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

Date December 13, 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	Third quarter 1996 groundwater monitoring results and remediation system performance evaluation report for ARCO service station 6148, Oakland, California

For your:			Sent by:		
	X	Use		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
Paul Supple, ARCO Products Company
File

ARCO Products Company

Date:
December 12, 1996

Re: ARCO Station #

6148 • 5131 Shattuck Avenue • Oakland, CA
Third 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:

Paul Supple
Environmental Engineer

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

December 12, 1996
Project 20805-135.006

Mr. Paul Supple
ARCO Products Company
P.O. Box 6549
Moraga, California 94570

Re: Third quarter 1996 groundwater monitoring program results and remediation system performance evaluation report, ARCO service station 6148, Oakland, California

Dear Mr. Supple:

This letter presents the results of the third 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

Krishnaveni Meka
Staff Engineer

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

REGISTERED GEOLOGIST
JOHN CHARLES YOUNG
7/98
NO. 6407
STATE OF CALIFORNIA

December 12, 1996

ARCO QUARTERLY REPORT

Station No.: 6148	Address: 5131 Shattuck Avenue, Oakland, California
EMCON Project No.	20805-135.006
ARCO Environmental Engineer/Phone No.:	Paul Supple /(510) 299-8891
EMCON Project Manager/Phone No.:	John C. Young /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Susan Hugo
Reporting Period:	July 1, 1996 to October 1, 1996

WORK PERFORMED THIS QUARTER (Third- 1996):

1. Conducted quarterly groundwater monitoring and sampling for third quarter 1996.
2. Prepared and submitted quarterly report for second quarter 1996.
3. Operated soil vapor extraction (SVE), air-sparge, and air-bubbling systems.

WORK PROPOSED FOR NEXT QUARTER (Fourth- 1996):

1. Perform quarterly groundwater monitoring and sampling for fourth quarter 1996.
2. Continue operation of SVE, air-sparge, and air-bubbling systems.
3. Prepare and submit quarterly report for third quarter 1996.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring and Operation and Maintenance of Remediation Systems
Frequency of Sampling:	Quarterly (groundwater), Monthly (SVE)
Frequency of Monitoring:	Quarterly (groundwater), Monthly (SVE, air-sparge, and air-bubbling)
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, Air-Sparge, and Air-Bubbling Systems
Approximate Depth to Groundwater:	15.68 feet
Groundwater Gradient (Average):	0.021 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):	170 ppmv (8-5-96)
Benzene Conc. End of Period (lab):	<1 ppmv (8-5-96)
Flowrate End of Period:	125.4 scfm (8-5-96)
HC Destroyed This Period:	240.5 pounds
HC Destroyed to Date:	1882.2 pounds
Utility Usage Electric (KWH):	20,821 KWH

Operating Hours This Period:	874.7 hours
Percent Operational:	39.6% System was down for quarterly monitoring, power interruptions, and other maintenance issues.
Operating Hours to Date:	2686.0 hours
Unit Maintenance:	NA
Number of Auto Shut Downs:	3
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	94.6% (8-5-96)
Stack Temperature:	730°F
Source Flow:	115.5 scfm (9-30-96)
Process Flow:	115.5 scfm (9-30-96)
Source Vacuum:	16 inches of water (9-30-96)

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Third Quarter 1996
- Table 2 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 3 - Historical Groundwater Analytical Data, Volatile and Semivolatile Organic Compounds
- Table 4 - Historical Groundwater Analytical Data, Metals
- Table 5 - Soil-Vapor Extraction System Operation and Performance Data
- Table 6 - Soil-Vapor Extraction Well Data
- Table 7 - Air-Sparge and Air-Bubbling Systems Operation and Performance Data
- Figure 1 - Site Location
- Figure 2 - Site Plan
- Figure 3 - Groundwater Data, Third 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, Third Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, Third Quarter 1996 Groundwater Monitoring Event
- Appendix C - SVE System Monitoring Data Log Sheets
- Appendix D - Field Data Sheets, Operation and Maintenance Visits, Third Quarter 1996
- Appendix E - Analytical Results and Chain-of-Custody Documentation for Soil Vapor Extraction System, Third Quarter 1996

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

Table 1
Groundwater Monitoring Data
Third Quarter 1996

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 11-25-96

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	08-14-96	107 80	17 15	90 65	ND	SW	0.021	08-14-96	98	18	<0 5	1 9	1	45	--	--	-	--
MW-2	08-14-96	107 28	17.00	90 28	ND	SW	0.021	08-14-96	130	22	4	2	9	120	--	--	--	--
MW-3	08-14-96	107 61	17 10	90.51	ND	SW	0.021	08-14-96	830	17	<1*	8	7	110	--	--	--	--
MW-4	08-14-96	106 71	15.68	91.03	ND	SW	0 021	08-14-96	<50	<0 5	<0.5	<0 5	<0 5	<3	--	--	--	--
MW-5	08-14-96	106.60	17 26	89 34	ND	SW	0.021	08-14-96	2100	130	2.7	47	4 7	220	--	--	--	--
MW-6	08-14-96	105 13	13.70	91.43	ND	SW	0 021	08-14-96	Not sampled	not scheduled for chemical analysis								
MW-7	08-14-96	107.05	14.35	92 70	ND	SW	0.021	08-14-96	Not sampled	not scheduled for chemical analysis								

ft-MSL elevation in feet, relative to mean sea level
MWN ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft foot per foot
TPHG total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L micrograms per liter
EPA United 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 or not applicable
* method reporting limit was raised due to (1) high analyte concentration requiring sample dilution, or (2) matrix interference

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20805-135.006

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 11-25-96

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	02-02-94	108 03	17 31	90.72	ND	NR	NR	02-02-94	250	93	<0 5	1.9	1	--	--	--	--	--
MW-1	04-29-94	108 03	17 31	90 72	ND	NR	NR	04-29-94	350	99	1.3	3.9	11	--	--	--	--	--
MW-1	08-02-94	108 03	17.95	90 08	ND	SW	0.017	08-02-94	210	82	<1	<1	2 5	--	--	-	--	--
MW-1	11-16-94	108 03	17 04	90.99	ND	SW	0 02	11-16-94	650	260	38	6.1	15	--	--	--	--	--
MW-1	03-20-95	108 03	15 75	92.28	ND	SW	0.02	03-20-95	830	140	5	41	110	--	-	--	--	-
MW-1	06-06-95	108 03	17.68	90 35	ND	SW	0.016	06-06-95	210	30	<0 5	7.3	16	--	--	-	--	--
MW-1	08-24-95	107 80	17 45	90.35	ND	SW	0 014	08-24-95	Not sampled	well was inaccessible due to construction								
MW-1	11-16-95	107.80	17 64	90.16	ND	SW	0 012	11-16-95	<50	5 6	<0 5	1 4	1.2	55	--	--	--	--
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-1	05-15-96	107 80	17 53	90.27	ND	SW	0.015	05-15-96	Not sampled: not scheduled for chemical analysis									
MW-1	08-14-96	107.80	17 15	90 65	ND	SW	0 021	08-14-96	98	18	<0 5	1 9	1	45	--	--	--	--
MW-2	02-02-94	107 43	16.96	90.47	ND	NR	NR	02-02-94	16000	1300	2500	540	2700	--	--	--	--	--
MW-2	04-29-94	107.43	16.95	90.48	ND	NR	NR	04-29-94	11000	1400	1200	360	1400	--	--	--	--	--
MW-2	08-02-94	107 43	17 59	89.84	ND	SW	0 017	08-02-94	4900	800	290	120	620	--	--	--	--	--
MW-2	11-16-94	107.43	16 73	90 70	ND	SW	0 02	11-16-94	49000	3300	8300	1400	7200	--	--	-	--	--
MW-2	03-20-95	107.43	15.50	91.93	ND#	SW	0.02	03-20-95	Not sampled	floating product entered well during purging								
MW-2	06-06-95	107 43	17.43	90.00	ND	SW	0 016	06-06-95	1200	60	21	35	140	--	--	--	--	--
MW-2	08-24-95	107 28	17 22	90 06	ND	SW	0 014	08-24-95	Not sampled	well was inaccessible due to construction								
MW-2	11-16-95	107 28	17 36	89.92	ND	SW	0 012	11-16-95	360	45	1 3	7 1	7 5	210	--	--	--	--
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-2	05-15-96	107 28	17 40	89.88	ND	SW	0 015	05-15-96	480	82	48	8	48	87	--	--	--	--
MW-2	08-14-96	107 28	17 00	90 28	ND	SW	0 021	08-14-96	130	22	4	2	9	120	-	--	--	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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-3	02-02-94	107.77	17.16	90.61	ND	NR	NR	02-02-94	26000	1400	1200	1200	4400	--	--	77	7.8	--
MW-3	04-29-94	107 77	17.14	90 63	ND	NR	NR	04-29-94	22000	1400	620	910	3400	--	--	10	--	--
MW-3	08-02-94	107 77	17 81	89.96	ND	SW	0.017	08-02-94	17000	530	410	720	2600	--	--	--	6.6	--
MW-3	11-16-94	107 77	16.91	90 86	ND	SW	0.02	11-16-94	18000	1400	560	790	2800	--	--	--	2 3	--
MW-3	03-20-95	107.77	15.60	92 17	ND	SW	0 02	03-20-95	29000	880	190	760	2000	--	--	--	16	--
MW-3	06-06-95	107 77	17 54	90.23	ND	SW	0.016	06-06-95	22000	450	54	380	1300	--	--	--	7 1	--
MW-3	08-24-95	107.61	17 42	90 19	ND	SW	0 014	08-24-95	Not sampled· well was inaccessible due to construction									
MW-3	11-16-95	107.61	17 58	90.03	ND	SW	0.012	11-16-95	13000	210	<20	320	1000	790	--	--	8 3	--
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-3	05-15-96	107 61	17 35	90.26	ND	SW	0.015	05-15-96	5600	66	12	37	67	230	--	-	--	--
MW-3	08-14-96	107 61	17 10	90 51	ND	SW	0.021	08-14-96	830	17	<1*	8	7	110	--	--	--	--
MW-4	02-02-94	106.58	15 36	91 22	ND	NR	NR	02-02-94	<50	3.9	<0.5	<0.5	<0 5	--	--	--	--	--
MW-4	04-29-94	106 58	15.36	91.22	ND	NR	NR	04-29-94	<50	4 2	<0 5	<0.5	<0.5	--	--	--	--	--
MW-4	08-02-94	106.58	15 94	90.64	ND	SW	0 017	08-02-94	<50	3.8	<0 5	<0 5	<0 5	--	--	--	--	--
MW-4	11-16-94	106 58	14 99	91 59	ND	SW	0.02	11-16-94	110	31	<0 5	<0.5	<0 5	--	--	--	--	--
MW-4	03-20-95	106.58	13.85	92 73	ND	SW	0.02	03-20-95	88	1	<0.5	<0 5	0 7	--	--	-	--	--
MW-4	06-06-95	106 58	15.70	90 88	ND	SW	0.016	06-06-95	<50	<0 5	<0.5	<0 5	<0.5	--	--	--	--	--
MW-4	08-24-95	106.71	15 86	90.85	ND	SW	0.014	08-24-95	Not sampled· well was inaccessible due to construction									
MW-4	11-16-95	106 71	16.10	90 61	ND	SW	0 012	11-16-95	<50	<0 5	<0 5	<0.5	<0.5	6	--	--	--	--
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-4	05-15-96	106 71	15.90	90 81	ND	SW	0 015	05-15-96	Not sampled· not scheduled for chemical analysis									
MW-4	08-14-96	106.71	15 68	91.03	ND	SW	0.021	08-14-96	<50	<0.5	<0.5	<0.5	<0 5	<3	--	--	--	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 11-25-96

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-5	02-02-94	106 68	16.38	90.30	ND	NR	NR	02-02-94	10000	3000	65	240	78	--	--	--	--	--
MW-5	04-29-94	106 68	16.41	90.27	ND	NR	NR	04-29-94	7600	2400	27	130	44	--	--	--	--	--
MW-5	08-02-94	106 68	16.81	89.87	ND	SW	0.017	08-02-94	1900	680	<10	24	<10	--	--	--	--	--
MW-5	11-16-94	106 68	16.12	90.56	ND	SW	0.02	11-16-94	17000	5900	700	440	320	--	--	--	--	--
MW-5	03-20-95	106.68	14 92	91.76	ND	SW	0.02	03-20-95	21000	6900	450	800	1300	--	--	--	--	--
MW-5	06-06-95	106 68	16.61	90.07	ND	SW	0.016	06-06-95	6500	1700	<20	120	69	--	--	--	--	--
MW-5	08-24-95	106 60	16 47	90 13	ND	SW	0 014	08-24-95	Not sampled. well was inaccessible due to construction									
MW-5	11-16-95	106 60	16.69	89 91	ND	SW	0.012	11-16-95	1800	470	<5	17	5	1000	--	--	--	--
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-5	05-15-96	106 60	16.58	90.02	ND	SW	0 015	05-15-96	3400	350	6	72	20	220	--	--	--	--
MW-5	08-14-96	106 60	17.26	89 34	ND	SW	0 021	08-14-96	2100	130	2 7	47	4.7	220	--	--	--	--
MW-6	02-02-94	105.16	13 60	91.56	ND	NR	NR	02-02-94	61	2.2	<0.5	<0.5	<0.5	--	--	--	--	--
MW-6	04-29-94	105.16	13.66	91.50	ND	NR	NR	04-29-94	<50	0.6	<0 5	<0.5	<0.5	--	--	--	--	--
MW-6	08-02-94	105.16	13.99	91.17	ND	SW	0.017	08-02-94	<50	<0.5	<0 5	<0 5	<0.5	--	--	--	--	--
MW-6	11-16-94	105.16	13.11	92.05	ND	SW	0 02	11-16-94	<50	1.1	<0 5	<0 5	<0.5	--	--	--	--	--
MW-6	03-20-95	105 16	12 13	93.03	ND	SW	0 02	03-20-95	<50	<0 5	<0 5	<0.5	<0.5	--	--	--	--	--
MW-6	06-06-95	105.16	13 95	91 21	ND	SW	0 016	06-06-95	<50	<0 5	<0 5	<0.5	<0 5	--	--	--	--	--
MW-6	08-24-95	105 13	14 07	91 06	ND	SW	0 014	08-24-95	<50	<0 5	<0 5	<0.5	<0 5	<3	--	--	--	--
MW-6	11-16-95	105 13	14 34	90 79	ND	SW	0.012	11-16-95	<60	<0.5	<0.5	<0.5	<0 5	--	--	--	--	--
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-6	05-15-96	105.13	14.10	91.03	ND	SW	0.015	05-15-96	Not sampled: not scheduled for chemical analysis									
MW-6	08-14-96	105 13	13.70	91.43	ND	SW	0.021	08-14-96	Not sampled: not scheduled for chemical analysis									

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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-7	02-02-94	107.08	14.04	93.04	ND	NR	NR	02-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	04-29-94	107.08	14.10	92.98	ND	NR	NR	04-29-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	08-02-94	107.08	14.61	92.47	ND	SW	0.017	08-02-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	11-16-94	107.08	13.37	93.71	ND	SW	0.02	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	03-20-95	107.08	12.32	94.76	ND	SW	0.02	03-20-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--
MW-7	06-06-95	107.08	14.59	92.49	ND	SW	0.016	06-06-95	Not sampled, not scheduled for chemical analysis									
MW-7	08-24-95	107.05	14.64	92.41	ND	SW	0.014	08-24-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-7	11-16-95	107.05	15.30	91.75	ND	SW	0.012	11-16-95	Not sampled, not scheduled for chemical analysis									
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	--	--	--	--
MW-7	05-15-96	107.05	14.65	92.40	ND	SW	0.015	05-15-96	Not sampled, not scheduled for chemical analysis									
MW-7	08-14-96	107.05	14.35	92.70	ND	SW	0.021	08-14-96	Not sampled, not scheduled for chemical analysis									

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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

ft-MSL: elevation in feet, relative to mean sea level
MWN ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft. foot per foot
TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L. micrograms per liter
EPA: United States Environmental Protection Agency
MTBE: Methyl-tert-butyl ether
SM standard method
mg/L milligrams per liter
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
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
- -: not analyzed or not applicable
*: method reporting limit was raised due to (1) high analyte concentration requiring sample dilution, or (2) matrix interference
**: For previous historical groundwater elevation and 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 3
Historical Groundwater Analytical Data
Volatile and Semivolatile Organic Compounds
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date. 11-25-96

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 3
Historical Groundwater Analytical Data
Volatile and Semivolatile Organic Compounds
1994 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date. 11-25-96

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 none detected
- -: not analyzed or not applicable
*: 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 4
Historical Groundwater Analytical Data
Metals

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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

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Table 5
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
Operation and Performance Data From: 09-27-95
To: 10-01-96

Date Begin:		09-27-96	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:		1	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 5
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
Operation and Performance Data From: 09-27-95
To: 10-01-96

Date Begin:	04-01-96	05-01-96	06-01-96
Date End:	05-01-96	06-01-96	07-01-96
Mode of Oxidation.	Cat-ox	Cat-ox	Cat-ox
Days of Operation.	22	3	3
Days of Downtime:	8	28	27
Average Vapor Concentrations (1)			
Well Field Influent: ppmv (2) as gasoline	190	160	180
mg/m3 (3) as gasoline	760	650	740
ppmv as benzene	0.9	0.6	<1
mg/m3 as benzene	3	2	<2.5
System Influent: ppmv as gasoline	190	160	180
mg/m3 as gasoline	760	650	740
ppmv as benzene	0 9	0.6	<1
mg/m3 as benzene	3	2	<2.5
System Effluent: ppmv as gasoline	10	10	<5
mg/m3 as gasoline	41	39	<20
ppmv as benzene	<0.2	<0.2	<0.2
mg/m3 as benzene	<0.5	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):	100.3	91.8	116.7
Average System Influent Flow Rate (4), scfm:	100.3	91.8	116.7
Average Destruction Efficiency (6), percent (7):	94.6	94.0	97.3
Average Emission Rates (8), pounds per day (9)			
Gasoline:	0.37	0.32	0.21
Benzene:	0.00	0.00	0.01
Operating Hours This Period:	532.5	72.9	83.7
Operating Hours To Date:	1654.6	1727.6	1811.3
Pounds/ Hour Removal Rate, as gasoline (10):	0.29	0.22	0.32
Pounds Removed This Period, as gasoline (11):	151.9	16.3	27.1
Pounds Removed To Date, as gasoline:	1598.4	1614.7	1641.8
Gallons Removed This Period, as gasoline (12):	24.5	2.6	4.4
Gallons Removed To Date, as gasoline:	257.8	260.5	264.8

Table 5
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
Operation and Performance Data From: 09-27-95
To: 10-01-96

Date Begin:	07-01-96	08-01-96	09-01-96
Date End:	08-01-96	09-01-96	10-01-96
Mode of Oxidation:	Cat-ox	Cat-ox	Cat-ox
Days of Operation	20	11	6
Days of Downtime	11	20	24
Average Vapor Concentrations (1)			
Well Field Influent: ppmv (2) as gasoline	170	170	NA
mg/m3 (3) as gasoline	690	710	NA
ppmv as benzene	0 4	<1	NA
mg/m3 as benzene	1.3	<2.5	NA
System Influent: ppmv as gasoline	170	170	NA
mg/m3 as gasoline	690	710	NA
ppmv as benzene	0.4	<1	NA
mg/m3 as benzene	1.3	<2.5	NA
System Effluent: ppmv as gasoline	6	9	NA
mg/m3 as gasoline	23	38	NA
ppmv as benzene	<0.2	<0.2	NA
mg/m3 as benzene	<0 5	<0.5	NA
Average Well Field Flow Rate (4), scfm (5):	125 7	125.4	125.2
Average System Influent Flow Rate (4), scfm:	125.7	125.4	125.2
Average Destruction Efficiency (6), percent (7):	96.7	94.6	0.0
Average Emission Rates (8), pounds per day (9)			
Gasoline.	0.26	0.43	0.00
Benzene:	0.01	0.01	0.00
Operating Hours This Period:	478.9	255.2	140.7
Operating Hours To Date:	2290.1	2545.3	2686.0
Pounds/ Hour Removal Rate, as gasoline (10):	0.32	0.33	0.00
Pounds Removed This Period, as gasoline (11)	155.4	85.0	0.0
Pounds Removed To Date, as gasoline.	1797.2	1882.2	1882.2
Gallons Removed This Period, as gasoline (12).	25.1	13.7	0.0
Gallons Removed To Date, as gasoline:	289.9	303.6	303.6

Table 5
Soil-Vapor Extraction System
Operation and Performance Data

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

CURRENT REPORTING PERIOD:	07-01-96	to	10-01-96
DAYS / HOURS IN PERIOD:	92	2208.0	
DAYS / HOURS OF OPERATION:	36	874.7	
DAYS / HOURS OF DOWN TIME:	56	1333.3	
PERCENT OPERATIONAL:		39.6	%
PERIOD POUNDS REMOVED:	240.5		
PERIOD GALLONS REMOVED:	38.8		
AVERAGE WELL FIELD FLOW RATE (scfm):		125 5	
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		125.5	

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 6
Soil-Vapor Extraction Well Data

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 11-25-96

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
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	190 PID	10 0	open	183 PID	10.0	open	167 PID	10.0	open	128 PID	10 0
06-07-96	open	NA	11 0	open	NA	10 0	open	NA	11 0	open	NA	11 0
06-28-96	open	290 PID	NA	open	550 PID	NA	open	400 PID	NA	closed	210 PID	NA
07-10-96	open	361 PID	8.0	open	302 PID	8 0	open	247 PID	8.0	closed	54 PID	0.0
08-05-96	open	NA	8.0	open	NA	7.0	open	NA	6.0	closed	NA	0 0
08-12-96	closed	NA	0 0	closed	NA	0 0	closed	NA	0 0	closed	NA	0 0
09-27-96	open (b)	NA	NA	open (b)	NA	NA	open	NA	NA	closed	NA	NA
09-30-96	open	200 FID	NA	open	220 FID	NA	open	800 FID	NA	open	>1000 FID	NA

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
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 6
Soil-Vapor Extraction Well Data

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	240 PID	10.0	open	191 PID	10 0	open	198 PID	10.0	open	220 PID	10 0
06-07-96	open	NA	11.0	open	NA	10 0	open	NA	10 0	open	NA	11 0
06-28-96	closed	95 PID	NA	open	430 PID	NA	open	460 PID	NA	closed	12 PID	NA
07-10-96	open	233 PID	8.0	open	371 PID	8.0	open	511 PID	8.0	open	113 PID	8 0
08-05-96	open	NA	8 0	open	NA	8 0	open	NA	6 0	open	NA	8 0
08-12-96	closed	NA	0.0	closed	NA	0 0	closed	NA	0 0	closed	NA	0 0
09-27-96	open	NA	NA	open (b)	NA	NA	open (b)	NA	NA	open	NA	NA
09-30-96	closed	48 FID	NA	closed	140 FID	NA	open	480 FID	NA	closed	120 FID	NA

TVHG concentration of total volatile hydrocarbons as gasoline
ppmv parts per million by volume
in-H2O: inches of water
open· open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed· closed to the system and atmosphere
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 6
Soil-Vapor Extraction Well Data

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date 11-25-96

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
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	175 PID	10 0	closed	40 PID	0 0	open	152 PID	10.0	closed	28.5 PID	0 0
06-07-96	open	NA	11.0	closed	NA	0.0	open	NA	10.0	closed	NA	0 0
06-28-96	open	310 PID	NA	closed	120 PID	NA	closed	100 PID	NA	closed	68 PID	NA
07-10-96	open	173 PID	8 0	closed	51 PID	0 0	closed	50 PID	0 0	closed	50 PID	0 0
08-05-96	open	NA	6.0	closed	NA	0 0	closed	NA	0.0	closed	NA	0 0
08-12-96	closed	NA	0 0	closed	NA	0 0	closed	NA	0 0	closed	NA	0 0
09-27-96	open (b)	NA	NA	closed	NA	NA	closed (b)	NA	NA	open (b)	NA	NA
09-30-96	open	600 FID	NA	open	>1000 FID	NA	closed	NA	NA	open	250 FID	NA

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

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

Air-Sparge and Air-Bubbling Unit:
5 Hp Powerex Rotary Oilless Compressor

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 10-01-96

Date Begin:	03-19-96	03-19-96	04-02-96	05-08-96	05-16-96	06-07-96
Date End:		04-02-96	05-08-96	05-16-96	06-07-96	06-28-96
Air-Bubbling Well Status:		See Table 6 for the status of the 12 SVE/air-bubbling wells. Air is bubbled at an average flow rate of 1 scfm per well.				
MW-2	off	on	on	off	on	on
MW-3	off	on	on	off	on	on
MW-4	off	off	off	off	off	on
Air-Sparge Well Status:						
AS-1	off	off	off	off	off	on
AS-2	off	off	off	off	off	on
AS-3	off	off	off	off	off	on
AS-4	off	off	off	off	off	on
AS-5	off	off	off	off	off	on
Air-Bubbling Well Pressure (psig) (1):						
MW-2	- - (4)	2.5	2.5	- -	2.5	- -
MW-3	- -	3.0	3.0	- -	3.0	- -
MW-4	- -	- -	- -	- -	- -	- -
Air-Sparge Well Pressure (psig) (1):						
AS-1	- -	- -	- -	- -	- -	- -
AS-2	- -	- -	- -	- -	- -	- -
AS-3	- -	- -	- -	- -	- -	- -
AS-4	- -	- -	- -	- -	- -	- -
AS-5	- -	- -	- -	- -	- -	- -
Total Air-Sparge and Air-Bubbling Pressure (psig) (1):	- -	20.0	20.0	0.0	20.0	20.0
Total Air-Sparge and Air-Bubbling Flow Rate (scfm) (2):	- -	- -	- -	- -	- -	- -
Dissolved Oxygen (ppm) (3):						
Air-Bubbling Wells:						
MW-2	- -	- -	- -	- -	- -	- -
MW-3	- -	- -	- -	- -	- -	- -
MW-4	- -	- -	- -	- -	- -	- -

Table 7
Air-Sparge and Air-Bubbling Systems
Operation and Performance Data

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

Air-Sparge and Air-Bubbling Unit:
5 Hp Powerex Rotary Oilless Compressor

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 10-01-96

Date Begin:	06-28-96	07-10-96	08-12-96	09-27-96
Date End:	07-10-96	08-12-96	09-27-96	10-01-96
Air-Bubbling Well Status:	See Table 6 for the status of the 12 SVE/air-bubbling wells Air is bubbled at an average flow rate of 1 scfm per well.			
MW-2	on	on	off	on
MW-3	on	on	off	on
MW-4	on	on	off	on
Air-Sparge Well Status:				
AS-1	on	on	off	off
AS-2	on	on	off	off
AS-3	on	on	off	off
AS-4	on	on	off	off
AS-5	on	on	off	off
Air-Bubbling Well Pressure (psig) (1):				
MW-2	4.0	5.0	0.0	2.6
MW-3	4.0	5.5	0.0	2.5
MW-4	4.0	5.5	0.0	4.1
Air-Sparge Well Pressure (psig):				
AS-1	4.0	5.0	0.0	0.0
AS-2	3.0	5.5	0.0	0.0
AS-3	4.0	4.0	0.0	0.0
AS-4	3.0	4.5	0.0	0.0
AS-5	3.5	5.0	0.0	0.0
Total Air-Sparge and Air-Bubbling Pressure (psig):	20.0	30.0	0.0	40.0
Total Air-Sparge and Air-Bubbling Flow Rate (scfm) (2):	--	--	--	--
Dissolved Oxygen (ppm) (3):				
Air-Bubbling Wells:				
MW-2	--	--	--	--
MW-3	--	--	--	--
MW-4	--	--	--	--

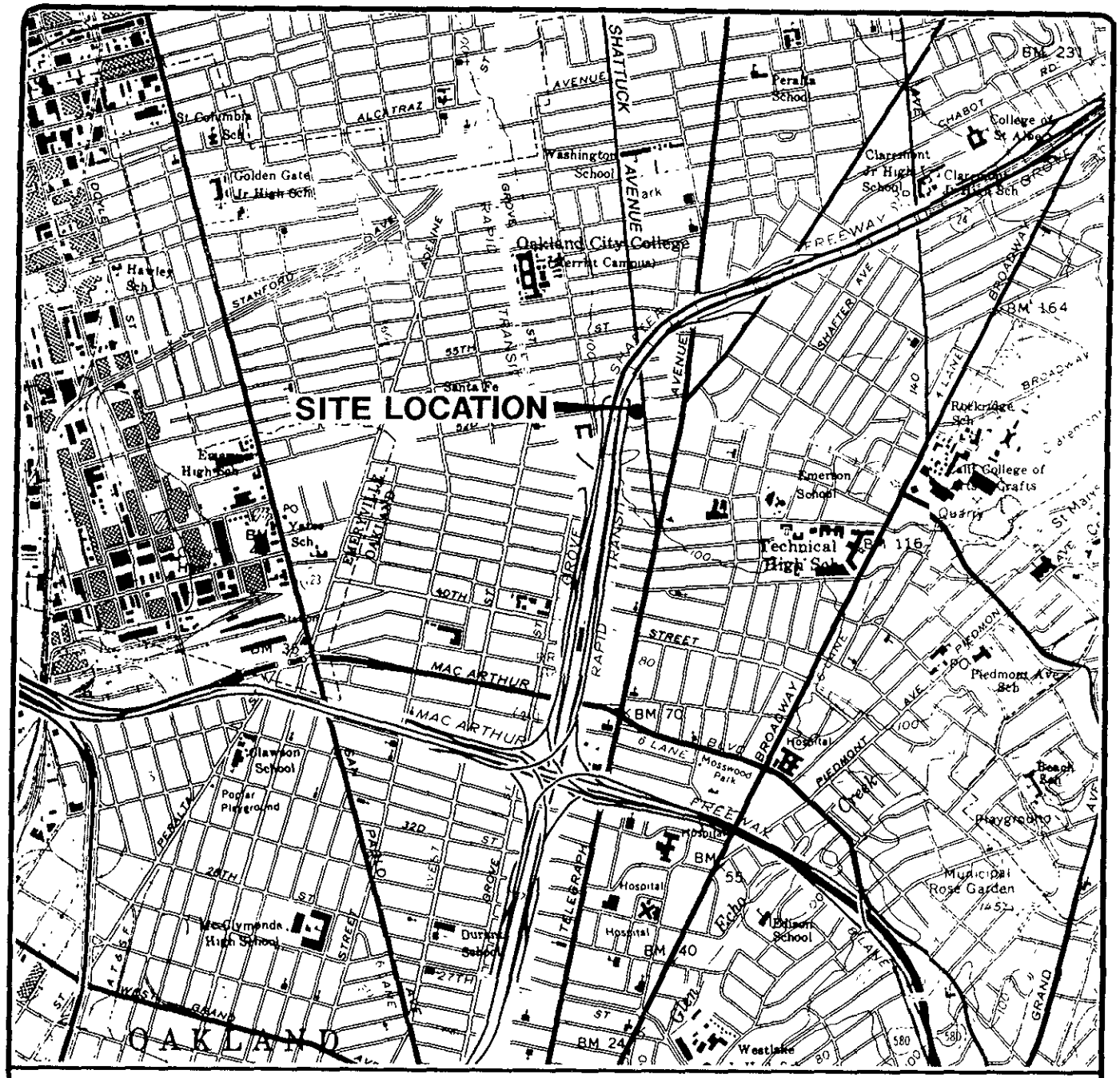
Table 7
Air-Sparge and Air-Bubbling Systems
Operation and Performance Data

Facility Number: 6148	Air-Sparge and Air-Bubbling Unit:
Location: 5131 Shattuck Avenue, Oakland, California	5 Hp Powerex Rotary Oilless Compressor
	Air-Bubbling Start-Up Date: 03-19-96
Consultant: EMCON	Air-Sparge Start-Up Date: 06-07-96
1921 Ringwood Avenue	Operation and Performance Data From: 03-19-96
San Jose, California	To: 10-01-96

CURRENT REPORTING PERIOD:	07-01-96	to	10-01-96
DAYS / HOURS IN PERIOD:	92.0		2208

1. psig: pounds per square inch gauge
2. scfm: standard cubic feet per minute at 14.7 psi and 70° F
3. ppm: parts per million
4. - - - not analyzed, not applicable, or not available

162753



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

- N -

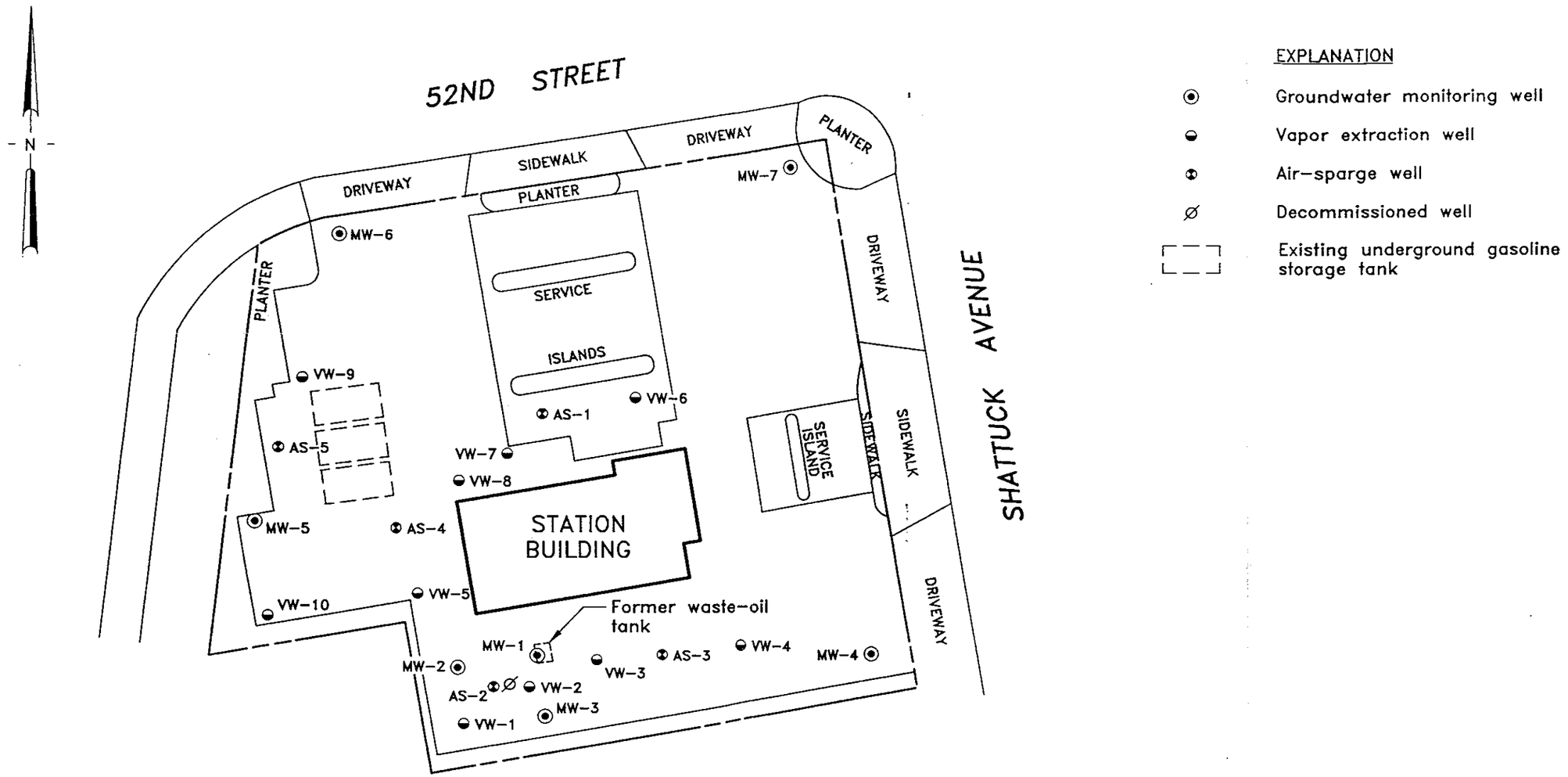
Scale : 0 2000 4000 Feet

EMCON

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-135.06



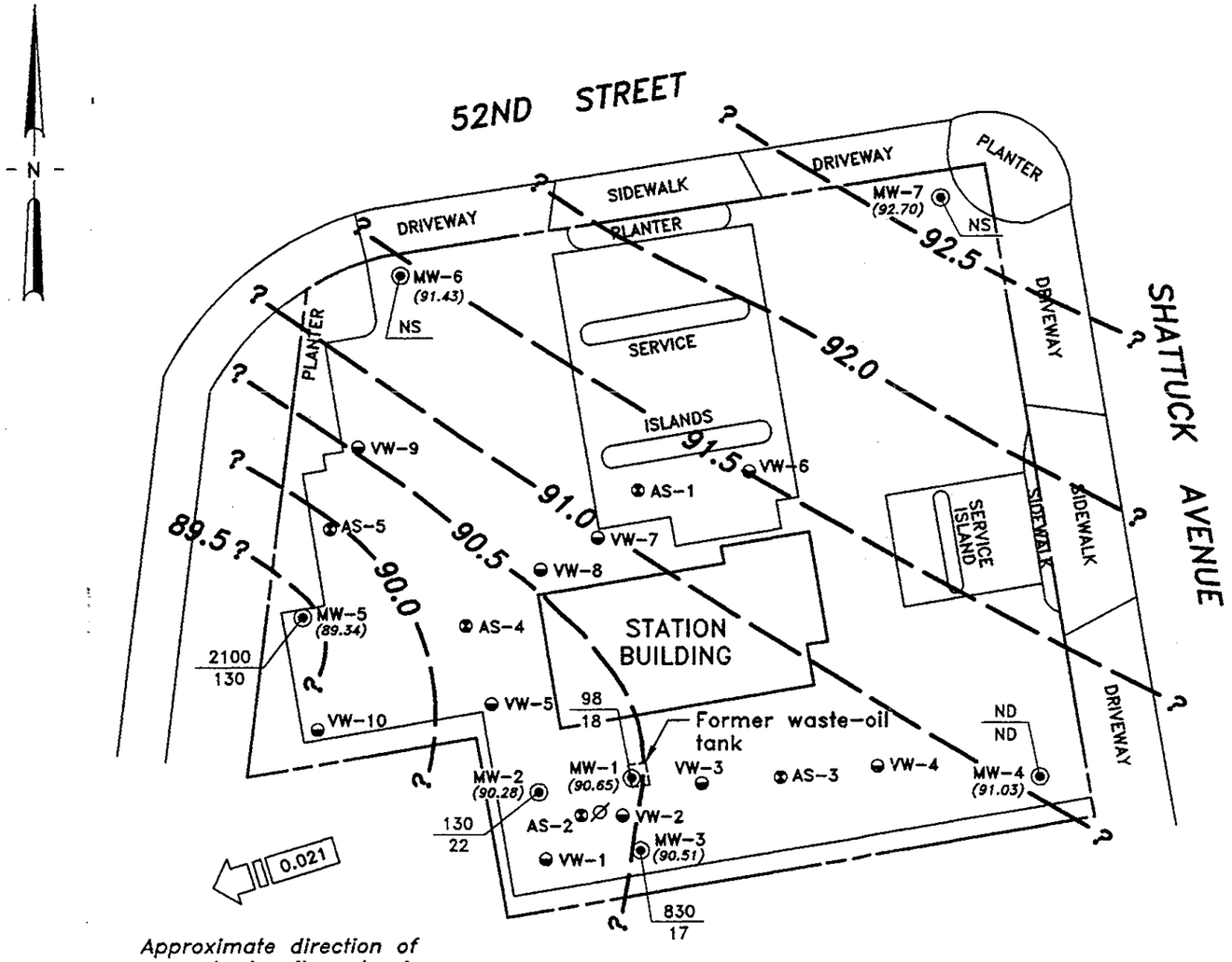
EMCON

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
- (89.34) Groundwater elevation (Ft.-MSL) measured 8/14/96
- Groundwater elevation contour (Ft.-MSL)
- 2100 / 130 — TPHG concentration in groundwater (ug/L); sampled 8/14/96; Benzene concentration in groundwater (ug/L); sampled 8/14/96
- NS — Not sampled; not scheduled for chemical analysis
- ND — Not detected at or above the method reporting limit for TPHG (50 ug/L) and benzene (0.5 ug/L)

EMCON

SCALE: 0 30 60 FEET
(Approximate)

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

GROUNDWATER DATA
THIRD QUARTER 1996

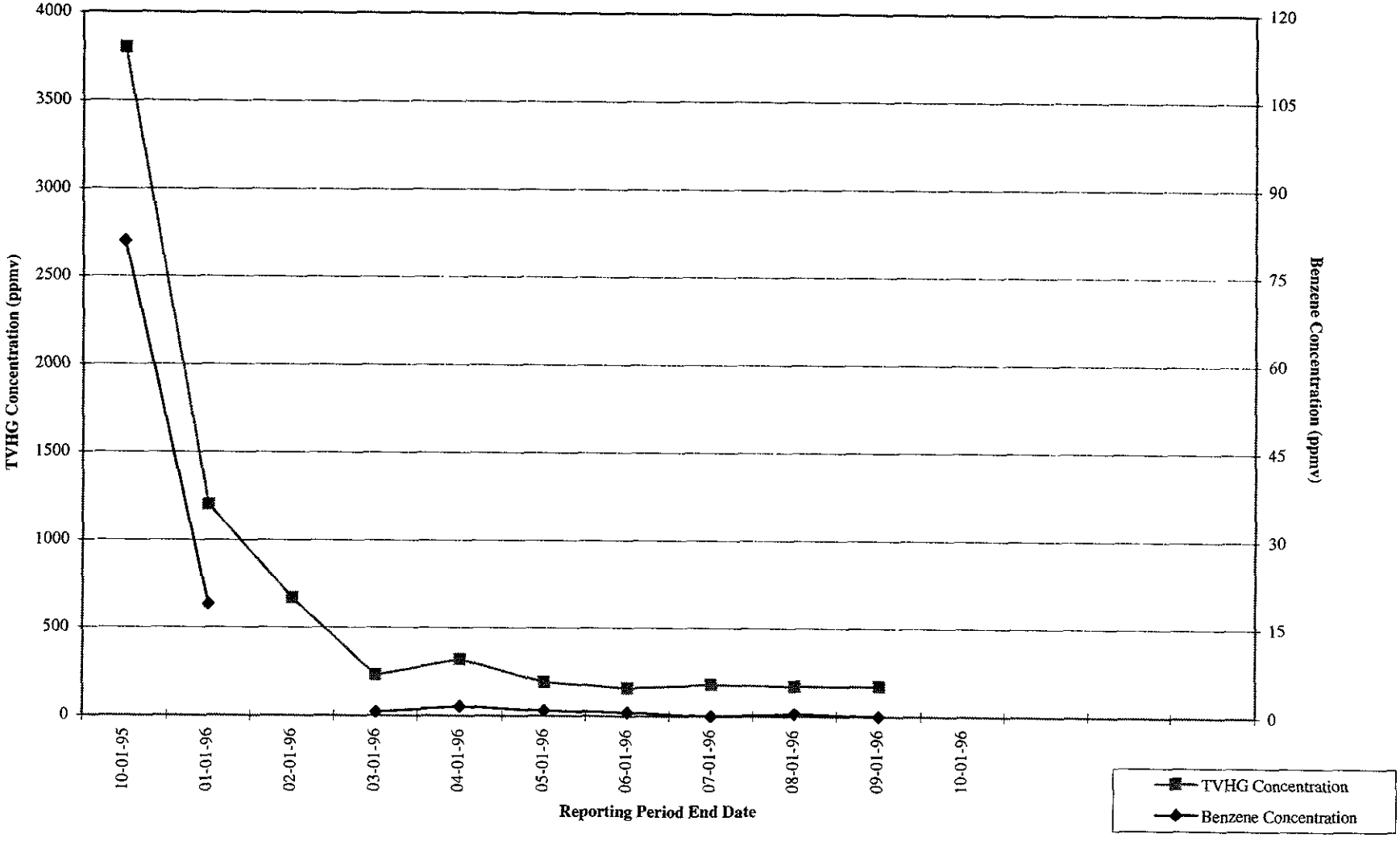
FIGURE NO. 3

PROJECT NO. 805-135.006

G:\805-135\G00 REV 0 11/21/96 12:38:22 DD DJ

Figure 4

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

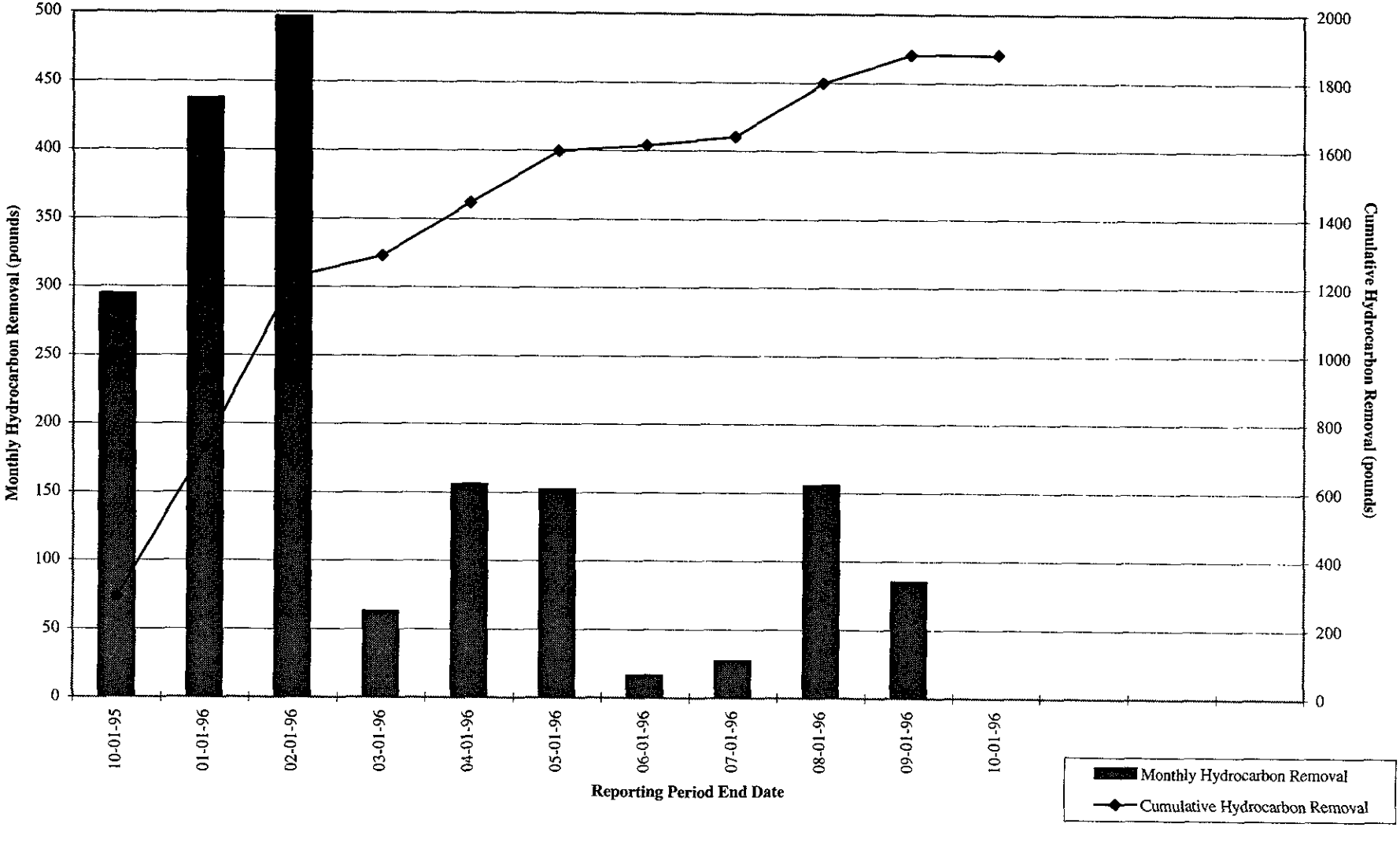


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

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, THIRD QUARTER 1996 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-250.002** STATION ADDRESS : **5131 Shattuck Avenue, Oakland** DATE : 8-14-96

ARCO STATION # : **6148** FIELD TECHNICIAN : M. Gallegos DAY : Wednesday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket Present	Lock Number	Type Of 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-4**	Good	Good	Yes	Bolt	Tec	15.68	15.68	N/A	N/A	26.1	
2	**MW-6**	Good	Good	Yes	Arco	Lwc	13.70	13.70			26.5	
3	**MW-7**	Good	Good	Yes	Arco	Lwc	14.35	14.35			26.8	
4	**MW-2**	Good	Good	Yes	None	Tec	17.00	17.00			25.4	
5	**MW-1**	Good	Good	Yes	None	Tec	17.15	17.15			25.4	
6	**MW-5**	Good	Good	Yes	None	Tec	17.26	17.26			24.8	
7	**MW-3**	Good	Good	Yes	None	Tec	17.10	17.10			25.5	

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 2177.5-250-002 SAMPLE ID: MW-1 (25')

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 6145

SAMPLED BY: ✓ LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 5.39

DEPTH TO WATER (feet): 17.15 CALCULATED PURGE (gal.): 16.17

DEPTH OF WELL (feet): 25.4 ACTUAL PURGE VOL. (gal.): 16.5

DATE PURGED: 8-14-94 Start (2400 Hr) 1119 End (2400 Hr) 1125

DATE SAMPLED: ✓ Start (2400 Hr) 1134 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1120	5.5	6.67	459	74.7	Cloudy	mod
1122	11.0	6.57	458	74.0	Clear	Light
1125	16.5	6.59	457	74.2	"	"

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

COLOR (COBALT 0 - 500): NR

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

Field QC samples collected at this well: NR.

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: none

REMARKS: Call Sampler to Leave

Meter Calibration: Date: 8-14-94 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: [signature] Reviewed By: [signature] Page 1 of 5

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

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

PURGED BY: M. GALLEGOS CLIENT NAME: ARCO #6148

SAMPLED BY: ↓ LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 5.48

DEPTH TO WATER (feet): 17.00 CALCULATED PURGE (gal.): 16.46

DEPTH OF WELL (feet): 25.4 ACTUAL PURGE VOL. (gal.): 12.0

DATE PURGED: 8-14-94 Start (2400 Hr) 1049 End (2400 Hr) 1053

DATE SAMPLED: ↓ Start (2400 Hr) 1100 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1049	5.5	6.54	463	72.1	cloudy	mod
1051	11.0	6.63	488	72.6	"	"
	well dried at		12.0	Sallons		
1102	recharge	6.65	475	73.1	↓	↓

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: none

REMARKS: All Samples Taken

Meter Calibration: Date: 8-14-94 Time: ___ Meter Serial #: 2204 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: [signature] Reviewed By: [signature] Page 2 of 5

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 20707.5-250.002 SAMPLE ID: MW-3(25')

PURGED BY: M. Gallegos CLIENT NAME: ARCO #6148

SAMPLED BY: ✓ LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 5.48

DEPTH TO WATER (feet): 17.10 CALCULATED PURGE (gal.): 16.46

DEPTH OF WELL (feet): 25.5 ACTUAL PURGE VOL. (gal.): 11.0

DATE PURGED: 8-14-96 Start (2400 Hr) 1232 End (2400 Hr) 1234

DATE SAMPLED: ✓ Start (2400 Hr) 1240 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1233	5.5	7.00	509	73.1	BRN	Heavy
1234	11.0	7.06	511	72.9	"	"
___	well dried		at 11.0	gallons		
1242	recharge	7.07	503	72.3	Cloudy	mod
___	___	___	___	___	___	___

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

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: Good LOCK #: None

REMARKS: Cell Sample taken

Meter Calibration: Date: 8-14-96 Time: ___ Meter Serial #: 9201 Temperature °F: ___

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

Location of previous calibration: MW-4

Signature: [signature] Reviewed By: [signature] Page 3 of 5

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250-002 SAMPLE ID: MW-4 (26')

PURGED BY: M. GALLEGOS CLIENT NAME: ARCO #6148

SAMPLED BY: ✓ LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 6.80

DEPTH TO WATER (feet): 15.68' CALCULATED PURGE (gal.): 20.42

DEPTH OF WELL (feet): 26.1 ACTUAL PURGE VOL. (gal.): 20.5

DATE PURGED: 8-14-96 Start (2400 Hr) 1022 End (2400 Hr) 1027

DATE SAMPLED: ✓ Start (2400 Hr) 1035 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1023	7.0	5.97	445	73.4	clear	light
1025	14.0	6.15	453	73.4	✓	✓
1027	20.5	6.20	450	73.4	✓	✓

D. O. (ppm): NR ODOR: none

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: None

REMARKS: All Samples Taken

Meter Calibration: Date: 8-14-96 Time: 1020 Meter Serial #: 9204 Temperature °F: 76.7

(EC 1000 1053 / 1000) (DI ___) (pH 7 704 / 700) (pH 10 1005 / 1000) (pH 4 400 / 400)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 4 of 5

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250-002 SAMPLE ID: MW-5 (24')

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 6148

SAMPLED BY: ✓ LOCATION: OAKLAND, CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 4.92

DEPTH TO WATER (feet): 17.26 CALCULATED PURGE (gal.): 14.77

DEPTH OF WELL (feet): 24.8 ACTUAL PURGE VOL. (gal.): 8.0

DATE PURGED: 8-14-94 Start (2400 Hr) 1156 End (2400 Hr) 1200

DATE SAMPLED: ✓ Start (2400 Hr) 1210 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1158	5.0	6.90	820	71.8	BRN	Heavy
	~~10.0~~	well dried at		8.0 gallons		
	~~15.0~~					
1212	Recharge	6.71	814	70.4	Clear	Light

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: None.

REMARKS: All Samples taken

Meter Calibration: Date: 8-14-94 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: ___

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

APPENDIX B

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

Columbia Analytical Services inc.

August 26, 1996 Service Request No.: S9601335

Mr. John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 6148 OAKLAND/20805-135.006/TO#19350.00

Dear Mr. Young:

Attached are the results of the samples submitted to our lab on August 14, 1996. For you reference, our service request number for this work is S9601335.

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 9, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

If you have questions or further needs, please call me at (408) 428-1283.

Sincerely,

Steven L. Green
Project Chemist

SG/sh

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:**	S9601335
Project:	6148 OAKLAND/20805-135.006/TO#19350.00	**Date Collected:**	8/14/96
Sample Matrix:	Water	**Date Received:**	8/14/96
		Date Extracted:	NA

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

	Sample Name:	**MW-4 (26)**	**MW-2 (25)**	**MW-1 (25)**
	Lab Code:	S9601335-001	S9601335-002	S9601335-003
	Date Analyzed:	8/19/96	8/21/96	8/19/96
Analyte	**MRL**			
TPH as Gasoline	50	ND	130	98
Benzene	0.5	ND	22	18
Toluene	0.5	ND	4	ND
Ethylbenzene	0.5	ND	2	1.9
Total Xylenes	0.5	ND	9	1.0
Methyl *tert*-Butyl Ether	3	ND	120	45

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601335
Project:	6148 OAKLAND/20805-135.006/TO#19350.00	**Date Collected:**	8/14/96
Sample Matrix:	Water	**Date Received:**	8/14/96
		Date Extracted:	NA

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

Sample Name:	**MW-5 (24)**	**MW-3 (25)**	**Method Blank**
Lab Code:	S9601335-004	S9601335-005	S960819-WB1
Date Analyzed:	8/21/96	8/21/96	8/19/96

Analyte	**MRL**			
TPH as Gasoline	50	2,100	830	ND
Benzene	0.5	130	17	ND
Toluene	0.5	2.7	<1*	ND
Ethylbenzene	0.5	47	8	ND
Total Xylenes	0.5	4.7	7	ND
Methyl *tert*-Butyl Ether	3	220	110	ND

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

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601335
Project:	6148 OAKLAND/20805-135.006/TO#19350.00	**Date Collected:**	8/14/96
Sample Matrix:	Water	**Date Received:**	8/14/96
		Date Extracted:	NA

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

Sample Name:	**Method Blank**
Lab Code:	S960821-WB1
Date Analyzed:	8/21/96

Analyte	**MRL**	
TPH as Gasoline	50	ND
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
Methyl *tert*-Butyl Ether	3	ND

3822/060194

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: S9601335
Date Collected: 8/14/96
Date Received: 8/14/96
Date Extracted: NA
Date Analyzed: 8/20-21/96

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-4 (26)	S9601335-001	101	102
MW-2 (25)	S9601335-002	101	97
MW-1 (25)	S9601335-003	102	97
MW-5 (24)	S9601335-004	98	113
MW-3 (25)	S9601335-005	95	100*
MW-4(26) (MS)	S9601335-001MS	103	101
MW-4(26) (DMS)	S9601335-001DMS	103	102
Method Blank	S960819-WB1	98	97
Method Blank	S960821-WB1	104	99
CAS Acceptance Limits:		69-116	69-116

* The surrogate used for this sample was 4-Bromofluorobenzene.

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601335
Project:	6148 OAKLAND/20805-135.006/TO#19350.00	**Date Collected:**	8/14/96
Sample Matrix:	Water	**Date Received:**	8/14/96
		Date Extracted:	NA
		Date Analyzed:	8/19/96

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

Sample Name: MW-4(26)
Lab Code: S9601335-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Benzene	25	25	ND	27.3	26.3	109	105	75-135	4
Toluene	25	25	ND	27.5	26.5	110	106	73-136	4
Ethylbenzene	25	25	ND	27.6	26.8	110	107	69-142	3

DMSES/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Service Request: S9601335
Date Analyzed: 8/19/96

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	27.0	108	85-115
Toluene	25	27.3	109	85-115
Ethylbenzene	25	27.2	109	85-115
Xylenes, Total	75	84.1	112	85-115
Gasoline	250	237	95	90-110
Methyl *tert*-Butyl Ether	50	51	102	85-115

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 9350.00

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) 453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave, San Jose, CA 95131		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH (gas) EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
(1) MW-4 (26')	2			X		X	HCL	8/14/96	1035		X									
(2) MW-2 (25')	2			X		X	HCL		1100		X									
(3) MW-1 (25')	2			X		X	HCL		1134		X									
(4) MW-5 (24')	2			X		X	HCL		1210		X									
(5) MW-3 (25')	2			X		X	HCL	↓	1240		X									

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2 - 40ml HCL VOAs

#20805-135.00

Lab number: 9960336

Turnaround time

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

Condition of sample:

Temperature received:

Relinquished by sampler	Date 8-14-96	Time 1445	Received by Suzanne Hoppe
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CAS

Date 8/14/96 Time 1445

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

APPC-3292 (2-91)

R8

APPENDIX C

SVE SYSTEM MONITORING DATA LOG SHEETS

ARCO 6148
SVE SYSTEM
MONITORING DATA

Reporting Period:
07/01/96 00 00
08/01/96 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						
07/01/96 00:00																								1815 75				
07/10/96 15.00	125.7	125 7	312	312			14 55	170	690	0.4	1.3	170	690	0 4	1 3	6	23	<0 2	<0 5	96.7	0 26	0 01	231 00	2048 19	232.44	9.69	-1.4	-0 06
08/01/96 00:00	125.7	125.7																					513.00	2294 81	246 42	10 27	265 6	11 11
Period Totals																							744 00		478 86	19.95	265 14	11.05
Period Averages	125.7	125.7	312	312				170	690	0 4	1 3	170	690	0 4	1 3	6	23	<0 2	<0 5	96 7	0 26	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
08/01/96 00:00
09/01/96 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	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		Laboratory Monitoring Data: 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						
08/01/96 00:00																								2294 61				
08/05/96 13:10	125 7	125 7																					109 17	2294.61	0.00	0.00	109 2	4 55
08/05/96 13 50	125.4	125.4					14:00	170	710	<1	<2 5	170	710	<1	<2 5	9	38	<0.2	<0 5	94 6	0.43	0 01	0 67	2295 28	0.67	0.03	0 0	0 00
08/12/96 13:44	125 4	125 4																					167.90	2417 25	121 97	5.08	45 9	1 91
08/26/96 11:32	0 0	0 0																					333 80	2417.25	0.00	0.00	333 80	13.91
08/26/96 11 42	125.4	125.4																					0 17	2417 48	0.23	0 01	-0 06	0.00
09/01/96 00:00	125 4	125.4																					132 30	2549 78	132.30	5.51	0 0	0.00
Period Totals*																							744 00		255.17	10.63	488 83	20 37
Period Averages:	125.4	125.4						170	710	<1	<2.5	170	710	<1	<2 5	9	38	<0 2	<0 5	94.6	0 43	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
09/01/96 00 00
10/01/96 00:00

Hours in Period: 720 00
Days in Period: 30 00

Operation + Down Hours: 720 00
Operation + Down Days: 30 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						
09/01/96 00 00																		2549 78				
09/30/96 12:32	125.4	125 4															708 53	2687.78	138.00	5 75	570.5	23.77
09/30/96 13 15	115.5	115.5															0.72	2688.50	0.72	0 03	0 00	0 00
09/30/96 14:20	115.5	115.5															1.08	2689 58	1.08	0.04	0.00	0.00
10/01/96 00:00	115.5	115 5															9 67	2690 48	0 90	0 04	8 8	0.37
Period Totals:																	720.00		140 70	5 86	579.30	24.14
Period Averages	125.2	125 2																				

* 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, THIRD QUARTER 1996

ARCO 6148 . 5131 Shattuck Ave.,O[illegible]d,CA. SVE System . EMCON Project #2080[illegible] 5.006 (WA or Task Order # 18336)

Remarks: Performed monthly O+M task Inst + EA Air samples, Cleaned Trash from site.

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)	1230	Effluent (E-1) (12"x12")	—
System Status (on or off)	ON	Stack Temperature (°F)	610
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	—	Fire Box Temperature (°F)	639
Reading Time (24:00 hour)	1500	Set Point (°F)	610
Well Field I-1 (3")	—	**TOTAL HOURS**	2048.19
Vacuum (in. of H,O)	14	Electric Meter (kwh)	—
Velocity (in. of H,O)	.42	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	77		
After Blower I-2 (4")	—		
Total Pressure (in. of H,O)	NA		
Total Flow (in. of H,O)	.10		
Temperature (°F)	192		
Dilution Air (3") Temperature (°F)	NA		
Dilution Air Flow (In of H,O)	Data on ATI only		
ATI operating properly: yes/no	Yes		

AIR MONITORING

	Amb	I-1	I-2	E-1
FID (ppm) Date: (WITHOUT CARBON FILTER)				
Date: (WITH CARBON FILTER)				
PID (ppm) Date: 7-10-96	CALIBRATION GAS TYPE: 3.6	312	312	—
Date:				

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,O)	Flow (2") (in. of H,O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'	N/A	N/A	100	8	N/A	N/A	N/A	361
VW-2	4"	10'-24'			100	8				302
VW-3	4"	14'-24'			100	8				247
VW-4	4"	10'-24'			0	0				54
VW-5	4"	10'-24'			100	8				233
VW-6	4"	10'-24'			100	8				371
VW-7	4"	10'-24'			100	8				511
VW-8	4"	10'-24'			100	8				113
VW-9	4"	10'-24'			100	8				173
VW-10	4"	10'-24'			0	0				51
MW-1	4"	13'-26'			0	0				50
MW-5	4"	10'-25'			0	0				50

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'				5.0			
AS-2 (Sparge only)	2"	26'-28'				5.5			
AS-3 (Sparge only)	2"	26'-28'				4.0			
AS-4 (Sparge only)	2"	26'-28'				4.5			
AS-5 (Sparge only)	2"	26'-28'				5.0			
MW-2 (Bubbler only)	2"	14'-26'				5.0			
MW-3 (Bubbler only)	2"	14'-26'				5.5			
MW-4 (Bubbler only)	4"	11.5'-26.5'				5.5			
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)= 30 | Total Air Sparge Flow Rate(cfm)= — | Compressor Hours= | Total Air Sparge Temp(°F)= 476.48

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.

Project#20805-135.006 **WA # (Task Order # 18336)**

Operator: V. Whitten **Date:** 7-10-96 **ARCO 6148 Soil Vapor Extraction System**

ARCO 6148 . 5131 Shattuck Ave.,Oakl[illegible],CA. SVE System . EMCON Project #20805-[illegible].006 (WA or Task Order # 18336)

Remarks: System Down - "Power Interrupt", "High Temp", "System Shut Down Remotely". Started system - performed O&M, performed maintenance on unit & compressor. Took Inf & Eff Air samples.

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)	1250	Effluent (E-1) (12"x12")	—
System Status (on or off)	OFF	Stack Temperature (°F)	695
Shutdown Time (24:00 hour)	?	**SYSTEM**	
Restart Time (24:00 hour)	1310	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1350	Set Point (°F)	610
Well Field I-1 (3")	—	**TOTAL HOURS**	2295.28
Vacuum (in. of H_2O)	15	Electric Meter (kwh)	—
Velocity (in. of H_2O)	.42	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	76	**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)	.10	Date: (WITH CARBON FILTER)	
Temperature (°F)	180	**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (In of H_2O)	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	8	N/A	N/A	N/A	N/A
VW-2	4"	10'-24'			100	7				
VW-3	4"	14'-24'			100	6				
VW-4	4"	10'-24'			0	0				
VW-5	4"	10'-24'			100	8				
VW-6	4"	10'-24'			100	8				
VW-7	4"	10'-24'			100	6				
VW-8	4"	10'-24'			100	8				
VW-9	4"	10'-24'			100	6				
VW-10	4"	10'-24'			0	0				
MW-1	4"	13'-26'			0	0				
MW-5	4"	10'-25'			0	0				

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)= 30 | Total Air Sparge Flow Rate(cfm)= 8 | Compressor Hours= 871.53 | Total Air Sparge Temp(°F)= 74

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, in % by volume.

Project#20805-135.006 WA # (Task Order # 18336)

Operator: D.Whitten Date: 8-5-96 ARCO 6148 Soil Vapor Extraction System

ARCO 6148 . 5131 Shattuck Ave.,Oakland,CA. SVE System . EMCON Project #20805-135.006 (WA or Task Order # 18336)

Remarks: Check system after Power Outage in area - System down, ~~restarted~~ Restart system down for Quarterly water monitoring

Unscheduled site visit [X] Scheduled site visit []

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

Arrival Time (24:00 hour)	1245	Effluent (E-1) (12"x12")	72
System Status (on or off)	OFF	Stack Temperature (°F)	
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	1300	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	~~1345~~ 1345	Set Point (°F)	
Well Field I-1 (3")	0	**TOTAL HOURS**	2407.25
Vacuum (in. of H,O)		Electric Meter (kwh)	
Velocity (in. of H,O)		Dilution Controller Setpoint (°F)	1200
Temperature (°F)		**AIR MONITORING**	
After Blower I-2 (4")		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H,O)	NA	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H,O)		Date: (WITH CARBON FILTER)	
Temperature (°F)		**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H,O)	Data on ATI only	Date:	
ATI operating properly: yes/no	yes	**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,O)	Flow (2") (in. of H,O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'				0				
VW-2	4"	10'-24'								
VW-3	4"	14'-24'								
VW-4	4"	10'-24'								
VW-5	4"	10'-24'								
VW-6	4"	10'-24'								
VW-7	4"	10'-24'								
VW-8	4"	10'-24'								
VW-9	4"	10'-24'								
VW-10	4"	10'-24'								
MW-1	4"	13'-26'								
MW-5	4"	10'-25'								

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)= OFF | Total Air Sparge Flow Rate(cfm)= | Compressor Hours= 976.27 | 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, and CO, in % by volume.

Project#20805-135.006 WA # (Task Order # 18336)

Operator: V. Whitten Date: 8-12-96 ARCO 6148 Soil Vapor Extraction System

ARCO 6148 . 5131 Shattuck Ave.,Oakl[illegible],CA. SVE System . EMCON Project #20805-[illegible].006 (WA or Task Order # 18336)

Remarks: Restarted unit after Quarterly sampling.

Unscheduled site visit [x] Scheduled site visit []

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

Arrival Time (24:00 hour)	1100	Effluent (E-1) (12"x12")	~~[illegible]~~
System Status (on or off)	ON	Stack Temperature (°F)	680
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	1132	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1142	Set Point (°F)	610
Well Field I-1 (3")	—	**TOTAL HOURS**	2417.48
Vacuum (in. of H_2O)	15	Electric Meter (kwh)	—
Velocity (in. of H_2O)	.42	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	70	**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)	.10	Date: (WITH CARBON FILTER)	
Temperature (°F)	175	**PID (ppm)**	CALIBRATION GAS TYPE.
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H_2O)	Data on ATI only	Date:	
ATI operating properly: yes/no	Yes	**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'								
VW-2	4"	10'-24'								
VW-3	4"	14'-24'								
VW-4	4"	10'-24'								
VW-5	4"	10'-24'								
VW-6	4"	10'-24'								
VW-7	4"	10'-24'								
VW-8	4"	10'-24'								
VW-9	4"	10'-24'								
VW-10	4"	10'-24'								
MW-1	4"	13'-26'								
MW-5	4"	10'-25'								

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= 976.41
		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, in % by volume.

Project#20805-135.006 WA # (Task Order # 18336)

Operator: L.Whitten Date: 8/26/96 ARCO 6148 Soil Vapor Extraction System

Remarks: Bubbler system on upon arrival - readjusted flows Compressor running from 90 to 120 psi in tank

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)	10:45	**Effluent (E-1) (12"x12")**	
System Status (on or off)	off	Stack Temperature (°F)	OFF
Shutdown Time (24:00 hour)	–	**SYSTEM**	
Restart Time (24:00 hour)	–	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	11:09	Set Point (°F)	
Well Field I-1 (3")		**TOTAL HOURS**	
Vacuum (in. of H,O)		Electric Meter (kwh)	
Velocity (in. of H,O)	OFF	Dilution Controller Setpoint (°F)	1200
Temperature (°F)		**AIR MONITORING**	
After Blower I-2 (4")		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H,O)	NA	Date. (WITHOUT CARBON FILTER)	
Total Flow (in. of H,O)		Date: (WITH CARBON FILTER)	NA
Temperature (°F)		**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date'	
Dilution Air Flow (in of H,O)	Data on ATI only	Date:	NA
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,O)	Flow (2") (in. of H,O)	Bubbler Flow (cfm) (L/psi)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'			100			>100/1.5		
VW-2	4"	10'-24'			100			20/1.6		
VW-3	4"	14'-24'			100			off		
VW-4	4"	10'-24'			0			off		
VW-5	4"	10'-24'			100			off		
VW-6	4"	10'-24'			100			>100/2.6		
VW-7	4"	10'-24'			100			80/3.25		
VW-8	4"	10'-24'			100			off		
VW-9	4"	10'-24'			100			60/3.7		
VW-10	4"	10'-24'			0	0		off		
MW-1	4"	13'-26'	Pressure gauge not working (psi)					10/0		
MW-5	4"	10'-25'			100			65/3.1		

Sparge/Bubbler Well ID	Well Diameter	Screened Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (cfm) (L)	DO (mg/l)	REMARKS
AS-1 (Sparge only)	1"	26'-28'				OFF			
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'				2.75	75		
MW-3 (Bubbler only)	2"	14'-26'				2.75	5	Flow	ball stuck @ 5L
MW-4 (Bubbler only)	4"	11.5'-26.5'				OFF			
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)= 32	Total Air Sparge Flow Rate(cfm)= 7	Compressor Hours= 1411.57 @ 11:09 AM
		Total Air Sparge Temp(°F)= 80

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: D. Larsen Date: 9-27-96

Project#20805-135.004

ARCO 6148 Soil Vapor Extraction System

Remarks: The following readings show what settings the bubbler system was left at.

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)	10:45	**Effluent (E-1) (12"x12")**	
System Status (on or off)	OFF	Stack Temperature (°F)	OFF
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	—	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	11:23	Set Point (°F)	
Well Field I-1 (3")	OFF	**TOTAL HOURS**	
Vacuum (in. of H_2O)		Electric Meter (kwh)	
Velocity (in. of H_2O)		Dilution Controller Setpoint (°F)	1200
Temperature (°F)		**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)	~ / NA / ~
Total Flow (in. of H_2O)		Date: (WITH CARBON FILTER)	
Temperature (°F)		**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	~ / NA / ~
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)~~ L/psi	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'		pressure gauge not working				60/?	(psi ?)	
VW-2	4"	10'-24'						60/2.2		
VW-3	4"	14'-24'						OFF		
VW-4	4"	10'-24'						OFF		
VW-5	4"	10'-24'						OFF		
VW-6	4"	10'-24'						60/0.8		
VW-7	4"	10'-24'						60/2.75		
VW-8	4"	10'-24'						OFF		
VW-9	4"	10'-24'						60/3.7		
VW-10	4"	10'-24'						OFF		
MW-1	4"	13'-26'						OFF		
MW-5	4"	10'-25'						OFF		

Sparge/Bubbler Well ID	Well Diameter	Screened Interval	DTW (feet)	TD (feet)	Valve Position (% open)	Pressure (psi)	Air Flow L ~~(cfm)~~	DO (mg/l)	REMARKS
AS-1 (Sparge only)	1"	26'-28'				OFF			
AS-2 (Sparge only)	2"	26'-28'				OFF			
AS-3 (Sparge only)	2"	26'-28'				OFF			
AS-4 (Sparge only)	2"	26'-28'				OFF			
AS-5 (Sparge only)	2"	26'-28'				OFF			
MW-2 (Bubbler only)	2"	14'-26'				2.6	~~2.660~~		
MW-3 (Bubbler only)	2"	14'-26'				2.5	Flow ball is stuck at 5L		
MW-4 (Bubbler only)	4"	11.5'-26.5'				4.1	60		
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)= 40 Total Air Sparge Flow Rate(cfm)= ? Compressor Hours= 1411.80 @ 11:23

Total Air Sparge Temp(°F)= ~~1411.80~~ 80°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: D. Larsen Date: 9-27-96

Project#20805-135.004

ARCO 6148 Soil Vapor Extraction System

Remarks: Arrived at 9:35. Shut down bubbler system before starting SVE. The following readings show conditions before starting the SVE

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)	09:35	Effluent (E-1) (12"x12")	
System Status (on or off)	Off	Stack Temperature (°F)	OFF
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	—	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	—	Set Point (°F)	
Well Field I-1 (3")	OFF	**TOTAL HOURS**	2687.78
Vacuum (in. of H_2O)		Electric Meter (kwh)	
Velocity (in. of H_2O)		Dilution Controller Setpoint (°F)	1200
Temperature (°F)		**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)		Date (WITH CARBON FILTER)	NA
Temperature (°F)		**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H_2O)	Data on ATI only	Date:	NA
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	OFF				
VW-2	4"	10'-24'			100					
VW-3	4"	14'-24'			100					
VW-4	4"	10'-24'			0					
VW-5	4"	10'-24'			100					
VW-6	4"	10'-24'			100					
VW-7	4"	10'-24'			100					
VW-8	4"	10'-24'			100					
VW-9	4"	10'-24'			100					
VW-10	4"	10'-24'			0					
MW-1	4"	13'-26'			0					
MW-5	4"	10'-25'			100					

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'			0	OFF			
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: D. Larsen Date: 9-30-96

Project#20805-135.004
ARCO 6148 Soil Vapor Extraction System

Remarks: Started well field at 12:32 (hr = 2687.78) VW-1 through VW-10 and MW-5 open to SVE; measured FID in each well. MW-1 was left closed to system, not measured

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)	09:35	Effluent (E-1) (12"x12")	
System Status (on or off)	OFF	Stack Temperature (°F)	707
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	12:32	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	13:15	Set Point (°F)	610
Well Field I-1 (3")	100% open	TOTAL HOURS	2683.50
Vacuum (in. of H_2O)	16	Electric Meter (kwh)	Could not find
Velocity (in. of H_2O)	2400	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	76	**AIR MONITORING**	
After Blower I-2 (4")		FID (ppm) Date: (WITHOUT CARBON FILTER)	Amb: ~ I-1: NA I-2: ~ E-1:
Total Pressure (in. of H_2O)	NA	Date: (WITH CARBON FILTER)	
Total Flow (in. of H_2O)	0.10	PID (ppm)	CALIBRATION GAS TYPE:
Temperature (°F)	180 (high)	Date.	Amb: ~ I-1: NA I-2: ~ E-1:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H_2O)	Data on ATI only	Lab samples taken for analysis at:	
ATI operating properly: yes/no			

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~~ FID (ppm)
VW-1	4"	14'-24'			100					200
VW-2	4"	10'-24'			100					220
VW-3	4"	14'-24'			100					800
VW-4	4"	10'-24'			100					>1000
VW-5	4"	10'-24'			100					48
VW-6	4"	10'-24'			100					140
VW-7	4"	10'-24'			100					480
VW-8	4"	10'-24'			100					120
VW-9	4"	10'-24'			100					600
VW-10	4"	10'-24'			100					>1000
MW-1	4"	13'-26'	18.01	25.5	0					NA
MW-5	4"	10'-25'			100					250

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'	OFF	—				→	
AS-2 (Sparge only)	2"	26'-28'	17.80	22.1	OFF			→	
AS-3 (Sparge only)	2"	26'-28'	OFF					→	
AS-4 (Sparge only)	2"	26'-28'	OFF					→	
AS-5 (Sparge only)	2"	26'-28'	OFF					→	
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: D. Lorzer Date: 9-30-96

Remarks: After taking PID readings, adjusted manifold to the following...
Process blower failure at 14:20 (2689.58)

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)	09:35	Effluent (E-1) (12"x12")	
System Status (on or off)	ON	Stack Temperature (°F)	730
Shutdown Time (24:00 hour)	14:20	**SYSTEM**	
Restart Time (24:00 hour)	12:32	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	13:55	Set Point (°F)	610
Well Field I-1 (3")		**TOTAL HOURS**	2689.16
Vacuum (in. of H,O)	16	Electric Meter (kwh)	could not find
Velocity (in. of H,O)	2400	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	76	**AIR MONITORING**	
After Blower I-2 (4")		FID (ppm)	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H,O)	NA	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H,O)	0.10	Date: (WITH CARBON FILTER)	NA
Temperature (°F)	185	PID (ppm)	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date:	
Dilution Air Flow (in of H,O)	Data on ATI only	Date.	NA
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,O)	Flow (2") (in. of H,O)	Bubbler Flow (cfm)	DO (mg/l)	PID (ppm)
VW-1	4"	14'-24'			100					
VW-2	4"	10'-24'			100	System shut down				
VW-3	4"	14'-24'			100	before I could get				
VW-4	4"	10'-24'			100	individual well				
VW-5	4"	10'-24'			0	flow readings.				
VW-6	4"	10'-24'			0					
VW-7	4"	10'-24'			100					
VW-8	4"	10'-24'			0					
VW-9	4"	10'-24'			100					
VW-10	4"	10'-24'			100					
MW-1	4"	13'-26'			0					
MW-5	4"	10'-25'			100					

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, and CO, in % by volume.

Operator: D. Larsen Date: 9-30-96

Project#20805-135.004
ARCO 6148 Soil Vapor Extraction System

6148 | 9-30-96

Programmed the AS/Bubbler controller between 13:15 and 13:45. Set controller so AS-1, AS-4 and AS-5 will run together, and AS-2 and AS-3 will run together. Each cycle is one hour. AS system values opened when the well field was opened to the SVE system (as it should). The well cycle for the AS wells switched at 14:00, controller is working as it should. Opened air to the AS wells at 14:01.

Time (2400)	Well Field (%)	Manual Dilution (%)	Total Flow (in H_2O)	WF Vacuum (in H_2O)	Inf. Temp (°F)	Box Temp (°F)	Stack Temp (°F)
1216	0	100	0.09	0	120	63	62
1225	0	100	0.09	0	145	473	372
1230	0	100	0.095	0	151	566	470
1232	0	100	0.09	0	160	610	525
1233	25	100	0.095	4	161	609	547
1235	50	100	0.09	4	165	612	559
1240	75	100	0.095	4	170	610	570
1242	100	100	0.095	4	170	610	575
1245	100	75	0.095	4	171	610	580
1250	100	50	0.095	4	175	610	586
1255	100	25	0.09	7	175	610	600
1300	100	0	0.10	15	176	610	669
1305	100	0	0.10	16	178	610	686
1310	100	0	0.10	16	179	610	699
1315	100	0	0.10	16	180	610	707
1355	100	0	0.10	16	185	610	730
1420	Process Blower Failure						

4400 FPM

APPENDIX E

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

Columbia Analytical Services inc.

July 17, 1996 Service Request No.: S9601098

Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 6148 OAKLAND/20805-135.006/TO#18336.00

Dear Sailaja Yelamanchili:

Attached are the results of the samples submitted to our lab on July 10, 1996.
For you reference, our service request number for this work is S9601098.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 11, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

If you have questions or further needs, please call me at (408) 428-1282.

Sincerely,

Steve Green
Project Chemist

SG/sh

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:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	7/10/96
Sample Matrix:	Air	**Date Received:**	7/10/96
		Date Extracted:	NA
		Date Analyzed:	7/11/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: I-1
Lab Code: S9601098-001

	MRLs		**Results**	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	1.3	0.4
Toluene	0.5	0.1	4.0	1.1
Ethylbenzene	0.5	0.1	1.5	0.3
Xylenes, Total	1	0.2	30	6.9
Total Volatile Hydrocarbons:				
C1 - C5	10	5	390	95
C6 - C12	20	5	690	170
TPH as Gasoline*	20	5	690	170

* 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:	ARCO Products Company	**Service Request:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	7/10/96
Sample Matrix:	Air	**Date Received:**	7/10/96
		Date Extracted:	NA
		Date Analyzed:	7/11/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: Eff
Lab Code: S9601098-002

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	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	10	5	38	9
C6 - C12	20	5	23	6
TPH as Gasoline*	20	5	23	6

* 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:	ARCO Products Company	**Service Request:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	7/10/96
Sample Matrix:	Air	**Date Received:**	7/10/96
		Date Extracted:	NA
		Date Analyzed:	7/11/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: Vapor Blank
Lab Code: S960711-VB

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	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	10	5	ND	ND
C6 - C12	20	5	ND	ND
TPH as Gasoline*	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: ARCO Products Company
Project: 6148 OAKLAND/20805-135.006/TO#18336.00
Sample Matrix: Air

Service Request: S9601098
Date Collected: 7/10/96
Date Received: 7/10/96
Date Extracted: N/A
Date Analyzed: 7/11/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1
Lab Code: S9601098-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	1.3	1.4	1	7
Toluene	0.5	4.0	3.8	4	5
Ethylbenzene	0.5	1.5	1.3	1	14
Xylenes, Total	1	30	31	30	3
Total Volatile Hydrocarbons					
C1 - C5	10	390	380	385	3
C6 - C12	20	690	680	685	1
TPH as Gasoline*	20	690	680	685	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 = 100

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 OAKLAND/20805-135.006/TO#18336.00
Sample Matrix: Air

Service Request: S9601098
Date Collected: 7/10/96
Date Received: 7/10/96
Date Extracted: N/A
Date Analyzed: 7/11/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Sample Name: I-1
Lab Code: S9601098-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.2	0.4	0.4	0.4	<1
Toluene	0.1	1.1	1.0	1	10
Ethylbenzene	0.1	0.3	0.3	0.3	<1
Xylenes, Total	0.2	6.9	7.2	7	4
Total Volatile Hydrocarbons					
C1 - C5	5	95	93	94	2
C6 - C12	5	170	170	170	<1
TPH as Gasoline*	5	170	170	170	<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 = 100

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	7/10/96
LCS Matrix:	Vapor	**Date Received:**	7/10/96
		Date Extracted:	NA
		Date Analyzed:	7/11/96

Laboratory Control Sample Summary
BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015
Units: mg/m^3

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	24	22.8	95	60-140
Toluene	24	24.2	101	60-140
Ethylbenzene	24	23.8	99	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	7/10/96
LCS Matrix:	Vapor	**Date Received:**	7/10/96
		Date Extracted:	NA
		Date Analyzed:	7/11/96

Laboratory Control Sample Summary
BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015
Units: uL/L (ppmv)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	7.5	7.1	95	60-140
Toluene	6.4	6.4	100	60-140
Ethylbenzene	5.5	5.5	100	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601098
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Analyzed:**	7/11/96

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	25	21.5	86	80-120
Toluene	25	21.4	86	80-120
Ethylbenzene	25	21.3	85	80-120
Xylenes, Total	75	63.9	85	80-120
Gasoline	250	239	96	80-120

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 18336.00

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) S. Yalamanchili	Laboratory name
ARCO engineer M. Whelan	Telephone no. (ARCO) 408 453-1040	Telephone no. (Consultant) 408 453-7300	Fax no. (Consultant) 408 453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, 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 EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
I-1	(1)	1			X			7-10-96	1455		X									
EM	(2)	1			X			7-10-96	1510		X									

Method of shipment

Special detection Limit/reporting

Mg/M³ & PPMV

Special QA/QC

Remarks

20805-135.006

Lab number

5960198

Turnaround time

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

Condition of sample:

Temperature received:

	Date	Time		Date	Time
Relinquished by sampler: Dan Whitt	7-10-96	16:45	Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory: Jane Brand	7-10-96	16 45

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

APC-3292 (2-91)

Columbia Analytical Services inc.

August 16, 1996 Service Request No.: S9601260

Ms. Ivy Inouye
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 6148 OAKLAND/20805-135.006/TO#18336.00

Dear Ms. Inouye:

Attached are the results of the samples submitted to our lab on August 5, 1996.
For you reference, our service request number for this work is S9601260.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 11, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

If you have questions or further needs, please call me at (408) 428-1282.

Sincerely,

Steve Green
Project Chemist

SG/sh

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:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
Sample Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	NA
		Date Analyzed:	8/6/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: E-1
Lab Code: S9601260-001

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	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	10	5	230	56
C6 - C12	20	5	38	9
TPH as Gasoline*	20	5	38	9

* 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:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
Sample Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	NA
		Date Analyzed:	8/6/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: I-1
Lab Code: S9601260-002

	MRLs		**Results**	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	<2.5**	<1**
Toluene	0.5	0.1	3.3	0.9
Ethylbenzene	0.5	0.1	<2.5**	<0.5**
Xylenes, Total	1	0.2	9.9	2.3
Total Volatile Hydrocarbons:				
C1 - C5	10	5	1,300	320
C6 - C12	20	5	710	170
TPH as Gasoline*	20	5	710	170

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

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

LCS/102194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
Sample Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	NA
		Date Analyzed:	8/6/96

BTEX and Total Volatile Hydrocarbons
EPA Methods 5030/8020/Modified 8015

Sample Name: Method Blank
Lab Code: S960806-VB1

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	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	10	5	ND	ND
C6 - C12	20	5	ND	ND
TPH as Gasoline*	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:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
Sample Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	N/A
		Date Analyzed:	8/6/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: E-1
Lab Code: S9601260-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	ND	ND	--	--
Toluene	0.5	ND	ND	--	--
Ethylbenzene	0.5	ND	ND	--	--
Xylenes, Total	1	ND	ND	--	--
Total Volatile Hydrocarbons					
C1 - C5	10	230	230	230	<1
C6 - C12	20	38	37	38	3
TPH as Gasoline*	20	38	37	38	3

Note: $ppmV = mg/m^3 \times [24.45 \text{ (gas constant)} / \text{molecular weight (MW)}]$
MW Benzene = 78, Toluene = 92, Ethylbenzene = 106, Total Xylenes = 106
MW Gasoline = 100

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

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
Sample Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	N/A
		Date Analyzed:	8/6/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Sample Name: E-1
Lab Code: S9601260-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.2	ND	ND	--	--
Toluene	0.1	ND	ND	--	--
Ethylbenzene	0.1	ND	ND	--	--
Xylenes, Total	0.2	ND	ND	--	--
Total Volatile Hydrocarbons					
C1 - C5	5	56	56	56	<1
C6 - C12	5	9	9	9	<1
TPH as Gasoline*	5	9	9	9	<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 = 100

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

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
LCS Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	NA
		Date Analyzed:	8/6/96

Laboratory Control Sample Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Gasoline	200	210	105	60-140

LCSX/121594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9601260
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	8/5/96
LCS Matrix:	Air	**Date Received:**	8/5/96
		Date Extracted:	NA
		Date Analyzed:	8/6/96

Laboratory Control Sample Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Gasoline	49	51	104	60-140

LCSX/121594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 6148 OAKLAND/20805-135.006/TO#18336.00

Service Request: S9601260
Date Analyzed: 8/6/96

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	25	22.0	88	80-120
Toluene	25	22.0	88	80-120
Ethylbenzene	25	21.4	86	80-120
Xylenes, Total	75	63.7	85	80-120
Gasoline	250	228	91	80-120

ARCO Produ[redacted]Co[redacted]ny
Division of AtlanticRichfieldCompany

Task Order No. 18336.00

Chain of Custody

ARCO Facility no. 6148 | City (Facility) Oakland | Project manager (Consultant) G. Yelimanchili

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

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

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
E-1	1	1			X			8/5/96	1400		X											
I-1	2	1			X			8/5/9	1405		X											

Laboratory name

Contract number

Method of shipment

Special detection Limit/reporting: Mg/M3 & PPMV

Special QA/QC

Remarks: 20805-135.006

Lab number 12609B 8/5/96 9608126 ~~98~~

~~Turnaround time~~

Priority Rush 1 Business Day ☐

Rush 2 Business Days ☐

Expedited 5 Business Days ☐

Standard 10 Business Days ☑

Condition of sample: Inflated

Temperature received: Ambient

Relinquished by sampler: Van Albrecht	Date 8-5-96	Time 1600	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: Joanne Brown; Date 8-5-96; Time 1600

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