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

9: 18

Date September 30, 1997
Project 20805-135.007

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 1997 groundwater monitoring results and remediation system performance evaluation report for ARCO service station 6148, Oakland, California

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

Comments:
The enclosed groundwater monitoring report is being sent to you per the request of ARCO Products Company. Please call if you have questions or comments.

Gary P. Messerotes
Project Manager

cc: Kevin Graves, RWQCB - SFBR
Paul Supple, ARCO Products Company
File

ARCO Products Company

Date: September 30, 1997

Re: ARCO Station #
6148 • 5131 Shattuck Avenue • Oakland, CA
Second Quarter 1997 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

August 29, 1997
Project 20805-135.007

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

Re: Second quarter 1997 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 1997 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, results should not be construed as a guarantee of the absence of such conditions at the site, but rather as the product of the scope, and limitations, of work performed during the monitoring event.

Please call if you have questions.

Sincerely,

EMCON

Gowri Kowtha
Staff Engineer

Gary P. Messerotes, R.G. 5650
Project Manager

REGISTERED GEOLOGIST
GARY P. MESSEROTES
5650
STATE OF CALIFORNIA

August 29, 1997

ARCO QUARTERLY REPORT

Station No.: 6148	Address: 5131 Shattuck Avenue, Oakland, California
EMCON Project No.	20805-135.007
ARCO Environmental Engineer/Phone No.:	Paul Supple /(510) 299-8891
EMCON Project Manager/Phone No.:	Gary P. Messerotes /(408) 453-7300
Primary Agency/Regulatory ID No.:	ACHCSA /Susan Hugo
Reporting Period:	April 1, 1997 to July 1, 1997

WORK PERFORMED THIS QUARTER (Second- 1997):

1. Prepared and submitted quarterly report for first quarter 1997.
2. Conducted quarterly groundwater monitoring and sampling for second quarter 1997.
3. Operated air-bubbling system.

WORK PROPOSED FOR NEXT QUARTER (Third- 1997):

1. Prepare and submit quarterly report for second quarter 1997.
2. Perform quarterly groundwater monitoring and sampling for third quarter 1997.
3. Continue operation air-bubbling system.
4. Restart soil-vapor extraction (SVE) and air-sparge systems if hydrocarbon concentrations warrant.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring and Operation and Maintenance of Remediation Systems The SVE system was shut down on October 3, 1996, because of maintenance problems. The SVE system remained shut down because of low TVHg concentrations in the extracted soil vapor.
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
Average Depth to Groundwater:	16.54 feet
Groundwater Gradient (Average):	0.014 ft/ft toward south-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):	NA (Not Available)
Benzene Conc. End of Period (lab):	NA
Flowrate End of Period:	NA

HC Destroyed This Period:	0.0 pounds
HC Destroyed to Date:	1885.6 pounds
Utility Usage Electric (KWH):	1497 KWH
Operating Hours This Period:	0.0 hours
Percent Operational:	0.0%
Operating Hours to Date:	2694.1 hours
Unit Maintenance:	Routine monthly maintenance
Number of Auto Shut Downs:	0
Destruction Efficiency Permit Requirement:	90%
Percent TPH Conversion:	NA
Average Stack Temperature:	NA
Average Source Flow:	0.0 scfm
Average Process Flow:	0.0 scfm
Average Source Vacuum:	0 inches of water

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Second Quarter 1997
- 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 1997
- 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 - Analytical Results and Chain of Custody Documentation, Second Quarter 1997 Groundwater Monitoring Event
- Appendix B - SVE System Monitoring Data Log Sheets

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

Table 1
Groundwater Monitoring Data
Second Quarter 1997

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 8-27-97

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	05-15-97	107.80	17.91	89.89	ND	SSW	0.014	05-15-97	Not sampled: well sampled semi-annually, during the first and third quarter									
MW-2	05-15-97	107.28	17.61	89.67	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	23	--	--	--	--
MW-3	05-15-97	107.61	17.84	89.77	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	65	--	--	--	--
MW-4	05-15-97	106.71	16.38	90.33	ND	SSW	0.014	05-15-97	Not sampled: well sampled semi-annually, during the first and third quarter									
MW-5	05-15-97	106.60	16.54	90.06	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-6	05-15-97	105.13	14.44	90.69	ND	SSW	0.014	05-15-97	Not sampled: well sampled annually, during the first quarter									
MW-7	05-15-97	107.05	15.27	91.78	ND	SSW	0.014	05-15-97	Not sampled: well sampled annually, during the first quarter									

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
ND: none detected
SSW: south-southwest
- -: not analyzed or not applicable

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20805-135.007

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-27-97

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	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: well sampled semi-annually, during the first and third quarter									
MW-1	08-14-96	107.80	17.15	90.65	ND	SW	0.021	08-14-96	98	18	<0.5	1.9	1	45	--	--	--	--
MW-1	11-11-96	107.80	17.78	90.02	ND	SW	0.015	11-11-96	Not sampled: well sampled semi-annually, during the first and third quarter									
MW-1	03-25-97	107.80	17.68	90.12	ND	SSW	0.018	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-1	05-15-97	107.80	17.91	89.89	ND	SSW	0.014	05-15-97	Not sampled: well sampled semi-annually, during the first and third quarter									
MW-2	03-20-95	107.43	15.50	91.93	ND#	SW	0.02	03-20-95	Not sampled: floating product entered well during purging									
MW-2	06-06-95	107.43	17.43	90.00	ND	SW	0.016	06-06-95	1200	60	21	35	140	--	--	--	--	--
MW-2	08-24-95	107 28	17.22	90.06	ND	SW	0.014	08-24-95	Not sampled: well was inaccessible due to construction									
MW-2	11-16-95	107 28	17.36	89.92	ND	SW	0.012	11-16-95	360	45	1.3	7.1	7.5	210	--	--	--	--
MW-2	02-27-96	107.28	14.82	92.46	ND	SW	0.016	02-27-96	8900	1400	980	150	550	940	--	--	--	--
MW-2	05-15-96	107.28	17.40	89.88	ND	SW	0.015	05-15-96	480	82	48	8	48	87	--	--	--	--
MW-2	08-14-96	107.28	17.00	90.28	ND	SW	0.021	08-14-96	130	22	4	2	9	120	--	--	--	--
MW-2	11-11-96	107.28	17.55	89.73	ND	SW	0.015	11-11-96	1200	150	120	21	160	110	--	--	--	--
MW-2	03-25-97	107.28	17.32	89.96	ND	SSW	0.018	03-25-97	670	23	58	13	120	28	--	--	--	--
MW-2	05-15-97	107.28	17.61	89.67	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	23	--	--	--	--

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-27-97

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	03-20-95	107.77	15.60	92.17	ND	SW	0.02	03-20-95	29000	880	190	760	2000	--	--	--	16	--
MW-3	06-06-95	107.77	17.54	90.23	ND	SW	0.016	06-06-95	22000	450	54	380	1300	--	--	--	7.1	--
MW-3	08-24-95	107.61	17.42	90.19	ND	SW	0.014	08-24-95	Not sampled: well was inaccessible due to construction									
MW-3	11-16-95	107.61	17.58	90.03	ND	SW	0.012	11-16-95	13000	210	<20	320	1000	790	--	--	8.3	--
MW-3	02-27-96	107.61	15.03	92.58	ND	SW	0.016	02-27-96	9700	94	15	290	720	430	--	--	10	--
MW-3	05-15-96	107.61	17.35	90.26	ND	SW	0.015	05-15-96	5600	66	12	37	67	230	--	--	--	--
MW-3	08-14-96	107.61	17.10	90.51	ND	SW	0.021	08-14-96	830	17	<1*	8	7	110	--	--	--	--
MW-3	11-11-96	107.61	17.73	89.88	ND	SW	0.015	11-11-96	500	28	3	12	13	150	--	--	--	--
MW-3	03-25-97	107.61	17.99	89.62	ND	SSW	0.018	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	94	--	--	--	--
MW-3	05-15-97	107.61	17 84	89.77	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	65	--	--	--	--
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: well sampled semi-annually, during the first and third quarter									
MW-4	08-14-96	106.71	15.68	91.03	ND	SW	0.021	08-14-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-4	11-11-96	106.71	16.19	90.52	ND	SW	0.015	11-11-96	Not sampled: well sampled semi-annually, during the first and third quarter									
MW-4	03-25-97	106.71	16.10	90 61	ND	SSW	0.018	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-4	05-15-97	106.71	16.38	90.33	ND	SSW	0.014	05-15-97	Not sampled: well sampled semi-annually, during the first and third quarter									

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-27-97

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	03-20-95	106.68	14.92	91.76	ND	SW	0.02	03-20-95	21000	6900	450	800	1300	--	--	--	--	--
MW-5	06-06-95	106.68	16.61	90.07	ND	SW	0.016	06-06-95	6500	1700	<20	120	69	--	--	--	--	--
MW-5	08-24-95	106.60	16.47	90 13	ND	SW	0.014	08-24-95	Not sampled: well was inaccessible due to construction									
MW-5	11-16-95	106.60	16.69	89.91	ND	SW	0.012	11-16-95	1800	470	<5	17	5	1000	--	--	--	--
MW-5	02-27-96	106.60	14.35	92.25	ND	SW	0.016	02-27-96	10000	1000	71	690	1000	440	450	--	--	--
MW-5	05-15-96	106.60	16.58	90.02	ND	SW	0.015	05-15-96	3400	350	6	72	20	220	--	--	--	--
MW-5	08-14-96	106.60	17.26	89.34	ND	SW	0.021	08-14-96	2100	130	2.7	47	4.7	220	--	--	--	--
MW-5	11-11-96	106.60	16.62	89.98	ND	SW	0.015	11-11-96	1200	31	1	8	2	130	--	--	--	--
MW-5	03-25-97	106.60	16.38	90.22	ND	SSW	0.018	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	5	--	--	--	--
MW-5	05-15-97	106.60	16 54	90.06	ND	SSW	0.014	05-15-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
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: well sampled annually, during the first quarter									
MW-6	08-14-96	105.13	13.70	91.43	ND	SW	0.021	08-14-96	Not sampled: well sampled annually, during the first quarter									
MW-6	11-11-96	105.13	14.11	91.02	ND	SW	0.015	11-11-96	Not sampled: well sampled annually, during the first quarter									
MW-6	03-25-97	105.13	14.15	90.98	ND	SSW	0.018	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--	--	--
MW-6	05-15-97	105.13	14.44	90 69	ND	SSW	0.014	05-15-97	Not sampled: well sampled annually, during the first quarter									

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-27-97

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	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: well sampled semi-annually, during the first and third quarters									
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: well sampled semi-annually, during the first and third quarters									
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: well sampled annually, during the first quarter									
MW-7	08-14-96	107.05	14.35	92.70	ND	SW	0.021	08-14-96	Not sampled: well sampled annually, during the first quarter									
MW-7	11-11-96	107.05	14.92	92.13	ND	SW	0.015	11-11-96	Not sampled: well sampled annually, during the first quarter									
MW-7	03-25-97	107.05	14.80	92.25	ND	SSW	0.018	03-25-97	<50	<0.5	<0 5	<0.5	<0.5	<3	--	--	--	--
MW-7	05-15-97	107.05	15.27	91.78	ND	SSW	0.014	05-15-97	Not sampled: well sampled annually, during the first quarter									

Table 2
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present**

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-27-97

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	Oil & Grease SM 5520C	TRPH EPA 418.1	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L

ft-MSL: elevation in feet, relative to mean sea level
MWN. ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft: foot per foot
TPHG total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA. United States Environmental Protection Agency
MTBE: Methyl tert-butyl ether
SM: standard method
mg/L: milligrams per liter
TRPH: total recoverable petroleum hydrocarbons
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND: none detected
SW: southwest
SSW: south-southwest
#: floating product entered the well during purging
- -: not analyzed or not applicable
^: method reporting limit was raised due to: (1) high analyte concentration requiring sample dilution, or (2) matrix interference
**: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 6148, Oakland, California,* (EMCON, March 4, 1996).

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

ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California

Date: 08-22-97

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: 08-22-97

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: 08-22-97

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: 07-01-97
System was shut down on 10-3-96.

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: 07-01-97
System was shut down on 10-3-96.

Date Begin:		04-01-96	05-01-96	06-01-96	07-01-96	08-01-96
Date End:		05-01-96	06-01-96	07-01-96	08-01-96	09-01-96
Mode of Oxidation:		Cat-ox	Cat-ox	Cat-ox	Cat-ox	Cat-ox
Days of Operation:		22	3	3	20	11
Days of Downtime:		8	28	27	11	20
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline	190	160	180	170	170
	mg/m3 (3) as gasoline	760	650	740	690	710
	ppmv as benzene	0.9	0.6	<1	0.4	<1
	mg/m3 as benzene	3	2	<2.5	1.3	<2.5
System Influent:	ppmv as gasoline	190	160	180	170	170
	mg/m3 as gasoline	760	650	740	690	710
	ppmv as benzene	0.9	0.6	<1	0.4	<1
	mg/m3 as benzene	3	2	<2.5	1.3	<2.5
System Effluent:	ppmv as gasoline	10	10	<5	6	9
	mg/m3 as gasoline	41	39	<20	23	38
	ppmv as benzene	<0.2	<0.2	<0.2	<0.2	<0.2
	mg/m3 as benzene	<0.5	<0.5	<0.5	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):		100.3	91.8	116.7	125.7	125.4
Average System Influent Flow Rate (4), scfm:		100.3	91.8	116.7	125.7	125.4
Average Destruction Efficiency (6), percent (7):		94.6	94.0	97.3	96.7	94.6
Average Emission Rates (8), pounds per day (9)						
Gasoline:		0.37	0.32	0.21	0.26	0.43
Benzene:		0.00	0.00	*0.01*	*0.01*	*0.01*
Operating Hours This Period:		532.5	72.9	83.7	478.9	255.2
Operating Hours To Date:		1654.6	1727.6	1811.3	2290.1	2545.3
Pounds/ Hour Removal Rate, as gasoline (10):		0.29	0.22	0.32	0.32	0.33
Pounds Removed This Period, as gasoline (11):		151.9	16.3	27.1	155.4	85.0
Pounds Removed To Date, as gasoline:		1598.4	1614.7	1641.8	1797.2	1882.2
Gallons Removed This Period, as gasoline (12):		24.5	2.6	4.4	25.1	13.7
Gallons Removed To Date, as gasoline:		257.8	260.5	264.8	289.9	303.6

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: 07-01-97
System was shut down on 10-3-96.

Date Begin:		09-01-96	10-01-96	11-01-96	12-01-96	01-01-97
Date End:		10-01-96	11-01-96	12-01-96	01-01-97	04-01-97
Mode of Oxidation:		Cat-ox	Cat-ox	Cat-ox	Cat-ox	Cat-ox
Days of Operation:		6	0	0	0	0
Days of Downtime:		24	31	30	31	90
Average Vapor Concentrations (1)						
Well Field Influent:	ppmv (2) as gasoline	NA	450	NA	NA	NA
	mg/m3 (3) as gasoline	NA	1900	NA	NA	NA
	ppmv as benzene	NA	<1	NA	NA	NA
	mg/m3 as benzene	NA	<4	NA	NA	NA
System Influent:	ppmv as gasoline	NA	330	NA	NA	NA
	mg/m3 as gasoline	NA	1400	NA	NA	NA
	ppmv as benzene	NA	<1	NA	NA	NA
	mg/m3 as benzene	NA	<4	NA	NA	NA
System Effluent:	ppmv as gasoline	NA	20	NA	NA	NA
	mg/m3 as gasoline	NA	83	NA	NA	NA
	ppmv as benzene	NA	<0 1	NA	NA	NA
	mg/m3 as benzene	NA	<0.4	NA	NA	NA
Average Well Field Flow Rate (4), scfm (5):		125.2	63.7	0.0	91.8	0.0
Average System Influent Flow Rate (4), scfm:		125.2	63.3	0.0	81.9	0.0
Average Destruction Efficiency (6), percent (7):		NA	94.1	NA	NA	NA
Average Emission Rates (8), pounds per day (9)						
Gasoline:		NA	0.47	NA	NA	NA
Benzene:		NA	0.00	NA	NA	NA
Operating Hours This Period:		140.7	7.5	0.0	0.6	0.0
Operating Hours To Date:		2686.0	2693.5	2693.5	2694.1	2694.1
Pounds/ Hour Removal Rate, as gasoline (10):		0.00	0.45	0.00	0.00	0.00
Pounds Removed This Period, as gasoline (11):		0.0	3.4	0.0	0.0	0.0
Pounds Removed To Date, as gasoline:		1882.2	1885.6	1885.6	1885.6	1885.6
Gallons Removed This Period, as gasoline (12):		0.0	0.5	0.0	0.0	0.0
Gallons Removed To Date, as gasoline:		303.6	304.2	304.2	304.2	304.2

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: 07-01-97
System was shut down on 10-3-96.

Date Begin:	04-01-97
Date End:	07-01-97
Mode of Oxidation:	Cat-ox
Days of Operation:	0
Days of Downtime:	91
Average Vapor Concentrations (1)	
Well Field Influent: ppmv (2) as gasoline	NA
mg/m3 (3) as gasoline	NA
ppmv as benzene	NA
mg/m3 as benzene	NA
System Influent: ppmv as gasoline	NA
mg/m3 as gasoline	NA
ppmv as benzene	NA
mg/m3 as benzene	NA
System Effluent: ppmv as gasoline	NA
mg/m3 as gasoline	NA
ppmv as benzene	NA
mg/m3 as benzene	NA
Average Well Field Flow Rate (4), scfm (5):	0.0
Average System Influent Flow Rate (4), scfm:	0.0
Average Destruction Efficiency (6), percent (7):	NA
Average Emission Rates (8), pounds per day (9)	
Gasoline:	NA
Benzene:	NA
Operating Hours This Period:	0.0
Operating Hours To Date:	2694.1
Pounds/ Hour Removal Rate, as gasoline (10):	0.00
Pounds Removed This Period, as gasoline (11):	0.0
Pounds Removed To Date, as gasoline:	1885.6
Gallons Removed This Period, as gasoline (12):	0.0
Gallons Removed To Date, as gasoline:	304.2

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: 07-01-97
System was shut down on 10-3-96.

CURRENT REPORTING PERIOD:	04-01-97	to	07-01-97
DAYS / HOURS IN PERIOD:	91	2184.0	
DAYS / HOURS OF OPERATION:	0	0.0	
DAYS / HOURS OF DOWN TIME:	91	2184.0	
PERCENT OPERATIONAL:		0.0 %	
PERIOD POUNDS REMOVED:	0.0		
PERIOD GALLONS REMOVED:	0.0		
AVERAGE WELL FIELD FLOW RATE (scfm):		0.0	
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		0.0	

1. Average concentrations are based on discrete sample results reported during the month; refer to Appendix B 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 B 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 B 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 B 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: 08-11-97

Date	Well Identification											
	VW-1			VW-2			VW-3			VW-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE monitoring well data prior to January 1, 1996, please refer to the fourth quarter 1995 groundwater monitoring report for this site.												
01-12-96	open	300 PID	25.0	open	500 PID	25.0	open	430 PID	25.0	open	580 PID	25.0
02-15-96	open	NA	27.0	open	NA	27.0	open	NA	26.0	open	NA	26.0
03-19-96	closed	14.1 PID	0.0	closed	18.8 PID	0.0	closed	30.2 PID	0.0	closed	16.6 PID	0.0
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	190 PID	10 0	open	183 PID	10.0	open	167 PID	10.0	open	128 PID	10.0
06-07-96	open	NA	11 0	open	NA	10.0	open	NA	11.0	open	NA	11.0
06-28-96	open	290 PID	NA	open	550 PID	NA	open	400 PID	NA	closed	210 PID	NA
07-10-96	open	361 PID	8.0	open	302 PID	8.0	open	247 PID	8.0	closed	54 PID	0 0
08-05-96	open	NA	8.0	open	NA	7.0	open	NA	6.0	closed	NA	0 0
08-12-96	closed	NA	0.0	closed	NA	0.0	closed	NA	0.0	closed	NA	0.0
09-27-96	open (b)	NA	NA	open (b)	NA	NA	open	NA	NA	closed	NA	NA
09-30-96	open	200 FID	NA	open	220 FID	NA	open	800 FID	NA	open	>1000 FID	NA
10-03-96	open	NA	9.0	open	NA	10.0	open	NA	9.0	open	NA	10.0
12-04-96	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
01-08-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed	NA	NA
02-04-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed	NA	NA
03-07-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed	NA	NA

TVHG. concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive. open to the atmosphere
closed: closed to the system and atmosphere
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: 08-11-97

Date	Well Identification											
	VW-5			VW-6			VW-7			VW-8		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE monitoring well data prior to January 1, 1996, please refer to the fourth quarter 1995 groundwater monitoring report for this site.												
01-12-96	open	350 PID	25.0	open	2210 PID	25.0	open	300 PID	22.0	open	225 PID	25 0
02-15-96	open	NA	26.0	open	NA	26.0	open	NA	24.0	open	NA	25.0
03-19-96	closed	8.9 PID	0.0	open (b)	512 PID	38.0	open (b)	156 PID	37.0	open (b)	60 1 PID	38.0
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	240 PID	10.0	open	191 PID	10.0	open	198 PID	10.0	open	220 PID	10.0
06-07-96	open	NA	11.0	open	NA	10.0	open	NA	10.0	open	NA	11.0
06-28-96	closed	95 PID	NA	open	430 PID	NA	open	460 PID	NA	closed	12 PID	NA
07-10-96	open	233 PID	8.0	open	371 PID	8.0	open	511 PID	8.0	open	113 PID	8.0
08-05-96	open	NA	8.0	open	NA	8.0	open	NA	6.0	open	NA	8.0
08-12-96	closed	NA	0.0	closed	NA	0 0	closed	NA	0.0	closed	NA	0.0
09-27-96	open	NA	NA	open (b)	NA	NA	open (b)	NA	NA	open	NA	NA
09-30-96	closed	48 FID	NA	closed	140 FID	NA	open	480 FID	NA	closed	120 FID	NA
10-03-96	closed	NA	NA	closed	NA	NA	open	NA	8 0	closed (b)	NA	0.0
12-04-96	closed	NA	NA	closed	NA	NA	closed (b)	NA	NA	closed	NA	NA
01-08-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
02-04-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
03-07-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA

TVHG: concentration of total volatile hydrocarbons as gasoline
ppmv: parts per million by volume
in-H2O: inches of water
open: open to the system
open (b): open to the system and bubbling air at 1 scfm per well
passive: open to the atmosphere
closed: closed to the system and atmosphere
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. 08-11-97

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
For SVE monitoring well data prior to January 1, 1996, please refer to the fourth quarter 1995 groundwater monitoring report for this site.												
01-12-96	open	930 PID	22.0	open	170 PID	5.0	closed	13 PID	0.0	open	172 PID	5.0
02-15-96	open	NA	24.0	open	NA	10.0	closed	NA	0.0	open	NA	6.0
03-19-96	open (b)	50.2 PID	38.0	open (b)	22.4 PID	38.0	closed	32.6 PID	0.0	open (b)	43.2 PID	38.0
05-08-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-96	open	175 PID	10.0	closed	40 PID	0.0	open	152 PID	10.0	closed	28.5 PID	0.0
06-07-96	open	NA	11 0	closed	NA	0.0	open	NA	10.0	closed	NA	0.0
06-28-96	open	310 PID	NA	closed	120 PID	NA	closed	100 PID	NA	closed	68 PID	NA
07-10-96	open	173 PID	8.0	closed	51 PID	0.0	closed	50 PID	0 0	closed	50 PID	0.0
08-05-96	open	NA	6.0	closed	NA	0.0	closed	NA	0.0	closed	NA	0.0
08-12-96	closed	NA	0 0	closed	NA	0.0	closed	NA	0.0	closed	NA	0.0
09-27-96	open (b)	NA	NA	closed	NA	NA	closed (b)	NA	NA	open (b)	NA	NA
09-30-96	open	600 FID	NA	open	>1000 FID	NA	closed	NA	NA	open	250 FID	NA
10-03-96	open	NA	9.0	open	NA	8.0	closed (b)	NA	0.0	open	NA	8.0
12-04-96	closed (b)	NA	NA	closed	NA	NA	closed	NA	NA	closed (b)	NA	NA
01-08-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
02-04-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA
03-07-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
05-16-97	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA	closed (b)	NA	NA

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

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

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

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

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 07-01-97

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

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

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

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

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 07-01-97

Date Begin:	06-28-96	07-10-96	08-12-96	09-27-96	10-01-96	10-03-96
Date End:	07-10-96	08-12-96	09-27-96	10-01-96	10-03-96	10-07-96
Air-Bubbling Well Status:	See Table 6 for the status of the 12 SVE/air-bubbling wells. Air is bubbled at an average flow rate of 1 scfm per well.					
MW-2	on	on	off	on	on	on
MW-3	on	on	off	on	on	on
MW-4	on	on	off	on	on	on
Air-Sparge Well Status:						
AS-1	on	on	off	off	on	off
AS-2	on	on	off	off	on	off
AS-3	on	on	off	off	on	off
AS-4	on	on	off	off	on	off
AS-5	on	on	off	off	on	off
Air-Bubbling Well Pressure (psig) (1):						
MW-1	--	--	--	--	--	0.0
MW-2	4.0	5.0	0.0	2.6	2.0	0.0
MW-3	4.0	5.5	0.0	2.5	2.5	0.0
MW-4	4.0	5.5	0.0	4.1	3.5	0.0
MW-5	--	--	--	--	--	3.0
Air-Sparge Well Pressure (psig):						
AS-1	4.0	5.0	0.0	0.0	8.0	0.0
AS-2	3.0	5.5	0.0	0.0	4.0	0.0
AS-3	4.0	4.0	0.0	0.0	7.0	0.0
AS-4	3.0	4.5	0.0	0.0	4.0	0.0
AS-5	3.5	5.0	0.0	0.0	12.0	0.0
Total Air-Sparge and Air-Bubbling Pressure (psig):	20.0	30.0	0.0	40.0	32.0	50.0
Total Air-Sparge and Air-Bubbling Flow Rate (scfm) (2):	--	--	--	--	--	--
Dissolved Oxygen (ppm) (3):						
Air-Bubbling Wells:						
MW-1	--	--	--	--	--	--
MW-2	--	--	--	--	--	--
MW-3	--	--	--	--	--	--
MW-4	--	--	--	--	--	--
MW-5	--	--	--	--	--	--

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

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

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

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 07-01-97

Date Begin:	10-07-96	11-06-96	12-04-96	01-08-97	02-04-97	03-07-97
Date End:	11-06-96	12-04-96	01-08-97	02-04-97	03-07-97	04-01-97
Air-Bubbling Well Status:	See Table 6 for the status of the 12 SVE/air-bubbling wells. Air is bubbled at an average flow rate of 1 scfm per well.					
MW-2	on	on	on	on	on	on
MW-3	off	off	off	off	off	off
MW-4	off	off	off	off	off	off
Air-Sparge Well Status:						
AS-1	off	off	off	off	off	off
AS-2	off	off	off	off	off	off
AS-3	off	off	off	off	off	off
AS-4	off	off	off	off	off	off
AS-5	off	off	off	off	off	off
Air-Bubbling Well Pressure (psig) (1):						
MW-1	3.5	3.5	--	--	--	--
MW-2	3.0	3.0	--	3.5	3.5	--
MW-3	0.0	0.0	0.0	0.0	0.0	0.0
MW-4	0.0	0.0	0.0	0.0	0.0	0.0
MW-5	3.0	3.5	--	--	--	--
Air-Sparge Well Pressure (psig):						
AS-1	0.0	0.0	0.0	0.0	0.0	0.0
AS-2	0.0	0.0	0.0	0.0	0.0	0.0
AS-3	0.0	0.0	0.0	0.0	0.0	0.0
AS-4	0.0	0.0	0.0	0.0	0.0	0.0
AS-5	0.0	0.0	0.0	0.0	0.0	0.0
Total Air-Sparge and Air-Bubbling Pressure (psig):	50.0	0.0	60.0	--	--	--
Total Air-Sparge and Air-Bubbling Flow Rate (scfm) (2):	--	--	--	--	--	--
Dissolved Oxygen (ppm) (3):						
Air-Bubbling Wells:						
MW-1	--	--	--	--	--	--
MW-2	--	--	--	--	--	0.5
MW-3	--	--	--	--	--	0.5
MW-4	--	--	--	--	--	0.5
MW-5	--	--	--	--	--	--

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

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

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

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Air-Bubbling Start-Up Date: 03-19-96
Air-Sparge Start-Up Date: 06-07-96
Operation and Performance Data From: 03-19-96
To: 07-01-97

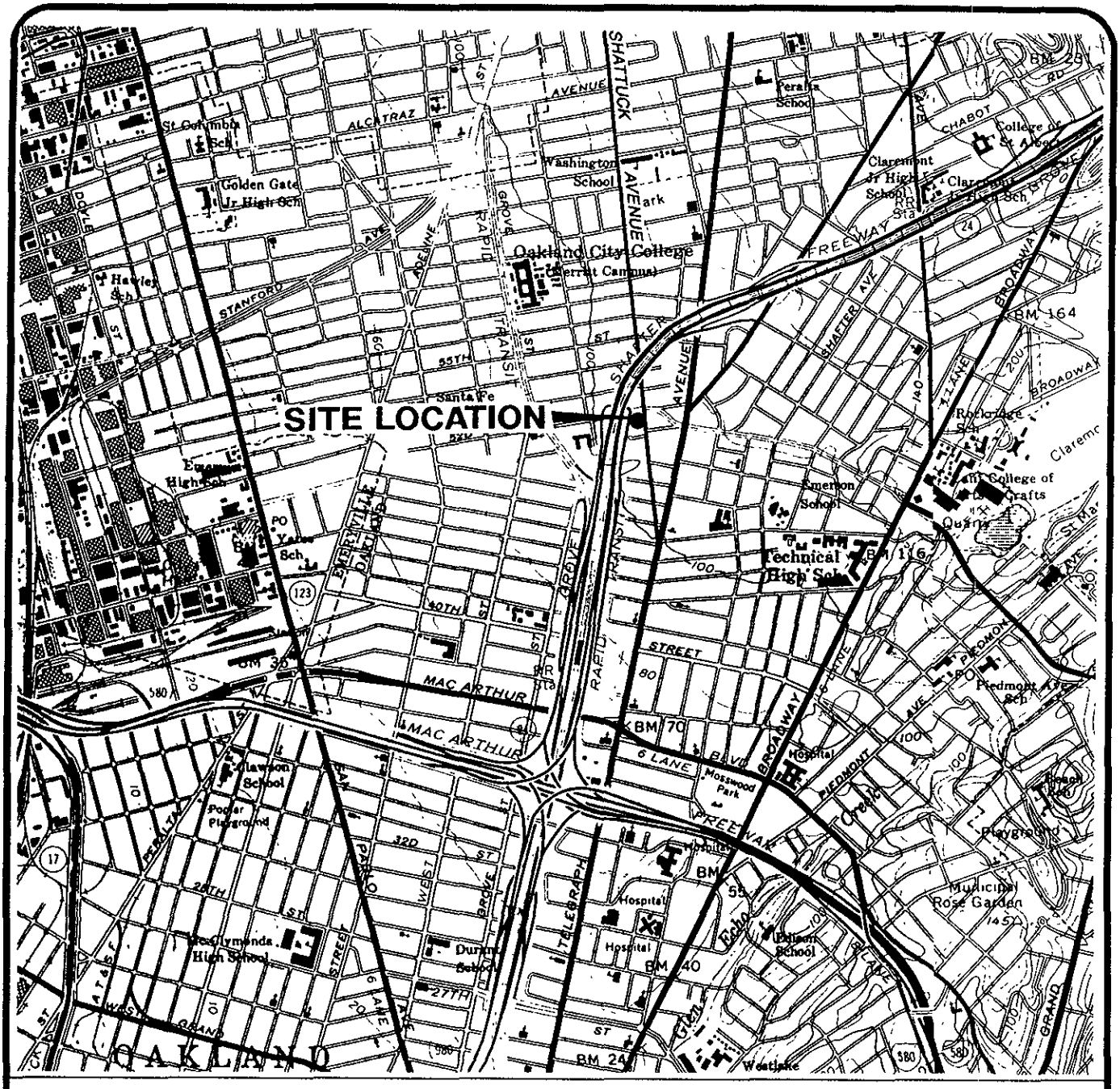
Date Begin:	04-01-97	05-01-97	06-01-97
Date End:	05-01-97	06-01-97	07-01-97
Air-Bubbling Well Status:	See Table 6 for the status of the 12 SVE/air-bubbling wells. Air is bubbled at an average flow rate of 1 scfm per well.		
MW-2	off	on	on
MW-3	off	on	on
MW-4	off	on	on
Air-Sparge Well Status:			
AS-1	off	off	off
AS-2	off	off	off
AS-3	off	off	off
AS-4	off	off	off
AS-5	off	off	off
Air-Bubbling Well Pressure (psig) (1):			
MW-1	0.0	--	--
MW-2	0.0	--	--
MW-3	0.0	0.0	0.0
MW-4	0.0	0.0	0.0
MW-5	0.0	--	--
Air-Sparge Well Pressure (psig):			
AS-1	0.0	0.0	0.0
AS-2	0.0	0.0	0.0
AS-3	0.0	0.0	0.0
AS-4	0.0	0.0	0.0
AS-5	0.0	0.0	0.0
Total Air-Sparge and Air-Bubbling Pressure (psig):	0.0	20.0	--
Total Air-Sparge and Air-Bubbling Flow Rate (scfm) (2):	0.0	16.0	--
Dissolved Oxygen (ppm) (3):			
Air-Bubbling Wells:			
MW-1	--	--	--
MW-2	--	0.5	--
MW-3	--	0.5	--
MW-4	--	--	--
MW-5	--	1.5	--

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

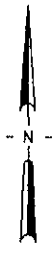
Facility Number: 6148	Air-Sparge and Air-Bubbling Unit:
Location: 5131 Shattuck Avenue Oakland, California	5 Hp Powerex Rotary Oilless Compressor
	Air-Bubbling Start-Up Date: 03-19-96
Consultant: EMCON	Air-Sparge Start-Up Date: 06-07-96
1921 Ringwood Avenue	Operation and Performance Data From: 03-19-96
San Jose, California	To: 07-01-97

CURRENT REPORTING PERIOD:	04-01-97	to	07-01-97
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



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



0 2000 4000

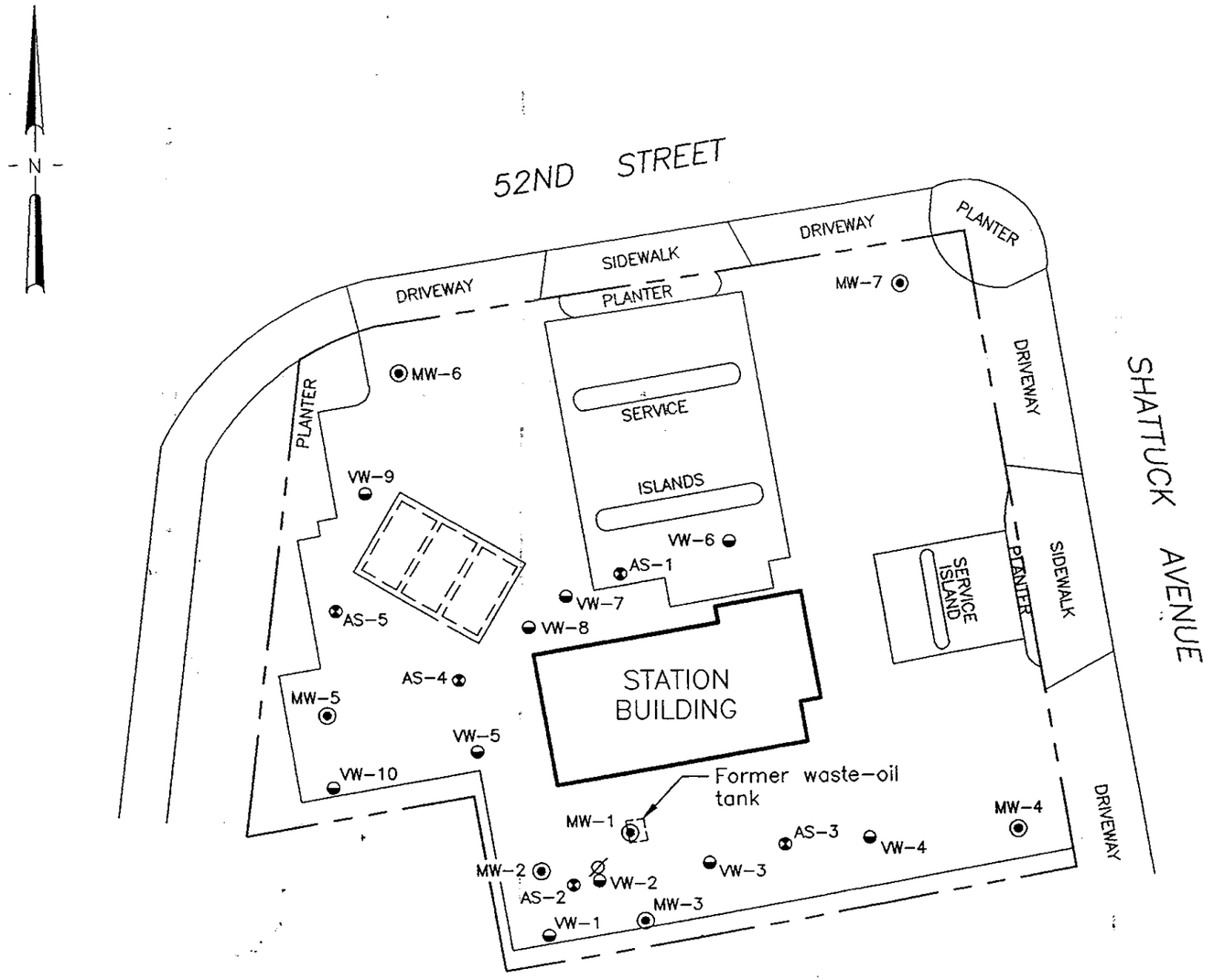
SCALE IN FEET

EMCON

DATE APR. 1997
DWN KAJ
APP
REV
PROJECT NO.
805-135.007

FIGURE 1
ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVE.
OAKLAND, CALIFORNIA
QUARTERLY GROUNDWATER MONITORING
SITE LOCATION

EA-SANJOSE-CAD/DRAWINGS: I:\0Z002\SITELOC.dwg Xrefs: <NONE>
Scale: 1 = 1.00 DimScale: 1 = 1.00 Date: 3/12/97 Time: 5:19 PM Operator: KAJ



EXPLANATION

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

0 30 60

SCALE IN FEET

EMCON

DATE	APR. 1997
DWN	KAJ
APP	
REV	
PROJECT NO.	805-135.007

FIGURE 2
ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVE.
OAKLAND, CALIFORNIA
QUARTERLY GROUNDWATER MONITORING SITE PLAN

EA-SANJOSE-CAD/DRAWINGS: G:\805-135\SJSITE.dwg Xrefs: <NONE>
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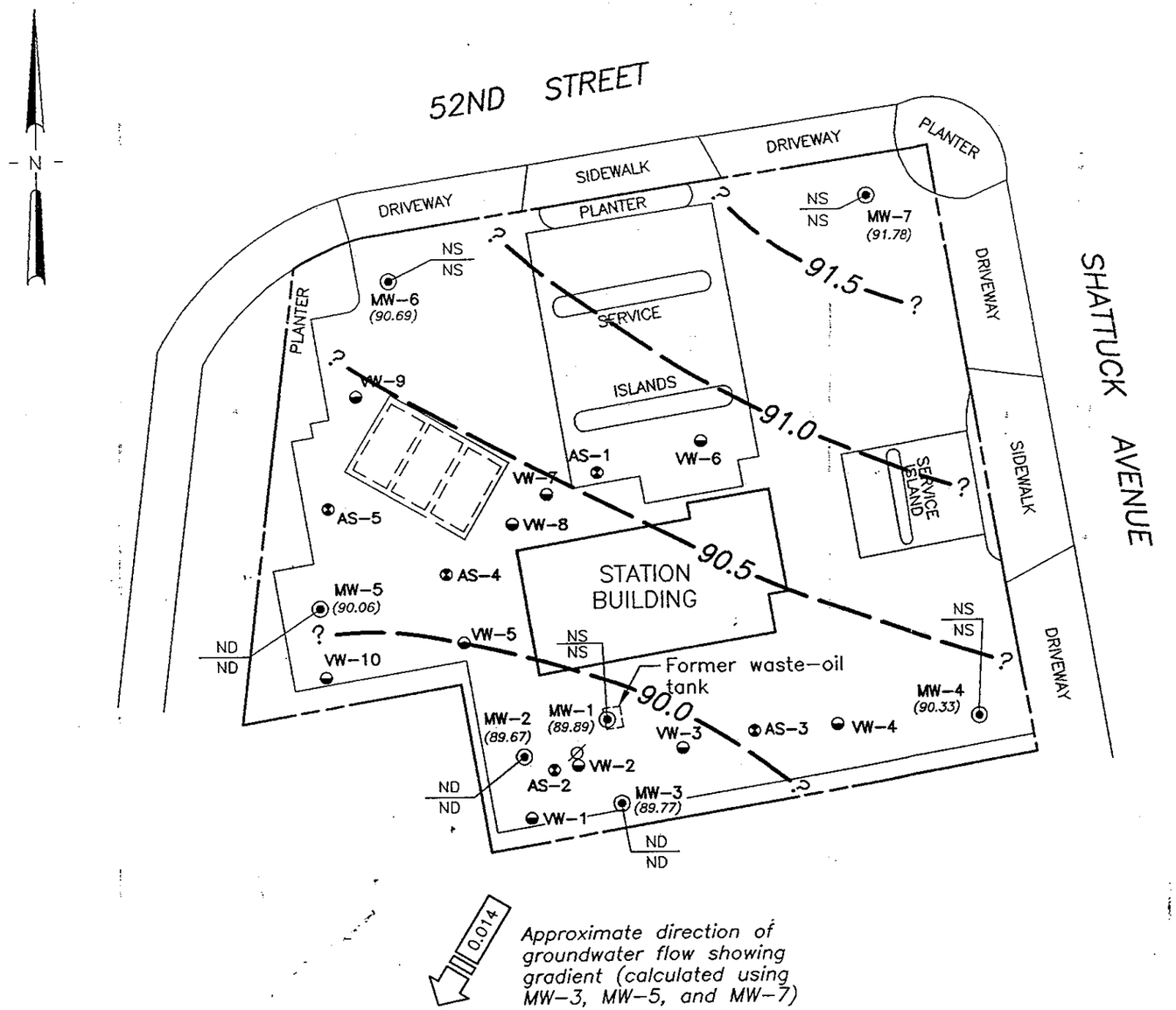


EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Air-sparge well
- Decommissioned well
- Existing underground gasoline storage tank
- (91.78) Groundwater elevation (Ft.-MSL) measured 5/15/97
- Groundwater elevation contour (Ft.-MSL)
- ND / ND — TPHG concentration in groundwater (ug/L); sampled 5/15/97
- Benzene concentration in groundwater (ug/L); sampled 5/15/97
- NS — Not sampled; not scheduled for chemical analysis
- ND — Not detected at or above the method reporting limit for TPHG (50 ug/L) and benzene (0.5 ug/L)

EMCON

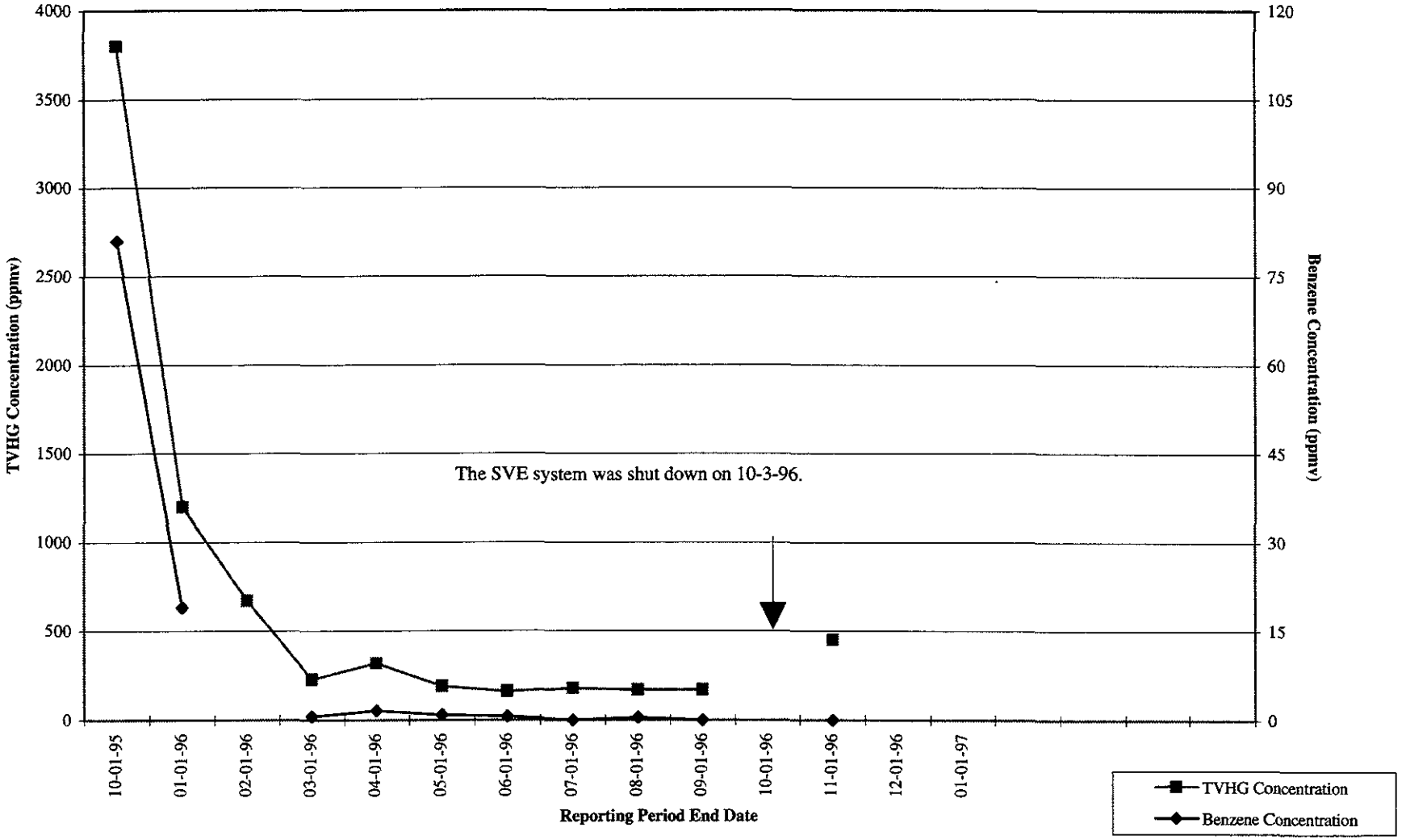
DATE	AUG. 1997
DWN	KAJ
APP	
REV	
PROJECT NO.	805-135.007

FIGURE 3
ARCO PRODUCTS COMPANY
SERVICE STATION 6148, 5131 SHATTUCK AVE.
OAKLAND, CALIFORNIA
QUARTERLY GROUNDWATER MONITORING
GROUNDWATER DATA - 2ND QUARTER 1997

EA-SANJOSE-CAD/DRAWINGS: G:\805-135\SJGWELEV.dwg Xrefs: <NONE>
Scale: 1 = 30.00 DimScale: 1 = 30.00 Date: 8/25/97 Time: 11:12 AM Operator: KAJ

Figure 4

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

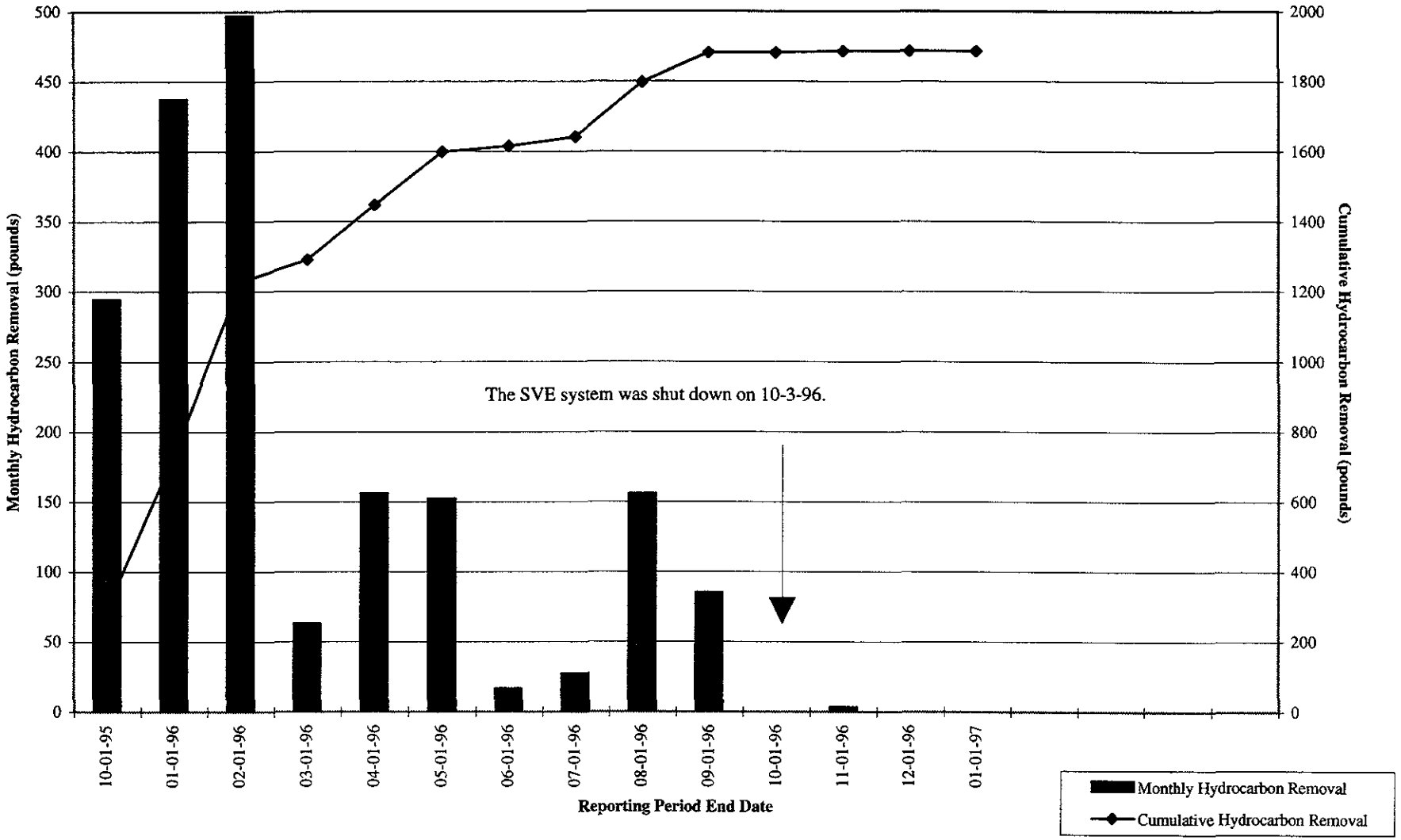


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/j:\qtr_rpts\6148\6148tdb.xls\SVE Model:imi
20805-135.007

Figure 5

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



esj/j:\qtr_rpts\6148\6148tdb.xls\SVE Model:imi
20805-135.007

APPENDIX A

ANALYTICAL RESULTS AND CHAIN OF CUSTODY DOCUMENTATION, SECOND QUARTER 1997 GROUNDWATER MONITORING EVENT

Columbia Analytical Services inc.

May 29, 1997 Service Request No.: S9700894

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

RE: 20805-135.007/TO#21133.00/6148 OAKLAND

Dear Ms. Inouye:

The following pages contain analytical results for sample(s) received by the laboratory on May 15, 1997. 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

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:**	S9700894
Project:	20805-135.007/TO#21133.00/6148 OAKLAND	**Date Collected:**	5/15/97
Sample Matrix:	Water	**Date Received:**	5/15/97

BTEX, MTBE and TPH as Gasoline

Sample Name	MW-3 (19)	Units:	ug/L (ppb)
Lab Code:	S9700894-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/27/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/27/97	65	

1522/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135.007/TO#21133.00/6148 OAKLAND	**Date Collected:**	5/15/97
Sample Matrix:	Water	**Date Received:**	5/15/97

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-5 (18)	Units:	ug/L (ppb)
Lab Code:	S9700894-002	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/27/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/27/97	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135.007/TO#21133.00/6148 OAKLAND	**Date Collected:**	5/15/97
Sample Matrix:	Water	**Date Received:**	5/15/97

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-2 (19)	Units:	ug/L (ppb)
Lab Code:	S970089-4-003	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/27/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Ethylbenzene	EPA 5030	8020	0 5	1	NA	5/27/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/27/97	23	

IS22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135 007 TO#21133.00/6148 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units	ug/L (ppb)
Lab Code:	S970523-WB1	Basis:	NA
Test Notes.			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/23/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/23/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/23/97	ND	
Ethylbenzene	EPA 5030	8020	0 5	1	NA	5/23/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/23/97	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/23/97	ND	

1822.020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135 007/TO#21133.00/6148 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S970527-WB1	Basis:	NA
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/27/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/27/97	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/27/97	ND	

1S22/020597p

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135 007/TO#21133 00/6148 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method:	EPA 5030	Units:	PERCENT
Analysis Method	8020 CA/LUFT	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			4-Bromofluorobenzene	a,a,a-Trifluorotoluene
MW-3 (19)	S9700894-001		104	98
MW-5 (18)	S9700894-002		102	101
MW-2 (19)	S9700894-003		103	101
BATCH QC	S9700925-001MS		98	106
BATCH QC	S9700925-001DMS		103	102
Method Blank	S970523-WB1		96	99
Method Blank	S970527-WB1		101	102
CAS Acceptance Limits:			69-116	69-116

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-135.007/TO#21133.00/6148 OAKLAND
Sample Matrix Water

Service Request: S9700894
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 5/27/97

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S9700925-001MS, S9700925-001DMS
Test Notes.

Units: ug/L (ppb)
Basis. NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Gasoline	EPA 5030	CA/LUFT	50	250	250	ND	260	260	104	104	75-135	<1	

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9700894
Project:	20805-135 007/TO#21133.00/6148 OAKLAND	**Date Analyzed:**	5/23/97

Initial Calibration Verification (ICV) Summary
BTEX, MTBE and TPH as Gasoline

Sample Name:	ICV	Units:	ug/L (ppb)
Lab Code:	ICV1	Basis	NA
Test Notes.			

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	250	240	96	
Benzene	EPA 5030	8020	25	26	104	
Toluene	EPA 5030	8020	25	26	104	
Ethylbenzene	EPA 5030	8020	25	27	108	
Xylenes, Total	EPA 5030	8020	75	82	109	
Methyl *tert*-Butyl Ether	EPA 5030	8020	25	22	88	

ICV032196

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 21133.00

Chain of Custody

ARCO Facility no 6148	City (Facility) Oakland	Project manager (Consultant) JohnYoung	Laboratory name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave San Jose, CA 95131		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH gas/dies, MTBE EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW3(19)	2			X		X	HCL	5-15-97	10:55		X											
MW-5(18)	2			X		X	HCL	↓	11.20		X											
MW-7(14)	2			X		X	HCL	↓	11:45		X											

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40ml HCL VOAs MTBE by 8020 #20805-135.007

Lab number: 9700894

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 5-15-97 Time 13:20	Received by
Relinquished by	Date 5/15/97 Time 13:20	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)

APPENDIX B

SVE SYSTEM MONITORING DATA LOG SHEETS

ARCO 6148
SVE SYSTEM
MONITORING DATA

Reporting Period
06/01/97 00:00
07/01/97 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						
06/01/97 00 00																				2698.56				
07/01/97 00.00	0 0	0.0																	720 00	2698 56	0 00	0 00	720 0	30.00
Period Totals																			720 00		0 00	0 00	720 00	30.00
Period Averages:	0.0	0.0																						

* 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.
05/01/97 00:00
06/01/97 00:00

Hours in Period: 744 00
Days in Period: 31 00

Operation + Down Hours: 744 00
Operation + Down Days: 31.00

Reading Date & Time	Field Monitoring Data: Flow Rates: Well Field Flow Rate	Field Monitoring Data: Flow Rates: System Influent Flow Rate*	Field Monitoring Data: FID or PID Results: Well Field	Field Monitoring Data: FID or PID Results: System Influent	Field Monitoring Data: FID or PID Results: System Effluent	Field Monitoring Data: Destruction Efficiency	Laboratory Sample Time	Laboratory Monitoring Data: Well Field Influent: Gasoline		Laboratory Monitoring Data: Well Field Influent: Benzene		Laboratory Monitoring Data: System Influent: Gasoline		Laboratory Monitoring Data: System Influent: Benzene		Laboratory Monitoring Data: System Effluent: Gasoline		Laboratory Monitoring Data: System Effluent: Benzene		Laboratory Monitoring Data: Destruction Efficiency	Laboratory Monitoring Data: Gasoline Emission Rate	Laboratory Monitoring Data: 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						
05/01/97 00.00																								2698 56				
05/07/97 10 55	0 0	0 0																					154 92	2698.56	0 00	0 00	154 9	6.45
05/16/97 10 40	0 0	0 0																					215 75	2698.56	0.00	0.00	215.8	8 99
06/01/97 00.00	0 0	0 0																					373.33	2698 56	0 00	0.00	373 3	15 56
Period Totals:																							744 00		0.00	0 00	744 00	31.00
Period Averages.	0 0	0 0																										

* 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
04/01/97 00 00
05/01/97 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						
04/01/97 00 00																					2698 56				
04/02/97 11 21	0 0	0 0																		35 35	2698.56	0 00	0 00	35 3	1 47
05/01/97 00 00	0 0	0 0																		684 65	2698 56	0.00	0 00	684.7	28 53
Period Totals																				720.00		0 00	0 00	720 00	30 00
Period Averages	0 0	0 0																							

* The total pressure for the system influent flow rate was assumed to be 5 0 inches of water because the data was unavailable.