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

Date June 24, 1996
Project 20805-123.003

To:

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harborbay Parkway, Suite 250
Alameda, California 94502-6577

3858

We are enclosing:

Copies	Description
1	First quarter 1996 groundwater monitoring results and remediation system performance evaluation report, ARCO service station 2035, Albany, 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: Kevin Graves, RWQCB - SFBR
Michael Whelan, ARCO Products Company
File

ARCO Products Company

Date: June 24, 1996

Re: ARCO Station # 2035 • 1001 San Pablo Avenue • Albany, 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 17, 1996
Project 20805-123.003

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 2035, Albany, California

Dear Mr. Whelan:

This letter presents the results of the first quarter 1996 groundwater monitoring program at ARCO Products Company (ARCO) service station 2035, 1001 San Pablo Avenue, Albany, California (Figure 1). Operation and performance data for the site's interim soil-vapor extraction (SVE) and groundwater extraction remediation 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

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

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

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June 17, 1996

ARCO QUARTERLY REPORT

Station No.: 2035	Address: 1001 San Pablo Avenue, San Pablo, California
EMCON Project No.	20805-123.003
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 /Barney Chan
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 soil-vapor extraction (SVE), air-bubbling, and groundwater extraction (GWE) systems.

WORK PROPOSED FOR NEXT QUARTER (Second- 1996):

1. Perform quarterly groundwater monitoring and sampling.
2. Restart SVE, air-sparge, and groundwater treatment systems.
3. Prepare and submit quarterly report for first quarter 1996.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring and Operation and Maintenance of Remediation Systems
Frequency of Sampling:	Quarterly (groundwater), Monthly (SVE)
Frequency of Monitoring:	Quarterly (groundwater), Monthly (SVE)
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Cumulative FP Recovered to Date :	27.9 gallons, Wells AS-1V, AS-2V, RW-1, VW-1, VW-2, and VW-7
FP Recovered This Quarter :	None
Bulk Soil Removed to Date :	605 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:	SVE, Air-Sparge, and Groundwater Extraction Systems
Approximate Depth to Groundwater:	9.5 feet
Groundwater Gradient (Average):	0.009 ft/ft toward southwest (consistent with past events)

SVE QUARTERLY OPERATION AND PERFORMANCE:

Equipment Inventory:	Therm Tech Model VAC-10 Thermal/Catalytic Oxidizer SVE system was shut down on 2-7-96.
Operating Mode:	Catalytic Oxidation
BAAQMD Permit #:	10931
TPH Conc. End of Period (lab):	<15 ppmv (2-7-96)
Benzene Conc. End of Period (lab):	<0.1 ppmv (2-7-96)
SVE Flowrate End of Period:	53.1 scfm (2-7-96)

Total HC Recovered This Period:	9.2 pounds
Total HC Recovered to Date:	2996.5 pounds
Utility Usage	
Electric (KWH):	10,174
Gas/Propane (CF):	1,292
Operating Hours This Period (SVE):	902.0 hours
Operating Hours to Date (SVE):	6149.5 hours
Percent Operational (SVE):	41.3%
Operating Hours This Period (GWE):	1934.1 hours
Percent Operational (GWE):	80.0%
Unit Maintenance:	NA
Number of Auto Shut Downs:	0
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	NA Laboratory analytical results collected during this period indicated the TVHG and benzene concentrations in extracted soil vapor discharged to the atmosphere were below laboratory detection limits.
Stack Temperature:	703°F
SVE Source Flow:	28.6 scfm (2-7-96)
SVE Process Flow:	53.1 scfm (2-7-96)
Source Vacuum:	20 inches of water (2-7-96)

DISCUSSION:

Rising water levels resulted in the submergence of hydrocarbon-impacted zone of soil and screen in the SVE wells. As a result, TPH concentration in extracted soil vapor was below the detection limits in January 1996. Therefore the SVE wells were taken off-line on February 7, 1996. The groundwater treatment system was shut down on March 25, 1996 because of substantial fuel costs being incurred to operate the ThermTech unit for the abatement of off-gas from the groundwater treatment system (aeration tank), and because TPHG concentrations in extracted groundwater decreased from 49,000 µg/L on February 8, 1995 to 70 µg/L on January 30, 1996.

ATTACHED:

- Table 1 - Groundwater Monitoring Data, First Quarter 1996
- Table 2 - Historical Groundwater Elevation Data
- Table 3 - Historical Groundwater Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 4 - Historical Groundwater Analytical Data, Well MW-3
- Table 5 - Approximate Cumulative Floating Product Recovered, Wells AS-1, AS-2, RW-1, VW-1, VW-2, and VW-7
- Table 6 - Soil-Vapor Extraction System Operation and Performance Data
- Table 7 - Soil-Vapor Extraction Well Data
- Table 8 - Influent and Effluent Groundwater Analyses Summary Report
- Table 9 - Estimated Total Dissolved TPHG and Benzene Removed, Summary Report
- Figure 1 - Site Location
- Figure 2 - Site Plan
- Figure 3 - Groundwater Data, First Quarter 1996
- Figure 4 - Soil-Vapor Extraction and Treatment System, Historical System Influent TVHG and Benzene Concentrations
- Figure 5 - Soil-Vapor Extraction and Treatment System, Historical Hydrocarbon Removal Rates

- Figure 6 - Groundwater Treatment System, Historical System Influent TPHG and Benzene Concentrations
- Figure 7 - Groundwater 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, SVE System, First Quarter 1996
- Appendix E - Analytical Results and Chain-of-Custody Documentation, SVE System, First Quarter 1996
- Appendix F - Field Data Sheets, Operation and Maintenance Visits, Groundwater Treatment System, First Quarter 1996
- Appendix G - Analytical Results and Chain-of-Custody Documentation, Groundwater Treatment System, First Quarter 1996

cc: Barney Chan, ACHCSA
Kevin Graves, RWQCB-SFBR

Table 1
Groundwater Monitoring Data
First Quarter 1996

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, 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	**Oil and Grease** SM 5520B&F	**Oil and Grease** SM 5520C	**Oil and Grease** SM 5520F	**TRPH** EPA 418.1	**TPHD** LUFT Method
		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	µg/L	µg/L	µg/L	µg/L
MW-1	02-27-96	41.41	9.08	32.33	ND	SW	0.009	02-27-96	2700	930	12	18	32	51	--	--	--	--	--	--
MW-2	02-27-96	40.38	10.25	30.13	ND	SW	0.009	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-3	02-27-96	41.44	9.41	32.03	ND	SW	0.009	02-27-96	120	3.6	<0.5	2.2	3.7	90	--	--	--	--	<0.5	--
MW-4	02-27-96	40.33	8.84	31.49	ND	SW	0.009	02-27-96	<50	0.8	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-5	02-27-96	41.84	9.52	32.32	ND	SW	0.009	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-6	02-27-96	40.13	11.86	28.27	ND	SW	0.009	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
RW-1	02-27-96	40.33	16.56	23.77	ND	SW	0.009	02-27-96	210	44	7.5	2.5	24	29	--	--	--	--	--	--

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
SM: standard method
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND: none detected
SW: southwest
-- : not analyzed

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20805-123.003

Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, 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	02-01-94	41.41	9.29	32.12	ND	NR	NR
MW-1	04-26-94	41.41	9.25	32.16	ND	NR	NR
MW-1	07-29-94	41.41	9.87	31.54	ND	WSW	0.016
MW-1	11-15-94	41.41	8.76	32.65	ND	WSW	0.019
MW-1	03-24-95	41.41	6.21	35.20	ND	NW	0.037
MW-1	05-24-95	41.41	9.37	32.04	ND	WNW	0.013
MW-1	08-22-95	41.41	10.30	31.11	ND	SW	0.012
MW-1	11-09-95	41.41	12.25	29.16	ND	WSW	0.01
MW-1	02-27-96	41.41	9.08	32.33	ND	SW	0.009
MW-2	02-01-94	40.38	9.66	30.72	ND	NR	NR
MW-2	04-26-94	40.38	9.60	30.78	ND	NR	NR
MW-2	07-29-94	40.38	10.61	29.77	ND	WSW	0.016
MW-2	11-15-94	40.38	9.23	31.15	ND	WSW	0.019
MW-2	03-24-95	40.38	6.96	33.42	ND	NW	0.037
MW-2	05-24-95	40.38	10.02	30.36	ND	WNW	0.013
MW-2	08-22-95	40.38	10.87	29.51	ND	SW	0.012
MW-2	11-09-95	40.38	13.12	27.26	ND	WSW	0.01
MW-2	02-27-96	40.38	10.25	30.13	ND	SW	0.009
MW-3	02-01-94	41.44	9.71	31.73	ND	NR	NR
MW-3	04-26-94	41.44	9.56	31.88	ND	NR	NR
MW-3	07-29-94	41.44	10.65	30.79	ND	WSW	0.016
MW-3	11-15-94	41.44	9.25	32.19	ND	WSW	0.019
MW-3	03-24-95	41.44	7.29	34.15	ND	NW	0.037
MW-3	05-24-95	41.44	9.53	31.91	ND	WNW	0.013
MW-3	08-22-95	41.44	11.19	30.25	ND	SW	0.012
MW-3	11-09-95	41.44	12.77	28.67	ND	WSW	0.01
MW-3	02-27-96	41.44	9.41	32.03	ND	SW	0.009
MW-4	02-01-94	40.33	9.10	31.23	ND	NR	NR
MW-4	04-26-94	40.33	8.94	31.39	ND	NR	NR
MW-4	07-29-94	40.33	10.02	30.31	ND	WSW	0.016
MW-4	11-15-94	40.33	8.47	31.86	ND	WSW	0.019
MW-4	03-24-95	40.33	5.92	34.41	ND	NW	0.037
MW-4	05-24-95	40.33	9.23	31.10	ND	WNW	0.013
MW-4	08-22-95	40.33	10.61	29.72	ND	SW	0.012
MW-4	11-09-95	40.33	11.97	28.36	ND	WSW	0.01
MW-4	02-27-96	40.33	8.84	31.49	ND	SW	0.009

Table 2
Historical Groundwater Elevation Data
1994 - Present*

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, 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-5	02-01-94	41.84	9.74	32.10	ND	NR	NR
MW-5	04-26-94	41.84	9.51	32.33	ND	NR	NR
MW-5	07-29-94	41.84	10.54	31.30	ND	WSW	0.016
MW-5	11-15-94	41.84	9.10	32.74	ND	WSW	0.019
MW-5	03-24-95	41.84	6.23	35.61	ND	NW	0.037
MW-5	05-24-95	41.84	9.61	32.23	ND	WNW	0.013
MW-5	08-22-95	41.84	11.12	30.72	ND	SW	0.012
MW-5	11-09-95	41.84	12.52	29.32	ND	WSW	0.01
MW-5	02-27-96	41.84	9.52	32.32	ND	SW	0.009
MW-6	02-01-94	40.13	11.80	28.33	ND	NR	NR
MW-6	04-26-94	40.13	11.33	28.80	ND	NR	NR
MW-6	07-29-94	40.13	12.16	27.97	ND	WSW	0.016
MW-6	11-15-94	40.13	11.01	29.12	ND	WSW	0.019
MW-6	03-24-95	40.13	9.03	31.10	ND	NW	0.037
MW-6	05-24-95	40.13	12.45	27.68	ND	WNW	0.013
MW-6	08-22-95	40.13	13.32	26.81	ND	SW	0.012
MW-6	11-09-95	40.13	14.13	26.00	ND	WSW	0.01
MW-6	02-27-96	40.13	11.86	28.27	ND	SW	0.009
RW-1	02-01-94	40.33	1.00	39.33	ND	NR	NR
RW-1	04-26-94	40.33	9.30	** 31.06	0.04	NR	NR
RW-1	07-29-94	40.33	9.91	** 30.43	0.02	WSW	0.016
RW-1	11-15-94	40.33	8.89	** 31.51	0.10	WSW	0.019
RW-1	03-24-95	40.33	9.32	** 31.02	0.01	NW	0.037
RW-1	05-24-95	40.33	9.75	** 30.60	0.03	WNW	0.013
RW-1	08-22-95	40.33	10.86	** 29.48	0.02	SW	0.012
RW-1	11-09-95	40.33	20.61	19.72	ND	WSW	0.01
RW-1	02-27-96	40.33	16.56	23.77	ND	SW	0.009

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
WSW: west-southwest
NW: northwest
WNW: west-northwest
SW: southwest
*: 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 2035, Albany, California*, (EMCON, March 25, 1996).
**: [corrected elevation (Z')] = Z + (h * 0.73); where Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

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

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, 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	Oil and Grease SM 5520B&F	Oil and Grease SM 5520C	Oil and Grease SM 5520F	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	µg/L	µg/L	µg/L
MW-1	02-01-94	<50	13	<0.5	0.5	0.6	--	--	--	--	--	--	--
MW-1	04-26-94	990	290	3.5	18	14	--	--	--	--	--	--	--
MW-1	07-29-94	760	280	<2.5	7.1	<2.5	--	--	--	--	--	--	--
MW-1	11-15-94	570	150	7.3	<2.5	30	--	--	--	--	--	--	--
MW-1	03-24-95	8800	3600	<50	62	99	--	--	--	--	--	--	--
MW-1	05-24-95	4800	2000	<20	52	<20	--	--	--	--	--	--	--
MW-1	08-22-95	780	310	<2.5	12	<2.5	14	--	--	--	--	--	--
MW-1	11-09-95	58	14	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-1	02-27-96	2700	930	12	18	32	51	--	--	--	--	--	--
MW-2	02-01-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-2	04-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-2	07-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-2	11-15-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-2	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-2	05-24-95	al analysis											
MW-2	08-22-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-2	11-09-95	al analysis											
MW-2	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-3	02-01-94	<50	1.9	<0.5	2.1	<0.5	--	--	--	<500	<500	--	--
MW-3	04-26-94	<50	1.1	<0.5	2.4	0.9	--	--	--	--	--	<600	--
MW-3	07-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	600	--
MW-3	11-15-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	<500	--
MW-3	03-24-95	51	0.8	<0.5	2.4	<0.5	--	--	--	--	--	<500	--
MW-3	05-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	<500	--
MW-3	08-22-95	<50	<0.5	<0.5	<0.5	<0.5	79	--	--	--	--	<500	--
MW-3	11-09-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	600	--
MW-3	02-27-96	120	3.6	<0.5	2.2	3.7	90	--	--	--	--	<0.5	--
MW-4	02-01-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-4	04-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-4	07-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-4	11-15-94	220	12	19	0.9	39	--	--	--	--	--	--	--
MW-4	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-4	05-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-4	08-22-95	<50	<0.5	<0.5	<0.5	<0.5	99	--	--	--	--	--	--
MW-4	11-09-95	<50	<0.5	<0.5	<0.5	<0.5	--	89	--	--	--	--	--
MW-4	02-27-96	<50	0.8	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--

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

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, 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	Oil and Grease SM 5520B&F	Oil and Grease SM 5520C	Oil and Grease SM 5520F	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	µg/L	µg/L	µg/L
MW-5	02-01-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-5	04-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-5	07-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-5	11-15-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-5	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-5	05-24-95	al analysis											
MW-5	08-22-95	al analysis											
MW-5	11-09-95	al analysis											
MW-5	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
MW-6	02-01-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-6	04-26-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-6	07-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-6	11-15-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-6	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
MW-6	05-24-95	al analysis											
MW-6	08-22-95	al analysis											
MW-6	11-09-95	al analysis											
MW-6	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--	--	--
RW-1	02-01-94	Not sampled: well connected to the remediation system											
RW-1	04-26-94	Not sampled: well contained floating product											
RW-1	07-29-94	Not sampled: well contained floating product											
RW-1	11-15-94	Not sampled: well contained floating product											
RW-1	03-24-95	11000	560	660	150	1700	--	--	--	--	--	--	--
RW-1	05-24-95	Not sampled: well contained floating product											
RW-1	08-22-95	Not sampled: well contained floating product											
RW-1	11-09-95	1600	79	46	13	240	--	--	--	--	--	--	--
RW-1	02-27-96	210	44	7.5	2.5	24	29	--	--	--	--	--	--

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
SM: standard method
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
- - : 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 2035, Albany, California* , (EMCON, March 25, 1996).

Table 4
Historical Groundwater Analytical Data
Additional Parameters

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 05-15-96

Well Designation	Water Sample Field Date	Total VOCs EPA 624	Total SVOCs EPA 3510/ 8270	Total PCBs EPA 3510/ 8080	Cadmium EPA 6010	Chromium EPA 6010	Lead EPA 7421	Zinc EPA 6010	Nickel EPA 6010
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-3	10-29-91	ND(a)	--	--	<10	<10	<5	45	<50
MW-3	03-19-92	--	--	--	--	--	--	--	--
MW-3	06-12-92	--	--	--	--	--	--	--	--
MW-3	09-08-92	--	--	--	--	--	--	--	--
MW-3	10-26-92	ND(b)	--	--	--	--	--	--	--
MW-3	12-01-92	--	ND(c)	ND(d)	--	--	--	--	--
MW-3	01-13-93	Not analyzed: sampling for additional parameters was discontinued							

VOCs: volatile organic compounds
EPA: United Statest Environmental Protection Agency
µg/L: micrograms per liter
SVOCs: semi-volatile organic compounds
PCBs: polychlorinated biphenyls analyzed
ND: not detected (31 compounds tested for VOCs were nondetectable)
(a): all 37 compounds analyzed were nondetectable except for toluene (3.0 ppb)
(b): all 41 compounds analyzed were nondetectable
(c): all 34 compounds analyzed were nondetectable
(d): all 7 compounds analyzed were nondetectable
-- : not analyzed

Table 5
Approximate Cumulative Floating Product Recovered

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-10-96

Well Designations	Date	Floating Product Recovered gallons
RW-1	1992	22.3
RW-1	1993	1.0
RW-1	1994	0.0
AS-1, AS-2, RW-1, VW-1, VW-2, and VW-7	1995	4.6
VW-7	1996	0.003
	1992 to 1996 Total:	27.9

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:		12-07-93	12-08-93	12-09-93	12-10-93	12-15-93
Date End:		12-08-93	12-09-93	12-10-93	12-15-93	12-16-93
Mode of Oxidation:		Therm-Ox (17)	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:		1	0	1	5	1
Days of Downtime:		0	1	0	0	0
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline (3)	2800	NA (18)	NA	NA	NA
	mg/m3 (4) as gasoline	10000	NA	NA	NA	NA
	ppmv as benzene (5)	170	NA	NA	NA	NA
	mg/m3 as benzene	540	NA	NA	NA	NA
System Influent:	ppmv as gasoline	390	NA	390	410	500
	mg/m3 as gasoline	1400	NA	1400	1500	1800
	ppmv as benzene	12	NA	19	31	24
	mg/m3 as benzene	38	NA	60	100	79
System Effluent:	ppmv as gasoline	21	NA	36	6	NA
	mg/m3 as gasoline	76	NA	130	21	NA
	ppmv as benzene	0.7	NA	1	<0.01	NA
	mg/m3 as benzene	2.3	NA	3.1	<0.05	NA
Average Well Field Flow Rate (6), scfm (7):		10.0	0.0	10.0	5.0	45.0
Average System Influent Flow Rate (6), scfm:		100.0	0.0	100.0	87.0	100.0
Average Destruction Efficiency (8), percent (9):		94.6	NA	90.7	98.6	NA
Average Emission Rates (10), pounds per day (11)						
Gasoline:		0.68	0.00	1.17	0.16	NA
Benzene:		0.02	0.00	0.03	<0.00	NA
Operating Hours This Period:		21.00	0.00	23.00	121.00	18.00
Operating Hours To Date:		21.0	21.0	44.0	165.0	183.0
SVE Pounds/ Hour Removal Rate, as gasoline (12):		0.52	0.00	0.52	0.49	0.67
SVE Pounds Removed This Period, as gasoline (13):		11.00	0.00	12.05	59.10	12.13
GWE Pounds Removed This Period, as gasoline (14):		0.00	0.00	0.00	0.00	0.00
Total Pounds Removed This Period, as gasoline (15):		11.00	0.00	12.05	59.10	12.13
Total Pounds Removed To Date, as gasoline:		11.0	11.0	23.1	82.2	94.3
Total Gallons Removed This Period, as gasoline (16):		1.77	0.00	1.94	9.53	1.96
Total Gallons Removed To Date, as gasoline:		1.8	1.8	3.7	13.3	15.2

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:	12-16-93	12-21-93	12-25-93	12-29-93	12-31-93
Date End:	12-21-93	12-25-93	12-29-93	12-31-93	01-07-94
Mode of Oxidation:	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:	0	4	0	2	0
Days of Downtime:	5	0	4	0	7
Average Vapor Concentrations (1)					
Well Field Influent: ppmv (2) as gasoline (3)	NA	NA	NA	NA	NA
mg/m3 (4) as gasoline	NA	NA	NA	NA	NA
ppmv as benzene (5)	NA	NA	NA	NA	NA
mg/m3 as benzene	NA	NA	NA	NA	NA
System Influent: ppmv as gasoline	NA	NA	NA	NA	NA
mg/m3 as gasoline	NA	NA	NA	NA	NA
ppmv as benzene	NA	NA	NA	NA	NA
mg/m3 as benzene	NA	NA	NA	NA	NA
System Effluent: ppmv as gasoline	NA	NA	NA	NA	NA
mg/m3 as gasoline	NA	NA	NA	NA	NA
ppmv as benzene	NA	NA	NA	NA	NA
mg/m3 as benzene	NA	NA	NA	NA	NA
Average Well Field Flow Rate (6), scfm (7):	0.0	20.0	0.0	54.0	0.0
Average System Influent Flow Rate (6), scfm:	0.0	100.0	0.0	78.0	0.0
Average Destruction Efficiency (8), percent (9):	NA	NA	NA	NA	NA
Average Emission Rates (10), pounds per day (11)					
Gasoline:	0.00	0.00	0.00	0.00	0.00
Benzene:	0.00	0.00	0.00	0.00	0.00
Operating Hours This Period:	0.00	104.00	0.00	43.00	0.00
Operating Hours To Date:	183.0	287.0	287.0	330.0	330.0
SVE Pounds/ Hour Removal Rate, as gasoline (12):	0.00	0.00	0.00	0.00	0.00
SVE Pounds Removed This Period, as gasoline (13):	0.00	0.00	0.00	0.00	0.00
GWE Pounds Removed This Period, as gasoline (14):	0.00	0.00	0.00	0.00	0.00
Total Pounds Removed This Period, as gasoline (15):	0.00	0.00	0.00	0.00	0.00
Total Pounds Removed To Date, as gasoline:	94.3	94.3	94.3	94.3	94.3
Total Gallons Removed This Period, as gasoline (16):	0.00	0.00	0.00	0.00	0.00
Total Gallons Removed To Date, as gasoline:	15.2	15.2	15.2	15.2	15.2

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:		01-07-94	01-12-94	01-24-94	03-31-94	12-31-94
Date End:		01-12-94	01-24-94	03-31-94	12-31-94	02-06-95
Mode of Oxidation:		Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox	Therm-Ox
Days of Operation:		5	12	0	0	0
Days of Downtime:		0	0	66	275	37
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline (3)	NA	NA	NA	NA	NA
	mg/m3 (4) as gasoline	NA	NA	NA	NA	NA
	ppmv as benzene (5)	NA	NA	NA	NA	NA
	mg/m3 as benzene	NA	NA	NA	NA	NA
System Influent:	ppmv as gasoline	NA	690	NA	NA	NA
	mg/m3 as gasoline	NA	2500	NA	NA	NA
	ppmv as benzene	NA	11	NA	NA	NA
	mg/m3 as benzene	NA	37	NA	NA	NA
System Effluent:	ppmv as gasoline	NA	14	NA	NA	NA
	mg/m3 as gasoline	NA	52	NA	NA	NA
	ppmv as benzene	NA	0.29	NA	NA	NA
	mg/m3 as benzene	NA	0.93	NA	NA	NA
Average Well Field Flow Rate (6), scfm (7):		37.0	41.0	0.0	0.0	0.0
Average System Influent Flow Rate (6), scfm:		60.0	64.0	0.0	0.0	0.0
Average Destruction Efficiency (8), percent (9):		97.9	97.9	NA	NA	NA
Average Emission Rates (10), pounds per day (11)						
Gasoline:		0.30	0.30	0.00	0.00	0.00
Benzene:		0.01	0.01	0.00	0.00	0.00
Operating Hours This Period:		123.00	285.00	0.00	0.00	8.90
Operating Hours To Date:		453.0	738.0	738.0	738.0	746.9
SVE Pounds/ Hour Removal Rate, as gasoline (12):		0.48	0.60	0.00	0.00	0.00
SVE Pounds Removed This Period, as gasoline (13):		59.40	170.67	0.00	0.00	0.00
GWE Pounds Removed This Period, as gasoline (14):		0.00	0.00	0.00	0.00	0.00
Total Pounds Removed This Period, as gasoline (15):		59.40	170.67	0.00	0.00	0.00
Total Pounds Removed To Date, as gasoline:		153.7	324.3	324.3	324.3	324.3
Total Gallons Removed This Period, as gasoline (16):		9.58	27.53	0.00	0.00	0.00
Total Gallons Removed To Date, as gasoline:		24.8	52.3	52.3	52.3	52.3

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:		02-06-95	03-01-95	04-01-95	06-01-95	07-01-95
Date End:		03-01-95	04-01-95	06-01-95	07-01-95	08-01-95
Mode of Oxidation:		Therm-Ox	Therm-Ox	Therm-Ox	Cat-Ox (19)	Cat-Ox
Days of Operation:		21	7	0	5	26
Days of Downtime:		2	24	61	25	5
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline (3)	1800	2500	NA	3300	130
	mg/m3 (4) as gasoline	6650	8900	NA	12000	480
	ppmv as benzene (5)	17	31	NA	50	4
	mg/m3 as benzene	62	99	NA	170	14
System Influent:	ppmv as gasoline	240	<15	NA	600	130
	mg/m3 as gasoline	880	<60	NA	2200	480
	ppmv as benzene	6	<0.1	NA	10	4
	mg/m3 as benzene	21	<0.5	NA	34	14
System Effluent:	ppmv as gasoline	<15	<15	NA	<15	<15
	mg/m3 as gasoline	<60	<60	NA	<60	<60
	ppmv as benzene	<0.1	<0.1	NA	0.5	<0.1
	mg/m3 as benzene	<0.5	<0.5	NA	1.5	<0.5
Average Well Field Flow Rate (6), scfm (7):		4.7	4.1	1.2	20.9	25.2
Average System Influent Flow Rate (6), scfm:		35.6	32.7	25.3	33.8	33.6
Average Destruction Efficiency (8), percent (9):		93.2	NA	NA	97.3	87.5
Average Emission Rates (10), pounds per day (11)						
Gasoline:		0.19	0.18	NA	0.18	0.18
Benzene:		0.00	0.00	NA	0.00	0.00
Operating Hours This Period:		501.95	162.83	3.02	112.33	614.38
Operating Hours To Date:		1248.9	1411.7	1414.7	1527.0	2141.4
SVE Pounds/ Hour Removal Rate, as gasoline (12):		0.12	0.14	0.00	0.94	0.05
SVE Pounds Removed This Period, as gasoline (13):		58.72	22.24	0.00	105.44	27.81
GWE Pounds Removed This Period, as gasoline (14):		4.28	0.31	0.00	1.42	0.00
Total Pounds Removed This Period, as gasoline (15):		63.00	22.55	0.00	106.86	27.81
Total Pounds Removed To Date, as gasoline:		387.3	409.9	409.9	516.8	544.6
Total Gallons Removed This Period, as gasoline (16):		10.16	3.64	0.00	17.24	4.49
Total Gallons Removed To Date, as gasoline:		62.5	66.1	66.1	83.4	87.8

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:		08-01-95	09-01-95	10-01-95	11-01-95	12-01-95
Date End:		09-01-95	10-01-95	11-01-95	12-01-95	01-01-96
Mode of Oxidation:		Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:		23	30	26	30	21
Days of Downtime:		8	0	5	1	10
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline (3)	1850	617	425	850	940
	mg/m3 (4) as gasoline	7800	2233	1535	3100	3385
	ppmv as benzene (5)	17.5	5.9	4.7	11	7.4
	mg/m3 as benzene	56	19	15	36	23
System Influent:	ppmv as gasoline	1950	457	320	570	310
	mg/m3 as gasoline	8300	1667	1165	2100	1300
	ppmv as benzene	20	4.6	3.9	7	4.1
	mg/m3 as benzene	63	15	12	23	13
System Effluent:	ppmv as gasoline	54	<15	<15	<15	17
	mg/m3 as gasoline	155	<60	<60	<60	63
	ppmv as benzene	1	0.2	0.2	0.4	0.3
	mg/m3 as benzene	3.2	0.6	0.5	1.2	0.9
Average Well Field Flow Rate (6), scfm (7):		27.7	139.7	91.2	68.0	39.5
Average System Influent Flow Rate (6), scfm:		76.5	114.7	88.4	73.4	57.8
Average Destruction Efficiency (8), percent (9):		98.1	96.4	94.8	97.1	95.2
Average Emission Rates (10), pounds per day (11)						
Gasoline:		1.07	0.62	0.48	0.40	0.33
Benzene:		0.02	0.01	0.00	0.01	0.00
Operating Hours This Period:		562.61	717.42	624.47	708.09	493.54
Operating Hours To Date:		2704.0	3421.4	4045.9	4754.0	5247.5
SVE Pounds/ Hour Removal Rate, as gasoline (12):		0.81	1.17	0.52	0.79	0.50
SVE Pounds Removed This Period, as gasoline (13):		454.96	837.62	327.19	558.66	246.98
GWE Pounds Removed This Period, as gasoline (14):		0.49	0.24	0.07	11.02	5.51
Total Pounds Removed This Period, as gasoline (15):		455.45	837.86	327.26	569.68	252.49
Total Pounds Removed To Date, as gasoline:		1000.0	1837.9	2165.1	2734.8	2987.3
Total Gallons Removed This Period, as gasoline (16):		73.46	135.15	52.79	91.89	40.73
Total Gallons Removed To Date, as gasoline:		161.3	296.5	349.2	441.1	481.9

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035
Location: 1001 San Pablo Avenue
Albany, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: Therm Tech Model VAC-10 thermal/catalytic oxidizer

Start-Up Date: 12-07-93
Reporting Period From: 12-07-93
To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

Date Begin:		01-01-96	02-01-96 (20)	03-01-96
Date End:		02-01-96	03-01-96	04-01-96
Mode of Oxidation:		Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:		31	29	24
Days of Downtime:		0	0	7
Average Vapor Concentrations (1)				
Well Field Influent:	ppmv (2) as gasoline (3)	<15	<15	NA
	mg/m3 (4) as gasoline	<60	<60	NA
	ppmv as benzene (5)	<0.1	<0.1	NA
	mg/m3 as benzene	<0.5	<0.5	NA
System Influent:	ppmv as gasoline	<15	<15	NA
	mg/m3 as gasoline	<60	<60	NA
	ppmv as benzene	0.3	0.3	NA
	mg/m3 as benzene	0.9	0.9	NA
System Effluent:	ppmv as gasoline	<15	<15	NA
	mg/m3 as gasoline	<60	<60	NA
	ppmv as benzene	<0.1	<0.1	NA
	mg/m3 as benzene	<0.5	<0.5	NA
Average Well Field Flow Rate (6), scfm (7):		24.8	28.6	0.0
Average System Influent Flow Rate (6), scfm:		51.2	53.1	0.0
Average Destruction Efficiency (8), percent (9):		NA	NA	NA
Average Emission Rates (10), pounds per day (11)				
Gasoline:		0.28	0.29	NA
Benzene:		0.00	0.00	NA
Operating Hours This Period:		744.00	158.00	0.00
Operating Hours To Date:		5991.5	6149.5	6149.5
SVE Pounds/ Hour Removal Rate, as gasoline (12):		0.01	0.01	0.00
SVE Pounds Removed This Period, as gasoline (13):		4.14	1.01	0.00
GWE Pounds Removed This Period, as gasoline (14):		3.99	0.00	0.01
Total Pounds Removed This Period, as gasoline (15):		8.13	1.01	0.01
Total Pounds Removed To Date, as gasoline:		2995.5	2996.5	2996.5
Total Gallons Removed This Period, as gasoline (16):		1.31	0.16	0.00
Total Gallons Removed To Date, as gasoline:		483.2	483.3	483.3

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2035	Vapor Treatment Unit: Therm Tech Model
Location: 1001 San Pablo Avenue Albany, California	VAC-10 thermal/catalytic oxidizer
Consultant: EMCON	Start-Up Date: 12-07-93
1921 Ringwood Avenue	Reporting Period From: 12-07-93
San Jose, California	To: 04-01-96

SVE system was shut down on 2-7-96.
Groundwater treatment system was shut down on 3-25-96.

CURRENT REPORTING PERIOD:	01-01-96	to	04-01-96
DAYS / HOURS IN PERIOD:	91	2184.0	
DAYS / HOURS OF OPERATION:	84	902.0	
DAYS / HOURS OF DOWN TIME:	7	1282.0	
PERCENT OPERATIONAL:		41.3 %	
PERIOD POUNDS REMOVED:	9.2		
PERIOD GALLONS REMOVED:	1.5		
AVERAGE WELL FIELD FLOW RATE (scfm):		25.5	
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		51.5	

1. Average vapor monitoring concentrations were calculated for all periods after February 6, 1995. 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. Between December 7, 1993, and February 6, 1995:
   Concentration (as gasoline in ppmv) = [concentration (as gasoline in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 87 lb/lb-mole
4. mg/m3: milligrams per cubic meter
5. Between December 7, 1993, and February 6, 1995:
   Concentration (as benzene in ppmv) = [concentration (as benzene in mg/m3) x 24.05 (lb/m3/lb-mole of air)/mg] / 78 lb/lb-mole
6. Average flow rates (time weighted average) are based on instantaneous flow rates recorded during the month; refer to Appendix C for instantaneous flow data.
7. scfm: flow in standard cubic feet per minute at one atmosphere and 70 degrees Fahrenheit
8. Average destruction efficiencies are calculated using monthly average concentrations; refer to Appendix C for instantaneous destruction efficiency data.
9. 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
10. Average emission rates are calculated using monthly average concentrations and flow rates; refer to Appendix C for instantaneous emission rate data.
11. 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
12. 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
13. Soil-vapor extraction (SVE) pounds removed this period (as gasoline) = pounds/ hour removal rate (SVE) x hours of operation (SVE)
14. Groundwater extraction (GWE); refer to Table 9 for GWE system performance data
15. Represents the total mass recovered by the SVE and GWE systems, and the total mass abated by the thermal/catalytic oxidizer
16. gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1613 gallons/pound of gasoline
17. Therm-Ox: thermal oxidation
18. NA: not analyzed, not applicable, or not available
19. Cat-Ox: catalytic oxidation; the SVE system's abatement unit was converted to the Cat-Ox mode of operation on June 20, 1995
20. On February 7, 1996 the SVE wells were taken off-line; however, the therm tech unit remained on for the groundwater extraction system.
21. The utility costs for February and March were $694.00 and $649.00, respectively. The SVE system was shut down on February 7, 1996, therefore cost per pound was not calculated for these periods. The utility costs incurred during February and March are associated with the off gas abatement for the aeration tank.

Table 7
Soil-Vapor Extraction Well Data

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Date	Well Identification											
	VW-1			VW-2			VW-3			VW-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
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
02-08-95	open	<17 LAB	20.0	open	<17 LAB	20.0	open	0.0 PID	20.0	open	0.0 PID	20.0
02-14-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	11.0	open	NA	NA	open	NA	NA	open	NA	NA
03-08-95	open	NA	28.0	closed	NA	17.0	closed	NA	0.0	closed	NA	26.0
03-08-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
06-20-95	open	NA	9.0	open	NA	10.0	closed	NA	NA	closed	NA	NA
06-26-95	open	59000 LAB	17.0	open	56000 LAB	15.0	closed	NA	0.0	closed	NA	14.0
07-10-95	open	NA	NA	open	NA	NA	closed	NA	NA	closed	NA	NA
08-08-95	open	NA	47.0	open	NA	46.0	open	NA	47.0	open	NA	47.0
09-12-95	open	3390 PID	26.7	open	2332 PID	26.5	open	263 PID	25.0	open	1736 PID	26.3
09-28-95	open	1498 PID	30.0	open	1075 PID	29.0	open	235 PID	26.0	open	911 PID	30.0
09-28-95	open	1800 LAB	NA	open	1500 LAB	NA	open	180 LAB	NA	open	990 LAB	NA
09-28-95	open	NA	NA	open	NA	NA	closed	NA	NA	open	NA	NA
09-29-95	open	NA	NA	open	NA	NA	closed	NA	NA	open	NA	NA
10-26-95	open	NA	25.5	open	NA	25.5	closed	NA	0.0	open	NA	25.3
12-05-95	open	NA	54.0	open	NA	54.0	closed	NA	NA	closed	NA	NA
02-07-96	open	698 PID	NA	open	390 PID	NA	open	501 PID	NA	open	610 PID	NA
03-25-96	System was manually shut down.											

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

Table 7
Soil-Vapor Extraction Well Data

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Date	Well Identification											
	VW-5			VW-6			VW-7			VW-8		
	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
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
02-08-95	open	0.0 PID	24.0	open	<17 LAB	10.0	open	0.0 PID	24.0	open	<17 LAB	20.0
02-14-95	open	NA	NA	closed	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	NA	closed	NA	16.0	open	NA	NA	open	NA	NA
03-08-95	closed	NA	1.0	closed	NA	8.0	closed	NA	22.0	closed	NA	0.0
03-08-95	closed	NA	NA	open	NA	NA	closed	NA	NA	closed	NA	NA
06-20-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
06-26-95	closed	NA	7.0	closed	NA	34.0	closed	NA	16.0	closed	NA	2.0
07-10-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
08-08-95	open	NA	46.0	open	NA	36.0	open	NA	47.0	open	NA	43.0
09-12-95	open	243 PID	26.2	open	587 PID	27.7	open	1297 PID	25.5	open	830 PID	26.2
09-28-95	open	301 PID	30.0	open	230 PID	32.0	open	941 PID	30.0	open	956 PID	29.0
09-28-95	open	280 LAB	NA	open	250 LAB	NA	open	1400 LAB	NA	open	2000 LAB	NA
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	open	NA	NA	closed	NA	NA	open	NA	NA	open	NA	NA
10-26-95	open	NA	25.3	closed	NA	0.0	open	NA	19.0	open	NA	21.9
12-05-95	closed	NA	NA	closed	NA	NA	open	NA	54.0	closed	NA	NA
02-07-96	open	47.2 PID	NA	open	840 PID	NA	open	102 PID	NA	open	780 PID	NA
03-25-96	System was manually shut down.											

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

Table 7
Soil-Vapor Extraction Well Data

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Date	Well Identification											
	VW-9			RW-1			AS-1V			AS-2V		
	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
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
02-08-95	open	0.0 PID	23.0	open	13.7 PID	20.0	open	<17 LAB	24.0	open	<17 LAB	24.0
02-14-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
02-15-95	open	NA	NA	open	NA	13.0	passive	NA	5.0	passive	NA	1.0
03-08-95	closed	NA	8.0	open	NA	28.0	passive	NA	0.0	passive	NA	0.0
03-08-95	closed	NA	NA	closed	NA	NA	open	NA	NA	open	NA	NA
06-20-95	closed	NA	NA	open	NA	10.0	open	NA	10.0	open	NA	10.0
06-26-95	closed	NA	8.0	open	4800 LAB	19.0	open	40000 LAB	15.0	open	40000 LAB	15.0
07-10-95	closed	NA	NA	open(b)	NA	NA	open	NA	NA	open	NA	NA
08-08-95	open	NA	44.5	open	NA	49.0	open	NA	44.5	open	NA	44.5
09-12-95	open	566 PID	25.3	open	1072 PID	26.3	open	2522 PID	26.6	open	2522 PID	26.6
09-28-95	open	393 PID	25.0	open	921 PID	31.0	open	1213 PID	26.5	open	1183 PID	26.0
09-28-95	open	500 LAB	NA	open	1100 LAB	NA	open	1400 LAB	NA	open	1500 LAB	NA
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	closed	NA	NA
09-29-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
10-26-95	open	NA	22.4	open	NA	23.9	open	NA	25.7	open	NA	25.7
12-05-95	closed	NA	NA	closed	NA	NA	open	NA	54.0	closed	NA	NA
02-07-96	open	1110 PID	NA	open	57 PID	NA	open	465 PID	NA	open	465 PID	NA
03-25-96	System was manually shut down.											

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

Table 8
Influent and Effluent Groundwater Analyses

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
I-1	02-08-95	NA	NA	NA	NA	NA
I-1	02-08-95	49000	4300	4900	1000	5200
I-1	02-14-95	33000	4300	5800	970	5600
I-1	02-21-95	21000	940	1500	360	4000
I-1	02-28-95	15000	430	290	54	2000
I-1	03-08-95	15000	430	290	54	2000
I-1	06-20-95	20000	1500	1200	220	2300
I-1	08-08-95	11000	970	1100	210	1800
I-1	09-12-95	2700	200	150	29	290
I-1	10-11-95	1000	97	38	7	69
I-1	11-08-95	2500	38	27	8	240
I-1	11-30-95	29000	190	530	300	3100
I-1	01-30-96	70	4.5	1.8	<0.5	8.3
I-2	02-08-95	NA	NA	NA	NA	NA
I-2	02-08-95	1500	59	70	14	86
I-2	02-14-95	1500	59	70	14	86
I-2	02-21-95	340	7.2	8.8	1.9	37
I-2	02-28-95	390	3.9	2.5	0.9	16
I-2	03-08-95	390	3.9	2.5	0.9	16
I-2	06-20-95	2200	30	27	11	77
I-2	08-08-95	330	17	18	3.5	36
I-2	09-12-95	78	4.1	3	<0.5	8.9
I-2	10-11-95	<50	0.9	<0.5	<0.5	1
I-2	11-08-95	1800	2.5	2.7	3.8	35
I-2	11-30-95	220	5	7.4	1.7	22
I-2	01-30-96	<50	<0.5	<0.5	<0.5	<0.5

Table 8
Influent and Effluent Groundwater Analyses

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Well Designation	Water Sample Field Date	TPHG µg/L	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L
I-3	02-08-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-14-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-21-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	02-28-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	06-20-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	08-08-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	09-12-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	10-11-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	11-08-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	11-30-95	<50	<0.5	<0.5	<0.5	<0.5
I-3	01-30-96	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-08-95	<50	0.7	<0.5	<0.5	<0.5
E-1	02-14-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-21-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	02-28-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	06-20-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	08-08-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	09-12-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	10-11-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	11-08-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	11-30-95	<50	<0.5	<0.5	<0.5	<0.5
E-1	01-30-96	<50	<0.5	<0.5	<0.5	<0.5

TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter
NA: not analyzed

Table 9
Estimated Total Dissolved TPHG Removed

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Sample Designation	Sample Date	Groundwater Extraction			TPHG Removal Data					Benzene Removal Data				
		Total Volume Extracted	Period Volume Extracted	Period Flow Rate	Period Influent Concentration	Period Removal Rate	Period Pounds Removed [1]	Total Pounds Removed	Total Gallons Removed [2]	Period Influent Concentration	Period Removal Rate	Period Pounds Removed [3]	Total Pounds Removed	Total Gallons Removed [4]
		gallons	gallons	gpd	µg/L	lbs/day	pounds	pounds	gallons	µg/L	lbs/day	pounds	pounds	gallons
I-1	02-08-95	628	0	0	NA	0.000	0.000	0.000	0.000	NA	0.0000	0.0000	0.0000	0.0000
I-1	02-08-95	880	252	2,520	49,000	1.031	0.103	0.103	0.017	4,300	0.0904	0.0090	0.0090	0.0012
I-1	02-14-95	1,329	449	76	33,000	0.021	0.124	0.227	0.037	4,300	0.0027	0.0161	0.0251	0.0035
I-1	02-21-95	15,499	14,170	2,051	21,000	0.360	2.484	2.710	0.437	940	0.0161	0.1112	0.1363	0.0188
I-1	02-28-95	28,788	13,289	1,894	15,000	0.237	1.664	4.374	0.706	430	0.0068	0.0477	0.1840	0.0254
I-1	03-08-95	31,358	2,570	316	15,000	0.040	0.322	4.696	0.757	430	0.0011	0.0092	0.1932	0.0266
I-1	06-20-95	31,695	337	3	20,000	0.001	0.056	4.752	0.767	1,500	0.0000	0.0042	0.1975	0.0272
I-1	06-30-95	40,933	9,238	924	20,000	0.154	1.542	6.294	1.015	1,500	0.0116	0.1157	0.3131	0.0432
I-1	08-08-95	46,416	5,483	141	11,000	0.013	0.503	6.798	1.097	970	0.0011	0.0444	0.3575	0.0493
I-1	09-12-95	57,434	11,018	315	2,700	0.007	0.248	7.046	1.137	200	0.0005	0.0184	0.3759	0.0518
I-1	10-11-95	66,534	9,100	314	1,000	0.003	0.076	7.122	1.149	97	0.0003	0.0074	0.3833	0.0529
I-1	11-08-95	106,654	40,120	1,433	2,500	0.030	0.837	7.959	1.284	38	0.0005	0.0127	0.3960	0.0546
I-1	11-30-95	151,566	44,912	2,041	29,000	0.494	10.871	18.831	3.037	190	0.0032	0.0712	0.4672	0.0644
I-1	12-22-95	174,511	22,945	1,043	29,000	0.252	5.554	24.385	3.933	190	0.0017	0.0364	0.5036	0.0695
I-1	01-01-96	191063*	16,552	1,655	29000**	0.401	4.007	28.391	4.580	190**	0.0026	0.0262	0.5299	0.0731
I-1	01-30-96	251,187	60,124	2,073	70	0.001	0.035	28.426	4.585	4.5	0.0001	0.0023	0.5321	0.0734
I-1	04-01-96	296826*	45,639	736	70**	0.000	0.027	28.453	4.589	4.5**	0.0000	0.0017	0.5339	0.0736

Table 9
Estimated Total Dissolved TPHG Removed

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

Date: 06-13-96

Sample Desig-nation	Sample Date	Groundwater Extraction			TPHG Removal Data					Benzene Removal Data				
		Total Volume Extracted	Period Volume Extracted	Period Flow Rate	Period Influent Concentration	Period Removal Rate	Period Pounds Removed [1]	Total Pounds Removed	Total Gallons Removed [2]	Period Influent Concentration	Period Removal Rate	Period Pounds Removed [3]	Total Pounds Removed	Total Gallons Removed [4]
		gallons	gallons	gpd	µg/L	lbs/day	pounds	pounds	gallons	µg/L	lbs/day	pounds	pounds	gallons
I-2	02-08-95	628	0	0	NA	0.000	0.000	0.000	0.000	NA	0.0000	0.0000	0.0000	0.0000
I-2	02-08-95	880	252	2,520	1,500	0.032	0.003	0.003	0.001	59	0.0012	0.0001	0.0001	0.0000
I-2	02-14-95	1,329	449	85	1,500	0.001	0.006	0.009	0.001	59	0.0000	0.0002	0.0003	0.0000
I-2	02-21-95	15,499	14,170	2,024	340	0.006	0.040	0.049	0.008	7	0.0001	0.0009	0.0012	0.0002
I-2	02-28-95	28,788	13,289	1,898	390	0.006	0.043	0.092	0.015	4	0.0001	0.0004	0.0016	0.0002
I-2	03-08-95	31,358	2,570	321	390	0.001	0.008	0.101	0.016	4	0.0000	0.0001	0.0017	0.0002
I-2	06-20-95	31,695	337	3	2,200	0.000	0.006	0.107	0.017	30	0.0000	0.0001	0.0018	0.0002
I-2	06-30-95	40,933	9,238	924	2,200	0.017	0.170	0.276	0.045	30	0.0002	0.0023	0.0041	0.0006
I-2	08-08-95	46,416	5,483	141	330	0.000	0.015	0.292	0.047	17	0.0000	0.0008	0.0049	0.0007
I-2	09-12-95	57,434	11,018	315	78	0.000	0.007	0.299	0.048	4	0.0000	0.0004	0.0053	0.0007
I-2	10-11-95	66,534	9,100	314	<50	0.000	0.004	0.303	0.049	1	0.0000	0.0001	0.0053	0.0007
I-2	11-08-95	106,654	40,120	1,433	1,800	0.022	0.603	0.905	0.146	3	0.0000	0.0008	0.0062	0.0009
I-2	11-30-95	151,566	44,912	2,041	220	0.004	0.082	0.988	0.159	5	0.0001	0.0019	0.0080	0.0011
I-2	12-22-95	174,511	22,945	1,043	220	0.002	0.042	1.030	0.166	5	0.0000	0.0010	0.0090	0.0012
I-2	01-01-96	191063*	16,552	1,655	220**	0.003	0.030	1.060	0.171	5**	0.0001	0.0007	0.0097	0.0013
I-2	01-30-96	251,187	60,124	2,073	<50	0.001	0.025	1.085	0.175	<0.5	0.0000	0.0003	0.0099	0.0014
I-2	04-01-96	296826*	45,639	736	<50**	0.000	0.019	1.104	0.178	<0.5**	0.0000	0.0002	0.0101	0.0014

Table 9
Estimated Total Dissolved TPHG Removed

ARCO Service Station 2035
1001 San Pablo Avenue, Albany, California

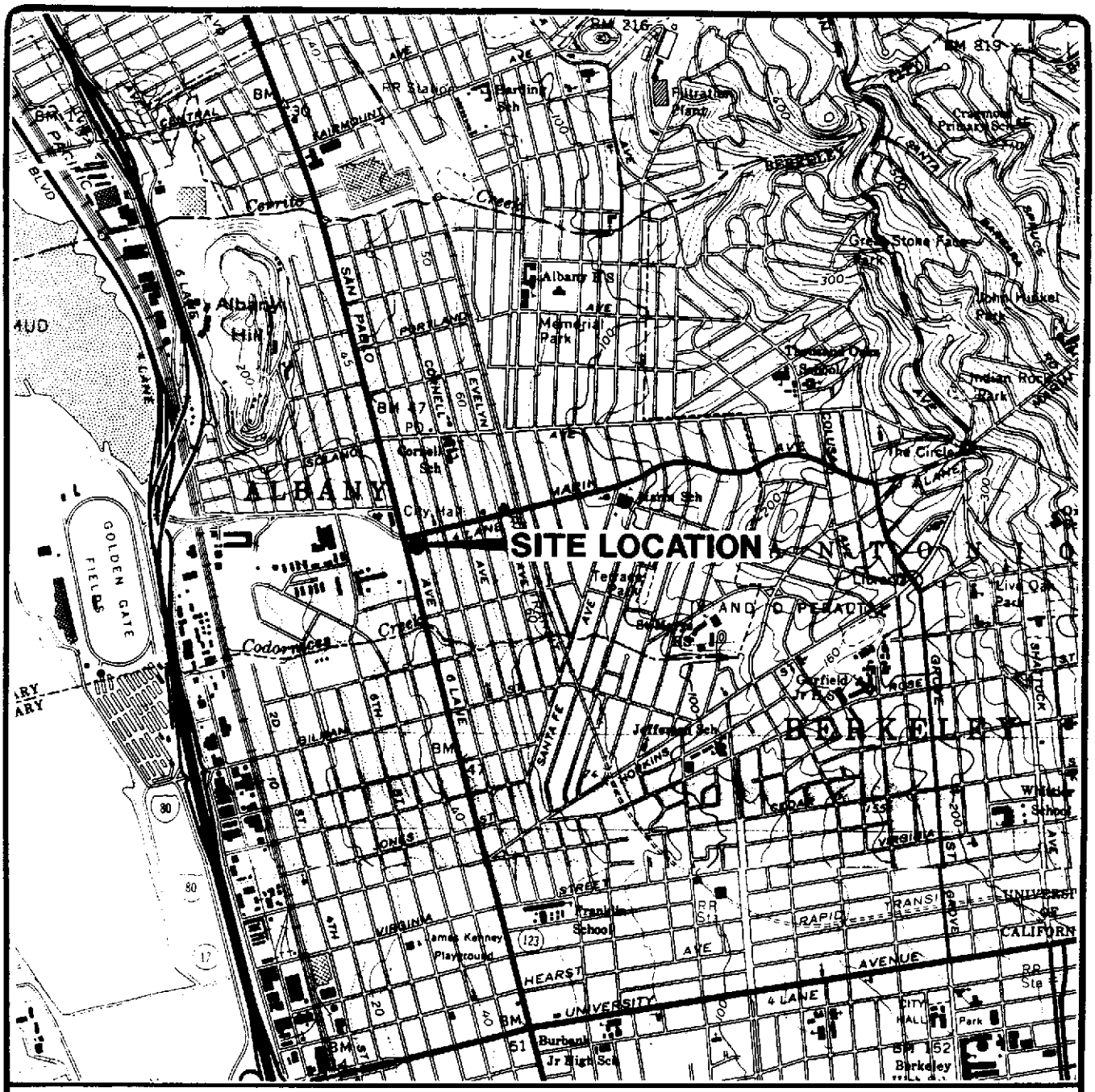
Date: 06-13-96

Sample Designation	Sample Date	Groundwater Extraction: Total Volume Extracted (gallons)	Groundwater Extraction: Period Volume Extracted (gallons)	Groundwater Extraction: Period Flow Rate (gpd)	TPHG Removal Data: Period Influent Concentration (µg/L)	TPHG Removal Data: Period Removal Rate (lbs/day)	TPHG Removal Data: Period Pounds Removed [1] (pounds)	TPHG Removal Data: Total Pounds Removed (pounds)	TPHG Removal Data: Total Gallons Removed [2] (gallons)	Benzene Removal Data: Period Influent Concentration (µg/L)	Benzene Removal Data: Period Removal Rate (lbs/day)	Benzene Removal Data: Period Pounds Removed [3] (pounds)	Benzene Removal Data: Total Pounds Removed (pounds)	Benzene Removal Data: Total Gallons Removed [4] (gallons)
CURRENT REPORTING PERIOD:	12-22-95	to	04-01-96											
DAYS / HOURS IN PERIOD:	101	2,424.0												
DAYS / HOURS OF OPERATION:	81	1,934.1												
DAYS / HOURS OF DOWN TIME:	20	489.9												
PERCENT OPERATIONAL:		80%												
PERIOD GROUNDWATER EXTRACTED (gallons):					122,315									
PERIOD HYDROCARBON REMOVAL (TOTAL):					4.069	pounds	0.656	gallons		0.0302	pounds	0.0042	gallons	
HYDROCARBONS REMOVED BY AERATION TANK:					3.994	pounds	0.644	gallons		0.0291	pounds	0.0040	gallons	
HYDROCARBONS REMOVED BY CARBON:					0.075	pounds	0.012	gallons		0.0011	pounds	0.0002	gallons	
PERCENT PRIMARY CARBON LOADING: [5]					11%									
PERIOD AVERAGE FLOW RATE (gpd):					1,211	(includes down time)								
PERIOD AVERAGE FLOW RATE (gpd):					1,518	(excludes down time)								
PERIOD AVERAGE FLOW RATE (gpm):					1.1	(excludes down time)								

TPHG: total petroleum hydrocarbons as gasoline
gpd: gallons per day
µg/L: micrograms per liter
lbs/day: pounds per day
NA: not analyzed
gpm: gallons per minute
*: The totalizer reading of the groundwater system was estimated from two consecutive monitoring events.
**: The TPHG and benzene concentrations were assumed to be equal to the previous sampling event.

1. Period TPHG removed (pounds) = period influent TPHG concentration (µg/L) x period volume of groundwater extracted (gallons) x 3.7854 (liters/gallon) x 0.000000002205 (pounds/µg)
2. Total TPHG removed (gallons) = total TPHG removed (pounds) x 0.1613 (gallons/pound)
3. Period benzene removed (pounds) = period influent benzene concentration (µg/L) x period volume of groundwater extracted (gallons) x 3.7854 (liters/gallon) x 0.000000002205 (pounds/µg)
4. Total benzene removed (gallons) = total benzene removed (pounds) x 0.1379 (gallons/pound)
5. Percent carbon loading = (total TPHG removed (1.030 pounds) / 10 pounds of TPH-G) x 100
   The percent carbon loading calculation assumes a 5% by weight carbon adsorption efficiency. The treatment system uses two 200 pound carbon canisters.
   Carbon Loading (10 lbs TPHG) = 1 canister x 200 lbs carbon/canister x 1 lb TPHG/20 lb carbon
6. Assumption that the BTEX and TPHG concentrations in the groundwater treatment system samples are the same as the previous sampling event on 11-30-95. System sampling schedule was reduced from monthly to quarterly by EBMUD during the third quarter 1995, therefore samples were not collected in December 1995.

152753

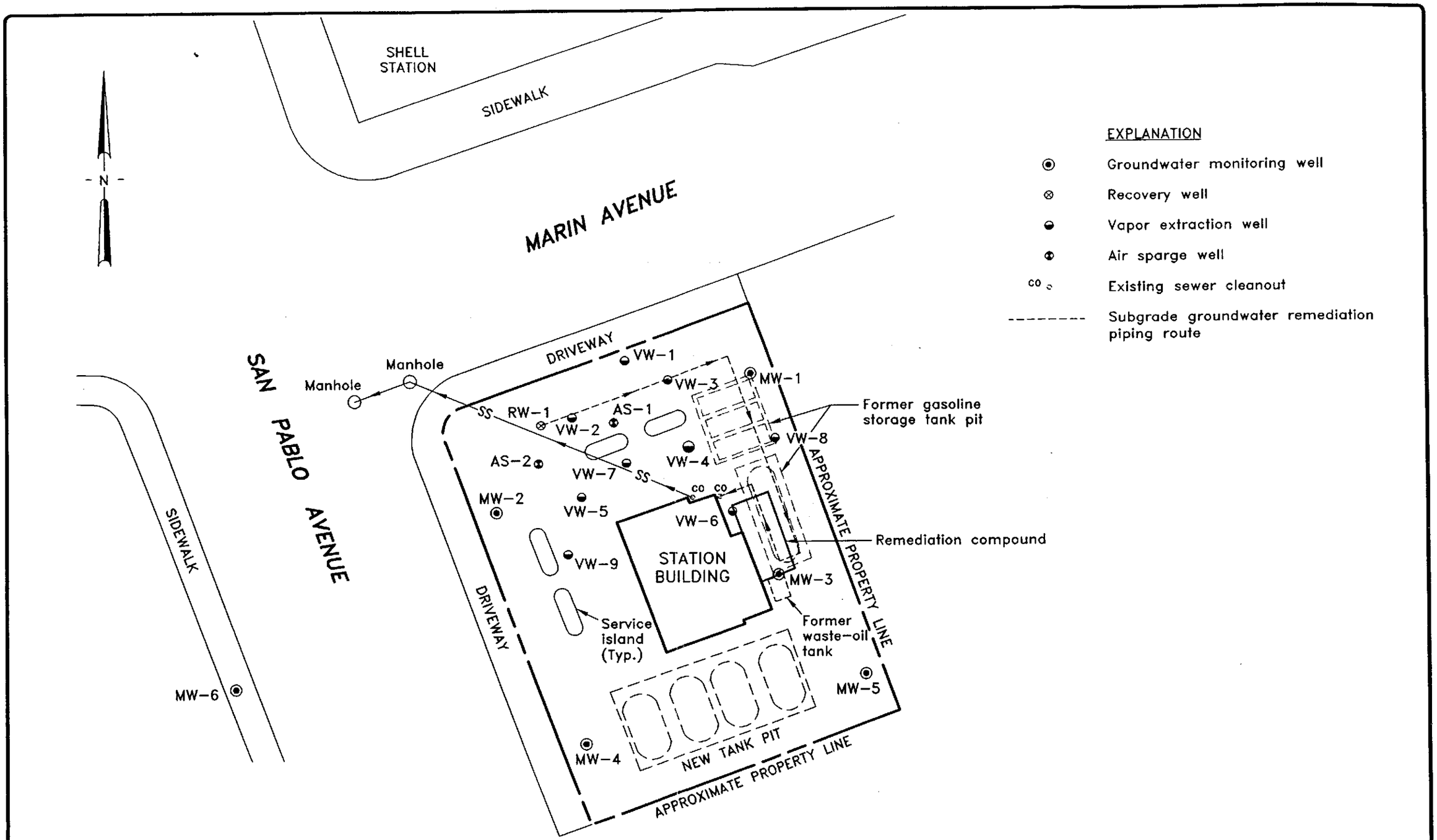


EMCON

ARCO PRODUCTS COMPANY
SERVICE STATION 2035, 1001 SAN PABLO AVENUE
QUARTERLY GROUNDWATER MONITORING
ALBANY, CALIFORNIA

SITE LOCATION

FIGURE
1
PROJECT NO.
805-123.03



emcon

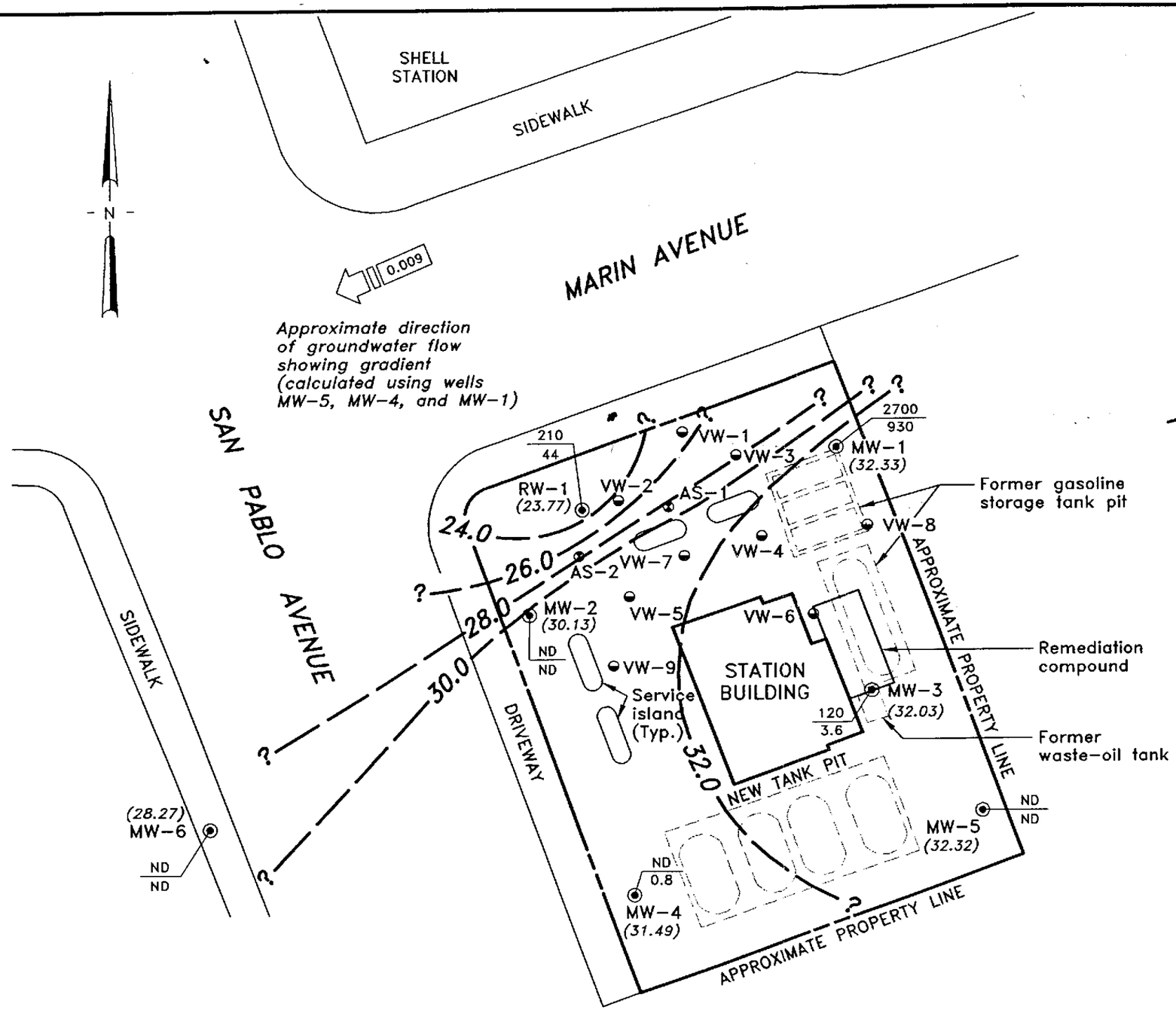
SCALE: 0 30 60 FEET

ARCO PRODUCTS COMPANY
SERVICE STAION 2035, 1001 SAN PABLO AVENUE
QUARTERLY GROUNDWATER MONITORING
ALBANY, CALIFORNIA

SITE PLAN

FIGURE NO.
2
PROJECT NO.
805-123.03

S:\805-123\SITEPLAN REV 2 06/10/93 10:26:10 AM



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Air sparge well
- (32.33) Groundwater elevation (Ft.-MSL); measured 2/27/96
- 28.0 Groundwater elevation contour (Ft.-MSL)
- 2700 / 930 TPHG concentration in groundwater (ug/L); sampled 2/27/96 / Benzene concentration in groundwater (ug/L); sampled 2/27/96
- ND Not detected at or above the method reporting limit for TPHG (50 ug/L) or benzene (0.5 ug/L)

EMCON

SCALE: 0 30 60 FEET

ARCO PRODUCTS COMPANY
SERVICE STATION 2035, 1001 SAN PABLO AVENUE
QUARTERLY GROUNDWATER MONITORING
ALBANY, CALIFORNIA

GROUNDWATER DATA
FIRST QUARTER 1996

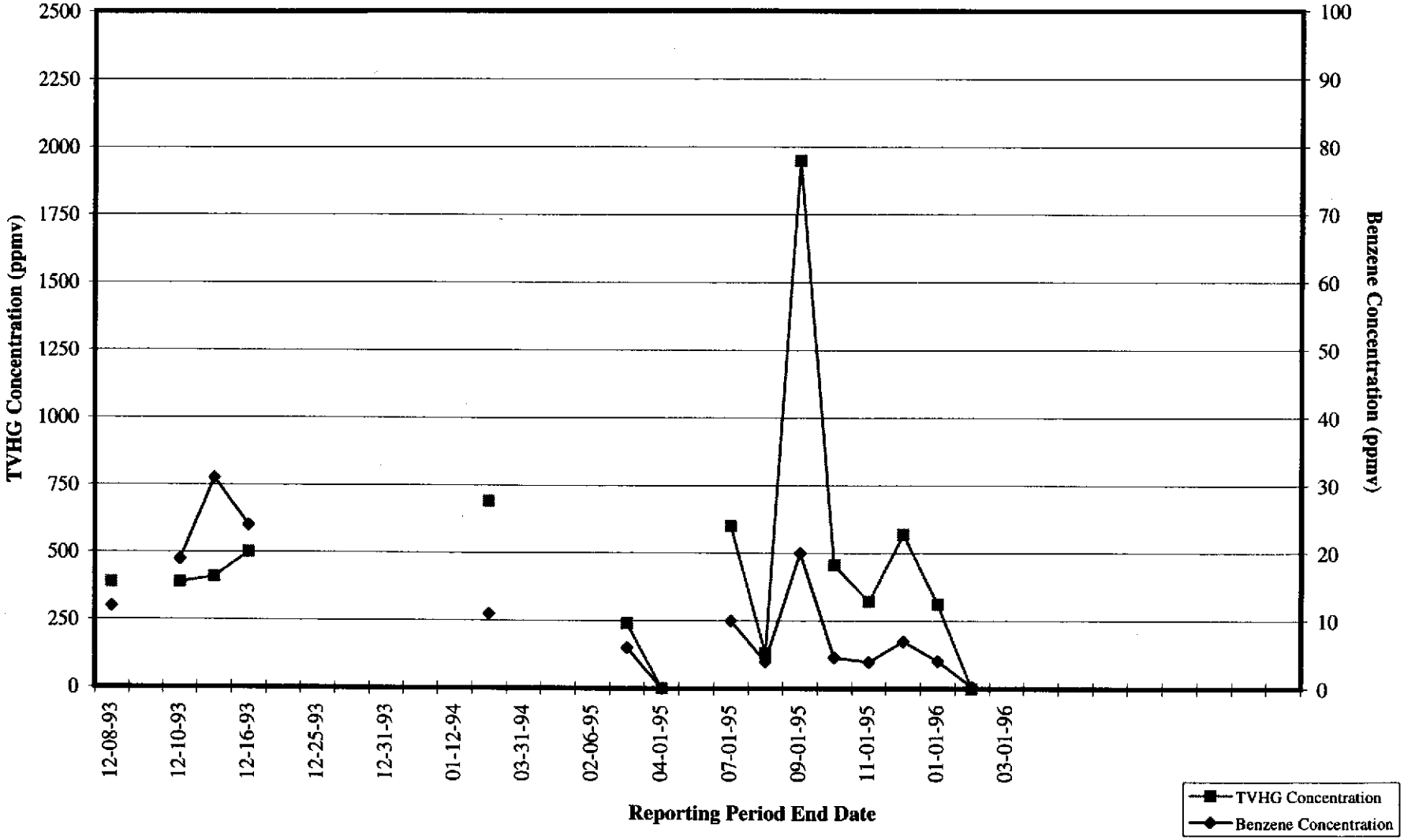
FIGURE NO. 3

PROJECT NO. 805-123.003

G:\805-123\GOO REV 0 05/08/96 15:39:43 DD DJ

Figure 4

ARCO Service Station 2035
Soil-Vapor Extraction and Treatment System
Historical System Influent TVHG and Benzene Concentrations

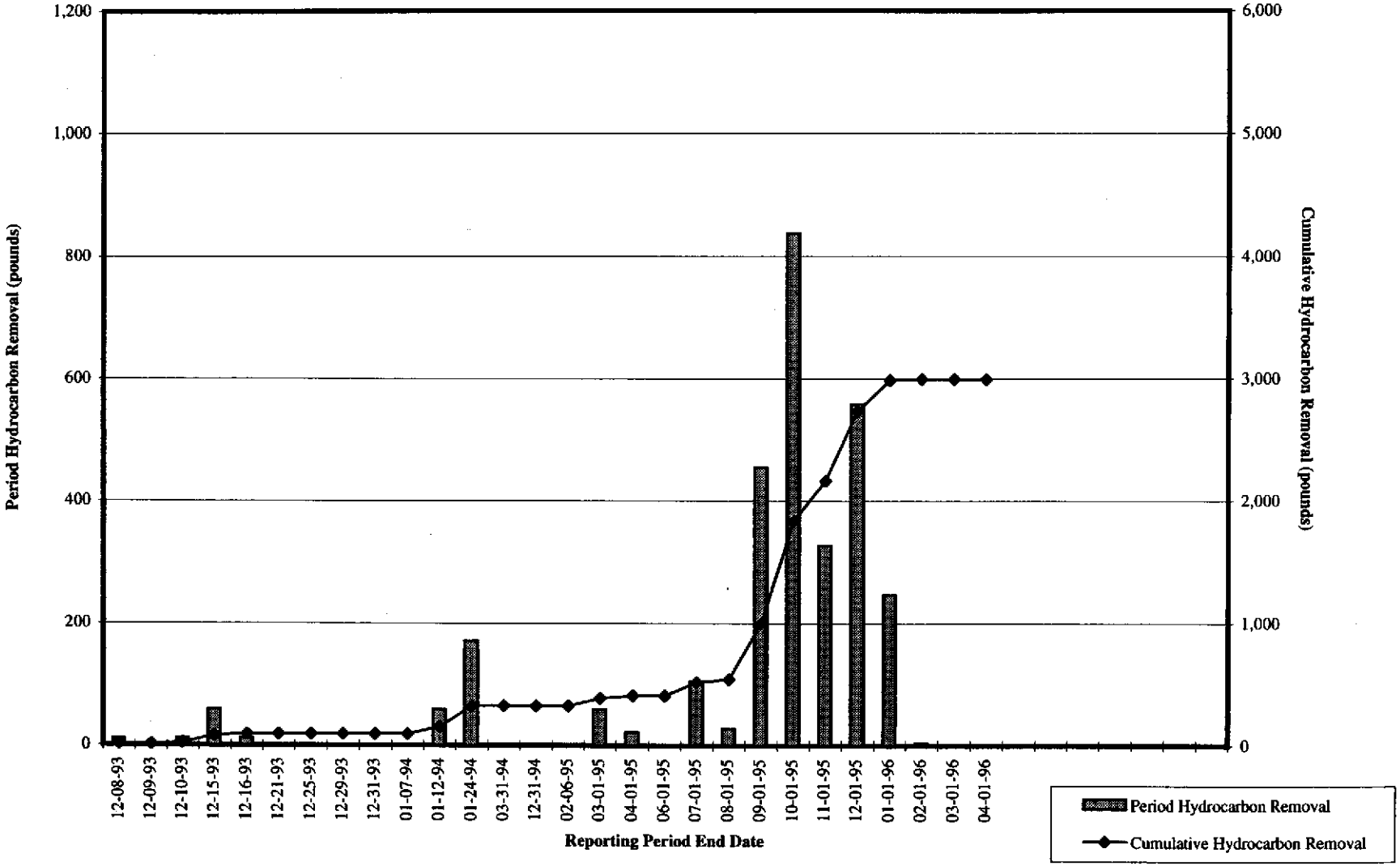


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/h:\2035\2035tdb.xls\SVE Model:imi
20805-123.003

Figure 5

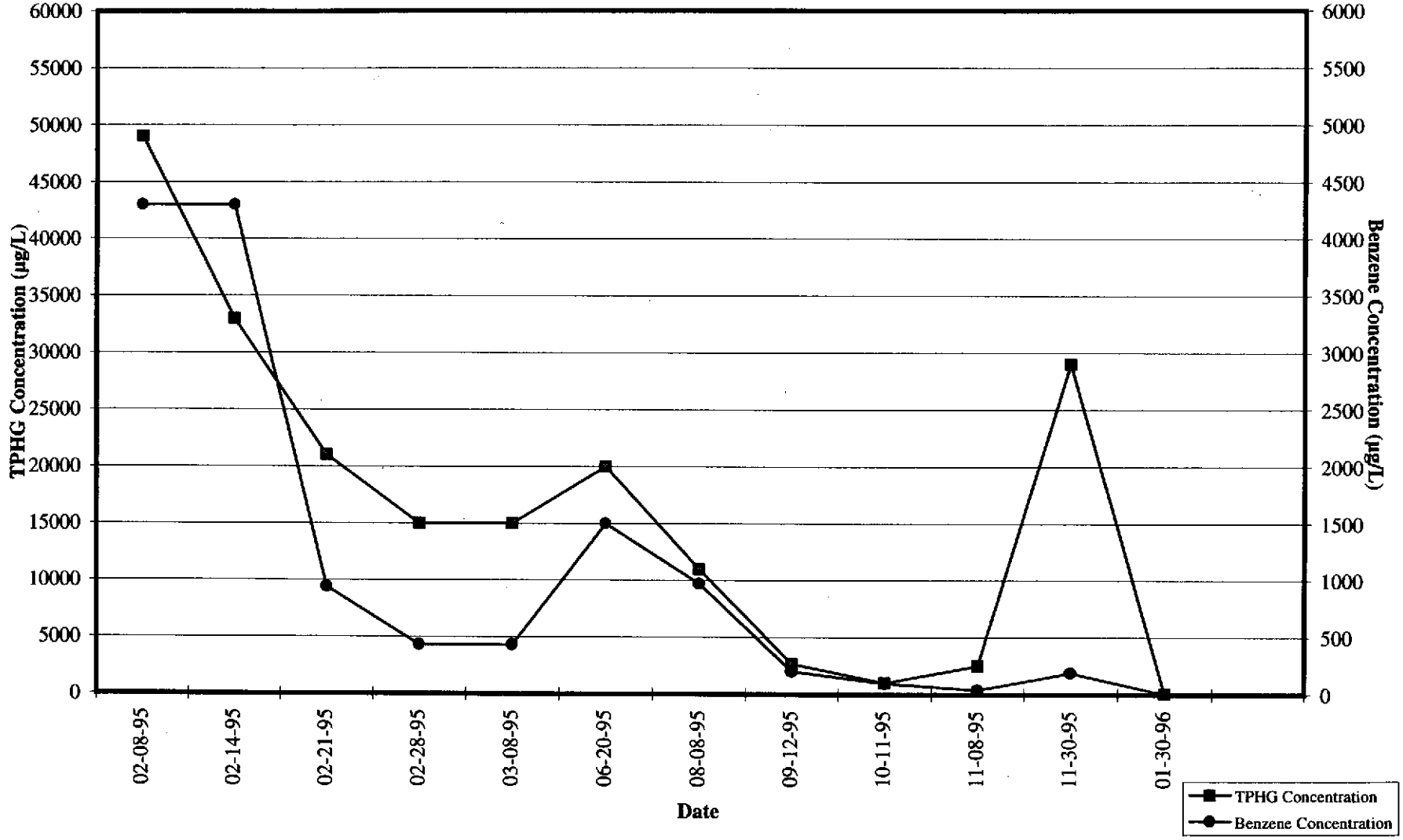
ARCO Service Station 2035
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



esj/h:\2035\2035tdb.xls\SVE Model:imi
20805-123.003

Figure 6

ARCO Service Station 2035
Historical Groundwater Treatment System
Influent TPHG and Benzene Concentrations

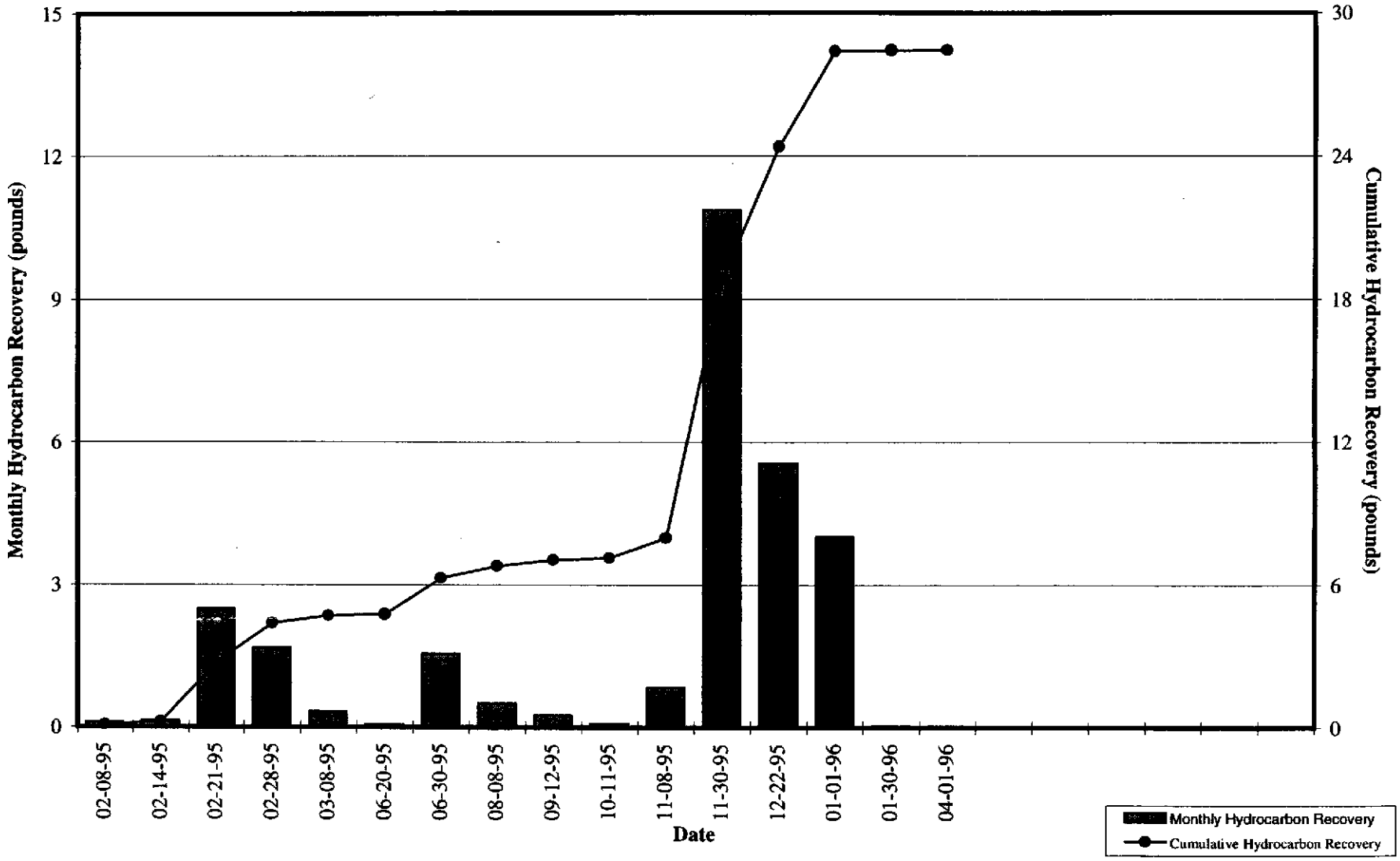


TPHG: total petroleum hydrocarbons as gasoline
µg/L: micrograms per liter

esj/h:\2035\2035tdb.xls\Table 8:imi
20805-123.003

Figure 7

ARCO Service Station 2035
Historical Groundwater Treatment System Hydrocarbon Recovery Rates



esj/h:\2035\2035tdb.xls\Table 9:imi
20805-123.003

APPENDIX A

FIELD DATA SHEETS, FIRST QUARTER 1996 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 21775-217.002 STATION ADDRESS : 101 San Pablo Avenue, Albany DATE : 2-27-96

ARCO STATION # : 2035 FIELD TECHNICIAN : M. Ross / D. Gambetta 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-2	OK	Yes	OK	Yes	Yes	10.25	10.25	ND	ND	29.6	
2	MW-3	OK	Yes	OK	Yes	Yes	9.41	9.41	ND	ND	32.8	
3	MW-5	OK	Yes	OK	Yes	Yes	9.52	9.52	ND	ND	24.2	
4	MW-6	OK	Yes	OK	Yes	Yes	11.86	11.86	ND	ND	24.2	
5	MW-4	OK	Yes	OK	Yes	Yes	8.84	8.84	ND	ND	25.0	
6	MW-1	OK	Yes	OK	Yes	Yes	9.08	9.08	ND	ND	29.6	
7	RW-1	OK	Yes	OK	Yes	Yes	16.56	16.56	ND	ND	25.4	

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21175-217.002 SAMPLE ID: MW-1 (29)

PURGED BY: M. Ross / D. Gonzalez CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Gonzalez LOCATION: ALBANY, 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.): 13.40

DEPTH TO WATER (feet): 9.08 CALCULATED PURGE (gal.): 40.21

DEPTH OF WELL (feet): 29.6 ACTUAL PURGE VOL. (gal.): 40.5

DATE PURGED: 2-27-96 Start (2400 Hr) 1423 End (2400 Hr) 1429

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1435 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1424	13.5	6.54	762	63.8	clr	TRACE
1426	27.0	6.55	763	65.5	clr	TRACE
1429	40.5	6.72	870	65.7	LIGHT BRN	MOD

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 #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Mike Ross Reviewed By: SH Page 1 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-217.002 SAMPLE ID: MW-2(28)

PURGED BY: M. Ross / P. Lamarche CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / P. Lamarche LOCATION: ALBANY, GA

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

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ✓ 1.96 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 11.98

DEPTH TO WATER (feet): 10.25 CALCULATED PURGE (gal.): 35.96

DEPTH OF WELL (feet): 28.6 ACTUAL PURGE VOL (gal.): 36.0

DATE PURGED: 2-27-96 Start (2400 Hr) 1251 End (2400 Hr) 1254

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1205 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1252	12.0	5.81	723	64.1	Light Brown	Trace
1253	24.0	5.91	760	64.4	Light Brn	Trace
1254	36.0	5.94	763	65.0	Light Brown	Trace

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 #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: 57.5

(EC 1000 960 / 1000) (DI —) (pH 7 689 / 700) (pH 10 1014 / 1000) (pH 4 397 / —)

Location of previous calibration: —

Signature: Mike Ross Reviewed By: [illegible] Page 2 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-217.002 SAMPLE ID: MW-3 (32)

PURGED BY: M. Ross / D. Gambelin CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Gambelin LOCATION: Alameda, 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.): 15.28

DEPTH TO WATER (feet): 9.41 CALCULATED PURGE (gal.): 45.84

DEPTH OF WELL (feet): 32.7 ACTUAL PURGE VOL. (gal.): 46.0

DATE PURGED: 2-27-96 Start (2400 Hr) 1308 End (2400 Hr) 1317

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1323 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1310	15.5	6.69	792	61.1	Light Brn	Trace
1314	31.0	6.75	794	62.3	Light Brn	Trace
1317	46.0	6.78	756	63.1	Light Brn	Trace

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

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

TURBIDITY (visual): 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 #: ARCO

REMARKS: Recalibrated Meter

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ___

(EC 1000 1003 / 1000) (DI —) (pH 7 1023 / 700) (pH 10 1016 / 1000) (pH 4 392 / —)

Location of previous calibration: —

Signature: Mike Ross Reviewed By: SA Page 3 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 7775-217.002 SAMPLE ID: MW-4(25)

PURGED BY: M. Ross / D. Barnes CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Barnes LOCATION: ALBANY, CA

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

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

CASING ELEVATION (feet/MSL):	N/A	VOLUME IN CASING (gal.):	10.55
DEPTH TO WATER (feet):	8.84	CALCULATED PURGE (gal.):	31.67
DEPTH OF WELL (feet):	25.0	ACTUAL PURGE VOL. (gal.):	25.0

DATE PURGED: 2-27-96 Start (2400 Hr) 1408 End (2400 Hr) 1412

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1415 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1409	11.0	6.55	453	61.7	Light Brown	TRACE
1411	22.0	6.52	545	64.0	Light Brown	TRACE
1412	DRY	at	25.0	gallons		
1415 DTW	→	13.59				
1415	Recharge	6.65	537	62.2	Light Brn	TRACE

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

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: DRY at 25.0 GALLONS

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Mike Ross Reviewed By: ___ Page 4 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-217.002 SAMPLE ID: MW-5(24)

PURGED BY: M. Ross / D. Lamberson CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Lamberson LOCATION: ALBANY, 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.): 9.59

DEPTH TO WATER (feet): 9.52 CALCULATED PURGE (gal.): 28.77

DEPTH OF WELL (feet): 24.2 ACTUAL PURGE VOL. (gal.): 22.0

DATE PURGED: 2-27-96 Start (2400 Hr) 1330 End (2400 Hr) 1334

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1340 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1330	10.0	6.24	694	60.7	Light Brn	Clr
1333	20.0	6.41	657	62.0	BRN	Heavy
1334	DRY at	22.0	GALLONS			
1339	DTW →	19.55				
1340	Recharge	6.49	677	62.3	BRN	Heavy
					NA (COBALT 0 - 500)	NA (NTU 0 - 200 or 0 - 1000)

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: DRY at 22.0 Gallons

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Mike Ross Reviewed By: SH Page 5 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-217.002 SAMPLE ID: MW-6 (24)

PURGED BY: M. Ross / D. Gonzalez CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Gonzalez LOCATION: ALAMEDA, CA

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

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

CASING ELEVATION (feet/MSL): NA

DEPTH TO WATER (feet): 11.76

DEPTH OF WELL (feet): 24.2

VOLUME IN CASING (gal.): 2.01

CALCULATED PURGE (gal.): 6.04

ACTUAL PURGE VOL (gal.): 6.5

DATE PURGED: 2-27-96 Start (2400 Hr) 1355 End (2400 Hr) 1405

DATE SAMPLED: 2-27-96 Start (2400 Hr) 1407 End (2400 Hr) ____

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1359	2.5	6.83	758	61.8	Brn	Hvy
1402	5.0	6.89	793	63.7	↓	↓
1405	6.5	6.95	789	64.3		

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

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

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

Field QC samples collected at this well: NA

Parameters field filtered at this well: NA

PURGING EQUIPMENT

- ____ 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®)
- ____ ODL Sampler
- ____ Bailer (Stainless Steel)
- ____ Dipper
- ____ Submersible Pump
- ____ Well Wizard™
- ____ Dedicated

Other: ____

WELL INTEGRITY: GOOD LOCK #: ARCO

REMARKS: ____

Meter Calibration: Date 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ____

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

Location of previous calibration: MW-3

Signature: Mike Ross Reviewed By: ____ Page 6 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-217.002 SAMPLE ID: ~~MW-1~~ RW-1(25)

PURGED BY: M. Ross / D. Gumeli CLIENT NAME: ARCO 2035

SAMPLED BY: M. Ross / D. Gumeli LOCATION: ALBANY, 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.): NA

DEPTH TO WATER (feet): 16.56 CALCULATED PURGE (gal.): NA

DEPTH OF WELL (feet): 25.4 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: 2-27-96 Start (2400 Hr) 1440 End (2400 Hr) 1444

DATE SAMPLED: 2-27-96 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)
1445	1 gal. Grab sample	7.09	806	61.8	clr	clr

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

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: 1230 Meter Serial #: 9072 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Mike Ross Reviewed By: ___ Page 1 of 1

APPENDIX B

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

Columbia Analytical Services, Inc.

March 13, 1996

Service Request No: S9600320

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **2035 Albany/20805-123.003/TO#19350.00**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on February 27, 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 11, 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

Christina V. Rayburn for

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
Project: 2035 Albany/20805-123.003/TO#19350.00
Sample Matrix: Water

Service Request: S9600320
Date Collected: 2/27/96
Date Received: 2/27/96
Date Extracted: NA

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

	Sample Name:	**MW-2(28)**	**MW-3(32)**	**MW-5(24)**
	Lab Code:	S9600230-001	S9600230-002	S9600230-003
	Date Analyzed:	3/6/96	3/6,7/96	3/6/96
Analyte	**MRL**			
TPH as Gasoline	50	ND	120	ND
Benzene	0.5	ND	3.6	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	2.2	ND
Total Xylenes	0.5	ND	3.7	ND
Methyl-tert-butyl ether	3	ND	90	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 2035 Albany/20805-123.003/TO#19350.00
Sample Matrix: Water

Service Request: S9600320
Date Collected: 2/27/96
Date Received: 2/27/96
Date Extracted: NA

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

Sample Name:		**MW-6(24)**	**MW-4(25)**	**MW-1(29)**
Lab Code:		S9600230-004	S9600230-005	S9600230-006
Date Analyzed:		3/6/96	3/6/96	3/7/96
Analyte	**MRL**			
TPH as Gasoline	50	ND	ND	2700
Benzene	0.5	ND	0.8	930
Toluene	0.5	ND	ND	12
Ethylbenzene	0.5	ND	ND	18
Total Xylenes	0.5	ND	ND	32
Methyl-tert-butyl ether	3	ND	ND	51

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 2035 Albany/20805-123.003/TO#19350.00
Sample Matrix: Water

Service Request: S9600320
Date Collected: 2/27/96
Date Received: 2/27/96
Date Extracted: NA

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

Sample Name:		**RW-1(25)**	**Method Blank**	**Method Blank**
Lab Code:		S9600230-007	S9600306-WB	S9600307-WB
Date Analyzed:		3/7/96	3/6/96	3/7/96
Analyte	**MRL**			
TPH as Gasoline	50	210	ND	ND
Benzene	0.5	44	ND	ND
Toluene	0.5	7.5	ND	ND
Ethylbenzene	0.5	2.5	ND	ND
Total Xylenes	0.5	24	ND	ND
Methyl-tert-butyl ether	3	29	ND	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: ARCO Products Company #2035/#20805-123.003/TO#19350.00
Sample Matrix: Water

Service Request: L9601590
Date Collected: 2/27/96
Date Received: 2/27/96
Date Extracted: 3/7/96
Date Analyzed: 3/7/96

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

Sample Name	Lab Code	MRL	Result
MW-3 (32)	L9601590-001	0.5	ND
Method Blank	L9601590-MB	0.5	ND

1AMRL/120594

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 2035 Albany/20805-123.003/TO#19350.00
Sample Matrix: Water

Service Request: S9600320
Date Collected: 2/27/96
Date Received: 2/27/96
Date Extracted: NA
Date Analyzed: 3/6,7/96

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-2(28)	S9600320-001	94	96
MW-3(32)	S9600320-002	92	101
MW-5(24)	S9600320-003	95	94
MW-6(24)	S9600320-004	94	100
MW-4(25)	S9600320-005	94	100
MW-1(29)	S9600320-006	91	96
RW-1(25)	S9600320-007	93	102
MW-2(28) MS	S9600320-001 MS	97	95
MW-2(28) DMS	S9600320-001 DMS	98	83
Method Blank	S9600306-WB	91	98
Method Blank	S9600307-WB	91	98
	CAS Acceptance Limits:	69-116	69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600320
Project:	2035 Albany/20805-123.003/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/27/96
		Date Extracted:	NA
		Date Analyzed:	3/6/96

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

Sample Name: MW-2(28)
Lab Code: S9600320-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Benzene	25	25	ND	24.7	24.9	99	100	75-135	1
Toluene	25	25	ND	24.6	25.1	98	100	73-136	2
Ethylbenzene	25	25	ND	24.4	24.8	98	99	69-142	2

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 2035 Albany/20805-123.003/TO#19350.00

Service Request: S9600320
Date Analyzed: 3/6/96

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	24.3	97	85-115
Toluene	25	24.3	97	85-115
Ethylbenzene	25	24.0	96	85-115
Xylenes, Total	75	73.3	98	85-115
Gasoline	250	252	101	90-110
Methyl-tert-butyl Ether	50	48	96	85-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L9601590
Project:	ARCO Products Company #2035/#20805-123.003/TO#19350.00	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	3/7/96
		Date Analyzed:	3/7/96

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	2.00	2.00	1.89	1.82	94	91	75-125	4

* 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.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany	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

Method of shipment: Sampler will deliver

	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 incldg. MTBE EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
1	MW-2	(28)	2		X		X	HCL	2-27-96	1205		X											
2	MW-3	(32)	4		X		X	HCL	↓	1323		X			X								
3	MW-5	(24)	2		X		X	HCL		1340		X											
4	MW-6	(24)	2		X		X	HCL		1407		X											
5	MW-4	(25)	2		X		X	HCL		1415		X											
6	MW-1	(29)	2		X		X	HCL		1435		X											
7	RW-1	(25)	2		X		X	HCL	↓	1445		X											

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40ml HCL VOAs (All Wells) 2-1liter HCL Glass (MW-3) #20805-123.003

Lab number: 9600320

Turnaround time

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

Condition of sample: ok

Temperature received: Cool

Relinquished by sampler: Mike Whelan	Date: 2-27-96	Time: 1615	Received by:
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by laboratory: Clare A. Linden — Date: 2/27/96 — Time: 1615

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 2035
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																								8396.09				
01/19/96 12:00	26.1	53.1					13:30	<15	<60	<0.1	<0.5	<15	<60	0.3	0.9	<15	<60	<0.1	<0.5	NR	0.28	0.00	444.00	8840.09	444.00	18.50	0.00	0.00
01/30/96 12:40	22.3	47.6																					264.67	9104.76	264.67	11.03	0.00	0.00
02/01/96 00:00	28.6	53.1																					35.33	9140.09	35.33	1.47	0.00	0.00
Period Totals:																							744.00		744.00	31.00	0.00	0.00
Period Averages:	24.8	51.2						<15	<60	<0.1	<0.5	<15	<60	0.3	0.9	<15	<60	<0.1	<0.5	NR	0.28	0.00						

ARCO 2035
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																								9140.09				
02/07/96 14:00	28.6	53.1					00:00	<15	<60	<0.1	<0.5	<15	<60	0.3	0.9	<15	<60	<0.1	<0.5	NR	0.29	0.00	158.00	9298.09	158.00	6.58	0.00	0.00
02/20/96 11:37	NA	NA																					309.62	9607.71	309.62	12.90	0.00	0.00
03/01/96 00:00	NA	NA																					228.38	9836.09	228.38	9.52	0.00	0.00
Period Totals:																							696.00		696.00	29.00	0.00	0.00
Period Averages:	28.6	53.1						<15	<60	<0.1	<0.5	<15	<60	0.3	0.9	<15	<60	<0.1	<0.5	NR	0.29	0.00						

Laboratory analytical data was unavailable for February 1996. In order to determine hydrocarbon recovery, the data from January 19, 1996 was used.
On February 7, 1996, the SVE wells were taken off-line. The operating hours after February 7, 1996 are associated with the off gas abatement for the aeration tank.

ARCO 2035
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																		9836.09				
03/25/96 10:45	NA	NA															586.75	10422.84	586.75	24.45	0.00	0.00
04/01/96 00:00	0.0	0.0															157.25	10422.84	0.00	0.00	157.25	6.55
Period Totals:																	744.00		586.75	24.45	157.25	6.55
Period Averages:	0.0	0.0																				

During the month of March, the SVE wells remained off-line. The operating hours are associated with the off gas abatement for the airation tank.

APPENDIX D

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

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 20805-123.002

Remarks: Performed monthly O&M - took Inf, Eff & WF Vapor Samples.

Unscheduled site visit [] Scheduled site visit [✓]

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	1055	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	ON	Stack Temperature (°F)	701
Shutdown Time (24:00 hour)	—	**SYSTEM**	—
Restart Time (24:00 hour)	—	Total Flow (3") (cfm) (before blower-same as Para-Fax)	600
Reading Time (24:00 hour)	1200	Fire Box Temperature (°F)	719
Well Field WF-1 (3")	—	Set Point (°F)	720
Vacuum (in. of H2O)	54	TOTAL HOURS 3843.59 hrs	~~8840.00~~
Velocity (ft/min) Assume 600	—	Electric Meter (kwh)	—
Temperature (°F)	62	Natural Gas (cf)	—
Aeration Tank AT-1 (2")	—	**AIR MONITORING**	
Vacuum (in. of H2O)	22		
Velocity (ft/min)	—		
Flow (scfm)	34		
After Blower I-2 (4") (AFTER DILUTION)	—		
Total Pressure (in. of H2O)	.5		
Total Flow (in. of H2O)	.025		
Influent I-1 (3") (BEFORE DILUTION)	—		
Vacuum (In. of H2O)	54		
Velocity (ft/min)	600		

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						

PID (ppm)	CAL GAS:					
Date:						
Date:						

Lab samples taken for analysis at: CAS

PARA-FAX on/off ON

Cleaned K.O. pump pre-filter ? yes/no Yes

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	Velocity (fpm)	Product Recovered (ml)	PID (ppm)	Bubbler (on/off)
VW-1	4"	5'-17'								NA
VW-2	4"	5'-17'								NA
VW-3	4"	4.5'-9.5'								NA
VW-4	4"	5'-17'								NA
VW-5	4"	4.5'-14.5'								NA
VW-6	4"	5'-12.5'								NA
VW-7	4"	5'-15'								NA
VW-8	4"	5'-15'								NA
VW-9	4"	5'-15'								NA
RW-1	6"	11'-26'								
AS-1 (vent)	2"	5'-15'								
AS-2 (vent)	2"	5'-15'								

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'							
AS-2	2"	28.8'-30.8'							

Total Sparge Data

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

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: V. Whitten Date: 1-19-96

Project# 20805-123.002

ARCO 2035 Soil Vapor Extraction System

Remarks: On site for East Bay Mud Water Dist. ~~to~~ to perform water sampling.

Unscheduled site visit [X] Scheduled site visit []

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	1030	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	ON	Stack Temperature (°F)	698
Shutdown Time (24:00 hour)	—	**SYSTEM**	—
Restart Time (24:00 hour)	—	Total Flow (3") (cfm) (before blower-same as Para-Fax)	60
Reading Time (24:00 hour)	1240	Fire Box Temperature (°F)	716
Well Field WF-1 (3")	—	Set Point (°F)	720
Vacuum (in. of H2O)	45"	TOTAL HOURS 9104.76 hrs	~~9105.52~~
Velocity (ft/min) Assume 500	—	Electric Meter (kwh)	—
Temperature (°F)	56	Natural Gas (cf)	—
Aeration Tank AT-1 (2")	—	**AIR MONITORING**	
Vacuum (in. of H2O)	20		
Velocity (ft/min)	~~3~~		
Flow (scfm)	37		
After Blower I-2 (4") (AFTER DILUTION)	—		
Total Pressure (in. of H2O)	.5		
Total Flow (in. of H2O)	.02		
Influent I-1 (3") (BEFORE DILUTION)	—		
Vacuum (in. of H2O)	50		
Velocity (ft/min)	500		

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						

PID (ppm)	CAL GAS:					
Date:						
Date:						

Lab samples taken for analysis at:	
PARA-FAX on/off	ON
Cleaned K.O. pump pre-filter ? yes/no	Yes

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	Velocity (fpm)	Product Recovered (ml)	PID (ppm)	Bubbler (on/off)
VW-1	4"	5'-17'								NA
VW-2	4"	5'-17'								NA
VW-3	4"	4.5'-9.5'								NA
VW-4	4"	5'-17'								NA
VW-5	4"	4.5'-14.5'								NA
VW-6	4"	5'-12.5'								NA
VW-7	4"	5'-15'								NA
VW-8	4"	5'-15'								NA
VW-9	4"	5'-15'								NA
RW-1	6"	11'-26'								
AS-1 (vent)	2"	5'-15'								
AS-2 (vent)	2"	5'-15'								

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'				8	<4	3.8	Before
AS-2	~~2"~~	~~28.8'-30.8'~~				6	<4	~~4.2~~	~~Before~~

Total Sparge Data

Total Air Sparge Pressure(psi)= 8	Total Air Sparge Flow Rate(scfm)= <4	Total Air Sparge Temp(F)= 64

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: K Whitten Date: 1-30-96

Project# 20805-123.002
ARCO 2035 Soil Vapor Extraction System

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 20805-123.003 DATE: 2-2-96

CLIENT NAME: Arco NAME: V. Whitten

LOCATION: 2035

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: O&M

REMARKS: Responded to Water side Alarm -

Water side down - High Sumps. Drained rain water from containment area and tried Starting water side - Air selinoid would not release. Took air selinoid apart and cleaned - reinstalled, Water side started

SIGNATURE: Van Whitt

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Soil Vapor Extraction System . EMCON Project # 20805-123.002

Remarks: Performed verbal work request per S. Yelcmanchile & B. Meada
Shut air sparge off, SVE wells taken off-line (no screen available) only for the SVE system
Unscheduled site visit [x] Scheduled site visit [ ] thermtech unit was kept on
SG 04/22/96

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	1015	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	ON	Stack Temperature (°F)	703
Shutdown Time (24:00 hour)	—	**SYSTEM**	—
Restart Time (24:00 hour)	—	Total Flow (3") ~~(cfm)~~ FPM (before blower-same as Para-Fax)	600
Reading Time (24:00 hour)	1400	Fire Box Temperature (°F)	719
Well Field WF-1 (3")	—	Set Point (°F)	720
Vacuum (in. of H2O)	20	TOTAL HOURS 9298.80 hrs	9298.80
Velocity (ft/min) Assume 600	—	Electric Meter (kwh)	—
Temperature (°F)	70	Natural Gas (cf)	—
Aeration Tank AT-1 (2")	—		
Vacuum (in. of H2O)	23		
Velocity (ft/min)	~~40~~		
Flow (scfm)	40		
After Blower I-2 (4") (AFTER DILUTION)	—		
Total Pressure (in. of H2O)	.5		
Total Flow (in. of H2O)	.025		
Influent I-1 (3") (BEFORE DILUTION)	—		
Vacuum (in. of H2O)	40		
Velocity (ft/min)	600		

AIR MONITORING

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						
PID (ppm)	CAL GAS:					
Date:						
Date:						

Lab samples taken for analysis at:

PARA-FAX on/off	ON
Cleaned K.O. pump pre-filter ? yes/no	Checked

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	Velocity (fpm)	Product Recovered (ml)	PID (ppm)	Bubbler (on/off)
VW-1	4"	5'-17'	None	2.49					698	NA
VW-2	4"	5'-17'	None	3.57					390	NA
VW-3	4"	4.5'-9.5'	None	1.78					501	NA
VW-4	4"	5'-17'	None	3.43					610	NA
VW-5	4"	4.5'-14.5'		N/A					47.2	NA
VW-6	4"	5'-12.5'		N/A					840	NA
VW-7	4"	5'-15'	5.86	5.87				10-15	102	NA
VW-8	4"	5'-15'		N/A					780	NA
VW-9	4"	5'-15'		N/A					1110	NA
RW-1	6"	11'-26'	None	15.78					57	
AS-1 (vent)	2"	5'-15'	None	4.85					465	
AS-2 (vent)	2"	5'-15'		N/A						

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'	None	11.23					
AS-2	2"	28.8'-30.8'							

Total Sparge Data

Total Air Sparge Pressure(psi)= 6 | Total Air Sparge Flow Rate(scfm)= < 4 | Total Air Sparge Temp(F)= —

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: V. Whitten Date: 2/7/96

Project# 20805-123.002
ARCO 2035 Soil Vapor Extraction System

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 20805-123.003 DATE: 2/20/96

CLIENT NAME: Arco NAME: V. Whitten

LOCATION: 2035

SERVICES RENDERED

GROUND WATER WELLS: ☐ Sampling ☐ Development ☐ Maintenance/Repair ☐ Water-Level Survey

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: O&M

REMARKS: Responded to system alarm.

Water side down - "High tank level" changed both bag filters - started water side

Totalizer gallons = 297,454

Therm Tec Hrs = 9608.43 @ 1137 hrs.

SIGNATURE: Van Whitt

Remarks: Therm-Tec running only for bubbler tank - no vacuum on well field. Water side down (High tank level) Effluent water = 331288 Gls, Shut system off per S. Velamchili.

Unscheduled site visit [✓] Scheduled site visit []

SYSTEM PARAMETERS (Therm Tech Model VAC-10 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	1015	Effluent (E-1) (12"x12")	—
System Status (on or off)	ON	Stack Temperature (°F)	625
Shutdown Time (24:00 hour)	1045	**SYSTEM**	—
Restart Time (24:00 hour)	—	Total Flow (3") (cfm) (before blower-same as Para-Fax)	
Reading Time (24:00 hour)	1045	Fire Box Temperature (°F)	625
Well Field WF-1 (3")	—	Set Point (°F)	625
Vacuum (in. of H2O)	0	TOTAL HOURS 10422.84 hrs.	~~10423.56~~
Velocity (ft/min)	0	Electric Meter (kwh)	—
Temperature (°F)	0	Natural Gas (cf)	—
Aeration Tank AT-1 (2")	—	**AIR MONITORING**	
Vacuum (in. of H2O)	32		
Velocity (ft/min)	~~80~~		
Flow (scfm)	90		
After Blower I-2 (4") (AFTER DILUTION)			
Total Pressure (in. of H2O)	2		
Total Flow (in. of H2O)	60 - 90		
Influent I-1 (3") (BEFORE DILUTION)	-		
Vacuum (in. of H2O)	0		
Velocity (ft/min)	0		

FID (ppm)	Amb	WF-1	AT-1	I-1	I-2	E-1
Date:						

PID (ppm)	CAL GAS:				
Date:					
Date:					

Lab samples taken for analysis at:

PARA-FAX on/off

Cleaned K.O. pump pre-filter ? yes/no

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H2O)	Velocity (fpm)	Product Recovered (ml)	PID (ppm)	Bubbler (on/off)
VW-1	4"	5'-17'								NA
VW-2	4"	5'-17'								NA
VW-3	4"	4.5'-9.5'								NA
VW-4	4"	5'-17'								NA
VW-5	4"	4.5'-14.5'								NA
VW-6	4"	5'-12.5'								NA
VW-7	4"	5'-15'		OFF						NA
VW-8	4"	5'-15'								NA
VW-9	4"	5'-15'								NA
RW-1	6"	11'-26'								
AS-1 (vent)	2"	5'-15'								
AS-2 (vent)	2"	5'-15'								

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (ppm)	REMARKS
AS-1	2"	28.3'-30.3'							
AS-2	2"	28.8'-30.8'		OFF					

Total Sparge Data

Total Air Sparge Pressure(psi)= —	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)= —

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# 20805-123.003 **Work Authorization # 19289**

Operator: J. Whitten Date: 3-25-96 **ARCO 2035 Soil Vapor Extraction System**

APPENDIX E

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR SVE SYSTEM, FIRST QUARTER 1996

Columbia Analytical Services, Inc.

February 8, 1996

Service Request No: S9600133

Ms. Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **20805-123.002 / TO# 19289.00 / 2035 Albany**

Dear Ms. Yelamanchili:

The following pages contain analytical results for sample(s) received by the laboratory on January 19, 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 10, 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 Q.A Coordinator

SLG/ajb

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

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

	Sample Name:	AT-1	WF-1	E-1
	Lab Code:	S9600133-001	S9600133-002	S9600133-003
	Date Analyzed:	1/19/96	1/19/96	1/19/96
Analyte	**MRL**			
Benzene	0.5	0.9	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	1	ND	ND	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20	ND	ND	ND
C_5 - C_8 Hydrocarbons	20	ND	28	ND
C_9 - C_{12} Hydrocarbons	20	ND	ND	ND
Gasoline Fraction (C_5-C_{12})	60	ND	ND	ND

3822/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: **Method Blank**
Lab Code: **S9600119-VB**
Date Analyzed: 1/19/96

Analyte	**MRL**	
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	1	ND
Total Volatile Hydrocarbons		
C_1 - C_4 Hydrocarbons	20	ND
C_5 - C_8 Hydrocarbons	20	ND
C_9 - C_{12} Hydrocarbons	20	ND
Gasoline Fraction (C_5-C_{12})	60	ND

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

	Sample Name:	AT-1	WF-1	E-1
	Lab Code:	S9600133-001	S9600133-002	S9600133-003
	Date Analyzed:	1/19/96	1/19/96	1/19/96
Analyte	**MRL**			
Benzene	0.1	0.3	ND	ND
Toluene	0.1	0.1	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.2	ND	ND	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	5	ND	ND	ND
C_5 - C_8 Hydrocarbons	5	ND	8	ND
C_9 - C_{12} Hydrocarbons	5	ND	ND	ND
Gasoline Fraction (C_5-C_{12})	15	ND	ND	ND

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name: **Method Blank**
Lab Code: **S9600119-VB**
Date Analyzed: 1/19/96

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

3S22/060194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA
Date Analyzed: 1/19/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: Batch QC
Lab Code: S9600122-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	8	8	8	<1
Toluene	0.5	19	19	19	<1
Ethylbenzene	0.5	26	26	26	<1
Xylenes, Total	1	100	110	105	10
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	<100	<100	-	-
C_5 - C_8 Hydrocarbons	20	1,700	1,700	1,700	<1
C_9 - C_{12} Hydrocarbons	20	540	560	550	4
Gasoline Fraction (C_5-C_{12})	60	2,200	2,200	2,200	<1

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00
Sample Matrix: Vapor

Service Request: S9600133
Date Collected: 1/19/96
Date Received: 1/19/96
Date Extracted: NA
Date Analyzed: 1/19/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name: Batch QC
Lab Code: S9600122-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.1	2.5	2.5	2.5	<1
Toluene	0.1	5.0	5.0	5.0	<1
Ethylbenzene	0.1	6.0	6.0	6.0	<1
Xylenes, Total	0.2	23	25	24	8
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	5	<30	<30	-	-
C_5 - C_8 Hydrocarbons	5	470	470	470	<1
C_9 - C_{12} Hydrocarbons	5	150	150	150	<1
Gasoline Fraction (C_5-C_{12})	15	600	600	600	<1

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 2035 ALBANY / 20805-123.003 / TO#19289.00

Service Request: S9600133
Date Analyzed: 1/19/96

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

Units: mg/m^3

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	16	18.4	115	85-115
Toluene	16	18.3	114	85-115
Ethylbenzene	16	17.1	107	85-115
Xylenes, Total	48	51.2	107	85-115
Gasoline	200	183	92	90-110

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

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. 19289.00

Chain of Custody

ARCO Facility no. 2035 | City (Facility) Albany | Project manager (Consultant) S. Yalamanchili

ARCO engineer Mike Whelan | Telephone no. (ARCO) 408 453-1640 | Telephone no. (Consultant) 408 453-7300 | Fax no. (Consultant) 408 453-0452

Consultant name EMCON | Address (Consultant) 1921 Ringwood Ave. San Jose, CA

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	Blank 1	Blank 2
AT-1	1	1			X			1-19-96	1330		X											
WF-1	2	1			X			1-19-96	1335		X											
E-1	3	1			X			1-19-96	1340		X											

Condition of sample:

Temperature received:

Relinquished by sampler: Van White | Date 1-19-96 | Time 1510 | Received by ~~Claire A Linden~~ 1/19/96

Relinquished by | Date | Time | Received by

Relinquished by | Date | Time | Received by laboratory Claire A Linden | Date 1/19/96 | Time 1510

Laboratory name

Contract number

Method of shipment

Special detection Limit/reporting: Mg/M³ & PPMV

Special QA/QC

Remarks: 20805-123.003

Lab number: S9600133

Turnaround time

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

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

APC-3292 (2-91)

APPENDIX F

FIELD DATA SHEETS, OPERATION AND MAINTENANCE VISITS, GROUNDWATER TREATMENT SYSTEM, FIRST QUARTER 1996

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction System . EMCON Project # 20805-123.002

Remarks: Performed monthly O&M.

Unscheduled site visit ☐ Scheduled site visit ☑

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	1055
System Status (on or off)	ON
Shutdown Time (24:00 hour)	—
Restart Time (24:00 hour)	1130
Reading Time (24:00 hour)	1200
RW-1 Ejection Pressure (psi)	60
RW-1 Stroke volume (ml)	—
RW-1 Strokes per minute	—
RW-1 Stroke counter	—
RW-1 DTFP (ft)	—
RW-1 DTW (ft)	—
Transfer pump flow rate (gpm)	—
GAC-1 Pressure (psi)	10
GAC-2 Pressure (psi)	3
#1 Filter IN (psi)	14
#1 Filter OUT (psi)	14
#2 Filter IN (psi)	5
#2 Filter OUT (psi)	1
Air compressor run time (hrs)	296
Air compressor discharge (psi)	100
Regulated discharge (psi)	70
RW-1 RUN TIME (hrs)	1559.2
TOTALIZER (gal)	223863

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?	✓		
Change Bag Filters ?	✓		
Check Scale Control Unit ?	✓		
Check Aeration Tank Baffles ?	✓		
Clean Pad ?		✓	
Backwash Carbon Drums ?		✓	

Notes:

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent			
I-3 (D) between carbon drums			
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: V. Whitten Date: 1-19-96

Project #20805-123.002
ARCO 2035 Groundwater Extraction System

Remarks:

Met EBM (East Bay Mud Water Dist) personnel for EAA samples. Took EAA sample for analysis.

Started sparging

Well	DTW	D.O
MW-1	9.55	0.6
MW-2	10.55	5.3
MW-3	10.09	1.4
MW-4	9.08	2.7
MW-5	Car on well	

Unscheduled site visit [✓] Scheduled site visit [ ]

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	1030
System Status (on or off)	ON
Shutdown Time (24:00 hour)	—
Restart Time (24:00 hour)	—
Reading Time (24:00 hour)	1240
RW-1 Ejection Pressure (psi)	60
RW-1 Stroke volume (ml)	—
RW-1 Strokes per minute	—
RW-1 Stroke counter	—
RW-1 DTFP (ft)	—
RW-1 DTW (ft)	—
Transfer pump flow rate (gpm)	—
GAC-1 Pressure (psi)	8
GAC-2 Pressure (psi)	2
#1 Filter IN (psi)	12
#1 Filter OUT (psi)	12
#2 Filter IN (psi)	5
#2 Filter OUT (psi)	2
Air compressor run time (hrs)	628.8
Air compressor discharge (psi)	100
Regulated discharge (psi)	60
RW-1 RUN TIME (hrs)	1823.6
TOTALIZER (gal)	25,615

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?		✓	
Change Bag Filters ?	✓		
Check Scale Control Unit ?	✓		
Check Aeration Tank Baffles ?	✓		
Clean Pad ?		✓	
Backwash Carbon Drums ?		✓	

Notes:

SAMPLE PARAMETERS			
SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent			
I-3 (D) between carbon drums	✓	✓	✓
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: V. Whitten Date: 1-30-96

Project #20805-123.002
ARCO 2035 Groundwater Extraction System

ARCO 2035 . 1001 San Pablo Ave.,Albany,Ca. Groundwater Extraction System . EMCON Project # 20805-123.002

Remarks:

Performed verbal request per S. Helemandili & B. Meada

Well	DTW	DTFP
MW-1	8.67'	None
MW-5	9.59'	None

Unscheduled site visit [✓] Scheduled site visit []

SYSTEM PARAMETERS	
Arrival Time (24:00 hour)	1015
System Status (on or off)	ON
Shutdown Time (24:00 hour)	—
Restart Time (24:00 hour)	—
Reading Time (24:00 hour)	1400
RW-1 Ejection Pressure (psi)	60
RW-1 Stroke volume (ml)	—
RW-1 Strokes per minute	—
RW-1 Stroke counter	Counter not work
RW-1 DTFP (ft)	None
RW-1 DTW (ft)	15.78
Transfer pump flow rate (gpm)	—
GAC-1 Pressure (psi)	10
GAC-2 Pressure (psi)	4
#1 Filter IN (psi)	17
#1 Filter OUT (psi)	15
#2 Filter IN (psi)	6
#2 Filter OUT (psi)	2
Air compressor run time (hrs)	666.5
Air compressor discharge (psi)	100
Regulated discharge (psi)	60
RW-1 RUN TIME (hrs)	2002.1
TOTALIZER (gal)	271,721

SYSTEM CHECKLIST	Yes	No	Other
Alarm Trip?		✓	
Change Bag Filters ?		✓	
Check Scale Control Unit ?	✓		
Check Aeration Tank Baffles ?	✓		
Clean Pad ?		✓	
Backwash Carbon Drums ?		✓	

Notes:

SAMPLE PARAMETERS

SAMPLE LOCATION	TEMP (°F)	EC (umhos/cm)	pH (units)
E-1 (E) effluent			
I-3 (D) between carbon drums			
I-2 after aeration tank			
I-1 (A) influent			

Special Instructions:

Use only ARCO chain-of-custody forms. Please include all analytical method numbers as requested on the chain-of-custody form.

Operator: V. Whitten Date: 2/7/96

Project #20805-123.002
ARCO 2035 Groundwater Extraction System

APPENDIX G

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION, GROUNDWATER TREATMENT SYSTEM, FIRST QUARTER 1996

Columbia Analytical Services, Inc.

February 14, 1996

Service Request No: S9600190

EMCON
Sailaja Yelamanchili
1921 Ringwood Avenue
San Jose, CA 95051

Re: **2035 ALBANY**
20805-123.003/TO#19289.00

Dear Ms. Yelamanchili:

The following pages contain analytical results for sample(s) received by the laboratory on January 30, 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 10, 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
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)

ACRONLST.DOC 7/14/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY
Sample Matrix: Water

Service Request: S9600190
Date Collected: 1/30/96
Date Received: 1/30/96
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8240
Units: ug/L (ppb)

	Sample Name:	**E-1(E)**	**Method Blank**	
	Lab Code:	S9600190-001	S960202-WB	
	Date Analyzed:	2/5/96	2/5/96	
Analyte	**MRL**			
Chloromethane	10	ND	ND	ND
Vinyl Chloride	10	ND	ND	ND
Bromomethane	10	ND	ND	ND
Chloroethane	10	ND	ND	ND
Trichlorofluoromethane (CFC 11)	1	ND	ND	ND
Trichlorotrifluoroethane (CFC 113)	10	ND	ND	ND
1,1-Dichloroethene	1	ND	ND	ND
Acetone	20	ND	ND	ND
Carbon Disulfide	1	ND	ND	ND
Methylene Chloride	10	ND	ND	ND
trans-1,2-Dichloroethene	1	ND	ND	ND
cis-1,2-Dichloroethene	1	ND	ND	ND
2-Butanone (MEK)	10	ND	ND	ND
1,1-Dichloroethane	1	ND	ND	ND
Chloroform	1	ND	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND	ND
Carbon Tetrachloride	1	ND	ND	ND
Benzene	1	ND	ND	ND
1,2-Dichloroethane	1	ND	ND	ND
Vinyl Acetate	10	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND
Bromodichloromethane	1	ND	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND	ND
trans-1,3-Dichloropropene	1	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND	ND
2-Hexanone	10	ND	ND	ND
Toluene	1	ND	ND	ND
cis-1,3-Dichloropropene	1	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND
Dibromochloromethane	1	ND	ND	ND
Chlorobenzene	1	ND	ND	ND
Ethylbenzene	1	ND	ND	ND
Styrene	1	ND	ND	ND
Total Xylenes	5	ND	ND	ND
Bromoform	1	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600190
Project:	20805-123.003/TO#19289.00/#2035 ALBANY	**Date Collected:**	1/30/96
Sample Matrix:	Water	**Date Received:**	1/30/96
		Date Extracted:	NA
		Date Analyzed:	2/6/96

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Analyte:	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name	**Lab Code**				
E-1(E)	S9600190-001	ND	ND	ND	ND	ND
I-1(A)	S9600190-002	70	4.5	1.8	ND	8.3
I-2	S9600190-003	ND	ND	ND	ND	ND
I-3(D)	S9600190-004	ND	ND	ND	ND	ND
Method Blank	S960206-WB	ND	ND	ND	ND	ND

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY
Sample Matrix: Water

Service Request: S9600190
Date Collected: 1/30/96
Date Received: 1/30/96
Date Extracted: NA
Date Analyzed: 2/5/96

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240

Sample Name	Lab Code	Percent Recovery 1,2-Dichloroethane-D_4	Toluene-D_8	4-Bromofluorobenzene
E-1(E)	S9600190-001	93	94	102
E-1(E)	S9600190-001MS	91	92	100
E-1(E)	S9600190-001DMS	91	91	105
Method Blank	S960202-WB	96	93	110
CAS Acceptance Limits:		76-114	88-110	86-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY
Sample Matrix: Water

Service Request: S9600190
Date Collected: 1/30/96
Date Received: 1/30/96
Date Extracted: NA
Date Analyzed: 2/5/96

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 8240
Units: ug/L (ppb)

Sample Name: E-1(E)
Lab Code: S9600190-001MS, S9600190-001DMS

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
1,1-Dichloroethene	50	50	ND	62	61	124	122	61-145	2
Trichloroethene	50	50	ND	57	58	114	116	71-120	2
Chlorobenzene	50	50	ND	56	55	112	110	75-130	2
Toluene	50	50	ND	56	48	112	96	76-125	15
Benzene	50	50	ND	55	53	110	106	76-127	4

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY
Sample Matrix: Water

Service Request: S9600190
Date Collected: 1/30/96
Date Received: 1/30/96
Date Extracted: NA
Date Analyzed: 2/6/96

Surrogate Recovery Summary
BTEX 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
E-1(E)	S9600190-001	95	92
I-1(A)	S9600190-002	98	95
I-2	S9600190-003	97	94
I-3(D)	S9600190-004	95	95
E-1(E)	S9600190-001MS	97	95
E-1(E)	S9600190-001DMS	96	92
Method Blank	S960206-WB	94	94
CAS Acceptance Limits:		69-116	69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY
Sample Matrix: Water

Service Request: S9600190
Date Collected: 1/30/96
Date Received: 1/30/96
Date Extracted: NA
Date Analyzed: 2/6/96

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

Sample Name: E-1(E)
Lab Code: S9600190-001MS, S9600190-001DMS

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	24.6	24.9	98	100	75-135	1
Toluene	25	25	ND	24.2	24.8	97	99	73-136	2
Ethylbenzene	25	25	ND	24.6	24.6	98	98	69-142	<1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-123.003/TO#19289.00/#2035 ALBANY

Service Request: 9600190
Date Analyzed: 2/6/96

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	24.4	98	85-115
Toluene	25	24.2	97	85-115
Ethylbenzene	25	23.8	95	85-115
Xylenes, Total	75	73.3	98	85-115
Gasoline	250	230	92	90-110

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. 19289.00

Chain of Custody

ARCO Facility no. 2035	City (Facility) Albany, CA	Project manager (Consultant) S. Yalamanchili	
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408 377-8647	Telephone no. (Consultant) 408 453-7300	Fax no. (Consultant) 408 453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave, San Jose, CA		

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
E-1(E)	1	4		X		X	X	1-30-96	1107		X					X						
I-1(A)	2	2		X		X	X	↓	↓		X											
I-2	3	2		X		X	X	↓	↓		X											
I-3(D)	4	2		X		X	X	↓	↓		X											

Laboratory name

Contract number

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks
20805-123.003

Lab number
9600190

Turnaround time

Priority Rush 1 Business Day ☐

Rush 2 Business Days ☐

Expedited 5 Business Days ☐

Standard 10 Business Days ☑

Condition of sample: ok		Temperature received: Cool	
Relinquished by sampler Dan White	Date 1-30-96 Time	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory Claire A. [illegible]	Date 1/30/96 Time 1550

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