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

Date March 31, 1996
Project 20805-129.002

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
1	Fourth quarter 1995 groundwater monitoring results and remediation system performance evaluation report, ARCO Service Station 2169, Oakland, California

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

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.

John C. Young
Project Manager

96 MAR 21 PM 2:32
ENVIRONMENTAL PROTECTION

cc: Kevin Graves, RWQCB - SFBR
Michael Whelan - ARCO Products Company
Ivy Inouye, EMCON
File

ARCO Products Company

Date:
March 31, 1996

Re: ARCO Station # 2169 • 889 West Grand Avenue • Oakland, CA
Fourth Quarter 1995 Groundwater Monitoring Results and
Remediation System Performance Evaluation Report

" I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached proposal or report are true and correct."

Submitted by:

Michael R. Whelan

Michael R. Whelan
Environmental Engineer

EMCON

LIMITATIONS

No monitoring event is thorough enough to describe all geologic and hydrogeologic conditions of interest at a given site. If conditions have not been identified during the monitoring event, such a finding should not be construed as a guarantee of the absence of such conditions at the site, but rather as the result of the scope, limitations, and cost of the work performed during the monitoring event.

SITE STATUS UPDATE

This update reports site activities performed during the fourth quarter of 1995 and the anticipated site activities for the first quarter of 1996.

Fourth Quarter 1995 Activities

- Prepared and submitted quarterly groundwater monitoring results and remediation system performance evaluation report for third quarter 1995.
- Performed quarterly groundwater monitoring for fourth quarter 1995.
- Restarted the SVE and AS systems.
- Performed operation and maintenance of the SVE and AS systems for fourth quarter 1995.

Work Anticipated for First Quarter 1996

- Prepare the quarterly groundwater monitoring results and remediation system performance evaluation report for fourth quarter 1995.
- Perform quarterly groundwater monitoring for first quarter 1996.
- Perform floating product recovery from wells ADR-1 and ADR-2 for first quarter 1996.

- Restart and perform operation and maintenance of the SVE and AS systems for first quarter 1996.

Sincerely,

EMCON

Sailaja Yelamanchili
Staff Engineer

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

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

cc: Kevin Graves, RWQCB
Susan Hugo, ACHCSA

Attachments:

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Appendix D -	Operation and Maintenance Field Data Sheets, SVE and Air-Sparge Systems, Fourth Quarter 1995
Appendix E -	Analytical Results and Chain-of-Custody Documentation for SVE System Air Samples, Fourth Quarter 1995

Table 1
Groundwater Monitoring Data
Fourth Quarter 1995

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

Date. 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240	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	12-04-95	14.16	12 28	1 88	ND	NNW	0.002	12-04-95	1200	240	17	25	56	--	120	--
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-3	12-04-95	15.75	13.57	2.18	ND	NNW	0.002	12-04-95	Not sampled: not scheduled for chemical analysis							
A-4	12-04-95	15.25	12.63	2.62	ND	NNW	0 002	12-04-95	Not sampled: not scheduled for chemical analysis							
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-6	12-04-95	13.51	11.52	1 99	ND	NNW	0.002	12-04-95	28000	1600	1800	880	3600	--	--	--
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-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	--	--	--
ADR-1	12-04-95	13.95	10.05	3.90	ND	NNW	0 002	12-13-95	8800	100	130	120	990	--	--	--
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							

ft-MSL: elevation in feet, relative to mean sea level
MWN: ground-water flow direction and gradient apply to the entire monitoring well network
ft/ft foot per foot
TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA: United Statest Environmental Protection Agency
MTBE. methyl-tert-butyl ether
TPHD: total petroleum hydrocarbons as diesel, California DHS LUFT Method
ND: none detected
NNW: north-northwest
- - : not analyzed
**: [corrected elevation (Z')] = Z + (h * 0.73) where: Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water

esj/h:\2169\2169mdb.xls\Table 1:dcl
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Table 2
Historical Groundwater Elevation Data

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

Date. 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-1	04-03-92	14.75	10.35	4.40	ND	NR	NR
A-1	05-20-92	14.75	11 66	3.09	ND	NR	NR
A-1	06-16-92	14.75	11 95	2 80	ND	NR	NR
A-1	07-17-92	14 75	12.23	2.52	ND	NR	NR
A-1	08-07-92	14.75	12.16	2.59	ND	NR	NR
A-1	09-22-92	14.75	12.42	2.33	ND	NR	NR
A-1	10-13-92	14.75	12.47	2.28	ND	NR	NR
A-1	11-23-92	14.75	11 83	2.92	ND	NR	NR
A-1	12-16-92	14.75	11 03	3 72	ND	NR	NR
A-1	01-28-93	14 75	9.08	5 67	ND	NR	NR
A-1	02-22-93	14.75	9.46	5.29	ND	NR	NR
A-1	03-25-93	14.75	10.02	4.73	ND	NR	NR
A-1	04-15-93	14.75	10 50	4.25	ND	NR	NR
A-1	05-22-93	14.75	11.33	3.42	ND	NR	NR
A-1	06-16-93	14.75	11.51	3 24	ND	NR	NR
A-1	07-27-93	14 75	11.91	2 84	ND	NR	NR
A-1	08-26-93	14 75	12.11	2.64	ND	NR	NR
A-1	09-27-93	14.75	12.21	2.54	ND	NR	NR
A-1	10-08-93	14.75	12.21	2.54	ND	NR	NR
A-1	02-09-94	14.16	10.09	4.07	ND	NR	NR
A-1	05-04-94	14.16	10.68	3.48	ND	NW	0.004
A-1	08-10-94	14.16	10.28	3.88	ND	WNW	0.007
A-1	11-16-94	14 16	9 75	4.41	ND	NW	0.005
A-1	03-24-95	14.16	8.10	6.06	ND	NW	0 009
A-1	06-05-95	14.16	11.13	3.03	ND	NW	0 002
A-1	08-17-95	14.16	11.71	2.45	ND	W	0.001
A-1	12-04-95	14.16	12.28	1.88	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date. 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-2	04-03-92	15.16	10 97	4.19	ND	NR	NR
A-2	05-20-92	15.16	12.17	2.99	ND	NR	NR
A-2	06-16-92	15.16	12 43	2.73	ND	NR	NR
A-2	07-17-92	15.16	12.64	2.52	ND	NR	NR
A-2	08-07-92	15.16	12.75	2 41	ND	NR	NR
A-2	09-22-92	15.16	12.88	2 28	ND	NR	NR
A-2	10-13-92	15.16	12.92	2.24	ND	NR	NR
A-2	11-23-92	15.16	12.18	2 98	ND	NR	NR
A-2	12-16-92	15.16	11.52	3 64	ND	NR	NR
A-2	01-28-93	15.16	9.73	5 43	ND	NR	NR
A-2	02-22-93	15.16	9.28	5.88	ND	NR	NR
A-2	03-25-93	15.16	10.57	4 59	ND	NR	NR
A-2	04-15-93	15.16	11.20	3.96	ND	NR	NR
A-2	05-22-93	15.16	11.91	3.25	ND	NR	NR
A-2	06-16-93	15.16	12.04	3.12	ND	NR	NR
A-2	07-27-93	15.16	12.41	2 75	ND	NR	NR
A-2	08-25-93	15.16	12.54	2.62	ND	NR	NR
A-2	09-27-93	15.16	12 66	2.50	ND	NR	NR
A-2	10-08-93	15.16	12.65	2.51	ND	NR	NR
A-2	02-09-94	14.55	10.67	3.88	ND	NR	NR
A-2	05-04-94	14.55	11.25	3.30	ND	NW	0 004
A-2	08-10-94	14.55	11.56	2 99	ND	WNW	0.007
A-2	11-16-94	14.55	10.31	4.24	ND	NW	0.005
A-2	03-24-95	14.55	8.64	5.91	ND	NW	0.009
A-2	06-05-95	14.55	11.72	2.83	ND	NW	0.002
A-2	08-17-95	14.55	12.35	2.20	ND	W	0.001
A-2	12-04-95	14.55	12.74	1.81	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date: 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-3	04-03-92	16.38	11.70	4.68	ND	NR	NR
A-3	05-20-92	16 38	13.00	3 38	ND	NR	NR
A-3	06-16-92	16.38	13 46	2.92	ND	NR	NR
A-3	07-17-92	16.38	13.45	2.93	ND	NR	NR
A-3	08-07-92	16.38	12.37	4 01	ND	NR	NR
A-3	09-22-92	16.38	13 71	2.67	ND	NR	NR
A-3	10-13-92	16 38	13.76	2.62	ND	NR	NR
A-3	11-23-92	16 38	13.60	2.78	ND	NR	NR
A-3	12-16-92	16.38	12.31	4.07	ND	NR	NR
A-3	01-28-93	16.38	10.33	6.05	ND	NR	NR
A-3	02-22-93	16.38	10 44	5.94	ND	NR	NR
A-3	03-25-93	16.38	11.27	5.11	ND	NR	NR
A-3	04-15-93	16 38	11.98	4.40	ND	NR	NR
A-3	05-22-93	16.38	12.70	3 68	ND	NR	NR
A-3	06-16-93	16.38	12.84	3.54	ND	NR	NR
A-3	07-27-93	16.38	13.22	3.16	ND	NR	NR
A-3	08-25-93	16.38	13.35	3.03	ND	NR	NR
A-3	09-27-93	16.38	13.50	2.88	ND	NR	NR
A-3	10-08-93	16.38	13.48	2.90	ND	NR	NR
A-3	02-09-94	15.75	11 32	4.43	ND	NR	NR
A-3	05-04-94	15.75	11.99	3.76	ND	NW	0.004
A-3	08-10-94	15.75	11 12	4.63	ND	WNW	0.007
A-3	11-16-94	15.75	11.02	4.73	ND	NW	0.005
A-3	03-24-95	15 75	8.83	6.92	ND	NW	0.009
A-3	06-05-95	15.75	12.44	3 31	ND	NW	0.002
A-3	08-17-95	15.75	13.04	2.71	ND	W	0.001
A-3	12-04-95	15.75	13.57	2.18	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date: 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-4	04-03-92	15.89	10.84	5.05	ND	NR	NR
A-4	05-20-92	15.89	12.13	3.76	ND	NR	NR
A-4	06-16-92	15.89	12.33	3.56	ND	NR	NR
A-4	07-17-92	15.89	12.60	3.29	ND	NR	NR
A-4	08-07-92	15.89	12 56	3.33	ND	NR	NR
A-4	09-22-92	15.89	12.87	3.02	ND	NR	NR
A-4	10-13-92	15.89	12.87	3.02	ND	NR	NR
A-4	11-23-92	15.89	12.63	3.26	ND	NR	NR
A-4	12-16-92	15.89	11.34	4.55	ND	NR	NR
A-4	01-28-93	15.89	9.40	6.49	ND	NR	NR
A-4	02-22-93	15.89	9.35	6 54	ND	NR	NR
A-4	03-25-93	15.89	10.32	5 57	ND	NR	NR
A-4	04-15-93	15.89	11.15	4.74	ND	NR	NR
A-4	05-22-93	15 89	11.84	4.05	ND	NR	NR
A-4	06-16-93	15.89	12.01	3.88	ND	NR	NR
A-4	07-27-93	15.89	12.33	3.56	ND	NR	NR
A-4	08-25-93	15 89	12.48	3.41	ND	NR	NR
A-4	09-27-93	15.89	12.60	3.29	ND	NR	NR
A-4	10-08-93	15.89	12 57	3.32	ND	NR	NR
A-4	02-09-94	15.25	10 01	5.24	ND	NR	NR
A-4	05-04-94	15.25	11.08	4.17	ND	NW	0.004
A-4	08-10-94	15.25	11.75	3.50	ND	WNW	0.007
A-4	11-16-94	15.25	9.78	5.47	ND	NW	0.005
A-4	03-24-95	15.25	7.20	8.05	ND	NW	0.009
A-4	06-05-95	15.25	11.70	3.55	ND	NW	0.002
A-4	08-17-95	15.25	12.28	2.97	ND	W	0.001
A-4	12-04-95	15.25	12.63	2.62	ND	NNW	0.002
A-5	02-11-93	14 14	9.15	4.99	ND	NR	NR
A-5	03-25-93	14.14	9.33	4.81	ND	NR	NR
A-5	04-15-93	14.14	10.11	4.03	ND	NR	NR
A-5	05-22-93	14.14	10.71	3.43	ND	NR	NR
A-5	06-16-93	14.14	10.84	3.30	ND	NR	NR
A-5	07-27-93	14.14	11.22	2.92	ND	NR	NR
A-5	08-26-93	14.14	11.44	2.70	ND	NR	NR
A-5	09-27-93	14.14	11.51	2.63	ND	NR	NR
A-5	10-08-93	14.14	11.68	2.46	ND	NR	NR
A-5	02-09-94	13.51	9.44	4.07	ND	NR	NR
A-5	05-04-94	13.51	10.00	3.51	ND	NW	0.004
A-5	08-10-94	13.51	10 76	2.75	ND	WNW	0.007
A-5	11-16-94	13.51	9.09	4.42	ND	NW	0.005
A-5	03-24-95	13 51	7.40	6.11	ND	NW	0.009
A-5	06-05-95	13.51	10.43	3.08	ND	NW	0.002
A-5	08-17-95	13.51	11.15	2 36	ND	W	0.001
A-5	12-04-95	13 51	11.42	2 09	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date: 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
A-6	02-11-93	14.17	9.35	4.82	ND	NR	NR
A-6	03-25-93	14.17	Not surveyed: well was inaccessible				
A-6	04-16-93	14 17	9.36	4.81	ND	NR	NR
A-6	05-22-93	14.17	10.86	3 31	ND	NR	NR
A-6	06-16-93	14.17	10.98	3.19	ND	NR	NR
A-6	07-27-93	14.17	Not surveyed: well was inaccessible				
A-6	08-25-93	14.17	Not surveyed: well was inaccessible				
A-6	09-27-93	14.17	11.65	2.52	ND	NR	NR
A-6	10-08-93	14.17	11.80	2.37	ND	NR	NR
A-6	02-09-94	13.51	9.48	4.03	ND	NR	NR
A-6	05-04-94	13.51	10.07	3.44	ND	NW	0.004
A-6	08-10-94	13.51	10.77	2 74	ND	WNW	0.007
A-6	11-16-94	13.51	9.14	4.37	ND	NW	0.005
A-6	03-24-95	13.51	7.89	5 62	ND	NW	0.009
A-6	06-05-95	13.51	10.06	3.45	ND	NW	0.002
A-6	08-17-95	13.51	11.10	2.41	ND	W	0.001
A-6	*12-04-95*	*13.51*	*11.52*	*1.99*	*ND*	*NNW*	*0.002*
AR-1	04-03-92	15.71	11.07	4.64	ND	NR	NR
AR-1	05-20-92	15.71	12.37	3 34	ND	NR	NR
AR-1	06-16-92	15.71	12.47	3.24	ND	NR	NR
AR-1	07-17-92	15.71	13.00	2 71	ND	NR	NR
AR-1	08-07-92	15.71	12.87	2.84	ND	NR	NR
AR-1	09-22-92	15.71	12.99	2 72	ND	NR	NR
AR-1	10-13-92	15.71	13.05	2.66	ND	NR	NR
AR-1	11-23-92	15.71	12.80	2.91	ND	NR	NR
AR-1	12-16-92	15.71	11.49	4 22	ND	NR	NR
AR-1	01-28-93	15.71	9.46	6 25	ND	NR	NR
AR-1	02-22-93	15.71	10.05	5.66	ND	NR	NR
AR-1	03-25-93	15.71	10.75	4 96	ND	NR	NR
AR-1	04-15-93	15.71	11.26	4 45	ND	NR	NR
AR-1	05-22-93	15.71	12.07	3.64	ND	NR	NR
AR-1	06-16-93	15.71	12.21	3.50	ND	NR	NR
AR-1	07-27-93	15.71	12.60	3 11	ND	NR	NR
AR-1	08-25-93	15.71	12.78	2 93	ND	NR	NR
AR-1	09-27-93	15.71	12.89	2 82	ND	NR	NR
AR-1	10-08-93	15.71	12.84	2.87	ND	NR	NR
AR-1	02-09-94	15.61	11.08	4.53	ND	NR	NR
AR-1	05-04-94	15.61	11.83	3.78	ND	NW	0.004
AR-1	08-10-94	15.61	11.09	4 52	ND	WNW	0.007
AR-1	11-16-94	15.61	10.19	5.42	ND	NW	0.005
AR-1	03-24-95	15.61	7.25	8.36	ND	NW	0.009
AR-1	06-05-95	15.61	11.37	4 24	ND	NW	0.002
AR-1	08-17-95	15.61	12.40	3.21	ND	W	0.001
AR-1	12-04-95	15.61	12.90	2 71	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date: 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
AR-2	07-17-92	15.79	13.14	2 65	ND	NR	NR
AR-2	08-07-92	15.79	13.25	2.54	ND	NR	NR
AR-2	09-22-92	15.79	13.58	2.21	ND	NR	NR
AR-2	10-13-92	15.79	13.65	2.14	ND	NR	NR
AR-2	11-23-92	*15.79 Not surveyed: could not located well*					
AR-2	12-16-92	15.79	12 16	3.63	ND	NR	NR
AR-2	01-28-93	15.79	10.26	5.53	ND	NR	NR
AR-2	02-22-93	15.79	10 52	5.27	ND	NR	NR
AR-2	03-25-93	15.79	11.18	4.61	ND	NR	NR
AR-2	04-15-93	15.79	11 81	3.98	ND	NR	NR
AR-2	05-22-93	15.79	12 46	3.33	ND	NR	NR
AR-2	06-16-93	15.79	12.53	3.26	ND	NR	NR
AR-2	07-27-93	15.79	12.77	3.02	ND	NR	NR
AR-2	08-26-93	15.79	13.23	2.56	ND	NR	NR
AR-2	09-27-93	15.79	13 16	2.63	ND	NR	NR
AR-2	10-08-93	15.79	13.32	2.47	ND	NR	NR
AR-2	02-09-94	15.28	11.33	3.95	ND	NR	NR
AR-2	05-04-94	15.28	11 88	3.40	ND	NW	0.004
AR-2	08-10-94	15.28	12.48	2.80	ND	WNW	0.007
AR-2	11-16-94	15.28	10.95	4.33	ND	NW	0.005
AR-2	03-24-95	15.28	9.13	6.15	ND	NW	0.009
AR-2	06-05-95	15 28	12.09	3.19	ND	NW	0.002
AR-2	08-17-95	15.28	12.78	2 50	ND	W	0 001
AR-2	12-04-95	15.28	11 44	3.84	ND	NNW	0.002

Table 2
Historical Groundwater Elevation Data

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

Date. 02-12-96

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient foot/foot
ADR-1	02-09-94	13.95	9.90	4.05	ND	NR	NR
ADR-1	05-04-94	13.95	10 50	3.45	ND	NW	0.004
ADR-1	08-10-94	13.95	10.36	3.59	ND	WNW	0.007
ADR-1	11-16-94	13.95	9.64	4.31	Sheen	NW	0.005
ADR-1	03-24-95	13.95	8.04	** 5.92	0.01	NW	0.009
ADR-1	06-05-95	13 95	11.02	2.93	ND	NW	0.002
ADR-1	08-17-95	13 95	11.86	2.09	ND	W	0.001
ADR-1	12-04-95	13.95	10.05	3.90	ND	NNW	0.002
ADR-2	02-09-94	14.64	10.73	3.91	ND	NR	NR
ADR-2	05-04-94	14.64	11.31	3.33	ND	NW	0.004
ADR-2	08-10-94	14 64	9.81	** 4.90	0.10	WNW	0.007
ADR-2	11-16-94	14.64	9.84	** 4.87	0.09	NW	0.005
ADR-2	03-24-95	14 64	8.41	NR*	>3 00*	NR*	NR*
ADR-2	06-05-95	14.64	11.45	NR*	>3.00*	NR*	NR*
ADR-2	08-17-95	14 64	12 10	** 2.56	0.03	W	0 001
ADR-2	12-04-95	14.64	10 93	** 3.73	0.03	NNW	0 002

ft-MSL: elevation in feet, relative to mean sea level
MWN: groundwater flow direction and gradient apply to the entire monitoring well network
ND: none detected
NR: not reported; data not available or not measurable
NW: northwest
WNW: west-northwest
W. west
NNW: north-northwest
**: [corrected elevation (Z')] = Z + (h * 0.73) where. Z = measured elevation, h = floating product thickness, 0.73 = density ratio of oil to water
*: well contained more than 3 feet of floating product; exact product thickness and groundwater elevation could not be measured

Table 3
Historical Groundwater Analytical Data

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

Date: 02-12-96

Well Designation	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	04-03-92	34000	6200	3900	410	3100	--	--	6100
A-1	07-17-92	5600	3000	500	<100	<100	--	--	--
A-1	10-13-92	5600	980	590	85	910	--	--	--
A-1	01-28-93	3700	780	360	130	460	--	--	^620
A-1	04-15-93	210	34	11	7.1	20	--	--	^420
A-1	08-26-93	2000	370	35	50	220	--	--	^1500
A-1	10-08-93	2600	430	65	64	99	--	--	^1200
A-1	02-09-94	3000	560	150	66	190	--	--	^650
A-1	05-04-94	1300	250	61	27	110	--	--	^2100
A-1	08-10-94	27000	3700	1100	540	3000	--	--	^3000
A-1	11-16-94	2100	460	6.4	62	120	--	--	^^^^640
A-1	03-24-95	1200	230	39	34	66	--	--	^^^^160
A-1	06-05-95	1500	310	27	36	76	--	--	^710
A-1	08-18-95	1600	470	35	48	110	120	--	^240
A-1	12-04-95	1200	240	17	25	56	--	120	--
A-2	04-03-92	<30	<0.3	<0.3	<0.3	<0.3	--	--	<50
A-2	07-17-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	10-13-92	<50	0.57	<0.5	<0.5	<0.5	--	--	--
A-2	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	04-15-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	08-25-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	02-09-94	^^260	<0.6	<0.5	<0.5	<0.5	--	--	--
A-2	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	08-10-94	690	47	25	3.9	86	--	--	--
A-2	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	06-05-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-2	08-17-95	<50	<0.5	<0.5	<0.5	<0.5	12	--	--
A-2	12-04-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	04-03-92	200	0.79	0.65	4.4	<0.3	--	--	130
A-3	07-17-92	<50	<0.5	<0.5	1.3	2.3	--	--	--
A-3	10-13-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	04-15-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	08-25-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	02-09-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	08-10-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	11-16-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-3	06-05-95	Not sampled: not scheduled for chemical analysis							
A-3	08-17-95	Not sampled: not scheduled for chemical analysis							
A-3	12-04-95	Not sampled: not scheduled for chemical analysis							

Table 3
Historical Groundwater Analytical Data

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

Date. 02-12-96

Well Designation	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-4	04-03-92	35	<0 3	<0 3	<0.3	<0.3	--	--	85
A-4	07-17-92	<50	<0 5	<0 5	<0 5	<0.5	--	--	--
A-4	10-13-92	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	01-28-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	04-15-93	<50	<0.5	<0.5	<0.5	<0 5	--	--	--
A-4	08-25-93	<50	<0 5	<0 5	<0.5	<0 5	--	--	--
A-4	10-08-93	<50	<0 5	<0 5	<0 5	<0.5	--	--	--
A-4	02-09-94	<50	<0.5	<0.5	<0 5	<0.5	--	--	--
A-4	05-04-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	08-10-94	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	11-16-94	<50	<0 5	<0 5	<0.5	<0.5	--	--	--
A-4	03-24-95	<50	<0.5	<0.5	<0.5	<0.5	--	--	--
A-4	06-05-95	Not sampled: not scheduled for chemical analysis							
A-4	08-17-95	Not sampled: not scheduled for chemical analysis							
A-4	12-04-95	Not sampled not scheduled for chemical analysis							
A-5	02-11-93	4900	380	640	140	970	--	--	--
A-5	04-15-93	27000	3100	4000	1100	4600	--	--	--
A-5	08-26-93	13000	1100	1400	480	1800	--	--	--
A-5	10-08-93	6800	490	620	280	980	--	--	--
A-5	02-09-94	2200	190	130	130	310	--	--	--
A-5	05-09-94	13000	1000	1500	490	2000	--	--	--
A-5	08-10-94	11000	730	930	310	1300	--	--	--
A-5	11-16-94	2600	160	220	130	400	--	--	--
A-5	03-24-95	3300	200	310	130	460	--	--	--
A-5	06-05-95	57000	2700	4600	1500	6800	--	--	--
A-5	08-18-95	34000	1600	2700	1100	5100	<28	--	--
A-5	12-04-95	61	<0.5	<0.5	<0.5	<0.5	--	--	--
A-6	02-11-93	990	1.8	5.1	17	7.2	--	--	--
A-6	04-16-93	390	1.3	1.6	1.7	7.7	--	--	--
A-6	08-25-93	Not sampled: well was inaccessible							
A-6	10-08-93	220	0.73	<0.5	0.82	0.65	--	--	--
A-6	02-09-94	640	<2.9	<3.7	<2.4	<8.2	--	--	--
A-6	05-04-94	260	<0.5	<1.5	<1.5	<0.5	--	--	--
A-6	08-10-94	300	<0 6	<2.5	<0.8	<1	--	--	--
A-6	11-16-94	250	<0.5	<1.5	<0.6	<1.5	--	--	--
A-6	03-24-95	120	<0.5	<1	<0.5	<1 5	--	--	--
A-6	06-05-95	160	<0.5	<0.6	<0.5	<0.5	--	--	--
A-6	08-18-95	530	<0 5	<0 5	<2.4	<4.2	6	--	--
A-6	12-04-95	28000	1600	1800	880	3600	--	--	--

Table 3
Historical Groundwater Analytical Data

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

Date. 02-12-96

Well Designation	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
AR-1	04-03-92	17000	310	1400	320	3000	--	--	12000
AR-1	07-17-92	*44000*	*4300*	*1800*	*1800*	*10000*	--	--	--
AR-1	10-13-92	32000	310	730	570	3100	--	--	^22000
AR-1	01-28-93	15000	1200	510	510	2600	--	--	^5300
AR-1	04-15-93	17000	1800	360	520	1600	--	--	^5400
AR-1	08-25-93	2900	260	54	80	160	--	--	^2800
AR-1	10-08-93	3500	200	85	120	290	--	--	^4100
AR-1	02-09-94	26000	2900	450	920	3000	--	--	^4200
AR-1	05-04-94	36000	3400	360	1400	3700	--	--	^7200
AR-1	08-10-94	6100	120	66	65	530	--	--	^2900
AR-1	11-16-94	1200	66	20	34	210	--	--	^^^^560
AR-1	03-24-95	270	14	0.6	2.5	2 1	--	--	^^^^130
AR-1	06-05-95	190	10	<0.5	0.8	0.5	--	--	^580
AR-1	08-17-95	960	110	12	4.5	150	14	--	<50
AR-1	12-04-95	<50	1.5	<0.5	<0.5	0.8	--	--	--
AR-2	07-17-92	150	6.6	24	6.6	39	--	--	--
AR-2	10-13-92	<50	2	0.86	0.51	3 8	--	--	^58
AR-2	01-28-93	2000	570	13	<10	380	--	--	^290
AR-2	04-15-93	85	15	<0.5	<0.5	2.4	--	--	<50
AR-2	08-26-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	<50
AR-2	10-08-93	<50	<0.5	<0.5	<0.5	<0.5	--	--	<50
AR-2	02-09-94	^^82	<0.5	<0.5	<0.5	<0.5	--	--	<50
AR-2	05-04-94	<50	<0.5	<0 5	<0 5	<0.5	--	--	<50
AR-2	08-10-94	200	5	1.7	2 7	38	--	--	^55
AR-2	11-16-94	<50	0.8	<0.5	<0.5	<0 5	--	--	<50
AR-2	03-24-95	<50	6.2	<0.5	<0.5	0.6	--	--	<50
AR-2	06-05-95	<50	<0 5	<0 5	<0.5	<0.5	--	--	<50
AR-2	08-18-95	<50	<0 5	<0 5	<0 5	<0.5	4	--	<50
AR-2	12-13-95	<50	<0.5	<0.5	<0 5	<0 5	--	--	--

Table 3
Historical Groundwater Analytical Data

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

Date: 02-12-96

Well Designation	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
ADR-1	02-09-94	3000	380	140	59	240	--	--	^110
ADR-1	05-04-94	2100	490	93	68	140	--	--	^60
ADR-1	08-10-94	150000	5400	15000	3600	24000	--	--	^^^4800
ADR-1	11-16-94	Not sampled: well contained floating product							
ADR-1	03-24-95	Not sampled: well contained floating product							
ADR-1	06-05-95	23000	310	420	300	1900	--	--	^13000
ADR-1	08-18-95	4400	150	120	95	620	120	--	^4500
ADR-1	12-13-95	8800	100	130	120	990	--	--	--
ADR-2	02-09-94	83000	6300	6100	2000	11000	--	--	12000
ADR-2	05-04-94	36000	4600	2600	930	4500	--	--	^4200
ADR-2	08-10-94	Not sampled: well contained floating product							
ADR-2	11-16-94	Not sampled: well contained floating product							
ADR-2	03-24-95	Not sampled: well contained floating product							
ADR-2	06-05-95	Not sampled: well contained floating product							
ADR-2	08-17-95	Not sampled: well contained floating product							
ADR-2	12-13-95	Not sampled: well contained floating product							

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method
µg/L: micrograms per liter
EPA: United Statest Environmental Protecuon Agency
MTBE: Methyl-tert-butyl ether
TPHD total petroleum hydrocarbons as diesel, California DHS LUFT Method
- - - not analyzed
^: sample contains a lower boiling point hydrocarbon quantitated as diesel; chromatogram does not match the typical diesel fingerprint
^^: sample contains a single non-fuel component eluting in the gasoline range, and quantified as gasoline
^^^: sample contains a *mixture of diesel and a lower boiling point* hydrocarbon quantitated as diesel, chromatogram does not match the typical diesel fingerprint
^^^^: sample contains components eluting in the diesel range, quantified as diesel; chromatogram does not match the typical diesel fingerprint

Table 4
Approximate Cumulative Floating Product Recovered

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

Date: 02-12-96

Well Designation	Date	Floating Product Recovered gallons
ADR-1	1994	0.0
ADR-2		0.0
ADR-1	1995	0.0
ADR-2		4.8
	1994 to 1995 Total:	4.8

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Table 5
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
Reporting Period From: 06-02-94
To: 01-01-96

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):	0.00	0.00	0.93	0.00	3.57
Total Operation (days):	0.07	5.05	8.07	6.05	4.43
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
TPH Concentrations					
Average Influent (ppmv):	18,000	16,000	830	1,100	230
Average Effluent (ppmv):	ND	45	ND	4.9	75.0
Benzene Concentrations					
Average Influent (ppmv):	250	420	17	24	3.8
Average Effluent (ppmv):	ND	0.30	ND	0.08	0.78
Flow Rates					
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	252.3	289.7	264.4	288.9
TPH-G Recovery Data					
Recovery Rate (lbs/hr):	11.12	21.26	1.22	2.16	0.41
Recovery Rate (lbs/day):	266.80	510.34	29.25	51.77	9.86
Destruction Efficiency (%):	100.00	99.46	100.00	99.39	46.70
Product Recovered (lbs):	18.68	2579.35	236.08	313.27	43.64
Product Recovered to Date (lbs):	18.68	2598.02	2834.10	3147.37	3191.01
Product Recovered to Date (gal):	3.11	433.00	472.35	524.56	531.83
Benzene Recovery Data					
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	11.250	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 7.25 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 5
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
Reporting Period From: 06-02-94
To: 01-01-96

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:		10.66	17.26	34.73	16.08	25.62
Days of Downtime:		20.34	13.74	56.27	14.92	5.38
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:		255.95	414.28	833.57	385.86	614.80
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):		1013.1	593.4	802.3	143.1	2.3
Pounds Removed To Date, as gasoline:		4204.1	4797.4	5599.7	5742.9	5745.2
Gallons Removed This Period, as gasoline (12):		163.4	95.7	129.4	23.1	0.4
Gallons Removed To Date, as gasoline:		678.1	773.8	903.2	926.3	926.7

Table 5
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
Reporting Period From: 06-02-94
To: 01-01-96

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	01-01-96
Mode of Oxidation:		Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox	Cat-Ox
Days of Operation:		0.00	14.42	19.27	27.18	11.59
Days of Downtime:		150.00	16.58	11.73	2.82	80.41
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 5
Soil-Vapor Extraction System
Operation and Performance Data

Facility Number:	2169	Vapor Treatment Unit:	ThermTech Model VAC-25, 250cfm Thermal/ Catalytic Oxidizer
Location:	889 West Grand Avenue Oakland, California		
Consultant:	EMCON 1921 Ringwood Avenue San Jose, California	Start-Up Date:	06-02-94
		Reporting Period From:	06-02-94
		To:	01-01-96

CURRENT REPORTING PERIOD:	10-01-95	to	01-01-96
DAYS / HOURS IN PERIOD:	92.0		2208.0
DAYS / HOURS OF OPERATION:	11.6		278.2
DAYS / HOURS OF DOWN TIME:	80.4		1929.8
PERCENT OPERATIONAL:			12.6 %
PERIOD POUNDS REMOVED:	62.8		
PERIOD GALLONS REMOVED:	10.1		
AVERAGE WELL FIELD FLOW RATE (scfm):			67.0
AVERAGE SYSTEM INFLUENT FLOW RATE (scfm):			174.1

1. Average concentrations are based on discrete sample results reported during the month; refer to Appendix C 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 C for instantaneous flow data.
5. scfm: flow in standard cubic feet per minute at one atmosphere and 70 degrees Fahrenheit
6. Average destruction efficiencies are calculated using monthly average concentrations; refer to Appendix C for instantaneous destruction efficiency data
7. destruction efficiency, percent = ([system influent concentration (as gasoline in mg/m3) - *system effluent concentration (as gasoline in mg/m3)*] / system influent concentration (as gasoline in mg/m3)) x 100 percent
8. Average emission rates are calculated using monthly average concentrations and flow rates; refer to Appendix C for instantaneous emission rate data.
9. emission rates (pounds per day) = system effluent concentration (as gasoline or benzene in mg/m3) x system influent flow rate (scfm) x 0.02832 m3/ft3 x 1440 minutes/day x 1 pound/454,000 mg
10. pounds/ hour removal rate (as gasoline) = well field influent concentration (as gasoline in mg/m3) x well field influent flow rate (scfm) x 0.02832 m3/ft3 x 60 minutes/hour x 1 pound/454,000 mg
11. pounds removed this period (as gasoline) = pounds/ hour removal rate x hours of operation
12. *gallons removed this period* (as gasoline) = pounds removed this period (as gasoline) x 0.1613 gallons/pound of gasoline
13. NA: not applicable, not analyzed, or not available

Table 6
Soil-Vapor Extraction Well Data

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

Date: 02-29-96

Date	Well Identification											
	A-1			A-2			A-3			A-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE 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	-1	closed	NA	0	closed	NA	0

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

Table 6
Soil-Vapor Extraction Well Data

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

Date: 02-29-96

Date	Well Identification											
	AV-1			AV-2			AV-3			AV-4		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE 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

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 6
Soil-Vapor Extraction Well Data

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

Date: 02-29-96

Date	Well Identification											
	AV-5			AV-6			AV-7			AR-2		
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE 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	2.3 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

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 6
Soil-Vapor Extraction Well Data

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

Date: 02-29-96

Date	Well Identification											
	ADR-1			ADR-2								
	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O	Valve Position	TVHG ppmv	Vacuum Response in-H2O
For SVE 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						

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 7
Air-Sparge System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Air-Sparge Unit: 3-horse power
Conde blower

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 07-15-94
Reporting Period From: 07-15-94
To: 10-12-95

Date Begin:	07-15-94	08-01-94	08-01-94	08-01-94	08-15-94
Date End:	08-01-94	08-01-94	08-01-94	08-15-94	09-13-94
Days of Operation:	5.5	0.0	0.1	19.3	27.2
Days of Downtime:	10.5	0.0	0.0	11.7	2.8
Air-Sparge Well Status:					
AS-1	open	open	open	open	open
AS-2	open	open	open	open	open
AS-3	open	open	open	open	open
AS-4	open	open	open	open	open
AS-5	open	open	open	open	open
Air-Sparge Well Pressure (psig) (1):					
AS-1	2.8	2.8	3.0	2.0	2.4
AS-2	3.0	3.0	2.8	2.2	2.4
AS-3	3.6	3.6	3.8	3.1	2.2
AS-4	3.1	3.1	3.4	3.0	2.8
AS-5	2.8	2.8	3.2	2.8	3.2
Total Air-Sparge Flow Rate (scfm) (2):	25.0	29.0	29.0	27.0	29.0
Total Air-Sparge Pressure (psig):	5.0	2.8	2.8	2.6	3.0
Dissolved Oxygen (mg/L) (3):					
Air-Sparge Wells:					
AS-1	NA (4)	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 7
Air-Sparge System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Air-Sparge Unit: 3-horse power
Conde blower

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 07-15-94
Reporting Period From: 07-15-94
To: 10-12-95

Date Begin:	09-13-94	11-28-94	01-03-95	02-03-95	03-31-95
Date End:	11-28-94	01-03-95	02-03-95	03-31-95	06-28-95
Days of Operation:	0.0	0.0	0.0	0.0	0.0
Days of Downtime:	76.0	36.0	31.0	56.0	89.0
Air-Sparge Well Status:					
AS-1	closed	closed	closed	closed	closed
AS-2	closed	closed	closed	closed	closed
AS-3	closed	closed	closed	closed	closed
AS-4	closed	closed	closed	closed	closed
AS-5	closed	closed	closed	closed	closed
Air-Sparge Well Pressure (psig) (1):					
AS-1	0.0	0.0	0.0	0.0	0.0
AS-2	0.0	0.0	0.0	0.0	0.0
AS-3	0.0	0.0	0.0	0.0	0.0
AS-4	0.0	0.0	0.0	0.0	0.0
AS-5	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	0.0
Total Air-Sparge Pressure (psig):	0.0	0.0	0.0	0.0	0.0
Dissolved Oxygen (mg/L) (3):					
Air-Sparge Wells:					
AS-1	1.4	NA	NA	NA	NA
AS-2	1.2	NA	NA	NA	NA
AS-3	1.2	NA	NA	NA	NA
AS-4	0.8	NA	NA	NA	NA
AS-5	1.4	NA	NA	NA	NA
Depth to Water (ft-BGS) (5):					
Air-Sparge Wells:					
AS-1	10.55	NA	NA	8.79	NA
AS-2	11.29	NA	NA	9.37	NA
AS-3	10.78	NA	NA	8.93	NA
AS-4	10.27	NA	NA	8.43	NA
AS-5	10.65	NA	NA	8.80	NA

Table 7
Air-Sparge System
Operation and Performance Data

Facility Number: 2169
Location: 889 West Grand Avenue
Oakland, California

Air-Sparge Unit: 3-horse power
Conde blower

Consultant: EMCON
1921 Ringwood Avenue
San Jose, California

Start-Up Date: 07-15-94
Reporting Period From: 07-15-94
To: 10-12-95

Date Begin:	07-25-95	08-10-95	08-22-95	09-21-95
Date End:	08-10-95	08-22-95	09-21-95	10-12-95
Days of Operation:	2.1	0.0	10.9	NA
Days of Downtime:	14.0	12.0	18.6	NA
Air-Sparge Well Status:				
AS-1	open	open	open	closed
AS-2	closed	closed	closed	closed
AS-3	closed	closed	closed	closed
AS-4	open	open	open	closed
AS-5	closed	closed	open	closed
Air-Sparge Well Pressure (psig) (1):				
AS-1	8.9	5.5	7.0	0.0
AS-2	0.0	0.0	0.0	0.0
AS-3	0.0	0.0	0.0	0.0
AS-4	2.0	2.3	1.5	0.0
AS-5	0.0	0.0	1.0	0.0
Total Air-Sparge Flow Rate (scfm) (2):	2.0	2.0	6.0	0.0
Total Air-Sparge Pressure (psig):	50	45	45	0
Dissolved Oxygen (mg/L) (3):				
Air-Sparge Wells:				
AS-1	1.1	NA	NA	7.4
AS-2	NA	NA	NA	NA
AS-3	NA	NA	NA	NA
AS-4	1.4	NA	NA	1.5
AS-5	1.0	NA	NA	1.6
Depth to Water (ft-BGS) (5):				
Air-Sparge Wells:				
AS-1	11.75	NA	NA	12.12
AS-2	NA	NA	NA	NA
AS-3	NA	NA	NA	NA
AS-4	11.31	NA	NA	11.78
AS-5	11.62	NA	NA	12.05

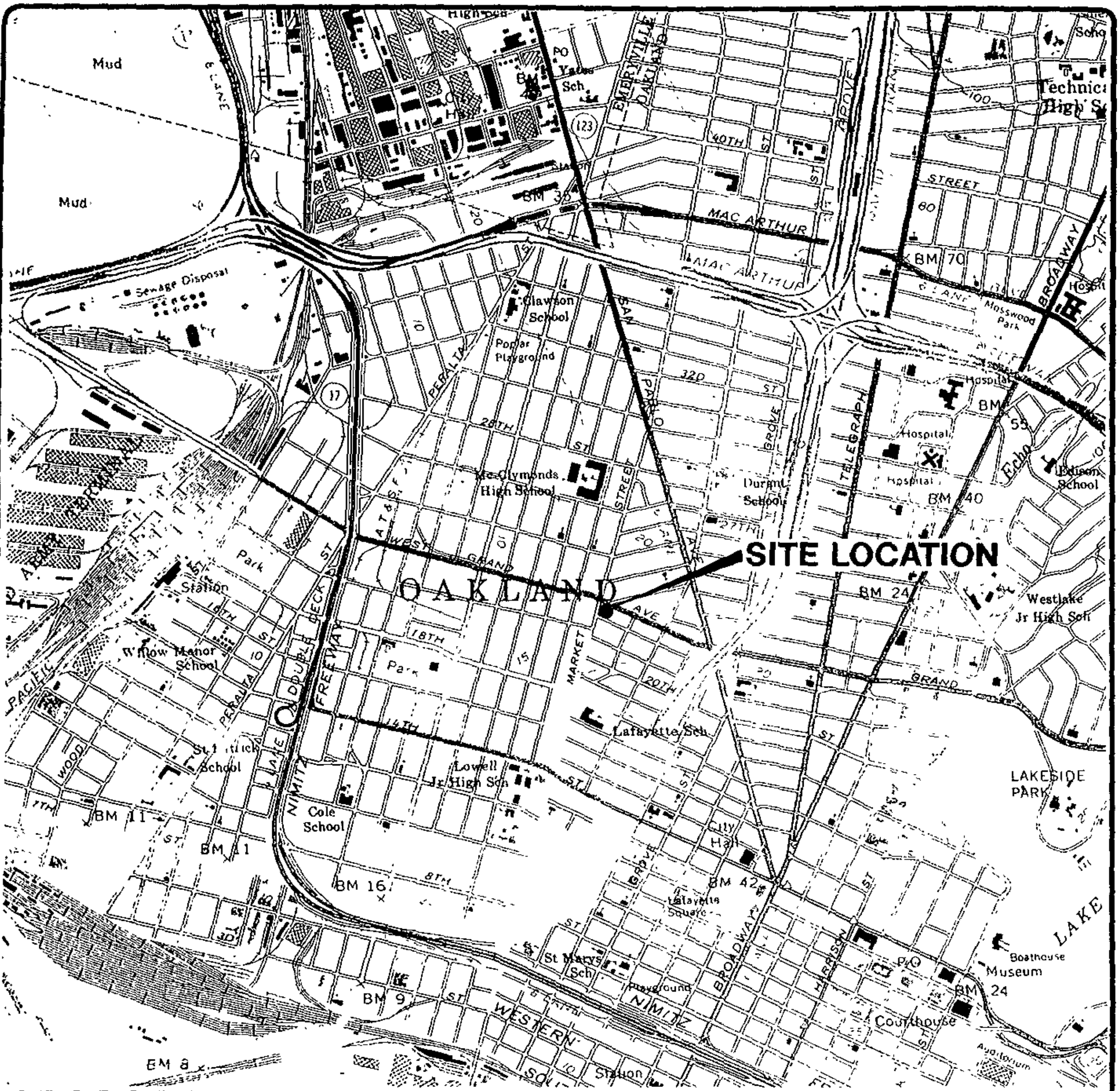
Table 7
Air-Sparge System
Operation and Performance Data

Facility Number:	2169	Air-Sparge Unit:	3-horse power Conde blower
Location:	*889 West Grand Avenue* Oakland, California		
Consultant:	EMCON	Start-Up Date:	07-15-94
	1921 Ringwood Avenue	Reporting Period *From:*	07-15-94
	San Jose, California	To:	10-12-95

CURRENT REPORTING PERIOD:	09-21-95	*to*	10-12-95
DAYS / HOURS IN PERIOD:	21.0		504
DAYS / HOURS OF OPERATION:	NA		NA
DAYS / HOURS OF DOWN TIME:	NA		NA
PERCENT OPERATIONAL:			NA

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

152753



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

Scale 0 2000 4000 Feet

N

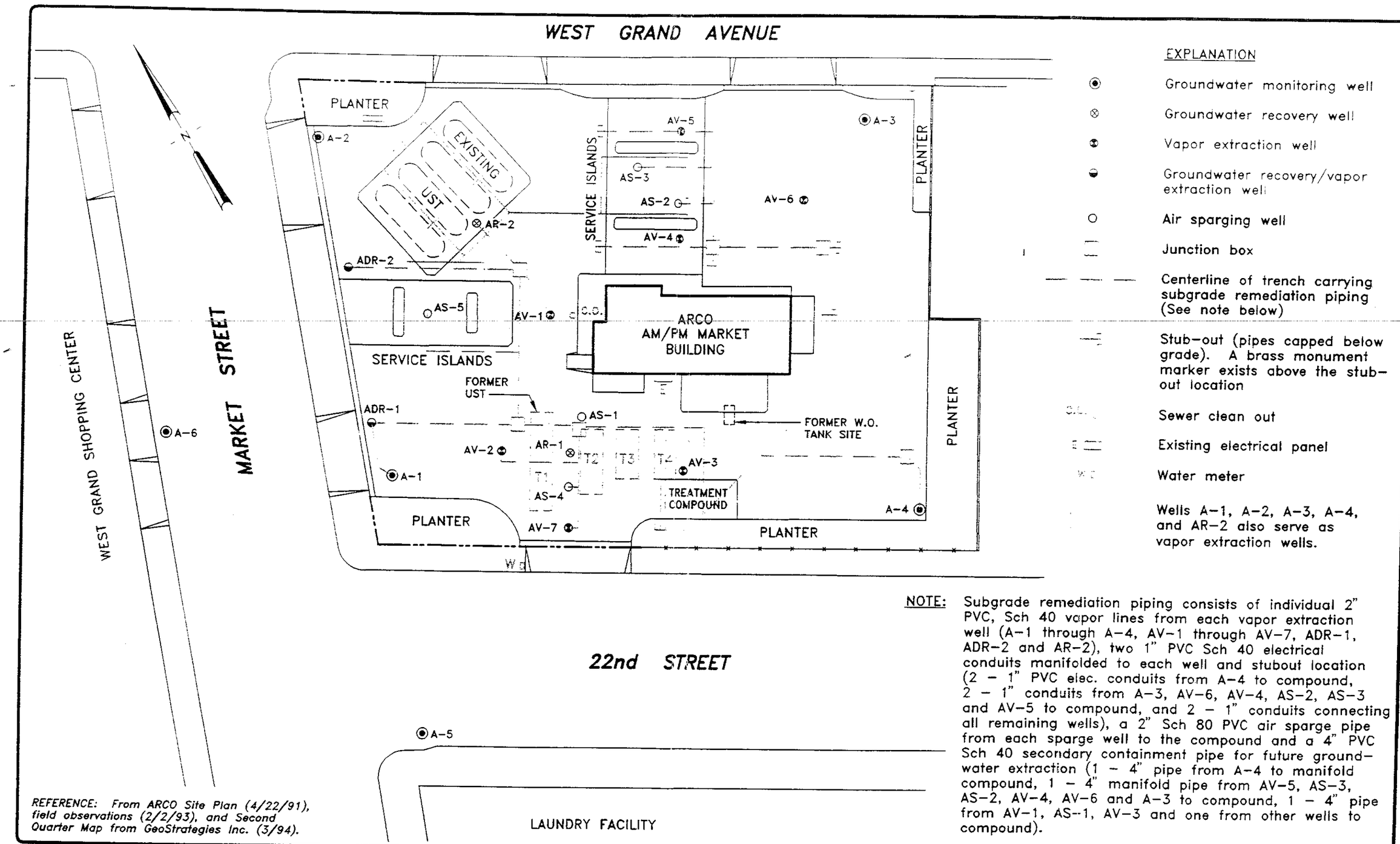
EMCON

ARCO PRODUCTS COMPANY
SERVICE STATION 2169, 889 WEST GRAND AVE.
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

SITE LOCATION

FIGURE
1

PROJECT NO.
805-129.02



EXPLANATION

- Groundwater monitoring well
- Groundwater recovery well
- Vapor extraction well
- Groundwater recovery/vapor extraction well
- Air sparging well
- Junction box
- Centerline of trench carrying subgrade remediation piping (See note below)
- Stub-out (pipes capped below grade). A brass monument marker exists above the stub-out location
- Sewer clean out
- Existing electrical panel
- Water meter

Wells A-1, A-2, A-3, A-4, and AR-2 also serve as vapor extraction wells.

NOTE: Subgrade remediation piping consists of individual 2" PVC, Sch 40 vapor lines from each vapor extraction well (A-1 through A-4, AV-1 through AV-7, ADR-1, ADR-2 and AR-2), two 1" PVC Sch 40 electrical conduits manifolded to each well and stubout location (2 - 1" PVC elec. conduits from A-4 to compound, 2 - 1" conduits from A-3, AV-6, AV-4, AS-2, AS-3 and AV-5 to compound, and 2 - 1" conduits connecting all remaining wells), a 2" Sch 80 PVC air sparge pipe from each sparge well to the compound and a 4" PVC Sch 40 secondary containment pipe for future groundwater extraction (1 - 4" pipe from A-4 to manifold compound, 1 - 4" manifold pipe from AV-5, AS-3, AS-2, AV-4, AV-6 and A-3 to compound, 1 - 4" pipe from AV-1, AS-1, AV-3 and one from other wells to compound).

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

EMCON

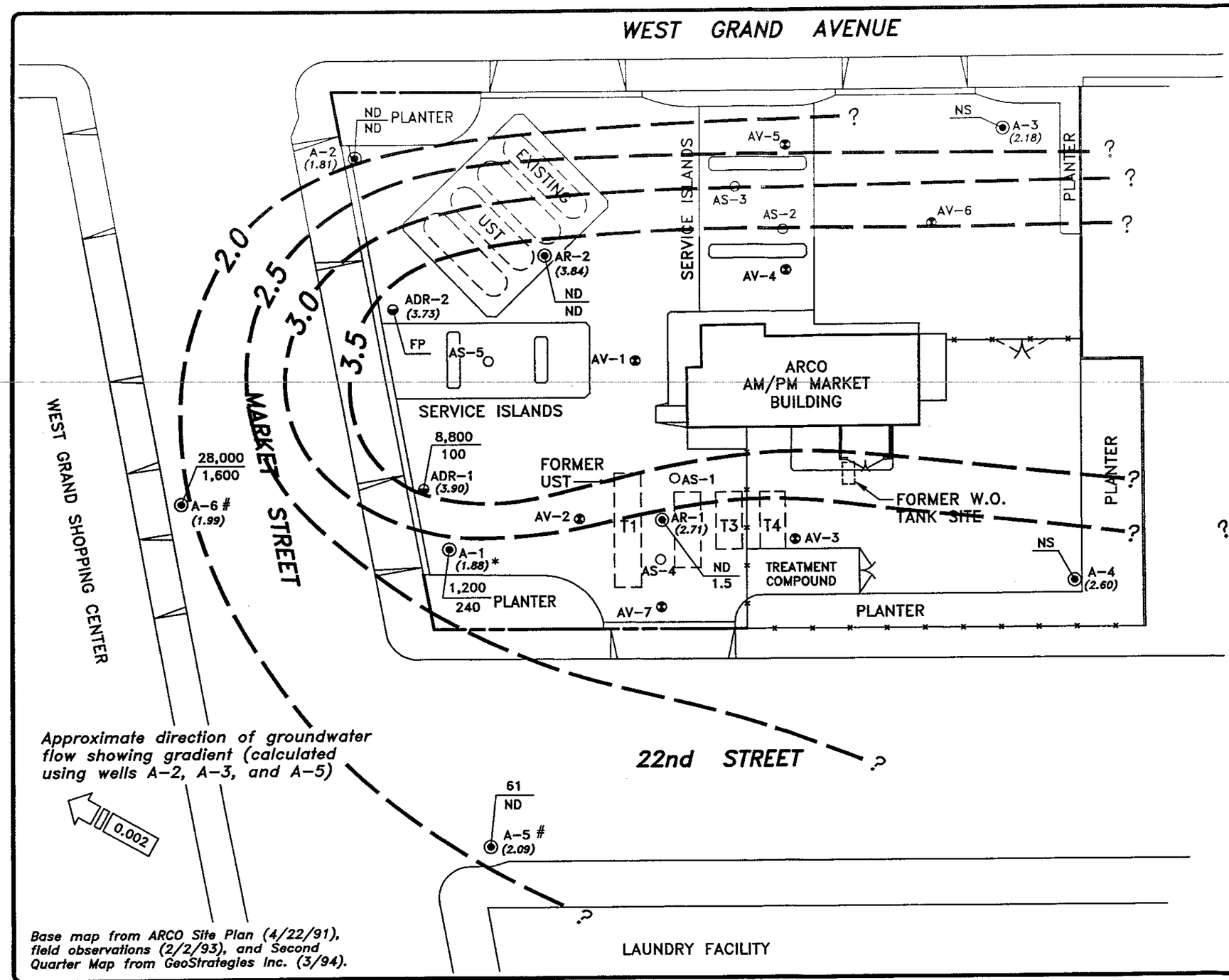
SCALE: 0 40 80 FEET

ARCO PRODUCTS COMPANY
SERVICE STATION 2169, 885 WEST GRAND AVENUE
OAKLAND, CALIFORNIA

SITE PLAN

FIGURE NO. **2**

PROJECT NO. 805-129.02



EXPLANATION

- ◉ Groundwater monitoring well
- ◉ Vapor extraction well
- ◒ Groundwater monitoring/vapor extraction well
- ○ Air sparging well
- (3.90) Groundwater elevation (Ft.-MSL); measured 12/4/95
- ? Groundwater elevation contour (Ft.-MSL)
- 1,200 / 240 TPHG concentration (ug/L); sampled 12/4/95 / Benzene concentration (ug/L); sampled 12/4/95
- 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
- FP Floating product
- * Groundwater elevation not used in contouring
- # The groundwater samples from wells A-5 and A-6 may have been switched in the field. These wells will be monitored during the first quarter 1996 event.

EMCON

SCALE: 0 40 80 FEET

ARCO PRODUCTS COMPANY
SERVICE STATION 2169, 889 WEST GRAND AVENUE
QUARTERLY GROUNDWATER MONITORING
OAKLAND, CALIFORNIA

GROUNDWATER DATA
FOURTH QUARTER 1995

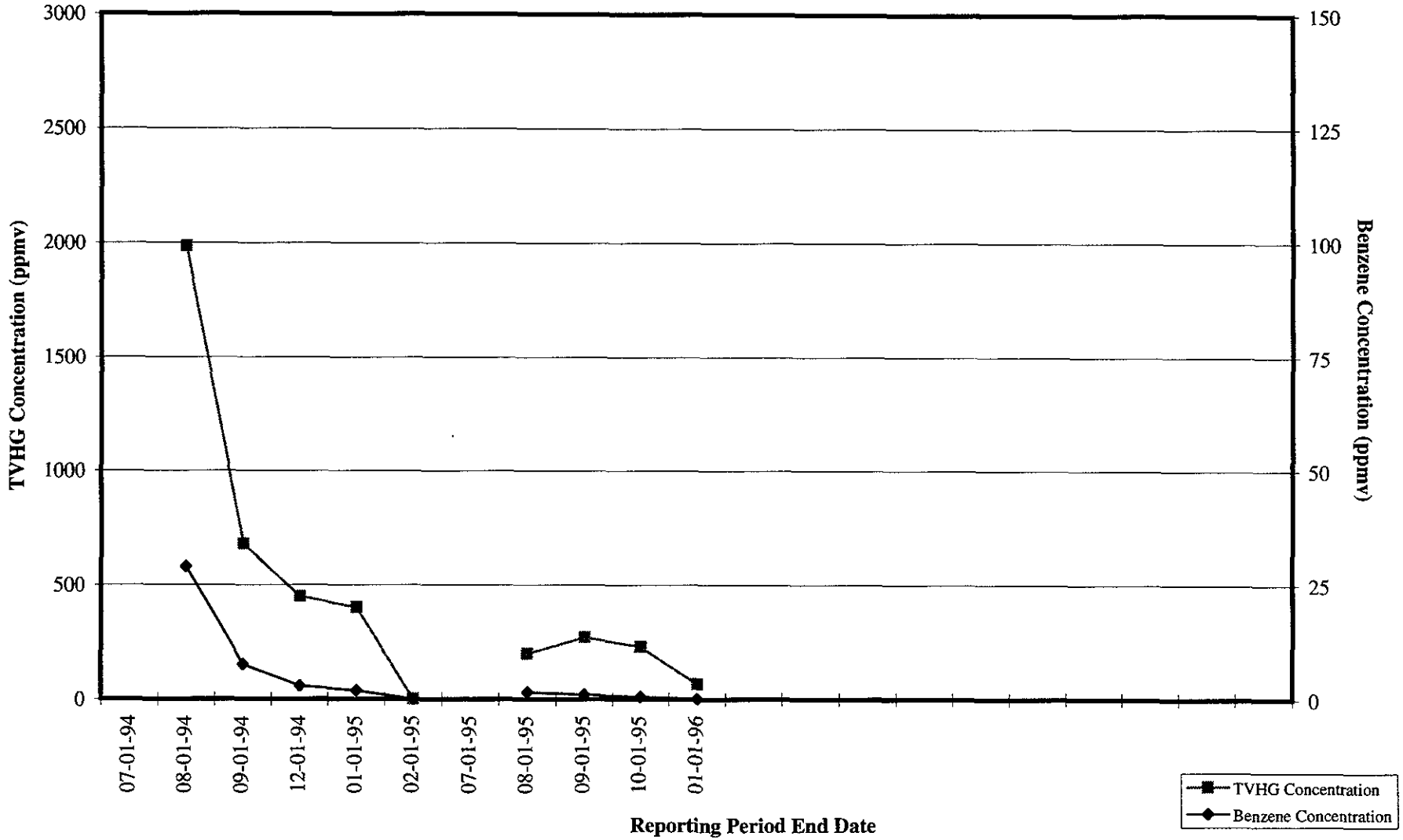
FIGURE NO.
3

PROJECT NO.
805-129.02

G:\805-129\G00 REV 0 03/04/96 10:24:39 KAJ DJ

Figure 4

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

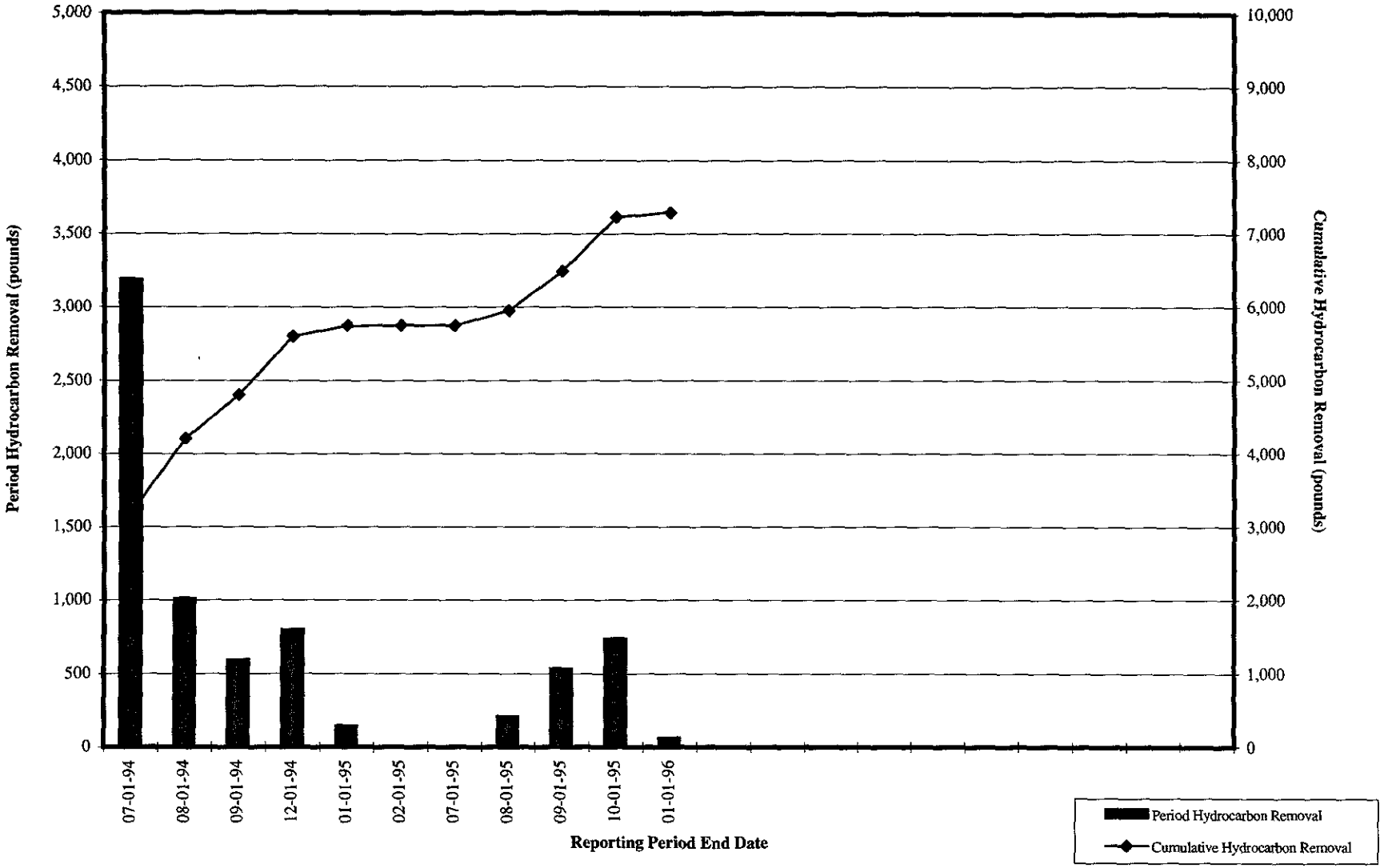


TVHG: total volatile hydrocarbons as gasoline
ppmv: parts per million by volume

esj/h:\2169\2169tdb.xls\2169tdb:dcl
20805-129.002

Figure 5

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



esj/h:\2169\2169tss.xls\2169tss:dcl
20805-129.002

APPENDIX A

FIELD DATA SHEETS, FOURTH QUARTER 1995 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 1775-235.01 STATION ADDRESS : 899 West Grand Avenue DATE : 12/4/95

ARCO STATION # : 2169 FIELD TECHNICIAN : D [illegible] / M Gallegos DAY : Mon

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	**A-2**	X	X	X	None	None	12.74	12.74	ND	NA	25.3	
2	**A-3**	X	X	X	None	None	~~12.82~~ 13.57	13.57 ~~12.82~~	ND	NA	~~23.2~~ 24.0	
3	**A-4**	X	X	X	None	None	~~11.93~~ 12.63	~~11.93~~ 12.63	ND	NA	28.4	
4	**AR-2**	OK	YES	BOX	~~None~~	~~None~~	11.44	11.44	~~ND~~	~~NA~~	28.6	Unable to remove PVC Cap
5	**A-6**	X	X	X	None	X	11.52	11.52	ND	NA	27.6	
6	**AR-1**	X	X	X	None	None	12.90	12.90	ND	NA	27.9	
7	**A-1**	X	X	X	None	None	12.28	12.28	ND	NA	24.4	
8	**A-5**	X	X	X	None	X	11.42	11.42	ND	NA	30.1	Strong Odor
9	**ADR-1**	OK	YES	BOX	~~None~~	~~None~~	~~10.05~~	~~10.05~~	~~ND~~	~~NA~~	21.0	Unable to Remove PVC Cap
10	**ADR-2**	OK	YES	BOX	None	None	10.93	10.93	~~10.90~~	~~.03~~	>26.2	↓ ↓

SURVEY POINTS ARE TOP OF ~~WELL CASINGS~~ Box

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 177525501 SAMPLE ID: A-1

PURGED BY: DL MG CLIENT NAME: ARCO 2169

SAMPLED BY: DL MG LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL):	NC	VOLUME IN CASING (gal.):	4.4
DEPTH TO WATER (feet):	12.28	CALCULATED PURGE (gal.):	13.33
DEPTH OF WELL (feet):	24.4	ACTUAL PURGE VOL. (gal.):	13.5

DATE PURGED: 12/4/95 Start (2400 Hr) 1456 End (2400 Hr) 1500

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1504 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1459	4.5	6.92	1510	70.2	Grey	Mod
1466	9.0	6.75	1475	71.5	Grey	Lt
1504	13.5	6.69	1482	71.8	↓	↓

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

Field QC samples collected at this well: NO

Parameters field filtered at this well: No

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

WELL INTEGRITY: Good LOCK #: None

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 7 Meter Serial #: 9110 Temperature °F: ___

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

Location of previous calibration: ___

Signature: ___ Reviewed By: ___ Page 1 of 5

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235 01 SAMPLE ID: A-2

PURGED BY: D Gambelin/MG CLIENT NAME: ARCO 2169

SAMPLED BY: D Gambelin/MG LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL) : NR VOLUME IN CASING (gal.) : 4.61

DEPTH TO WATER (feet) : 12.74 CALCULATED PURGE (gal.) : 13.82

DEPTH OF WELL (feet) : 25.3 ACTUAL PURGE VOL. (gal.) : 14.0

DATE PURGED: 12/4/95 Start (2400 Hr) 1350 End (2400 Hr) 1356

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1400 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1352	5.0	6.30	1143	69.1	Brn	Mod
1354	9.5	6.36	1134	69.6	Brn	Light
1356	14.0	6.41	1126	69.2	↓	↓

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY : Good LOCK # : [illegible]

REMARKS : ___

Meter Calibration: Date: [illegible] Time: 1320 Meter Serial #: [illegible] Temperature °F: 66.1

(EC 1000 996 / [illegible]) (DI [illegible]) (pH 7 7.21 / [illegible]) (pH 10 9.94 / 10.00) (pH 4 3.42 / —)

Location of previous calibration: ___

Signature: [illegible] Reviewed By: [illegible] Page 2 of [illegible]

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-2350' SAMPLE ID: A 5

PURGED BY: DL/MC CLIENT NAME: ARCO 216'

SAMPLED BY: DL/MC LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 3.05

DEPTH TO WATER (feet): 11.42 CALCULATED PURGE (gal.): 9.15

DEPTH OF WELL (feet): 31.1 ACTUAL PURGE VOL. (gal.): 5.5

DATE PURGED: 12/4/95 Start (2400 Hr) 1518 End (2400 Hr) 1527

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1527 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1521	3.5	6.7	1240	68.8	Brn	Heavy
1524	Well Dry at 5.5					
1527	Replace	6.72	1258	68.9	Brn	Heavy

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

COLOR (COBALT 0 - 500): NR

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: No

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 320 Meter Serial #: 911 Temperature °F: ___

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

Location of previous calibration: A 2

Signature: ___ Reviewed By: ___ Page 2 of 8

Rev. 3, 2/94

EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-235.01 SAMPLE ID: A-6

PURGED BY: DG/MG CLIENT NAME: ARCO 2169

SAMPLED BY: DG/MG LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 2.63

DEPTH TO WATER (feet): 11.57 CALCULATED PURGE (gal.): 7.88

DEPTH OF WELL (feet): 27.6 ACTUAL PURGE VOL. (gal.): 8.0

DATE PURGED: 12/4/95 Start (2400 Hr) 1530 End (2400 Hr) 1542

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1545 End (2400 Hr) ——

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1533	3.0	7.10	1120	67.0	Gray	M.
1535	5.5	7.02	1130	67.1	|	|
1542	8.0	7.04	1134	67.9	↓	↓

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS:

Meter Calibration: Date: 12/4/95 Time: 33: Meter Serial #: 9116 Temperature °F: ___

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

Location of previous calibration: A-2

Signature: [illegible] Reviewed By: [illegible] Page 4 of 9

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EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775 225.01   SAMPLE ID: AR-1

PURGED BY: DC / MK   CLIENT NAME: ARCO 2169

SAMPLED BY: DC / MK   LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR   VOLUME IN CASING (gal.): 22.05

DEPTH TO WATER (feet): 12.96   CALCULATED PURGE (gal.): 66.15

DEPTH OF WELL (feet): 27.9   ACTUAL PURGE VOL. (gal.): 50.0

DATE PURGED: 12/4/95   Start (2400 Hr) 1423   End (2400 Hr) 1440

DATE SAMPLED: 12/4/95   Start (2400 Hr) 1445   End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1430	22.5	7.38	971	71.4	Brn	Mod
1433	45.0	7.47	977	71.6	Br	Mod
1440	well Dry at	50.0				
1443	Recharge	7.51	996	70.4	Brn	Light

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: Good   LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1340 Meter Serial #: [illegible] Temperature °F: ___

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

Location of previous calibration: [illegible]

Signature: [illegible]   Reviewed By: [illegible]   Page 5 of 9

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235-01 SAMPLE ID: MW-2 (28S)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2167

SAMPLED BY: L LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL):	N/A	VOLUME IN CASING (gal.):	11.21
DEPTH TO WATER (feet):	11.44	CALCULATED PURGE (gal.):	33.63
DEPTH OF WELL (feet):	28.6	ACTUAL PURGE VOL. (gal.):	34

DATE PURGED: 12-13-95 Start (2400 Hr) 1142 End (2400 Hr) 1157

DATE SAMPLED: L Start (2400 Hr) — End (2400 Hr) 1159

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1146	11.5	7.71	911	65.2	GRAY	HEAVY
1148	23	7.78	919	67.3	CLEAR	CLEAR
1152	34	7.79	919	67.2	CLEAR	CLEAR

D. O. (ppm): N/A ODOR: none

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

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

WELL INTEGRITY: OK LOCK #: 110

REMARKS: ___

Meter Calibration: Date: 12-13-95 Time: 1130 Meter Serial #: ___ Temperature °F: 61.9

(EC 1000 1044 / 1000) (DI ___) (pH 7 6.01 / 7.00) (pH 10 9.94 / 10.00) (pH 4 4.03 / ___)

Location of previous calibration: ___

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

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235-01 SAMPLE ID: ADR-1 (20)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2165

SAMPLED BY: / LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	7.15
DEPTH TO WATER (feet):	10.05	CALCULATED PURGE (gal.):	21.46
DEPTH OF WELL (feet):	21.0	ACTUAL PURGE VOL. (gal.):	22

DATE PURGED: 12-13-95 Start (2400 Hr) 1241 End (2400 Hr) 1246

DATE SAMPLED: / Start (2400 Hr) — End (2400 Hr) 1252

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1243	7.5	6.66	1354	68.6	GRAY	HEAVY
1245	15	6.75	1374	70.7	CLEAR	CLEAR
1246	22	6.75	1379	71.0	CLEAR	CLEAR

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

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

WELL INTEGRITY: OK LOCK #: LID

REMARKS: ___

Meter Calibration: Date: 12-13-95 Time: 1130 Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 7 of 8

Rev. 3, 2/94

EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 1775-235-01 SAMPLE ID: ADR-2

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2169

SAMPLED BY: ✓ LOCATION: OAKLAND CA.

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

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

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

DEPTH TO WATER (feet): 10.93 CALCULATED PURGE (gal.): NR

DEPTH OF WELL (feet): 26.2 ACTUAL PURGE VOL. (gal.): NR

DATE PURGED: 12-13-95 Start (2400 Hr) NR End (2400 Hr) NR

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

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)

PRODUCT .03

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

Field QC samples collected at this well: NR Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

NR

SAMPLING EQUIPMENT

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

NR

WELL INTEGRITY: OK LOCK #: NONE

REMARKS: PRODUCT .03 Teflon Bailer

Meter Calibration: Date: 12-13-95 Time: 1130 Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: [initials] Page 8 of 8

APPENDIX A

FIELD DATA SHEETS, FOURTH QUARTER 1995 GROUNDWATER MONITORING EVENT

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 1775-235.01 STATION ADDRESS : 899 West Grand Avenue DATE : 12/4/95

ARCO STATION # : 2169 FIELD TECHNICIAN : D Gambelin / M Gallegos DAY : Mon

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	A-2	X	X	X	None	None	12.74	12.74	ND	N/A	25.3	
2	A-3	X	X	X	None	None	~~12.82~~ 13.51	~~12.82~~ 13.51	ND	NA	~~29.2~~ 29.0	
3	A-4	X	X	X	None	None	~~11.93~~ 12.63	~~11.93~~ 12.63	ND	NA	28.4	
4	AR-2	OK	YES	~~BOX~~	~~None~~	~~None~~	11.44	11.44	~~ND~~	~~NA~~	~~28.6~~	Unable to remove AVC Cap
5	A-6	X	X	X	None	X	11.52	11.52	ND	NA	27.6	
6	AR-1	X	X	X	None	None	12.90	12.90	ND	NA	27.9	
7	A-1	X	X	X	None	None	12.28	12.28	ND	NA	24.4	
8	A-5	X	X	X	None	X	11.42	11.42	ND	NA	30.1	Strong Odor
9	ADR-1	OK	~~YES~~ NO	~~BOX~~	~~None~~	~~None~~	~~10.05~~	~~10.05~~	ND	NA	21.0	Unable to Remove AVC Cap
10	ADR-2	OK	~~YES~~ NO	~~BOX~~	None	None	10.93	10.93	~~10.90~~	.03	>26.2	

SURVEY POINTS ARE TOP OF ~~WELL CASINGS~~ BOX

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 177523501 SAMPLE ID: A-1

PURGED BY: DL MG CLIENT NAME: ARCO 2169

SAMPLED BY: DL MG LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 4.44

DEPTH TO WATER (feet): 12.28 CALCULATED PURGE (gal.): 13.33

DEPTH OF WELL (feet): 24.4 ACTUAL PURGE VOL. (gal.): 13.5

DATE PURGED: 12/4/95 Start (2400 Hr) 1456 End (2400 Hr) 1500

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1504 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1458	4.5	6.92	1510	70.2	Grey	Med
1502	9.0	6.75	1495	71.5	Grey	Light
1506	13.5	6.69	1497	71.8	↓	↓

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

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: None

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1320 Meter Serial #: 9110 Temperature °F: ___

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

Location of previous calibration: AD

Signature: [signature] Reviewed By: [signature] Page 1 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235.01 SAMPLE ID: A-2

PURGED BY: D. Gamblin/MC CLIENT NAME: ARCO 2169

SAMPLED BY: D. Gamblin/MC LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	4.61
DEPTH TO WATER (feet):	12.74	CALCULATED PURGE (gal.):	13.82
DEPTH OF WELL (feet):	25.3	ACTUAL PURGE VOL. (gal.):	14.0

DATE PURGED: 12/4/95 Start (2400 Hr) 1350 End (2400 Hr) 1356

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1400 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1352	5.0	6.30	1143	69.1	Brn	Mod
1354	9.5	6.36	1134	69.6	Brn	Light
1356	14.0	6.41	1126	69.2	↓	↓

D. O. (ppm): NR ODOR: None COLOR: NR (COBALT 0 - 500) TURBIDITY: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: NONE

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1320 Meter Serial #: 9110 Temperature °F: 66.1

(EC 1000 986 / 1.00) (DI 24) (pH 7 7.02 / 7.00) (pH 10 9.99 / 10.00) (pH 4 3.42 / —)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 2 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235.01 SAMPLE ID: A5

PURGED BY: DE/MG CLIENT NAME: ARCO 2169

SAMPLED BY: DE/MG LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 3.05

DEPTH TO WATER (feet): 11.42 CALCULATED PURGE (gal.): 9.15

DEPTH OF WELL (feet): 30.1 ACTUAL PURGE VOL. (gal.): 5.5

DATE PURGED: 12/4/95 Start (2400 Hr) 1518 End (2400 Hr) 1524

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1527 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1521	3.5	6.7	1240	68.8	Brn	Heavy
1524	Well Dry at 5.5 gal					
1527	Recharge	6.72	1258	68.9	Brn	Heavy

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

Color: NR (COBALT 0 - 500) Turbidity: NR (NTU 0 - 200 or 0 - 1000)

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1320 Meter Serial #: 9110 Temperature °F: ___

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

Location of previous calibration: A2

Signature: [signature] Reviewed By: [signature] Page 3 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775.235.01 SAMPLE ID: A-6

PURGED BY: DL/ML CLIENT NAME: ARCO 2169

SAMPLED BY: DL/ML LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 2.63

DEPTH TO WATER (feet): 11.52 CALCULATED PURGE (gal.): 7.88

DEPTH OF WELL (feet): 27.6 ACTUAL PURGE VOL. (gal.): 8.0

DATE PURGED: 12/4/95 Start (2400 Hr) 1530 End (2400 Hr) 1542

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1545 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1533	3.0	7.00	1120	67.0	Grey	Mod.
1538	5.5	7.02	1130	67.1	"	"
1542	8.0	7.04	1134	67.9	"	"

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1320 Meter Serial #: 9110 Temperature °F: ___

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

Location of previous calibration: MW-2

Signature: [signature] Reviewed By: [signature] Page 4 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-23501 SAMPLE ID: AR-1

PURGED BY: DG/MK CLIENT NAME: ARCO 2169

SAMPLED BY: DG/MK LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 22.5

DEPTH TO WATER (feet): 12.90 CALCULATED PURGE (gal.): 66.15

DEPTH OF WELL (feet): 27.9 ACTUAL PURGE VOL. (gal.): 50.0

DATE PURGED: 12/4/95 Start (2400 Hr) 1433 End (2400 Hr) 1440

DATE SAMPLED: 12/4/95 Start (2400 Hr) 1445 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1436	22.5	7.38	881	71.4	Brn	Mod
1438	45.0	7.47	977	71.6	Brn	Mod
1441	well Dry at	50.0				
1445	Recharge	7.51	996	70.4	Brn	Light

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

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

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

WELL INTEGRITY: Good LOCK #: ARCO

REMARKS: ___

Meter Calibration: Date: 12/4/95 Time: 1320 Meter Serial #: 611 Temperature °F: ___

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

Location of previous calibration: A-2

Signature: [signature] Reviewed By: [signature] Page 5 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235-01 SAMPLE ID: MW-2 (28)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2169

SAMPLED BY: L LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL):	N/A	VOLUME IN CASING (gal.):	11.21
DEPTH TO WATER (feet):	11.44	CALCULATED PURGE (gal.):	33.63
DEPTH OF WELL (feet):	28.6	ACTUAL PURGE VOL. (gal.):	34

DATE PURGED: 12-13-95 Start (2400 Hr) 1142 End (2400 Hr) 1157

DATE SAMPLED: L Start (2400 Hr) — End (2400 Hr) 1159

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1146	11.5	7.71	911	65.2	GRAY	HEAVY
1148	23	7.78	919	67.3	CLEAR	CLEAR
1152	34	7.79	919	67.2	CLEAR	CLEAR

D. O. (ppm): N/A ODOR: none

COLOR (COBALT 0 - 500): NR

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

Field QC samples collected at this well: N/R

Parameters field filtered at this well: N/R

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

WELL INTEGRITY: OK LOCK #: 410

REMARKS: ___

Meter Calibration: Date: 12-13-95 Time: 1130 Meter Serial #: ___ Temperature °F: 61.9

(EC 1000 1046 / 1000) (DI ___) (pH 7 6.01 / 7.00) (pH 10 9.94 / 10.00) (pH 4 4.03 / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 6 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235-01 SAMPLE ID: MDR-1 (20)

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2169

SAMPLED BY: / LOCATION: OAKLAND CA

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 7.15

DEPTH TO WATER (feet): 10.05 CALCULATED PURGE (gal.): 21.46

DEPTH OF WELL (feet): 21.0 ACTUAL PURGE VOL. (gal.): 22

DATE PURGED: 12-13-95 Start (2400 Hr) 1241 End (2400 Hr) 1246

DATE SAMPLED: / Start (2400 Hr) ___ End (2400 Hr) 1252

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1243	7.5	6.66	1354	68.6	GRAY	HEAVY
1245	15	6.75	1377	70.7	CLEAR	CLEAR
1246	22	6.75	1379	71.0	CLEAR	CLEAR

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: LID

REMARKS: ___

Meter Calibration: Date: 12-13-95 Time: 1130 Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 7 of 8

Rev. 3, 2/94

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 1775-235-01 SAMPLE ID: ADR-2

PURGED BY: J WILLIAMS CLIENT NAME: ARCO 2169

SAMPLED BY: " LOCATION: OAKLAND CA.

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

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

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

DEPTH TO WATER (feet): 10.93 CALCULATED PURGE (gal.): NR

DEPTH OF WELL (feet): 26.2 ACTUAL PURGE VOL. (gal.): ___

DATE PURGED: 12-13-95 Start (2400 Hr) NR End (2400 Hr) NR

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

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
			PRODUCT - 03			

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

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

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

Field QC samples collected at this well: NR

Parameters field filtered at this well: NR

PURGING EQUIPMENT

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

Other: ___

SAMPLING EQUIPMENT

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

Other: ___

WELL INTEGRITY: OK LOCK #: NONE

REMARKS: PRODUCT .03 Teflon Bailer

Meter Calibration: Date: 12-13-95 Time: 1150 Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: SA Page 8 of 8

APPENDIX B

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR GROUNDWATER MONITORING SAMPLES, FOURTH QUARTER 1995

Columbia Analytical Services, Inc.

December 19, 1995

Service Request No: S9501541

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **0805-129.02 / TO# 17075.00 / 2169 Oakland**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on December 5, 1995. 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 10, 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

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9501541
Project:	0805-129.02 / TO#17075.00 / 2169 Oakland	**Date Collected:**	12/4/95
Sample Matrix:	Water	**Date Received:**	12/5/95
		Date Extracted:	NA
		Date Analyzed:	12/14/95

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Analyte:	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name	**Lab Code**				
A-2 (25)	S9501541-001	ND	ND	ND	ND	ND
A-6 (27)	S9501541-002	28,000	1,600	1,800	880	3,600
AR-1 (27)	S9501541-003	ND	1.5	ND	ND	0.8
A-1 (24)	S9501541-004	1,200	240	17	25	56
A-5 (30)	S9501541-005	61	ND	ND	ND	ND
Method Blank	S951214-WB	ND	ND	ND	ND	ND

5ABTXGAS/061694

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland
Sample Matrix: Water

Service Request: S9501541
Date Collected: 12/4/95
Date Received: 12/5/95
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8240
Units: ug/L (ppb)

	Sample Name:	**A-1 (24)**	**Method Blank**
	Lab Code:	S951541-004	S951208-WB
	Date Analyzed:	12/8/95	12/8/95
Analyte	**MRL**		
Methyl-tert-butyl ether	1	120	ND

3S44/060191

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland
Sample Matrix: Water

Service Request: S9501541
Date Collected: 12/4/95
Date Received: 12/5/95
Date Extracted: NA
Date Analyzed: 12/14/95

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Lab Code	PID Detector Percent Recovery 4-Bromofluorobenzene	FID Detector Percent Recovery α,α,α-Trifluorotoluene
A-2 (25)	S9501541-001	103	99
A-6 (27)	S9501541-002	100	106
AR-1 (27)	S9501541-003	99	103
A-1 (24)	S9501541-004	101	103
A-5 (30)	S9501541-005	104	102
MS	S9501540-003MS	90	107*
DMS	S9501540-003DMS	88	111*
Method Blank	S951214-WB	91	101
CAS Acceptance Limits:		69-116	69-116

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

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland

Service Request: S9501541
Date Analyzed: 12/14/95

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	22.5	90	85-115
Toluene	25	22.3	89	85-115
Ethylbenzene	25	22.4	90	85-115
Xylenes, Total	75	68.4	91	85-115
Gasoline	250	254	102	90-110

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9501541
Project:	0805-129.02 / TO#17075.00 / 2169 Oakland	**Date Collected:**	12/4/95
Sample Matrix:	Water	**Date Received:**	12/5/95
		Date Extracted:	NA
		Date Analyzed:	12/14/95

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

Sample Name: Batch QC
Lab Code: S9501540-003

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Percent Difference**
Gasoline	5,000	5,000	6,800	11,000	11,000	84	84	67-121	<1

DMS1S/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland
Sample Matrix: Water

Service Request: S9501541
Date Collected: 12/4/95
Date Received: 12/5/95
Date Extracted: NA
Date Analyzed: 12/8/95

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8240

		Percent Recovery		
Sample Name	**Lab Code**	1,2-Dichloroethane-D_4	Toluene-D_8	4-Bromofluorobenzene
A-1 (24)	S9501541-004	103	106	97
Method Blank	S951208-WB	89	99	98
CAS Acceptance Limits:		76-114	88-110	86-115

SURV060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland

Service Request: S9501541
Date Analyzed: 11/28/95

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Methyl-tert-butyl ether	50	63.7	127	70-130

ICV41/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 17075.00

Chain of Custody

ARCO Facility no. 2169 | City (Facility) Oakland | Project manager (Consultant) John Young | Laboratory name CAS

ARCO engineer Mike Whelan | Telephone no. (ARCO) | Telephone no. (Consultant) (408) 453-7300 | Fax no. (Consultant) (408) 453-0452 | Contract number

Consultant name EMCON | Address (Consultant) 1921 Ringwood Ave. San Jose, CA 95131

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240 MTBE Only	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	~~TPH-Diesel place on hold~~ Cancel 12/7/95 John	
①	A-2	(25)	2		X		X	HCL	12/4/95	1400		X											
	~~AR-2~~	( )	~~4~~		~~X~~		~~X~~	~~HCL~~	Not Sampled			~~X~~										~~X~~	
②	A-6	(27)	2		X		X	HCL	12/4/95	1545		X											
③	AR-1	(27)	4		X		X	HCL	↓	1445		X										X	
④	A-1	(24)	5		X		X	HCL	↓	1504		X					X					X	
⑤	A-5	(30)	2		X		X	HCL	12/4/95	1527		X											
	~~ADR-1~~	( )	~~4~~		~~X~~		~~X~~	~~HCL~~	Not Sampled			~~X~~										~~X~~	
	~~ADR-2~~	( )	~~4~~		~~X~~		~~X~~	~~HCL~~	Not Sampled			~~X~~										~~X~~	

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks:
A-2, A-6, A-5 2-40ml HCL VOAs
AR-2, AR-1, ADR-1, ADR-2 2-40ml HCL VOAs 2-1liter NP Glass
A-1 3-40ml HCL VOAs 2-1liter NP Glass
#0805-129.02

Lab number: S9501541

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

Condition of sample: ok | Temperature received: Cool

Relinquished by	Date	Time	Received by
Relinquished by sampler: [signature]	12/5/95	900	Received by:
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received by laboratory: [signature] Date 12-5-95 Time 900

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

Columbia Analytical Services inc.

December 27, 1995

Service Request No: S9501606

John Young
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **0805-129.02 / TO# 17075.00 / 2169 Oakland**

Dear Mr. Young:

The following pages contain analytical results for sample(s) received by the laboratory on December 13, 1995. 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 7, 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:

Cristina V. Rayburn

Steven L. Green
Project Chemist

Annelise Jade Bazar

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9501606
Project:	0805-129.02 / TO#17075.00 / 2169 Oakland	**Date Collected:**	12/13/95
Sample Matrix:	Water	**Date Received:**	12/13/95
		Date Extracted:	NA
		Date Analyzed:	12/19/95

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Analyte:	**TPH as Gasoline**	**Benzene**	**Toluene**	**Ethyl-benzene**	**Xylenes, Total**
Units:	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
Method Reporting Limit:	50	0.5	0.5	0.5	0.5
Sample Name / **Lab Code**					
AR-2 (28) / S9501606-001	ND	ND	ND	ND	ND
ADR-1 (20) / S9501606-002	8,800	100	130	120	990
Method Blank / S951219-WB	ND	ND	ND	ND	ND

5ABTXGAS/061694

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland
Sample Matrix: Water

Service Request: S9501606
Date Collected: 12/13/95
Date Received: 12/13/95
Date Extracted: NA
Date Analyzed: 12/19/95

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Lab Code	PID Detector Percent Recovery 4-Bromofluorobenzene	FID Detector Percent Recovery α,α,α–Trifluorotoluene
AR-2 (28)	S9501606-001	95	95
ADR-1 (20)	S9501606-002	96	99
MS	S9501596-001MS	96	99
DMS	S9501596-001DMS	96	95
Method Blank	S951213-WB	94	95
CAS Acceptance Limits:		69-116	69-116

SUR2/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO#17075.00 / 2169 Oakland

Service Request: S9501606
Date Analyzed: 12/19/95

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Benzene	25	24.2	97	85-115
Toluene	25	24.2	97	85-115
Ethylbenzene	25	24.0	96	85-115
Xylenes, Total	75	74.2	99	85-115
Gasoline	250	236	94	90-110

ICV25AL/060194

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9501606
Project:	0805-129.02 / TO#17075.00 / 2169 Oakland	**Date Collected:**	12/13/95
Sample Matrix:	Water	**Date Received:**	12/13/95
		Date Extracted:	NA
		Date Analyzed:	12/19/95

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

Sample Name: Batch QC
Lab Code: S9501596-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Benzene	25	25	ND	25.5	26.0	102	104	75-135	2
Toluene	25	25	ND	25.3	25.8	101	103	73-136	2
Ethylbenzene	25	25	ND	25.0	25.4	100	102	69-142	2

DMS1S/060194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 17075.00

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) John Young	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no (Consultant) (408)453-7300	Fax no. (Consultant) (408)453-0452
Consultant name EMCON		Address (Consultant) 1921 Ringwood Ave, San Jose, CA 95131	Contract number

	Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☒ (* Hold)	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
1	AR-2(28)		4		X		X	HCL	12/13/95	1159		X	X										
2	ADR-1(20)		4		X		X	HCL	12/13/95	1252		X	X										
	ADR-2( )		4		X		X	HCL	— No Sample, well contained product —														

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks:
2-40ml HCL VOAs
2-1liter NP * Glass
Please place diesel samples on hold.
#0805-129.07

Lab number: 9501606

Turnaround time

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

Condition of sample: ok		Temperature received: Cool	
Relinquished by sampler: Joe Smith	Date 12-13-95 Time 1545	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory: Joanne Brown	Date 12-13-95 Time 1545

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

Due 12/28

APPENDIX C

SVE SYSTEM MONITORING DATA LOG SHEETS

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
06/01/94 00.00
07/01/94 00.00

Hours in Period: 720.0
Days in Period: 30.00

Operation + Down Hours: 720.00
Operation + Down Days 30.00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent		System Influent		System Effluent										
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	lb/day	lb/day						
06/01/94 00:00	0.0	0.0																446.92				
06/30/94 16:28	164 4	169.5															712 47	446.92	0 00	0.00	712 47	29.69
07/01/94 00:00	206.7	206.7															7.53	454 45	7.53	0.31	0.00	0.00
Period Totals:																	720 00		7 53	0.31	712 47	29.69
Period Averages:	206.7	206.7																				

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
07/01/94 00:00
08/01/94 00:00

Hours in Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data																	
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent									
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
07/01/94 00:00																								454 45				
07/15/94 08:42	206.7	206 7	5000	5000	0	100.0	08:40	2000	5400	31	101	2000	5400	31	101	11	30	<0.031	<0.100	99 4	0.56	0.00	344.70	612.00	157.55	6 56	187.15	7 80
07/15/94 12:42	209.4	209.4	8000	8000	0	100.0	12:40	3200	8600	47	152	3200	8600	47	152	23	62	0 15	0.49	99.3	1.17	0.01	4.00	616.00	4.00	0.17	0 00	0.00
07/20/94 14:38	183.9	183.9	2500	2500	0	100.0	15:10	750	2000	10	32	750	2000	10	32	<3.8	<10.3	<0 031	<0 100	99.5	0.17	0 00	121.93	702.14	86.14	3 59	35.79	1.49
07/20/94 16:51	183.9	183 9																					2.22	704 36	2.22	0.09	0.00	0 00
08/01/94 00:00	183.9	183.9																					271.15	710.40	6.04	0.25	265.11	11.05
Period Totals:																							744.00		255.95	10 66	488.05	20.34
Period Averages:	198.3	198.3	5167	5167	0.0			1983	5333	29	95	1983	5333	29	95	17	46	0 15	0.49	99.1	0 82	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
08/01/94 00:00 — 09/01/94 00:00

Hours in Period: 744.00 — Operation + Down Hours: 744.00
Days in Period: 31.00 — Operation + Down Days: 31.00

Reading Date & Time	Field Monitoring Data: Flow Rates: Well Field Flow Rate	Field Monitoring Data: Flow Rates: System Influent Flow Rate	Field Monitoring Data: FID or PID Results: Well Field	Field Monitoring Data: FID or PID Results: System Influent	Field Monitoring Data: FID or PID Results: System Effluent	Field Monitoring Data: Destruction Efficiency	Laboratory Sample Time	Laboratory Monitoring Data: Well Field Influent: Gasoline		Well Field Influent: Benzene		System Influent: Gasoline		System Influent: Benzene		System Effluent: Gasoline		System Effluent: Benzene		Laboratory Monitoring Data: Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
08/01/94 00:00																								710.40				
08/01/94 15:30	183.9	183.9	2020	2020	0	100.0																	15.50	710.40	0.00	0.00	15.50	0.65
08/01/94 17:25	206.4	206.4	2510	2510	40	98.4	17:25	680	1800	6	19	680	1800	6	19	52	141	1.1	3.6	92.2	2.61	0.07	1.92	712.50	2.10	0.09	-0.18	-0.01
08/15/94 14:38	206.4	206.4																					333.22	881.86	169.36	7.06	163.86	6.83
08/15/94 15:38	206.4	206.4	910	910	20	97.8	15:30	680	1800	9.1	30	680	1800	9.1	30	35	95	0.31	1.01	94.7	1.76	0.02	1.00	882.86	1.00	0.04	0.00	0.00
08/15/94 16:30	206.4	206.4	1000	1000	30	97.0																	0.87	883.71	0.85	0.04	0.02	0.00
09/01/94 00:00	217.0	217.0																					391.50	1124.68	240.97	10.04	150.53	6.27
Period Totals:																							744.00		414.28	17.26	329.72	13.74
Period Averages:	212.6	212.6	1610	1610	23			680	1800	7.6	25	680	1800	7.6	25	44	118	0.7	2.3	93.4	2.25	0.04						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
09/01/94 00:00
12/01/94 00:00

Hours in Period: 2184.0
Days in Period: 91.00

Operation + Down Hours: 2184.0
Operation + Down Days: 91.00

	Field Monitoring Data							Laboratory Monitoring Data																		
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent										
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
09/01/94 00:00																								1124.68				
09/13/94 10:00	217.0	217.0	270	270	0.0	100.0	10:30	450	1200	2.9	9.4	450	1200	2.9	9.4	4.1	11.1	0.044	0.143	99.1	0.22	0.00	298.00	1124.68	0.00	0.00	298.00	12.42
09/13/94 11:00	215.6	215.6	370	370	0.0	100.0																	1.00	1125.68	1.00	0.04	0.00	0.00
11/02/94 13:54	215.6	215.6																					1202.9	1953.36	827.68	34.49	375.22	15.63
12/01/94 00:00	0.0	0.0																					682.10	1958.25	4.89	0.20	677.21	28.22
Period Totals.																							2184.0		833.57	34.73	1350.4	56.27
Period Averages:	214.3	214.3	320	320	0.0			450	1200	2.9	9.4	450	1200	2.9	9.4	4.1	11.1	0.04	0.143	99.1	0.21	0.00						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
12/01/94 00:00
01/01/95 00:00

Hours In Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data																
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent								
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
12/01/94 00:00																								*1958 25*				
12/15/94 15:26	38.9	126.9	>1000	240	72	70.0																	351.43	1958.72	0.47	0.02	350 96	14 62
12/15/94 17:10	34.7	126.9					16:54	1500	5600	7	22	400	1600	1.9	6	<15	<60	<0.1	<0.5	96.3	0.68	0.01	1.73	1960.45	1.73	0.07	0.00	0 00
12/30/94 09:22	*18.2*	*111.6*	*1.2*	*0*	*6.5*	NR																	*352 20*	*2305.54*	*345.09*	*14.38*	*7.11*	*0.30*
12/30/94 11:58	14.4	199 8	236	51.4	18.4	64.2																	2.60	2308.08	2.54	0.11	0.06	0.00
01/01/95 00.00	12.0	195.6																					36.03	2344.11	36.03	1.50	0 00	0.00
Period Totals:																							744.00		385.86	16.08	358.14	14.92
Period Averages:	17.7	120.1	119	97	32			1500	5600	7	22	400	1600	1.9	6	<15	<60	<0.1	<0 5	96.3	0.65	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
01/01/95 00:00
02/01/95 00:00

Hours in Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent						
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
01/01/95 00:00																								2344.11				
01/13/95 08:22	12.0	195.6	208	45.1	19.1	57.6																	296.37	2639.25	295.14	12.30	1.23	0.05
01/13/95 14:10	27.8	135.4																					5.80	2644.92	5.67	0.24	0.13	0.01
01/26/95 17:06	20.9	135.4	0.3	0	1.3	NR	14:00	<15	<60	<0.1	<0.5	<15	<60	<0.1	<0.5	<15	<60	<0.1	<0.5	NR	0.73	0.01	314.93	2956.32	311.40	12.98	3.53	0.15
02/01/95 00:00	20.9	135.4																					126.90	2958.91	2.59	0.11	124.31	5.18
Period Totals:																							744.00		614.80	25.62	129.20	5.38
Period Averages:	16.7	164.3	104	23	10.2			<15	<60	<0.1	<0.5	<15	<60	<0.1	<0.5	<15	<60	<0.1	<0.5	NR	0.89	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
02/01/95 00:00
07/01/95 00:00

Hours in Period: 3600
Days in Period: 150.00

Operation + Down Hours: 3600
Operation + Down Days: 150.00

	Field Monitoring Data							Laboratory Monitoring Data													
	Flow Rates		FID or PID Results					Well Field Influent		System Influent		System Effluent									
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline	Benzene	Gasoline	Benzene	Gasoline	Benzene	Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	ppmv mg/m3	%	lb/day	lb/day						
02/01/95 00:00																		2958.91				
07/01/95 00:00	0.0	0.0															3600	2958.91	0.00	0.00	3600	150.00
Period Totals:																	3600		0.00	0.00	3600	150.00
Period Averages:	0.0	0.0																				

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
07/01/95 00.00
08/01/95 00.00

Hours in Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data																	
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent									
Reading Data & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
07/01/95 00:00																								2958.91				
07/17/95 14:26	260.3	346.8	150	20	9	55.0	14:45	2200	8000	18	59	200	740	1.6	5.2	23	83	0 1	<0.5	88.8	2.59	0.02	398 43	2960 28	1.37	0.06	397.06	16.54
07/25/95 13:30	19.3	208.7																					191.07	3150 62	190 34	7.93	0.73	0.03
07/25/95 16 34	*42.6*	*182.6*	*1266*			NR	*17:16*	*1200*	*4400*	*8.6*	*28*									NR	NR	NR	*3.07*	*3153.67*	*3.05*	*0.13*	*0.02*	*0 00*
07/25/95 18:07	42.6	182.6					18:15	1300	4900	10	33									NR	NR	NR	1.55	3155.20	1.53	0.06	0.02	0.00
08/01/95 00:00	36.2	182.6																					149.88	3305.08	149.88	6 25	0 00	0.00
Period Totals:																							744.00		346 17	14 42	397.83	16 58
Penod Averages:	27.9	197.6	708	20	9.0			1567	5767	12	40	200	740	1.6	5 2	23	83	<0.1	<0.5	88.8	1.47	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
08/01/95 00:00
09/01/95 00:00

Hours in Period: 744.00
Days in Period: 31.00

Operation + Down Hours: 744.00
Operation + Down Days: 31.00

	Field Monitoring Data							Laboratory Monitoring Data																	
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent									
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
08/01/95 00:00																								3305.08				
08/01/95 10:39	36.2	182.6	4001	259	25.1	90.3																	10.65	3315.75	10.67	0.44	-0.02	0.00
08/01/95 11:33	38.1	163.1					11:10	2400	8800	10	32	340	1200	1.4	4.6	<15	<60	<0.1	<0.5	95.0	0.88	0.01	0.90	3316.60	0.85	0.04	0.05	0.00
08/10/95 20:05	40.0	166.4					19:45	1700	6200	5.8	19	200	740	0.6	1.9	<15	<60	<0.1	<0.5	91.9	0.90	0.01	224.5	3541.18	224.58	9.36	-0.05	0.00
08/22/95 13:47	0.0	0.0																					281.70	3541.31	0.13	0.01	281.57	11.73
08/22/95 13:58	48.9	169.9					14:15	2100	7700	14	43									NR	NR	NR	0.18	3541.46	0.15	0.01	0.03	0.00
08/22/95 14:52	58.0	174.1					15:02	1700	6000	11	36									NR	NR	NR	0.90	3542.35	0.89	0.04	0.01	0.00
09/01/95 00:00	46.4	166.5																					225.13	3767.48	225.13	9.38	0.00	0.00
Period Totals:																							744.00		462.40	19.27	281.60	11.73
Period Averages:	43.0	166.8	4001	259	25.1			1975	7175	10	33	270	970	1.0	3.3	<15	<60	<0.1	<0.5	93.8	0.90	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
09/01/95 00:00
10/01/95 00:00

Hours in Period: 720.00
Days in Period: 30.00

Operation + Down Hours: 720.00
Operation + Down Days: 30.00

	Field Monitoring Data							Laboratory Monitoring Data																
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent								
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
09/01/95 00:00																								3767.48				
09/21/95 13:14	53 3	166.4					13:34	1400	5200	3.1	10	230	920	0 6	1.8	<15	<60	<0.1	<0 5	93.5	0.90	0.01	493 23	4192 99	425.51	17.73	67.72	2 82
09/28/95 12:48	67.4	169.8																					167.57	4360.55	167.56	6 98	0.01	0.00
10/01/95 00.00	67.0	174.1																					59.20	4419.75	59.20	2 47	0 00	0.00
Period Totals:																							720.00		652.27	27.18	67.73	2.82
Period Averages:	58.1	167.9						1400	5200	3.1	10	230	920	0 6	1 8	<15	<60	<0.1	<0.5	93 5	0 91	0.01						

ARCO 2169
SVE SYSTEM
MONITORING DATA

Reporting Period:
10/01/95 00:00
01/01/96 00:00

Hours in Period: 2208
Days In Period: 92.00

Operation + Down Hours: 2208
Operation + Down Days: 92 00

	Field Monitoring Data							Laboratory Monitoring Data														
	Flow Rates		FID or PID Results					Well Field Influent				System Influent				System Effluent						
Reading Date & Time	Well Field Flow Rate	System Influent Flow Rate	Well Field	System Influent	System Effluent	Destruction Efficiency	Laboratory Sample Time	Gasoline		Benzene		Gasoline		Benzene		Gasoline		Benzene		Destruction Efficiency	Gasoline Emission Rate	Benzene Emission Rate	Period Hours	Meter Hours	Hours of Operation	Days of Operation	Down Hours	Down Days
	scfm	scfm	ppm	ppm	ppm	%		ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	ppmv	mg/m3	%	lb/day	lb/day						
10/01/95 00:00																								4419.75				
10/12/95 14:10	67.0	174.1					13:35	250	900	0.6	1.7	66	240	0.1	<0.5	<15	<60	<0.1	<0.5	75.0	0 94	0.01	278.17	4697.91	278.16	11.59	0.01	0.00
11/01/95 00:00	0.0	0.0																					465.83	4697.91	0.00	0.00	465.83	19.41
12/01/95 00:00	0.0	0.0																					720.00	4697.91	0.00	0.00	720.00	30.00
01/01/96 00:00	0 0	0.0																					744.00	4697.91	0.00	0 00	744.00	31.00
Period Totals:																							2208.0		278.16	11.59	1929 8	80.41
Period Averages:	67.0	174.1						250	900	0.6	1.7	66	240	0.1	<0 5	<15	<60	<0.1	<0 5	75.0	0.94	0.01						

APPENDIX D

OPERATION AND MAINTENANCE FIELD DATA SHEETS, SVE AND AIR-SPARGE SYSTEMS, FOURTH QUARTER 1995

Remarks: System on upon arrival. Took readings. Van sampled E-1 I-1 & I-2
Took DTW's & D.O.'s after shutting off unit

Shut off System per ARCO @ 14:10 Total Hrs = 4697.91
AR-1 TD = 27.6 DTW = 12.48 DO = 4.7

Unscheduled site visit [] Scheduled site visit [X]

SYSTEM PARAMETERS (Therm Tech Model VAC-25 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	13:10	**Effluent (E-1) (12"x12")**	
System Status (on or off)	ON	Stack Temperature (°F)	737
Shutdown Time (24:00 hour)	14:10	**SYSTEM**	
Restart Time (24:00 hour)	—	Fire Box Temperature (°F)	750
Reading Time (24:00 hour)	13:34	Set Point (°F)	750
Well Field I-1 (3")		**TOTAL HOURS**	4697.34
Vacuum (in. of H,O)	43.6-44	Electric Meter (kwh)	74463
Velocity (ft/min)	1500	Natural Gas (cf)	
Temperature (°F)	74	**AIR MONITORING**	
After Blower I-2 (4")		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H,O)	3.5	Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H,O)	26	Date: (WITH CARBON FILTER)	
Temperature (°F)	210	**PID (ppm)**	CAL GAS:
Dilution Air (3") Temperature (°F)	77	Date:	
Dilution Air Flow (in of H,O)	-10	Date:	
ATI operating properly: yes/no	yes	**Lab samples taken for analysis at:**	E-1 I-1 I-2

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H,O)	Velocity (ft/min)	DO (mg/l)	~~PID~~ TD (ppm)
AV-1	2"	5'-14'	ND	12.14	Open	42.4-43.8	(2") 25	2.3	13.0'
AV-2	2"	5'-14'			↓	42.0-43.0	(2") 300-700		
AV-3	2"	5'-14'	ND	6.73	↓	41.9-42.6	(2") 200-500	1.1	13.6
AV-4	4"	5'-14'			Closed	.64	(2") 0		
AV-5	4"	5'-14'			Closed	.01	(2") 0		
AV-6	4"	5'-14'			Open	41.9-42.8	(2") 1400-1500		
AV-7	4"	5'-14'	ND	5.70	Closed	.33	(2") 0	NA	6.3'
A-1	3"	9'-25'	ND	11.25	Open	34.9-35.5	(2") Moisture	1.6	23.7'
A-2	3"	10'-25'			Closed	-1.0	(2") 0		
A-3	3"	9'-29.5'			Closed	0	(2") 0		
A-4	3"	8'-28'			Closed	0	(2") 0		
AR-2	4"	8.5'-28.5'	ND	12.43	Open	42.8-43.7	(2") 25-250	1.8	28.6'
ADR-1	4"	5'-22'	ND	11.07	↓	41.2-43.5	(2") 100-200	0.7	28.6'
ADR-2	4"	5'-22'	0.01	11.85	↓	42.8-43.7	(2") 300-400	NA	NA

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (mg/l)	REMARKS T.D.
AS-1	2"	27'-29'	ND	12.12	OFF	0	0	7.4	28.2
AS-2	2"	21'-23'			↓	↓	↓		
AS-3	2"	26'-29'							
AS-4	2"	20'-22'	ND	11.78				1.5	21.5
AS-5	2"	20.5'-22.5'	ND	12.05	↓	↓	↓	1.6	21.5

Total Sparge Data Compressor Hours= —

Total Air Sparge Pressure(psi)= 0 | Total Air Sparge Flow Rate(scfm)= 0 | Total Air Sparge Temp(F)= NA

Special Instructions:

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

Operator: Miller/Whittle Date: 10/12/95

Project# 20805-129.002
ARCO 2169 Soil Vapor Extraction System

Remarks: System off per ARCO Rotated blower on Therm Tech

Performed product Recovery also per J Young
ADR-1 Removed 1 gallon (strong order) water with sheen ~1ml product
ADR-2 Removed 2 gallon (strong order) water w approx ~10 ml product to 30ml product with bio growth mixed in

Unscheduled site visit [] Scheduled site visit [X]

SYSTEM PARAMETERS (Therm Tech Model VAC-25 thermal/catalytic oxidizer)

Arrival Time (24:00 hour)	0959	**Effluent (E-1) (12"x12")**	
System Status (on or off)	OFF	Stack Temperature (°F)	
Shutdown Time (24:00 hour)		**SYSTEM**	
Restart Time (24:00 hour)		Fire Box Temperature (°F)	
Reading Time (24:00 hour)		Set Point (°F)	
Well Field I-1 (3")		**TOTAL HOURS**	
Vacuum (in. of H_2O)		Electric Meter (kwh)	
Velocity (ft/min)		Natural Gas (cf)	
Temperature (°F)		**AIR MONITORING**	
After Blower I-2 (4")		**FID (ppm)**	Amb / I-1 / I-2 / E-1
Total Pressure (in. of H_2O)		Date: (WITHOUT CARBON FILTER)	
Total Flow (in. of H_2O)		Date: (WITH CARBON FILTER)	
Temperature (°F)		**PID (ppm)**	CAL GAS:
Dilution Air (3") Temperature (°F)		Date:	
Dilution Air Flow (in of H_2O)		Date.	
ATI operating properly: yes/no		***Lab samples taken for analysis at:***	

WELL FIELD

SVE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Vacuum (in. of H_2O)	Velocity (ft/min)	DO (mg/l)	PID (ppm)
AV-1	2"	5'-14'					(2")		
AV-2	2"	5'-14'		1 Soil Drum Removed			(2")		
AV-3	2"	5'-14'					(2")		
AV-4	4"	5'-14'		2 Soil Drums still on site			(2")		
AV-5	4"	5'-14'					(2")		
AV-6	4"	5'-14'		1 water Drum still on site			(2")		
AV-7	4"	5'-14'					(2")		
A-1	3"	9'-25'					(2")		
A-2	3"	10'-25'					(2")		
A-3	3"	9'-29.5'					(2")		
A-4	3"	8'-28'					(2")		
AR-2	4"	8.5'-28.5'				Product is dark & oily in texture	(2")		
ADR-1	4"	5'-22'	11.25	11.25	→ Just a Sheen		(2")		
ADR-2	4"	5'-22'	11.99	12.00	→ .01' product mixed with bio growth				

SPARGE WELL ID	Well Diameter	Screen Interval	DTFP (feet)	DTW (feet)	Valve Position (% open)	Pressure (psi)	Air Flow (scfm)	DO (mg/l)	REMARKS
AS-1	2"	27'-29'							
AS-2	2"	21'-23'							
AS-3	2"	26'-29'							
AS-4	2"	20'-22'							
AS-5	2"	20.5'-22.5'							

Total Sparge Data Compressor Hours=

Total Air Sparge Pressure(psi)=	Total Air Sparge Flow Rate(scfm)=	Total Air Sparge Temp(F)=

Special Instructions:

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

Operator: MAller/V Whitten Date: 10/26/95

Project# 20805-129.002
ARCO 2169 Soil Vapor Extraction System

APPENDIX E

ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR SVE SYSTEM AIR SAMPLES, FOURTH QUARTER 1995

Columbia
Analytical
Services inc.

October 25, 1995

Service Request No: S951282

Ms. Valli Voruganti
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

Re: **0805-129.02 / TO# 9382.00 / 2169 Oakland**

Dear Ms. Voruganti:

The following pages contain analytical results for sample(s) received by the laboratory on October 12, 1995. 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 9, 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

Annelise J. Bazar
Regional QA Coordinator

SLG/ajb

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

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: 0805-129.02 / TO# 9382.00 / 2169 Oakland
Sample Matrix: Vapor

Service Request: S951282
Date Collected: 10/12/95
Date Received: 10/12/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name:	**E-1**	**I-1**	**I-2**
Lab Code:	S951282-001	S951282-002	S951282-003
Date Analyzed:	10/13/95	10/13/95	10/13/95

Analyte	**MRL**			
Benzene	0.5	ND	1.7	ND
Toluene	0.5	ND	8.6	2.4
Ethylbenzene	0.5	ND	6.1	1.5
Total Xylenes	1	ND	83	17
Total Volatile Hydrocarbons				
C_1 - C_4 Hydrocarbons	20	ND	<40 *	<20 *
C_5 - C_8 Hydrocarbons	20	ND	600	180
C_9 - C_{12} Hydrocarbons	20	ND	300	66
Gasoline Fraction (C_5-C_{12})	60	ND	900	240

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

3822/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S951282
Project:	0805-129.02 / TO# 9382.00 / 2169 Oakland	**Date Collected:**	10/12/95
Sample Matrix:	Vapor	**Date Received:**	10/12/95
		Date Extracted:	NA

BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name:	**Method Blank**
Lab Code:	S951013-VB
Date Analyzed:	10/13/95

Analyte	**MRL**	
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	1	ND
Total Volatile Hydrocarbons		
C_1 - C_4 Hydrocarbons	20	ND
C_5 - C_8 Hydrocarbons	20	ND
C_9 - C_{12} Hydrocarbons	20	ND
Gasoline Fraction (C_5-C_{12})	60	ND

3822/060194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 0805-129.02 / TO# 9382.00 / 2169 Oakland
Sample Matrix: Vapor

Service Request: S951282
Date Collected: 10/12/95
Date Received: 10/12/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

		Sample Name:	**E-1**	**I-1**	**I-2**
		Lab Code:	S951282-001	S951282-002	S951282-003
		Date Analyzed:	10/13/95	10/13/95	10/13/95
Analyte	**MRL**				
Benzene	0.1		ND	0.6	0.1
Toluene	0.1		ND	2.4	0.6
Ethylbenzene	0.1		ND	1.4	0.3
Total Xylenes	0.2		ND	19	3.9
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	5		ND	<10 *	<5 *
C_5 - C_8 Hydrocarbons	5		ND	170	50
C_9 - C_{12} Hydrocarbons	5		ND	83	18
Gasoline Fraction (C_5-C_{12})	15		ND	250	66

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

3822/0o0194

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 0805-129.02 / TO# 9382.00 / 2169 Oakland
Sample Matrix: Vapor

Service Request: S951282
Date Collected: 10/12/95
Date Received: 10/12/95
Date Extracted: NA

BTEX and Total Volatile Hydrocarbons

Units: ppmV

Sample Name:	**Method Blank**
Lab Code:	S951013-VB
Date Analyzed:	10/13/95

Analyte	**MRL**	
Benzene	0.1	ND
Toluene	0.1	ND
Ethylbenzene	0.1	ND
Total Xylenes	0.2	ND
Total Volatile Hydrocarbons		
C_1 - C_4 Hydrocarbons	5	ND
C_5 - C_8 Hydrocarbons	5	ND
C_9 - C_{12} Hydrocarbons	5	ND
Gasoline Fraction (C_5-C_{12})	15	ND

3822/0b01v1

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 0805-129.02 / TO# 9382.00 / 2169 Oakland
Sample Matrix: Vapor

Service Request: S951282
Date Collected: 10/12/95
Date Received: 10/12/95
Date Extracted: NA
Date Analyzed: 10/13/95

Duplicate Summary
BTEX and Total Volatile Hydrocarbons

Units: mg/m^3

Sample Name: 1-2
Lab Code: S951282-003

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	ND	ND	ND	<1
Toluene	0.5	2.4	2.4	2.4	<1
Ethylbenzene	0.5	1.5	1.4	1.5	7
Xylenes, Total	1	17	16	17	6
Total Volatile Hydrocarbons					
C_1 - C_4 Hydrocarbons	20	<20 *	<20 *	<20 *	<1
C_5 - C_8 Hydrocarbons	20	180	170	180	6
C_9 - C_{12} Hydrocarbons	20	66	64	65	3
Gasoline Fraction (C_5-C_{12})	60	240	240	240	<1

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

DUP1S:0601194

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 9382.00

Chain of Custody

ARCO Facility no. 2169	City (Facility) Oakland	Project manager (Consultant) Vall. Veruganti	Laboratory name CAS
ARCO engineer Mike Whelan	Telephone no. (ARCO) 408-377-8697	Telephone no. (Consultant) 408 453 7300	Fax no. (Consultant) 408 453 0452
Consultant name EMCON	Address (Consultant) 1921 Ringwood San Jose, CA.		Contract number 07077

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
E-1	1	1			X			10/12/95	13:35		X											
I-1	2	1			X			"	13:44		X											
I-2	3	1			X			"	13:40		X											

Special detection Limit/reporting: please report in mg/m³ or ppmv

Special QA/QC

Remarks: 0805-129.02

Lab number: 9950282

Method of shipment: Tech

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

Condition of sample: Inflated		Temperature received: RT	
Relinquished by sampler	Date 10/12/95 Time 1705	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory Joanne Brown	Date 10-12-95 Time 1705

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

APC-3292 (2-91)

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