



R0392

June 22, 1999
Project 20805-130.008

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

Re: Quarterly Groundwater Monitoring Report, First Quarter 1999, for ARCO Service Station
No. 2185, located at 9800 East 14th Street, Oakland, California

Dear Mr. Supple:

Pinnacle Environmental Solutions, a division of EMCON (Pinnacle), is submitting the attached report which presents the results of the first quarter 1999 groundwater monitoring program at ARCO Products Company (ARCO) Service Station No. 2185, located at 9800 East 14th Street, Oakland, California. The monitoring program complies with the Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

LIMITATIONS

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

Please call if you have questions.

Sincerely,

Pinnacle

Glen VanderVeen
Project Manager

Jay R. Johnson, R.G.
Senior Project Supervisor

Attachment: Quarterly Groundwater Monitoring Report, First Quarter 1999

cc: Barney M. Chan, ACHCSA

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ENVIRONMENTAL
PROTECTION



Date: June 22, 1999

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 2185 Address: 9800 East 14th Street, Oakland, California
Pinnacle Project No. 20805-130.008
ARCO Environmental Engineer/Phone No.: Paul Supple /(925) 299-8891
Pinnacle Project Manager/Phone No.: Glen VanderVeen /(510) 740-5807
Primary Agency/Regulatory ID No.: ACHCSA

WORK PERFORMED THIS QUARTER (FIRST - 1999):

1. Prepared and submitted quarterly groundwater monitoring report for fourth quarter 1998.
2. Performed quarterly groundwater monitoring and sampling for first quarter 1999.

WORK PROPOSED FOR NEXT QUARTER (SECOND - 1999):

1. Prepare and submit quarterly groundwater monitoring report for first quarter 1999.
2. No environmental work is scheduled at this time.

QUARTERLY MONITORING:

Current Phase of Project: Quarterly Groundwater Monitoring
Frequency of Sampling: None
Frequency of Monitoring: None
Is Floating Product (FP) Present On-site: Yes No
Bulk Soil Removed to Date: 2,550 cubic yards of TPH impacted soil
Bulk Soil Removed This Quarter: None
Water Wells or Surface Waters,
within 2000 ft., impacted by site: None
Current Remediation Techniques: None
Average Depth to Groundwater: 8.4 feet
Groundwater Flow Direction and Gradient
(Average): 0.009 ft/ft toward Northwest

DISCUSSION:

- As discussed in written correspondence (April, 8, 1999, letter from Pinnacle to ACHCSA) and telephone conversations between Pinnacle and ACHCSA, all future monitoring and remediation activities are indefinitely suspended for this site, with the understanding that the ACHCSA case for this site will remain "open", and the site will continue to be used as a gasoline station.

ATTACHMENTS:

- Table 1 - Historical Groundwater Elevation and Analytical Data, Petroleum Hydrocarbons and Their Constituents
- Figure 1 - Groundwater Analytical Summary Map
- Figure 2 - Groundwater Elevation Contour Map
- Appendix A - Sampling and Analysis Procedures
- Appendix B - Certified Analytical Reports and Chain-of-Custody Documentation
- Appendix C - Field Data Sheets

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 2185
9800 East 14th Street, Oakland, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPFHG 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 8240/8260 µg/L
MW-1	03-15-95	29.15	8.50	20.65	ND	NW	0.01	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-1	05-30-95	29.15	10.28	18.87	ND	SW	0.005	05-30-95	Not sampled: well sampled annually, during the first quarter						
MW-1	09-20-95	29.15	11.70	17.45	ND	WSW	0.005	09-20-95	Not sampled: well sampled annually, during the first quarter						
MW-1	11-07-95	29.15	12.12	17.03	ND	WSW	0.004	11-07-95	Not sampled: well sampled annually, during the first quarter						
MW-1	02-28-96	29.15	8.54	20.61	ND	NW	0.009	02-28-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-1	05-30-96	29.15	10.05	19.10	ND	W	0.007	05-31-96	Not sampled: well sampled annually, during the first quarter						
MW-1	08-20-96	29.15	11.35	17.80	ND	SW	0.005	08-20-96	Not sampled: well sampled annually, during the first quarter						
MW-1	11-19-96	29.15	11.20	17.95	ND	WSW	0.005	11-19-96	Not sampled: well sampled annually, during the first quarter						
MW-1	03-25-97	29.15	10.12	19.03	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-1	06-17-97	29.15	11.27	17.88	ND	W	0.001	06-17-97	Not sampled: well sampled annually, during the first quarter						
MW-1	08-07-97	29.15	11.83	17.32	ND	SW	0.005	08-07-97	Not sampled: well sampled annually, during the first quarter						
MW-1	11-18-97	29.15	11.80	17.35	ND	SW	0.004	11-18-97	Not sampled: well sampled annually, during the first quarter						
MW-1	02-25-98	29.15	7.02	22.13	ND	NW	0.011	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-1	05-11-98	29.15	9.17	19.98	ND	WNW	0.01	05-11-98	Not sampled: well sampled annually, during the first quarter						
MW-1	07-29-98	29.15	10.46	18.69	ND	W	0.009	07-29-98	Not sampled: well sampled annually, during the first quarter						
MW-1	10-12-98	29.15	11.27	17.88	ND	W	0.009	10-12-98	Not sampled: well sampled annually, during the first quarter						
MW-1	02-18-99	29.15	8.34	20.81	ND	NW	0.009	02-18-99	Not sampled						
MW-2	03-15-95	28.47	8.37	20.10	ND	NW	0.01	03-15-95	2100	7.4	<2.5	130	39	--	--
MW-2	05-30-95	28.47	9.95	18.52	ND	SW	0.005	05-30-95	1700	3.3	<2.5	120	31	--	--
MW-2	09-20-95	28.47	11.37	17.10	ND	WSW	0.005	09-21-95	1200	1	<1	68	16	<5	--
MW-2	11-07-95	28.47	11.73	16.74	ND	WSW	0.004	11-07-95	1100	<3	<3	74	14	<20	--
MW-2	02-28-96	28.47	8.12	20.35	ND	NW	0.009	02-29-96	2200	<3	<3	130	27	<20	--
MW-2	05-30-96	28.47	9.89	18.58	ND	W	0.007	05-31-96	970	<9	<1	29	3	<5	--
MW-2	08-20-96	28.47	11.05	17.42	ND	SW	0.005	08-20-96	670	<1	<1	16	1	<5	--
MW-2	11-19-96	28.47	10.96	17.51	ND	WSW	0.005	11-19-96	990	<1	<1	46	3	<5	--
MW-2	03-25-97	28.47	9.84	18.63	ND	WNW	0.006	03-25-97	540	<1	<1	<1	<1	<6	--
MW-2	06-17-97	28.47	10.99	17.48	ND	W	0.001	06-17-97	510	<7	0.9	1.1	<2	<3	--
MW-2	08-07-97	28.47	11.50	16.97	ND	SW	0.005	08-07-97	280	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	11-18-97	28.47	11.41	17.06	ND	SW	0.004	11-18-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	02-25-98	28.47	6.33	22.14	ND	NW	0.011	02-25-98	850	<0.5	1.1	13	1.4	<3	--

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Petroleum Hydrocarbons and Their Constituents
1995 - Present*

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Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHC 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	MTEB EPA 82408260 µg/L
MW-2	05-11-98	28.47	8.89	19.58	ND	WNW	0.01	05-11-98	290	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	07-29-98	28.47	10.22	18.25	ND	W	0.009	07-29-98	310	<0.5	0.5	<0.5	1.1	<3	--
MW-2	10-12-98	28.47	10.95	17.52	ND	W	0.009	10-12-98	280	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	02-18-99	28.47	8.05	20.42	ND	NW	0.009	02-18-99	180	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	03-15-95	28.57	8.47	20.10	ND	NW	0.01	03-15-95	2000	<2.5	<2.5	88	82	--	--
MW-3	05-30-95	28.57	10.03	18.54	ND	SW	0.005	05-30-95	2000	3.2	<2.5	70	46	--	--
MW-3	09-20-95	28.57	11.30	17.27	ND	WSW	0.005	09-21-95	2100	12	<3	77	38	280	--
MW-3	11-07-95	28.57	11.65	16.92	ND	WSW	0.004	11-07-95	3000	18	<3	120	62	--	430[1]
MW-3	02-28-96	28.57	8.35	20.22	ND	NW	0.009	02-29-96	5100	83	<5	160	57	640	--
MW-3	05-30-96	28.57	9.77	18.80	ND	W	0.007	05-31-96	2100	41	<5	57	15	890	--
MW-3	08-20-96	28.57	11.00	17.57	ND	SW	0.005	08-20-96	2500	94	<2.5	62	14	2200	--
MW-3	11-19-96	28.57	10.92	17.65	ND	WSW	0.005	11-19-96	2400	84	<2.5	73	22	1300	--
MW-3	03-25-97	28.57	9.90	18.67	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	48	--
MW-3	06-17-97	28.57	10.95	17.62	ND	W	0.001	06-17-97	<200	<2	<2	<2	<2	200	--
MW-3	08-07-97	28.57	11.44	17.13	ND	SW	0.005	08-07-97	<500	<5	<5	<5	<5	490	--
MW-3	11-18-97	28.57	11.35	17.22	ND	SW	0.004	11-18-97	200	9	<2	7	<2	300	--
MW-3	02-25-98	28.57	6.98	21.59	ND	NW	0.011	02-25-98	250	<2	<2	7	<2	370	--
MW-3	05-11-98	28.57	9.07	19.50	ND	WNW	0.01	05-11-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	07-29-98	28.57	10.06	18.51	ND	W	0.009	07-29-98	<50	<0.5	<0.5	<0.5	<0.5	51	--
MW-3	10-12-98	28.57	10.96	17.61	ND	W	0.009	10-12-98	<50	<0.5	<0.5	<0.5	<0.5	98	--
MW-3	02-18-99	28.57	8.35	20.22	ND	NW	0.009	02-19-99	650	<5	<5	6	<5	610	--
MW-4	03-15-95	29.21	8.69	20.52	ND	NW	0.01	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	05-30-95	29.21	10.57	18.64	ND	SW	0.005	05-30-95	Not sampled; well sampled annually, during the first quarter						
MW-4	09-20-95	29.21	12.02	17.19	ND	WSW	0.005	09-20-95	Not sampled; well sampled annually, during the first quarter						
MW-4	11-07-95	29.21	12.42	16.79	ND	WSW	0.004	11-07-95	Not sampled; well sampled annually, during the first quarter						
MW-4	02-28-96	29.21	8.66	20.55	ND	NW	0.009	02-28-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	05-30-96	29.21	10.34	18.87	ND	W	0.007	05-31-96	Not sampled; well sampled annually, during the first quarter						
MW-4	08-20-96	29.21	11.67	17.54	ND	SW	0.005	08-20-96	Not sampled; well sampled annually, during the first quarter						
MW-4	11-19-96	29.21	11.50	17.71	ND	WSW	0.005	11-19-96	Not sampled; well sampled annually, during the first quarter						

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MW-4	03-25-97	29.21	10.42	18.79	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	06-17-97	29.21	11.60	17.61	ND	W	0.001	06-17-97	Not sampled: well sampled annually, during the first quarter						
MW-4	08-07-97	29.21	12.17	17.04	ND	SW	0.005	08-07-97	Not sampled: well sampled annually, during the first quarter						
MW-4	11-18-97	29.21	12.05	17.16	ND	SW	0.004	11-18-97	Not sampled: well sampled annually, during the first quarter						
MW-4	02-25-98	29.21	6.91	22.30	ND	NW	0.011	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	05-11-98	29.21	9.45	19.76	ND	WNW	0.01	05-11-98	Not sampled: well sampled annually, during the first quarter						
MW-4	07-29-98	29.21	10.80	18.41	ND	W	0.009	07-29-98	Not sampled: well sampled annually, during the first quarter						
MW-4	10-12-98	29.21	11.58	17.63	ND	W	0.009	10-12-98	Not sampled: well sampled annually, during the first quarter						
MW-4	02-18-99	29.21	8.56	20.65	ND	NW	0.009	02-18-99	Not sampled						
MW-5	03-15-95	28.12	8.47	19.65	ND	NW	0.01	03-15-95	170	5.6	<0.5	17	11	--	--
MW-5	05-30-95	28.12	9.69	18.43	ND	SW	0.005	05-30-95	53	0.6	<0.5	4.8	2.8	--	--
MW-5	09-20-95	28.12	10.90	17.22	ND	WSW	0.005	09-21-95	1500	47	2	120	86	70	--
MW-5	11-07-95	28.12	11.20	16.92	ND	WSW	0.004	11-07-95	140	4.5	<0.5	8.3	16	10	--
MW-5	02-28-96	28.12	8.15	19.97	ND	NW	0.009	02-29-96	900	11	<1	59	29	99	--
MW-5	05-30-96	28.12	9.48	18.64	ND	W	0.007	05-31-96	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-5	08-20-96	28.12	10.58	17.54	ND	SW	0.005	08-20-96	67	0.7	<0.5	3.6	0.6	27	--
MW-5	11-19-96	28.12	10.50	17.62	ND	WSW	0.005	11-19-96	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-5	03-25-97	28.12	9.58	18.54	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	06-17-97	28.12	10.52	17.60	ND	W	0.001	06-17-97	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-5	08-07-97	28.12	11.00	17.12	ND	SW	0.005	08-07-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	11-18-97	28.12	10.93	17.19	ND	SW	0.004	11-18-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	02-25-98	28.12	6.75	21.37	ND	NW	0.011	02-25-98	370	2	6	11	9	270	--
MW-5	05-11-98	28.12	9.11	19.01	ND	WNW	0.01	05-11-98	<50	<0.5	<0.5	<0.5	<0.5	9	--
MW-5	07-29-98	28.12	9.89	18.23	ND	W	0.009	07-29-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	10-12-98	28.12	10.52	17.60	ND	W	0.009	10-12-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	02-18-99	28.12	8.08	20.04	ND	NW	0.009	02-19-99	230	<1	<1	4	1	140	--
MW-6	03-15-95	27.79	7.75	20.04	ND	NW	0.01	03-15-95	3600	77	<5	420	180	--	--
MW-6	05-30-95	27.79	9.48	18.31	ND	SW	0.005	05-30-95	5000	68	<5	530	250	--	--
MW-6	09-20-95	27.79	10.75	17.04	ND	WSW	0.005	09-21-95	3300	36	<5	360	120	<30	--

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1995 - Present*

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Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240/8260 µg/L
MW-6	11-07-95	27.79	11.06	16.73	ND	WSW	0.004	11-07-95	3500	33	<5	410	110	<30	--
MW-6	02-28-96	27.79	7.86	19.93	ND	NW	0.009	02-29-96	520	33	<5	480	160	<30	--
MW-6	05-30-96	27.79	9.35	18.44	ND	W	0.007	05-31-96	Not sampled: well sampled semi-annually, during the first and third quarters						--
MW-6	08-20-96	27.79	10.43	17.36	ND	SW	0.005	08-20-96	1900	3.4	<2.5	150	21	<12	--
MW-6	11-19-96	27.79	10.36	17.43	ND	WSW	0.005	11-19-96	Not sampled: well sampled semi-annually, during the first and third quarters						--
MW-6	03-25-97	27.79	9.35	18.44	ND	WNW	0.006	03-25-97	1100	<2	<2	5	5	<10	--
MW-6	06-17-97	27.79	10.37	17.42	ND	W	0.001	06-17-97	Not sampled: well sampled semi-annually, during the first and third quarters						--
MW-6	08-07-97	27.79	10.85	16.94	ND	SW	0.005	08-07-97	53	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	11-18-97	27.79	10.75	17.04	ND	SW	0.004	11-18-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	02-25-98	27.79	6.30	21.49	ND	NW	0.011	02-25-98	3500	<5	18	190	54	<30	--
MW-6	05-11-98	27.79	8.55	19.24	ND	WNW	0.01	05-11-98	730	<1	<1	4	<1	<6	--
MW-6	07-29-98	27.79	9.71	18.08	ND	W	0.009	07-29-98	77	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	10-12-98	27.79	10.37	17.42	ND	W	0.009	10-12-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	02-18-99	27.79	7.82	19.97	ND	NW	0.009	02-19-99	1600	<2	<2	84	7	<12	--
MW-7	03-15-95	27.88	8.13	19.75	ND	NW	0.01	03-15-95	150**	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	05-30-95	27.88	10.14	17.74	ND	SW	0.005	05-30-95	110**	<0.5	<0.5	<0.5	<0.5	--	--
MW-7	09-20-95	27.88	11.52	16.36	ND	WSW	0.005	09-20-95	<400**	<0.8	<0.5	<0.5	<0.5	<7	--
MW-7	11-07-95	27.88	11.70	16.18	ND	WSW	0.004	11-07-95	<500	2	<1	<1	<1	<20	--
MW-7	02-28-96	27.88	8.19	19.69	ND	NW	0.009	02-29-96	<300**	<0.5	<0.5	<0.5	<0.5	<6	--
MW-7	05-30-96	27.88	9.98	17.90	ND	W	0.007	05-31-96	<100**	<0.5	<0.5	<0.5	<0.5	<3	--
MW-7	08-20-96	27.88	11.15	16.73	ND	SW	0.005	08-20-96	<200**	<0.5	<0.5	<0.5	<0.5	<5	--
MW-7	11-19-96	27.88	10.92	16.96	ND	WSW	0.005	11-19-96	Not sampled: well sampled annually, during the first quarter						--
MW-7	03-25-97	27.88	9.88	18.00	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-7	06-17-97	27.88	11.13	16.75	ND	W	0.001	06-17-97	Not sampled: well sampled annually, during the first quarter						--
MW-7	08-07-97	27.88	11.65	16.23	ND	SW	0.005	08-07-97	Not sampled: well sampled annually, during the first quarter						--
MW-7	11-18-97	27.88	11.46	16.42	ND	SW	0.004	11-18-97	Not sampled: well sampled annually, during the first quarter						--
MW-7	02-25-98	27.88	6.35	21.53	ND	NW	0.011	02-25-98	<50	<0.5	0.5	<0.5	0.7	14	--
MW-7	05-11-98	27.88	9.15	18.73	ND	WNW	0.01	05-11-98	Not sampled: well sampled annually, during the first quarter						--
MW-7	07-29-98	27.88	10.56	17.32	ND	W	0.009	07-29-98	Not sampled: well sampled annually, during the first quarter						--
MW-7	10-12-98	27.88	11.22	16.66	ND	W	0.009	10-12-98	Not sampled: well sampled annually, during the first quarter						--

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 2185
9800 East 14th Street, Oakland, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240/8260 µg/L
MW-7	02-18-99	27.88	8.15	19.73	ND	NW	0.009	02-18-99	Not sampled						
MW-8	03-15-95	NR	8.43	NR	ND	NR	NR	03-15-95	280	<0.5	<0.5	0.7	0.7	--	--
MW-8	05-30-95	NR	9.86	NR	ND	NR	NR	05-30-95	390	<0.5	<0.5	<2	1.6	--	--
MW-8	09-20-95	28.08	11.07	17.01	ND	WSW	0.005	09-21-95	470	<0.5	<0.5	3	1.2	52	--
MW-8	11-07-95	28.08	11.40	16.68	ND	WSW	0.004	11-07-95	280	<0.5	<0.5	0.6	<0.5	94	--
MW-8	02-28-96	28.08	8.30	19.78	ND	NW	0.009	02-29-96	160	<0.5	<0.5	<0.9	<0.6	32	--
MW-8	05-30-96	28.08	9.68	18.40	ND	W	0.007	05-31-96	100	<0.5	<0.5	<0.6	<0.5	16	--
MW-8	08-20-96	28.08	10.72	17.36	ND	SW	0.005	08-20-96	140	<0.5	<0.5	<0.5	<0.5	190	--
MW-8	11-19-96	28.08	10.58	17.50	ND	WSW	0.005	11-19-96	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-8	03-25-97	28.08	9.73	18.35	ND	WNW	0.006	03-25-97	63	<0.5	<0.5	<0.5	<0.5	38	--
MW-8	06-17-97	28.08	10.67	17.41	ND	W	0.001	06-17-97	Not sampled: well sampled semi-annually, during the first and third quarters						
MW-8	08-07-97	28.08	11.15	16.93	ND	SW	0.005	08-07-97	53	<0.5	<0.5	<0.5	<0.5	390	--
MW-8	11-18-97	28.08	11.05	17.03	ND	SW	0.004	11-18-97	<500	<5	<5	<5	<5	640	--
MW-8	02-25-98	28.08	7.25	20.83	ND	NW	0.011	02-25-98	<50	<0.5	0.7	<0.5	0.9	56	--
MW-8	05-11-98	28.08	9.00	19.08	ND	WNW	0.01	05-11-98	<50	<0.5	<0.5	<0.5	<0.5	18	--
MW-8	07-29-98	28.08	10.03	18.05	ND	W	0.009	07-29-98	<50	<0.5	<0.5	<0.5	<0.5	19	21[2]
MW-8	10-12-98	28.08	10.70	17.38	ND	W	0.009	10-12-98	<100	<1	<1	<1	<1	81	--
MW-8	02-18-99	28.08	8.15	19.93	ND	NW	0.009	02-19-99	<50	<0.5	<0.5	<0.5	<0.5	44	--
MW-9	09-20-95	27.73	11.67	16.06	ND	WSW	0.005	09-20-95	<50	<0.5	<0.5	<0.5	<0.5	<4	--
MW-9	11-07-95	27.73	11.70	16.03	ND	WSW	0.004	11-07-95	<50	<0.5	<0.5	<0.5	<0.5	<4	--
MW-9	02-28-96	27.73	9.23	18.50	ND	NW	0.009	02-29-96	<50	<0.5	<0.5	<0.5	<0.5	<5	--
MW-9	05-30-96	27.73	10.50	17.23	ND	W	0.007	05-31-96	<50	0.6	<0.5	<0.5	<0.5	<8	--
MW-9	08-20-96	27.73	11.33	16.40	ND	SW	0.005	08-20-96	<50	<0.5	<0.5	<0.5	<0.5	<7	--
MW-9	11-19-96	27.73	11.20	16.53	ND	WSW	0.005	11-19-96	Not sampled: well sampled annually, during the first quarter						
MW-9	03-25-97	27.73	10.41	17.32	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<6	--
MW-9	06-17-97	27.73	11.30	16.43	ND	W	0.001	06-17-97	Not sampled: well sampled annually, during the first quarter						
MW-9	08-07-97	27.73	11.70	16.03	ND	SW	0.005	08-07-97	Not sampled: well sampled annually, during the first quarter						
MW-9	11-18-97	27.73	11.42	16.31	ND	SW	0.004	11-18-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-9	02-25-98	27.73	8.72	19.01	ND	NW	0.011	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<8	--

Table 1
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ARCO Service Station 2185
9800 East 14th Street, Oakland, California

Well Designation	Water Level Field Date	Top of Casing Elevation ft-MSL	Depth to Water feet	Groundwater Elevation ft-MSL	Floating Product Thickness feet	Groundwater Flow Direction MWN	Hydraulic Gradient ft/ft	Water Sample Field Date	TPHG LUFT Method µg/L	Benzene EPA 8020 µg/L	Toluene EPA 8020 µg/L	Ethylbenzene EPA 8020 µg/L	Total Xylenes EPA 8020 µg/L	MTBE EPA 8020 µg/L	MTBE EPA 8240/8260 µg/L	
MW-9	05-11-98	27.73	10.05	17.68	ND	WNW	0.01	05-11-98	<50	<0.5	<0.5	<0.5	<0.5	5	--	
MW-9	07-29-98	27.73	11.04	16.69	ND	W	0.009	07-29-98	<50	<0.5	<0.5	<0.5	<0.5	6	--	
MW-9	10-12-98	27.73	11.55	16.18	ND	W	0.009	10-12-98	<50	<0.5	<0.5	<0.5	<0.5	5	--	
MW-9	02-18-99	27.73	8.90	18.83	ND	NW	0.009	02-18-99	<50	<0.5	<0.5	<0.5	<0.5	39	--	
MW-10	09-20-95	27.55	10.65	16.90	ND	WSW	0.005	09-21-95	<50	<0.5	<0.5	<0.5	<0.5	△	--	
MW-10	11-07-95	27.55	10.85	16.70	ND	WSW	0.004	11-07-95	<50	<0.5	<0.5	<0.5	<0.5	△	--	
MW-10	02-28-96	27.55	9.38	18.17	ND	NW	0.009	02-29-96	<50	<0.5	<0.5	<0.5	<0.5	△	--	
MW-10	05-30-96	27.55	9.99	17.56	ND	W	0.007	05-31-96	<50	<0.5	<0.5	<0.5	<0.5	△	--	
MW-10	08-20-96	27.55	10.47	17.08	ND	SW	0.005	08-20-96	<50	<0.5	<0.5	<0.5	<0.5	△	--	
MW-10	11-19-96	27.55	10.44	17.11	ND	WSW	0.005	11-19-96	Not sampled; well sampled annually, during the first quarter							
MW-10	03-25-97	27.55	10.02	17.53	ND	WNW	0.006	03-25-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--	
MW-10	06-17-97	27.55	10.40	17.15	ND	W	0.001	06-17-97	Not sampled; well sampled annually, during the first quarter							
MW-10	08-07-97	27.55	10.75	16.80	ND	SW	0.005	08-07-97	Not sampled; well sampled annually, during the first quarter							
MW-10	11-18-97	27.55	10.67	16.88	ND	SW	0.004	11-18-97	Not sampled; well sampled annually, during the first quarter							
MW-10	02-25-98	27.55	9.02	18.53	ND	NW	0.011	02-25-98	<50	<0.5	1.4	<0.5	1.8	12	--	
MW-10	05-11-98	27.55	9.63	17.92	ND	WNW	0.01	05-11-98	Not sampled; well sampled annually, during the first quarter							
MW-10	07-29-98	27.55	10.15	17.40	ND	W	0.009	07-29-98	Not sampled; well sampled annually, during the first quarter							
MW-10	10-12-98	27.55	10.55	17.00	ND	W	0.009	10-12-98	Not sampled; well sampled annually, during the first quarter							
MW-10	02-18-99	27.55	9.21	18.34	ND	NW	0.009	02-18-99	Not sampled							

Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 2185
9800 East 14th Street, Oakland, California

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 8240/8260
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L

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

MWN: ground-water flow direction and gradient apply to the entire monitoring well network

ft/ft: foot per foot

TPHG: total petroleum hydrocarbons as gasoline, California DHS LUFT Method

µg/L: micrograms per liter

EPA: United States Environmental Protection Agency

MTBE: Methyl tert-butyl ether

ND: none detected

NR: not reported; data not available or not measurable

NW: northwest

--: not analyzed or not applicable

[1]: confirmed by EPA method 8240

[2]: confirmed by EPA method 8260

*: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 2185, Oakland, California*, (EMCON, February 27, 1996).

**: chromatogram does not match the typical gasoline fingerprint



McDONALDS
(Former
Exxon Station)

CITY OF OAKLAND
FIRE STATION

98TH AVENUE

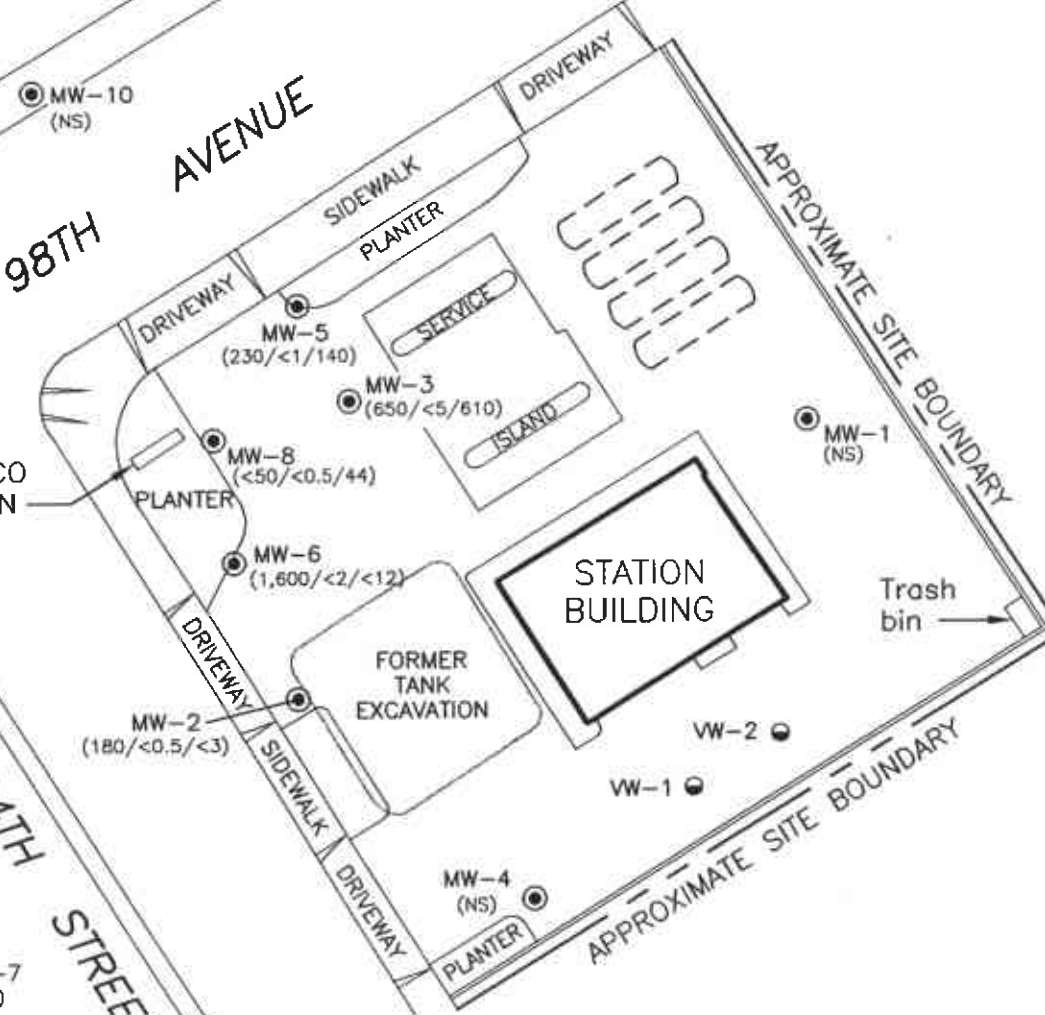
EAST 14TH STREET

BIG-O TIRES
(FORMER GAS STATION)

Approximate location of
former pump island

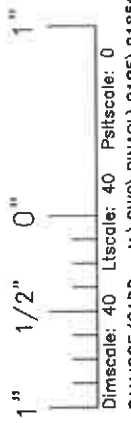
EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- ⎓ Existing underground gasoline storage tank
- (180/<0.5/<3) Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 2/18-19/99
- < Not detected at or above the indicated laboratory detection limit
- NS Not sampled



Base map modified from RESNA, 1994.

IMAGE Files: <No Images>
 XREF Files: <No Xrefs>
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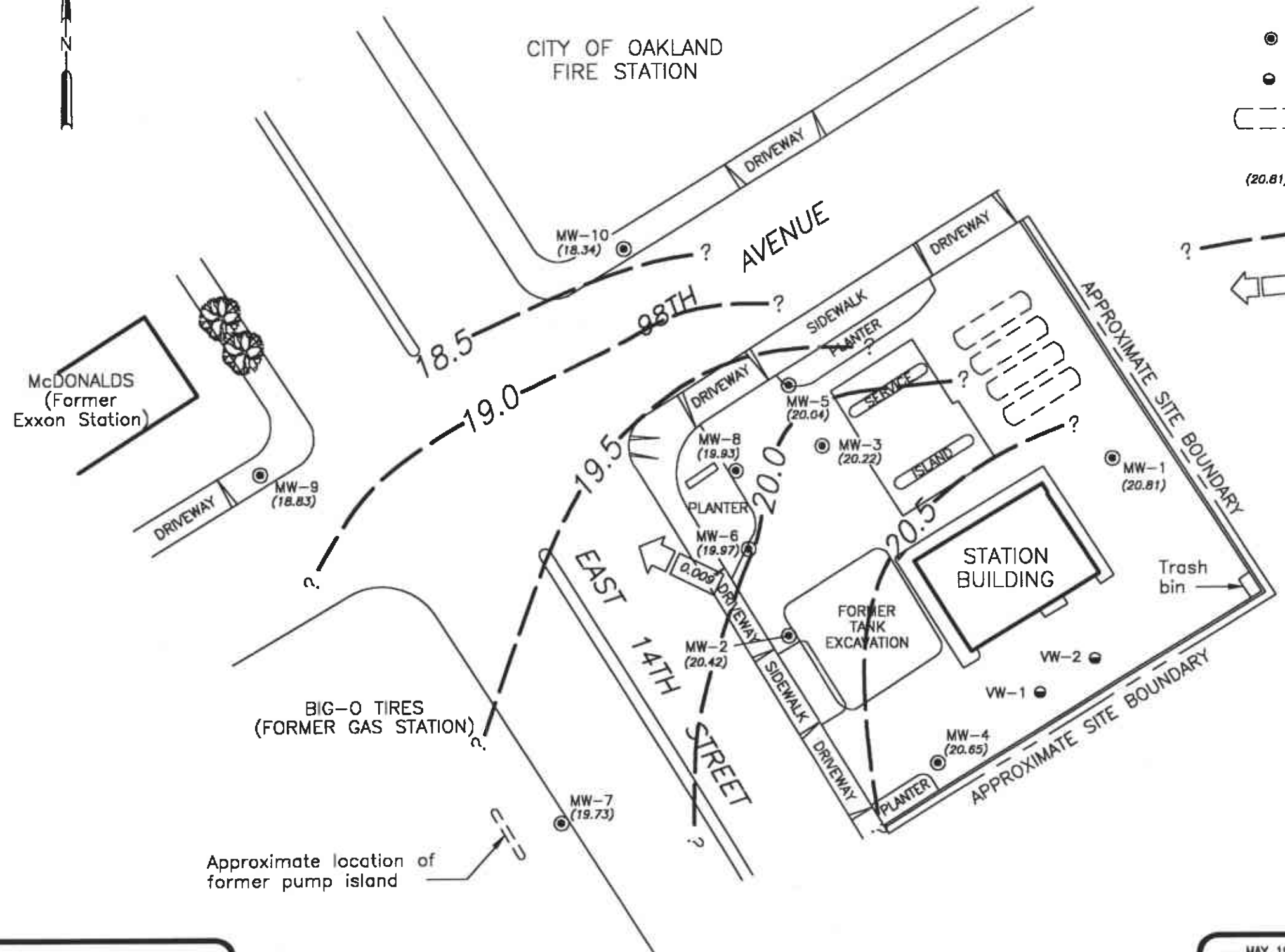
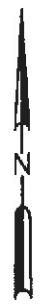
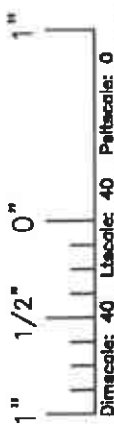


Pinnacle
 ENVIRONMENTAL SOLUTIONS
 A DIVISION OF EMCON

DATE	MAY 1999
DWN	KAB
APP	
REV	
PROJECT NO.	20805-130.008

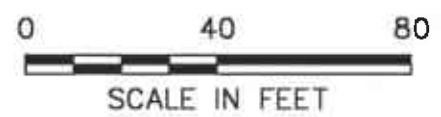
FIGURE 1
 ARCO PRODUCTS COMPANY
 SERVICE STATION 2185, 9800 E. 14TH STREET
 OAKLAND, CALIFORNIA
GROUNDWATER ANALYTICAL SUMMARY
FIRST QUARTER 1999

IMAGE Files: <No Images>
 XREF Files: <No Xrefs>
 Dimstyle: 40 Ltscale: 40 Ptscale: 0
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EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- ⎓ Existing underground gasoline storage tank
- (20.81) Groundwater elevation (Ft.-MSL); measured 2/18/99
- Groundwater elevation contour (Ft.-MSL)
- ← Approximate direction of groundwater flow showing gradient



Base map modified from RESNA, 1994.

Pinnacle
 ENVIRONMENTAL SOLUTIONS
 A DIVISION OF EMCON

DATE	MAY 1999
DWN	KAB
APP	
REV	
PROJECT NO.	20805-130.008

FIGURE 2
 ARCO PRODUCTS COMPANY
 SERVICE STATION 2185, 9800 E. 14TH STREET
 OAKLAND, CALIFORNIA
GROUNDWATER ELEVATION CONTOURS
FIRST QUARTER 1999

APPENDIX A
SAMPLING AND ANALYSIS PROCEDURES

APPENDIX A

SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis procedures for water quality monitoring programs are contained in this appendix. The procedures provided for consistent and reproducible sampling methods, proper application of analytical methods, and accurate and precise analytical results. Finally, these procedures provided guidelines so that the overall objectives of the monitoring program were achieved.

The following documents have been used as guidelines for developing these procedures:

- Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities, Environmental Protection Agency (EPA)-530/SW-611, August 1977
- Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document, Office of Solid Waste and Emergency Response (OSWER) 9950.1, September 1986
- Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, 3rd edition, November 1986
- Methods for Organic Chemical Analysis of Municipal and Industrial Waste Water, EPA-600/4-82-057, July 1982
- Methods for Organic Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised March 1983
- Leaking Underground Fuel Tank (LUFT) Field Manual, California State Water Resources Control Board, revised October 1989

Sample Collection

Sample collection procedures include equipment cleaning, water level and total well depth measurements, and well purging and sampling.

Equipment Cleaning

Before the sampling event was started, equipment that was used to sample groundwater was disassembled and cleaned with detergent water and then rinsed with deionized water. During field sampling, equipment surfaces that were placed in the well or came into contact with groundwater during field sampling were steam cleaned with deionized water before the next well was purged or sampled.

Water Level, Floating Hydrocarbon, and Total Well Depth Measurements

Before purging and sampling occurred, the depth to water, floating hydrocarbon thickness, and total well depth were measured using an oil/water interface measuring system. The oil/water interface measuring system consists of a probe that emits a continuous audible tone when immersed in a nonconductive fluid, such as oil or gasoline, and an intermittent tone when immersed in a conductive fluid, such as water. The floating hydrocarbon thickness and water level were measured by lowering the probe into the well. Liquid levels were recorded relative to the tone emitted at the groundwater surface. The sonic probe was decontaminated by being rinsed with deionized water or steam cleaned after each use. A bottom-filling, clear Teflon[®] bailer was used to verify floating hydrocarbon thickness measurements of less than 0.02 foot. Alternatively, an electric sounder and a bottom-filling Teflon bailer may have been used to record floating hydrocarbon thickness and depth to water.

The electric sounder is a transistorized instrument that uses a reel-mounted, two-conductor, coaxial cable that connects the control panel to the sensor. Cable markings are stamped at 1-foot intervals. The water level was measured by lowering the sensor into the monitoring well. A low-current circuit was completed when the sensor contacted the water, which served as an electrolyte. The current was amplified and fed into an indicator light and audible buzzer, signaling when water had been contacted. A sensitivity control compensated for highly saline or conductive water. The electric sounder was decontaminated by being rinsed with deionized water after each use. The bailer was lowered to a point just below the liquid level, retrieved, and observed for floating hydrocarbon.

Liquid measurements were recorded to the nearest 0.01 foot on the depth to water/floating product survey form. The groundwater elevation at each monitoring well was calculated by subtracting the measured depth to water from the surveyed elevation of the top of the well casing. (Every attempt was made to measure depth to water for all wells on the same day.) Total well depth was then measured by lowering the sensor to the bottom of the well. Total well depth, used to calculate purge volumes and to determine whether the well screen was partially obstructed by silt, was recorded to the nearest 0.1 foot on the depth to water/floating product survey form.

Well Purging

If the depth to groundwater was above the top of screens of the monitoring wells, then the wells were purged. Before sampling occurred, a polyvinyl chloride (PVC) bailer, centrifugal pump, low-flow submersible pump, or Teflon bailer was used to purge standing water in the casing and gravel pack from the monitoring well. Monitoring wells were purged according to the protocol presented in Figure A-1. In most monitoring wells, the amount of water purged before sampling was greater than or equal to three casing volumes. Some monitoring wells were expected to be evacuated to dryness after removing fewer than three casing volumes. These low-yield monitoring wells were allowed to recharge for up to 24 hours. Samples were obtained as soon as the monitoring wells recharged to a level sufficient for sample collection. If insufficient water recharged after 24 hours, the monitoring well was recorded as dry for the sampling event.

Groundwater purged from the monitoring wells was transported in a 500-gallon water trailer, 55-gallon drum, or a 325-gallon truck-mounted tank to EMCON's San Jose or Sacramento office location for temporary storage. EMCON arranged for transport and disposal of the purged groundwater through Integrated Waste Stream Management, Inc.

Field measurements of pH, specific conductance, and temperature were recorded in a waterproof field logbook. Figure A-2 shows an example of the water sample field data sheet on which field data are recorded. Field data sheets were reviewed for completeness by the sampling coordinator after the sampling event was completed.

The pH, specific conductance, and temperature meter were calibrated each day before field activities were begun. The calibration was checked once each day to verify meter performance. Field meter calibrations were recorded on the water sample field data sheet.

Well Sampling

A Teflon bailer was the only equipment acceptable for well sampling. When samples for volatile organic analysis were being collected, the flow of groundwater from the bailer was regulated to minimize turbulence and aeration. Glass bottles of at least 40-milliliters volume and fitted with Teflon-lined septa were used in sampling for volatile organics. These bottles were filled completely to prevent air from remaining in the bottle. A positive meniscus formed when the bottle was completely full. A convex Teflon septum was placed over the positive meniscus to eliminate air. After the bottle was capped, it was inverted and tapped to verify that it contained no air bubbles. The sample containers for other parameters were filled, filtered as required, and capped.

When required, dissolved concentrations of metals were determined using appropriate field filtration techniques. The sample was filtered by emptying the contents of the Teflon bailer into a pressure transfer vessel. A disposable 0.45-micron acrylic copolymer filter was threaded onto the transfer vessel at the discharge point, and the vessel was sealed. Pressure was applied to the vessel with a hand pump and the filtrate directed into the appropriate containers. Each filter was used once and discarded.

Sample Preservation and Handling

The following section specifies sample containers, preservation methods, and sample handling procedures.

Sample Containers and Preservation

Sample containers vary with each type of analytical parameter. Container types and materials were selected to be nonreactive with the particular analytical parameter tested.

Sample Handling

Sample containers were labeled immediately prior to sample collection. Samples were kept cool with cold packs until received by the laboratory. At the time of sampling, each sample was logged on an ARCO chain-of-custody record that accompanied the sample to the laboratory.

Samples that required overnight storage prior to shipping to the laboratory were kept cool (4° C) in a refrigerator. The refrigerator was kept in a warehouse, which was locked when not occupied by an EMCON employee. A sample/refrigerator log was kept to record the date and time that samples were placed into and removed from the refrigerator.

Samples were transferred from EMCON to an ARCO-approved laboratory by courier or taken directly to the laboratory by the environmental sampler. Sample shipments from EMCON to laboratories performing the selected analyses routinely occurred within 24 hours of sample collection.

Sample Documentation

The following procedures were used during sampling and analysis to provide chain-of-custody control during sample handling from collection through storage. Sample documentation included the use of the following:

- Water sample field data sheets to document sampling activities in the field
- Labels to identify individual samples
- Chain-of-custody record sheets for documenting possession and transfer of samples
- Laboratory analysis request sheets for documenting analyses to be performed

Field Logbook

In the field, the sampler recorded the following information on the water sample field data sheet (see Figure A-2) for each sample collected:

- Project number
- Client's name
- Location
- Name of sampler
- Date and time
- Well accessibility and integrity
- Pertinent well data (e.g., casing diameter, depth to water, well depth)
- Calculated and actual purge volumes
- Purging equipment used
- Sampling equipment used
- Appearance of each sample (e.g., color, turbidity, sediment)
- Results of field analyses (temperature, pH, specific conductance)
- General comments

The water sample field data sheet was signed by the sampler and reviewed by the sampling coordinator.

Labels

Sample labels contained the following information:

- Project number
- Sample number (i.e., well designation)
- Sample depth
- Sampler's initials
- Date and time of collection
- Type of preservation used (if any)

Sampling and Analysis Chain-of-Custody Record

The ARCO chain-of-custody record initiated at the time of sampling contained, at a minimum, the sample designation (including the depth at which the sample was collected), sample type, analytical request, date of sampling, and the name of the sampler. The record sheet was signed, timed, and dated by the sampler when transferring the samples. The number of custodians in the chain of possession was minimized. A copy of the ARCO chain-of-custody record was returned to EMCON with the analytical results.

Groundwater Sampling and Analysis Request Form

A groundwater sampling and analysis request form (see Figure A-3) was used to communicate to the environmental sampler the requirements of the monitoring event. At a minimum, the groundwater sampling and analysis request form included the following information:

- Date scheduled
- Site-specific instructions
- Specific analytical parameters
- Well number
- Well specifications (expected total depth, depth of water, and product thickness)



OWT

MONITORING WELL PURGING PROTOCOL

MEASURE AND RECORD DEPTH TO WATER AND WELL TOTAL DEPTH

CHECK FOR FLOATING PRODUCT

YES

MEASURE AND DOCUMENT FLOATING PRODUCT THICKNESS. DO NOT SAMPLE WELL FOR DISSOLVED CONSTITUENTS.

NO

CALCULATE PURGE VOLUME BY USING THE FOLLOWING EQUATION:

$$P = \pi r^2 h \times 7.48 \times 3$$

where:

P = calculated purge volume (gallons)

$\pi = 3.14$

r = radius of well casing in feet

h = height of water column in feet

WELL EVACUATED TO PRACTICAL LIMITS OF DRYNESS BEFORE REMOVING CALCULATED PURGE VOLUME

EVACUATE WATER FROM WELL EQUAL TO THE CALCULATED PURGE VOLUME WHILE MONITORING GROUNDWATER STABILIZATION INDICATOR PARAMETERS (pH, CONDUCTIVITY, TEMPERATURE) AT INTERVALS OF ONE CASING VOLUME.

NO

YES

FINAL TWO SETS OF GROUNDWATER STABILIZATION INDICATOR PARAMETER MEASUREMENTS MEET THE FOLLOWING CRITERIA:

pH = ± 0.1 pH units

COND. = ± 10 %

TEMP. = ± 1.0 °F

WELL RECHARGES TO A LEVEL SUFFICIENT FOR SAMPLE COLLECTION WITHIN 24 HOURS OF EVACUATION TO DRYNESS.

YES

NO

YES

NO

WELL PURGING CRITERIA MET; PROCEED TO WELL SAMPLING.

CONTINUE PURGING; EVACUATE ADDITIONAL CASING VOLUME OF WATER, MONITORING INDICATOR PARAMETERS FOR STABILITY.

FIELD TEST FIRST RECHARGE WATER FOR INDICATOR PARAMETERS, THEN PROCEED TO WELL SAMPLING.

RECORD WELL AS DRY FOR PURPOSES OF SAMPLING.



EMCON

MONITORING WELL PURGING PROTOCOL

FIGURE

A-1

WATER SAMPLE FIELD DATA SHEET

Rev. 5/96



OWT

PROJECT NO : _____
 PURGED BY : _____
 SAMPLED BY : _____

SAMPLE ID : _____
 CLIENT NAME : _____
 LOCATION : _____

TYPE: Groundwater _____ Surface Water _____ Leachate _____ Other _____
 CASING DIAMETER (inches): 2 _____ 3 _____ 4 _____ 4.5 _____ 6 _____ Other _____

CASING ELEVATION (feet/MSL) : _____ VOLUME IN CASING (gal.) : _____
 DEPTH OF WELL (feet) : _____ CALCULATED PURGE (gal.) : _____
 DEPTH OF WATER (feet) : _____ ACTUAL PURGE VOL. (gal.) : _____

DATE PURGED : _____ END PURGE : _____
 DATE SAMPLED : _____ SAMPLING TIME : _____

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

OTHER: _____ ODOR: _____
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1) : _____

<p style="text-align: center;"><u>PURGING EQUIPMENT</u></p> <p>_____ 2" Bladder Pump _____ Bailer (Teflon) _____ Centrifugal Pump _____ Bailer (PVC) _____ Submersible Pump _____ Bailer (Stainless Steel) _____ Well Wizard™ _____ Dedicated Other: _____</p>	<p style="text-align: center;"><u>SAMPLING EQUIPMENT</u></p> <p>_____ 2" Bladder Pump _____ Bailer (Teflon) _____ Bomb Sampler _____ Bailer (Stainless Steel) _____ Dipper _____ Submersible Pump _____ Well Wizard™ _____ Dedicated Other: _____</p>
--	---

WELL INTEGRITY: _____ LOCK: _____
 REMARKS: _____

pH, E.C., Temp. Meter Calibration: Date: _____ Time: _____ Meter Serial No.: _____
 E.C. 1000 _____ / _____ pH 7 _____ / _____ pH 10 _____ / _____ pH 4 _____ / _____
 Temperature °F _____

SIGNATURE: _____ REVIEWED BY: _____ PAGE _____ OF _____



EMCON

WATER SAMPLE FIELD DATA SHEET

FIGURE
A-2



OWT

EMCON - SACRAMENTO
GROUNDWATER SAMPLING AND ANALYSIS REQUEST FORM

PROJECT NAME :

SCHEDULED DATE :

SPECIAL INSTRUCTIONS / CONSIDERATIONS :

Project Authorization: _____
EMCON Project No.: _____
OWT Project No.: _____
Task Code: _____
Originals To: _____
cc: _____

Well Lock Number (s)

CHECK BOX TO AUTHORIZE DATA ENTRY

Site Contact: _____
Name Phone #

Well Number or Source	Casing Diameter (inches)	Casing Length (feet)	Depth to Water (feet)	ANAYSES REQUESTED

Laboratory and Lab QC Istructions:



EMCON

SAMPLING AND ANALYSIS REQUEST FORM

FIGURE
A-3

APPENDIX B

**CERTIFIED ANALYTICAL REPORTS,
AND CHAIN-OF-CUSTODY DOCUMENTATION**



March 4, 1999

Service Request No.: S9900592

Mr. Glen Vanderveen
PINNACLE
144 A Mayhew Wy.
Walnut Creek, CA 94596

RE: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND

Dear Mr. Vanderveen:

The following pages contain analytical results for sample(s) received by the laboratory on February 19, 1999. 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.

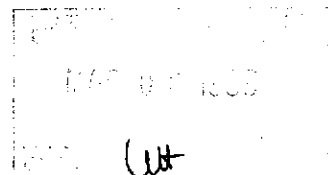
Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 16, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

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

Sincerely,

Bernadette T. Cox
Project Chemist

Regional QA Coordinator



COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/18/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-2(9)
Lab Code: S9900592-001
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/21/99	180	
Benzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	2/21/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/19/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-6(27)
Lab Code: S9900592-002
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	4	NA	3/3/99	1600	
Benzene	EPA 5030	8020	0.5	4	NA	3/3/99	<2	C1
Toluene	EPA 5030	8020	0.5	4	NA	3/3/99	<2	C1
Ethylbenzene	EPA 5030	8020	0.5	4	NA	3/3/99	84	
Xylenes, Total	EPA 5030	8020	0.5	4	NA	3/3/99	7	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	4	NA	3/3/99	<12	C1

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/18/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-9(10)
Lab Code: S9900592-003
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	3/3/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	3/3/99	39	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/19/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-5(26)
Lab Code: S9900592-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	2	NA	3/3/99	230	
Benzene	EPA 5030	8020	0.5	2	NA	3/3/99	<1	C1
Toluene	EPA 5030	8020	0.5	2	NA	3/3/99	<1	C1
Ethylbenzene	EPA 5030	8020	0.5	2	NA	3/3/99	4	
Xylenes, Total	EPA 5030	8020	0.5	2	NA	3/3/99	1	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	2	NA	3/3/99	140	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/19/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-3(22)
Lab Code: S9900592-005
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	10	NA	3/3/99	650	
Benzene	EPA 5030	8020	0.5	10	NA	3/3/99	<5	C1
Toluene	EPA 5030	8020	0.5	10	NA	3/3/99	<5	C1
Ethylbenzene	EPA 5030	8020	0.5	10	NA	3/3/99	6	
Xylenes, Total	EPA 5030	8020	0.5	10	NA	3/3/99	<5	C1
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	10	NA	3/3/99	610	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: 2/19/99
Date Received: 2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-8(22)
Lab Code: S9900592-006
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/21/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	2/21/99	44	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S990220-WB2 GC1
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/20/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/20/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/20/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/20/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/20/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	2/20/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S990220-WB4 GC1
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	2/21/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/21/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	2/21/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S990303-WB1 GC2
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	3/3/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Methyl tert-Butyl Ether	EPA 5030	8020	3	1	NA	3/3/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank
Lab Code: S990303-WB3 GC2
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	3/3/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	3/3/99	ND	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	3	1	NA	3/3/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
 BTEX, MTBE and TPH as Gasoline

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

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			4-Bromofluorobenzene	a,a,a-Trifluorotoluene
MW-2(9)	S9900592-001		96	99
MW-6(27)	S9900592-002		92	90
MW-9(10)	S9900592-003		87	87
MW-5(26)	S9900592-004		91	88
MW-3(22)	S9900592-005		89	88
MW-8(22)	S9900592-006		99	90
Lab Control Sample	S990220-LCS		100	89
Lab Control Sample	S990220-DLCS		97	90
Method Blank	S990220-WB2 GC1		94	90
Method Blank	S990220-WB4 GC1		99	88
Method Blank	S990303-WB1 GC2		92	89

CAS Acceptance Limits: 69-116 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND
Sample Matrix: Water

Service Request: S9900592
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/21/99

Lab Control Sample / Duplicate Lab Control Sample Summary
 TPH as Gasoline

Sample Name: Lab Control Sample Units: ug/L (ppb)
Lab Code: S990220-LCS S990220-DLCS Basis: NA
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Percent Recovery								Relative Percent Difference	Result Notes
				Spike Level		Sample Result	Spike Result		CAS Acceptance Limits				
				LCS	DLCS		LCS	DLCS	LCS	DLCS			
Gasoline	EPA 5030	CA/LUFT	50	250	250	ND	250	260	100	104	75-135	4	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
 Project: 20805-130.006/TO#24118.00/RAT8/2185 OAKLAND

Service Request: S9900592
 Date Analyzed: 2/20/99

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

Sample Name: ICV
 Lab Code: ICV1
 Test Notes:

Units: ug/L (ppb)
 Basis: NA

ICV Source:

Analyte	Prep Method	Analysis Method	True Value	Result	CAS		Result Notes
					Acceptance Limits	Percent Recovery	
TPH as Gasoline	EPA 5030	CA/LUFT	250	270	90-110	108	
Benzene	EPA 5030	8020	25	23	85-115	92	
Toluene	EPA 5030	8020	25	22	85-115	88	
Ethylbenzene	EPA 5030	8020	25	22	85-115	88	
Xylenes, Total	EPA 5030	8020	75	72	85-115	96	
Methyl <i>tert</i> -Butyl Ether	EPA 5030	8020	25	24	85-115	96	

ARCO Products Company

Division of Atlantic/Richfield Company

59900592

Task Order No.

74118.00

Chain of Custody

ARCO Facility no. 7185 City (Facility) Oakland

Project manager (Consultant) Glen Vander Veen

Laboratory Name CAS

ARCO engineer Paul Scipple Telephone no. (ARCO)

Telephone no. (Consultant) (408) 453-7300

Fax no. (Consultant) (408) 457-9576 Contract Number

Consultant name EMCON

Address (Consultant) 144-A Mayhew Way Walnut Creek, CA

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH MCL/10/15 EPA 1602/8020/15	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCUP Metals <input type="checkbox"/> VOAD <input type="checkbox"/>	Semi Metals <input type="checkbox"/> VOAD <input type="checkbox"/>	CAM Metals EPA 6010/7000 Tl/Cd <input type="checkbox"/> ST/Cd <input type="checkbox"/>	Lead Org/DHS <input type="checkbox"/>	Lead EPA 7420/7421 <input type="checkbox"/>	
			Soil	Water	Other	Ice	Acid																
MW-2 (91)	2	1	X			X	HCL	2/18/99	1340		X												
MW-6 (27)	2	2	X			X	HCL	2/19/99	0900		X												
MW-9 (107)	2	3	X			X	HCL	2/18/99	1330		X												
MW-5 (26)	2	4	X			X	HCL	2/19/99	0840		X												
MW-3 (32)	2	5	X			X	HCL	2/19/99	0955		X												
MW-8 (20)	2	6	X			X	HCL	↓	0925		X												

Method of shipment
Sampler will deliver

Special Detection Limit/reporting
Lowest Possible

Special QA/QC
As Normal

Remarks
RAT 8
2-40m HCL
VOAs

#20805-130,506

Lab Number

Turnaround Time:
Priority Rush 1 Business Day

Rush 2 Business Days

Expedited 5 Business Days

Standard 10 Business Days

Condition of sample:

Temperature received: Due: 3/5/99 R11/D3

Relinquished by sampler
[Signature]

Date 2/19/99 Time 1500

Received by *[Signature]* 2/19/99 1500

Relinquished by

Date Time

Received by

Relinquished by

Date Time

Received by laboratory

Date Time

APPENDIX C
FIELD DATA SHEETS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 21775-236.004 STATION ADDRESS : 9800 East 14th Street, Oakland DATE : 2/18/99

ARCO STATION # : 2185 FIELD TECHNICIAN : Manuel Gallegos/ Mike Ross DAY : Thursday

DTW Order	WELL ID	Well Box Seal	Type Of Well Lid	Gasket Present	Lock Number	Type Of Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-10	OK	9/16"	YES	3900	LWC	9.21	9.21	NR	NR	22.9	
2	MW-4	OK	15/16"	YES	ARCO	LWC	8.56	8.56	NR	NR	23.8	
3	MW-1	OK	15/16"	YES	ARCO	LWC	8.34	8.34	NR	NR	23.6	
4	MW-2	OK	15/16"	YES	ARCO	LWC	8.05	8.05	NR	NR	23.3	
5	MW-6	OK	15/16"	YES	ARCO	LWC	7.82	7.82	NR	NR	27.6	
6	MW-9	OK	9/16"	YES	3900	LWC	8.90	8.90	NR	NR	21.2	
7	MW-7	OK	15/16"	YES	3616	LWC	8.15	8.15	NR	NR	25.4	
8	MW-5	OK	15/16"	YES	ARCO	LWC	8.08	8.08	NR	NR	26.6	
9	MW-3	OK	15/16"	YES	ARCO	LWC	8.35	8.35	NR	NR	22.9	Water in box in need of new box
10	MW-8	OK	15/16"	YES	ARCO	LWC	8.15	8.15	NR	NR	22.3	

SURVEY POINTS ARE TOP OF WELL CASINGS

BY: Ut

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-236.004
 PURGED BY M. Gallegos
 SAMPLED BY ✓

SAMPLE ID MW-2 (9')
 CLIENT NAME ARCO # 2185
 LOCATION OAKLAND, CA

TYPE Groundwater Surface Water Leachate Other
 CASING DIAMETER (inches) 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL) NR VOLUME IN CASING (gal.) NR
 DEPTH OF WELL (feet) 23.3 CALCULATED PURGE (gal.) NR
 DEPTH OF WATER (feet) 9.05 ACTUAL PURGE VOL. (gal.) NR

DATE PURGED: 2-18-99 END PURGE: _____
 DATE SAMPLED: ↓ SAMPLING TIME: 1340

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1340</u>	<u>GRAB</u>	<u>6.41</u>	<u>682</u>	<u>62.6</u>	<u>Clear</u>	<u>Clear</u>

OTHER: DO = .5 ODOR: None NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT	SAMPLING EQUIPMENT
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> 2" Bladder Pump <input checked="" type="checkbox"/>
<input type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bomb Sampler
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Dipper
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Well Wizard™
<input type="checkbox"/> Bailer (Teflon)	<input checked="" type="checkbox"/> Bailer (Teflon)
<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Dedicated	<input type="checkbox"/> Dedicated
Other: _____	Other: _____

WELL INTEGRITY: OK LOCK: ARCO

REMARKS: All samples taken

pH, E.C., Temp. Meter Calibration Date: 2/18/99 Time: _____ Meter Serial No. 8700
 E.C. 1000 1000 pH 7 700/700 pH 10 1000/1000 pH 4 400/400
 Temperature °F 62.6
 SIGNATURE: [Signature] REVIEWED BY: [Signature] PAGE 1 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-236.004
 PURGED BY M. Gallegos
 SAMPLED BY ↓

SAMPLE ID MW-3 (22')
 CLIENT NAME AR10#2185
 LOCATION OAKLAND, CA

TYPE Groundwater Surface Water _____ Leachate _____ Other _____
 CASING DIAMETER (inches) 2 _____ 3 _____ 4 4.5 _____ 6 _____ Other _____

CASING ELEVATION (feet/MSL) NR VOLUME IN CASING (gal) 9.49
 DEPTH OF WELL (feet) 22.9 CALCULATED PURGE (gal) 28.49
 DEPTH OF WATER (feet) 8.36 ACTUAL PURGE VOL (gal) 28.5

DATE PURGED: 2-19-99 END PURGE: 0946
 DATE SAMPLED: ↓ SAMPLING TIME: 0955

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>0942</u>	<u>9.5</u>	<u>6.70</u>	<u>389</u>	<u>60.9</u>	<u>dk/rain</u>	<u>heavy</u>
<u>0944</u>	<u>19.0</u>	<u>6.67</u>	<u>516</u>	<u>62.2</u>	<u>cloudy</u>	<u>mod</u>
<u>0944</u>	<u>28.5</u>	<u>6.64</u>	<u>492</u>	<u>62.6</u>	<u> </u>	<u> </u>

OTHER: DO=1 ODOR: Strong NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon)
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> Bomb Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____		Other: _____	

WELL INTEGRITY: Needs new well Box. LOCK: AR10

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration Date 2/19/99 Time: _____ Meter Serial No. _____
 E.C. 1000 1 pH 7 1 pH 10 1 pH 4 1

Temperature °F _____
 SIGNATURE M. Gallegos REVIEWED BY: MG PAGE 2 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-234.004
 PURGED BY M. Gallegos
 SAMPLED BY ↓

SAMPLE ID MW-5 (26')
 CLIENT NAME NR1042185
 LOCATION OAKLAND, CA

TYPE Groundwater Surface Water Leachate Other
 CASING DIAMETER (inches) ~~2~~ 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL) <u>NR</u>	VOLUME IN CASING (gal.) <u>12.08</u>
DEPTH OF WELL (feet) <u>26.4</u>	CALCULATED PURGE (gal.) <u>36.26</u>
DEPTH OF WATER (feet) <u>8.10</u>	ACTUAL PURGE VOL (gal.) <u>36.5</u>

DATE PURGED: 2/19/99 END PURGE: 0831
 DATE SAMPLED: ↓ SAMPLING TIME: 0840

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>0824</u>	<u>12.0</u>	<u>6.29</u>	<u>604</u>	<u>62.0</u>	<u>clear</u>	<u>light</u>
<u>0828</u>	<u>24.0</u>	<u>6.84</u>	<u>586</u>	<u>64.7</u>	<u>cloudy</u>	<u>MOD</u>
<u>0831</u>	<u>36.5</u>	<u>6.91</u>	<u>593</u>	<u>65.2</u>	<u>1</u>	<u>"</u>

OTHER: DO = 0.5 ODOR: none NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

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

2" Bladder Pump Bailer (Teflon)
 Bomb Sampler Bailer (Stainless Steel)
 Dipper Submersible Pump
 Well Wizard™ Dedicated
 Other: _____

WELL INTEGRITY: OK LOCK: NR10

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration Date: 2/19/99 Time: 0820 Meter Serial No.: 8771
 E.C. 1000 1002/1000 pH 7 701/700 pH 10 1000/1000 pH 4 3971/400
 Temperature °F 57.6
 SIGNATURE: [Signature] REVIEWED BY: [Signature] PAGE 3 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-236.001
 PURGED BY M. Gallegos
 SAMPLED BY ✓

SAMPLE ID MW-6 (27')
 CLIENT NAME ARCO
 LOCATION OAKLAND, CA

TYPE Groundwater Surface Water _____ Leachate _____ Other _____
 CASING DIAMETER (inches) 2 _____ 3 _____ 4 4.5 _____ 6 _____ Other _____

CASING ELEVATION (feet/MSL) NR VOLUME IN CASING (gal.) 12.90
 DEPTH OF WELL (feet) 27.6 CALCULATED PURGE (gal.) 38.72
 DEPTH OF WATER (feet) 7.84 ACTUAL PURGE VOL (gal.) 39.0

DATE PURGED: 2-19-99 END PURGE 0854
 DATE SAMPLED: ✓ SAMPLING TIME: 0900

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>0850</u>	<u>13.0</u>	<u>6.67</u>	<u>702</u>	<u>63.7</u>	<u>clear</u>	<u>light</u>
<u>0852</u>	<u>26.0</u>	<u>6.73</u>	<u>674</u>	<u>64.5</u>	<u>"</u>	<u>"</u>
<u>0854</u>	<u>39.0</u>	<u>6.79</u>	<u>665</u>	<u>65.1</u>	<u>"</u>	<u>"</u>

OTHER: DO=0.5 ODOR: moderate NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

2" Bladder Pump Bailor (Teflon)
 Centrifugal Pump Bailor (PVC)
 Submersible Pump Bailor (Stainless Steel)
 Well Wizard™ Dedicated
 Other: _____

2" Bladder Pump Bailor (Teflon)
 Bomb Sampler Bailor (Stainless Steel)
 Dipper Submersible Pump
 Well Wizard™ Dedicated
 Other: _____

WELL INTEGRITY: OK LOCK: ARCO

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration Date 2/19/99 Time _____ Meter Serial No. 87M
 E.C. 1000 _____ pH 7 _____ pH 10 _____ pH 4 _____

Temperature °F _____
 SIGNATURE [Signature] REVIEWED BY [Signature] PAGE 4 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-236-004
 PURGED BY M. Gallagos
 SAMPLED BY ↓

SAMPLE ID MW-8 (22')
 CLIENT NAME AR10# 2185
 LOCATION OAKLAND, CA

TYPE Groundwater Surface Water _____ Leachate _____ Other _____
 CASING DIAMETER (inches) 2 _____ 3 _____ 4 4.5 _____ 6 _____ Other _____

CASING ELEVATION (feet/MSL) NR VOLUME IN CASING (gal) 9.23
 DEPTH OF WELL (feet) 22.3 CALCULATED PURGE (gal) 27.69
 DEPTH OF WATER (feet) 9.17 ACTUAL PURGE VOL (gal) 28.0

DATE PURGED: 2/19/99 END PURGE: 0920
 DATE SAMPLED: ↓ SAMPLING TIME: 0925

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>0915</u>	<u>9.5</u>	<u>6.91</u>	<u>6.20</u>	<u>61.4</u>	<u>clear</u>	<u>clear</u>
<u>0917</u>	<u>19.0</u>	<u>6.84</u>	<u>6.16</u>	<u>62.7</u>	<u>↓</u>	<u>light</u>
<u>0920</u>	<u>28.0</u>	<u>6.83</u>	<u>6.18</u>	<u>63.2</u>	<u>↓</u>	<u>↓</u>

OTHER: DO=15 ODOR: none NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT

SAMPLING EQUIPMENT

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

2" Bladder Pump Bailer (Teflon)
 Bomb Sampler Bailer (Stainless Steel)
 Dipper Submersible Pump
 Well Wizard™ Dedicated
 Other: _____

WELL INTEGRITY: OK LOCK: Acco

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration Date: 2/19/99 Time _____ Meter Serial No. _____
 E.C. 1000 1 pH 7 1 pH 10 1 pH 4 1
 Temperature °F _____

SIGNATURE: [Signature] REVIEWED BY: [Signature] PAGE 5 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97



OWT

PROJECT NO 21775-236,004
 PURGED BY NR
 SAMPLED BY M. Ross

SAMPLE ID MW-9 (10)
 CLIENT NAME ARCO 2185
 LOCATION Oakland, Ca

TYPE Groundwater Surface Water Leachate Other
 CASING DIAMETER (inches) 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL) NR VOLUME IN CASING (gal.) NR
 DEPTH OF WELL (feet) 21.2 CALCULATED PURGE (gal.) NR
 DEPTH OF WATER (feet) 8.90 ACTUAL PURGE VOL. (gal.) NR

DATE PURGED: NR END PURGE NR
 DATE SAMPLED: 2/18/99 SAMPLING TIME 1330

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (umhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1330</u>	<u>GRAB</u>	<u>6.43</u>	<u>597</u>	<u>62.6</u>	<u>clr</u>	<u>clr</u>

OTHER: DO 0.5 mg/l ODOR: None NR NR
(COBALT 0-100) (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT	SAMPLING EQUIPMENT
<input checked="" type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> 2" Bladder Pump
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bomb Sampler
<input checked="" type="checkbox"/> Submersible Pump	<input type="checkbox"/> Dipper
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Well Wizard™
Other: <u>NR</u>	Other: <u>0.5 gal grab</u>

WELL INTEGRITY: OK LOCK: 3900

REMARKS: GRAB sample taken water level below top of screen.

pH, E.C., Temp. Meter Calibration Date: 1/18/99 Time: 1130 Meter Serial No.: 600 235
 E.C. 1000 1997 pH 7 700 1 702 pH 10 1000 1 994 pH 4 400 1 379
 Temperature °F 21.2
 SIGNATURE: Mike Ross REVIEWED BY: NR PAGE 6 OF 6

1921 Ringwood Avenue
San Jose, California

1999

ARCO 2185
21775-236.004

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product	Gallons			
						First	Second	Third	Fourth
MW-1	First	02/18/99	0.00	NA	NO	132.00	27.00	25.00	24.00
	Second	05/11/98	0.00	NA	NO				
	Third	07/29/98	0.00	NA	NO				
	Fourth	10/12/98	0.00	NA	NO				
MW-2	First	02/18/99	0.00	GRAB	NO				
	Second	05/11/98	0.00	GRAB	NO				
	Third	07/29/98	0.00	GRAB	NO				
	Fourth	10/12/98	0.00	GRAB	NO				
MW-3	First	02/18/99	28.50	NO	NO				
	Second	05/11/98	0.00	GRAB	NO				
	Third	07/29/98	0.00	GRAB	NO				
	Fourth	10/12/98	0.00	GRAB	NO				
MW-4	First	02/18/99	0.00	NA	NO				
	Second	05/11/98	0.00	NA	NO				
	Third	07/29/98	0.00	NA	NO				
	Fourth	10/12/98	0.00	NA	NO				
MW-5	First	02/18/99	36.50	NO	NO				
	Second	05/11/98	0.00	GRAB	NO				
	Third	07/29/98	0.00	GRAB	NO				
	Fourth	10/12/98	0.00	GRAB	NO				
MW-6	First	02/18/99	39.00	NO	NO				
	Second	05/11/98	0.00	NA	NO				
	Third	07/29/98	0.00	GRAB	NO				
	Fourth	10/12/98	0.00	GRAB	NO				
MW-7	First	02/18/99	0.00	NA	NO				
	Second	05/11/98	0.00	NO	NO				
	Third	07/29/98	0.00	NA	NO				
	Fourth	10/12/98	0.00	NA	NO				
MW-8	First	02/18/99	28.00	NO	NO				
	Second	05/11/98	27.00	NO	NO				
	Third	07/29/98	25.00	NO	NO				
	Fourth	10/12/98	24.00	NO	NO				
MW-9	First	02/18/99	0.00	GRAB	NO				
	Second	05/11/98	0.00	GRAB	NO				
	Third	07/29/98	0.00	GRAB	NO				
	Fourth	10/12/98	0.00	GRAB	NO				
MW-10	First	02/18/99	0.00	NA	NO	Steam water (gal)			
	Second	05/11/98	0.00	NA	NO				
	Third	07/29/98	0.00	NA	NO				
	Fourth	10/12/98	0.00	NA	NO				

ARCO Products Company

Division of Atlantic/Richfield Company

Chain of Custody

Task Order No. 74119.00

ARCO Facility no. 155 City (Facility) Oakland Project manager (Consultant) Clen Vander Veem Laboratory Name CAF

ARCO engineer Paul Sample Telephone no. (ARCO) Telephone no. (Consultant) (408) 452-7000 Fax no. (Consultant) (408) 437-9172 Contract Number

Consultant name ARCO Address (Consultant) 144-A Mayhew Way Walnut Creek, CA

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 816/200/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCMP Metals <input type="checkbox"/> VOAD <input type="checkbox"/> VOAD	CAMP Metals EPA 6010/7000 TLLCO STLCO	Lead Org/DHSC Lead EPA 7420/7421 <input type="checkbox"/>																																		
			Soil	Water	Other	Ice	Acid																																															
<u>MU-2(6)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>2/17/99</u>	<u>1340</u>		<u>X</u>																																											
<u>MU-6(2)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>7/15/00</u>	<u>5700</u>		<u>X</u>																																											
<u>MU-9(6)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>2/17/99</u>	<u>1530</u>		<u>X</u>																																											
<u>MU-5(30)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>2/15/99</u>	<u>0540</u>		<u>X</u>																																											
<u>MU-3(32)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>2/11/99</u>	<u>0955</u>		<u>X</u>																																											
<u>MU-1(2)</u>	<u>2</u>			<u>X</u>		<u>X</u>	<u>HCL</u>	<u>↓</u>	<u>0925</u>		<u>X</u>																																											

Method of shipment
Sample will deliver

Special Detection Limit/reporting
Lowest Possible

Special QA/QC
A- Normal

Remarks
RA75
7-400-1400
VOAD
4/23/05-10/03

Lab Number

Turnaround Time:
 Priority Rush 1 Business Day
 Rush 2 Business Days
 Expedited 5 Business Days
 Standard 10 Business Days

Condition of sample:	Temperature received:
Relinquished by sampler <u>[Signature]</u> Date <u>2/19/99</u> Time <u>1:00</u>	Received by <u>[Signature]</u> Date <u>2/19/99</u> Time <u>1:00</u>
Relinquished by <u>[Signature]</u> Date <u>2/19/99</u> Time <u>1:00</u>	Received by <u>[Signature]</u> Date <u>2/19/99</u> Time <u>1:00</u>
Relinquished by <u>[Signature]</u> Date <u>2/19/99</u> Time <u>1:00</u>	Received by laboratory Date <u>2/19/99</u> Time <u>1:00</u>