Pinnacle
ENVIRONMENTAL SOLUTIONS

a division of EMCON

ENVIRONMENTAL PROTECTION

98 NOV -6 PM 3:13

November 3, 1998
Project 20805-131.013

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

Re: Quarterly Groundwater Monitoring Report, Second Quarter 1998, for former ARCO Service Station No. 6002, located at 6235 Seminary Avenue, Oakland, California

Dear Mr. Supple:

Pinnacle Environmental Solutions, a division of EMCON (Pinnacle), is submitting the attached report which presents the results of the second quarter 1998 groundwater monitoring program at former ARCO Products Company (ARCO) Service Station No. 6002, located at 6235 Seminary Avenue, 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, Second Quarter 1998

cc: Thomas Peacock, ACHCSA

144-A Mayhew Way Walnut Creek, California 94596 (510) 977-9020 (510) 977-9030 Fax

Date: November 3, 1998

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 6002 Address:	6235 Seminary Avenue, Oakland, California
Pinnacle Project No.:	20805-131.013
ARCO Environmental Engineer/Phone No.:	Paul Supple /(510) 299-8891
Pinnacle Project Manager/Phone No.:	Glen VanderVeen /(925) 977-9020
Primary Agency/Regulatory ID No.:	ACHCSA /Thomas Peacock

WORK PERFORMED THIS QUARTER (SECOND - 1998):

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

WORK PROPOSED FOR NEXT QUARTER (THIRD - 1998):

1. Prepare and submit quarterly groundwater monitoring report for second quarter 1998.
2. Perform quarterly groundwater monitoring and sampling for third quarter 1998.

QUARTERLY MONITORING:

Current Phase of Project:	Quarterly Groundwater Monitoring
Frequency of Sampling:	Annual (1st Quarter): MW-3, MW-6 Quarterly: MW-4, MW-5, MW-7, MW-8, VW-1, VW-4
Frequency of Monitoring:	Quarterly (groundwater)
Is Floating Product (FP) Present On-site:	☐ Yes ☒ No
Bulk Soil Removed to Date :	approximately 370 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:	Natural Attenuation
Average Depth to Groundwater:	10.93 feet
Groundwater Flow Direction and Gradient (Average):	0.07 ft/ft toward West

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 Report 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 6002
6235 Seminary Avenue, 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
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-1	03-15-95	247.06	7.37	239.69	ND	WSW	0.08	03-15-95	13000	1200	44	770	1100	--	--
MW-1	05-30-95	247.06	8.48	238.58	ND	WSW	0.08	05-30-95	19000	1600	30	890	1400	--	--
MW-1	09-01-95	247.06	9.47	237.59	ND	WSW	0.09	09-01-95	14000	1300	28	480	780	24000	--
MW-1	11-13-95	247.06	8.78	** 238.29	0.01	WSW	0.08	11-13-95	11000	570	17	260	410	--	25000
MW-1	02-23-96	247.06	Well was decommisioned on 2-12-96					03-01-96	Well was decommisioned on 2-12-96						
MW-2	03-15-95	249.30	8.25	241.05	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	05-30-95	249.30	9.93	239.37	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	09-01-95	249.30	10.69	238.61	ND	WSW	0.09	09-01-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-2	11-13-95	249.30	10.32	238.98	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-2	02-23-96	249.30	Well was decommisioned on 2-12-96					03-01-96	Well was decommisioned on 2-12-96						
MW-3	03-15-95	248.35	6.76	241.59	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	05-30-95	248.35	7.81	240.54	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-3	09-01-95	248.35	8.65	239.70	ND	WSW	0.09	09-01-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	11-13-95	248.35	8.25	240.10	ND	WSW	0.08	11-13-95	120	45	0.7	<0.5	6.2	--	--
MW-3	02-23-96	248.35	6.64	241.71	ND	WSW	0.08	03-01-96	<50	<0.5	<0.5	0.6	1.9	<3	--
MW-3	05-10-96	248.35	7.95	240.40	ND	WSW	0.08	05-10-96	Not sampled: well sampled annually, during the first quarter						
MW-3	08-09-96	248.35	8.06	240.29	ND	SW	0.08	08-09-96	Not sampled: well sampled annually, during the first quarter						
MW-3	11-08-96	248.35	Not surveyed: inaccessible			SW	0.055	11-11-96	Not sampled: inaccessible						
MW-3	03-21-97	248.35	8.21	240.14	ND	WSW	0.051	03-21-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	05-27-97	248.35	8.25	240.10	ND	WSW	0.069	05-27-97	Not sampled: well sampled annually, during the first quarter						
MW-3	08-05-97	248.35	8.29	240.06	ND	W	0.076	08-05-97	Not sampled: well sampled annually, during the first quarter						
MW-3	10-29-97	248.35	8.58	239.77	ND	WSW	0.036	10-29-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	02-25-98	248.35	7.69	240.66	ND	WSW	0.052	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-3	05-12-98	248.35	8.20	240.15	ND	W	0.07	05-12-98	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 6002
6235 Seminary Avenue, 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
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-4	03-15-95	242.91	9.37	233.54	ND	WSW	0.08	03-15-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	05-30-95	242.91	11.47	231.44	ND	WSW	0.08	05-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	09-01-95	242.91	12.28	230.63	ND	WSW	0.09	09-01-95	78	<0.5	0.7	<0.5	<0.5	<3	--
MW-4	11-13-95	242.91	11.75	231.16	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	02-23-96	242.91	8.51	234.40	ND	WSW	0.08	03-01-96	59	1.2	7.4	1.6	9.3	3	--
MW-4	05-10-96	242.91	11.35	231.56	ND	WSW	0.08	05-10-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	08-09-96	242.91	9.70	233.21	ND	SW	0.08	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	11-08-96	242.91	11.79	231.12	ND	SW	0.055	11-08-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	03-21-97	242.91	10.94	231.97	ND	WSW	0.051	03-21-97	<50	<0.5	<0.5	<0.5	<0.5	81	--
MW-4	05-27-97	242.91	11.51	231.40	ND	WSW	0.069	05-27-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	08-05-97	242.91	11.90	231.01	ND	W	0.076	08-05-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	10-29-97	242.91	12.00	230.91	ND	WSW	0.036	10-29-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-4	02-25-98	242.91	8.34	234.57	ND	WSW	0.052	02-25-98	<50	<0.5	0.9	<0.5	0.9	4	--
MW-4	05-12-98	242.91	10.93	231.98	ND	W	0.07	05-12-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-5	03-15-95	244.82	11.99	232.83	ND	WSW	0.08	03-15-95	21000	870	22	1600	1900	--	--
MW-5	05-30-95	244.82	12.97	231.85	ND	WSW	0.08	05-30-95	17000	2100	250	1000	520	--	--
MW-5	09-01-95	244.82	14.03	230.79	ND	WSW	0.09	09-01-95	19000	1500	25	1600	880	8300	--
MW-5	11-13-95	244.82	13.65	231.17	ND	WSW	0.08	11-13-95	21000	1300	22	1400	630	--	--
MW-5	02-23-96	244.82	11.93	232.89	ND	WSW	0.08	03-01-96	27000	1300	<50	1600	1500	730	--
MW-5	05-10-96	244.82	13.05	231.77	ND	WSW	0.08	05-10-96	17000	460	21	760	480	1000	--
MW-5	08-09-96	244.82	13.22	231.60	ND	SW	0.08	08-09-96	16000	420	14	870	390	1500	--
MW-5	11-08-96	244.82	Not surveyed: inaccessible			SW	0.055	11-11-96	Not sampled: inaccessible						
MW-5	03-21-97	244.82	13.24	231.58	ND	WSW	0.051	03-21-97	18000	110	<50	730	1500	1800	--
MW-5	05-27-97	244.82	13.10	231.72	ND	WSW	0.069	05-27-97	21000	86	<20	810	610	1700	--
MW-5	08-05-97	244.82	13.14	231.68	ND	W	0.076	08-05-97	340	2.2	<0.5	15	8.8	39	--
MW-5	10-29-97	244.82	13.03	231.79	ND	WSW	0.036	10-29-97	19000	130	<20	1400	620	1700	--
MW-5	02-25-98	244.82	11.33	233.49	ND	WSW	0.052	02-25-98	8500	19	13	190	100	170	--
MW-5	05-12-98	244.82	12.81	232.01	ND	W	0.07	05-12-98	10000	34	<10	390	220	610	--

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

ARCO Service Station 6002
6235 Seminary Avenue, 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
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-6	06-29-95	NR	6.63	NR	ND	NR	NR	06-30-95	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-6	09-01-95	NR	Not surveyed:					09-01-95	Not sampled:						
MW-6	11-13-95	NR	7.70	NR	ND	WSW	0.08	11-13-95	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	02-23-96	NR	9.82	NR	ND	WSW	0.08	03-01-96	<50	<0.5	0.8	<0.5	0.6	<3	--
MW-6	05-10-96	NR	15.25	NR	ND	WSW	0.08	05-10-96	Not sampled: well sampled annually, during the first quarter						
MW-6	08-09-96	252.20	11.11	241.09	ND	SW	0.08	08-09-96	Not sampled: well sampled annually, during the first quarter						
MW-6	11-08-96	252.20	9.31	242.89	ND	SW	0.055	11-11-96	Not sampled: well sampled annually, during the first quarter						
MW-6	03-21-97	252.20	9.40	242.80	ND	WSW	0.051	03-21-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	05-27-97	252.20	7.08	245.12	ND	WSW	0.069	05-27-97	Not sampled: well sampled annually, during the first quarter						
MW-6	08-05-97	252.20	7.12	245.08	ND	W	0.076	08-05-97	Not sampled: well sampled annually, during the first quarter						
MW-6	10-29-97	252.20	7.42	244.78	ND	WSW	0.036	10-29-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	02-25-98	252.20	10.35	241.85	ND	WSW	0.052	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-6	05-12-98	252.20	15.83	236.37	ND	W	0.07	05-12-98	Not sampled: well sampled annually, during the first quarter						
MW-7	08-09-96	235.95	Not surveyed: well was dry			SW	0.08	08-09-96	Not sampled: well was dry						
MW-7	11-08-96	235.95	Not surveyed: well was dry			SW	0.055	11-11-96	Not sampled: well was dry						
MW-7	01-27-97	235.95	NR	NR	ND	NR	NR	01-27-97	2900	29	<5	<5	580	220	--
MW-7	03-21-97	235.95	7.13	228.82	ND	WSW	0.051	03-21-97	590	3.5	<0.5	<0.5	1.3	90	--
MW-7	05-27-97	235.95	9.02	226.93	ND	WSW	0.069	05-27-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-7	08-05-97	235.95	12.33	223.62	ND	W	0.076	08-05-97	110	0.5	<0.5	<0.5	0.8	81	--
MW-7	10-29-97	235.95	NR	NR	ND	WSW	0.036	10-29-97	Not sampled: well is dry						
MW-7	02-25-98	235.95	8.04	227.91	ND	WSW	0.052	02-25-98	<50	<0.5	0.6	<0.5	0.7	<3	--
MW-7	05-12-98	235.95	8.88	227.07	ND	W	0.07	05-12-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--

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

ARCO Service Station 6002
6235 Seminary Avenue, Oakland, California

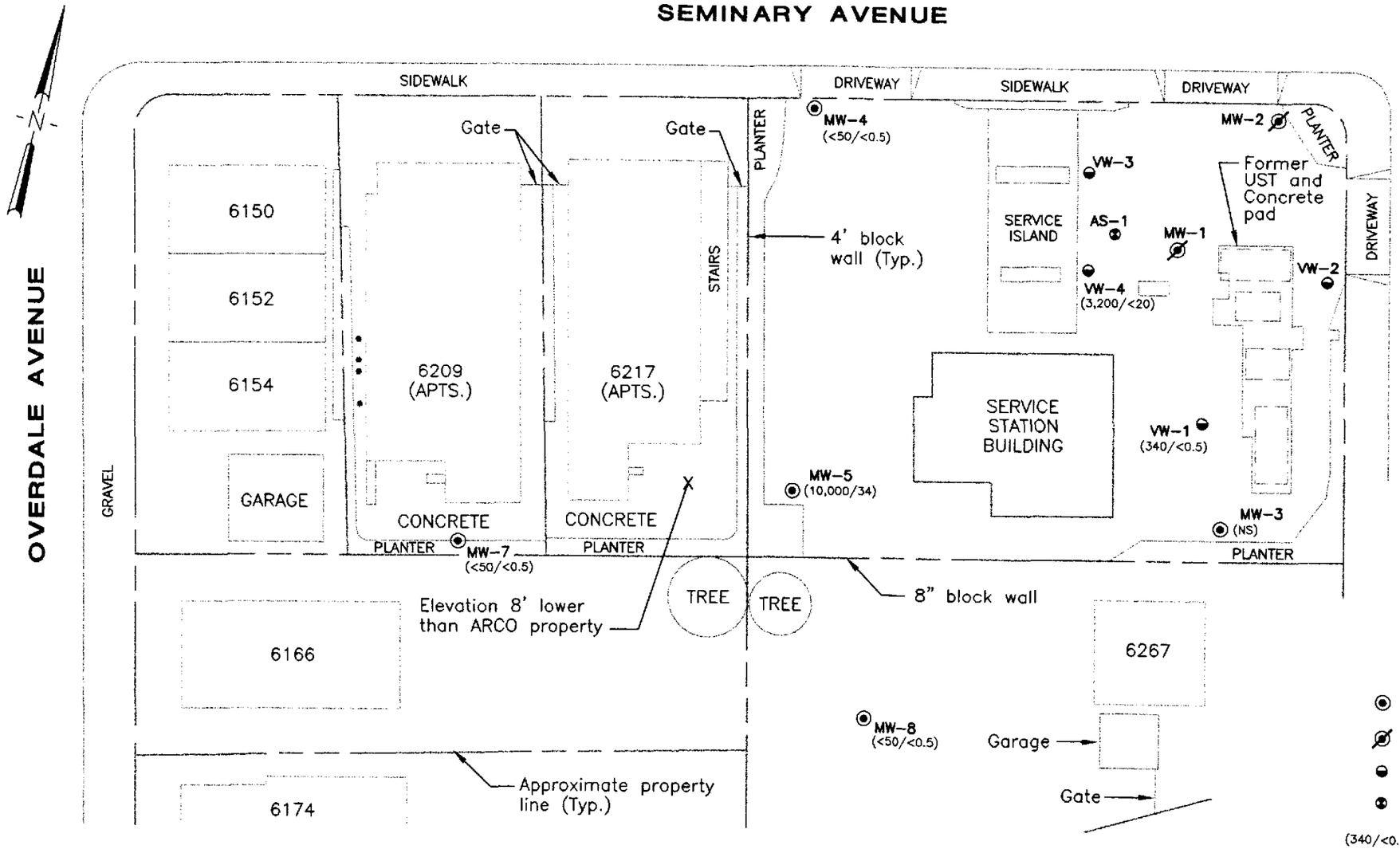
Well Designation	Water Level Field Date	Top of Casing Elevation	Depth to Water	Groundwater Elevation	Floating Product Thickness	Groundwater Flow Direction	Hydraulic Gradient	Water Sample Field Date	TPHG LUFT Method	Benzene EPA 8020	Toluene EPA 8020	Ethylbenzene EPA 8020	Total Xylenes EPA 8020	MTBE EPA 8020	MTBE EPA 8240
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MW-8	08-09-96	240.37	9.41	230.96	ND	SW	0.08	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	11-08-96	240.37	9.19	231.18	ND	SW	0.055	11-11-96	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	03-21-97	240.37	8.55	231.82	ND	WSW	0.051	03-21-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	05-27-97	240.37	11.06	229.31	ND	WSW	0.069	05-27-97	91	0.6	<0.5	<0.5	0.6	66	--
MW-8	08-05-97	240.37	9.32	231.05	ND	W	0.076	08-05-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	10-29-97	240.37	9.35	231.02	ND	WSW	0.036	10-29-97	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	02-25-98	240.37	7.08	233.29	ND	WSW	0.052	02-25-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
MW-8	05-12-98	240.37	8.61	231.76	ND	W	0.07	05-12-98	<50	<0.5	<0.5	<0.5	<0.5	<3	--
AS-1	06-29-95	NR	9.20	NR	ND	NR	NR	06-30-95	<50	1.6	<0.5	0.9	0.9	--	--
VW-1	02-23-96	NR	5.29	NR	ND	WSW	0.08	03-01-96	21000	490	57	520	1500	240	--
VW-1	05-10-96	NR	6.80	NR	ND	WSW	0.08	05-10-96	3700	61	<5	100	50	200	--
VW-1	08-09-96	NR	7.03	NR	ND	SW	0.08	08-09-96	970	2.7	<2.5	2.7	3.7	180	--
VW-1	11-08-96	NR	Not surveyed: inaccessible			SW	0.055	11-11-96	Not sampled: inaccessible						
VW-1	03-21-97	NR	7.51	NR	ND	WSW	0.051	03-21-97	640	<4	<1	1	3	194	--
VW-1	05-27-97	NR	7.51	NR	ND	WSW	0.069	05-27-97	Not sampled: well sampled semi-annually, during the first and third quarters						
VW-1	08-05-97	NR	7.51	NR	ND	W	0.076	08-05-97	630	<1	<1	3	2	120	--
VW-1	10-29-97	NR	7.53	NR	ND	WSW	0.036	10-29-97	600	<0.5	<0.5	<0.5	1.6	84	--
VW-1	02-25-98	NR	6.77	NR	ND	WSW	0.052	02-25-98	230	<4	<0.7	1.2	0.5	27	--
VW-1	05-12-98	NR	7.43	NR	ND	W	0.07	05-12-98	340	<0.5	0.5	2.3	0.8	29	--
VW-2	02-23-96	NR	6.92	NR	ND	WSW	0.08	03-01-96	Not sampled: not part of sampling program						
VW-2	05-10-96	NR	Not surveyed: not scheduled for monitoring					05-10-96	Not sampled: not part of sampling program						

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

ARCO Service Station 6002
6235 Seminary Avenue, 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
		ft-MSL	feet	ft-MSL	feet	MWN	ft/ft		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
VW-4	05-10-96	NR	8.58	NR	ND	WSW	0.08	05-10-96	13000	2500	41	420	660	43000	- -
VW-4	08-09-96	NR	11.70	NR	ND	SW	0.08	08-09-96	<50	<0.5	<0.5	<0.5	<0.5	6200	- -
VW-4	11-08-96	NR	9.38	NR	ND	SW	0.055	11-08-96	7800	510	7	180	370	21000	- -
VW-4	03-21-97	NR	9.11	NR	ND	WSW	0.051	03-21-97	10000	290	10	270	230	8900	- -
VW-4	05-27-97	NR	9.34	NR	ND	WSW	0.069	05-27-97	Not sampled: well sampled semi-annually, during the first and third quarters						
VW-4	08-05-97	NR	9.47	NR	ND	W	0.076	08-05-97	<10000	180	<100	<100	110	12000	- -
VW-4	10-29-97	NR	9.35	NR	ND	WSW	0.036	10-29-97	9800	200	69	260	360	4900	- -
VW-4	02-25-98	NR	7.08	NR	ND	WSW	0.052	02-25-98	<50	2.5	<0.5	<0.5	0.7	<3	- -
VW-4	05-12-98	NR	9.17	NR	ND	W	0.07	05-12-98	3200	<20	22	29	52	2100	- -

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
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
W: west
- -: not analyzed or not applicable
*: For previous historical groundwater elevation data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6002, Oakland, California,* (EMCON, February 23, 1996).
** (corrected elevation (Z')) = Z + (h * 0.73) where: Z: measured elevation, h: floating product thickness, 0.73: density ratio of oil to water



Base map modified from GSI, 1994.

EXPLANATION

- ◉ Groundwater monitoring well
- ⊘ Decommissioned monitoring well
- ◒ Vapor extraction well
- ◒ Air sparge well
- (340/<0.5) Concentration of total petroleum hydrocarbons, as gasoline (TPHG) and benzene in groundwater (ug/L); water samples collected 5/12/98
- < Not detected at or above indicated laboratory detection limit
- NS Not sampled

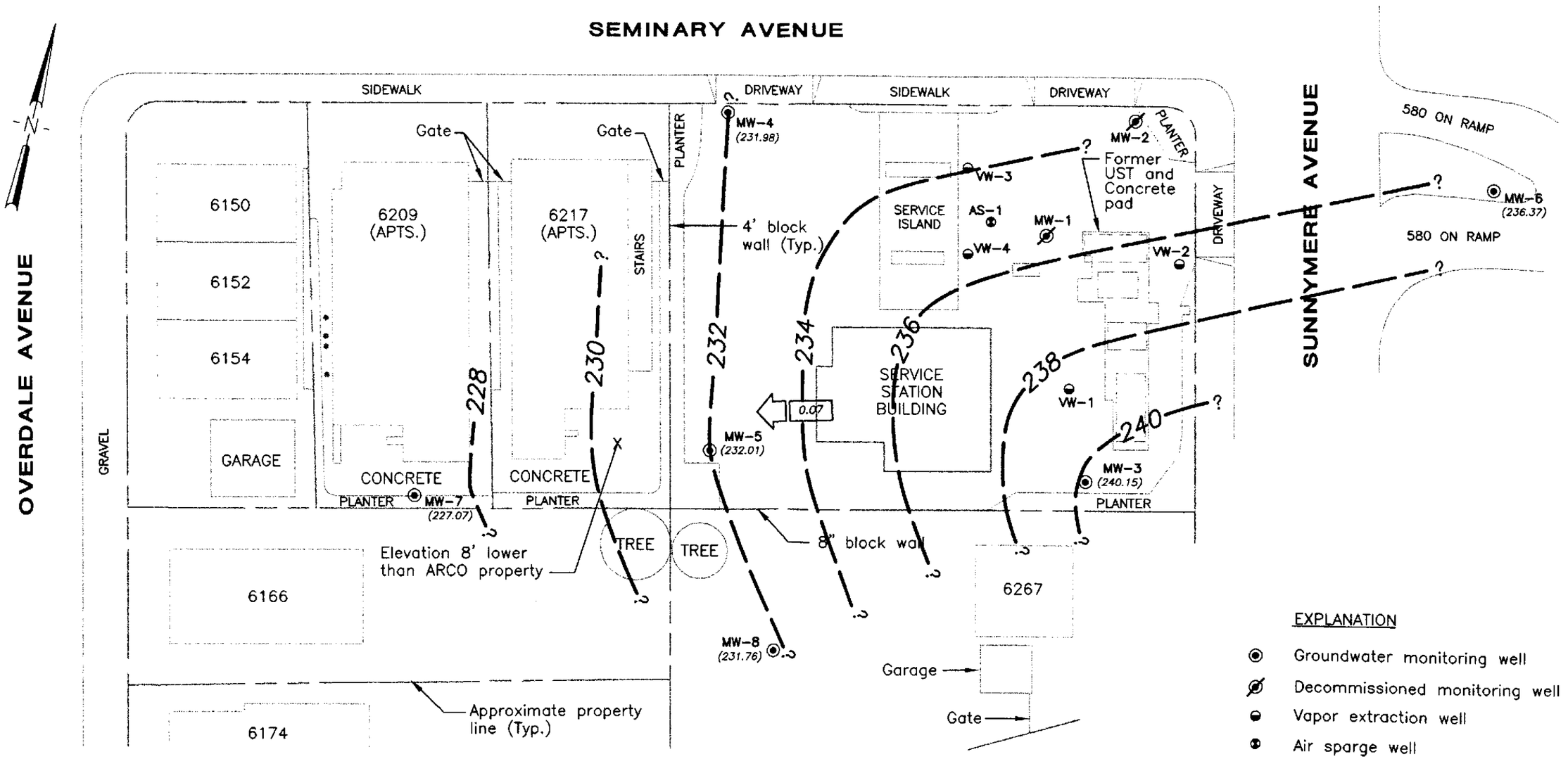
0 30 60
SCALE IN FEET

Pinnacle
ENVIRONMENTAL SOLUTIONS
A DIVISION OF EMCON

DATE SEPT. 1998
DWN KAB
APP
REV
PROJECT NO.
20805-131.013

FIGURE 1
ARCO PRODUCTS COMPANY
FORMER STATION 6002, 6235 SEMINARY AVE.
OAKLAND, CALIFORNIA
GROUNDWATER ANALYTICAL SUMMARY
SECOND QUARTER 1998

IMAGE Files: <No Images>
XREF Files: <No Xrefs>
SANJOSE/CADD: N:\DWG\PINACL\6002\6002CHEM.DWG Fri, 09/Oct/98 12:45pm kblack
Dimscale: 30 Ltscale: 30 Psltscale: 1



EXPLANATION

- Groundwater monitoring well
- Decommissioned monitoring well
- Vapor extraction well
- Air sparge well
- (240.15) Groundwater elevation (Ft.–MSL) measured 5/12/98
- Groundwater elevation contour (Ft.–MSL)
- Approximate direction of groundwater flow showing gradient

Base map modified from GSI, 1994.

Pinnacle
ENVIRONMENTAL SOLUTIONS
A DIVISION OF EMCON

0 30 60
SCALE IN FEET

DATE SEPT. 1998
DWN KAB
APP
REV
PROJECT NO.
805-131.013

FIGURE 2
ARCO PRODUCTS COMPANY
FORMER STATION 6002, 6235 SEMINARY AVE.
OAKLAND, CALIFORNIA
GROUNDWATER ELEVATION CONTOURS
SECOND QUARTER 1998

IMAGE Files: <No Images>
XREF Files: <No Xrefs>
SANJOSE/CADD: N:\DWG\PINACL\6002\6002GWC.DWG Wed, 21/Oct/98 09:24am kblack
Dimscale: 30 Ltscale: 30 Paltscale: 1
1" 1/2" 0" 1"

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)

MONITORING WELL PURGING PROTOCOL

OWT

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:

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

where:

P = calculated purge volume (gallons)

$\pi = 3.14$

r = radius of well casing in feet

h = height of water column in feet

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.

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

NO

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

pH = ± 0.1 pH units

COND. = ± 10 %

TEMP. = ± 1.0 °F

YES

WELL PURGING CRITERIA MET; PROCEED TO WELL SAMPLING.

NO

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

YES

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

YES

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

NO

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 : _____ SAMPLE ID : _____

PURGED BY : _____ CLIENT NAME : _____

SAMPLED BY : _____ 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) : _____

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

____ Submersible Pump ____ Bailer (Stainless Steel)

____ Well Wizard™ ____ Dedicated

Other: _____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well Wizard™ ____ Dedicated

Other: _____

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

Columbia Analytical Services, Inc.

May 28, 1998 Service Request No.: S9801203

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

RE: 20805-131.012/TO#22312.00/RAT8/6002 OAKLAND

Dear Mr. Vanderveen:

The following pages contain analytical results for sample(s) received by the laboratory on May 13, 1998. 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 15, 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 for Cristina V. Rayburn for

Steven L. Green
Project Chemist

Greg Anderson
Regional QA Coordinator

COLUMBIA ANALYTICAL SERVICES, Inc.
Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-8(9)	Units:	ug/L (ppb)
Lab Code:	S9801203-001	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/15/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/15/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-4(12)	Units:	ug/L (ppb)
Lab Code:	S9801203-002	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/15/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/15/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-7(10)	Units:	ug/L (ppb)
Lab Code:	S9801203-003	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/15/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/15/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	MW-5(14)	Units:	ug/L (ppb)
Lab Code:	S9801203-004	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	20	NA	5/16/98	10000	
Benzene	EPA 5030	8020	0.5	20	NA	5/16/98	34	
Toluene	EPA 5030	8020	0.5	20	NA	5/16/98	<10	C1
Ethylbenzene	EPA 5030	8020	0.5	20	NA	5/16/98	390	
Xylenes, Total	EPA 5030	8020	0.5	20	NA	5/16/98	220	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	20	NA	5/16/98	610	

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

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	VW-1(9)	Units:	ug/L (ppb)
Lab Code:	S9801203-005	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/15/98	340	
Benzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/15/98	0.5	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/15/98	2.3	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/15/98	0.8	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/15/98	29	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	5/12/98
Sample Matrix:	Water	**Date Received:**	5/13/98

BTEX, MTBE and TPH as Gasoline

Sample Name:	VW-4(10)	Units:	ug/L (ppb)
Lab Code:	S9801203-006	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	40	NA	5/15/98	3200	
Benzene	EPA 5030	8020	0.5	40	NA	5/15/98	<20	C1
Toluene	EPA 5030	8020	0.5	40	NA	5/15/98	22	
Ethylbenzene	EPA 5030	8020	0.5	40	NA	5/15/98	29	
Xylenes, Total	EPA 5030	8020	0.5	40	NA	5/15/98	52	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	40	NA	5/15/98	2100	

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

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980514-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/14/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/14/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/14/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/14/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/14/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/14/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980515-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/15/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/15/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/15/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9801203
Project:	20805-131.012/TO#22312.00/RAT8/6002 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	S980516-WB1	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	5/16/98	ND	
Benzene	EPA 5030	8020	0.5	1	NA	5/16/98	ND	
Toluene	EPA 5030	8020	0.5	1	NA	5/16/98	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	5/16/98	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	5/16/98	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	5/16/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#22312.00/RAT8/6002 OAKLAND
Sample Matrix: Water

Service Request: S9801203
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	Percent Recovery a,a,a-Trifluorotoluene
MW-8(9)	S9801203-001		104	92
MW-4(12)	S9801203-002		105	81
MW-7(10)	S9801203-003		105	90
MW-5(14)	S9801203-004		105	90
VW-1(9)	S9801203-005		93	111
VW-4(10)	S9801203-006		109	86
BATCH QC	S9801158-001MS		98	96
BATCH QC	S9801158-001DMS		97	103
Method Blank	S980514-WB1		107	91
Method Blank	S980515-WB1			
Method Blank	S980516-WB1			

CAS Acceptance Limits: 69-116 69-116

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#22312.00/RAT8/6002 OAKLAND
Sample Matrix Water

Service Request: S9801203
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 5/14/98

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline

Sample Name: BATCH QC
Lab Code: S9801158-001MS, S9801158-001DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

				Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent	
Analyte	**Prep Method**	**Analysis Method**	**MRL**	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**	**Result Notes**
Gasoline	EPA 5030	CA/LUFT	50	250	250	ND	240	240	96	96	75-135	<1	

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-131.012/TO#22312.00/RAT8/6002 OAKLAND

Service Request: S9801203
Date Analyzed: 5/14/98

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 Percent Recovery Acceptance Limits	Percent Recovery	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	250	240	90-110	96	
Benzene	EPA 5030	8020	25	27	85-115	108	
Toluene	EPA 5030	8020	25	27	85-115	108	
Ethylbenzene	EPA 5030	8020	25	28	85-115	112	
Xylenes, Total	EPA 5030	8020	75	85	85-115	113	
Methyl *tert*-Butyl Ether	EPA 5030	8020	25	23	85-115	92	

ICV032196

TPH, BTEX

ARCO Products Company
Division of Atlantic/Richfield Company

Task Order No. 22312.00

Chain of Custody

ARCO Facility no. 6007	City (Facility) Oakland	Project manager (Consultant) Glen Vanderveen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9576
Consultant name EMCON	Address (Consultant) 1921 Ringwood Ave, San Jose, CA 95131		Contract Number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐
MW-4(12)	2	2		X		X	HCl	5-12-98	12:20		X									
MW-7(10)	3	2		X		X	HCl	↓	12:35		X									
MW-5(14)	4	2		X		X	HCl	↓	13:05		X									

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest possible

Special QA/QC: As Normal

Remarks: RAT 8
2-40ml HCl VOAs
20805-131.012

Lab Number: 5980203

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 5-13-98 Time 08:00	Received by	5/13/98 M
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant

R11/03

TPH, BC, F

ARCO Products Company

Division of Atlantic/Richfield Company

Task Order No. 22312.00

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) Glen Vanderveen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON	Address (Consultant) 1921A Mayhew Wy, Walnut Creek, CA 94596		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 mod. 8015 EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐			
MW-8(9)1	2			X		X	HCL	5-12-98	12:00		X												

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest possible

Special QA/QC: As Normal

Remarks: RAT 8

2-40ml HCL VOAs

20805-B1.012

Lab Number: 5980203

Turnaround Time:

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 5-12-98 Time 0800	Received by	
Relinquished by	Date Time	Received by	5/13/98 1m
Relinquished by	Date Time	Received by laboratory	Date Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant

R11/93

TPH, BC, F

ARCO Products Company
Division of Atlantic/Richfield Company

Task Order No. 22312.00

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) Glen Vanderveen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON	Address (Consultant) 144-A Mayhew Way, Walnut Creek, CA 94596		Contract Number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH gas/BTEX EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead OrgDHS ☐ Lead EPA 7420/7421 ☐			
VW-1(9)5	2			X		X	HCL	5-12-98	12:50		X												
VW-4(10)6	2			X		X	HCL	↓	13:20		X												

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: RAT 8
2-40ml HCL VOAs
#20805-131.02

Lab Number: 5980203

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

Condition of sample:		Temperature received:	
Relinquished by sampler	Date 5-13-98 Time 0930	Received by	5/13/98
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant

5/11/03

EMCON - Groundwater Sampling and Analysis Request Form

PROJECT NAME : **ARCO 6002**
6235 Seminary Avenue, Oakland

Sampling Project #: **21775-241.003**
Reporting Project #: **20805-131.012**

DATE REQUESTED : **12-May-98**

Project Manager: **Glen Vanderveen**

Groundwater Monitoring Instructions	Treatment System Instructions
Quarterly Monitoring- Second Month of the Quarter Perform a water level survey prior to sampling (see ARCO SOP). The survey points are the tops of the well casings. Purge three (3) casing volumes. Sample all wells regardless of product, per John Young's request. **Please use the reporting project number (#20805-131.012) on the chain-of-custody form, sample containers and analytical results.** **You will need a D.O. kit and the Redox meter.** Sample ID's on the sample bottles must include the depth at which the sample was collected [i.e. MW-1 (30)]. **Ring bell at Apt. #3 prior to accessing well MW-7.**	No treatment system is at this site. **Lisle Rath Pager # (408) 798-2928**

Site Contact: **?** Site Phone: **?** Well Locks: **ARCO Key**

Well ID or Source	Casing Diameter (inches)	Casing Length (feet)	Top Of Screen (feet)	Analyses Requested
MW-3	**4.0**	**24.4**	**5.0**	**Depth To Water** **Total Depth** **Well Integrity**
MW-6	**2.0**	**30.0**	**17.0**	
MW-8	**2.0**	**13.9**	**5.5**	
MW-4	**4.0**	**24.0**	**4.5**	
MW-7	**2.0**	**13.3**	**8.5**	
VW-1	**4.0**	**13.5**	**6.0**	
MW-5	**4.0**	**24.4**	**5.0**	
VW-4	**4.0**	**15.0**	**6.0**	
Above wells in indicated order				
~~**MW-8**~~		*<Separate COC & CAR*		**Dissolved Oxygen** **TPH-Gasoline** **BTEX** **MTBE by EPA 8020** (2-40ml HCL VOAs) ***If depth to water is below the top of the screen take a grab sample. If the water level is above the top of the screen purge as normal.***
~~**MW-4**~~				
~~**MW-7**~~		**(See Above)**		
~~**VW-1**~~		*<Separate COC & CAR*		
~~**MW-5**~~				
VW-4		*<Separate COC & CAR*		
Above wells in indicated order				

Laboratory Instructions:
Provide lowest detection limits possible.
Please use the EMCON reporting project number **(#20805-131.012)** on the CAR.

ND = None Detected IP = Intermitent Product

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : **21775-241.003** STATION ADDRESS : **6235 Seminary Avenue, Oakland** DATE : **5/12/98**

ARCO STATION # : **6002** FIELD TECHNICIAN : **Chris Chaco** DAY : **Tuesday**

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-3	OK	15/16"	NO	ARCO	LWC	8.20	8.20	ND	ND	24.6	Damaged Lid
2	MW-6	OK	6"	NO	DOLPHIN	LWC	15.83	15.83			32.0	
3	MW-8	OK	Green Box	NO	DOLPHIN	LWC	8.61	8.61			14.0	
4	MW-4	OK	15/16"	YES	ARCO	LWC	10.93	10.93			24.2	
5	MW-7	OK	Green Box	NO	3616	LWC	8.88	~~8.88~~	8.88		13.2	
6	VW-1	OK	15/16	NO	3616	LWC	7.43	7.43			14.0	
7	MW-5	OK	15/16	NO	ARCO	LWC	12.81	12.81			24.4	
8	VW-4	OK	15/16"	YES	3616	LWC	9.17	9.17			15.0	

SURVEY POINTS ARE TOP OF WELL CASINGS

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 SAMPLE ID MW-4 (12)
PURGED BY C. Chaco CLIENT NAME ARCO 6002
SAMPLED BY ↓ LOCATION OAKLAND

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) 24.2 CALCULATED PURGE (gal.) NA
DEPTH OF WATER (feet) 10.93 ACTUAL PURGE VOL (gal.) ____

DATE PURGED 5-12-98 END PURGE ✓
DATE SAMPLED ↓ SAMPLING TIME 12:20

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12.20	GRAB	6.17	344.4	65.	CLR	Light

OTHER: D.O. 0-1 ODOR: None — (COBALT 0-100) — (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK: ARCO

REMARKS: ____

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

SIGNATURE: [signature] REVIEWED BY: NA PAGE 1 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 SAMPLE ID MW-5 (14)
PURGED BY C. Chaco CLIENT NAME ARCO 6002
SAMPLED BY ↓ LOCATION OAKLAND

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) 24.4 CALCULATED PURGE (gal.) N/A
DEPTH OF WATER (feet) 12.81 ACTUAL PURGE VOL (gal.) ____

DATE PURGED 5-12-98 END PURGE —
DATE SAMPLED ↓ SAMPLING TIME 13:05

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
13:05	GRAB	6.45	59.42	64.8	CLR	Light

OTHER: D.O.: 1-2 ODOR Strong — (COBALT 0-100) — (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK: ____

REMARKS: Well Does not secure

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: NA PAGE 2 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 | SAMPLE ID MW-7 (10)
PURGED BY C. Chaco | CLIENT NAME ARCO 6002
SAMPLED BY ↓ | LOCATION OAKLAND

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) 13.2 | CALCULATED PURGE (gal.) ___
DEPTH OF WATER (feet) 8.88 | ACTUAL PURGE VOL (gal.) N/A

DATE PURGED 5-12-98 | END PURGE ✓
DATE SAMPLED ↓ | SAMPLING TIME 12:35

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:35	GRAB	6.38	420.3	64.5	CLR	Light

OTHER: D.O. 0-1 | ODOR: None | — (COBALT 0-100) | — (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good | LOCK: Dolphin

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 NA PAGE 3 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 | SAMPLE ID MW-8 (6FT)
PURGED BY C. Chaco | CLIENT NAME ARCO 6002
SAMPLED BY ↓ | LOCATION OAKLAND

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) 14.0 | CALCULATED PURGE (gal.) ____
DEPTH OF WATER (feet) 8.61 | ACTUAL PURGE VOL (gal.) NA

DATE PURGED 5-12-98 | END PURGE ✓
DATE SAMPLED ↓ | SAMPLING TIME 12:00

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:00	GRAB	6.25	347.1	62.2	CLR	Light

OTHER: D.O. 0-1 | ODOR NONE | — (COBALT 0-100) | — (NTU 0-200)

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

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
____ Bomb Sampler
____ Dipper
____ Well Wizard™
✓ Bailer (Teflon)
____ Bailer (Stainless Steel)
____ Submersible Pump
____ Dedicated
Other: ____

WELL INTEGRITY: Good | LOCK: ARCO

REMARKS: ____

pH, E.C., Temp. Meter Calibration: Date 5-12-98 | Time ____ | Meter Serial No. 272
E.C. 1000 1004 / 1048 | pH 7 7.05 / 7.00 | pH 10 9.92 / 10.00 | pH 4 3.91 /
Temperature °F 59.3
SIGNATURE: ____ | REVIEWED BY NA | PAGE 4 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 SAMPLE ID VW-1 (9)
PURGED BY C. Chace CLIENT NAME ARCO 6002
SAMPLED BY ↓ LOCATION Oakland

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) 14.0 CALCULATED PURGE (gal.) NA
DEPTH OF WATER (feet) 7.43 ACTUAL PURGE VOL (gal.) ____

DATE PURGED 5-12-98 END PURGE /
DATE SAMPLED ↓ SAMPLING TIME 12:50

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:50	GRAB	6.39	505.7	64.7	Yllw-Tint	Moderate

OTHER: D.O. = 0 - 1 ODOR: Sewer — — (COBALT 0-100) (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good LOCK: ARCO

REMARKS: Well Lid Damage

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 5 OF 6

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-241.003 | SAMPLE ID VW-4 (10)
PURGED BY C. Chaco | CLIENT NAME ARCO 6002
SAMPLED BY ↓ | LOCATION OAKLAND

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) 15.0 | CALCULATED PURGE (gal.) N/A
DEPTH OF WATER (feet) 9.17 | ACTUAL PURGE VOL (gal.) ____

DATE PURGED 5-12-98 | END PURGE ____
DATE SAMPLED ↓ | SAMPLING TIME 13:20

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
13:20	GRAB	6.71	620.9	64.0	CLR	Light

OTHER: D.O. 1-2 | ODOR: Strong | — (COBALT 0-100) | — (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good | LOCK: ARCO

REMARKS: ____

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

SIGNATURE: [signature] REVIEWED BY [signature] PAGE 6 OF 6

ARCO Products Company
Division of Atlantic Richfield Company

Task Order No. 7312.00

Chain of Custod

ARCO Facility no. 6007 | City (Facility) Oakland | Project manager (Consultant) Glen Vandelween | Laboratory Name CAS

ARCO engineer Paul Supple | Telephone no. (ARCO) | Telephone no. (Consultant) (408)453-7300 | Fax no. (Consultant) (408)437-9526 | Contract Number

Consultant name EMCON | Address (Consultant) 1921 Mayhew Wy. Walnut Creek, CA 94596

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/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals VOA VOC Semi	CAM Metals EPA 6010/7000 TTLC STLC	Lead Org/DHS Lead EPA 7420/7421			
MW-8(9)		2		X		X	HCL	5-12-98	12:00		X												

Method of shipment: Sam... wi... deli...

Special Detection Limit/reporting: Low... Poss...

Special QA/QC: As Normal

Remarks:

Lab number

Turnaround time

Priority Rush 1 Business Day

Rush 2 Business Days

Expedited

Condition of sample:

Relinquished by sampler	Date 5-12-98	Time 0840	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory / Date / Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering: Pink Copy – Consultant

ARCO Products Company
Division of Atlantic/Richfield Company

Task Order No. 77312.00

Chain of Custody

ARCO Facility no. 6007	City (Facility) Oakland	Project manager (Consultant) Glen Vanderveen	Laboratory Name CAS
ARCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
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	[illegible]	[illegible]	[illegible] 8015	Oil and Grease 413.1 413.2	TPH EPA 418.1/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals VOA VOA	CAM Metals EPA 6010/7000 TTLC STLC	Lead Org/DHS	Lead EPA 7420/7421			
MW-4(11)		2		X		X	HCL	5-12-98	12:2[illegible]		X													
MW-7(10)		2		X		X	HCL	↓	12:35		X													
MW-5(14)		2		X		X	HCL	↓	13:05		X													

Method of shipment: [illegible]

Special detection limit/reporting: [illegible]

Special QA/QC: [illegible]

Remarks: [illegible]

Lab Number: [illegible]

Condition of sample: | Temperature received: [illegible]

Relinquished by sampler [signature]	Date 5-13-98	Time [illegible]	Received by [signature]
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory	Date	Time

Distribution: White Copy – Laboratory: Canary Copy – ARCO Environmental Engineering; Pink Copy – Consultant

ARCO Products Company

Division of Atlantic/Richfield Company

Task Order No. 7312.00

Chain of Custody

ARCO Facility no.	6002
City (Facility)	Oakland
Project manager (Consultant)	Glen Vanderveen
Laboratory Name	CAS
ARCO engineer	Paul Supple
Telephone no. (ARCO)	
Telephone no. (Consultant)	(408) 453-7300
Fax no. (Consultant)	(408) 437-952[illegible]
Contract Number	
Consultant name	EMCON
Address (Consultant)	1[illegible] Mayhew Way, Walnut Creek, CA 94596

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/SM 503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐			
VW-1(9)		2		X		X	HCL	5-12-98	17:50		X												
VW-4(10)		2		X		X	HCL	↓	8:20		X												

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest possible

Special QA/QC: As normal

Remarks: RA[illegible] 2-40ml HCL VOAs #2080[illegible]

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:

	Date	Time			
Relinquished by sampler: [signature]	5-13-98	0820	Received by: [signature]		
Relinquished by			Received by		
Relinquished by			Received by laboratory	Date	Time

Distribution: White Copy – Laboratory; Canary Copy – ARCO Environmental Engineering; Pink Copy – Consultant