	HCL	"	1620		X											
MW-1(36')	12	2		X		X	HCL	"	1317		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

*ADDED HCL TO Sample

Remarks: 2-20-96 @ 1730

2-40ml HCL VOAs + 2-1liter HCL Glass for (MW-6)

#20805-122.003

Lab number: 59600294

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days 3/6 ☒

Condition of sample: Ice		Temperature received: Cool	
Relinquished by sampler: Mike Whelan	Date: 2-21-96 Time: 0815	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory: Joanne Brown	Date: 2-21-96 Time: 0815

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

APC-3292 (2-91)

APPENDIX C

SVE SYSTEM MONITORING DATA LOG SHEETS

ARCO 771
SVE SYSTEM
MONITORING DATA

Reporting Period:
01/01/96 00:00
02/01/96 00:00

Hours In Period: 744.00
Days In Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent		System Influent		System Effluent										
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene			Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3			%	lb/day	lb/day						
01/01/96 00:00																				1461.00				
02/01/96 00:00	0.0	0.0																	744.00	1461.00	0.00	0.00	744.00	31.00
Period Totals:																			744.00		0.00	0.00	744.00	31.00
Period Averages:	0.0	0.0																						

ARCO 771
SVE SYSTEM
MONITORING DATA

Reporting Period:
02/01/96 00:00
03/01/96 00:00

Hours in Period: 696.00
Days in Period: 29.00

Operation + Down Hours: 696.00
Operation + Down Days: 29.00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent		System Influent		System Effluent										
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene						Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3						%	lb/day	lb/day						
02/01/96 00:00																							1461.00				
02/08/96 10:52	0.0	0.0																				178.87	1461.00	0.00	0.00	178.87	7.45
03/01/96 00:00	0.0	0.0																				517.13	1461.20	0.20	0.01	516.93	21.54
Period Totals:																						696.00		0.20	0.01	695.80	28.99
Period Averages:	0.0	0.0																									

ARCO 771
SVE SYSTEM
MONITORING DATA

Reporting Period:
03/01/96 00:00
04/01/96 00:00

Hours in Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent		System Influent		System Effluent										
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	lb/day	lb/day						
03/01/96 00:00																		1461.00				
03/22/96 11:02	0.0	0.0															515.03	1461.20	0.20	0.01	514.83	21.45
04/01/96 00:00	0.0	0.0															228.97	1461.20	0.00	0.00	228.97	9.54
Period Totals:																	744.00		0.20	0.01	743.80	30.99
Period Averages:	0.0	0.0																				

APPENDIX D

FIELD DATA SHEETS, OPERATION AND MAINTENANCE VISITS, FIRST QUARTER 1996

Remarks: Arrived on Site at 0926 HRS. Pruse converter on Bubbler OFF upon arrival Scheduled to install timer and HR Meter on Bubbler Motor. Ray with North western electric on Site Control Switch and control motor Relay Blew up when Ray Cuadrado activated the unit.

Switch Sprecher + Schuh DE3-01 AC-1 690V 10A

CA3-23-CT3 Relay V. 230 10 AMPS

Sprecher + Schuh CT 3-23
Cat # CBT3-23-120-23-R3
Type Custom
S/N 167883 W/O WS-615-292
3 HP 230V 1Ph 60 HZ. 17.0 FLA
Type 1 Encl 120V control

Unscheduled site visit [] Scheduled site visit []

SYSTEM PARAMETERS (King Buck Electric Catalytic Oxidizer MMC-6A/E SN 9231)

Arrival Time (24:00 hour)	0926	**SYSTEM**	
System Status (on or off)	OFF	Operating Set Point (°F)	
Shutdown Time (24:00 hour)	OFF	High Temperature Set Point (°F)	
Restart Time (24:00 hour)	OFF	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	NR	Catalyst Temperature (°F)	
Well Field I-1 (2.5")		**E-1 Effluent** Stack Temperature (°F)	
Vacuum (in. of H_2O)		Total Flow from Chart Recorder (cfm)	
Velocity (ft/min)		Electric Meter (kwh)	03461
Temperature (°F)		**TOTAL HOURS**	
After Blower I-2 (2.5") (after dilution)		**AIR MONITORING**	
Total Pressure (in. of H_2O)		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Flow (in. of H_2O)		Date: (WITHOUT CARBON FILTER)	
Temperature (°F)		(WITH CARBON FILTER)	
Dilution Air open/closed		**PID (ppm)** CAL GAS:	
Alarm Trip ? yes/no		Date:	
Total Vapor Condensate on site (gal)		**Lab samples taken for analysis at:**	

WELL FIELD

SVE WELL ID	Well Diameter (feet)	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Bubbler On/Off	PID (ppm)	DO (mg/l)	Remarks
VW-1	4"	18.5'-28.5'	20.21						.8	
MW-1	4"	32'-41'	26.80						.9	
MW-2	4"	30'-38'	23.68						.4	
MW-4	4"	26'-42'	25.88						.9	
MW-5	4"	31.5'-41'	26.04						1.8	
MW-7	4"	30'-40'	25.23						1.0	
RW-1 (Bubbler Only)	6"	25'-40'	23.46		NA	NA		NA		Hinge 16 Bolts all Lid

Total Bubbler Data

Total Hours=	Total Pressure (psi)=	Total Flow (in H_2O)=	Timer Setting-

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Project # 20805-122.002

Operator: L. BATH **Date:** 1-19-96 **ARCO 771 Soil Vapor Extraction System**

ARCO 771. 899 Rincon Av ivermore,CA. Soil Vapor Extraction Systen MCON Project # 20805-122.002

0903 HRS Pump out Rain water From Secondary containment.

Remarks: Arrived on site at 0903 HRS. System OFF upon Arrival Ray with Northwestern Electric is on Site working on Bubbler Blower Relay. Ray Reports that the Relay was wired using the thermal overload as the Normally open contact. Ray Reports that this is Not the proper way to use a Relay; Call V.Voruganti at 0920 leave Voice mail. At 1040 HRS Ray Reinstalled Jumper cables and Re activated Relay. The Relay Produced Smoke upon activation. All control wiring For Relay is 12 GA. one 10 Ga. Jumper Found on Relay. Several other attempts are made Resulting in Smoke or Relay Breaker trip's. 1200 HRS "ok" to Proceed with New Relay and 3 Phase ByPass From V Voruganti. 1245 install all timer(on)(off) Pin's. timer set For One HR(on) one HR(OFF) For 2 241 1300 HRS Ray is Picking up electrical Supplies For the Job. Ray Back at 1415 HRS. original Relay Sprecher Schun CT 3-23 Rated For 7.5 Amps at 230 V. 1433 HRS cover For Phase converter Explode while Ray energized New Relay. Explosion blew 1" hole threw metal cover. 1443 HRS start Butter exploded while Ray energized New Relay. 1523 HRS Ray is unable to Fit New Relay in exsisting Controller Box. Ray and I leave site at 1530 HRS. V Voruganti is contac mark ADler to See Unscheduled site visit ● IF any work Scheduled site visit ☐ wks Done on Relay By him.

SYSTEM PARAMETERS (King Buck Electric Catalytic Oxidizer MMC-6A/E SN 9231)

Arrival Time (24:00 hour)	0903
System Status (on or off)	OFF
Shutdown Time (24:00 hour)	
Restart Time (24:00 hour)	
Reading Time (24:00 hour)	
Well Field I-1 (2.5")	
Vacuum (in. of H_2O)	
Velocity (ft/min)	
Temperature (°F)	
After Blower I-2 (2.5") (after dilution)	
Total Pressure (in. of H_2O)	
Total Flow (in. of H_2O)	
Temperature (°F)	
Dilution Air open/closed	
Alarm Trip ? yes/no	
Total Vapor Condensate on site (gal)	✓

SYSTEM	
Operating Set Point (°F)	OFF
High Temperature Set Point (°F)	
Fire Box Temperature (°F)	
Catalyst Temperature (°F)	
E-1 Effluent Stack Temperature (°F)	
Total Flow from Chart Recorder (cfm)	✓
Electric Meter (kwh)	24393
TOTAL HOURS	01461.1

AIR MONITORING

FID (ppm)	Amb	I-1	I-2	E-1
Date: (WITHOUT CARBON FILTER)				
(WITH CARBON FILTER)				
PID (ppm)	CAL GAS:			
Date:				

Lab samples taken for analysis at:

WELL FIELD

SVE WELL ID	Well Diameter (feet)	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Bubbler On/Off	PID (ppm)	DO (mg/l)	Remarks
VW-1	4"	18.5'-28.5'								
MW-1	4"	32'-41'								
MW-2	4"	30'-38'								
MW-4	4"	26'-42'								
MW-5	4"	31.5'-41'								
MW-7	4"	30'-40'								
RW-1 (Bubbler Only)	6"	25'-40'			NA	NA		NA		

Total Bubbler Data

Total Hours=	Total Pressure (psi)=	Total Flow (in H_2O)=	Timer Setting-

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Project # 20805-122.002

Operator: L. RATH **Date:** 2-7-96 **ARCO 771 Soil Vapor Extraction System**

1-19-96 on site at 0926 HRS Ray Cudrado on Site control Switch Blew up Sending large Blue Flame out of control Box. All electrical work Done by Northwestern Electric.

L. RATH 2-7-96

Remarks: Arrived on site at 0954 HRS Per V. Voruganti. System OFF upon Arrival. Northwestern electric personel not on site. Tools Found inside compound all electrical Boxes Found open. NWE on site at 1018 HRS. Ray From NWE continuing work on Bubbler motor starter Relay. 1049 HRS Ray activated Relay Resulting in a tripped Breaker. New Starter Relay and timer working at 1052 HR. Ray Reports that installing HR meter would Be against electrical code. timer electrical contacts Found welded closed. 1111 HRS waiting For timer to shut OFF. timer turned OFF at 1143 HRS. Ray Continuing work on 3 Ph converter Bypass. 3 way Switch Relay and timer working well.

Blower motor Leeson cat # 130043.00 mod P184C17FBZH TEFC RPM 1740 HP 3 FR 19 HZ 60 1 Ph 230 V

Unscheduled site visit ☒ Scheduled site visit ☐

SYSTEM PARAMETERS (King Buck Electric Catalytic Oxidizer MMC-6A/E SN 9231)

Arrival Time (24:00 hour)	0954	**SYSTEM**	
System Status (on or off)	OFF	Operating Set Point (°F)	OFF
Shutdown Time (24:00 hour)	—	High Temperature Set Point (°F)	
Restart Time (24:00 hour)	1052	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	1100	Catalyst Temperature (°F)	
Well Field I-1 (2.5")	OFF	**E-1 Effluent** Stack Temperature (°F)	
Vacuum (in. of H_2O)		Total Flow from Chart Recorder (cfm)	
Velocity (ft/min)		Electric Meter (kwh)	
Temperature (°F)		**TOTAL HOURS**	
After Blower I-2 (2.5") (after dilution)	OFF	**AIR MONITORING**	
Total Pressure (in. of H_2O)		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Flow (in. of H_2O)		Date: (WITHOUT CARBON FILTER)	
Temperature (°F)		(WITH CARBON FILTER)	
Dilution Air open/closed	OFF	**PID (ppm)** CAL GAS:	
Alarm Trip ? yes/no		Date:	
Total Vapor Condensate on site (gal)	0	**Lab samples taken for analysis at:**	

WELL FIELD

SVE WELL ID	Well Diameter (feet)	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Bubbler On/Off	PID (ppm)	DO (mg/l)	Remarks
VW-1	4"	18.5'-28.5'					On			
MW-1	4"	32'-41'								
MW-2	4"	30'-38'								
MW-4	4"	26'-42'								
MW-5	4"	31.5'-41'								
MW-7	4"	30'-40'								
RW-1 (Bubbler Only)	6"	25'-40'			NA	NA	✓	NA		

Total Bubbler Data Temp 100°F Bubbles 17/M

Total Hours=	Total Pressure (psi)= 11	Total Flow (in H_2O)= 1.0 +	Timer Setting- on 1/HR OFF 1/HR

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Project # 20805-122.002

Operator: L. RATH **Date:** 2-8-96 **ARCO 771 Soil Vapor Extraction System**

Remarks: Arrived on site at 1040 HRS Blower running upon Arrival Phase converter OFF, SVE OFF. Bubblers turned OFF Automatically at 1105HR. Clean compound. Turn Bubbler OFF FOR Quarterly Sampling event.

Stop by ARCO Station 6113 and clean up compound.

Unscheduled site visit [] Scheduled site visit [x]

SYSTEM PARAMETERS (King Buck Electric Catalytic Oxidizer MMC-6A/E SN 9231)

Arrival Time (24:00 hour)	1040
System Status (on or off) Bubbler	On
Shutdown Time (24:00 hour)	NA
Restart Time (24:00 hour)	NA
Reading Time (24:00 hour)	1040
Well Field I-1 (2.5")	OFF
Vacuum (in. of H_2O)	↓
Velocity (ft/min)	↓
Temperature (°F)	↓
After Blower I-2 (2.5") (after dilution)	OFF
Total Pressure (in. of H_2O)	↓
Total Flow (in. of H_2O)	↓
Temperature (°F)	↓
Dilution Air open/closed	↓
Alarm Trip ? yes/no	↓
Total Vapor Condensate on site (gal)	0

SYSTEM	
Operating Set Point (°F)	OFF
High Temperature Set Point (°F)	↓
Fire Box Temperature (°F)	↓
Catalyst Temperature (°F)	↓
E-1 Effluent Stack Temperature (°F)	↓
Total Flow from Chart Recorder (cfm)	↓
Electric Meter (kwh)	24566
TOTAL HOURS	

AIR MONITORING

FID (ppm)	Amb	I-1	I-2	E-1
Date: (WITHOUT CARBON FILTER)				
(WITH CARBON FILTER)		NR		
PID (ppm)	CAL GAS:			
Date:				

Lab samples taken for analysis at:

WELL FIELD

SVE WELL ID	Well Diameter (feet)	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Bubbler On/Off	PID (ppm)	DO (mg/l)	Remarks
VW-1	4"	18.5'-28.5'	19.84		OFF	OFF	on		8.9	Bubbler on
MW-1	4"	32'-41'	19.89		↓	↓	on		8.8	Bubbler on (8.8 DO)
MW-2	4"	30'-38'	18.68		↓	↓	on		9.3	Black Hose in Well
MW-4	4"	26'-42'	20.84		↓	↓	on		8.9	↓
MW-5	4"	31.5'-41'	21.36		↓	↓	on		9.1	↓
MW-7	4"	30'-40'	19.79		↓	↓	on		9.0	↓
RW-1 (Bubbler Only)	6"	25'-40'	20.10		NA	NA		NA		↓

Total Bubbler Data

Total Hours=	Total Pressure (psi)= 10	Total Flow (in H_2O)= 1.0+ 1" line	Timer Setting- on 1 HR / OFF 1 HR

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: L. BATIT Date: 2-14-96

Project # 20805-122.002
ARCO 771 Soil Vapor Extraction System

Remarks: Arrived on site at 1101 HRS. Bobbler system on, SVE OFF Per V. Vorugant.

Total Bobbler PSI Guage Found Broken
Need 0-50 PSI 1/4" thread.

Unscheduled site visit ☐ Scheduled site visit ☒

SYSTEM PARAMETERS (King Buck Electric Catalytic Oxidizer MMC-6A/E SN 9231)

Arrival Time (24:00 hour)	1101
System Status (on or off) Bobbler	on
Shutdown Time (24:00 hour)	[redacted] 1107
Restart Time (24:00 hour)	1220
Reading Time (24:00 hour)	1102
Well Field I-1 (2.5")	OFF
Vacuum (in. of H_2O)	
Velocity (ft/min)	
Temperature (°F)	
After Blower I-2 (2.5") (after dilution)	OFF
Total Pressure (in. of H_2O)	
Total Flow (in. of H_2O)	
Temperature (°F)	
Dilution Air open/closed	OFF
Alarm Trip ? yes/no	OFF
Total Vapor Condensate on site (gal)	0

SYSTEM

Operating Set Point (°F)	OFF
High Temperature Set Point (°F)	
Fire Box Temperature (°F)	
Catalyst Temperature (°F)	
E-1 Effluent Stack Temperature (°F)	
Total Flow from Chart Recorder (cfm)	
Electric Meter (kwh)	25274
TOTAL HOURS 01461.2	01461.2

AIR MONITORING

FID (ppm)	Amb	I-1	I-2	E-1
Date: (WITHOUT CARBON FILTER)				
(WITH CARBON FILTER)				
PID (ppm) CAL GAS:			NR	
Date:				

Lab samples taken for analysis at:

WELL FIELD

SVE WELL ID	Well Diameter (feet)	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Bubbler On/Off	PID (ppm)	DO (mg/l)	Remarks
VW-1	4"	18.5'-28.5'	19.80	NR		OFF	on	NR	9.2	
MW-1	4"	32'-41'	22.0				on		9.0	
MW-2	4"	30'-38'	18.69				on		8.8	Black hose in well
MW-4	4"	26'-42'	20.81				on		8.6	
MW-5	4"	31.5'-41'	21.34				on		8.4	
MW-7	4"	30'-40'	19.96				on		8.2	
RW-1 (Bubbler Only)	6"	25'-40'	NR		NA	NA		NA		

Gauge [redacted] Broken

Total Bubbler Data

Total Hours= NR	Total Pressure (psi)=	Total Flow (in H_2O)= 1.0 +	Timer Setting- 1 HR on / 1 HR OFF

Special Instructions: Gauge Broken

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form. Request all TPHG,BTEX, and Benzene results in mg/m³. Report O_2 and CO_2 in % by volume.

Operator: L. RATH Date: 3-22-96

Project # 20805-122.002
ARCO 771 Soil Vapor Extraction System