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

Date June 18, 1996
Project 20805-135.006

To:

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

We are enclosing:

Copies	Description
1	First quarter 1996 groundwater monitoring results and remediation system performance evaluation report for ARCO service station 6148, Oakland, 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. Please 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 18, 1996

Re: ARCO Station #

6148 • 5131 Shattuck Avenue • Oakland, 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 3, 1996
Project 20805-135.006

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 6148, Oakland, California

Dear Mr. Whelan:

This letter presents the results of the first quarter 1996 groundwater monitoring program at ARCO Products Company (ARCO) service station 6148, 5131 Shattuck Avenue, Oakland, California (Figure 1). Operation and performance data for the on-site soil-vapor extraction (SVE), air-sparge (AS), and air-bubbling 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

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

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

I:\ARCO\MI01332.DOC-96 ljt:1

June 3, 1996

ARCO QUARTERLY REPORT

Station No.: 6148	Address: 5131 Shattuck Avenue, Oakland, California
EMCON Project No.	20805-135.006
ARCO Environmental Engineer/Phone No.:	Michael Whelan /(408) 453-1640
EMCON Project Manager/Phone No.:	John C. Young /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Susan Hugo
Reporting Period:	January 1, 1996 to April 1, 1996

WORK PERFORMED THIS QUARTER (First- 1996):

1. Conducted quarterly groundwater monitoring and sampling.
2. Prepared and submitted quarterly report for fourth quarter 1995.
3. Operation of soil vapor extraction (SVE) and air-bubbling systems.

WORK PROPOSED FOR NEXT QUARTER (Second- 1996):

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

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
Bulk Soil Removed to Date :	560 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 and Air-Bubbling Systems
Approximate Depth to Groundwater:	13.72 feet
Groundwater Gradient (Average):	0.016 ft/ft toward southwest (consistent with past events)

SVE QUARTERLY OPERATION AND PERFORMANCE:

Equipment Inventory:	Therm Tech Model CATVAC-10E, Electric/Catalytic Oxidizer
Operating Mode:	Catalytic Oxidation
BAAQMD Permit #:	25126
TPH Conc. End of Period (lab):	320 ppmv
Benzene Conc. End of Period (lab):	1.6 ppmv
Flowrate End of Period:	126.4 scfm
HC Destroyed This Period:	714.8 pounds
HC Destroyed to Date:	1,446.5 pounds
Utility Usage	
Electric (KWH):	17,071 KWH
Gas/Propane (CF):	NA (Not Available)

Operating Hours This Period:	791.9 hours
Percent Operational:	36.3% System was down for quarterly monitoring and other maintenance issues.
Operating Hours to Date:	1122.2 hours
Unit Maintenance:	NA
Number of Auto Shut Downs:	2
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	91.5%
Stack Temperature:	691°F
Source Flow:	126.4 scfm
Process Flow:	126.4 scfm
Source Vacuum:	40 inches of water

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, Volatile and Semivolatile Organic Compounds
- Table 5 - Historical Groundwater Analytical Data, Metals
- Table 6 - Soil-Vapor Extraction System Operation and Performance Data
- Table 7 - Soil-Vapor Extraction Well Data
- 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
- Appendix A - Field Data Sheets, First Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, First Quarter 1996 Groundwater Monitoring Event
- Appendix C - SVE System Monitoring Data Log Sheets
- Appendix D - Field Data Sheets, Operation and Maintenance Visits, First Quarter 1996
- Appendix E - Analytical Results and Chain-of-Custody Documentation for Soil Vapor Extraction System, First Quarter 1996

cc: Susan Hugo, ACHCSA
Kevin Graves, RWQCB-SFBR

Table 1
Groundwater Monitoring Data
First Quarter 1996

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 5-9-96

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 & Grease SM 5520C	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	mg/L	mg/L	µg/L
MW-1	02-27-96	107.80	15.21	92.59	ND	SW	0.016	02-27-96	1400	240	88	44	110	200	--	--	--	--
MW-2	02-27-96	107.28	14.82	92.46	ND	SW	0.016	02-27-96	8900	1400	980	150	550	940	--	--	--	--
MW-3	02-27-96	107.61	15.03	92.58	ND	SW	0.016	02-27-96	9700	94	15	290	720	430	--	--	10	--
MW-4	02-27-96	106.71	13.72	92.99	ND	SW	0.016	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	10	--	--	--	--
MW-5	02-27-96	106.60	14.35	92.25	ND	SW	0.016	02-27-96	10000	1000	71	690	1000	440	450	--	--	--
MW-6	02-27-96	105.13	12.00	93.13	ND	SW	0 016	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-7	02-27-96	107.05	12.24	94.81	ND	SW	0.016	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--

ft-MSL: elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA: United Statest Environmental Protection Agency
MTBE: methyl-tert-butyl ether
SM: standard method
mg/L: milligrams per liter
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND: none detected
SW: southwest
--: not analyzed

esj/h:\6148\6148mdb.xls\Table 1:imi
20805-135.006

Table 2
Historical Groundwater Elevation Data
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

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	02-02-94	108.03	17.31	90 72	ND	NR	NR
MW-1	04-29-94	108.03	17.31	90.72	ND	NR	NR
MW-1	08-02-94	108.03	17.95	90.08	ND	SW	0.017
MW-1	11-16-94	108.03	17.04	90.99	ND	SW	0.02
MW-1	03-20-95	108.03	15.75	92.28	ND	SW	0.02
MW-1	06-06-95	108.03	17 68	90.35	ND	SW	0.016
MW-1	08-24-95	107.80	17.45	90.35	ND	SW	0.014
MW-1	11-16-95	107.80	17.64	90.16	ND	SW	0.012
MW-1	02-27-96	107.80	15.21	92.59	ND	SW	0.016
MW-2	02-02-94	107.43	16.96	90.47	ND	NR	NR
MW-2	04-29-94	107.43	16.95	90.48	ND	NR	NR
MW-2	08-02-94	107.43	17.59	89.84	ND	SW	0.017
MW-2	11-16-94	107.43	16.73	90.70	ND	SW	0.02
MW-2	03-20-95	107.43	15.50	91.93	ND*	SW	0.02
MW-2	06-06-95	107.43	17.43	90.00	ND	SW	0.016
MW-2	08-24-95	107.28	17.22	90.06	ND	SW	0.014
MW-2	11-16-95	107.28	17.36	89.92	ND	SW	0.012
MW-2	02-27-96	107.28	14.82	92.46	ND	SW	0.016
MW-3	02-02-94	107.77	17.16	90.61	ND	NR	NR
MW-3	04-29-94	107.77	17.14	90.63	ND	NR	NR
MW-3	08-02-94	107.77	17.81	89.96	ND	SW	0.017
MW-3	11-16-94	107.77	16.91	90.86	ND	SW	0.02
MW-3	03-20-95	107.77	15.60	92.17	ND	SW	0.02
MW-3	06-06-95	107.77	17.54	90 23	ND	SW	0.016
MW-3	08-24-95	107.61	17.42	90.19	ND	SW	0.014
MW-3	11-16-95	107.61	17.58	90.03	ND	SW	0.012
MW-3	02-27-96	107.61	15.03	92.58	ND	SW	0.016

Table 2
Historical Groundwater Elevation Data
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
MW-4	02-02-94	106.58	15.36	91.22	ND	NR	NR
MW-4	04-29-94	106.58	15.36	91.22	ND	NR	NR
MW-4	08-02-94	106.58	15.94	90.64	ND	SW	0.017
MW-4	11-16-94	106.58	14.99	91.59	ND	SW	0.02
MW-4	03-20-95	106.58	13.85	92.73	ND	SW	0.02
MW-4	06-06-95	106.58	15.70	90.88	ND	SW	0 016
MW-4	08-24-95	106 71	15.86	90.85	ND	SW	0.014
MW-4	11-16-95	106.71	16 10	90.61	ND	SW	0.012
MW-4	02-27-96	106.71	13.72	92.99	ND	SW	0.016
MW-5	02-02-94	106.68	16.38	90.30	ND	NR	NR
MW-5	04-29-94	106.68	16.41	90.27	ND	NR	NR
MW-5	08-02-94	106 68	16.81	89.87	ND	SW	0.017
MW-5	11-16-94	106.68	16.12	90.56	ND	SW	0.02
MW-5	03-20-95	106.68	14.92	91.76	ND	SW	0.02
MW-5	06-06-95	106.68	16 61	90.07	ND	SW	0.016
MW-5	08-24-95	106.60	16.47	90.13	ND	SW	0.014
MW-5	11-16-95	106.60	16 69	89.91	ND	SW	0.012
MW-5	02-27-96	106.60	14.35	92.25	ND	SW	0.016
MW-6	02-02-94	105.16	13.60	91.56	ND	NR	NR
MW-6	04-29-94	105.16	13.66	91.50	ND	NR	NR
MW-6	08-02-94	105.16	13.99	91.17	ND	SW	0.017
MW-6	11-16-94	105.16	13.11	92.05	ND	SW	0.02
MW-6	03-20-95	105.16	12.13	93.03	ND	SW	0.02
MW-6	06-06-95	105.16	13 95	91.21	ND	SW	0.016
MW-6	08-24-95	105.13	14.07	91.06	ND	SW	0.014
MW-6	11-16-95	105.13	14.34	90.79	ND	SW	0.012
MW-6	02-27-96	105.13	12.00	93.13	ND	SW	0 016

Table 2
Historical Groundwater Elevation Data
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
MW-7	02-02-94	107.08	14.04	93.04	ND	NR	NR
MW-7	04-29-94	107.08	14 10	92.98	ND	NR	NR
MW-7	08-02-94	107.08	14.61	92.47	ND	SW	0.017
MW-7	11-16-94	107.08	13.37	93.71	ND	SW	0.02
MW-7	03-20-95	107.08	12.32	94.76	ND	SW	0.02
MW-7	06-06-95	107.08	14.59	92.49	ND	SW	0.016
MW-7	08-24-95	107 05	14.64	92.41	ND	SW	0.014
MW-7	11-16-95	107.05	15.30	91 75	ND	SW	0.012
MW-7	02-27-96	107.05	12.24	94.81	ND	SW	0.016
AS-1	09-30-93	107.71	18.31	89.40	ND	NR	NR
AS-2	08-11-95	107.38	17.46	89.92	ND	NR	NR
AS-3	08-11-95	107.89	19.30	88.59	ND	NR	NR
AS-4	08-11-95	106.81	16.51	90.30	ND	NR	NR
AS-5	08-11-95	106.24	16.52	89.72	ND	NR	NR

ft-MSL: elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
NR: not reported; data not available
ND: none detected
SW: southwest
^: groundwater elevation (GWE) and depth to water (DTW) adjusted to include 80 percent of the floating product thickness (FPT):
[GWE: (TOC - DTW) + (FPT x 0.8)]
*: floating product entered the well during purging
**: 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 6148, Oakland, California,* (EMCON, March 4, 1996).

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

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 & Grease SM 5520C	TRPH EPA 418.1	TPHD LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L
MW-1	02-02-94	250	93	<0.5	1.9	1	--	--	--	--	--
MW-1	04-29-94	350	99	1.3	3.9	11	--	--	--	--	--
MW-1	08-02-94	210	82	<1	<1	2.5	--	--	--	--	--
MW-1	11-16-94	650	260	38	6.1	15	--	--	--	--	--
MW-1	03-20-95	830	140	5	41	110	--	--	--	--	--
MW-1	06-06-95	210	30	<0.5	7.3	16	--	--	--	--	--
MW-1	08-24-95	Not sampled: well was inaccessible due to construction									
MW-1	11-16-95	<50	5.6	<0.5	1.4	1.2	55	--	--	--	--
MW-1	02-27-96	1400	240	88	44	110	200	--	--	--	--
MW-2	02-02-94	16000	1300	2500	540	2700	--	--	--	--	--
MW-2	04-29-94	11000	1400	1200	360	1400	--	--	--	--	--
MW-2	08-02-94	4900	800	290	120	620	--	--	--	--	--
MW-2	11-16-94	49000	3300	8300	1400	7200	--	--	--	--	--
MW-2	03-20-95	Not sampled: floating product entered well during purging									
MW-2	06-06-95	1200	60	21	35	140	--	--	--	--	--
MW-2	08-24-95	Not sampled: well was inaccessible due to construction									
MW-2	11-16-95	360	45	1.3	7.1	7.5	210	--	--	--	--
MW-2	02-27-96	8900	1400	980	150	550	940	--	--	--	--
MW-3	02-02-94	26000	1400	1200	1200	4400	--	--	7.7	7.8	--
MW-3	04-29-94	22000	1400	620	910	3400	--	--	10	--	--
MW-3	08-02-94	17000	530	410	720	2600	--	--	--	6.6	--
MW-3	11-16-94	18000	1400	560	790	2800	--	--	--	2.3	--
MW-3	03-20-95	29000	880	190	760	2000	--	--	--	16	--
MW-3	06-06-95	22000	450	54	380	1300	--	--	--	7.1	--
MW-3	08-24-95	Not sampled: well was inaccessible due to construction									
MW-3	11-16-95	13000	210	<20	320	1000	790	--	--	8.3	--
MW-3	02-27-96	9700	94	15	290	720	430	--	--	10	--

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

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 & Grease SM 5520C	TRPH EPA 418.1	TPHD LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L
MW-4	02-02-94	<50	3.9	<0.5	<0.5	<0.5	--	--	--	--	--
MW-4	04-29-94	<50	4.2	<0.5	<0.5	<0.5	--	--	--	--	--
MW-4	08-02-94	<50	3.8	<0.5	<0.5	<0.5	--	--	--	--	--
MW-4	11-16-94	110	31	<0.5	<0.5	<0.5	--	--	--	--	--
MW-4	03-20-95	88	1	<0.5	<0.5	0.7	--	--	--	--	--
MW-4	06-06-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-4	08-24-95	Not sampled: well was inaccessible due to construction									
MW-4	11-16-95	<50	<0.5	<0.5	<0.5	<0.5	6	--	--	--	--
MW-4	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	10	--	--	--	--
MW-5	02-02-94	10000	3000	65	240	78	--	--	--	--	--
MW-5	04-29-94	7600	2400	27	130	44	--	--	--	--	--
MW-5	08-02-94	1900	680	<10	24	<10	--	--	--	--	--
MW-5	11-16-94	17000	5900	700	440	320	--	--	--	--	--
MW-5	03-20-95	21000	6900	450	800	1300	--	--	--	--	--
MW-5	06-06-95	6500	1700	<20	120	69	--	--	--	--	--
MW-5	08-24-95	Not sampled: well was inaccessible due to construction									
MW-5	11-16-95	1800	470	<5	17	5	1000	--	--	--	--
MW-5	02-27-96	10000	1000	71	690	1000	440	450	--	--	--
MW-6	02-02-94	61	2.2	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	04-29-94	<50	0.6	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	08-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	11-16-94	<50	1.1	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	06-06-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	08-24-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-6	11-16-95	<60	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

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 & Grease SM 5520C	TRPH EPA 418.1	TPHD LUFT Method
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L
MW-7	02-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	04-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	08-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	06-06-95	Not sampled: not scheduled for chemical analysis									
MW-7	08-24-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-7	11-16-95	Not sampled: not scheduled for chemical analysis									
MW-7	02-27-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
AS-1	09-30-93	<50	1.2	<0.5	<0.5	<0.5	--	--	--	--	--
AS-2	08-11-95	310	15	2.6	5.9	44	--	--	--	--	--
AS-3	08-11-95	10000	1700	380	490	1600	--	--	--	--	--
AS-4	08-11-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
AS-5	08-11-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--

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
mg/L: milligrams per liter
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 6148, Oakland, California,* (BMCON, March 4, 1996).

Table 4
Historical Groundwater Analytical Data
Volatile and Semivolatile Organic Compounds
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 5030/601						Semivolatile Organic Compounds by EPA Method 3510/8270			
		Tetrachloro-ethene	Trichloro-ethene	Chloroform	cis-1,2-Dichloro-ethene	Vinyl Chloride	1,1-Dichloro-ethane	Naphthalene	2-Methyl-naphthalene	Bis (2ethylhexyl) Phthalate	Di-n-octyl Phthalate
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	02-02-94	11	1.1	ND	ND	ND	ND	--	--	--	--
MW-1	04-29-94	13	1.3	0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-1	08-02-94	15	1.4	0.7	0.7	<0.5	<0.5	--	--	--	--
MW-1	11-16-94	12	1.1	0.5	1.2	<0.5	<0.5	--	--	--	--
MW-1	03-20-95	Not analyzed: sampling for additional parameters was discontinued									
MW-2	02-02-94	13	ND	ND	ND	ND	ND	--	--	--	--
MW-2	04-29-94	9.4	1.9	<0.5	2.2	<0.5	<0.5	--	--	--	--
MW-2	08-02-94	15	2	<0.5	2.9	<0.5	<0.5	--	--	--	--
MW-2	11-16-94	9.6	1.8	<0.5	2.1	<0.5	<0.5	--	--	--	--
MW-2	03-20-95	Not analyzed: sampling for additional parameters was discontinued									
MW-3	02-02-94	ND*	ND*	ND*	ND*	ND*	ND*	160	91	9	ND
MW-3	04-29-94	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	110	50	<10	<10
MW-3	08-02-94	1	<0.5	<0.5	<0.5	<0.5	<0.5	120	53	10	<10
MW-3	11-16-94	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	100	53	<10	<10
MW-3	03-20-95	Not analyzed. sampling for additional parameters was discontinued									
MW-4	02-02-94	1.4	ND	ND	ND	ND	ND	--	--	--	--
MW-4	04-29-94	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-4	08-02-94	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-4	11-16-94	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-4	03-20-95	Not analyzed: sampling for additional parameters was discontinued									
MW-5	02-02-94	2.7	ND	ND	ND	ND	ND	--	--	--	--
MW-5	04-29-94	10	2.7	<0.5	2.4	<0.5	<0.5	--	--	--	--
MW-5	08-02-94	13	5.4	<0.5	5.7	<0.5	<0 5	--	--	--	--
MW-5	11-16-94	1.1	1	<0.5	3.5	1.3	<0.5	--	--	--	--
MW-5	03-20-95	Not analyzed: sampling for additional parameters was discontinued									

Table 4
Historical Groundwater Analytical Data
Volatile and Semivolatile Organic Compounds
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

Well Designation	Water Sample Field Date	Halogenated Volatile Organic Compounds by EPA Method 5030/601						Semivolatile Organic Compounds by EPA Method 3510/8270			
		Tetrachloro-ethene	Trichloro-ethene	Chloroform	cis-1,2-Dichloro-ethene	Vinyl Chloride	1,1-Dichloro-ethane	Naphthalene	2-Methyl-naphthalene	Bis (2ethylhexyl) Phthalate	Di-n-octyl Phthalate
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-6	02-02-94	100	ND	6.7	ND	ND	ND	--	--	--	--
MW-6	04-29-94	95	6.6	7.2	<2.5	<2.5	<2.5	--	--	--	--
MW-6	08-02-94	87	6.1	4 6	<2.5	<2.5	<2.5	--	--	--	--
MW-6	11-16-94	86	6.8	8.9	<2 5	<2.5	<2.5	--	--	--	--
MW-6	03-20-95	Not analyzed: sampling for additional parameters was discontinued									
MW-7	02-02-94	3.4	ND	0.8	ND	ND	ND	--	--	--	--
MW-7	04-29-94	3.4	<0.5	1.1	<0.5	<0.5	<0.5	--	--	--	--
MW-7	08-02-94	3.3	<0.5	0.8	<0.5	<0.5	<0.5	--	--	--	--
MW-7	11-16-94	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	--
MW-7	03-20-95	Not analyzed: sampling for additional parameters was discontinued									
AS-1	09-30-93	29	1.5	1	ND	ND	ND	--	--	--	--
AS-2	08-11-95	Not analyzed: sampling for additional parameters was not initiated									
AS-3	08-11-95	Not analyzed: sampling for additional parameters was not initiated									
AS-4	08-11-95	Not analyzed: sampling for additional parameters was not initiated									
AS-5	08-11-95	Not analyzed: sampling for additional parameters was not initiated									

EPA. United Statest Environmental Protection Agency
µg/L: micrograms per liter
ND. not detected
_ _ : not analyzed
*: sample was analyzed for volatile organic compounds using USEPA Method 624 (only BTEX was detected)
**: For previous historical analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 6148, Oakland, California,* (EMCON, March 4, 1996).

Table 5
Historical Groundwater Analytical Data
Metals

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 05-09-96

Well Designation	Water Sample FieldDate	Cadmium EPA 6010 µg/L	Chromium EPA 6010 µg/L	Lead EPA 7421 µg/L	Zinc EPA 6010 µg/L	Nickel EPA 6010 µg/L
MW-1	03-18-92	<3	5	3	31	<20
MW-1	06-12-92	--	--	--	--	--
MW-1	09-14-92	--	--	--	--	--
MW-1	10-07-92	--	--	--	--	--
MW-1	01-22-93	--	--	--	--	--
MW-1	04-14-93	<3	<5	3	25	<20
MW-1	09-30-93	Not analyzed: sampling for additional parameters was discontinued				
MW-2	03-18-92	<3	21	9	54	38
MW-2	06-12-92	Not analyzed: sampling for additional parameters was discontinued				
MW-3	03-18-92	<3	67	27	156	113
MW-3	06-12-92	--	--	--	--	--
MW-3	09-14-92	--	--	--	--	--
MW-3	10-07-92	Not sampled: well contained floating product				
MW-3	01-22-93	<3	10	8	28	23
MW-3	04-14-93	<3	<5	3	25	<20
MW-3	09-30-93	<5	50	26	100	70
MW-3	11-16-93	Not analyzed. sampling for additional parameters was discontinued				
MW-4	11-12-92	Not analyzed: sampling for additional parameters was not initiated				
MW-5	11-12-92	Not analyzed: sampling for additional parameters was not initiated				
MW-6	11-12-92	Not analyzed: sampling for additional parameters was not initiated				
MW-7	11-12-92	Not analyzed: sampling for additional parameters was not initiated				
AS-1	09-30-93	Not analyzed: sampling for additional parameters was not initiated				
AS-2	08-11-95	Not analyzed: sampling for additional parameters was not initiated				
AS-3	08-11-95	Not analyzed: sampling for additional parameters was not initiated				
AS-4	08-11-95	Not analyzed: sampling for additional parameters was not initiated				
AS-5	08-11-95	Not analyzed: sampling for additional parameters was not initiated				

EPA: United Statest Environmental Protection Agency
µg/L: micrograms per liter
- - : not analyzed

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 6148
Location: 5131 Shattuck Avenue
Oakland, California

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Vapor Treatment Unit: ThermTech Model CATVAC-10E electric/ catalytic oxidizer

Start-Up Date: 09-27-95
Reporting Period From: 09-27-95
To: 04-01-96

Date Begin:		09-01-95	10-01-95	01-01-96	02-01-96	03-01-96
Date End:		10-01-95	01-01-96	02-01-96	03-01-96	04-01-96
Mode of Oxidation:		Cat-ox	Cat-ox	Cat-ox	Cat-ox	Cat-ox
Days of Operation:		3	11	16	7	11
Days of Downtime:		27	81	15	22	20
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline	3800	1200	670	230	320
	mg/m3 (3) as gasoline	14000	4400	2790	830	1300
	ppmv as benzene	81	19	NA (13)	0.6	1.6
	mg/m3 as benzene	260	61	NA	2	5.2
System Influent:	ppmv as gasoline	1800	600	415	230	320
	mg/m3 as gasoline	6700	2200	1730	830	1300
	ppmv as benzene	41	11	NA	0.6	1.6
	mg/m3 as benzene	130	34	NA	2	5.2
System Effluent:	ppmv as gasoline	52	30	3.8*	21	26
	mg/m3 as gasoline	190	110	20	76	110
	ppmv as benzene	1.1	0 5	NA	<0.1	<0.1
	mg/m3 as benzene	3.5	1.5	NA	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):		75.0	104.0	124.6	128.2	126.4
Average System Influent Flow Rate (4), scfm:		103.6	132.3	111.9	128.2	126.4
Average Destruction Efficiency (6), percent (7):		97.2	95.0	98.8	90.8	91.5
Average Emission Rates (8), pounds per day (9)						
Gasoline:		1.77	1.31	0.20	0.88	1.25
Benzene:		0.03	0.02	0.00	0.01	0.01
Operating Hours This Period:		74.9	255.3	381.7	157.2	253.0
Operating Hours To Date:		74.9	330.2	711.9	869.1	1122.2
Pounds/ Hour Removal Rate, as gasoline (10):		3.93	1.71	1.30	0.40	0.62
Pounds Removed This Period, as gasoline (11):		294.4	437.3	496.6	62.6	155.6
Pounds Removed To Date, as gasoline:		294.4	731.7	1228.3	1290.9	1446.5
Gallons Removed This Period, as gasoline (12):		47.5	70.5	80.1	10.1	25.1
Gallons Removed To Date, as gasoline:		47.5	118.0	198.1	208.2	233 3

Table 6
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number:	6148	Vapor Treatment Unit:	ThermTech Model CATVAC-10E electric/ catalytic oxidizer
Location:	5131 Shattuck Avenue Oakland, California		
Consultant:	EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date:	09-27-95
		Reporting Period From:	09-27-95
		To:	04-01-96

CURRENT REPORTING PERIOD:	01-01-96	to	04-01-96
DAYS / HOURS IN PERIOD:	91		2184.0
DAYS / HOURS OF OPERATION:	33		791.9
DAYS / HOURS OF DOWN TIME:	58		1392.1
PERCENT OPERATIONAL:			36.3 %
PERIOD POUNDS REMOVED:	714.8		
PERIOD GALLONS REMOVED:	115.3		
AVERAGE WELL FIELD FLOW RATE (scfm):			125.9
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):			123.2

1. Average concentrations are based on discrete sample results reported during the month; refer to Appendix C for discrete sample results. For the period of January 1, 1996 to February 1, 1996, laboratory analytical results were unavailable. The average concentrations were based on photoionization d (PID) field readings taken during the month of January 1996.
2. ppmv: parts per million by volume
3. mg/m3: milligrams per cubic meter
4. Average flow rates (time weighted average) are based on instantaneous flow rates recorded during the month, refer to Appendix C for instantaneous flow data
5. scfm: flow in standard cubic feet per minute at one atmosphere and 70 degrees Fahrenheit
6. Average destruction efficiencies are calculated using monthly average concentrations; refer to Appendix C for instantaneous destruction efficiency data.
7. destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - system effluent concentration (as gasoline in mg/m3)] / system influent concentration (as gasoline in mg/m3)) x 100 percent
8. Average emission rates are calculated using monthly average concentrations and flow rates; refer to Appendix C for instantaneous emission rate data
9. emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
10. pounds/ hour removal rate (as gasoline) = well field influent concentration (as gasoline in mg/m3) x well field influent flow rate (scfm) x 0 02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
11. pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
12. gallons removed this period (as gasoline) = pounds removed this period (as gasoline) x 0.1613 gallons/pound of gasoline
13. not available

Table 7
Soil-Vapor Extraction Well Data

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 06-17-96

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
09-27-95	open	NA	7.0	open	NA	7.5	open	NA	7 0	open	NA	7.0
09-27-95	open	NA	14.0	open	NA	13.0	open	NA	13.0	open	NA	13.0
09-27-95	open	NA	18.0	open	NA	18.0	open	NA	17.0	open	NA	17 0
09-27-95	open	538 PID	19.0	open	767 PID	19.5	open	531 PID	19.0	open	627 PID	19.5
09-27-95	open	NA	NA	open	4100 LAB	NA	open	1700 LAB	NA	open	3600 LAB	NA
09-28-95	open	1006 PID	18 0	open	NA	18.0	open	NA	18.0	open	NA	18.5
09-28-95	open	2800 LAB	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	open	NA	20.0	open	NA	20.0	open	NA	20.0	open	NA	20.0
10-11-95	open	NA	18.0	open	NA	18 0	open	NA	18 0	open	NA	18.0
01-12-96	open	300 PID	25.0	open	500 PID	25.0	open	430 PID	25 0	open	580 PID	25.0
02-15-96	open	NA	27 0	open	NA	27.0	open	NA	26 0	open	NA	26.0
03-19-96	closed	14.1 PID	0.0	closed	18.8 PID	0.0	closed	30 2 PID	0 0	closed	16.6 PID	0.0

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
PID: TVHG concentration was measured with a portable photoionization detector

Table 7
Soil-Vapor Extraction Well Data

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 06-17-96

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
09-27-95	open	NA	6.5	open	NA	6.0	open	NA	6.0	open	NA	6.0
09-27-95	open	NA	13.0	open	NA	13 0	open	NA	13.0	open	NA	13.0
09-27-95	open	NA	17.0	open	NA	17.0	open	NA	17.0	open	NA	17.0
09-27-95	open	247 PID	18.0	open	2615 PID	19.0	open	856 PID	19.0	open	501 PID	18.5
09-27-95	open	550 LAB	NA	open	4700 LAB	NA	open	2800 LAB	NA	open	1100 LAB	NA
09-28-95	open	NA	18 0	open	NA	18.0	open	NA	17 5	open	NA	17.0
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	closed	NA	NA	open	NA	19.0	open	NA	19.5	open	NA	19.0
10-11-95	closed	NA	NA	open	NA	17.5	open	NA	17.0	open	NA	17.0
01-12-96	open	350 PID	25.0	open	2210 PID	25.0	open	300 PID	22.0	open	225 PID	25 0
02-15-96	open	NA	26.0	open	NA	26.0	open	NA	24.0	open	NA	25.0
03-19-96	closed	8 9 PID	0.0	open (b)	512 PID	38.0	open (b)	156 PID	37.0	open (b)	60 1 PID	38.0

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
PID: TVHG concentration was measured with a portable photoionization detector

Table 7
Soil-Vapor Extraction Well Data

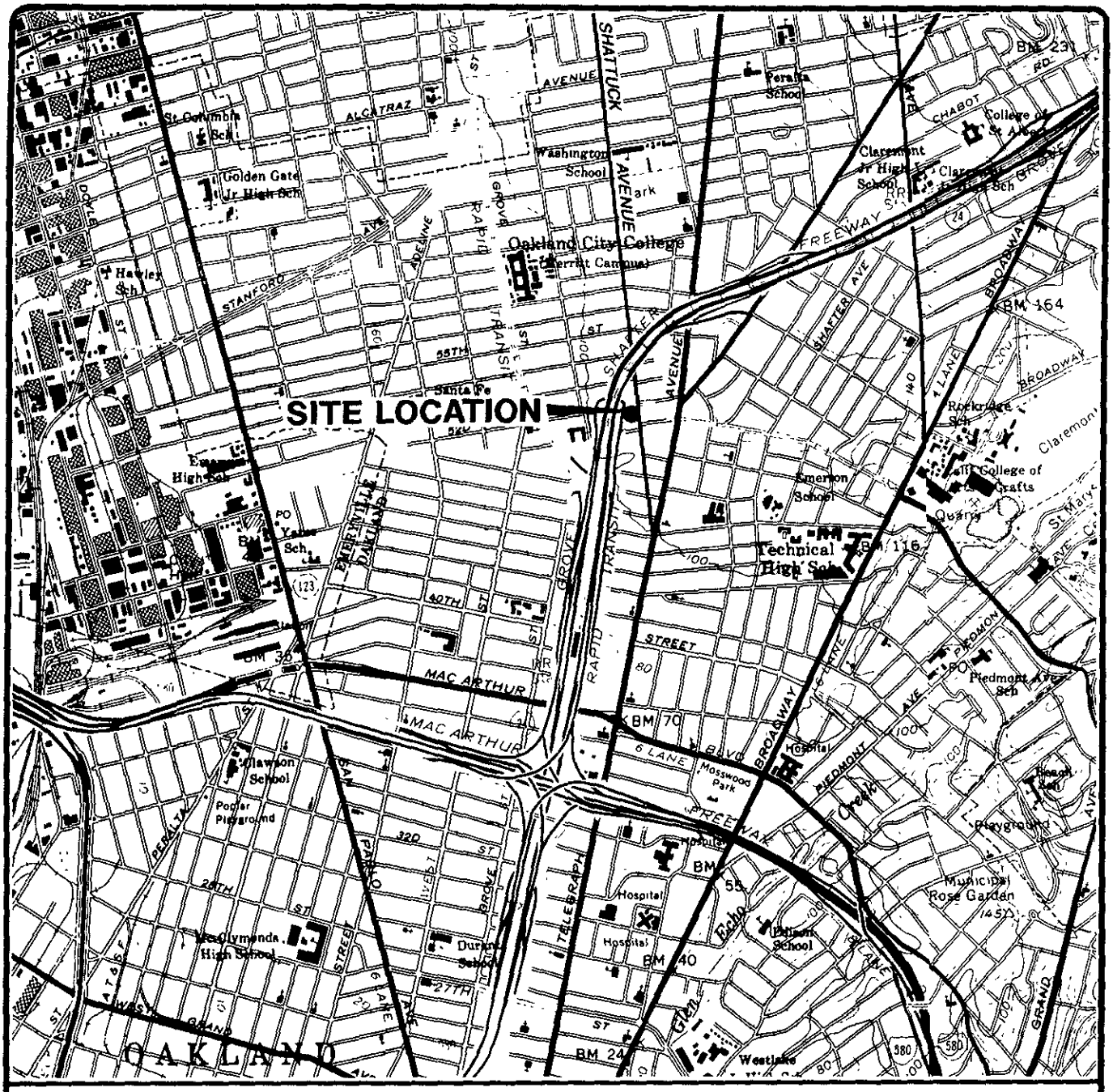
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 06-17-96

Date	Well Identification											
	VW-9			VW-10			MW-1			MW-5		
	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
09-27-95	open	NA	7.5	open	NA	6 0	open	NA	7.5	open	NA	5.0
09-27-95	open	NA	13.0	open	NA	13.0	open	NA	14.0	open	NA	12.0
09-27-95	open	NA	17.0	open	NA	17.0	open	NA	17.0	open	NA	17.0
09-27-95	open	801 PID	19.0	open	482 PID	19.0	open	438 PID	5.0	open	457 PID	18.5
09-27-95	open	6300 LAB	NA	open	1700 LAB	NA	open	1600 LAB	NA	open	960 LAB	NA
09-28-95	open	NA	18.0	open	NA	18.0	open	NA	5.0	open	NA	17 0
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	open	NA	19.0	open	NA	19.5	open	NA	5.0	open	NA	19.0
10-11-95	open	NA	17.5	open	NA	17.5	open	NA	4.0	open	NA	16.5
01-12-96	open	930 PID	22.0	open	170 PID	5.0	closed	13 PID	0.0	open	172 PID	5.0
02-15-96	open	NA	24.0	open	NA	10.0	closed	NA	0.0	open	NA	6 0
03-19-96	open (b)	50.2 PID	38.0	open (b)	22.4 PID	38.0	closed	32.6 PID	0.0	open (b)	43.2 PID	38 0

TVHG· concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O. inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
NA: not analyzed or not measured
FID: TVHG concentration was measured with a portable flame ionization detector
LAB: TVHG concentration was analyzed in the laboratory
PID: TVHG concentration was measured with a portable photoionization detector

152753



Base map from USGS 7.5' Quad. Maps:
Oakland East and Oakland West, California.
Photorevised 1980.

- N -

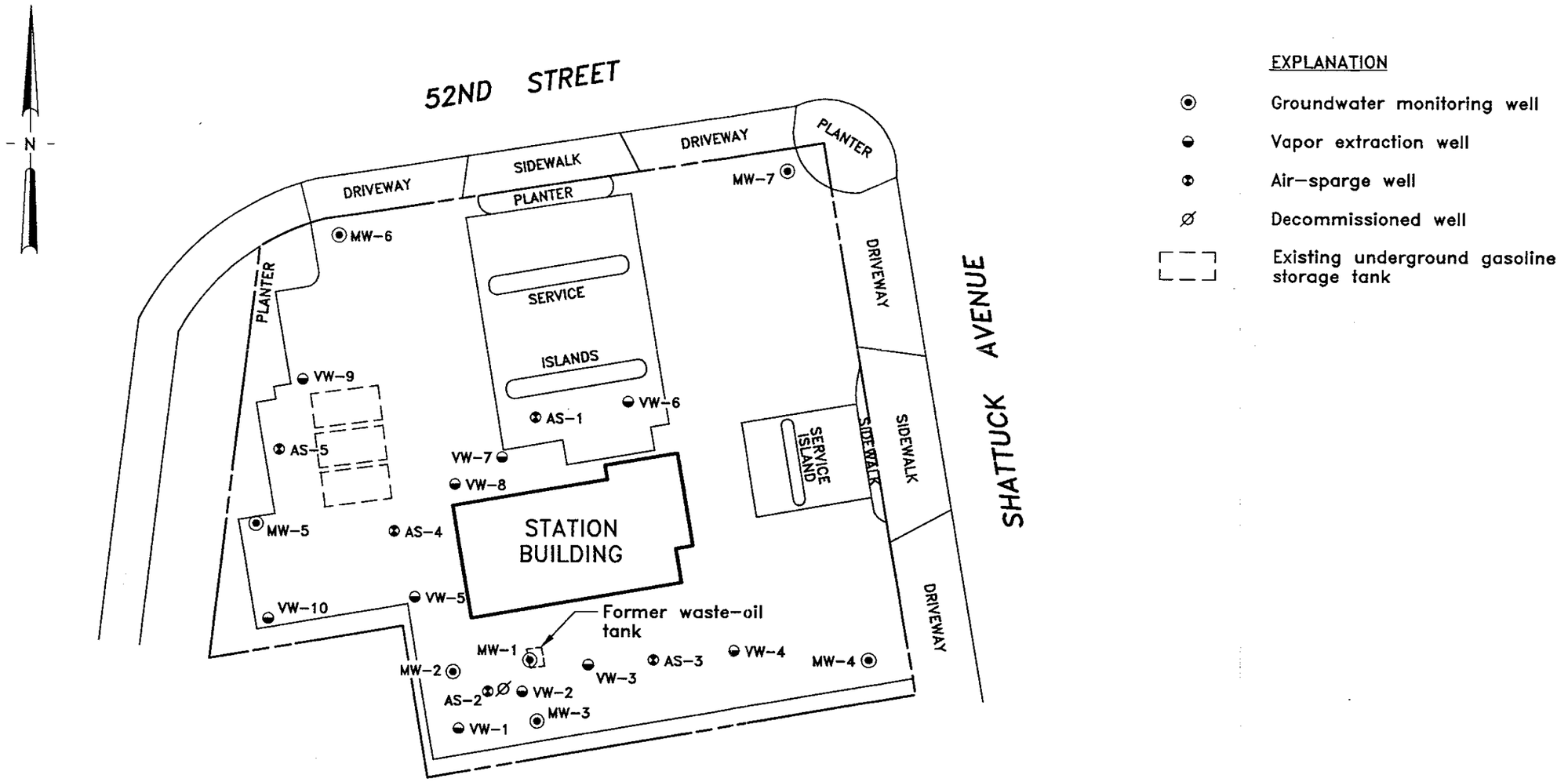
Scale : 0 2000 4000 Feet

EMCON

ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

SITE LOCATION

FIGURE
1
PROJECT NO.
805-135.06



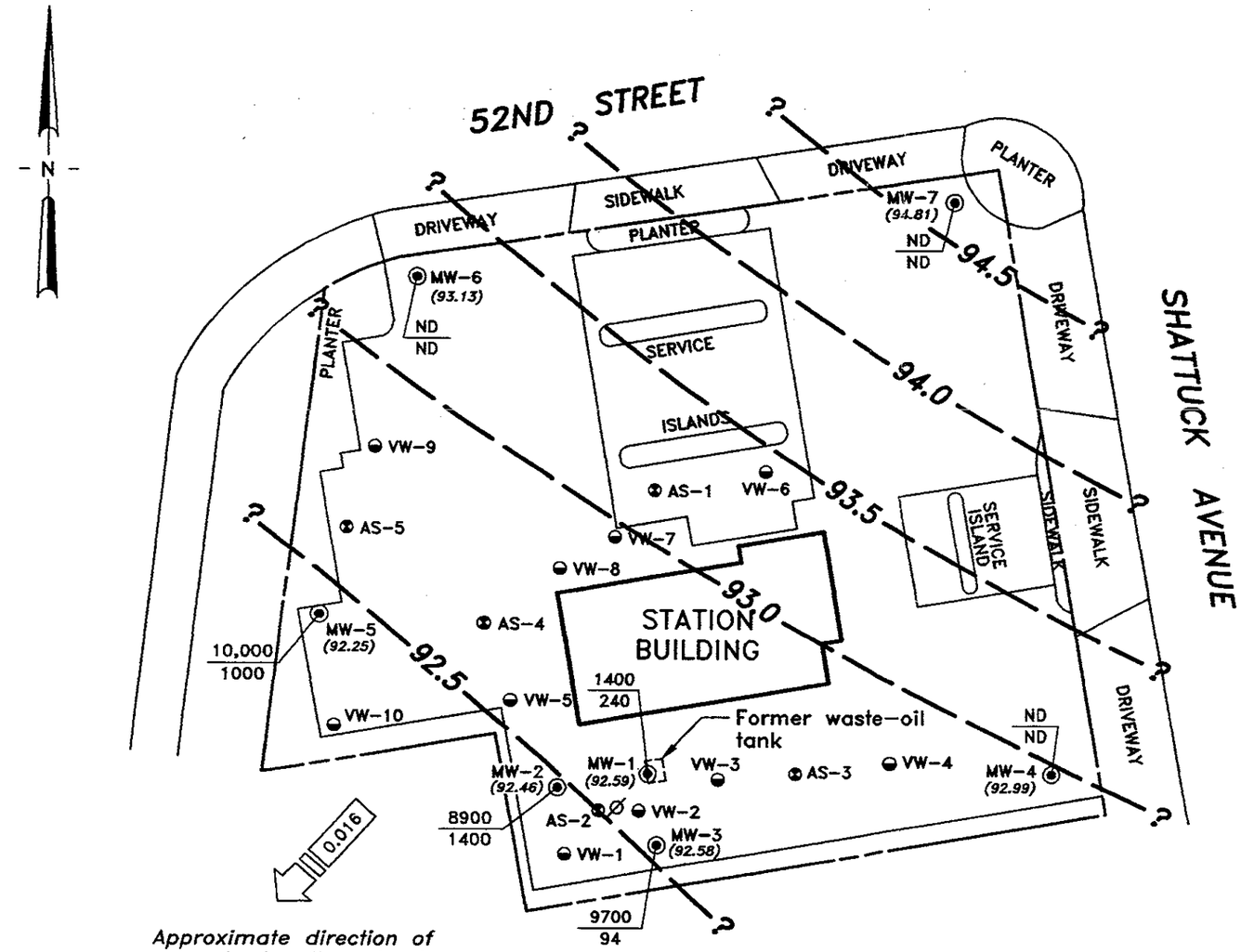
emcon

SCALE: 0 30 60 FEET
(Approximate)

ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

SITE PLAN

FIGURE NO.
2
PROJECT NO.
805-135.06



Approximate direction of groundwater flow showing gradient (calculated using MW-3, MW-5, and MW-7)

EXPLANATION

- ◉ Groundwater monitoring well
- ◒ Vapor extraction well
- ◉ Air-sparge well
- ⌀ Decommissioned well
- Existing underground gasoline storage tank
- (92.99) Groundwater elevation (Ft.-MSL) measured 2/27/96
- Groundwater elevation contour (Ft.-MSL)
- 1400 / 240 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
(Approximate)

ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

GROUNDWATER DATA
FIRST QUARTER 1996

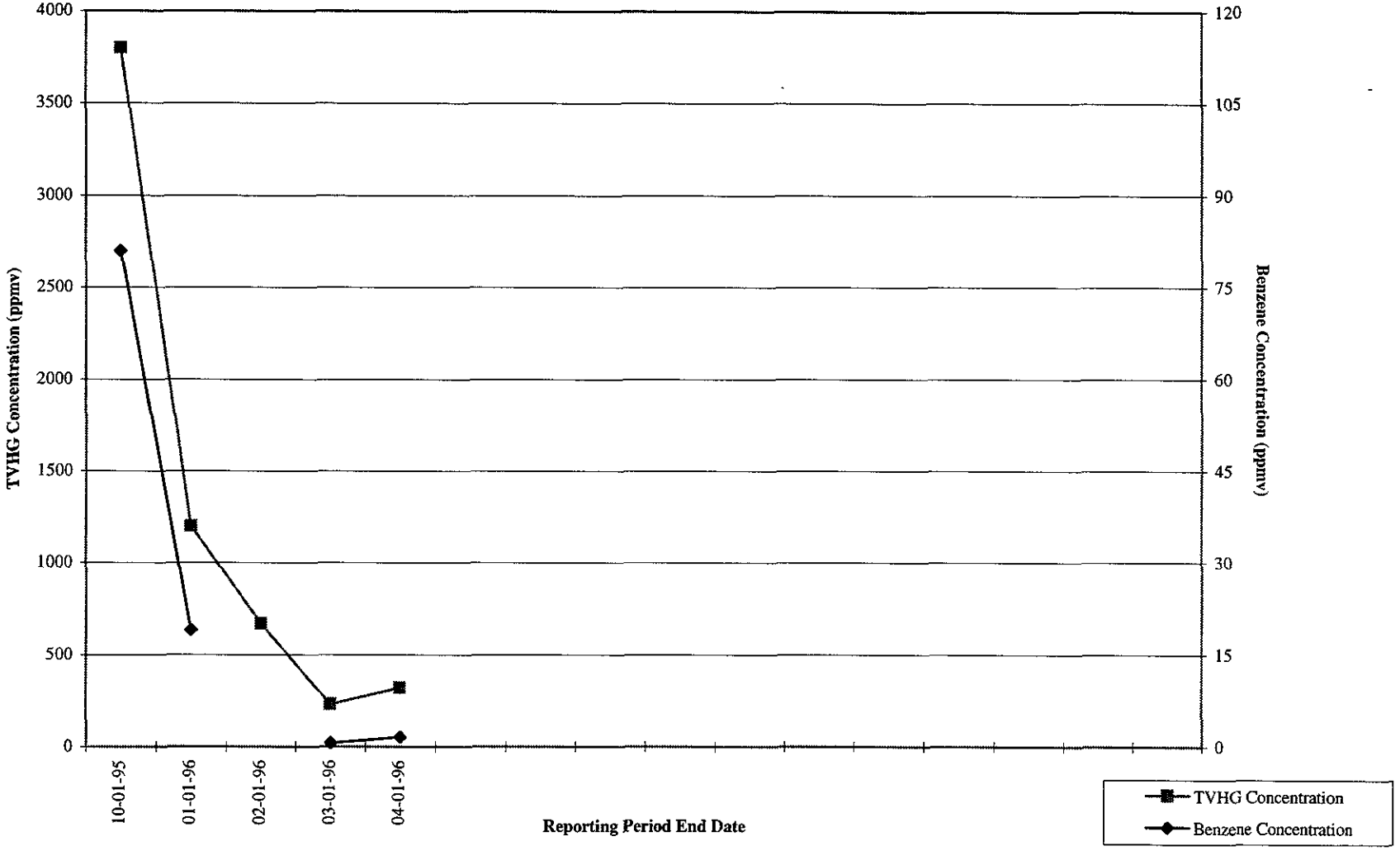
FIGURE NO. 3

PROJECT NO. 805-135.006

G:\805-135\G00 REV 0 06/03/96 09:58:10 DD DJ

Figure 4

ARCO Service Station 6148
Soil-Vapor Extraction and Treatment System
Historical Well Field Influent TVHG and Benzene Concentrations

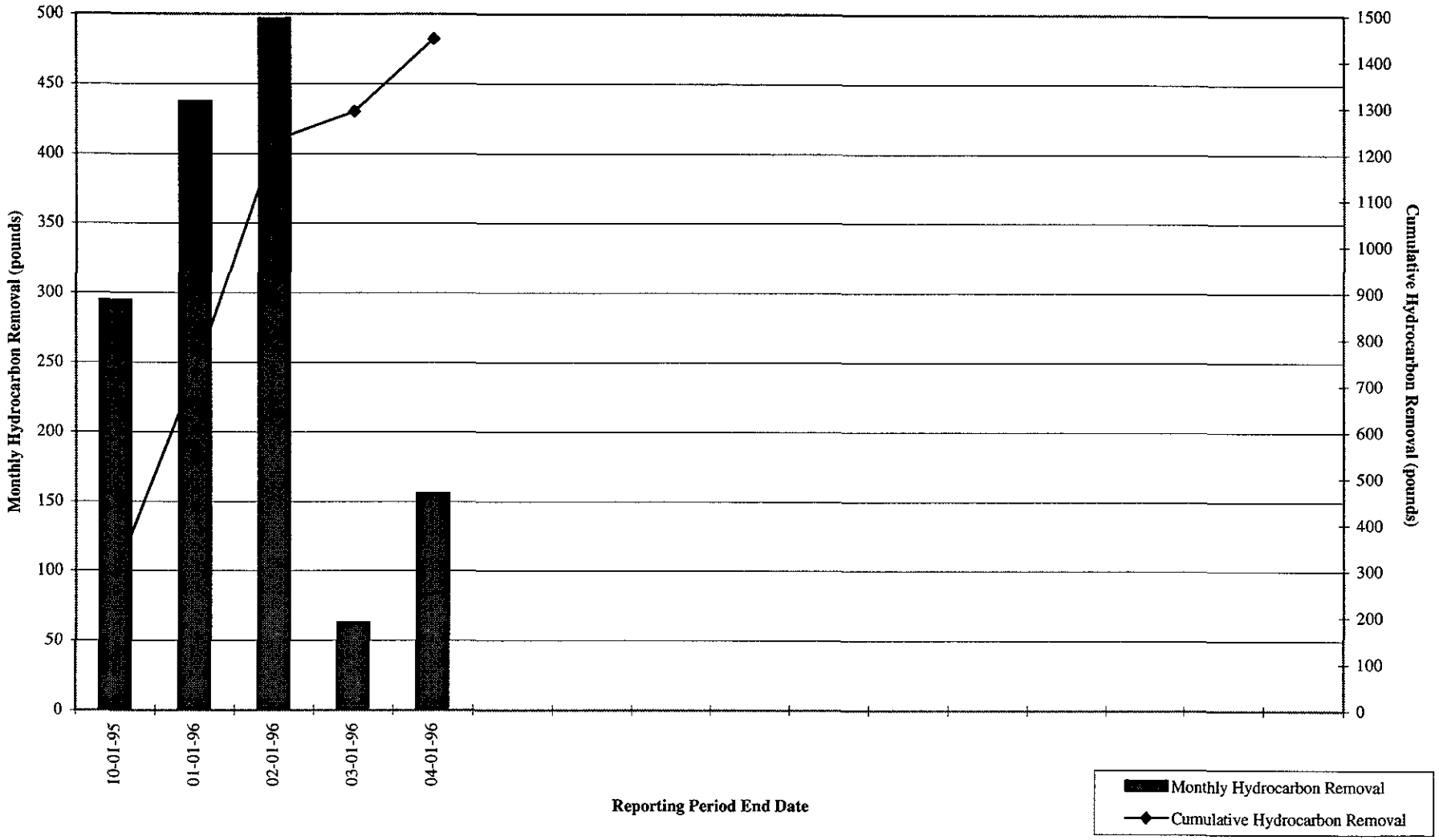


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/h:\6148\6148tdb xls\SVE Model·imi
20805-135.006

Figure 5

ARCO Service Station 6148
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



esj/h:\6148\6148tdb.xls\SVE Model:imi
20805-135.006

APPENDIX A

FIELD DATA SHEETS, FIRST QUARTER 1996 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-250.002** STATION ADDRESS : **5131 Shattuck Avenue, Oakland** DATE : 02-27-96

ARCO STATION # : **6148** FIELD TECHNICIAN : Joe Hall 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-6**	OK	YES	OK	ARCO	OK	12.0	12.0	ND	ND	26.6	
2	**MW-7**	OK	YES	OK	ARCO	OK	12.24	12.24	ND	ND	27.0	
3	**MW-4**	OK	YES	OK	NONE	NONE	13.72	13.72	ND	ND	26.0	
4	**MW-1**	OK	YES	OK	NONE	NONE	15.21	15.21	ND	ND	25.5	
5	**MW-5**	OK	YES	OK	NONE	NONE	14.35	14.35	ND	ND	24.8	
6	**MW-3**	OK	YES	OK	NONE	NONE	15.03	15.03	ND	ND	25.6	
7	**MW-2**	OK	YES	OK	NONE	NONE	14.82	14.82	ND	ND	25.6	

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev 3. 2/94

EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 21775-250-003

PURGED BY: J Williams

SAMPLED BY: ↓

SAMPLE ID: MW-1 (25)

CLIENT NAME: ARCO 6148

LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL) : NR

DEPTH TO WATER (feet) : 15.21

DEPTH OF WELL (feet) : 25.5

VOLUME IN CASING (gal.) : 6.72

CALCULATED PURGE (gal.) : 20.16

ACTUAL PURGE VOL. (gal.) : 21

DATE PURGED: 02-27-96 Start (2400 Hr) 1425 End (2400 Hr) 1435

DATE SAMPLED: ↓ Start (2400 Hr) ___ End (2400 Hr) 1440

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1429	7	6.69	454	67.2	BROWN	HEAVY
1432	14	6.77	479	68.3	CLEAR	TRACE
1435	21	6.75	480	69.0	CLEAR	CLEAR

D. O. (ppm): NR ODOR: STRONG [illegible] (COBALT 0 - 500): NR (NTU 0 - 200 or 0 - 1000): NR

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other ___

SAMPLING EQUIPMENT

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

Other ___

WELL INTEGRITY : OK LOCK # : [illegible]

REMARKS ___

Meter Calibration: Date 2-27-96 Time ___ Meter Serial #: 9312 Temperature °F ___

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

Location of previous calibration: [illegible]

Signature: [signature] Reviewed By: [signature] Page 1 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON

PROJECT NO: 21775-250-002 SAMPLE ID: MW-2 (25)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 6148

SAMPLED BY: " LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	7.04
DEPTH TO WATER (feet):	14.82	CALCULATED PURGE (gal.):	21.12
DEPTH OF WELL (feet):	25.6	ACTUAL PURGE VOL. (gal.):	21.5

DATE PURGED: 02-27-96 Start (2400 Hr) 1553 End (2400 Hr) 1601

DATE SAMPLED: " Start (2400 Hr): ___ End (2400 Hr) 1606

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1555	7.5	6.88	557	64.3	CLEAR	TRACE
1557	14.5	6.58	463	67.6	CLEAR	CLEAR
1601	21.5	6.58	463	68.0	CLEAR	CLEAR

D. O. (ppm): NR ODOR: STRONG 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: OK LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: ___ Meter Serial #: 9208 Temperature °F: ___

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

Location of previous calibration: ___

Signature: Joe Williams Reviewed By: SM Page 2 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2175-250-005 SAMPLE ID: MW-3 (EE)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 6148

SAMPLED BY: " LOCATION: OAKLAND, 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.): 6.90

DEPTH TO WATER (feet): 15.03 CALCULATED PURGE (gal.): 20.71

DEPTH OF WELL (feet): 25.6 ACTUAL PURGE VOL. (gal.): 21

DATE PURGED: 02-27-96 Start (2400 Hr) 1525 End (2400 Hr) 1533

DATE SAMPLED: " Start (2400 Hr) ___ End (2400 Hr) 1534

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1528	7	6.95	507	64.6	CLEAR	CLEAR
1530	14	6.77	488	67.2	CLEAR	TRACE
1533	21	6.70	488	67.9	CLEAR	TRACE

D. O. (ppm): N/A ODOR: STRONG

COLOR (visual): N/A (COBALT 0 - 500)

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

Field QC samples collected at this well: N/A

Parameters field filtered at this well: N/A

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: ___ Meter Serial #: 9208 Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 2 of 7

Rev 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-850-002 | SAMPLE ID: MW-4 (25)

PURGED BY: J WILLIAMS | CLIENT NAME: ARCO #145

SAMPLED BY: " | LOCATION: OAKLAND C.A

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	9.02
DEPTH TO WATER (feet)	13.72	CALCULATED PURGE (gal.):	24.06
DEPTH OF WELL (feet):	26.0	ACTUAL PURGE VOL. (gal.):	24.5

DATE PURGED: 02-27-96 | Start (2400 Hr) 1352 | End (2400 Hr) 1359

DATE SAMPLED: " | Start (2400 Hr) — | End (2400 Hr) 1405

TIME (2400 Hr)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1355	8.5	6.74	476	71.3	BROWN	MOD
1357	16.5	6.56	488	71.5	CLEAR	TRACE
1359	24.5	6.55	490	71.5	CLEAR	TRACE

D. O. (ppm): NR | ODOR: NONE | NR (COBALT 0 - 500) | NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NONE

Parameters field filtered at this well: NONE

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

WELL INTEGRITY: OK | LOCK #: NONE

REMARKS ___

Meter Calibration: Date: 2-27-96 Time: ___ Meter Serial #: 9205 Temperature °F: ___

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

Location of previous calibration: MW-5

Signature ___ Reviewed By SIT Page 4 of 7

Rev 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250-002 SAMPLE ID: MW-5

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 6148

SAMPLED BY: " LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NA VOLUME IN CASING (gal.): 6.82

DEPTH TO WATER (feet): 14.35 CALCULATED PURGE (gal.): 20.48

DEPTH OF WELL (feet): 24.5 ACTUAL PURGE VOL. (gal.): 21

DATE PURGED: 02-27-96 Start (2400 Hr) 1455 End (2400 Hr) 1504

DATE SAMPLED: " Start (2400 Hr) ___ End (2400 Hr) 1509

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1458	7	6.79	508	65.0	BROWN	HEAVY
1502	14	6.79	479	66.9	CLEAR	TRACE
1504	21	6.75	479	66.9	CLEAR	CLEAR

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

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
- V Centrifugal Pump
- ___ Submersible Pump
- ___ Well Wizard™
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)
- ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: OK LOCK #: MW-5

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: ___ Meter Serial #: 9608 Temperature °F ___

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

Location of previous calibration ___

Signature: [signature] Reviewed By: [signature] Page 5 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250-002 SAMPLE ID: MW-6 (26)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 6148

SAMPLED BY: " LOCATION: OAKLAND 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.): 9.53

DEPTH TO WATER (feet): 12.0 CALCULATED PURGE (gal.): 28.61

DEPTH OF WELL (feet): 26.6 ACTUAL PURGE VOL. (gal.): 29

DATE PURGED: 02-27-96 Start (2400 Hr) 1301 End (2400 Hr) 1307

DATE SAMPLED: " Start (2400 Hr) ___ End (2400 Hr) 1310

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1304	10	6.43	435	67.7	BROWN	MOD
1306	20	6.61	436	68.1	BROWN	MOD
1307	29	6.62	438	68.2	BROWN	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: OK LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: 1243 Meter Serial #: 5704 Temperature °F: 58.5

(EC 1000 1413 / 1413) (DI ___) (pH 7 6.91 / 7.00) (pH 10 10.28 / 10.00) (pH 4 4.06 / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 6 of 7

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250-002 SAMPLE ID: MW-7 (26)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 6148

SAMPLED BY: L LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 9.64

DEPTH TO WATER (feet): 12.24 CALCULATED PURGE (gal.): 28.92

DEPTH OF WELL (feet): 27 ACTUAL PURGE VOL. (gal.): 29

DATE PURGED: 02-27-96 Start (2400 Hr) 1327 End (2400 Hr) 1334

DATE SAMPLED: L Start (2400 Hr) — End (2400 Hr) 1340

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1330	10	6.45	435	70.7	BROWN	MOD
1332	20	6.52	443	70.7	BROWN	MOD
1334	29	6.46	440	70.7	BROWN	HEAVY

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 2-27-96 Time: ___ Meter Serial #: 9208 Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: [signature] Reviewed By: [signature] 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: S9600321

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **6148 Oakland / 20805-135.006 / TO# 19350.00**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on February 28, 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 15, 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

Cristina 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	**Service Request:**	S9600321
Project:	6148 Oakland / 20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		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(26)**	**MW-7(26)**	**MW-4(25)**
	Lab Code:	S9600321-001	S9600321-002	S9600321-003
	Date Analyzed:	3/7/96	3/7/96	3/7/96
Analyte	**MRL**			
TPH as Gasoline	50	ND	ND	ND
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
Methyl-tert-butyl ether	3	ND	ND	10

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 6148 Oakland / 20805-135.006/TO#19350.00
Sample Matrix: Water

Service Request: S9600321
Date Collected: 2/27/96
Date Received: 2/28/96
Date Extracted: NA

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

	Sample Name:	**MW-1(25)**	**MW-5(24)**	**MW-3(25)**
	Lab Code:	S9600321-004	S9600321-005	S9600321-006
	Date Analyzed:	3/8/96	3/8/96	3/8/96
Analyte	**MRL**			
TPH as Gasoline	50	1400	10000	9700
Benzene	0.5	240	1000	94
Toluene	0.5	88	71	15
Ethylbenzene	0.5	44	690	290
Total Xylenes	0.5	110	1000	720
Methyl-tert-butyl ether	3	200	440	430

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600321
Project:	6148 Oakland / 20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		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(25)**	**Method Blank**	**Method Blank**
	Lab Code:	S9600321-007	S9600307-WB	S9600308-WB
	Date Analyzed:	3/8/96	3/7/96	3/8/96
Analyte	**MRL**			
TPH as Gasoline	50	8900	ND	ND
Benzene	0.5	1400	ND	ND
Toluene	0.5	980	ND	ND
Ethylbenzene	0.5	150	ND	ND
Total Xylenes	0.5	550	ND	ND
Methyl-tert-butyl ether	3	940	ND	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600321
Project:	6148 Oakland / 20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		Date Extracted:	NA
		Date Analyzed:	3/11/96

Methyl-tert-butyl Ether
EPA Method 8240
Units: ug/L (ppb)

Sample Name	Lab Code	MRL	Result
MW-5(24)	S9600321-001	1	450
Method Blank	S9600311-WB	1	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	L9601609
Project:	6148 Oakland/#20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		Date Extracted:	3/4/96
		Date Analyzed:	3/4/96

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

Sample Name	Lab Code	MRL	Result
MW-3 (25)	L9601609-001	0.5	10
Method Blank	L9601609-MB	0.5	ND

1AMRL/120594

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 Oakland / 20805-135.006/TO#19350.00
Sample Matrix: Water

Service Request: S9600321
Date Collected: 2/27/96
Date Received: 2/28/96
Date Extracted: NA
Date Analyzed: 3/7,8/96

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-6(26)	S9600321-001	93	98
MW-7(26)	S9600321-002	93	102
MW-4(25)	S9600321-003	92	100
MW-1(25)	S9600321-004	90	102
MW-5(24)	S9600321-005	97	105
MW-3(25)	S9600321-006	96	103
MW-2(25)	S9600321-007	95	101
MW-6(26) MS	S9600321-001MS	93	110
MW-6(26) DMS	S9600321-001DMS	88	106
Method Blank	S9600307-WB	91	98
Method Blank	S9600308-WB	93	94
CAS Acceptance Limits:		69-116	69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600321
Project:	6148 Oakland / 20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		Date Extracted:	NA
		Date Analyzed:	3/7/96

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

Sample Name: MW-6(26)
Lab Code: S9600321-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Gasoline	250	250	ND	270	270	108	108	67-121	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 Oakland / 20805-135.006/TO#19350.00

Service Request: S9600321
Date Analyzed: 3/7/96

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	22.9	92	85-115
Toluene	25	22.8	91	85-115
Ethylbenzene	25	22.5	90	85-115
Xylenes, Total	75	68.6	91	85-115
Gasoline	250	240	96	90-110
Methyl-tert-butyl Ether	50	44	88	85-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 Oakland / 20805-135.006/TO#19350.00
Sample Matrix: Water

Service Request: S9600321
Date Collected: 2/27/96
Date Received: 2/28/96
Date Extracted: NA
Date Analyzed: 3/11/96

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240

		Percent Recovery		
Sample Name	**Lab Code**	1,2-Dichloroethane-D_4	Toluene-D_8	4-Bromofluorobenzene
MW-5(24)	S9600321-001	106	91	94
Batch QC MS	S9600330-001 MS	107	89	93
Batch QC DMS	S9600330-001 DMS	89	90	105
Method Blank	S9600311-WB	89	89	107
CAS Acceptance Limits:		76-114	88-110	86-115

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600321
Project:	6148 Oakland / 20805-135.006/TO#19350.00	**Date Collected:**	2/27/96
Sample Matrix:	Water	**Date Received:**	2/28/96
		Date Extracted:	NA
		Date Analyzed:	3/11/96

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

Sample Name: Batch QC
Lab Code: S9600330-001

	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	58	60	116	120	61-145	3
Trichloroethene	50	50	ND	57	57	114	114	71-120	<1
Chlorobenzene	50	50	ND	52	57	104	114	75-130	9
Toluene	50	50	ND	50	54	100	108	76-125	8
Benzene	50	50	ND	53	55	106	110	76-127	4

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 Oakland / 20805-135.006/TO#19350.00

Service Request: S9600321
Date Analyzed: 3/11/96

Initial Calibration Verification (ICV) Summary
Volatile Organic Compounds
EPA Method 624
Units: ppb

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Chloromethane	50	54	108	70-130
Vinyl Chloride	50	58	116	70-130
Bromomethane	50	55	110	70-130
Chloroethane	50	57	114	70-130
Acetone	50	47	94	70-130
1,1-Dichloroethene	50	51	102	70-130
Carbon Disulfide	50	59	118	70-130
Methylene Chloride	50	53	106	70-130
trans-1,2-Dichloroethene	50	58	116	70-130
cis-1,2-Dichloroethene	50	55	110	70-130
1,1-Dichloroethane	50	57	114	70-130
Vinyl Acetate	50	60	120	70-130
2-Butanone (MEK)	50	52	104	70-130
Chloroform	50	56	112	70-130
1,1,1-Trichloroethane (TCA)	50	59	118	70-130
Carbon Tetrachloride	50	61	122	70-130
Benzene	50	56	112	70-130
1,2-Dichloroethane	50	53	106	70-130
Trichloroethene (TCE)	50	57	114	70-130
1,2-Dichloropropane	50	55	110	70-130
Bromodichloromethane	50	53	106	70-130
2-Hexanone	50	54	108	70-130
trans-1,3-Dichloropropene	50	52	104	70-130
Toluene	50	61	122	70-130
cis-1,3-Dichloropropene	50	54	108	70-130
1,1,2-Trichloroethane	50	55	110	70-130
Tetrachloroethene (PCE)	50	58	116	70-130
Dibromochloromethane	50	56	112	70-130
Chlorobenzene	50	53	106	70-130
Ethylbenzene	50	58	116	70-130
o- Xylene	50	54	108	70-130
Styrene	50	52	104	70-130
Bromoform	50	55	110	70-130
1,1,2,2-Tetrachloroethane	50	51	102	70-130
MTBE	50	58	116	70-130

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L9601609
Project:	6148 Oakland/#20805-135.006/TO#19350.00	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	3/4/96
		Date Analyzed:	3/4/96

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	1.82	1.82	91	91	75-125	<1

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no.	6148
City (Facility)	Oakland
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)453-0457
Contract number	
Consultant name	EMCON
Address (Consultant)	1921 Ringwood Ave. San Jose, CA 95131

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH (incl. MTBE) EPA 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 (Do Not Report Full Scan MTBE Only)	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW-6(26)	1	2		X		X	HCL	2/27/96	1310		X											
MW-7(26)	2	2		X		X	HCL	↓	1340		X											
MW-4(25)	3	2		X		X	HCL	↓	1405		X											
MW-1(25)	4	2		X		X	HCL	↓	1440		X											
MW-5(24)	5	4		X		X	HCl	↓	1509		X					X						
MW-3(25)	6	4		X		X	HCl	↓	1537		X			X								
MW-2(25)	7	2		X		X	HCL	↓	1606		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks:
2-40ml HCL VOAs (All Wells)
Add 2-40ml HCL VOAs (MW-5)
2-1liter HCL Glass (MW-3)

#20805-135.006

Lab number: S9600321

Condition of sample: ok

Temperature received: Cool

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by sampler: [signature]	2-28-96	830	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory: [signature] Joanne Brown	2-28-96	0830

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒ 3/13

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 6148
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

Reading Date & Time	Field Monitoring Data: Flow Rates: Well Field Flow Rate	Flow Rates: System Influent Flow Rate*	FID or PID Results: Well Field	FID or PID Results: System Influent	FID or PID Results: System Effluent	Destruction Efficiency	Laboratory Sample Time	Laboratory Monitoring Data: Well Field Influent: Gasoline	Well Field Influent: Benzene	System Influent: Gasoline	System Influent: Benzene	System Effluent: Gasoline	System Effluent: 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																		334 71				
01/12/96 12:40	129.2	115.3	670	415	3.8	99 1											276 67	334 71	0.00	0.00	276 7	11.53
01/30/96 13:50	129.2	115 3															433.17	682.21	347.50	14.48	85.7	3.57
02/01/96 00:00	77.7	77.7															34.17	716.38	34 17	1.42	0.0	0.00
Period Totals:																	744 00		381.67	15.90	362.33	15 10
Period Averages:	124.6	111.9	670	415	3.8																	

* The total pressure for the system influent flow rate was assumed to be 5.0 inches of water because the data was unavailable

ARCO 6148
SVE SYSTEM
MONITORING DATA

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

Hours in Period: 696.0
Days in Period: 29.00

Operation + Down Hours: 696.0
Operation + Down Days: 29.00

Reading Date & Time	Field Monitoring Data: Flow Rates: Well Field Flow Rate	Field Monitoring Data: Flow Rates: System Influent Flow Rate*	Field Monitoring Data: FID or PID Results: Well Field	Field Monitoring Data: FID or PID Results: System Influent	Field Monitoring Data: FID or PID Results: System Effluent	Field Monitoring Data: Destruction Efficiency	Laboratory Sample Time	Laboratory Monitoring Data: Well Field Influent: Gasoline		Well Field Influent: Benzene		System Influent: Gasoline		System Influent: Benzene		System Effluent: Gasoline		System Effluent: 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																								716 38				
02/15/96 12:30	128.2	128 2					12:25	230	830	0 6	2	230	830	0 6	2	21	76	<0.1	<0.5	90.8	0.88	0.01	348.50	873 40	157 02	6.54	191.5	7.98
03/01/96 00:00	128.2	128.2																					347.50	873.59	0 19	0.01	347.3	14 47
Period Totals:																							696.00		157 21	6.55	538 79	22 45
Period Averages:	128.2	128.2						230	830	0.6	2.0	230	830	0.6	2.0	21	76	<0.1	<0.5	90 8	0.88	0 01						

* The total pressure for the system influent flow rate was assumed to be 5.0 inches of water because the data was unavailable.

ARCO 6148
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																								873.59				
03/19/96 13:30	128.2	128.2																					445.50	873.59	0.00	0.00	445.5	18.56
03/19/96 14:30	126.4	126.4	250			NR	15:00	320	1300	1.6	5.2	320	1300	1.6	5.2	26	110	<0.1	<0.5	91.5	1.25	0.01	1.00	874.59	1.00	0.04	0.00	0.00
04/01/96 00:00	126.4	126.4																					297.50	1126.63	252.04	10.50	45.5	1.89
Period Totals:																							744.00		253.04	10.54	490.96	20.46
Period Averages:	126.4	126.4	250					320	1300	1.6	5.2	320	1300	1.6	5.2	26	110	<0.1	<0.5	91.5	1.25	0.01						

* The total pressure for the system influent flow rate was assumed to be 5.0 inches of water because the data was unavailable.

APPENDIX D

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

Remarks: Started system per S. Yelimanchiler instructions. check compressor - OK
Note: Strong gasoline smell in area (NO leaks)
Unscheduled site visit [] Scheduled site visit [✓]

SYSTEM PARAMETERS (Therm Tech Model CATVAC 10E electric catalytic oxidizer) ATI phone # 510-595-9298

Arrival Time (24:00 hour)	1020	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	ON	Stack Temperature (°F)	1010
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	1030	Fire Box Temperature (°F)	650
Reading Time (24:00 hour)	1240	Set Point (°F)	650
Well Field I-1 (3")	—	**TOTAL HOURS**	334.71
Vacuum (in. of H_2O)	32	Electric Meter (kwh)	
Velocity (in. of H_2O)	>.50	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	58	**AIR MONITORING**	
After Blower I-2 (4")	—	**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H_2O)	NA	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H_2O)	.14	Date: (WITH CARBON FILTER)	
Temperature (°F)	160	**PID (ppm)**	CALIBRATION GAS TYPE: 130
Dilution Air (3") Temperature (°F)	NA	Date: 1-12-96	20.6 / 670 / 415 / 38
Dilution Air Flow (in of H_2O)	Data on ATI only	Date:	
ATI operating properly: yes/no		**Lab samples taken for analysis at:**	

WELL FIELD

SVE/Bubbler Well ID	Well Diameter	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Flow (2") (in. of H_2O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'			100	25	.22			300
VW-2	4"	10'-24'			100	25	.01			500
VW-3	4"	14'-24'			100	25	.02			430
VW-4	4"	10'-24'			100	25	0			580
VW-5	4"	10'-24'			10	25	0			350
VW-6	4"	10'-24'			100	25	0			2210
VW-7	4"	10'-24'			10	22	.22			300
VW-8	4"	10'-24'			100	25	.01			225
VW-9	4"	10'-24'			100	22	.01			930
VW-10	4"	10'-24'			100	5	.40			170
MW-1	4"	13'-26'			closed	0	0			13
MW-5	4"	10'-25'			10	5	.18			172

Sparge/Bubbler Well ID	Well Diameter	Screened Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (cfm)	DO (mg/l)	REMARKS
AS-1 (Sparge only)	1"	26'-28'							
AS-2 (Sparge only)	2"	26'-28'							
AS-3 (Sparge only)	2"	26'-28'							
AS-4 (Sparge only)	2"	26'-28'							
AS-5 (Sparge only)	2"	26'-28'							
MW-2 (Bubbler only)	2"	14'-26'							
MW-3 (Bubbler only)	2"	14'-26'							
MW-4 (Bubbler only)	4"	11.5'-26.5'							
MW-6 (Monitor only)	4"	12'-27'			NA	NA	NA		
MW-7 (Monitor only)	4"	12'-27'			NA	NA	NA		

Total Sparge Data		
Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(cfm)=	Compressor Hours=
		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. Winther **Date:** 1-12-96

Project#20805-135.004
ARCO 6148 Soil Vapor Extraction System

Rev. 0, 10/91

EMCON ASSOCIATES

FIELD REPORT
FIELD SERVICES GROUP

PROJECT NO: 20805-135.006 DATE: 1-30-96

CLIENT NAME: Avco NAME: V. Whitten

LOCATION: 614B

SERVICES RENDERED

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

SOIL SAMPLING: ☐ Excavation ☐ Borings ☐ Stockpile

OTHER: O&M

REMARKS: Responded to request by S. Velimanchile to check on system at 614B.
System down because of High Water in Knock out Tank. Drained Knock-out of water and restarted system. @ 1350 hrs.

Unit hrs. 6822.1
Box 629°
SP 650°
Stack 670°
Total Vacuum From well field: 40"
Total Flow = .185"/wtr.

SIGNATURE: Van Whitten

Page 1 of 1

Remarks: System down - High Temp. Tried to restart - problems (Electrical), switched relays & got system running, ran for 1 hour took E-1 & I-1 samples Shut System down for Quarterly Sampling

Unscheduled site visit [] Scheduled site visit [✓]

SYSTEM PARAMETERS (Therm Tech Model CATVAC 10E electric catalytic oxidizer) ATI phone # 510-595-9298

Arrival Time (24:00 hour)	0923	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	OFF	Stack Temperature (°F)	655
Shutdown Time (24:00 hour)	1245	**SYSTEM**	
Restart Time (24:00 hour)	1102	Fire Box Temperature (°F)	641
Reading Time (24:00 hour)	1230	Set Point (°F)	650
Well Field I-1 (3")	—	**TOTAL HOURS**	873.40
Vacuum (in. of H_2O)	35	Electric Meter (kwh)	—
Velocity (in. of H_2O)	>.5	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	62	**AIR MONITORING**	
After Blower I-2 (4")	—	**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H_2O)	NA	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H_2O)	.21	Date: (WITH CARBON FILTER)	
Temperature (°F)	145	**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H_2O)	O Data on ATI only	Date:	
ATI operating properly: yes/no	Yes	**Lab samples taken for analysis at:**	CAS

WELL FIELD

SVE/Bubbler Well ID	Well Diameter	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Flow (2") (in. of H_2O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'			100	27	Gauges			
VW-2	4"	10'-24'			100	27	Not			
VW-3	4"	14'-24'			100	26	Working			
VW-4	4"	10'-24'			100	26				
VW-5	4"	10'-24'			100	26				
VW-6	4"	10'-24'			100	26				
VW-7	4"	10'-24'			100	24				
VW-8	4"	10'-24'			100	25				
VW-9	4"	10'-24'			100	24				
VW-10	4"	10'-24'			10	10				
MW-1	4"	13'-26'			OFF	0				
MW-5	4"	10'-25'			10	6				

Sparge/Bubbler Well ID	Well Diameter	Screened Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (cfm)	DO (mg/l)	REMARKS
AS-1 (Sparge only)	1"	26'-28'							
AS-2 (Sparge only)	2"	26'-28'							
AS-3 (Sparge only)	2"	26'-28'							
AS-4 (Sparge only)	2"	26'-28'							
AS-5 (Sparge only)	2"	26'-28'							
MW-2 (Bubbler only)	2"	14'-26'							
MW-3 (Bubbler only)	2"	14'-26'							
MW-4 (Bubbler only)	4"	11.5'-26.5'							
MW-6 (Monitor only)	4"	12'-27'			NA	NA	NA		
MW-7 (Monitor only)	4"	12'-27'			NA	NA	NA		

Not operating

Total Sparge Data		
Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(cfm)=	Compressor Hours= / 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: P. Whitten Date: 2/15/96

Project#20805-135.004

ARCO 6148 Soil Vapor Extraction System

ARCO 6148 . 5131 Shattuck Ave.,Oakland,CA. Soil Vapor Extraction System EMCON Project #20805-135.004

SAmple I-1 E-1 FOR T , GAS BTXE. START system For Sailaja Yelamanchili

Remarks: Arrived on site at 1055 HRS. System's OFF. Water Found in MAnifold at VW-1 VW-3 mw-1. SAmple Port Found Broken in mw-3, mw-4. White threads Seal Noticed on all well caps. EST 15 min Per well FOR all D. O. Readings. One Regulator For Bubbler AIR PSI Set at 20 PSI Unscheduled site visit [] Scheduled site visit [] Bubble PSI 90 PSI 0-15 PSI max

SYSTEM PARAMETERS (Therm Tech Model CATVAC 10E electric catalytic oxidizer) ATI phone # 510-595-9298

Arrival Time (24:00 hour)	1055	Effluent (E-1) (12"x12")	
System Status (on or off)	OFF	Stack Temperature (°F)	691
Shutdown Time (24:00 hour)	NR	assume HR 874.59 SYSTEM	
Restart Time (24:00 hour)	1330	Fire Box Temperature (°F)	650
Reading Time (24:00 hour)	1430	Set Point (°F)	650
Well Field I-1 (3")		**TOTAL HOURS** 1222 HRS	00873.59
Vacuum (in. of H_2O)	40	Electric Meter (kwh) 1222 HRS	24262
Velocity (in. of H_2O)	.50+	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	68	**AIR MONITORING**	
After Blower I-2 (4")		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H_2O)	NA	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H_2O)	.18	Date: (WITH CARBON FILTER)	
Temperature (°F)	160	**PID (ppm)** CALIBRATION GAS TYPE:	
Dilution Air (3") Temperature (°F)	NA	Date: 3-19-96 1422	0.0 / 205 / NR / NR
Dilution Air Flow (in of H_2O)	Data on ATI only	Date: 3-19-96 1441	0.0 / 250
ATI operating properly: yes/no	YES	**Lab samples taken for analysis at:**	

WELL FIELD Bubbler valves Found OFF in well Box

SVE/Bubbler Well ID	Well Diameter	Screen Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Flow (2") (in. of H_2O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'	16.15	NR	0/100	OFF		0	NR	141
VW-2	4"	10'-24'	16.33		0/100	OFF		0		18.8
VW-3	4"	14'-24'	NR		NR	OFF		0		30.2
VW-4	4"	10'-24'	15.75		0/100	OFF		0		16.6
VW-5	4"	10'-24'	15.25		0/100	OFF		0		8.9
VW-6	4"	10'-24'	15.16		0/100	38		40		512
VW-7	4"	10'-24'	15.53		0/100	37		40		156
VW-8	4"	10'-24'	15.54		0/100	38		40		60.1
VW-9	4"	10'-24'	14.61		0/100	38		40		50.2
VW-10	4"	10'-24'	NR		NR	38		40		22.4
MW-1	4"	13'-26'	NR		NR	OFF		OFF		32.6
MW-5	4"	10'-25'	15.60		0/100	38		40		43.2

Sparge/Bubbler Well ID	Well Diameter	Screened Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (cfm)	DO (mg/l)	REMARKS
AS-1 (Sparge only)	1"	26'-28'	15.15	NR	0/100	OFF	OFF	NR	OFF
AS-2 (Sparge only)	2"	26'-28'	NR		NR				
AS-3 (Sparge only)	2"	26'-28'	NR		NR				
AS-4 (Sparge only)	2"	26'-28'	15.18		0/100				
AS-5 (Sparge only)	2"	26'-28'	NR		NR				
MW-2 (Bubbler only)	2"	14'-26'	15.99		0/100		40		Sample Port Found Broken
MW-3 (Bubbler only)	2"	14'-26'	NR		0/100		40		Sample Port Found Broken
MW-4 (Bubbler only)	4"	11.5'-26.5'	NR		0/100		OFF		
MW-6 (Monitor only)	4"	12'-27'	NR		NA	NA	NA		
MW-7 (Monitor only)	4"	12'-27'	NR		NA	NA	NA		

Total Sparge Data

Total Air Sparge Pressure(psi)= 20 | Total Air Sparge Flow Rate(cfm)= NR | Total Air Sparge Temp(°F)= 71 | Compressor Hours= 00.36 → 1222 HRS

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, and CO, in % by volume.

Operator: L. PATH Date: 3/19/96

Project#20805-135.004

ARCO 6148 Soil Vapor Extraction System

PID 1450 HRS → 522, 159, 70.2, 49.2, 27.8, 44.0, 43.0

APPENDIX E

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR SOIL-VAPOR EXTRACTION SYSTEM, FIRST QUARTER 1996

Columbia
Analytical
Services INC.

February 29, 1996

Service Request No: S9600269

Bruce Maeda
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: 6148 Oakland / 20805-135.006 / TO#19313

Dear Mr. Maeda:

The following pages contain analytical results for sample(s) received by the laboratory on February 15, 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 8, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

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

Sincerely,

Steven L. Green
Project Chemist

Cristina V. Raybuck 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)

ACRONLST.DOC 7/14/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9600269
Project:	20805-135.006/TO#19313.00	**Date Collected:**	2/15/96
Sample Matrix:	Vapor	**Date Received:**	2/15/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name:	**I-1**	**E-1**	**Method Blank**
Lab Code:	S9600269-001	S9600269-002	S9600269MB
Date Analyzed:	2/15/96	2/15/96	2/15/96

Analyte	**MRL**			
Benzene	0.5	2	ND	ND
Toluene	0.5	18	ND	ND
Ethylbenzene	0.5	13	ND	ND
Total Xylenes	1	96	2.4	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20	<40 *	ND	ND
C_5 - C_8 Hydrocarbons	20	210	58	ND
C_9 - C_{12} Hydrocarbons	20	620	ND	ND
Gasoline Fraction (C_5-C_{12})	60	830	76	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9600269
Project:	20805-135.006/TO#19313.00	**Date Collected:**	2/15/96
Sample Matrix:	Vapor	**Date Received:**	2/15/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name:	**I-1**	**E-1**	**Method Blank**
Lab Code:	S9600269-001	S9600269-002	S9600269MB2
Date Analyzed:	2/15/96	2/15/96	2/15/96

Analyte	**MRL**			
Benzene	0.1	0.6	ND	ND
Toluene	0.1	4.8	0.1	ND
Ethylbenzene	0.1	3.0	ND	ND
Total Xylenes	0.2	22	0.6	ND
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	5	<10 *	ND	ND
C_5 - C_8 Hydrocarbons	5	58	16	ND
C_9 - C_{12} Hydrocarbons	5	170	ND	ND
Gasoline Fraction (C_5-C_{12})	15	230	21	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

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

3S22/060194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: 20805-135.006/TO#19313.00
Sample Matrix: Vapor

Service Request: S9600269
Date Collected: 2/15/96
Date Received: 2/15/95
Date Extracted: N/A
Date Analyzed: 2/15/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1
Lab Code: S9600262-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	3.1	3.0	3	3
Toluene	0.5	5.8	6.1	6	5
Ethylbenzene	0.5	2.5	2.4	2	4
Xylenes, Total	1	20	21	21	5
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	ND	ND	--	--
C_5 - C_8 Hydrocarbons	20	680	670	675	1
C_9 - C_{12} Hydrocarbons	20	100	96	98	4
Gasoline Fraction (C_5-C_{12})	60	780	770	775	1

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

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	S9600269
Project:	20805-135.006/TO#19313.00	**Date Collected:**	2/15/96
Sample Matrix:	Vapor	**Date Received:**	2/15/95
		Date Extracted:	NA
		Date Analyzed:	

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name: I-1
Lab Code: S9600262-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.1	1.0	0.9	0.95	11
Toluene	0.1	1.5	1.6	1.55	6
Ethylbenzene	0.1	0.6	0.6	0.6	<1
Xylenes, Total	0.2	4.6	4.8	4.7	4
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	5	ND	ND	--	--
C_5 - C_8 Hydrocarbons	5	190	180	185	5
C_9 - C_{12} Hydrocarbons	5	28	26	27	7
Gasoline Fraction (C_5-C_{12})	15	210	210	210	<1

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

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-135.006/TO#19313.00

Service Request: S9600269
Date Analyzed: 2/15/96

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	15.1	94	85-115
Toluene	16	15.1	94	85-115
Ethylbenzene	16	14.6	91	85-115
Xylenes, Total	48	43.6	91	85-115
Gasoline	200	199	100	90-110

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

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19313.00

Chain of Custody

ARCO Facility no.	6148
City (Facility)	Oakland
Project manager (Consultant)	Bruce Meada
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
Laboratory name	
Contract number	
Method of shipment	

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 ☐		
I-1		1			X			2-15-96	1230		X											
E-1		1			X			2-15-96	1225		X											

Special detection Limit/reporting:

Special QA/QC: mg/M³ & PPMV

Remarks: #20805-135.006

Lab number: 59600369

Turnaround time:
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☑ 3/1

Condition of sample: ok

Temperature received: ambient

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by sampler: Van White	2-15-96		Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory: [signature]	2-15-96	1420

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

Columbia
Analytical
Services INC.

April 2, 1996

Service Request No: S9600459

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

Re: 6148 Oakland/Project No. 20805-135.006/TO#18336.00

Dear Ms. Yelamanchili:

The following pages contain analytical results for sample(s) received by the laboratory on March 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 8, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

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

Sincerely,

Steven L. Green
Project Chemist

Cristina 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:	EMCON	**Service Request:**	L9601827
Project:	ARCO Products Company #6148/#20805-135.006	**Date Collected:**	3/19/96
Sample Matrix:	Air	**Date Received:**	3/19/96
		Date Extracted:	NA
		Date Analyzed:	3/20/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 8020/Modified 8015

Sample Name: I-1
Lab Code: L9601827-001

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.1	5.2	1.6
Toluene	0.5	0.1	28	7.2
Ethylbenzene	0.5	0.1	26	5.9
Xylenes, Total	1	0.2	130	30
Total Volatile Hydrocarbons:				
C1 - C5	20	5	1000	240
C6 - C12*	20	5	1300	320

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

LCS/102194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	L9601827
Project:	ARCO Products Company #6148/#20805-135.006	**Date Collected:**	3/19/96
Sample Matrix:	Air	**Date Received:**	3/19/96
		Date Extracted:	NA
		Date Analyzed:	3/20/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 8020/Modified 8015

Sample Name: E-1
Lab Code: L9601827-002

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0 1	ND	ND
Toluene	0.5	0.1	1.2	0 3
Ethylbenzene	0.5	0.1	0.5	0.1
Xylenes, Total	1	0.2	1.8	0.4
Total Volatile Hydrocarbons:				
C1 - C5	20	5	690	170
C6 - C12*	20	5	110	26

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

LCS/102194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	L9601827
Project:	ARCO Products Company #6148/#20805-135.006	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	3/20/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 8020/Modified 8015

Sample Name: Method Blank
Lab Code: L9601827-MB

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.1	ND	ND
Toluene	0.5	0.1	ND	ND
Ethylbenzene	0.5	0.1	ND	ND
Xylenes, Total	1	0.2	ND	ND
Total Volatile Hydrocarbons:				
C1 - C5	20	5	ND	ND
C6 - C12*	20	5	ND	ND

* TPH as gasoline is defined as C6 (benzene) through C12 (dodecane) and uses a molecular weight of 100 to calculate the ppmv.

LCS/102194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	L9601827
Project:	ARCO Products Company #6148/#20805-135.006	**Date Collected:**	NA
LCS Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	3/19/96

Laboratory Control Sample Summary
BTEX and Total Volatile Hydrocarbons
EPA Methods 8020/Modified 8015
Units: uL/L (ppmv)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	10.0	9.19	92	60-140
Toluene	10.0	9.02	90	60-140
Ethylbenzene	10.0	9.32	93	60-140
TPH as Gasoline*	710	757	107	60-140

* TPH as gasoline is defined as C6 (Benzene) through C12 (Dodecane) and uses a molecular weight of 100 to calculate the ppmv.

LCS/121594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: ARCO Products Company #6148/#20805-135.006
Sample Matrix: Air

Service Request: L9601827
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 3/19/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons
EPA Methods 8020/Modified 8015
Units: uL/L (ppmv)

Sample Name: BATCH QC
Lab Code: L9601814-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.1	1.59	1.62	1.60	2
Toluene	0.1	12.7	13.3	13.0	5
Ethylbenzene	0.1	5.05	5.32	5.18	5
Total Xylenes	0.2	57.6	60.9	59.2	6
Total Volatile Hydrocarbon:					
C1-C5	5	76.9	82.2	79.6	7
C6-C12*	5	440	473	456	7

* TPH as gasoline is defined as C6 (Benzene) through C12 (Dodecane) and uses a molecular weight of 100 to calculate the ppmv.

DUPIS/120594

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 18336.00 Per Sailaja Velamanchili

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) Sailaja Velamanchili	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no (ARCO)	Telephone no. (Consultant) 408 453 7300	Fax no. (Consultant)
Consultant name Emcon	Address (Consultant) 1921 Ringwood Ave SJ. CA		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH gas EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
I-1	-1	1			AIR			3/19/96	1510		X											
E-1	-2	1			AIR			3/19/96	1500		X											

Method of shipment: Tech

Special detection Limit/reporting: Report in ppmv / mg/m3

Special QA/QC:

Remarks: 20805 135 006

L9601827

Lab number: S9600459

Turnaround time:
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒ 4/2

Condition of sample:

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler [signature]	3/19/96	1600	Received by Joanne Brown		
Relinquished by			Received by		
Relinquished by Joanne Brown CASSLAB	3-19-96	1700	Received by laboratory LLAB [signature]	3/20/96	1000

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

LLAB: GBTEX