



EMCON

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

03 APR -2 PM 1: 21

Date March 31, 1998
Project 20805-129.004

To:

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

We are enclosing:

Copies	Description
<u>1</u>	<u>Fourth quarter 1997 groundwater monitoring results and</u>
<u>_____</u>	<u>remediation system performance evaluation report,</u>
<u>_____</u>	<u>ARCO Service Station 2169, Oakland, California</u>
<u>_____</u>	<u>_____</u>

For your:	<u> X </u>	Use	Sent by:	<u> X </u>	Regular Mail
	<u>_____</u>	Approval		<u>_____</u>	Standard Air
	<u>_____</u>	Review		<u>_____</u>	Courier
	<u>_____</u>	Information		<u>_____</u>	Other:

Comments:

The enclosed groundwater monitoring and performance evaluation 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 Paul Supple - ARCO Products Company
File





Date: March 31, 1998

Re: ARCO Station # 2169 • 889 West Grand Avenue • Oakland, CA
Fourth 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:

A handwritten signature in black ink that reads "Paul Supple". The signature is written in a cursive, flowing style.

Paul Supple
Environmental Engineer



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

March 17, 1998
Project 20805-129.004

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

Re: Fourth quarter 1997 groundwater monitoring results and remediation system performance evaluation report, ARCO service station 2169, Oakland, California

Dear Mr. Supple:

This letter presents the results of the fourth quarter 1997 groundwater monitoring program at ARCO Products Company (ARCO) service station 2169, 889 West Grand Avenue, Oakland, California (Figure 1). Operation and performance data for the interim soil-vapor extraction (SVE) and air-sparge (AS) remediation systems at the site are also presented. The quarterly monitoring program complies with Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations. Pertinent site features, including the locations of existing on-site monitoring and vapor extraction wells are shown in Figure 2.

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.

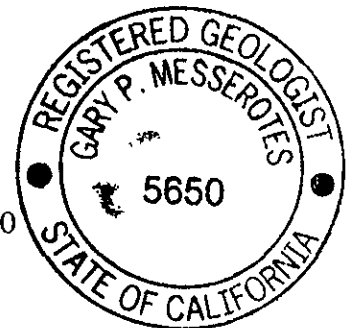
Please call if you have questions.

Sincerely,

EMCON

Valli Voruganti, P.E.
Project Engineer

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



EMCON



March 17, 1998

ARCO QUARTERLY REPORT

Station No.: 2169 Address: 889 West Grand Avenue, Oakland, California
EMCON Project No. 20805-129.004
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: October 1, 1997 to January 1, 1998

WORK PERFORMED THIS QUARTER (Fourth- 1997):

1. Prepared and submitted quarterly report for third quarter 1997.
2. Performed quarterly groundwater monitoring and sampling for fourth quarter 1997.
3. Attempting to stimulate natural biodegradation in groundwater monitoring well A-5 with oxygen releasing compounds (ORCs).
4. Operated air-bubbling system at low flowrates of approximately 1 to 2 cfm per well in October and November 1997. Shut system down in mid-November 1997 for repair of sparge blower.
5. Restarted SVE system.

WORK PROPOSED FOR NEXT QUARTER (First- 1998):

1. Prepare and submit quarterly report for fourth quarter 1997.
2. Perform quarterly groundwater monitoring and sampling for first quarter 1998.
3. Restart air-sparge system.
4. Continue to monitor dissolved oxygen in groundwater monitoring well A-5.
5. Continue operating SVE system.

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 Bubbling)

Is Floating Product (FP) Present On-site: Yes No

Cumulative FP Recovered to Date : 4.8 gallons, Wells ADR-1 and ADR-2, None present to be recovered since 1996.

FP Recovered This Quarter : None

Bulk Soil Removed to Date : 2,196 cubic yards of TPH-impacted soil

Bulk Soil Removed This Quarter : None

Water Wells or Surface Waters
within 2000 ft., impacted by site: None

Current Remediation Techniques: SVE and Air-Bubbling Systems

Average Depth to Groundwater: 11.22 feet

Groundwater Gradient (Average): 0.003 ft/ft toward north-northwest (consistent with past events)

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SVE QUARTERLY OPERATION AND PERFORMANCE:

Equipment Inventory:	Therm Tech Model VAC-25, 250 cfm, Thermal/Catalytic Oxidizer
Operating Mode:	Catalytic Oxidation
BAAQMD Permit #:	12119
TPH Conc. End of Period (lab):	110 ppmv (12-12-97)
Benzene Conc. End of Period (lab):	0.13 ppmv (12-12-97)
Flowrate End of Period:	65.7 scfm (12-12-97)
HC Destroyed This Period:	751.8 pounds
HC Destroyed to Date:	8582.1 pounds
Utility Usage	
Electric (KWH):	10735 KWH
Operating Hours This Period:	1,056 hours
Percent Operational:	48.0% System was shut down periodically for quarterly monitoring and other maintenance issues.
Operating Hours to Date:	6909.6 hours
Unit Maintenance:	Routine monthly maintenance.
Number of Auto Shut Downs:	0
Destruction Efficiency Permit Requirement:	90%, if POC concentrations are below 1,000 ppmv; or 97% if POC concentrations are greater than 1,000 ppmv but less than 3,000 ppmv
Average Percent TPH Conversion:	90.2 %
Average Stack Temperature:	657.4 °F
Average Source Flow:	91.3 scfm
Average Process Flow:	91.3 scfm
Average Source Vacuum:	63 in H ₂ O

DISCUSSION:

The system was shut down January 15, 1997. The soil-vapor extraction (SVE) system was restarted on October 16, 1997 due to an increase in influent hydrocarbon concentrations in extracted vapor, and was operated periodically during fourth quarter 1997.

ATTACHED:

- Table 1 - Groundwater Monitoring Data, Fourth Quarter 1997
- Table 2 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Table 3 - Approximate Cumulative Floating Product Recovery Data
- Table 4 - Soil Vapor Extraction System Operation and Performance Data
- Table 5 - Soil-Vapor Extraction Well Data
- Table 6 - Air-Sparge System Operation and Performance Data
- Figure 1 - Site Location
- Figure 2 - Site Plan
- Figure 3 - Groundwater Data, Fourth Quarter 1997
- Figure 4 - Historical SVE System Influent TVHG and Benzene Concentrations
- Figure 5 - Historical SVE System Hydrocarbon Removal Rates
- Appendix A - Analytical Results and Chain of Custody Documentation, Fourth Quarter 1997 Groundwater Monitoring Event
- Appendix B - SVE System Monitoring Data Log Sheets
- Appendix C - Analytical Results and Chain-of-Custody Documentation for Soil Vapor Extraction System, Fourth Quarter 1997.

cc: Susan Hugo, ACHCSA

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Table 1
Groundwater Monitoring Data
Fourth Quarter 1997

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-10-98

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L	TPHD LUFT Method µg/L
A-1	11-18-97	14.16	10.70	3.46	ND	NNW	0.003	11-18-97	54	<0.5	<0.5	<0.5	0.6	27	--	--
A-2	11-18-97	14.55	11.22	3.33	ND	NNW	0.003	11-18-97	Not sampled: well sampled semi-annually, during the first and third quarters							--
A-3	11-18-97	15.75	12.00	3.75	ND	NNW	0.003	11-18-97	Not sampled: well sampled annually, during the first quarter							--
A-4	11-18-97	15.25	10.88	4.37	ND	NNW	0.003	11-18-97	Not sampled: well sampled annually, during the first quarter							--
A-5	11-18-97	13.51	NA	NA	ND	NNW	0.003	11-18-97	Not sampled, well was inaccessible							--
A-6	11-18-97	13.51	10.10	3.41	ND	NNW	0.003	11-18-97	690	<1 [^]	<1 [^]	3.0	2	7	--	--
AR-1	11-18-97	15.61	11.64	3.97	ND	NNW	0.003	11-18-97	Not sampled: well sampled semi-annually, during the first and third quarters							--
AR-2	11-18-97	15.28	11.80	3.48	ND	NNW	0.003	11-18-97	Not sampled, well sampled semi-annually, during the first and third quarters							--
ADR-1	11-18-97	13.95	10.48	3.47	ND	NNW	0.003	11-18-97	18000	900	140	360	2700	<60 [^]	--	--
ADR-2	11-18-97	14.64	11.31	3.33	ND	NNW	0.003	11-18-97	11000	230	29	300	1200	<60 [^]	--	--

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

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

NR: not reported; data not available or not measurable

ND: none detected

NNW: north-northwest

[^] method reporting limit was raised due to: (1) high analyte concentration requiring sample dilution, or (2) matrix interference

-- : not analyzed or not applicable

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

ARCO Service Station 2169
 889 West Grand Avenue, Oakland, CA

Date: 03-10-98

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	TPHC LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
A-1	03-24-95	14.16	8.10	6.06	ND	NW	0.009	03-24-95	1200	230	39	34	66	--	--	160^^
A-1	06-05-95	14.16	11.13	3.03	ND	NW	0.002	06-05-95	1500	310	27	36	76	--	--	710^
A-1	08-17-95	14.16	11.71	2.45	ND	W	0.001	08-18-95	1600	470	35	48	110	120	--	240^
A-1	12-04-95	14.16	12.28	1.88	ND	NNW	0.002	12-04-95	1200	240	17	25	56	--	120	--
A-1	03-01-96	14.16	8.78	5.38	ND	NW	0.003	03-13-96	1300	300	74	29	73	100	--	--
A-1	05-29-96	14.16	9.85	4.31	ND	NW	0.002	05-29-96	Not sampled: well sampled semi-annually, during the first and third quarters							--
A-1	08-29-96	14.16	11.08	3.08	ND	W	0.002	08-29-96	1200	320	5.9	25	27	110	--	--
A-1	11-21-96	14.16	10.54	3.62	ND	WNW	0.002	11-21-96	Not sampled: well sampled semi-annually, during the first and third quarters							--
A-1	03-26-97	14.16	10.55	3.61	ND	NW	0.002	03-26-97	<50	0.8	<0.5	<0.5	<0.5	64	--	--
A-1	05-21-97	14.16	11.10	3.06	ND	NNW	0.002	05-21-97	Not sampled: well sampled semi-annually, during the first and third quarters							--
A-1	08-08-97	14.16	11.32	2.84	ND	NNW	0.002	08-08-97	91	7	<0.5	0.5	3.9	<60^	--	--
A-1	11-18-97	14.16	10.70	3.46	ND	NNW	0.003	11-18-97	54	<0.5	<0.5	<0.5	0.6	27	--	--
A-2	03-24-95	14.55	8.64	5.91	ND	NW	0.009	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	06-05-95	14.55	11.72	2.83	ND	NW	0.002	06-05-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	08-17-95	14.55	12.35	2.20	ND	W	0.001	08-17-95	<50	<0.5	<0.5	<0.5	<0.5	12	--	--
A-2	12-04-95	14.55	12.74	1.81	ND	NNW	0.002	12-04-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	03-01-96	14.55	9.34	5.21	ND	NW	0.003	03-13-96	<50	<0.5	0.6	<0.5	1.3	--	--	--
A-2	05-29-96	14.55	10.40	4.15	ND	NW	0.002	05-29-96	<50	<0.5	<0.5	<0.5	<0.5	<20	--	--
A-2	08-29-96	14.55	11.50	3.05	ND	W	0.002	08-29-96	<50	<0.5	<0.5	<0.5	<0.5	<39^	--	--
A-2	11-21-96	14.55	11.06	3.49	ND	WNW	0.002	11-21-96	<50	<0.5	<0.5	<0.5	<0.5	<30^	--	--
A-2	03-26-97	14.55	11.12	3.43	ND	NW	0.002	03-26-97	<50	<0.5	<0.5	<0.5	<0.5	<20^	--	--
A-2	05-21-97	14.55	11.58	2.97	ND	NNW	0.002	05-21-97	Not sampled: well sampled semi-annually, during the first and third quarters							--
A-2	08-08-97	14.55	11.82	2.73	ND	NNW	0.002	08-08-97	<50	<0.5	<0.5	<0.5	<0.5	<20^	--	--
A-2	11-18-97	14.55	11.22	3.33	ND	NNW	0.003	11-18-97	Not sampled: well sampled semi-annually, during the first and third quarters							--

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

ARCO Service Station 2169
 889 West Grand Avenue, Oakland, CA

Date 03-10-98

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	TPHC LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN										
A-3	03-24-95	15.75	8.83	6.92	ND	NW	0.009	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	06-05-95	15.75	12.44	3.31	ND	NW	0.002	06-05-95	Not sampled. well sampled annually, during the first quarter							
A-3	08-17-95	15.75	13.04	2.71	ND	W	0.001	08-17-95	Not sampled. well sampled annually, during the first quarter							
A-3	12-04-95	15.75	13.57	2.18	ND	NNW	0.002	12-04-95	Not sampled. well sampled annually, during the first quarter							
A-3	03-01-96	15.75	9.90	5.85	ND	NW	0.003	03-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
A-3	05-29-96	15.75	11.08	4.67	ND	NW	0.002	05-29-96	Not sampled. well sampled annually, during the first quarter							
A-3	08-29-96	15.75	12.38	3.37	ND	W	0.002	08-29-96	Not sampled. well sampled annually, during the first quarter							
A-3	11-21-96	15.75	11.86	3.89	ND	WNW	0.002	11-21-96	Not sampled. well sampled annually, during the first quarter							
A-3	03-26-97	15.75	11.81	3.94	ND	NW	0.002	03-26-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
A-3	05-21-97	15.75	12.35	3.40	ND	NNW	0.002	05-21-97	Not sampled. well sampled annually, during the first quarter							
A-3	08-08-97	15.75	12.62	3.13	ND	NNW	0.002	08-08-97	Not sampled. well sampled annually, during the first quarter							
A-3	11-18-97	15.75	12.00	3.75	ND	NNW	0.003	11-18-97	Not sampled. well sampled annually, during the first quarter							
A-4	03-24-95	15.25	7.20	8.05	ND	NW	0.009	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	06-05-95	15.25	11.70	3.55	ND	NW	0.002	06-05-95	Not sampled. well sampled annually, during the first quarter							
A-4	08-17-95	15.25	12.28	2.97	ND	W	0.001	08-17-95	Not sampled. well sampled annually, during the first quarter							
A-4	12-04-95	15.25	12.63	2.62	ND	NNW	0.002	12-04-95	Not sampled. well sampled annually, during the first quarter							
A-4	03-01-96	15.25	8.55	6.70	ND	NW	0.003	03-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
A-4	05-29-96	15.25	10.32	4.93	ND	NW	0.002	05-29-96	Not sampled. well sampled annually, during the first quarter							
A-4	08-29-96	15.25	11.55	3.70	ND	W	0.002	08-29-96	Not sampled. well sampled annually, during the first quarter							
A-4	11-21-96	15.25	10.83	4.42	ND	WNW	0.002	11-21-96	Not sampled. well sampled annually, during the first quarter							
A-4	03-26-97	15.25	10.97	4.28	ND	NW	0.002	03-26-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
A-4	05-21-97	15.25	11.51	3.74	ND	NNW	0.002	05-21-97	Not sampled. well sampled annually, during the first quarter							
A-4	08-08-97	15.25	11.73	3.52	ND	NNW	0.002	08-08-97	Not sampled. well sampled annually, during the first quarter							
A-4	11-18-97	15.25	10.88	4.37	ND	NNW	0.003	11-18-97	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 2169
 889 West Grand Avenue, Oakland, CA

Date: 03-10-98

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240 µg/L	TPHD LUFT Method µg/L
A-5	03-24-95	13.51	7.40	6.11	ND	NW	0.009	03-24-95	3300	200	310	130	460	--	--	--
A-5	06-05-95	13.51	10.43	3.08	ND	NW	0.002	06-05-95	57000	2700	4600	1500	6800	--	--	--
A-5	08-17-95	13.51	11.15	2.36	ND	W	0.001	08-18-95	34000	1600	2700	1100	5100	<28	--	--
A-5	12-04-95	13.51	11.42	2.09	ND	NNW	0.002	12-04-95	61	<0.5	<0.5	<0.5	<0.5	--	--	--
A-5	03-01-96	13.51	8.11	5.40	ND	NW	0.003	03-13-96	11000	860	960	380	1600	<100	--	--
A-5	05-29-96	13.51	9.30	4.21	ND	NW	0.002	05-29-96	19000	1600	1900	880	3300	<100	--	--
A-5	08-29-96	13.51	10.60	2.91	ND	W	0.002	08-29-96	7700	490	450	260	990	<30^	--	--
A-5	11-21-96	13.51	10.05	3.46	ND	WNW	0.002	11-21-96	8000	450	550	340	1100	<30^	--	--
A-5	03-26-97	13.51	9.87	3.64	ND	NW	0.002	03-26-97	3100	190	140	130	340	<30^	--	--
A-5	05-21-97	13.51	10.25	3.26	ND	NNW	0.002	05-21-97	16000	1500	900	700	2700	<120^	--	--
A-5	08-08-97	13.51	10.42	3.09	ND	NNW	0.002	08-08-97	9000	690	240	440	1300	<30^	--	--
A-5	11-18-97	13.51	NR	NR	ND	NNW	0.003	11-18-97	Not sampled well was inaccessible							
A-6	03-24-95	13.51	7.89	5.62	ND	NW	0.009	03-24-95	120	<0.5	<1	<0.5	<1.5	--	--	--
A-6	06-05-95	13.51	10.06	3.45	ND	NW	0.002	06-05-95	160	<0.5	<0.6	<0.5	<0.5	--	--	--
A-6	08-17-95	13.51	11.10	2.41	ND	W	0.001	08-18-95	530	<0.5	<0.5	<2.4	<4.2	6	--	--
A-6	12-04-95	13.51	11.52	1.99	ND	NNW	0.002	12-04-95	28000	1600	1800	880	3600	--	--	--
A-6	03-01-96	13.51	8.21	5.30	ND	NW	0.003	03-13-96	1400	<3	<15	<7	<10	<20	--	--
A-6	05-29-96	13.51	9.25	4.26	ND	NW	0.002	05-29-96	410	<2	<2	<2	<2	3	--	--
A-6	08-29-96	13.51	10.52	2.99	ND	W	0.002	08-29-96	80	<0.5	<0.5	<0.5	<0.5	6	--	--
A-6	11-21-96	13.51	10.54	2.97	ND	WNW	0.002	11-21-96	62	<0.5	<0.5	<0.5	<0.5	12	--	--
A-6	03-26-97	13.51	9.93	3.58	ND	NW	0.002	03-26-97	110	<0.5	0.8	1	1.4	15	--	--
A-6	05-21-97	13.51	10.54	2.97	ND	NNW	0.002	05-21-97	600	0.6	0.6	<2^	2.7	<3	--	--
A-6	08-08-97	13.51	10.77	2.74	ND	NNW	0.002	08-08-97	850	<0.5	<0.5	6.1	<0.5	<4^	--	--
A-6	11-18-97	13.51	10.10	3.41	ND	NNW	0.003	11-18-97	690	<1^	<1^	3	2	7	--	--

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

ARCO Service Station 2169
 889 West Grand Avenue, Oakland, CA

Date: 03-10-98

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	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
AR-1	03-24-95	15.61	7.25	8.36	ND	NW	0.009	03-24-95	270	14	0.6	2.5	2.1	--	--	130^^
AR-1	06-05-95	15.61	11.37	4.24	ND	NW	0.002	06-05-95	190	10	<0.5	0.8	0.5	--	--	580^
AR-1	08-17-95	15.61	12.40	3.21	ND	W	0.001	08-17-95	960	110	12	4.5	150	14	--	<50
AR-1	12-04-95	15.61	12.90	2.71	ND	NNW	0.002	12-04-95	<50	1.5	<0.5	<0.5	0.8	--	--	--
AR-1	03-01-96	15.61	8.19	7.42	ND	NW	0.003	03-13-96	150	3.8	0.5	1.4	1.3	<3	--	--
AR-1	05-29-96	15.61	10.41	5.20	ND	NW	0.002	05-29-96	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-1	08-29-96	15.61	12.12	3.49	ND	W	0.002	08-29-96	<50	<0.5	<0.5	<0.5	0.8	<3	--	--
AR-1	11-21-96	15.61	11.52	4.09	ND	WNW	0.002	11-21-96	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-1	03-26-97	15.61	11.33	4.28	ND	NW	0.002	03-26-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
AR-1	05-21-97	15.61	12.02	3.59	ND	NNW	0.002	05-21-97	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-1	08-08-97	15.61	12.31	3.30	ND	NNW	0.002	08-08-97	<50	0.7	<0.5	1	<0.5	<3	--	--
AR-1	11-18-97	15.61	11.64	3.97	ND	NNW	0.003	11-18-97	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-2	03-24-95	15.28	9.13	6.15	ND	NW	0.009	03-24-95	<50	6.2	<0.5	<0.5	0.6	--	--	<50
AR-2	06-05-95	15.28	12.09	3.19	ND	NW	0.002	06-05-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	<50
AR-2	08-17-95	15.28	12.78	2.50	ND	W	0.001	08-18-95	<50	<0.5	<0.5	<0.5	<0.5	4	--	<50
AR-2	12-04-95	15.28	11.44	3.84	ND	NNW	0.002	12-13-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
AR-2	03-01-96	15.28	9.83	5.45	ND	NW	0.003	03-13-96	190	26	2.6	3.3	13	200	--	--
AR-2	05-29-96	15.28	10.97	4.31	ND	NW	0.002	05-29-96	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-2	08-29-96	15.28	12.20	3.08	ND	W	0.002	08-29-96	<50	<0.5	<0.5	<0.5	<0.5	95	--	--
AR-2	11-21-96	15.28	11.57	3.71	ND	WNW	0.002	11-21-96	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-2	03-26-97	15.28	11.60	3.68	ND	NW	0.002	03-26-97	<50	<0.5	<0.5	<0.5	<0.5	9	--	--
AR-2	05-21-97	15.28	12.12	3.16	ND	NNW	0.002	05-21-97	Not sampled: well sampled semi-annually, during the first and third quarters							
AR-2	08-08-97	15.28	12.35	2.93	ND	NNW	0.002	08-08-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	--
AR-2	11-18-97	15.28	11.80	3.48	ND	NNW	0.003	11-18-97	Not sampled: well sampled semi-annually, during the first and third quarters							

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

ARCO Service Station 2169
 889 West Grand Avenue, Oakland, CA

Date: 03-10-98

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	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ADR-1	03-24-95	13.95	8.04	** 5.92	0.01	NW	0.009	03-24-95	Not sampled: well contained floating product							
ADR-1	06-05-95	13.95	11.02	2.93	ND	NW	0.002	06-05-95	23000	310	420	300	1900	--	--	13000^
ADR-1	08-17-95	13.95	11.86	2.09	ND	W	0.001	08-18-95	4400	150	120	95	620	120	--	4500^
ADR-1	12-04-95	13.95	10.05	3.90	ND	NNW	0.002	12-13-95	8800	100	130	120	990	--	--	--
ADR-1	03-01-96	13.95	8.76	5.19	ND	NW	0.003	03-13-96	89000	370	1000	840	8100	<500	--	--
ADR-1	05-29-96	13.95	9.74	4.21	ND	NW	0.002	05-30-96	27000	230	380	370	2700	<100	--	--
ADR-1	08-29-96	13.95	10.77	3.18	ND	W	0.002	08-29-96	5300	190	58	76	470	85	--	--
ADR-1	11-21-96	13.95	10.49	3.46	ND	WNW	0.002	11-21-96	1900	82	21	32	270	110	--	--
ADR-1	03-26-97	13.95	10.37	3.58	ND	NW	0.002	03-26-97	1300	260	6	39	27	95	--	--
ADR-1	05-21-97	13.95	10.90	3.05	ND	NNW	0.002	05-21-97	2100	300	18	37	200	79	--	--
ADR-1	08-08-97	13.95	11.12	2.83	ND	NNW	0.002	08-08-97	3900	620	49	110	470	<200^	--	--
ADR-1	11-18-97	13.95	10.48	3.47	ND	NNW	0.003	11-18-97	18000	900	140	360	2700	<60^	--	--
ADR-2	03-24-95	14.64	8.41	NR*	>3.00*	NR*	NR*	03-24-95	Not sampled: well contained floating product							
ADR-2	06-05-95	14.64	11.45	NR*	>3.00*	NR*	NR*	06-05-95	Not sampled: well contained floating product							
ADR-2	08-17-95	14.64	12.10	** 2.56	0.03	W	0.001	08-17-95	Not sampled: well contained floating product							
ADR-2	12-04-95	14.64	10.93	** 3.73	0.03	NNW	0.002	12-13-95	Not sampled: well contained floating product							
ADR-2	03-01-96	14.64	8.74	5.90	ND	NW	0.003	03-13-96	29000	1100	1200	710	3800	<500	--	--
ADR-2	05-29-96	14.64	10.43	4.21	ND	NW	0.002	05-29-96	33000	510	500	470	2300	120	--	--
ADR-2	08-29-96	14.64	11.64	3.00	ND	W	0.002	08-29-96	8000	230	180	150	730	53	--	--
ADR-2	11-21-96	14.64	11.23	3.41	ND	WNW	0.002	11-21-96	15000	630	440	390	2100	75	--	--
ADR-2	03-26-97	14.64	11.13	3.51	ND	NW	0.002	03-26-97	6100	320	23	180	400	32	--	--
ADR-2	05-21-97	14.64	11.64	3.00	ND	NNW	0.002	05-21-97	6100	380	22	210	320	<30^	--	--
ADR-2	08-08-97	14.64	11.85	2.79	ND	NNW	0.002	08-08-97	8400	380	35	230	910	<30^	--	--
ADR-2	11-18-97	14.64	11.31	3.33	ND	NNW	0.003	11-18-97	11000	230	29	300	1200	<60^	--	--

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

ARCO Service Station 2169
 889 West Grand Avenue, Oakland, CA

Date: 03-10-98

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	TPHD LUFT Method
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

ft-MSL: elevation in feet, relative to mean sea level

MWN: groundwater 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

TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method

ND: none detected

NR: not reported, data not available or not measurable

NNW: north-northwest

^: method reporting limit was raised due to (1) high analyte concentration requiring sample dilution, or (2) matrix interference

^^: sample contains components eluting in the diesel range, quantified as diesel; chromatogram does not match the typical diesel fingerprint

--: not analyzed or not applicable

*: well contained more than 3 feet of floating product; exact product thickness and groundwater elevation could not be measured

**': [corrected elevation (Z')] = Z + (h * 0.73) where: Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

***: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results and Remediation System Performance Evaluation Report, ARCO Service Station 2169, 889 West Grand Avenue, Oakland, California, (EMCON, March 4, 1996)*

Table 3
Approximate Cumulative Floating Product Recovered

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 03-10-98

Well Desig- nation	Date	Floating Product Recovered gallons
ADR-1	1994	0.0
ADR-2		0.0
ADR-1	1995	0.0
ADR-2		4.8
ADR-1	1996	0.0
ADR-2		0.0
ADR-1	1997	0.0
ADR-2		0.0
1994 to 1997 Total:		4.8

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer				
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98				
System was shut down on 1-15-97 but was restarted on 10-16-97.					
Beginning Date:	06-02-94	06-02-94	06-07-94	06-16-94	06-22-94
Ending Date:	06-02-94	06-07-94	06-16-94	06-22-94	06-30-94
Down-time (days):	0	0	1	0	4
Total Operation (days):	0	5	8	6	4
Total Operation (hours):	1.7	121.3	193.7	145.2	106.3
Operation Hours to Date:	1.7	123.0	316.7	462.0	568.2
<u>TPH Concentrations</u>					
Average Influent (ppmv):	18,000	16,000	830	1,100	230
Average Effluent (ppmv):	ND	45	ND	4.9	75.0
<u>Benzene Concentrations</u>					
Average Influent (ppmv):	270	420	17	24	3.8
Average Effluent (ppmv):	ND	0.30	ND	0.08	0.78
<u>Flow Rates</u>					
Average Influent (scfm):	61.1	131.5	145.3	194.1	176.7
Average Dilution (scfm):	184.2	97.8	69.9	0.0	0.0
Average Effluent (scfm):	268.6	272.3	289.7	264.4	288.9
<u>TPH-G Recovery Data</u>					
Recovery Rate (lbs/hr):	11.12	21.26	1.22	2.16	0.41
Recovery Rate (lbs/day):	266.80	510.34	29.27	51.77	9.86
Destruction Efficiency (%):	100.00	99.46	100.00	99.39	46.70
Product Recovered (lbs):	18.68	2779.35	236.08	313.27	43.64
Product Recovered to Date (lbs):	18.68	2798.02	2834.10	3147.37	3191.01
Product Recovered to Date (gal):	3.11	433.00	472.35	524.56	531.83
<u>Benzene Recovery Data</u>					
Recovery Rate (lbs/hr):	0.185	0.670	0.030	0.056	0.008
Recovery Rate (lbs/day):	4.447	16.076	0.719	1.355	0.195
Destruction Efficiency (%):	100.00	99.86	100.00	99.56	66.45
Product Recovered (lbs):	0.311	81.249	5.802	8.202	0.865
Product Recovered to Date (lbs):	0.311	81.561	87.363	95.565	96.430
Product Recovered to Date (gal):	0.043	11.270	12.050	13.181	13.301

Page 1 Footnotes

ppmv: parts per million by volume
scfm: standard cubic feet per minute
lbs/hr. pounds per operational hour
lbs/day: pounds per day
lbs: pounds
gal: gallons

ND: None Detected, Recovery data calculated using laboratory detection limits

Notes:

1. Molecular weights used in recovery calculations are 65 for TPH and 78 for benzene.
2. Densities used in recovery calculations are 6.0 lbs/gal for TPH and 7.27 lbs/gal for benzene
3. All data and calculations on this page were prepared by GeoStrategies, Inc (GSI), as presented in *Letter Report, Vapor Extraction Start Up and Quarterly Groundwater Monitoring, Second Quarter 1994*, (GSI, September 1994).

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98 System was shut down on 1-15-97 but was restarted on 10-16-97.
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	07-01-94	08-01-94	09-01-94	12-01-94	01-01-95
Date Begin:	07-01-94	08-01-94	09-01-94	12-01-94	01-01-95
Date End:	08-01-94	09-01-94	12-01-94	01-01-95	02-01-95
Mode of Oxidation:	Therm-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:	11	17	35	16	26
Days of Downtime:	20	14	56	15	5
Average Vapor Concentrations (1)					
Well Field Influent: ppmv (2) as gasoline	1983	680	450	1500	<15
mg/m3 (3) as gasoline	5333	1800	1200	5600	<60
ppmv as benzene	29	7.6	2.9	7	<0.1
mg/m3 as benzene	95	25	9.4	22	<0.5
System Influent: ppmv as gasoline	1983	680	450	400	<15
mg/m3 as gasoline	5333	1800	1200	1600	<60
ppmv as benzene	29	7.6	2.9	1.9	<0.1
mg/m3 as benzene	95	25	9.4	6	<0.5
System Effluent: ppmv as gasoline	17	44	4.1	<15	<15
mg/m3 as gasoline	46	118	11.1	<60	<60
ppmv as benzene	0.15	0.7	0.04	<0.1	<0.1
mg/m3 as benzene	0.49	2.3	0.143	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):	198.3	212.6	214.3	17.7	16.7
Average System Influent Flow Rate (4), scfm:	198.3	212.6	214.3	120.1	164.3
Average Destruction Efficiency (6), percent (7):	99.1	93.4	99.1	96.3	NA
Average Emission Rates (8), pounds per day (9)					
Gasoline:	0.82	2.25	0.21	0.65	0.89
Benzene:	0.01	0.04	0.00	0.01	0.01
Operating Hours This Period:	<u>255.95</u>	<u>414.28</u>	<u>833.57</u>	<u>385.86</u>	<u>614.80</u>
Operating Hours To Date:	256.0	670.2	1503.8	1889.7	2504.5
Pounds/ Hour Removal Rate, as gasoline (10):	3.96	1.43	0.96	0.37	0.00
Pounds Removed This Period, as gasoline (11):	<u>1013.1</u>	<u>593.4</u>	<u>802.3</u>	<u>143.1</u>	<u>2.3</u>
Pounds Removed To Date, as gasoline:	4204.1	4797.4	5599.7	5742.9	5745.2
Gallons Removed This Period, as gasoline (12):	<u>163.4</u>	<u>95.7</u>	<u>129.4</u>	<u>23.1</u>	<u>0.4</u>
Gallons Removed To Date, as gasoline:	678.1	773.8	903.2	926.3	926.7

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer				
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98 System was shut down on 1-15-97 but was restarted on 10-16-97.				
Date Begin:	02-01-95	07-01-95	08-01-95	09-01-95	10-01-95
Date End:	07-01-95	08-01-95	09-01-95	10-01-95	11-01-95
Mode of Oxidation:	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:	0	14	19	27	12
Days of Downtime:	150	17	12	3	19
Average Vapor Concentrations (1)					
Well Field Influent: ppmv (2) as gasoline	NA (13)	1567	1975	1400	250
mg/m3 (3) as gasoline	NA	5767	7175	5200	900
ppmv as benzene	NA	12	10	3.1	0.6
mg/m3 as benzene	NA	40	33	10	1.7
System Influent: ppmv as gasoline	NA	200	270	230	66
mg/m3 as gasoline	NA	740	970	920	240
ppmv as benzene	NA	1.6	1	0.6	0.1
mg/m3 as benzene	NA	5.2	3.3	1.8	<0.5
System Effluent: ppmv as gasoline	NA	23	<15	<15	<15
mg/m3 as gasoline	NA	83	<60	<60	<60
ppmv as benzene	NA	<0.1	<0.1	<0.1	<0.1
mg/m3 as benzene	NA	<0.5	<0.5	<0.5	<0.5
Average Well Field Flow Rate (4), scfm (5):	0.0	27.9	43.0	58.1	67.0
Average System Influent Flow Rate (4), scfm:	0.0	197.6	166.8	167.9	174.1
Average Destruction Efficiency (6), percent (7):	NA	88.8	93.8	93.5	75.0
Average Emission Rates (8), pounds per day (9)					
Gasoline:	0.00	1.47	0.90	0.90	0.94
Benzene:	0.00	0.01	0.01	0.01	0.01
Operating Hours This Period:	0.00	346.17	462.40	652.27	278.16
Operating Hours To Date:	2504.5	2850.6	3313.0	3965.3	4243.5
Pounds/ Hour Removal Rate, as gasoline (10):	0.00	0.60	1.15	1.13	0.23
Pounds Removed This Period, as gasoline (11):	0.0	208.5	533.9	737.6	62.8
Pounds Removed To Date, as gasoline:	5745.2	5953.6	6487.6	7225.1	7287.9
Gallons Removed This Period, as gasoline (12):	0.0	33.6	86.1	119.0	10.1
Gallons Removed To Date, as gasoline:	926.7	960.3	1046.4	1165.4	1175.5

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169	Vapor Treatment Unit: ThermTech Model				
Location: 889 West Grand Avenue Oakland, California	VAC-25, 250cfm Thermal/ Catalytic Oxidizer				
Consultant: EMCON	Start-Up Date: 06-02-94				
1921 Ringwood Avenue	Operation and Performance Data From: 06-02-94				
San Jose, California	To: 01-01-98				
	System was shut down on 1-15-97 but was restarted on 10-16-97.				

Date Begin:	11-01-95	01-01-96	04-01-96	07-01-96	08-01-96
Date End:	01-01-96	04-01-96	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:	0	0	0	0	18
Days of Downtime:	61	91	91	31	13
Average Vapor Concentrations (1)					
Well Field Influent: ppmv (2) as gasoline	NA	NA	NA	NA	140
mg/m3 (3) as gasoline	NA	NA	NA	NA	570
ppmv as benzene	NA	NA	NA	NA	1.6
mg/m3 as benzene	NA	NA	NA	NA	5
System Influent: ppmv as gasoline	NA	NA	NA	NA	73
mg/m3 as gasoline	NA	NA	NA	NA	300
ppmv as benzene	NA	NA	NA	NA	0.8
mg/m3 as benzene	NA	NA	NA	NA	2.6
System Effluent: ppmv as gasoline	NA	NA	NA	NA	<5
mg/m3 as gasoline	NA	NA	NA	NA	<20
ppmv as benzene	NA	NA	NA	NA	<0.2
mg/m3 as benzene	NA	NA	NA	NA	<0.5
Average Well Field Flow Rate (4), scfm (5):	0.0	0.0	0.0	0.0	119.3
Average System Influent Flow Rate (4), scfm:	0.0	0.0	0.0	0.0	153.0
Average Destruction Efficiency (6), percent (7):	NA	NA	NA	NA	93.3
Average Emission Rates (8), pounds per day (9)					
Gasoline:	0.00	0.00	0.00	0.00	0.27
Benzene:	0.00	0.00	0.00	0.00	0.01
Operating Hours This Period:	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>1.82</u>	<u>435.13</u>
Operating Hours To Date:	4243.5	4243.5	4243.5	4245.3	4680.4
Pounds/ Hour Removal Rate, as gasoline (10):	0.00	0.00	0.00	0.00	0.25
Pounds Removed This Period, as gasoline (11):	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>110.7</u>
Pounds Removed To Date, as gasoline:	7287.9	7287.9	7287.9	7287.9	7398.7
Gallons Removed This Period, as gasoline (12):	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>17.9</u>
Gallons Removed To Date, as gasoline:	1175.5	1175.5	1175.5	1175.5	1193.4

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer				
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98 System was shut down on 1-15-97 but was restarted on 10-16-97.				
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	02-01-97
Mode of Oxidation:	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:	8	30	0	2	9
Days of Downtime:	22	1	30	29	22
Average Vapor Concentrations (1)					
Well Field Influent: ppmv (2) as gasoline	770	110	NA	300	NA
mg/m3 (3) as gasoline	3200	460	NA	1200	NA
ppmv as benzene	2.4	1.5	NA	<0.5	NA
mg/m3 as benzene	7.8	4.9	NA	<2	NA
System Influent: ppmv as gasoline	300	39	NA	300	NA
mg/m3 as gasoline	1200	160	NA	1200	NA
ppmv as benzene	0.8	0.5	NA	<0.5	NA
mg/m3 as benzene	2.6	1.7	NA	<2	NA
System Effluent: ppmv as gasoline	<5	<5	NA	11	NA
mg/m3 as gasoline	<20	<20	NA	46	NA
ppmv as benzene	<0.1	<0.2	NA	<0.1	NA
mg/m3 as benzene	<0.4	<0.5	NA	<0.4	NA
Average Well Field Flow Rate (4), scfm (5):	128.6	99.3	0.0	148.8	148.8
Average System Influent Flow Rate (4), scfm:	204.3	157.7	0.0	148.8	148.8
Average Destruction Efficiency (6), percent (7):	98.3	87.5	NA	96.2	NA
Average Emission Rates (8), pounds per day (9)					
Gasoline:	0.37	0.28	NA	0.61	NA
Benzene:	0.01	0.01	NA	0.01	NA
Operating Hours This Period:	<u>180.20</u>	<u>730.20</u>	<u>0.19</u>	<u>43.83</u>	<u>215.74</u>
Operating Hours To Date:	4860.6	5590.8	5591.0	5634.8	5850.6
Pounds/ Hour Removal Rate, as gasoline (10):	1.54	0.17	0.00	0.67	0.00
Pounds Removed This Period, as gasoline (11):	<u>277.5</u>	<u>124.8</u>	<u>0.0</u>	<u>29.3</u>	<u>0.0</u>
Pounds Removed To Date, as gasoline:	7676.2	7801.0	7801.0	7830.3	7830.3
Gallons Removed This Period, as gasoline (12):	<u>44.8</u>	<u>20.1</u>	<u>0.0</u>	<u>4.7</u>	<u>0.0</u>
Gallons Removed To Date, as gasoline:	1238.2	1258.3	1258.3	1263.0	1263.0

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98 System was shut down on 1-15-97 but was restarted on 10-16-97.
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	02-01-97	03-01-97	04-01-97	07-01-97	10-01-97
Date Begin:	02-01-97	03-01-97	04-01-97	07-01-97	10-01-97
Date End:	03-01-97	04-01-97	07-01-97	10-01-97	11-01-97
Mode of Oxidation:	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:	0	0	0	0	16
Days of Downtime:	28	31	91	92	15
<u>Average Vapor Concentrations (1)</u>					
Well Field Influent: ppmv (2) as gasoline	NA	NA	NA	NA	1200
mg/m3 (3) as gasoline	NA	NA	NA	NA	5100
ppmv as benzene	NA	NA	NA	NA	44
mg/m3 as benzene	NA	NA	NA	NA	140
System Influent: ppmv as gasoline	NA	NA	NA	NA	1200
mg/m3 as gasoline	NA	NA	NA	NA	5100
ppmv as benzene	NA	NA	NA	NA	44
mg/m3 as benzene	NA	NA	NA	NA	140
System Effluent: ppmv as gasoline	NA	NA	NA	NA	100
mg/m3 as gasoline	NA	NA	NA	NA	420
ppmv as benzene	NA	NA	NA	NA	0.5
mg/m3 as benzene	NA	NA	NA	NA	1.7
Average Well Field Flow Rate (4), scfm (5):	0.0	0.0	0.0	0.0	153.7
Average System Influent Flow Rate (4), scfm:	0.0	0.0	0.0	0.0	153.7
Average Destruction Efficiency (6), percent (7):	NA	NA	NA	NA	91.8
<u>Average Emission Rates (8), pounds per day (9)</u>					
Gasoline:	NA	NA	NA	NA	5.72
Benzene:	NA	NA	NA	NA	0.02
Operating Hours This Period:	0.00	0.00	0.00	0.00	375.18
Operating Hours To Date:	5850.6	5850.6	5850.6	5850.6	6225.8
Pounds/ Hour Removal Rate, as gasoline (10):	0.00	0.00	0.00	0.00	1.75
Pounds Removed This Period, as gasoline (11):	0.0	0.0	0.0	0.0	657.2
Pounds Removed To Date, as gasoline:	7830.3	7830.3	7830.3	7830.3	8487.5
Gallons Removed This Period, as gasoline (12):	0.0	0.0	0.0	0.0	106.0
Gallons Removed To Date, as gasoline:	1263.0	1263.0	1263.0	1263.0	1369.0

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169	Vapor Treatment Unit: ThermTech Model	
Location: 889 West Grand Avenue Oakland, California	VAC-25, 250cfm Thermal/ Catalytic Oxidizer	
Consultant: EMCON	Start-Up Date: 06-02-94	
1921 Ringwood Avenue	Operation and Performance Data From: 06-02-94	
San Jose, California	To: 01-01-98	
	System was shut down on 1-15-97 but was restarted on 10-16-97.	
Date Begin:	11-01-97	12-01-97
Date End:	12-01-97	01-01-98
Mode of Oxidation:	Cat-Ox	Cat-Ox
Days of Operation:	17	11
Days of Downtime:	12	20
Average Vapor Concentrations (1)		
Well Field Influent: ppmv (2) as gasoline	110	110
mg/m3 (3) as gasoline	450	450
ppmv as benzene	0.8	0.13
mg/m3 as benzene	2.5	0.41
System Influent: ppmv as gasoline	110	110
mg/m3 as gasoline	450	450
ppmv as benzene	0.8	0.13
mg/m3 as benzene	2.5	0.41
System Effluent: ppmv as gasoline	8	16
mg/m3 as gasoline	31	64
ppmv as benzene	<0.1	0.06
mg/m3 as benzene	<0.4	0.19
Average Well Field Flow Rate (4), scfm (5):	51.2	65.7
Average System Influent Flow Rate (4), scfm:	51.2	65.7
Average Destruction Efficiency (6), percent (7):	93.1	85.8
Average Emission Rates (8), pounds per day (9)		
Gasoline:	0.14	0.38
Benzene:	0.00	0.00
Operating Hours This Period:	<u>410.34</u>	<u>273.47</u>
Operating Hours To Date:	6636.1	6909.6
Pounds/ Hour Removal Rate, as gasoline (10):	0.16	0.11
Pounds Removed This Period, as gasoline (11):	<u>64.3</u>	<u>30.3</u>
Pounds Removed To Date, as gasoline:	8551.8	8582.1
Gallons Removed This Period, as gasoline (12):	<u>10.4</u>	<u>4.9</u>
Gallons Removed To Date, as gasoline:	1379.4	1384.3

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility	Number: 2169 Location: 889 West Grand Avenue Oakland, California	Vapor Treatment Unit: ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer
	Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 06-02-94 Operation and Performance Data From: 06-02-94 To: 01-01-98
		System was shut down on 1-15-97 but was restarted on 10-16-97.
<hr/>		
CURRENT REPORTING PERIOD:	10-01-97	to 01-01-98
DAYS / HOURS IN PERIOD:	92	2208.0
DAYS / HOURS OF OPERATION:	44	1056.0
DAYS / HOURS OF DOWN TIME:	48	1152.0
PERCENT OPERATIONAL:		47.8 %
PERIOD POUNDS REMOVED:	751.8	
PERIOD GALLONS REMOVED:	121.3	
AVERAGE WELL FIELD FLOW RATE (scfm):		91.3
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):		91.3

Table 4
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number: 2169	Vapor Treatment Unit: ThermTech Model
Location: 889 West Grand Avenue Oakland, California	VAC-25, 250cfm Thermal/ Catalytic Oxidizer
Consultant: EMCON	Start-Up Date: 06-02-94
1921 Ringwood Avenue	Operation and Performance Data From: 06-02-94
San Jose, California	To: 01-01-98
	System was shut down on 1-15-97 but was restarted on 10-16-97.

1. Average concentrations are based on discrete sample results reported during the month, refer to Appendix B for discrete sample results
 2. ppmv: parts per million by volume
 3. mg/m³: milligrams per cubic meter
- For the period from July 1 to December 1, 1994, ppmv results were converted to mg/m³ using the following formula:**
concentration (as gasoline in mg/m³) = [concentration (as gasoline in ppmv) x 65 lb/lb-mole / 24.05 (lb/m³/lb-mole of air)/mg] (rounded as appropriate)
concentration (as benzene in mg/m³) = [concentration (as benzene in ppmv) x 78 lb/lb-mole / 24.05 (lb/m³/lb-mole of air)/mg] (rounded as appropriate)
- For the period from December 1, 1994, to July 1, 1995, ppmv results were converted to mg/m³ using the following formula:**
concentration (as gasoline in mg/m³) = [concentration (as gasoline in ppmv) x 87 lb/lb-mole / 24.05 (lb/m³/lb-mole of air)/mg] (rounded as appropriate)
concentration (as benzene in mg/m³) = [concentration (as benzene in ppmv) x 78 lb/lb-mole / 24.05 (lb/m³/lb-mole of air)/mg] (rounded as appropriate)
- After July 1, 1995, all vapor results were reported by the laboratory in ppmv and mg/m³.**
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. NA: not applicable, not analyzed, or not available

Table 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-18-98

Date	Well Identification											
	A-1			A-2			A-3			A-4		
	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response
	ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O	
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
01-13-95	passive	NA	0	passive	NA	0	passive	NA	0	passive	NA	0
01-26-95	passive	NA	0	passive	NA	0	passive	NA	0	passive	NA	0
07-17-95	System was shut down on January 26, 1995.			System was restarted on July 17, 1995.								
07-17-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
07-25-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
08-22-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
09-21-95	closed	NA	0	closed	NA	0	closed	NA	0	closed	NA	0
09-21-95	open	NA	46	closed	NA	0	closed	NA	0	closed	NA	0
09-21-95	open	600 LAB	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
10-12-95	open	NA	36	closed	NA	0	closed	NA	0	closed	NA	0
10-12-95	System was manually shut down.											
08-02-96	closed	NA	0	closed	NA	0	open	NA	46	closed	NA	0
08-05-96	closed	NA	NA	closed	NA	NA	open	NA	22	closed	NA	NA
09-23-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
10-24-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-04-96	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
01-15-97	System was manually shut down.											
10-16-97	closed(b)	NA	NA	closed(b)	NA	NA	closed(b)	NA	NA	closed(b)	39.5PID	NA
10-22-97	closed(b)	NA	NA	closed(b)	NA	NA	closed(b)	NA	NA	closed(b)	NA	NA
11-06-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
11-19-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-12-97	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 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 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-18-98

Date	Well Identification											
	AV-1			AV-2			AV-3			AV-4		
	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response
	ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O	
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
01-13-95	passive	NA	15	passive	NA	0	passive	NA	0	open	463 PID	16
01-26-95	passive	NA	27	passive	NA	0	passive	NA	0	open	1.8 FID	30
07-17-95	System was shut down on January 26, 1995.			System was restarted on July 17, 1995.								
07-17-95	open	NA	NA	open	NA	NA	open	NA	NA	closed	NA	NA
07-25-95	open	1026 PID	42	open	1364 PID	42	open	869 PID	42	closed	NA	NA
07-25-95	open	1200 LAB	NA	open	1600 LAB	NA	open	980 LAB	NA	closed	NA	NA
08-22-95	open	NA	42	open	NA	44	open	NA	44	closed	NA	NA
09-21-95	open	NA	43	open	NA	47	open	NA	47	closed	NA	0
09-21-95	open	NA	46	open	NA	46	open	NA	46	closed	NA	1
10-12-95	open	NA	44	open	NA	43	open	NA	43	closed	NA	1
10-12-95	System was manually shut down.											
08-02-96	closed	48.5 PID	6	open	863 PID	46	open	322 PID	44	closed	NA	0
08-05-96	closed	NA	NA	open	NA	32	open	NA	36	open	NA	32
09-23-96	open	NA	42	open	NA	50	open	NA	53	open	NA	50
10-24-96	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
12-04-96	open	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
01-15-97	System was manually shut down.											
10-16-97	closed(b)	NA	NA	open(b)	356PID	NA	open(b)	575PID	NA	open(b)	NA	NA
10-22-97	closed(b)	NA	NA	open(b)	NA	NA	open(b)	NA	NA	open(b)	NA	NA
11-06-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
11-19-97	closed	NA	NA	open	NA	NA	open	NA	NA	open	NA	NA
12-12-97	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 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 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date: 02-18-98

Date	Well Identification											
	AV-5			AV-6			AV-7			AR-2		
	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response
	ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O		ppmv	in-H2O	
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.												
01-13-95	passive	NA	1	open	46 PID	16	passive	NA	0	passive	NA	0
01-26-95	open	2.2 FID	30	open	23 FID	30	passive	NA	0	passive	NA	0
07-17-95	System was shut down on January 26, 1995.			System was restarted on July 17, 1995.								
07-17-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
07-25-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
08-22-95	closed	NA	NA	closed	NA	NA	closed	NA	NA	open	NA	44
09-21-95	closed	NA	0	closed	NA	0	closed	NA	0	open	NA	48
09-21-95	closed	NA	0	open	NA	46	closed	NA	0	open	NA	46
09-21-95	closed	NA	NA	open	2300 LAB	NA	closed	NA	NA	open	NA	NA
10-12-95	closed	NA	0	open	NA	42	closed	NA	0	open	NA	43
10-12-95	System was manually shut down.											
08-02-96	open	NA	44	open	185 PID	42	open	NA	44	closed	NA	40
08-05-96	open	NA	30-36	open	NA	32	open	NA	34	open	NA	28
09-23-96	open	455 PID	50	open	282 PID	49	closed	NA	NA	open	13.2 PID	45
10-24-96	open	NA	NA	open	NA	NA	closed	NA	NA	open	NA	NA
12-04-96	open	NA	NA	open	NA	NA	closed	NA	NA	open	NA	NA
01-15-97	System was manually shut down.											
10-16-97	open(b)	NA	NA	closed(b)	45.8PID	NA	closed(b)	52.9PID	NA	closed(b)	40.7PID	NA
10-22-97	open(b)	NA	NA	closed(b)	NA	NA	closed(b)	NA	NA	closed(b)	NA	NA
11-06-97	closed	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
11-19-97	open	NA	NA	closed	NA	NA	closed	NA	NA	closed	NA	NA
12-12-97	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 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 5
Soil-Vapor Extraction Well Data

ARCO Service Station 2169
889 West Grand Avenue, Oakland, CA

Date. 02-18-98

Date	Well Identification					
	ADR-1			ADR-2		
	Valve Position	TVHG	Vacuum Response	Valve Position	TVHG	Vacuum Response
	ppmv	in-H2O		ppmv	in-H2O	
For SVE well monitoring data prior to January 1, 1995, please refer to the third quarter 1995 groundwater monitoring report for this site.						
01-13-95	open	58 PID	16	open	160 PID	16
01-26-95	open	2.2 FID	30	open	4.4 FID	30
07-17-95	System was shut down on January 26, 1995.			System was restarted on July 17, 1995.		
07-17-95	open	NA	NA	open	NA	NA
07-25-95	open	1184 PID	42	open	1057 PID	42
07-25-95	open	1400 LAB	NA	open	1300 LAB	NA
08-22-95	open	NA	44	open	NA	44
09-21-95	open	NA	48	open	NA	47
09-21-95	open	NA	45	open	NA	46
10-12-95	open	NA	43	open	NA	44
10-12-95	System was manually shut down.					
08-02-96	closed	NA	0	open	950 PID	42
08-05-96	closed	NA	NA	open	NA	32
09-23-96	open	1221 PID	NA	open	950 PID	50
10-24-96	open	NA	NA	open	NA	NA
12-04-96	open	NA	NA	open	NA	NA
01-15-97	System was manually shut down.					
10-16-97	open(b)	892PID	NA	open(b)	543PID	NA
10-22-97	open(b)	NA	NA	open(b)	NA	NA
11-06-97	closed	NA	NA	closed	NA	NA
11-19-97	open	NA	NA	open	NA	NA
12-12-97	closed	NA	NA	closed	NA	NA
<p>TVHG: concentration of total volatile hydrocarbons as gasoline ppmv: parts per million by volume in-H2O: inches of water open: open to the system 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</p>						

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Air-Bubbling and Air-Sparge Unit:* 3-horsepower Conde blower 5-horsepower air compressor Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.
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Date Begin:	07-15-94	08-01-94	08-01-94	08-01-94	08-15-94	09-13-94
Date End:	08-01-94	08-01-94	08-01-94	08-15-94	09-13-94	11-28-94
Days of Operation:	6	0	0	19	27	0
Days of Downtime:	11	0	0	12	3	76

Air-Bubbling Well Status: See Table 5 for the status of the air-bubbling wells.
Air is bubbled at an average flow rate of 1 scfm per well.

Air-Sparge Well Status:

AS-1	open	open	open	open	open	closed
AS-2	open	open	open	open	open	closed
AS-3	open	open	open	open	open	closed
AS-4	open	open	open	open	open	closed
AS-5	open	open	open	open	open	closed

Air-Sparge Well Pressure (psig) (1):

AS-1	2.8	2.8	3.0	2.0	2.4	0.0
AS-2	3.0	3.0	2.8	2.2	2.4	0.0
AS-3	3.6	3.6	3.8	3.1	2.2	0.0
AS-4	3.1	3.1	3.4	3.0	2.8	0.0
AS-5	2.8	2.8	3.2	2.8	3.2	0.0

Total Air-Sparge Flow Rate (scfm) (2): 25.0 29.0 29.0 27.0 29.0 0.0

Total Air-Bubbling and Air-Sparge Pressure (psig): 5.0 2.8 2.8 2.6 3.0 0.0

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:

AS-1	NA (4)	NA	NA	NA	NA	1.4
AS-2	NA	NA	NA	NA	NA	1.2
AS-3	NA	NA	NA	NA	NA	1.2
AS-4	NA	NA	NA	NA	NA	0.8
AS-5	NA	NA	NA	NA	NA	1.4

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	NA	10.55
AS-2	NA	NA	NA	NA	NA	11.29
AS-3	NA	NA	NA	NA	NA	10.78
AS-4	NA	NA	NA	NA	NA	10.27
AS-5	NA	NA	NA	NA	NA	10.65

**Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data**

Facility Number: 2169	Air-Bubbling and Air-Sparge Unit:*
Location: 889 West Grand Avenue Oakland, California	3-horsepower Conde blower 5-horsepower air compressor
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.

Date Begin:	11-28-94	01-03-95	02-03-95	03-31-95	07-25-95	08-10-95
Date End:	01-03-95	02-03-95	03-31-95	06-28-95	08-10-95	08-22-95
Days of Operation:	0	0	0	0	2	0
Days of Downtime:	36	31	56	89	14	12

Air-Bubbling Well Status: See Table 5 for the status of the air-bubbling wells.
Air is bubbled at an average flow rate of 1 scfm per well.

Air-Sparge Well Status:

AS-1	closed	closed	closed	closed	open	open
AS-2	closed	closed	closed	closed	closed	closed
AS-3	closed	closed	closed	closed	closed	closed
AS-4	closed	closed	closed	closed	open	open
AS-5	closed	closed	closed	closed	closed	closed

Air-Sparge Well Pressure (psig) (1):

AS-1	0.0	0.0	0.0	0.0	8.9	5.5
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	2.0	2.3
AS-5	0.0	0.0	0.0	0.0	0.0	0.0

Total Air-Sparge Flow Rate (scfm) (2):

0.0	0.0	0.0	0.0	2.0	2.0
-----	-----	-----	-----	-----	-----

**Total Air-Bubbling and
Air-Sparge Pressure (psig):**

0.0	0.0	0.0	0.0	50	45
-----	-----	-----	-----	----	----

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	1.1	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	1.4	NA
AS-5	NA	NA	NA	NA	1.0	NA

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:

AS-1	NA	NA	8.79	NA	11.75	NA
AS-2	NA	NA	9.37	NA	NA	NA
AS-3	NA	NA	8.93	NA	NA	NA
AS-4	NA	NA	8.43	NA	11.31	NA
AS-5	NA	NA	8.80	NA	11.62	NA

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California	Air-Bubbling and Air-Sparge Unit:* 3-horsepower Conde blower 5-horsepower air compressor
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.

Date Begin:	08-22-95	09-21-95	10-12-95	01-01-96	04-01-96	07-01-96
Date End:	09-21-95	10-12-95	01-01-96	04-01-96	07-01-96	08-01-96
Days of Operation:	11	NA	NA	NA	NA	0
Days of Downtime:	19	NA	NA	NA	NA	31

Air-Bubbling Well Status: See Table 5 for the status of the air-bubbling wells.
Air is bubbled at an average flow rate of 1 scfm per well.

Air-Sparge Well Status:

AS-1	open	closed	closed	closed	closed	closed
AS-2	closed	closed	closed	closed	closed	closed
AS-3	closed	closed	closed	closed	closed	closed
AS-4	open	closed	closed	closed	closed	closed
AS-5	open	closed	closed	closed	closed	closed

Air-Sparge Well Pressure (psig) (1):

AS-1	7.0	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	1.5	0.0	0.0	0.0	0.0	0.0
AS-5	1.0	0.0	0.0	0.0	0.0	0.0

Total Air-Sparge Flow Rate (scfm) (2): 6.0 0.0 0.0 0.0 0.0 0.0

Total Air-Bubbling and Air-Sparge Pressure (psig): 45 0 0 0 0 0.0

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:						
AS-1	NA	7.4	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	1.5	NA	NA	NA	NA
AS-5	NA	1.6	NA	NA	NA	NA

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:						
AS-1	NA	12.12	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	11.78	NA	NA	NA	NA
AS-5	NA	12.05	NA	NA	NA	NA

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Air-Bubbling and Air-Sparge Unit:* 3-horsepower Conde blower 5-horsepower air compressor Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.
--	---

Date Begin:	08-01-96	09-01-96	10-01-96	11-01-96	12-01-96
Date End:	09-01-96	10-01-96	11-01-96	12-01-96	01-01-97
Days of Operation:	18	0	30	0	2
Days of Downtime:	13	22	1	30	29

Air-Bubbling Well Status: See Table 5 for the status of the air-bubbling wells.
Air is bubbled at an average flow rate of 1 scfm per well.

Air-Sparge Well Status:

AS-1	open	open	open	closed	open
AS-2	closed	open	open	closed	open
AS-3	open	open	open	closed	open
AS-4	open	open	open	closed	open
AS-5	open	open	open	closed	open

Air-Sparge Well Pressure (psig) (1):

AS-1	2.0	1.5	2.0	0.0	2.0
AS-2	NA	1.5	2.0	0.0	2.0
AS-3	2.0	1.5	2.0	0.0	2.0
AS-4	2.0	1.5	2.0	0.0	2.0
AS-5	1.5	1.5	2.0	0.0	2.0

Total Air-Sparge Flow Rate (scfm) (2):

6.0	12.0	9.0	0.0	9.0
-----	------	-----	-----	-----

Total Air-Bubbling and
Air-Sparge Pressure (psig):

40	45	50	0	50
----	----	----	---	----

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Air-Bubbling and Air-Sparge Unit: * 3-horsepower Conde blower 5-horsepower air compressor Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.
--	--

Date Begin:	01-01-97	02-01-97	03-01-97	04-01-97	05-01-97	06-01-97
Date End:	02-01-97	03-01-97	04-01-97	05-01-97	06-01-97	07-01-97
Days of Operation (Air-Bubbler):						
Days of Downtime (Air-Bubbler):						
Days of Operation (Air-Sparge):	9	0	0	0	9	30
Days of Downtime (Air-Sparge):	22	28	31	30	22	0

Air-Bubbling Well Status: See Table 5 for the status of the air-bubbling wells.
Air is bubbled at an average flow rate of 1 scfm per well.

Air-Sparge Well Status:

AS-1	open	closed	closed	closed	open	open
AS-2	open	closed	closed	closed	open	open
AS-3	open	closed	closed	closed	open	open
AS-4	open	closed	closed	closed	open	open
AS-5	open	closed	closed	closed	open	open

Air-Sparge Well Pressure (psig) (1):

AS-1	NA	0.0	0.0	0.0	NA	NA
AS-2	NA	0.0	0.0	0.0	NA	NA
AS-3	NA	0.0	0.0	0.0	NA	NA
AS-4	NA	0.0	0.0	0.0	NA	NA
AS-5	NA	0.0	0.0	0.0	NA	NA

Total Air-Sparge Flow Rate (scfm) (2): 10.0 0.0 0.0 8.0 10.0 8 to 10

Total Air-Bubbling and Air-Sparge Pressure (psig): 60 0 0 50 50 20

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:						
AS-1	NA	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA	NA

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:						
AS-1	NA	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA	NA

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169 Location: 889 West Grand Avenue Oakland, California Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Air-Bubbling and Air-Sparge Unit:* 3-horsepower Conde blower 5-horsepower air compressor Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.
--	---

Date Begin:	07-01-97	08-01-97	09-01-97	10-01-97	11-01-97	12-01-97
Date End:	08-01-97	09-01-97	10-01-97	11-01-97	12-01-97	01-01-98
Days of Operation (Air-Sparge):	31	31	30	31	19	0
Days of Downtime (Air-Sparge):	0	0	0	0	11	31

Air-Sparge Well Status:

AS-1	open	open	open	open	closed	closed
AS-2	open	open	open	open	closed	closed
AS-3	open	open	open	open	closed	closed
AS-4	open	open	open	open	closed	closed
AS-5	open	open	open	open	closed	closed

Air-Sparge Well Pressure (psig) (1):

AS-1	NA	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA	NA

Total Air-Sparge Flow Rate (scfm) (2): 8 to 10 10.0 8 to 10 8 to 10 0.0 0.0

Total Air-Bubbling and Air-Sparge Pressure (psig): 10.0 18.0 20.0 20.0 0.0 0.0

Dissolved Oxygen (mg/L) (3):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA	NA

Depth to Water (ft-BGS) (5):

Air-Sparge Wells:

AS-1	NA	NA	NA	NA	NA	NA
AS-2	NA	NA	NA	NA	NA	NA
AS-3	NA	NA	NA	NA	NA	NA
AS-4	NA	NA	NA	NA	NA	NA
AS-5	NA	NA	NA	NA	NA	NA

Table 6
Air-Bubbling and Air-Sparge Systems
Operation and Performance Data

Facility Number: 2169	Air-Bubbling and Air-Sparge Unit:*
Location: 889 West Grand Avenue Oakland, California	3-horsepower Conde blower 5-horsepower air compressor
Consultant: EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date: 07-15-94 Operation and Performance Data From: 07-15-94 To: 01-01-98 System was shut down on 1-15-97 and restarted on 10-16-97.

CURRENT REPORTING PERIOD:	10-01-97	to	01-01-98
DAYS / HOURS IN PERIOD:	92		1104.0
DAYS / HOURS OF OPERATION:	50		600.0
DAYS / HOURS OF DOWN TIME:	42		504.0
PERCENT OPERATIONAL:			54.3%

-
1. psig: pounds per square inch gauge
 2. scfm: standard cubic feet per minute at 14.7 psi and 70° F
 3. mg/L: milligrams per liter
 4. NA: not available or not analyzed
 5. ft-BGS: feet below grade surface
- * During the period from July 15, 1994 to July 25, 1995 the air-sparge system used a 3-horsepower Conde blower. On July 25, 1995, it was replaced with a 5-horsepower air compressor.



EA-SANJOSE-CAD/DRAWINGS: I:\02002\SITELOC.dwg Xrefs: <NONE>
 Scale: 1 = 1.00 DimScale: 1 = 1.00 Date: 3/12/97 Time: 5:19 PM Operator: KAJ



Base map from USGS 7.5' Quad. Map:
Oakland West, California. Photorevised 1980.

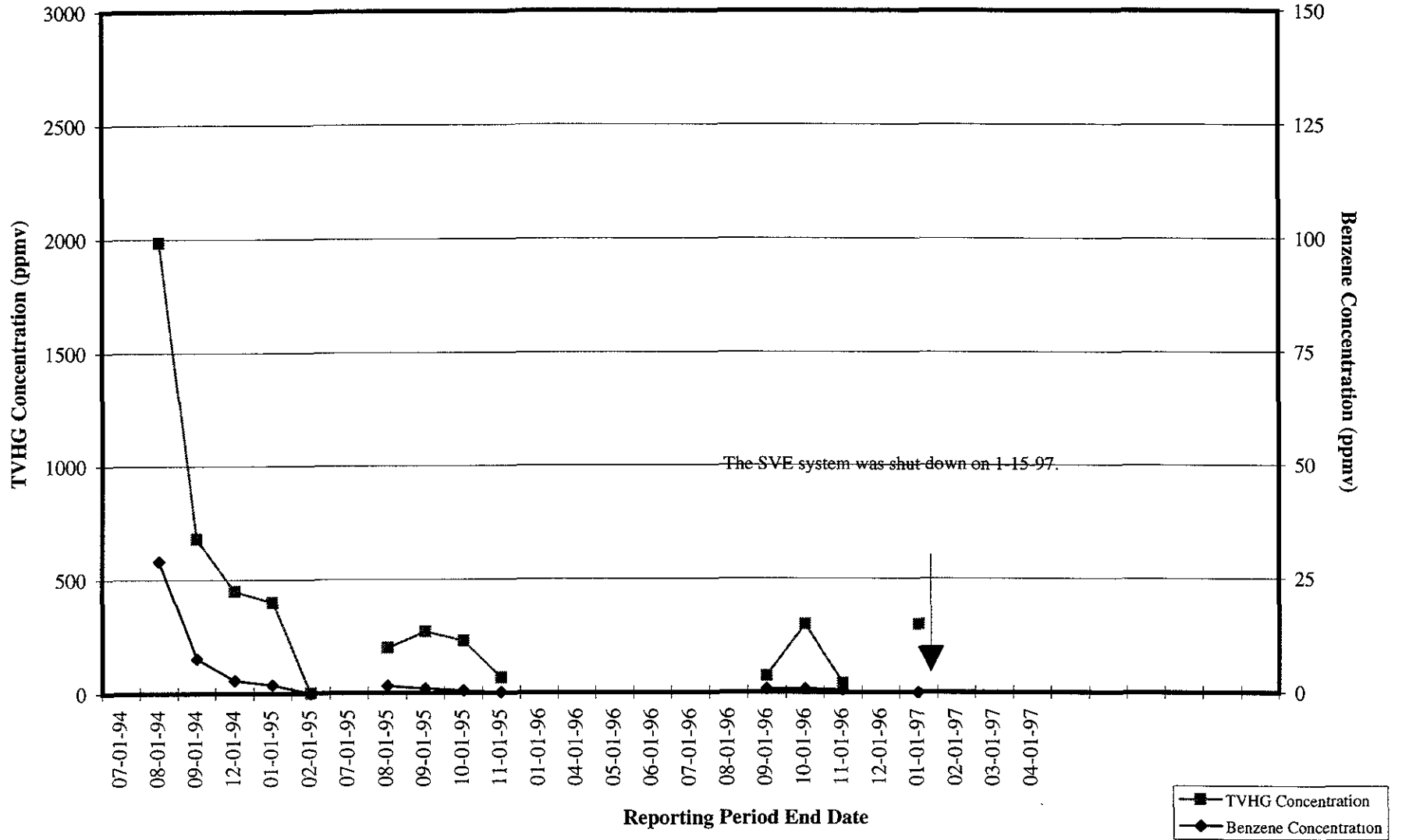


DATE NOV. 1997
 DWN KAJ
 APP _____
 REV _____
 PROJECT NO.
 805-129.004

FIGURE 1
 ARCO PRODUCTS COMPANY
 SERVICE STATION 2169, 889 W. GRAND AVE.
 SAN JOSE, CALIFORNIA
**QUARTERLY GROUNDWATER MONITORING
 SITE LOCATION**

Figure 4

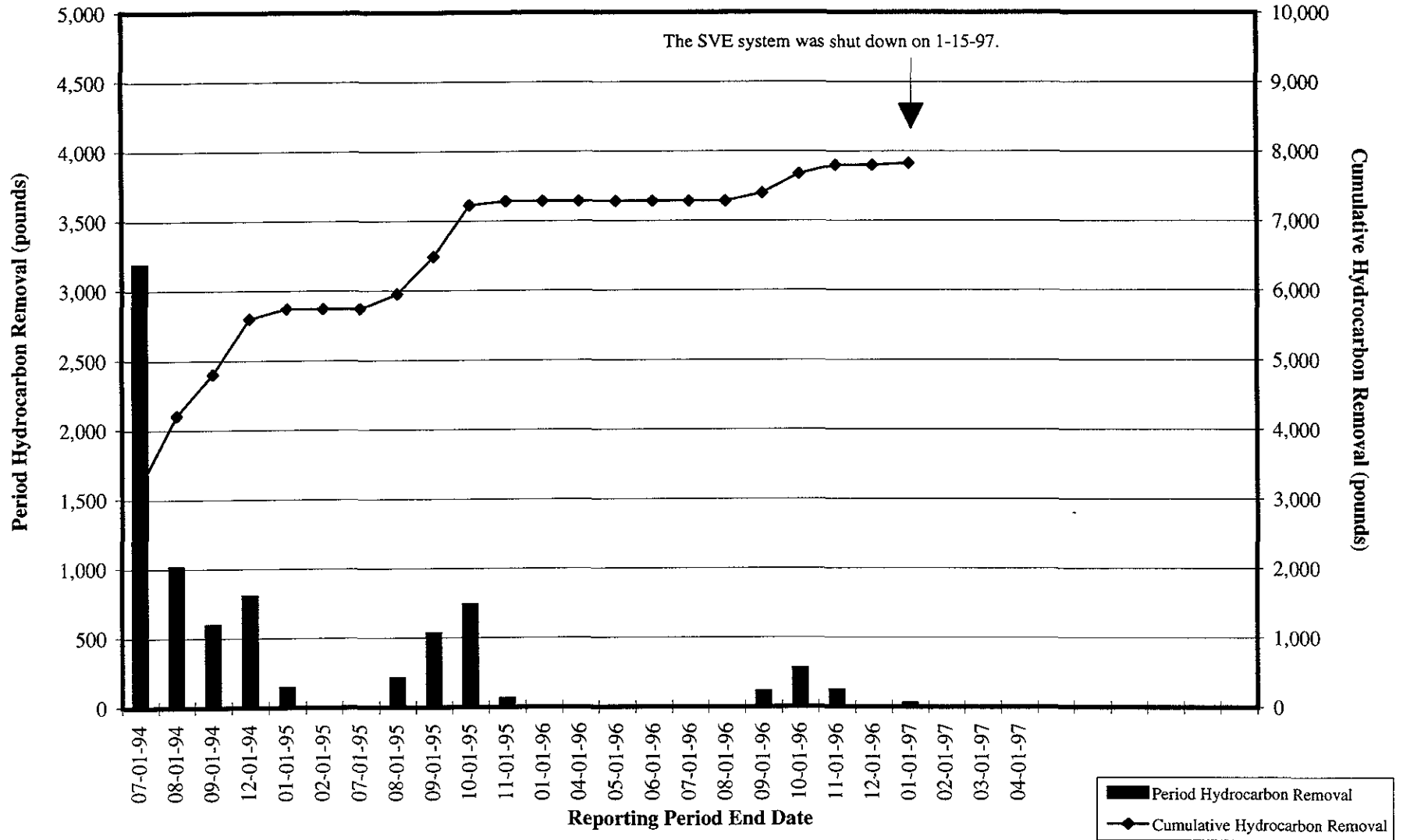
ARCO Service Station 2169
Soil-Vapor Extraction and Treatment System
Historical System Influent TVHG and Benzene Concentrations



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

Figure 5

ARCO Service Station 2169
Soil-Vapor Extraction and Treatment System
Historical Hydrocarbon Removal Rates



APPENDIX A

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



December 4, 1997

Service Request No.: S9702395

Gary Messerotes
EMCON
1921 Ringswood Avenue
San Jose, CA 95131

RE: 20805-129.004/TO#21133.00/2169 OAKLAND

Dear Mr. Messerotes:

The following pages contain analytical results for sample(s) received by the laboratory on November 18, 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 12, 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,

A handwritten signature in black ink, appearing to read "S. L. Green", written over the word "Sincerely,".

Steven L. Green
Project Chemist

A handwritten signature in black ink, appearing to read "Bernadette J. Cox for", written in a cursive style.

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
TTLIC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: 11/18/97
Date Received: 11/18/97

BTEX, MTBE and TPH as Gasoline

Sample Name: A-1(11')
Lab Code: S9702395-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/25/97	54	
Benzene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	11/25/97	0.6	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	11/25/97	27	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: 11/18/97
Date Received: 11/18/97

BTEX, MTBE and TPH as Gasoline

Sample Name: ADR-2(12')
Lab Code: S9702395-002
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	20	NA	11/26/97	11000	
Benzene	EPA 5030	8020	0.5	20	NA	11/26/97	230	
Toluene	EPA 5030	8020	0.5	20	NA	11/26/97	29	
Ethylbenzene	EPA 5030	8020	0.5	20	NA	11/26/97	300	
Xylenes, Total	EPA 5030	8020	0.5	20	NA	11/26/97	1200	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	20	NA	11/26/97	<60	C1

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: 11/18/97
Date Received: 11/18/97

BTEX, MTBE and TPH as Gasoline

Sample Name: A-6(11')
Lab Code: S9702395-003
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	2	NA	11/26/97	690	
Benzene	EPA 5030	8020	0.5	2	NA	11/26/97	<1	C1
Toluene	EPA 5030	8020	0.5	2	NA	11/26/97	<1	C1
Ethylbenzene	EPA 5030	8020	0.5	2	NA	11/26/97	3	
Xylenes, Total	EPA 5030	8020	0.5	2	NA	11/26/97	2	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	2	NA	11/26/97	7	

C1

The MRL was elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: 11/18/97
Date Received: 11/18/97

BTEX, MTBE and TPH as Gasoline

Sample Name: ADR-1(11')
Lab Code: S9702395-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	20	NA	11/26/97	18000	
Benzene	EPA 5030	8020	0.5	20	NA	11/26/97	900	
Toluene	EPA 5030	8020	0.5	20	NA	11/26/97	140	
Ethylbenzene	EPA 5030	8020	0.5	20	NA	11/26/97	360	
Xylenes, Total	EPA 5030	8020	0.5	20	NA	11/26/97	2700	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	20	NA	11/26/97	<60	C1

C1 The MRL was elevated due to high analyte concentration requiring sample dilution.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S971125-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/25/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	11/25/97	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	11/25/97	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S971126-WB1
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	11/26/97	ND	
Benzene	EPA 5030	8020	0.5	1	NA	11/26/97	ND	
Toluene	EPA 5030	8020	0.5	1	NA	11/26/97	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	11/26/97	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	11/26/97	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	11/26/97	ND	

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
 BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8020 CA/LUFT

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			4-Bromofluorobenzene	a,a,a-Trifluorotoluene
A-1(11')	S9702395-001		100	99
ADR-2(12')	S9702395-002		95	97
A-6(11')	S9702395-003		106	82
ADR-1(11')	S9702395-004		97	92
BATCH QC	S9702368-002MS		103	98
BATCH QC	S9702368-002DMS		104	96
Method Blank	S971125-WB1		103	97
Method Blank	S971126-WB1		96	96

CAS Acceptance Limits: 69-116 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND
Sample Matrix: Water

Service Request: S9702395
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/25/97

Matrix Spike/Duplicate Matrix Spike Summary
 BTE

Sample Name: BATCH QC Units: ug/L (ppb)
Lab Code: S9702368-002MS, S9702368-002DMS Basis: NA
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery			
				MS	DMS		MS	DMS	CAS Acceptance Limits		Relative Percent Difference	
Benzene	EPA 5030	8020	0.5	25	25	ND	26	26	104	104	75-135	<1
Toluene	EPA 5030	8020	0.5	25	25	ND	25	25	100	100	73-136	<1
Ethylbenzene	EPA 5030	8020	0.5	25	25	ND	25	25	100	100	69-142	<1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#21133.00/2169 OAKLAND

Service Request: S9702395
Date Analyzed: 11/25/97

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	CAS	Percent Recovery	Result Notes
					Percent Recovery Acceptance Limits		
TPH as Gasoline	EPA 5030	CA/LUFT	250	250	90-110	100	
Benzene	EPA 5030	8020	25	24	85-115	96	
Toluene	EPA 5030	8020	25	24	85-115	96	
Ethylbenzene	EPA 5030	8020	25	24	85-115	96	
Xylenes, Total	EPA 5030	8020	75	72	85-115	96	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	25	26	85-115	104	

F. GL. VDA

ARCO Products Company 597 02395

Division of Atlantic/Richfield Company

Task Order No. **21133.00**

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Gary Messerotes	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408)453-7300	Contract Number
Consultant name EMCON		Address (Consultant) 1921 Ringwood Ave. San Jose, CA 95131	

Sample I.D	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX	EPA 8020	EPA 8015	Gas Diesel	Oil and Grease	413.1	413.2	TPH	EPA 418.1/SM 503E	EPA 601/6010	EPA 624/6240	EPA 625/6270	TCIP	Semi Metals	VOAD	VOMD	CAN Metals	EPA 601/7000	TTLCD	STLCC	Lead Org/DHSC	Lead EPA 7420/7420		
			Soil	Water	Other	Ice	Acid																										
1 A-1 (11)		2		X		X	HCL	11-18-97	10:55																								
2 ADR-2 (12)		2		X		X	HCL		11:06																								
A-5 ()		2		X		X	HCL																										
3 A-6 (11)		2		X		X	HCL		11:40																								
1 ADR-1 (11)		2		X		X	HCL		11:30																								

Method of shipment
Sampler will deliver

Special Detection Limit/reporting
Lowest Possible

Special QA/QC
As Normal

Remarks
2 - 40ml HCL VOAs

#209805-179.004

Lab Number
59702395

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 <i>[Signature]</i>	Date 11-18-97	Time 15:10	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CAS
	Date 11-18-97	Time 3:15 AM	

ARCON

APPENDIX B
SVE SYSTEM MONITORING DATA LOG SHEETS

APPENDIX C
ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY
DOCUMENTATION FOR SOIL-VAPOR EXTRACTION SYSTEM,
FOURTH QUARTER 1997



RECEIVED
NOV 3 - 1997
EMCON/SACRAMENTO

October 30, 1997

Service Request No.: S9702090

Gowri Kowtha
EMCON
1433 N. Market Boulevard
Sacramento, CA 95834-1943

RE: 20805-129.004/TO#20821.00/2169 OAKLAND

Dear Mr. Kowtha:

The following pages contain analytical results for sample(s) received by the laboratory on October 16, 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 14, 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,

A handwritten signature in cursive script, appearing to read "Bernadette T. Cox".

Bernadette T. Cox
Project Chemist

A handwritten signature in cursive script, appearing to read "Greg Anderson".

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
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: 10/16/97
Date Received: 10/16/97

BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702090-001
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	10	NA	10/18/97	140	
Toluene	5030	8020	0.4	10	NA	10/18/97	95	
Ethylbenzene	5030	8020	0.5	10	NA	10/18/97	100	
Xylenes, Total	5030	8020	0.9	10	NA	10/18/97	320	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	10	NA	10/18/97	2600	
C6 - C12	5030	8015M	20	10	NA	10/18/97	2500	
TPH as Gasoline*	5030	8015M	20	10	NA	10/18/97	5100	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: 10/16/97
Date Received: 10/16/97

BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702090-001
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	10	NA	10/18/97	44	
Toluene	5030	8020	0.1	10	NA	10/18/97	25	
Ethylbenzene	5030	8020	0.1	10	NA	10/18/97	23	
Xylenes, Total	5030	8020	0.2	10	NA	10/18/97	74	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	10	NA	10/18/97	1100	
C6 - C12	5030	8015M	5	10	NA	10/18/97	600	
TPH as Gasoline*	5030	8015M	5	10	NA	10/18/97	1200	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: 10/16/97
Date Received: 10/16/97

BTEX and Total Volatile Hydrocarbons

Sample Name: E-1
Lab Code: S9702090-002
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	1	NA	10/17/97	1.7	
Toluene	5030	8020	0.4	1	NA	10/17/97	1.5	
Ethylbenzene	5030	8020	0.5	1	NA	10/17/97	ND	
Xylenes, Total	5030	8020	0.9	1	NA	10/17/97	2.7	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	10/17/97	180	
C6 - C12	5030	8015M	20	1	NA	10/17/97	240	
TPH as Gasoline*	5030	8015M	20	1	NA	10/17/97	420	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: 10/16/97
Date Received: 10/16/97

BTEX and Total Volatile Hydrocarbons

Sample Name: E-1
Lab Code: S9702090-002
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	1	NA	10/17/97	0.5	
Toluene	5030	8020	0.1	1	NA	10/17/97	0.4	
Ethylbenzene	5030	8020	0.1	1	NA	10/17/97	ND	
Xylenes, Total	5030	8020	0.2	1	NA	10/17/97	0.6	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	10/17/97	76	
C6 - C12	5030	8015M	5	1	NA	10/17/97	59	
TPH as Gasoline*	5030	8015M	5	1	NA	10/17/97	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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S971017-VB1
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	1	NA	10/17/97	ND	
Toluene	5030	8020	0.4	1	NA	10/17/97	ND	
Ethylbenzene	5030	8020	0.5	1	NA	10/17/97	ND	
Xylenes, Total	5030	8020	0.9	1	NA	10/17/97	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	10/17/97	ND	
C6 - C12	5030	8015M	20	1	NA	10/17/97	ND	
TPH as Gasoline*	5030	8015M	20	1	NA	10/17/97	ND	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S971017-VB1
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	1	NA	10/17/97	ND	
Toluene	5030	8020	0.1	1	NA	10/17/97	ND	
Ethylbenzene	5030	8020	0.1	1	NA	10/17/97	ND	
Xylenes, Total	5030	8020	0.2	1	NA	10/17/97	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	10/17/97	ND	
C6 - C12	5030	8015M	5	1	NA	10/17/97	ND	
TPH as Gasoline*	5030	8015M	5	1	NA	10/17/97	ND	

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

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 10/18-19/97

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702090-001DUP
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	5030	8020	0.4	140	150	140	7	
Toluene	5030	8020	0.4	95	96	96		
Ethylbenzene	5030	8020	0.5	100	96	98	1	
Xylenes, Total	5030	8020	0.9	320	320	320		
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	12	2600	2700	2600	69	
C6 - C12	5030	8015M	20	2500	2600	2600		
TPH as Gasoline*	5030	8015M	20	5100	5300	5200	69	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 10/18-19/97

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702090-001DUP
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	5030	8020	0.1	44	47	46	7	
Toluene	5030	8020	0.1	25	26	26	4	
Ethylbenzene	5030	8020	0.1	23	22	23	4	
Xylenes, Total	5030	8020	0.2	74	74	74	<1	
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	5	1100	1100	1,100	<1	
C6 - C12	5030	8015M	5	600	640	620	6	
TPH as Gasoline*	5030	8015M	5	1200	1300	1,300	8	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
LCS Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 10/17/97

Laboratory Control Sample Summary
 BTE

Sample Name: Lab Control Sample
Lab Code: S971017-LCS
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS		Result Notes
						Percent Recovery	Acceptance Limits	
Benzene	5030	8020	24	20	83	60-140		
Toluene	5030	8020	24	19	79	60-140		
Ethylbenzene	5030	8020	24	19	79	60-140		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
LCS Matrix: Air

Service Request: S9702090
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 10/17/97

Laboratory Control Sample Summary
 BTE

Sample Name: Lab Control Sample
Lab Code: S971017-LCS
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS		Result Notes
						Percent Recovery	Acceptance Limits	
Benzene	5030	8020	7.5	6.3	84	60-140		
Toluene	5030	8020	6.4	5.0	78	60-140		
Ethylbenzene	5030	8020	5.5	4.4	80	60-140		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND

Service Request: S9702090
Date Analyzed: 10/17/97

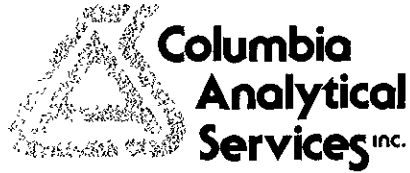
Initial Calibration Verification (ICV) Summary
BTEX and Total Volatile Hydrocarbons

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: mg/m3
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Acceptance Limits
Benzene	5030	8020	25	24	96	80-120
Toluene	5030	8020	25	24	96	80-120
Ethylbenzene	5030	8020	25	24	96	80-120
Xylenes, Total	5030	8020	75	72	96	80-120
Gasoline	5030	8015M	250	250	100	80-120



November 19, 1997

Service Request No.: S9702283

Valli Voruganti
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 20805-129.004/TO#20821.00/2169 OAKLAND

Dear Ms. Voruganti:

The following pages contain analytical results for sample(s) received by the laboratory on November 6, 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 12, 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,

A handwritten signature in black ink that reads "Steven L. Green".

Steven L. Green
Project Chemist

A handwritten signature in black ink that reads "Cristina V. Laybourn for Greg Anderson".

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
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: 11/6/97
Date Received: 11/6/97

BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702283-001
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	1	NA	11/7/97	2.5	
Toluene	5030	8020	0.4	1	NA	11/7/97	7.0	
Ethylbenzene	5030	8020	0.5	1	NA	11/7/97	2.8	
Xylenes, Total	5030	8020	0.9	1	NA	11/7/97	22	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	11/7/97	240	
C6 - C12	5030	8015M	20	1	NA	11/7/97	450	
TPH as Gasoline*	5030	8015M	20	1	NA	11/7/97	450	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: 11/6/97
Date Received: 11/6/97

BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702283-001
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	1	NA	11/7/97	0.8	
Toluene	5030	8020	0.1	1	NA	11/7/97	1.9	
Ethylbenzene	5030	8020	0.1	1	NA	11/7/97	0.6	
Xylenes, Total	5030	8020	0.2	1	NA	11/7/97	5.0	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	11/7/97	100	
C6 - C12	5030	8015M	5	1	NA	11/7/97	110	
TPH as Gasoline*	5030	8015M	5	1	NA	11/7/97	110	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: 11/6/97
Date Received: 11/6/97

BTEX and Total Volatile Hydrocarbons

Sample Name: E-1
Lab Code: S9702283-002
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	1	NA	11/7/97	ND	
Toluene	5030	8020	0.4	1	NA	11/7/97	ND	
Ethylbenzene	5030	8020	0.5	1	NA	11/7/97	ND	
Xylenes, Total	5030	8020	0.9	1	NA	11/7/97	1.1	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	11/7/97	ND	
C6 - C12	5030	8015M	20	1	NA	11/7/97	31	
TPH as Gasoline*	5030	8015M	20	1	NA	11/7/97	31	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: 11/6/97
Date Received: 11/6/97

BTEX and Total Volatile Hydrocarbons

Sample Name: E-1
Lab Code: S9702283-002
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	1	NA	11/6/97	ND	
Toluene	5030	8020	0.1	1	NA	11/6/97	ND	
Ethylbenzene	5030	8020	0.1	1	NA	11/6/97	ND	
Xylenes, Total	5030	8020	0.2	1	NA	11/6/97	0.2	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	11/6/97	ND	
C6 - C12	5030	8015M	5	1	NA	11/6/97	8	
TPH as Gasoline*	5030	8015M	5	1	NA	11/6/97	8	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S971106-VB1
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.4	1	NA	11/6/97	ND	
Toluene	5030	8020	0.4	1	NA	11/6/97	ND	
Ethylbenzene	5030	8020	0.5	1	NA	11/6/97	ND	
Xylenes, Total	5030	8020	0.9	1	NA	11/6/97	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	12	1	NA	11/6/97	ND	
C6 - C12	5030	8015M	20	1	NA	11/6/97	ND	
TPH as Gasoline*	5030	8015M	20	1	NA	11/6/97	ND	

* 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.

Analytical Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: NA
Date Received: NA

BTEX and Total Volatile Hydrocarbons

Sample Name: Method Blank
Lab Code: S971106-VB1
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	5030	8020	0.1	1	NA	11/6/97	ND	
Toluene	5030	8020	0.1	1	NA	11/6/97	ND	
Ethylbenzene	5030	8020	0.1	1	NA	11/6/97	ND	
Xylenes, Total	5030	8020	0.2	1	NA	11/6/97	ND	
Total Volatile Hydrocarbons:								
C1 - C5	5030	8015M	5	1	NA	11/6/97	ND	
C6 - C12	5030	8015M	5	1	NA	11/6/97	ND	
TPH as Gasoline*	5030	8015M	5	1	NA	11/6/97	ND	

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

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/7/97

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702283-001DUP
Test Notes:

Units: mg/m3
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	5030	8020	0.4	2.5	2.6	2.6	2	
Toluene	5030	8020	0.4	7.0	7.0	7.0	<1	
Ethylbenzene	5030	8020	0.5	2.8	3.1	3.0	5	
Xylenes, Total	5030	8020	0.9	22	23	23	4	
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	12	240	240	240	<1	
C6 - C12	5030	8015M	20	450	450	450	<1	
TPH as Gasoline*	5030	8015M	20	450	450	450	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND
Sample Matrix: Air

Service Request: S9702283
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 11/7/97

Duplicate Summary
 BTEX and Total Volatile Hydrocarbons

Sample Name: I-1
Lab Code: S9702283-001DUP
Test Notes:

Units: ppmV
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Benzene	5030	8020	0.1	0.8	0.8	0.8	<1	
Toluene	5030	8020	0.1	1.9	1.9	1.9	<1	
Ethylbenzene	5030	8020	0.1	0.6	0.7	0.7	5	
Xylenes, Total	5030	8020	0.2	5.0	5.3	5.3	6	
Total Volatile Hydrocarbons								
C1 - C5	5030	8015M	5	100	100	100	<1	
C6 - C12	5030	8015M	5	110	110	110	<1	
TPH as Gasoline*	5030	8015M	5	110	110	110	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-129.004/TO#20821.00/2169 OAKLAND

Service Request: S9702283
Date Analyzed: 11/6/97

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

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: mg/m3
Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Acceptance Limits
Benzene	5030	8020	25	28	112	80-120
Toluene	5030	8020	25	28	112	80-120
Ethylbenzene	5030	8020	25	28	112	80-120
Xylenes, Total	5030	8020	75	86	115	80-120
Gasoline	5030	8015M	250	260	104	80-120

Chain of Custody

TPH/DA F

ARCO Products Company

Division of Atlantic/Richfield Company

Task Order No. **20821.00**

Laboratory Name

CAS

Facility no. **2169**

City (Facility) **Oakland**

Project manager (Consultant) **V. Voruganti**

Contract Number

CO engineer **Paul Supple**

Telephone no. **408 (ARCO) 377 8697**

Telephone no. (Consultant)

Fax no. (Consultant)

Consultant name **EMCON**

Address (Consultant)

Method of shipment

Tech

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602 EPA 8020	BTEX/TPH EPA 162/802/8015	TPH Modified 8015	Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals <input type="checkbox"/> VOAC <input type="checkbox"/> VOAD <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOAC <input type="checkbox"/> VOAD <input type="checkbox"/>	CAM Metals EPA 6010/7000	TLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org/DHSO	Lead EPA 7420/7421 <input type="checkbox"/>	
			Soil	Water	Other	Ice	Acid																		
1-1	1	1			AIR			11/6/97	1245			X													
1-1	2	1			AIR			11/6/97	1230			X													

Special Detection Limit/reporting

Report in PPM & mg/m³

Special QA/QC

Remarks

20805.129.0041

Lab Number

5970 2283

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 **11/6/97** Time **1345**

Received by

Relinquished by

Date

Received by

Received by laboratory

AS

Date **11/6/97** Time **1200**

VOALAB



December 31, 1997

Service Request No.: S9702648

Valli Voruganti
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: 20805-030.041/TO#20821.00/2169 Oakland

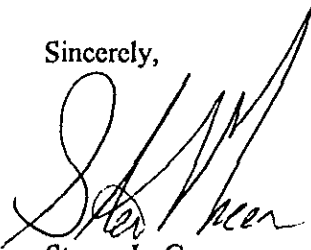
Dear Ms. Voruganti:


The following pages contain analytical results for sample(s) received by the laboratory on December 12, 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 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


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)

RESULTS OF ANALYSIS

Client : EMCON

Client Sample ID : I-1
PAI Sample ID : P9704452-001

Test Code : Modified CARB Method 410
Analyst : J. Dan Taliaferro
Instrument : HP5890/PID #2
Matrix : Tedlar Bag
Date Sampled : 12/12/97
Date Received : 12/15/97
Date Analyzed : 12/15/97
Volume(s) Analyzed : 1.00 ml

F. = 1.00

CAS #	COMPOUND	RESULT mg/m3	REPORTING LIMIT mg/m3	RESULT ppm	REPORTING LIMIT ppm
71-43-2	Benzene	0.41	0.16	0.13	0.050
108-88-3	Toluene	4.3	0.19	1.1	0.050
100-41-4	Ethylbenzene	0.69	0.22	0.16	0.050
1330-20-7	m- & p-Xylenes	7.6	0.22	1.8	0.050
95-47-6	o-Xylene	3.2	0.22	0.73	0.050

TR = Detected Below Indicated Reporting Limit

ND = Not Detected

RESULTS OF ANALYSIS

Client : EMCON

Client Sample ID : I-1

PAI Sample ID : P9704452-001 (Laboratory Duplicate)

Test Code : Modified CARB Method 410

Date Sampled : 12/12/97

Analyst : J. Dan Taliaferro

Date Received : 12/15/97

Instrument : HP5890/PID #2

Date Analyzed : 12/15/97

Matrix : Tedlar Bag

Volume(s) Analyzed : 1.00 ml

F. = 1.00

CAS #	COMPOUND	RESULT	REPORTING	RESULT	REPORTING
		mg/m3	LIMIT mg/m3	ppm	LIMIT ppm
71-43-2	Benzene	0.38	0.16	0.12	0.050
108-88-3	Toluene	4.2	0.19	1.1	0.050
100-41-4	Ethylbenzene	0.69	0.22	0.16	0.050
1330-20-7	m- & p-Xylenes	7.7	0.22	1.8	0.050
95-47-6	o-Xylene	2.9	0.22	0.68	0.050

TR = Detected Below Indicated Reporting Limit

ND = Not Detected

RESULTS OF ANALYSIS

Client : EMCON

Client Sample ID : E-1
PAI Sample ID : P9704452-002

Test Code : Modified CARB Method 410
Analyst : J. Dan Taliaferro
Instrument : HP5890/PID #2
Matrix : Tedlar Bag
Date Sampled : 12/12/97
Date Received : 12/15/97
Date Analyzed : 12/15/97
Volume(s) Analyzed : 1.00 ml

F. = 1.00

CAS #	COMPOUND	RESULT mg/m3	REPORTING LIMIT mg/m3	RESULT ppm	REPORTING LIMIT ppm
71-43-2	Benzene	0.19	0.16	0.060	0.050
108-88-3	Toluene	0.98	0.19	0.26	0.050
100-41-4	Ethylbenzene	0.35	0.22	0.080	0.050
1330-20-7	m- & p-Xylenes	2.1	0.22	0.49	0.050
95-47-6	o-Xylene	0.95	0.22	0.22	0.050

TR = Detected Below Indicated Reporting Limit

ND = Not Detected

RESULTS OF ANALYSIS

Client : EMCON
 13 APR -2 PM 11:34

Client Sample ID : N/A
 PAI Sample ID : PAI Method Blank

Test Code : Modified CARB Method 410	Date Sampled : N/A
Analyst : J. Dan Taliaferro	Date Received : N/A
Instrument : HP5890/PID #2	Date Analyzed : 12/15/97
Matrix : Tedlar Bag	Volume(s) Analyzed : 1.00 ml

.F. = 1.00

CAS #	COMPOUND	RESULT mg/m3	REPORTING LIMIT mg/m3	RESULT ppm	REPORTING LIMIT ppm
71-43-2	Benzene	ND	0.16	ND	0.050
108-88-3	Toluene	ND	0.19	ND	0.050
100-41-4	Ethylbenzene	ND	0.22	ND	0.050
1330-20-7	m- & p-Xylenes	ND	0.22	ND	0.050
95-47-6	o-Xylene	ND	0.22	ND	0.050

TR = Detected Below Indicated Reporting Limit

ND = Not Detected

RESULTS OF TOTAL PETROLEUM HYDROCARBON (TPH) ANALYSIS

Client : EMCON

Client Project ID: ARCO Products Company
PAI Project ID: P9704452

Test Code : GC/FID
 Instrument : HP5890A/FID #2
 Analyst : J. Dan Taliaferro
 Matrix : Tedlar Bag(s)

Date Sampled : 12/12/97
 Date Received : 12/15/97
 Date Analyzed : 12/15/97
 Volume(s) Analyzed : 1.00 ml

.F. = 1.00

Client Sample ID	PAI Sample ID	D. F.	Total Petroleum Hydrocarbons as Gasoline			
			Result	Reporting	Result	Reporting
			mg/m3	Limit mg/m3	ppm	Limit ppm
I-1	P9704452-001	1.00	450	3.6	110	1.0
I-1	Lab Duplicate	1.00	440	3.6	110	1.0
E-1	P9704452-002	1.00	64	3.6	16	1.0
N/A (12/15/97)	Method Blank	1.00	ND	3.6	ND	1.0

TR = Detected Below Indicated Reporting Limit

ND = Not Detected

Parts Per Million Results Are Based on a Molecular Weight of 100.

APPENDIX A

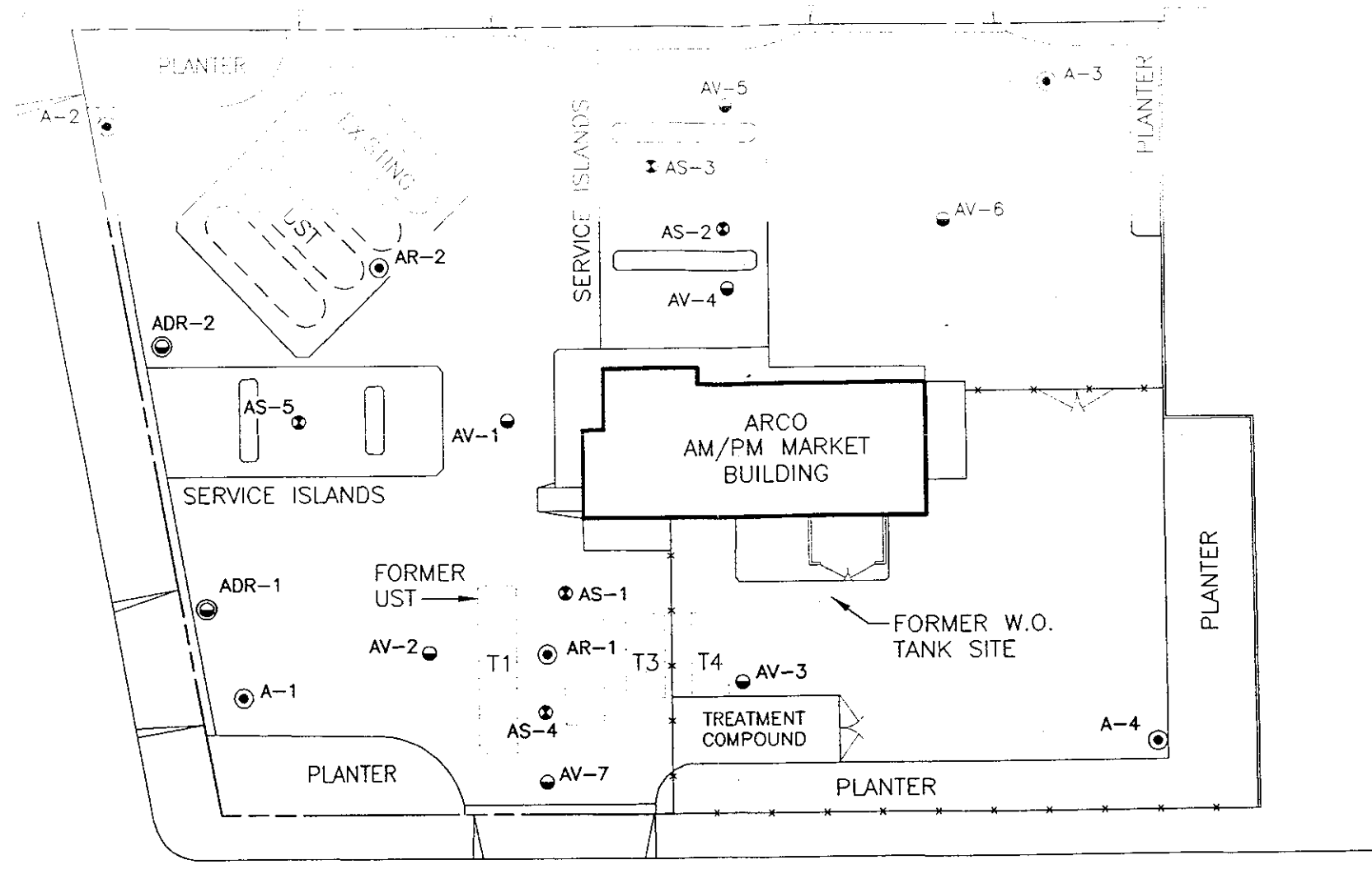
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WEST GRAND AVENUE

MARKET STREET

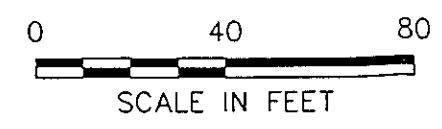
WEST GRAND SHOPPING CENTER



22nd STREET

A-5

LAUNDRY FACILITY



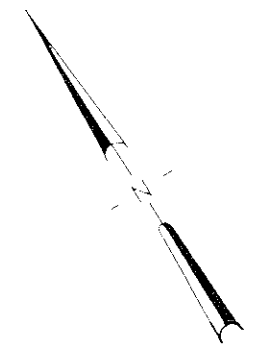
EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Groundwater monitoring/vapor extraction well
- ⊕ Air sparging well

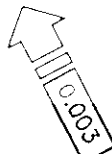
DATE NOV. 1997
 DWN KAJ
 APP _____
 REV _____
 PROJECT NO.
 805-129.004

FIGURE 2
 ARCO PRODUCTS COMPANY
 SERVICE STATION 2169, 889 W. GRAND AVE.
 OAKLAND, CALIFORNIA
**QUARTERLY GROUNDWATER MONITORING
 SITE PLAN**

WEST GRAND AVENUE

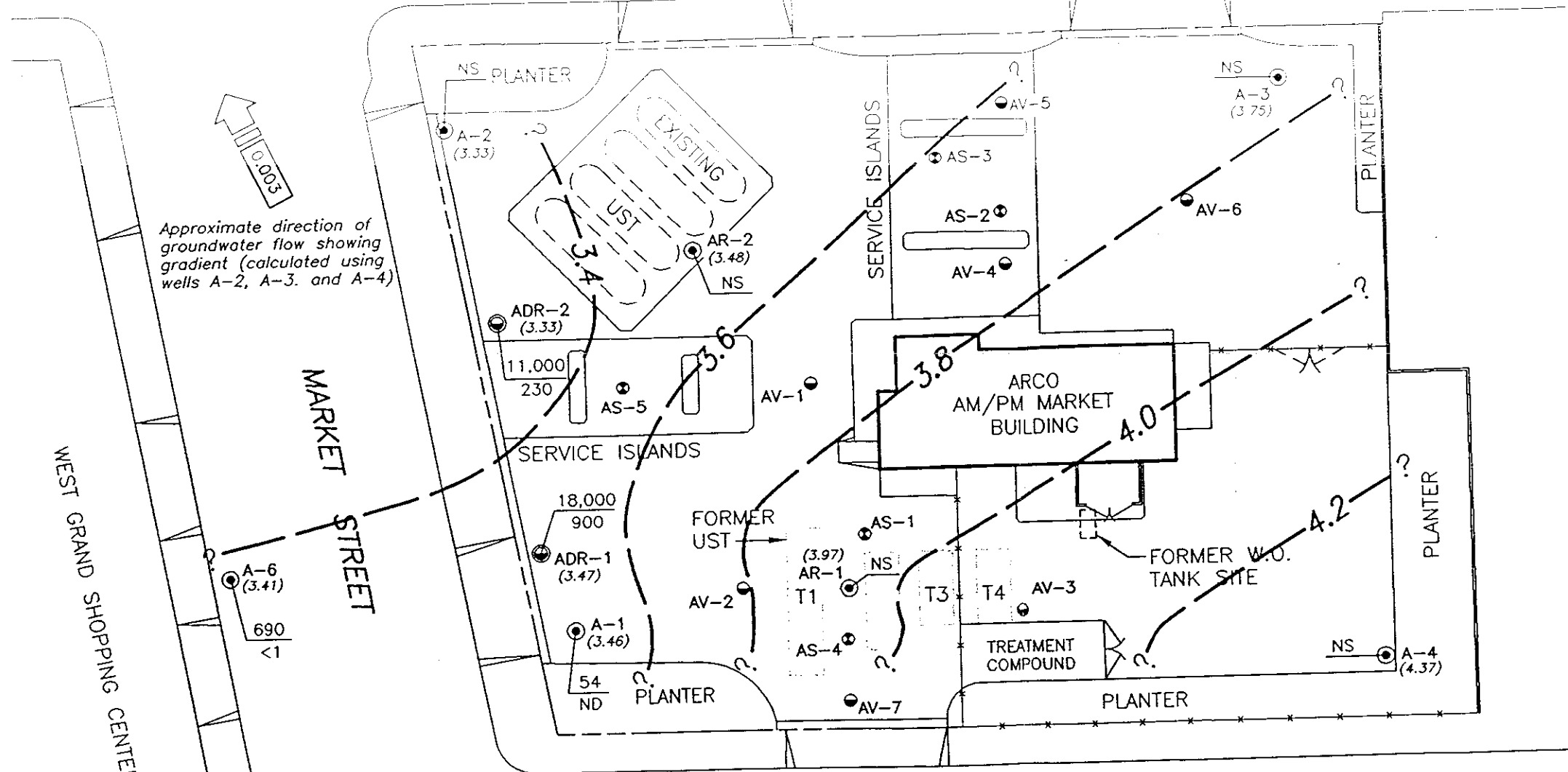


Approximate direction of groundwater flow showing gradient (calculated using wells A-2, A-3, and A-4)



EXPLANATION

- ⊙ Groundwater monitoring well
- Vapor extraction well
- ⊕ Groundwater monitoring/vapor extraction well
- ⊙ Air sparging well
- (3.46) Groundwater elevation (Ft.-MSL); measured 11/18/97
- ? - - - Groundwater elevation contour (Ft.-MSL)
- 54 / ND TPHG concentration (ug/L); sampled 11/18/97
- 54 / ND Benzene concentration (ug/L); sampled 11/18/97
- ND Not detected at or above reporting limit for TPHG (50 ug/L) and benzene (0.5 ug/L)
- NS Not sampled; not scheduled for chemical analysis
- NR Not recorded; filter sock stuck in well



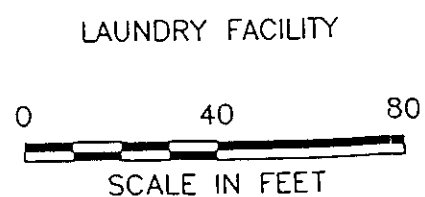
WEST GRAND SHOPPING CENTER

MARKET STREET

22nd STREET

A-5 (NR)

Base map from ARCO Site Plan (4/22/91), field observations (2/2/93), and Second Quarter Map from GeoStrategies Inc. (3/94).



DATE MAR. 1998
 DWN KAJ
 APP _____
 REV _____
 PROJECT NO. 805-129.004

FIGURE 3
 ARCO PRODUCTS COMPANY
 SERVICE STATION 2169, 889 W. GRAND AVE.
 OAKLAND, CALIFORNIA
 QUARTERLY GROUNDWATER MONITORING
 GROUNDWATER DATA - 4TH QUARTER 1997

EA-SANJOSE-CAD/DRAWINGS: G:\805-129\SIGWELEV.dwg Xrefs: <NONE> Operator: KAJ Date: 3/17/98 Time: 2:56 PM Scale: 1 = 40.00 DimScale: 1 = 40.00