EMCON

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

Date September 26, 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	Second 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: September 26, 1996

Re: ARCO Station #

6148 • 5131 Shattuck Avenue • Oakland, CA
Second 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

September 25, 1996
Project 20805-135.006

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

Re: Second 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 second 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

Calli Yelamanchili for

Sailaja Yelamanchili
Staff Engineer

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

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

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September 25, 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:	April 1, 1996 to July 1, 1996

WORK PERFORMED THIS QUARTER (Second- 1996):

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

WORK PROPOSED FOR NEXT QUARTER (Third- 1996):

1. Perform quarterly groundwater monitoring and sampling for third quarter 1996.
2. Continue operation of SVE, air-sparge, and air-bubbling systems.
3. Prepare and submit quarterly report for second 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:	15.90 feet
Groundwater Gradient (Average):	0.015 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):	180 ppmv
Benzene Conc. End of Period (lab):	<1 ppmv
Flowrate End of Period:	116.7 scfm
HC Destroyed This Period:	195.3 pounds
HC Destroyed to Date:	1,641.8 pounds
Utility Usage Electric (KWH):	22,770 KWH

Operating Hours This Period:	689.1 hours
Percent Operational:	31.6% System was down for quarterly monitoring, power interruptions, and other maintenance issues.
Operating Hours to Date:	1811.3 hours
Unit Maintenance:	NA
Number of Auto Shut Downs:	3
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	97.3%
Stack Temperature:	610°F
Source Flow:	126.2 scfm (6-28-96)
Process Flow:	126.2 scfm (6-28-96)
Source Vacuum:	28 inches of water (6-28-96)

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Second 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, Second 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, Second Quarter 1996 Groundwater Monitoring Event
- Appendix B - Analytical Results and Chain of Custody Documentation, Second Quarter 1996 Groundwater Monitoring Event
- Appendix C - SVE System Monitoring Data Log Sheets
- Appendix D - Field Data Sheets, Operation and Maintenance Visits, Second Quarter 1996
- Appendix E - Analytical Results and Chain-of-Custody Documentation for Soil Vapor Extraction System, Second Quarter 1996

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

Table 1
Groundwater Monitoring Data
Second Quarter 1996

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 7-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & 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	05-15-96	107.80	17.53	90.27	ND	SW	0.015	05-15-96	Not sampled: not scheduled for chemical analysis									
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-3	05-15-96	107.61	17.35	90.26	ND	SW	0.015	05-15-96	5600	66	12	37	67	230	--	--	--	--
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-5	05-15-96	106 60	16.58	90.02	ND	SW	0.015	05-15-96	3400	350	6	72	20	220	--	--	--	--
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-7	05-15-96	107.05	14.65	92.40	ND	SW	0 015	05-15-96	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

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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: 07-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & 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-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	--	--	--	--

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: 07-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & 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	--	--	7.7	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-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									

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: 07-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & 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-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									

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: 07-15-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & 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									

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
**: 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: 07-15-96

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: 07-15-96

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: 07-15-96

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

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

Table 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: 07-01-96

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: 07-01-96

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	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: 07-01-96

CURRENT REPORTING PERIOD:	04-01-96	to	07-01-96
DAYS / HOURS IN PERIOD:	91		2184.0
DAYS / HOURS OF OPERATION:	29		689.1
DAYS / HOURS OF DOWN TIME:	62		1494 9
PERCENT OPERATIONAL:			31.6 %
PERIOD POUNDS REMOVED:	195.3		
PERIOD GALLONS REMOVED:	31.5		
AVERAGE WELL FIELD FLOW RATE (scfm):			101.4
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):			101.4

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. 07-17-96

Date	Well Identification											
	VW-1			VW-2			VW-3			VW-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
09-27-95	open	NA	7.0	open	NA	7.5	open	NA	7.0	open	NA	7.0
09-27-95	open	NA	14 0	open	NA	13.0	open	NA	13.0	open	NA	13.0
09-27-95	open	NA	18.0	open	NA	18.0	open	NA	17.0	open	NA	17.0
09-27-95	open	538 PID	19.0	open	767 PID	19.5	open	531 PID	19.0	open	627 PID	19.5
09-27-95	open	NA	NA	open	4100 LAB	NA	open	1700 LAB	NA	open	3600 LAB	NA
09-28-95	open	1006 PID	18.0	open	NA	18.0	open	NA	18.0	open	NA	18.5
09-28-95	open	2800 LAB	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	open	NA	20.0	open	NA	20.0	open	NA	20.0	open	NA	20.0
10-11-95	open	NA	18.0	open	NA	18 0	open	NA	18 0	open	NA	18.0
01-12-96	open	300 PID	25.0	open	500 PID	25.0	open	430 PID	25.0	open	580 PID	25 0
02-15-96	open	NA	27.0	open	NA	27.0	open	NA	26.0	open	NA	26.0
03-19-96	closed	14.1 PID	0.0	closed	18.8 PID	0 0	closed	30.2 PID	0.0	closed	16.6 PID	0.0
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

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: 07-17-96

Date	Well Identification											
	VW-5			VW-6			VW-7			VW-8		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
09-27-95	open	NA	6.5	open	NA	6.0	open	NA	6.0	open	NA	6.0
09-27-95	open	NA	13.0	open	NA	13.0	open	NA	13.0	open	NA	13.0
09-27-95	open	NA	17.0	open	NA	17.0	open	NA	17.0	open	NA	17 0
09-27-95	open	247 PID	18.0	open	2615 PID	19.0	open	856 PID	19.0	open	501 PID	18.5
09-27-95	open	550 LAB	NA	open	4700 LAB	NA	open	2800 LAB	NA	open	1100 LAB	NA
09-28-95	open	NA	18 0	open	NA	18.0	open	NA	17.5	open	NA	17.0
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	closed	NA	NA	open	NA	19 0	open	NA	19.5	open	NA	19.0
10-11-95	closed	NA	NA	open	NA	17.5	open	NA	17.0	open	NA	17.0
01-12-96	open	350 PID	25.0	open	2210 PID	25.0	open	300 PID	22.0	open	225 PID	25.0
02-15-96	open	NA	26.0	open	NA	26.0	open	NA	24.0	open	NA	25.0
03-19-96	closed	8.9 PID	0 0	open (b)	512 PID	38.0	open (b)	156 PID	37.0	open (b)	60.1 PID	38.0
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

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: 07-17-96

Date	Well Identification											
	VW-9			VW-10			MW-1			MW-5		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
09-27-95	open	NA	7.5	open	NA	6.0	open	NA	7.5	open	NA	5.0
09-27-95	open	NA	13.0	open	NA	13.0	open	NA	14.0	open	NA	12.0
09-27-95	open	NA	17.0	open	NA	17.0	open	NA	17.0	open	NA	17.0
09-27-95	open	801 PID	19.0	open	482 PID	19.0	open	438 PID	5.0	open	457 PID	18 5
09-27-95	open	6300 LAB	NA	open	1700 LAB	NA	open	1600 LAB	NA	open	960 LAB	NA
09-28-95	open	NA	18.0	open	NA	18.0	open	NA	5 0	open	NA	17.0
09-28-95	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
09-29-95	open	NA	19.0	open	NA	19.5	open	NA	5.0	open	NA	19.0
10-11-95	open	NA	17 5	open	NA	17.5	open	NA	4.0	open	NA	16.5
01-12-96	open	930 PID	22 0	open	170 PID	5.0	closed	13 PID	0 0	open	172 PID	5 0
02-15-96	open	NA	24.0	open	NA	10.0	closed	NA	0 0	open	NA	6.0
03-19-96	open (b)	50.2 PID	38.0	open (b)	22.4 PID	38 0	closed	32 6 PID	0.0	open (b)	43.2 PID	38 0
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

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	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	AS Start-Up Date: 06-07-96
1921 Ringwood Avenue San Jose, California	Operation and Performance Data From: 03-19-96 To: 07-01-96

Date Begin:	06-28-96
Date End:	07-01-96
Air-Bubbling Well Status:	
MW-2	on
MW-3	on
MW-4	on
Air-Sparge Well Status:	
AS-1	on
AS-2	on
AS-3	on
AS-4	on
AS-5	on
Air-Bubbling Well Pressure (psig) (1):	
MW-2	4.0
MW-3	4.0
MW-4	4.0
Air-Sparge Well Pressure (psig):	
AS-1	4.0
AS-2	3.0
AS-3	4.0
AS-4	3.0
AS-5	3.5
Total Air-Sparge and Air-Bubbling Pressure (psig):	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	- -

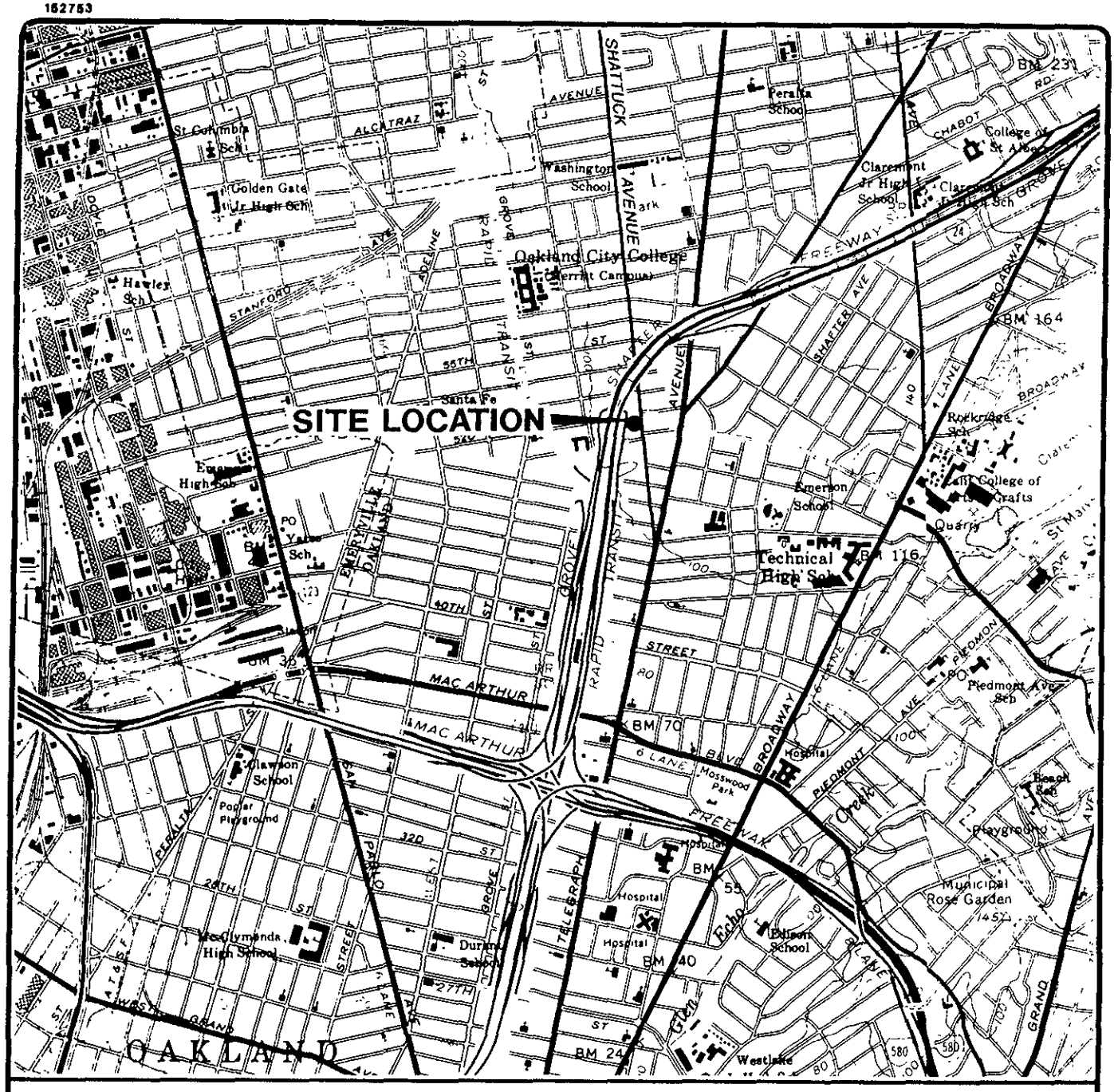
Table 7
Air-Sparge and Air-Bubbling Systems
Operation and Performance Data

Facility Number: 6148	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	AS Start-Up Date: 06-07-96
1921 Ringwood Avenue San Jose, California	Operation and Performance Data From: 03-19-96 To: 07-01-96

CURRENT REPORTING PERIOD:	04-01-96	to	07-01-96
DAYS / HOURS IN PERIOD:	91.0	2184	

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

152753



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

- N -

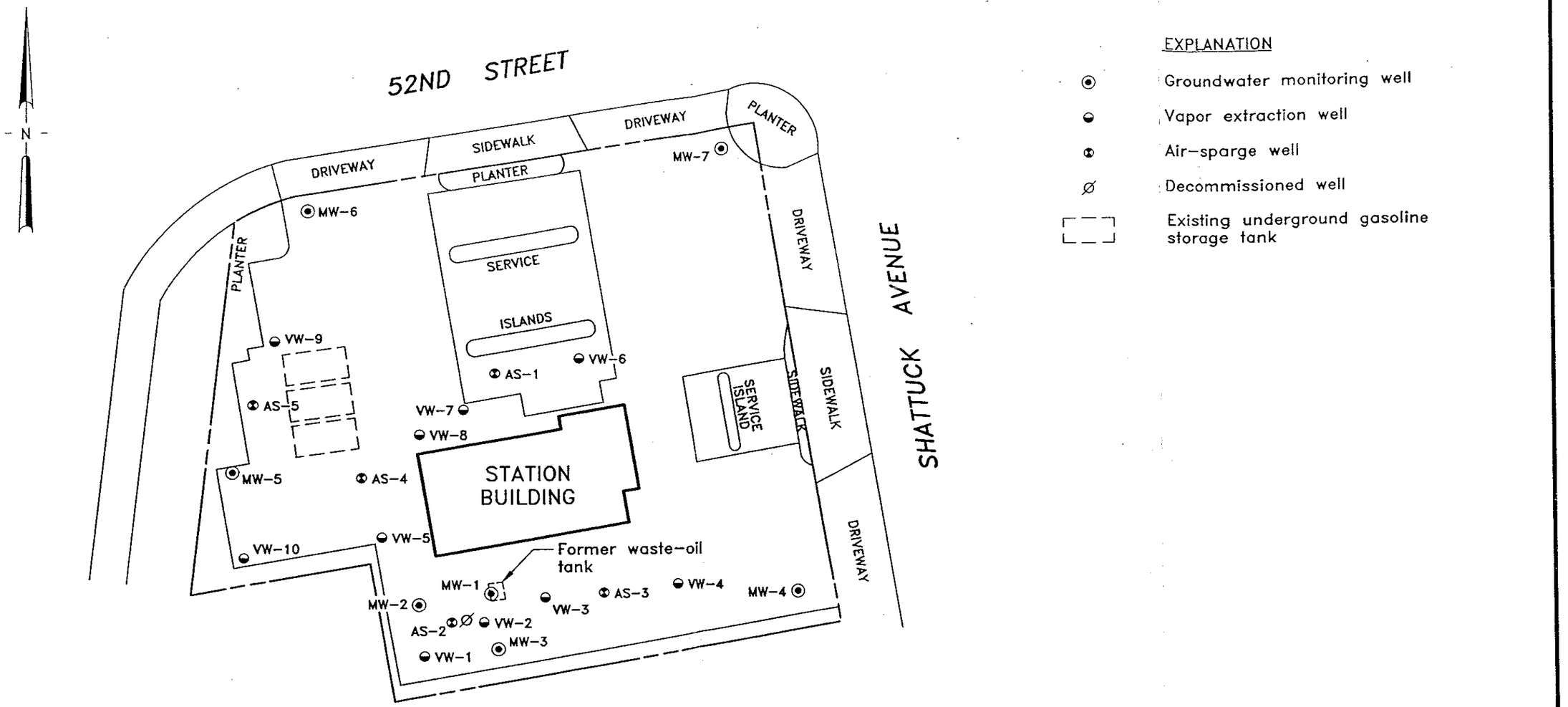
Scale : 0 2000 4000 Feet

EMCON

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

SITE LOCATION

FIGURE
1
PROJECT NO.
805-135.06



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Air-sparge well
- Decommissioned well
- Existing underground gasoline storage tank

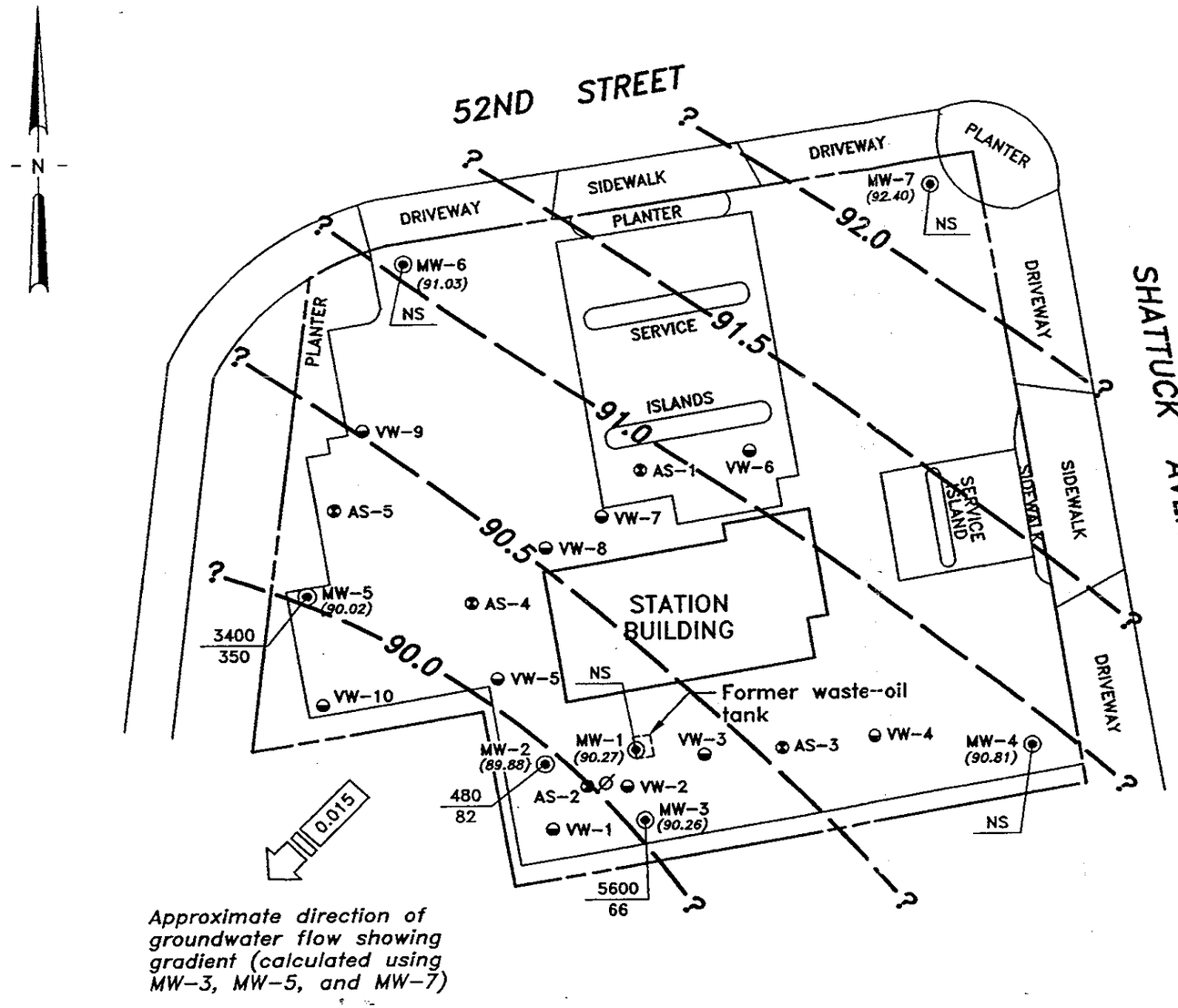
EMCON

SCALE: 0 30 60 FEET
(Approximate)

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

SITE PLAN

FIGURE NO.
2
PROJECT NO.
805-135.06



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

EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Air-sparge well
- Decommissioned well
- Existing underground gasoline storage tank
- (92.40) Groundwater elevation (Ft.-MSL) measured 5/15/96
- Groundwater elevation contour (Ft.-MSL)
- 3400 / 350 TPHG concentration in groundwater (ug/L); sampled 5/15/96
  Benzene concentration in groundwater (ug/L); sampled 5/15/96
- NS Not sampled; not scheduled for chemical analysis

emcon

SCALE: 0 30 60 FEET
(Approximate)

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

GROUNDWATER DATA
SECOND QUARTER 1996

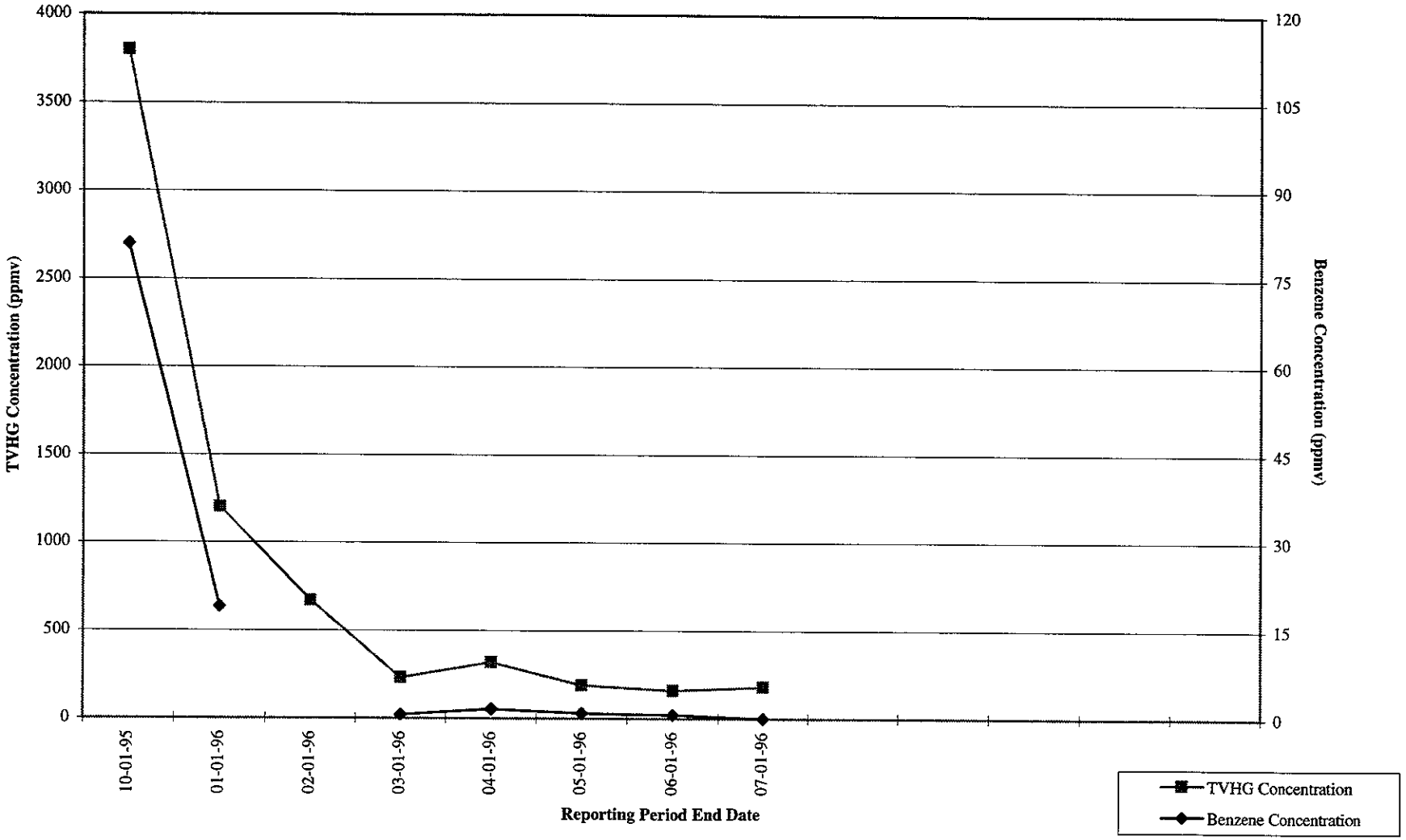
FIGURE NO. 3

PROJECT NO. 805-135.006

G:\805-135\G00 REV 0 07/09/96 16:08:13 DD DJ

Figure 4

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

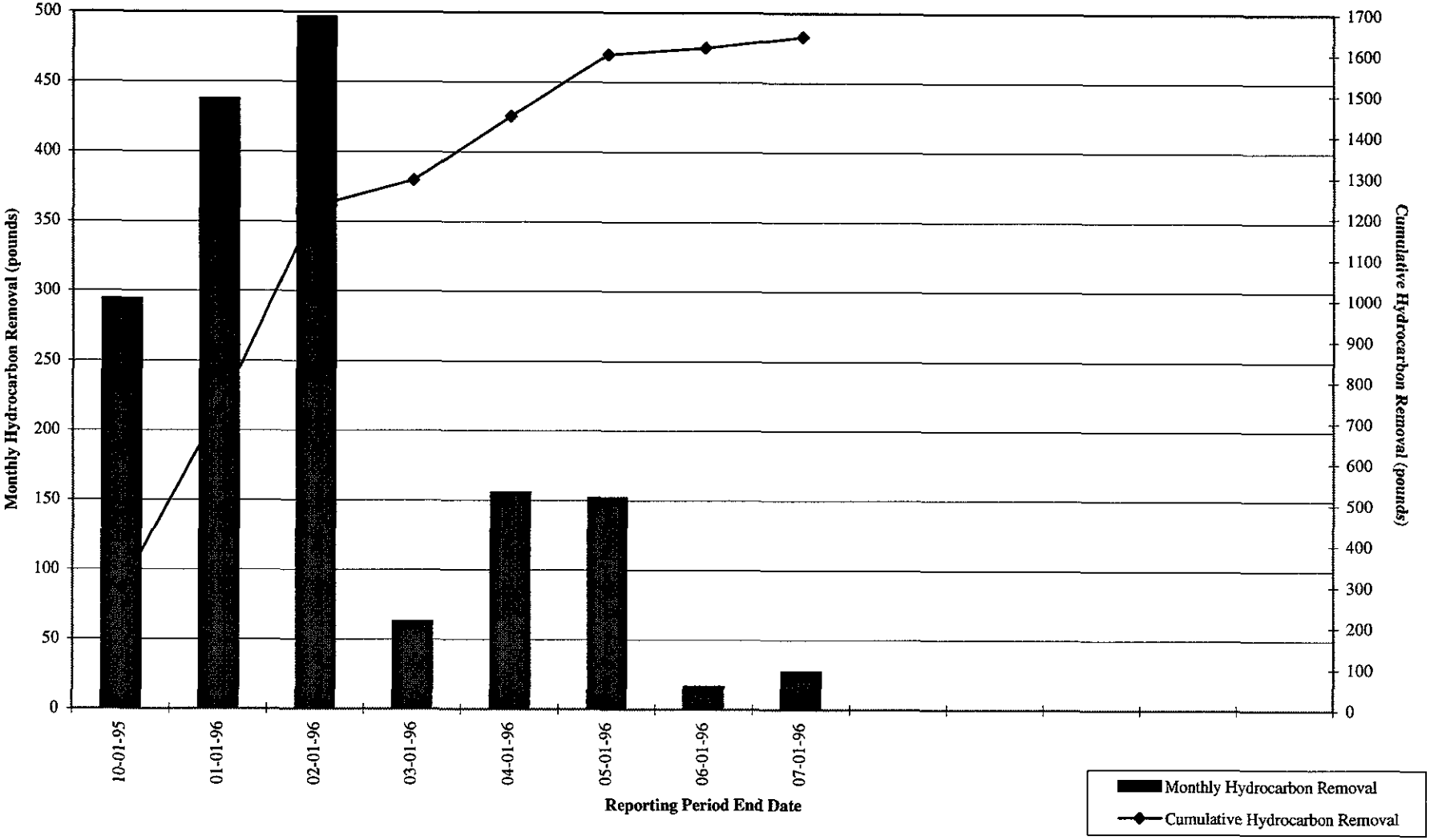


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

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, SECOND QUARTER 1996 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-250.002** STATION ADDRESS : **5131 Shattuck Avenue, Oakland** DATE : 5-15-96

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	Good	none	Tec.	15.90	~~15.90~~	NR	NA	26.0	
2	**MW-6**	Good	Good	Good	Arco	Loc.	14.10	14.10	NR	NA	26.4	
3	**MW-7**	Good	Good	Good	Arco	Loc	14.65	14.65	NR	NA	26.7	
4	**MW-1**	Good	Good	Good	none	TEC	17.52	17.53	NR	NA	25.5	
5	**MW-2**	Good	Good	Good	none	Tec	17.40	17.40	NR	NA	25.5	
6	**MW-3**	Good	Good	Good	none	Tec.	17.35	17.35	NR	NA	25.5	
7	**MW-5**	Good	Good	Good	none	Tec	16.58	16.58	NR	NA	25.0	

SURVEY POINTS ARE TOP OF WELL CASINGS

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21725-250-002 SAMPLE ID: MW-2 (25')

PURGED BY: M. Gallegos CLIENT NAME: ARCO 6148

SAMPLED BY: V LOCATION: OAKLAND, CA

TYPE: Ground Water V 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.):	5.29
DEPTH TO WATER (feet):	17.40	CALCULATED PURGE (gal.):	15.87
DEPTH OF WELL (feet):	25.5	ACTUAL PURGE VOL. (gal.):	16.0

DATE PURGED: 5-15-96 Start (2400 Hr) 1113 End (2400 Hr) 1118

DATE SAMPLED: V Start (2400 Hr) 1125 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1115	5.5	6.03	463	71.3	Cloudy	Mod
1116	11.0	6.32	455	71.1	"	"
1118	16.0	6.38	447	70.7	"	"

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

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

WELL INTEGRITY: Good LOCK #: None

REMARKS: All Samples taken

Meter Calibration: Date: 5/15/96 Time: 1110 Meter Serial #: 9204 Temperature °F: 74.1

(EC 1000 1029 / 1000) (DI ___) (pH 7 700 / 700) (pH 10 994 / 1000) (pH 4 400 / 400)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 1 of 3

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250.002 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.): 5.32

DEPTH TO WATER (feet): 17.35 CALCULATED PURGE (gal.): 15.97

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

DATE PURGED: 5-15-96 Start (2400 Hr) 1137 End (2400 Hr) 1139

DATE SAMPLED: √ Start (2400 Hr) 1148 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1138	5.5	6.51	483	69.4	BLK	Heavy
1139	11.0	6.69	473	69.9	cloudy	mod
	well dried @		11.0	Gallons		
1150	recharge	6.76	498	68.7	Clear	light

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

WELL INTEGRITY: Good LOCK #: None

REMARKS: All samples taken

Meter Calibration: Date: 5/15/96 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-2

Signature: [signature] Reviewed By: SAT Page 2 of 3

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 21775-250.002 SAMPLE ID: MW-5(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.):	5.50
DEPTH TO WATER (feet):	16.58	CALCULATED PURGE (gal.):	16.50
DEPTH OF WELL (feet):	25.0	ACTUAL PURGE VOL. (gal.):	11.0

DATE PURGED: 5-15-96 Start (2400 Hr) 1206 End (2400 Hr) 1211

DATE SAMPLED: √ Start (2400 Hr) 1220 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1208	5.5	6.34	595	68.3	BRN	HEAVY
1211	11.0	6.07	1301	68.9	"	"
	well dried at 11.0 gallons					
1222	recharge	5.89	1411	69.8	cloudy	light

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

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

WELL INTEGRITY: Good LOCK #: none

REMARKS: all samples taken

Meter Calibration: Date: 5/15/96 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-2

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

APPENDIX B

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

Columbia Analytical Services, Inc.

May 29, 1996 Service Request No: S9600772

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

Re: **21775-250.002/TO#19350.00/6148 Oakland**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on May 15, 1996. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. Listed above -- to help expedite our service please refer to this number when contacting the laboratory.

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

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

Sincerely,

Steven L. Green
Project Chemist

Cristina V. Layburn for
Greg Anderson
Regional QA Coordinator

SLG/jk

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600772
Project:	6148 OAKLAND/21775-250.002/TO#19350.00	**Date Collected:**	5/15/96
Sample Matrix:	Water	**Date Received:**	5/15/96
		Date Extracted:	NA

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

		Sample Name:	**MW-2 (25)**	**MW-3 (25)**	**MW-5 (25)**
		Lab Code:	S9600772-001	S9600772-002	S9600772-003
		Date Analyzed:	5/21/96	5/21/96	5/21/96
Analyte	**MRL**				
TPH as Gasoline	50		480	5,600	3,400
Benzene	0.5		82	66	350
Toluene	0.5		48	12	6
Ethylbenzene	0.5		8	37	72
Total Xylenes	0.5		48	67	20
Methyl *tert*-Butyl Ether	3		87	230	220

3S22/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9600772
Project:	6148 OAKLAND/21775-250.002/TO#19350.00	**Date Collected:**	5/15/96
Sample Matrix:	Water	**Date Received:**	5/15/96
		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:	S960521-WB1
Date Analyzed:	5/21/96

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

3S22/0e0194

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600772
Project:	6148 OAKLAND/21775-250.002/TO#19350.00	**Date Collected:**	5/15/96
Sample Matrix:	Water	**Date Received:**	5/15/96
		Date Extracted:	NA
		Date Analyzed:	5/21/96

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-2 (25)	S9600772-001	95	101
MW-3 (25)	S9600772-002	91	98*
MW-5 (25)	S9600772-003	93	103*
Batch QC (MS)	S9600776-001MS	98	112
Batch QC (DMS)	S0600776-001DMS	90	104
Method Blank	S960521-WB1	96	98
	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:**	S9600772
Project:	6148 OAKLAND/21775-250.002/TO#19350.00	**Date Collected:**	5/15/96
Sample Matrix:	Water	**Date Received:**	5/15/96
		Date Extracted:	NA
		Date Analyzed:	5/21/96

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

Sample Name: Batch QC
Lab Code: S9600776-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Gasoline	250	250	120	330	350	84	92	67-121	6

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600772
Project:	6148 OAKLAND/21775-250.002/TO#19350.00	**Date Analyzed:**	5/21/96

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	24.6	98	85-115
Toluene	25	25.0	100	85-115
Ethylbenzene	25	24.4	98	85-115
Xylenes, Total	75	75.4	101	85-115
Gasoline	250	248	99	90-110
Methyl *tert*-Butyl Ether	50	46	92	85-115

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 19350.00

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0452
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 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 ☐		
MW-2	(25') 1	2		X		X	HCl	5-15-96	1125		X											
MW-3	(25') 2	2		X		X	HCl	"	1148		X											
MW-5	(25') 3	2		X		X	HCl	"	1220		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40ml HCL VOAs

#21775-250.00

Lab number: 9600772

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 5-15-96 Time 1335	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory CAS-ST	Date 5-15-96 Time 1335

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

APPENDIX C

SVE SYSTEM MONITORING DATA LOG SHEETS

ARCO 6148
SVE SYSTEM
MONITORING DATA

Reporting Period:
04/01/96 00:00
05/01/96 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						
04/01/96 00:00																								1126.63				
04/02/96 11:40	100.3	100 3	268	268	14.7	94.5	13:10	190	760	0.9	3	190	760	0.9	3	10	41	<0.2	<0.5	94.6	0.37	0.00	35.67	1126.80	0.17	0.01	35.5	1 48
05/01/96 00:00	100.3	100 3																					684.33	1659.11	532.31	22.18	152.0	6.33
Period Totals*																							720.00		532.48	22.19	187.52	7 81
Period Averages:	100.3	100.3	268	268	14.7			190	760	0.9	3	190	760	0.9	3	10	41	<0.2	<0.5	94.6	0.37	0 00						

* 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.
05/01/96 00:00
06/01/96 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						
05/01/96 00:00																								1659.11				
05/08/96 13:20	100 3	100 3																					181.33	1659 11	0.00	0.00	181.3	7 56
05/16/96 12:35	0.0	0.0																					191.25	1659 11	0 00	0 00	191.25	7.97
05/16/96 14:09	91.8	91.8	356			NR	14.02	160	650	0.6	2	160	650	0.6	2	10	39	<0.2	<0 5	94.0	0.32	0.00	1.57	1660 53	1 42	0.06	0.15	0.01
06/01/96 00:00	91.8	91.8																					369 85	1732.04	71.51	2 98	298.3	12 43
Period Totals:																							744.00		72 93	3.04	671.07	27.96
Period Averages:	91.8	91 8	356					160	650	0.6	2	160	650	0.6	2	10	39	<0.2	<0.5	94.0	0.32	0.00						

* 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:
06/01/96 00:00
07/01/96 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						
06/01/96 00:00																								1732 04				
06/07/96 12:40	93.3	93 3	882	882	NR	NR	12:52	180	740	<1	<2.5	180	740	<1	<2 5	<5	<20	<0.2	<0.5	97 3	0 17	0.00	156.67	1733 12	1.08	0.05	155.6	6.48
06/28/96 11:40	93.3	93.3																					503.00	1755.41	22 29	0.93	480.71	20.03
06/28/96 13:20	126.2	126.2	512	512	26.3	94 9																	1.67	1757.08	1.67	0.07	0.00	0.00
07/01/96 00:00	125.7	125 7																					58.67	1815 75	58.67	2.44	0.0	0.00
Period Totals.																							720 00		83.71	3.49	636.29	26 51
Period Averages:	116.7	116.7	697	697	26			180	740	<1	<2.5	180	740	<1	<2.5	<5	<20	<0 2	<0.5	97.3	0.21	0.01						

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

APPENDIX D

FIELD DATA SHEETS, OPERATION AND MAINTENANCE VISITS, SECOND 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 list & EAA 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	**AIR MONITORING**	
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		

FID (ppm)	Amb	I-1	I-2	E-1
Date: (WITHOUT CARBON FILTER)				
Date: (WITH CARBON FILTER)				
PID (ppm)	CALIBRATION GAS TYPE:			
Date: 7-10-96	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)= 476.49

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.

EMCON

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

Operator: [illegible] Date: 7-10-96 ARCO 6148 Soil Vapor Extraction System

ARCO 6148 . 5131 Shattuck Ave., O. nd, CA. SVE System . EMCON Project #208(35.006 (WA or Task Order # 18336)

Remarks: System down on "control fault", restarted system per S. Yalimanchili's instructions. Compressor tripped at starter relay - restarted.

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)	1040	**Effluent (E-1) (12"x12")**	—
System Status (on or off)	ON	Stack Temperature (°F)	826
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	1140	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1320	Set Point (°F)	610
Well Field I-1 (3")	—	**TOTAL HOURS**	1757.08
Vacuum (in. of H_2O)	20	Electric Meter (kwh)	—
Velocity (in. of H_2O)	.44	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)	.08	Date: (WITH CARBON FILTER)	
Temperature (°F)	190	**PID (ppm)**	CALIBRATION GAS TYPE:
Dilution Air (3") Temperature (°F)	NA	Date: 6/28/96	.02 / 512 / 512 / 26.3
Dilution Air Flow (in of H_2O)	Data on ATI only	Date:	
ATI operating properly: yes/no		**Lab samples taken for analysis at:**	NONE

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		N/A			290
VW-2	4"	10'-24'			100					550
VW-3	4"	14'-24'			100					400
VW-4	4"	10'-24'			0					210
VW-5	4"	10'-24'			0					95
VW-6	4"	10'-24'			100					430
VW-7	4"	10'-24'			100					460
VW-8	4"	10'-24'			0					12
VW-9	4"	10'-24'			100					310
VW-10	4"	10'-24'			0					120
MW-1	4"	13'-26'			0					100
MW-5	4"	10'-25'	16.40		0					68

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'			30	4			
AS-2 (Sparge only)	2"	26'-28'			20	3			
AS-3 (Sparge only)	2"	26'-28'			30	4			
AS-4 (Sparge only)	2"	26'-28'			30	3			
AS-5 (Sparge only)	2"	26'-28'			30	3.5			
MW-2 (Bubbler only)	2"	14'-26'			30	4			
MW-3 (Bubbler only)	2"	14'-26'			25	4			
MW-4 (Bubbler only)	4"	11.5'-26.5'			30	4			
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)= 20 | Total Air Sparge Flow Rate(cfm)= | Compressor Hours= 289.75 | Total Air Sparge Temp(°F)= 78

Special Instructions:

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

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

Operator: L. Whitten Date: 6/28/96 ARCO 6148 Soil Vapor Extraction System

Remarks: System down on following: Power Interruption, Control Fault, Ozidizer High Temp, System Remote/y shut down.

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)	1050	Effluent (E-1) (12"x12")	—
System Status (on or off)	OFF	Stack Temperature (°F)	722
Shutdown Time (24:00 hour)	~~1135~~	**SYSTEM**	
Restart Time (24:00 hour)	1135	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1240	Set Point (°F)	610
Well Field I-1 (3")	—	**TOTAL HOURS**	1733.12
Vacuum (in. of H,O)	20	Electric Meter (kwh)	—
Velocity (in. of H,O)	.24	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	80	**AIR MONITORING**	
After Blower I-2 (4")	~~200~~	**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H,O)	NA	Date: (WITHOUT CARBON FILTER)	.04 / BB2 / BB2 / —
Total Flow (in. of H,O)	.08	Date: (WITH CARBON FILTER)	
Temperature (°F)	280	**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		**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'			100	11				
VW-2	4"	10'-24'			100	10				
VW-3	4"	14'-24'			100	11				
VW-4	4"	10'-24'			100	11				
VW-5	4"	10'-24'			100	11				
VW-6	4"	10'-24'			100	10				
VW-7	4"	10'-24'			100	10				
VW-8	4"	10'-24'			100	11				
VW-9	4"	10'-24'			100	11				
VW-10	4"	10'-24'			0	0				
MW-1	4"	13'-26'			100	10				
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'			100				
AS-2 (Sparge only)	2"	26'-28'			100				
AS-3 (Sparge only)	2"	26'-28'			100				
AS-4 (Sparge only)	2"	26'-28'			100				
AS-5 (Sparge only)	2"	26'-28'			100				
MW-2 (Bubbler only)	2"	14'-26'			100				
MW-3 (Bubbler only)	2"	14'-26'			100				
MW-4 (Bubbler only)	4"	11.5'-26.5'			100				
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)= 20 | Total Air Sparge Flow Rate(cfm)= | Compressor Hours= 284.53 | Total Air Sparge Temp(°F)= 82

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: 6/7/90 ARCO 6148 Soil Vapor Extraction System

ARCO 6148 . 5131 Shattuck Ave.,O. ıd,CA. SVE System . EMCON Project #208(35.006 (WA or Task Order # 18336)

Remarks: Installed 55 gallon drum in Tie-in to Knock-out ~~out~~ on Therm Tec. Started unit.

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)	1010	**Effluent (E-1) (12"x12")**	–
System Status (on or off)	on	Stack Temperature (°F)	622
Shutdown Time (24:00 hour)	–	**SYSTEM**	
Restart Time (24:00 hour)	1330	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1409	Set Point (°F)	610
Well Field I-1 (3")	–	**TOTAL HOURS**	1660.53
Vacuum (in. of H_2O)	10	Electric Meter (kwh)	–
Velocity (in. of H_2O)	.22	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	72	**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)	.075	Date: (WITH CARBON FILTER)	
Temperature (°F)	210	**PID (ppm)**	CALIBRATION GAS TYPE: 130 (100 PPM)
Dilution Air (3") Temperature (°F)	NA	Date:	0 / 356 / 356
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	~~120~~	10				190
VW-2	4"	10'-24'		100	~~183~~	10				183
VW-3	4"	14'-24'		100	~~167~~	10				167
VW-4	4"	10'-24'		100	~~128~~	10				128
VW-5	4"	10'-24'		100	~~240~~	10				240
VW-6	4"	10'-24'		100		10				191
VW-7	4"	10'-24'		100		10				198
VW-8	4"	10'-24'		100		10				220
VW-9	4"	10'-24'		100		10				175
VW-10	4"	10'-24'		0		0				40.0
MW-1	4"	13'-26'		100		10				152
MW-5	4"	10'-25'		0		0				28.5

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'				2.5			
MW-3 (Bubbler only)	2"	14'-26'				3			
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)= 20	Total Air Sparge Flow Rate(cfm)= –	Compressor Hours= / 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, and CO, in % by volume.

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

Operator: V. Whitten Date: 5/16/96 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: Installed addional Knock-out on Unit. Unit hours at start= 16591.1

Unscheduled site visit [] Scheduled site visit [X]

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

Arrival Time (24:00 hour)	1102	Effluent (E-1) (12"x12")	--
System Status (on or off)	ON	Stack Temperature (°F)	622
Shutdown Time (24:00 hour)	-	**SYSTEM**	
Restart Time (24:00 hour)	1235	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1409	Set Point (°F)	610
Well Field I-1 (3")	-	**TOTAL HOURS**	166053
Vacuum (in. of H,O)	10	Electric Meter (kwh)	-
Velocity (in. of H,O)	.22	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	72	**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)	.075	Date: (WITH CARBON FILTER)	
Temperature (°F)	200	**PID (ppm)**	CALIBRATION GAS TYPE: 250 = 100 APLM
Dilution Air (3") Temperature (°F)	NA	Date: 5-16-96	0 / 356 / - / -
Dilution Air Flow (in of H,O)	Data on ATI only	Date.	
ATI operating properly: yes/no		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'			100	10				190
VW-2	4"	10'-24'			100	10				183
VW-3	4"	14'-24'			100	10				167
VW-4	4"	10'-24'			100	10				128
VW-5	4"	10'-24'			100	10				240
VW-6	4"	10'-24'			100	10				191
VW-7	4"	10'-24'			100	10				198
VW-8	4"	10'-24'			100	10				220
VW-9	4"	10'-24'			100	10				175
VW-10	4"	10'-24'			0	0				40.0
MW-1	4"	13'-26'			~~0~~ 100	10				152
MW-5	4"	10'-25'			0	0				28.5

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'				2.5			
MW-3 (Bubbler only)	2"	14'-26'				3			
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)= 16	Total Air Sparge Flow Rate(cfm)=	Total Air Sparge Temp(°F)= 74

Compressor Hours=

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_2 in % by volume.

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

Operator: V. Whitten **Date:** 5-16-96 **ARCO 6148 Soil Vapor Extraction System**

ARCO 6148 . 5131 Shattuck Ave.,C ınd,CA. SVE System . EMCON Project #208 '35.006 (WA or Task Order # 18336)

Remarks: Unit down - Did not restart unit - Quarterly sampling will take place. (Unit down on "control fault")

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)	1304	Effluent (E-1) (12"x12")	/
System Status (on or off)	OFF	Stack Temperature (°F)	/
Shutdown Time (24:00 hour)	—	**SYSTEM**	
Restart Time (24:00 hour)	—	Fire Box Temperature (°F)	
Reading Time (24:00 hour)	1320	Set Point (°F)	
Well Field I-1 (3")		**TOTAL HOURS**	1659.11
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)	
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:	
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'								
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'			OFF					
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'			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= 207.30
		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.

EMCON

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

Operator: D. Whitten Date: 5/6/96 **ARCO 6148 Soil Vapor Extraction System**

ARCO 6148 . 5131 Shattuck Ave.,Oakland,CA. SVE System . EMCON Project #20805.006 (WA or Task Order # 18336)

Remarks: System down upon arrival "High Tank level". Performed monthly O&M per attached request. assume restart HR 1126.63

Unscheduled site visit [] Scheduled site visit [X]

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

Arrival Time (24:00 hour)	1040	Effluent (E-1) (12"x12")	—
System Status (on or off)	OFF	Stack Temperature (°F)	610
Shutdown Time (24:00 hour)	— 112609	**SYSTEM**	
Restart Time (24:00 hour)	1130	Fire Box Temperature (°F)	610
Reading Time (24:00 hour)	1140	Set Point (°F)	610
Well Field I-1 (3")	—	TOTAL HOURS	1126.80
Vacuum (in. of H,O)	28	Electric Meter (kwh)	—
Velocity (in. of H,O)	.29	Dilution Controller Setpoint (°F)	1200
Temperature (°F)	68	**AIR MONITORING**	
After Blower I-2 (4")	—		
Total Pressure (in. of H,O)	NA		
Total Flow (in. of H,O)	.08		
Temperature (°F)	190°		
Dilution Air (3") Temperature (°F)	~~—~~ NA		
Dilution Air Flow (in of H,O)	Data on ATI only		
ATI operating properly: yes/no	Yes		

FID (ppm)	Amb	I-1	I-2	E-1
Date: (WITHOUT CARBON FILTER)				
Date: (WITH CARBON FILTER)				
PID (ppm)	CALIBRATION GAS TYPE:	50 = 100		
Date: 4-2-96	9.6	268		14.7
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'			0					
VW-2	4"	10'-24'			0					
VW-3	4"	14'-24'			0					
VW-4	4"	10'-24'			0					
VW-5	4"	10'-24'	15.77		100	22	3.9			40
VW-6	4"	10'-24'			0					
VW-7	4"	10'-24'			100	20	0.46			292
VW-8	4"	10'-24'	16.08		100	22	0.80			107
VW-9	4"	10'-24'			0					
VW-10	4"	10'-24'			0					
MW-1	4"	13'-26'			0					
MW-5	4"	10'-25'			100	22	0.20			35

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'				2.5			
MW-3 (Bubbler only)	2"	14'-26'				3			
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)= 20 | Total Air Sparge Flow Rate(cfm)= | Compressor Hours= | Total Air Sparge Temp(°F)= 72°

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:** 4-2-96 **ARCO 6148 Soil Vapor Extraction System**

APPENDIX E

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

Columbia Analytical Services inc.

April 17, 1996

Service Request No: S9600541

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

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

Dear Ms. Yelamanchili:

The following pages contain analytical results for sample(s) received by the laboratory on April 2, 1996. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. Listed above -- to help expedite our service please refer to this number when contacting the laboratory.

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

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

Sincerely,

Steven L. Green
Project Chemist

SLG/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)

ACRONLST.DOC 7/14/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Arco Products Company	**Service Request:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Collected:**	4/2/96
Sample Matrix:	Air	**Date Received:**	4/2/96
		Date Extracted:	NA
		Date Analyzed:	4/4/96

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

Sample Name: I-1
Lab Code: S9600541-001

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	3	0.9
Toluene	0.5	0.1	18	4.8
Ethylbenzene	0.5	0.1	8	1.8
Xylenes, Total	1	0.2	45	10
Total Volatile Hydrocarbons:				
C1 - C5	10	5	450	110
C6 - C12	20	5	760	190
TPH as Gasoline*	20	5	760	190

* 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:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Collected:**	4/2/96
Sample Matrix:	Air	**Date Received:**	4/2/96
		Date Extracted:	NA
		Date Analyzed:	4/4/96

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

Sample Name: E-1
Lab Code: S9600541-002

	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	78	19
C6 - C12	20	5	41	10
TPH as Gasoline*	20	5	41	10

* 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:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Collected:**	4/2/96
Sample Matrix:	Air	**Date Received:**	4/2/96
		Date Extracted:	NA
		Date Analyzed:	4/4/96

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

Sample Name: Method Blank
Lab Code: S9600541-002

	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:			ND	ND
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: S9600541
Date Collected: 4/2/96
Date Received: 4/2/96
Date Extracted: NA
Date Analyzed: 4/4/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1
Lab Code: S9600541-001D

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	3	3	3	<1
Toluene	0.5	18	18	18	<1
Ethylbenzene	0.5	8	8	8	<1
Xylenes, Total	1	45	45	45	<1
Total Volatile Hydrocarbons					
C_1 - C_5 Hydrocarbons	20	450	440	445	2
C_6 - C_{12} Hydrocarbons	20	760	760	760	<1
Gasoline Fraction (C_5-C_{12})	60	760	760	760	<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

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: S9600541
Date Collected: 4/2/96
Date Received: 4/2/96
Date Extracted: NA
Date Analyzed: 4/4/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Sample Name: I-1
Lab Code: S9600541-001D

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	0.9	0.9	1	<1
Toluene	0.5	4.8	4.8	5	<1
Ethylbenzene	0.5	1.8	1.8	2	<1
Xylenes, Total	1	10	10	10	<1
Total Volatile Hydrocarbons					
C_1 - C_5 Hydrocarbons	20	110	110	110	<1
C_6 - C_{12} Hydrocarbons	20	190	190	190	<1
Gasoline Fraction (C_5-C_{12})	60	190	190	190	<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

DUP1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Arco Products Company	**Service Request:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Collected:**	NA
LCS Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	4/4/96

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	210	105	104	60-140

LCSX/121594

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Arco Products Company	**Service Request:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Collected:**	NA
LCS Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	4/4/96

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	**Service Request:**	S9600541
Project:	6148 Oakland/#20805-135.006/TO#18336.00	**Date Analyzed:**	4/4/96

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	24.0	96	85-115
Toluene	25	23.9	96	85-115
Ethylbenzene	25	23.5	94	85-115
Xylenes, Total	75	71.0	95	85-115
Gasoline	250	227	91	90-110

ICV25AL/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 16336.00

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) S. Yalimanchili	Laboratory name
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408 453-1640	Telephone no. (Consultant) 408 453-7300	Fax no. (Consultant) 408 453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave., San Jose, CA		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			4-2-96	1315		X											
E-1	2	1			X			4-2-96	1310		X											

Special detection Limit/reporting: Mg/M3 & PPMV

Special QA/QC: ARCO

Remarks: 20805-135.006

Lab number: 5960054 1

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days 4/16 ☒

Condition of sample:		Temperature received:	
Relinquished by sampler: Dan Whelan	Date 4-2-96 Time 1740	Received by Kurt Foley CAS-SJ	
Relinquished by	Date 4-2-96 Time 1440	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

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

Columbia Analytical Services, Inc.

May 29, 1996 Service Request No: S9600785

Sailaja Yelamanchili
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **6148 OAKLAND/20805-135.006/TO#18336.00**

Dear Sailaja Yelamanchili:

The following pages contain analytical results for sample(s) received by the laboratory on May 16, 1996. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. Listed above -- to help expedite our service please refer to this number when contacting the laboratory.

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

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

Sincerely,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

SLG/jk

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Arco Products Company	**Service Request:**	S9600785
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	5/16/96
Sample Matrix:	Air	**Date Received:**	5/16/96
		Date Extracted:	NA
		Date Analyzed:	5/17/96

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

Sample Name: I-1
Lab Code: S9600785-001

	MRLs		Results	
	mg/m3	uL/L (ppmv)	mg/m3	uL/L (ppmv)
Benzene	0.5	0.2	2	0.6
Toluene	0.5	0.1	3	0.8
Ethylbenzene	0.5	0.1	2	0.5
Xylenes, Total	1	0.2	17	3.9
Total Volatile Hydrocarbons:				
C1 - C5	10	5	820	200
C6 - C12	20	5	650	160
TPH as Gasoline*	20	5	650	160

* 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:**	S9600785
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	5/16/96
Sample Matrix:	Air	**Date Received:**	5/16/96
		Date Extracted:	NA
		Date Analyzed:	5/17/96

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

Sample Name: E-1
Lab Code: S9600785-002

	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	140	34
C6 - C12	20	5	39	10
TPH as Gasoline*	20	5	39	10

* 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:**	S9600785
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	5/16/96
Sample Matrix:	*Air*	**Date Received:**	*5/16/96*
		Date Extracted:	NA
		Date Analyzed:	5/17/96

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

Sample Name: Method Blank
Lab Code: S969517-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
Project: 6148 OAKLAND/20805-135.006/TO#18336.00
Sample Matrix: Air

Service Request: S9600785
Date Collected: 5/16/96
Date Received: 5/16/96
Date Extracted: N/A
Date Analyzed: 5/17/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1
Lab Code: S9600785-001

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	2	2	2	<1
Toluene	0.5	3	3	3	<1
Ethylbenzene	0.5	2	2	2	<1
Xylenes, Total	1	17	15	16	13
Total Volatile Hydrocarbons					
C1 - C5	10	820	790	805	4
C6 - C12	20	650	610	630	6
TPH as Gasoline*	20	650	610	635	5

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

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: S9600785
Date Collected: NA
Date Received: NA
Date Extracted: N/A
Date Analyzed: 5/17/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Sample Name: I-1
Lab Code: S9600785-001D

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.2	0.6	0.6	1	<1
Toluene	0.1	0.8	0.8	1	<1
Ethylbenzene	0.1	0.5	0.5	1	<1
Xylenes, Total	0.2	3.9	3.5	4	11
Total Volatile Hydrocarbons					
C1 - C5	5	200	190	195	5
C6 - C12	5	160	150	155	6
TPH as Gasoline*	5	160	150	155	6

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Arco Products Company	**Service Request:**	S9600785
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	NA
LCS Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	5/17/96

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	230	115	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Arco Products Company	**Service Request:**	S9600785
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	NA
LCS Matrix:	Air	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	5/17/96

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	56.0	114	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Service Request: S9600785
Date Analyzed: 5/17/96

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	22.6	90	85-115
Toluene	25	22.6	90	85-115
Ethylbenzene	25	22.5	90	85-115
Xylenes, Total	75	66.9	89	85-115
Gasoline	250	255	102	90-110

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 18336.00

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland, CA	Project manager (Consultant) S. Yeleswarapu	Laboratory name
ARCO engineer M. Whelan	Telephone no. (ARCO) 408 453-1640	Telephone no. (Consultant) 408 453-7300	Fax no. (Consultant) 408 453-0452	Contract number
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave. San Jose, CA		Method of shipment

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
I-1	(1)	1			X			5-16-96	1415		X											
E-1	(2)	1			X			5-16-96	1402		X											

Special detection Limit/reporting: mg/m³ ? ppmv

Special QA/QC

Remarks: 20805-135.006

Lab number: 59600785

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: Dan Whelan	Date 5-16-96	Time 1557	Received by
Relinquished by	Date	Time	Received by: Kurt Roby
Relinquished by	Date	Time	Received by laboratory: CAS-SJ — Date 5-16-96 — Time 1600

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

APC-3292 (2-91)

Columbia Analytical Services inc.

June 20, 1996

Service Request No: S9600916

Mr. John Young
EMCON
1921 Ringwood Ave.
San Jose, Ca 95131

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

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on June 7, 1996. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. Listed above -- to help expedite our service please refer to this number when contacting the laboratory.

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

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

Sincerely,

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

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:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
Sample Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	NA
		Date Analyzed:	6/7/96

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

Sample Name: E-1
Lab Code: S9600916-001

	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	76	19
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	*ARCO Products Company*	**Service Request:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
Sample Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	NA
		Date Analyzed:	6/7/96

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

Sample Name: I-1
Lab Code: S9600916-002

	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	2.8	0.7
Ethylbenzene	0.5	0.1	3	0.7
Xylenes, Total	1	0.2	8.8	2.0
Total Volatile Hydrocarbons:				
C1 - C5	10	5	1,200	290
C6 - C12	20	5	740	180
TPH as Gasoline*	20	5	740	180

* 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:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
Sample Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	NA
		Date Analyzed:	6/7/96

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

Sample Name: Method Blank
Lab Code: S960607-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:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
Sample Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	N/A
		Date Analyzed:	6/7/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: I-1
Lab Code: S9600916-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	<2.5**	<2.5**	--	--
Toluene	0.5	2.8	2.6	3	7
Ethylbenzene	0.5	3.0	3.1	3	3
Xylenes, Total	1	8.8	8.9	9	1
Total Volatile Hydrocarbons					
C1 - C5	10	1,200	1,200	1,200	<1
C6 - C12	20	740	750	745	1
TPH as Gasoline*	20	740	750	745	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.

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
Sample Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	N/A
		Date Analyzed:	6/7/96

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: uL/L (ppmv)

Sample Name: I-1
Lab Code: S9600916-002

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.2	<1**	<1**	--	--
Toluene	0.1	0.7	0.7	1	<1
Ethylbenzene	0.1	0.7	0.7	1	<1
Xylenes, Total	0.2	2.0	2.1	2	5
Total Volatile Hydrocarbons					
C1 - C5	5	290	290	290	<1
C6 - C12	5	180	180	180	<1
TPH as Gasoline*	5	180	180	180	<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:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
LCS Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	NA
		Date Analyzed:	6/7/96

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	24.7	103	60-140
Toluene	24	23.6	98	60-140
Ethylbenzene	24	22.9	95	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9600916
Project:	6148 OAKLAND/20805-135.006/TO#18336.00	**Date Collected:**	6/7/96
LCS Matrix:	Air	**Date Received:**	6/7/96
		Date Extracted:	NA
		Date Analyzed:	6/7/96

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	7.7	103	60-140
Toluene	6.4	6.3	98	60-140
Ethylbenzene	5.5	5.3	96	60-140

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Service Request: S9600916
Date Analyzed: 6/7/96

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	21.3	85	85-115
Toluene	25	21.3	85	85-115
Ethylbenzene	25	21.3	85	85-115
Xylenes, Total	75	63.8	85	85-115
Gasoline	250	255	102	90-110

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 Mike Whelan	Telephone no. (ARCO) 408 453-7640	Telephone no. (Consultant) 408 453-7300	Fax no. (Consultant) 408 453-2176
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 ☐		
E-1		1			X			6-7-96	1252		X											
I-1		1			X			6-7-96	1310		X											

Special detection Limit/reporting

Special QA/QC
MG/M³ ?
PPMV

Remarks
20805 - 135.006

Lab number
59600916

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 Jan Whitt	Date 6/7/96 Time 15:00	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory Cristina Mayfield	Date 6/7/96 Time 15:00

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