R0716

June 22, 1999
Project 20805-213.002

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. 4931, located at 731 West MacArthur Boulevard, 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. 4931, located at 731 West MacArthur Boulevard, 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: Mr. John Kaiser, Regional Water Quality Control Board - San Francisco Bay Region
Ms. Susan Hugo, Alameda County Health Care Services Agency

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ENVIRONMENTAL PROTECTION

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Date: June 22, 1999

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Facility No.: 4931 Address: 731 West MacArthur Boulevard, Oakland, California

ARCO Environmental Engineer: Paul Supple

Consulting Co./Contact Person: Pinnacle Environmental Solutions/ Glen VanderVeen

Consultant Project No.: 20805-213.002

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. Perform quarterly groundwater monitoring and sampling for second quarter 1999.

QUARTERLY MONITORING:

Current Phase of Project:	Monitoring/Remediation
Frequency of Groundwater Sampling:	Annual (2nd Quarter): A-7, A-13 Semi-Annual (2nd/4th Quarter): A-3, A-5, A-11, A-12 Quarterly: A-2, A-4, A-6, A-8, A-9
Frequency of Groundwater Monitoring:	Quarterly
Is Free Product (FP) Present On-Site:	No
FP Recovered this Quarter:	None
Cumulative FP Recovered to Date:	Unknown
Bulk Soil Removed This Quarter:	None
Bulk Soil Removed to Date:	Unknown
Current Remediation Techniques:	Intrinsic Bioremediation Enhancement using ORC
Approximate Depth to Groundwater:	6.2 feet
Groundwater Flow Direction and Gradient (Average):	0.04 ft/ft toward Southwest
Period TPPH- g/Benzene Removed:	0.0/0.0
Cumulative TPPH-g/Benzene Removed:	0.45/0.06 gallons

DISCUSSION:

- Bioremediation enhancement is ongoing using oxygen release compound socks (ORC) in wells A-4 and A-8.

ATTACHMENTS:

- Table 1 - Groundwater Elevation and Analytical Data
- 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
- Appendix D - Remedial System Performance Summary

Table 1
Groundwater Elevation and Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MtBE)

ARCO Service Station 4931
731 West MacArthur Boulevard, Oakland, California

Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-2	03/26/96	55.48	5.37	50.11	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	05/22/96		5.25	50.23	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		10.45	45.03	<50	1.1	1.8	<0.5	1.3	<2.5	NM	
	12/19/96		5.53	49.95	<50	<0.5	<0.5	<0.5	<0.5	2.7	NM	
	04/01/97		8.77	46.71	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NM	
	05/27/97		9.87	45.61	<50	<0.5	<0.5	<0.5	<0.5	4.6	NM	
	08/12/97		11.11	44.37	<50	<0.5	<0.5	<0.5	<0.5	5.6	NM	
	11/14/97		10.63	44.85	<50	0.9	2.8	<0.5	2.4	27	2.6	
	03/18/98		3.58	51.90	<50	<0.5	<0.5	<0.5	<0.5	<3	NM	
	05/19/98		4.82	50.66	<50	<0.5	<0.5	<0.5	<0.5	<3	1.30	P
	07/29/98		8.94	46.54	<50	<0.5	<0.5	<0.5	<0.5	<3	1.2	NP
	10/09/98		10.82	44.66	<50	<0.5	<0.5	<0.5	<0.5	<3	0.5	NP
	02/19/99		4.46	51.02	<50	<0.5	<0.5	<0.5	<0.5	<3	3.0	P
A-3	03/26/96	54.66	7.20	47.46	---------- Well Sampled Semiannually ----------							
	05/22/96		7.70	46.96	<50	1.2	1.9	0.7	1.3	NA	NM	
	08/22/96		10.88	43.78	---------- Well Sampled Semiannually ----------							
	12/19/96		7.70	46.96	5,900	<25	<25	<25	<25	5,300*	NM	
	04/01/97		9.78	44.88	---------- Well Sampled Semiannually ----------							
	05/27/97		10.55	44.11	2,300	<20	<20	<20	<20	3,800	NM	
	08/12/97		11.12	43.54	---------- Well Sampled Semiannually ----------							
	11/14/97		8.24	46.42	<1,000	<10	<10	<10	<10	1,500	3.8	
	03/18/98		5.05	49.61	---------- Well Sampled Semiannually ----------							
	05/19/98		9.00	45.66	<250	<2.5	<2.5	<2.5	<2.5	220	4.60	P
	07/29/98		9.86	44.80	---------- Well Sampled Semiannually ----------							
	10/09/98		11.36	43.30	<250	<2.5	<2.5	<2.5	<2.5	260	1.0	NP
	02/19/99		6.19	48.47	<50	<0.5	<0.5	<0.5	<0.5	<3	2.5	NP

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A-4	03/26/96	54.73	7.95	46.78	8,900	1,200	21	200	220	NA	NM	
	05/22/96		8.35	46.38	5,300	700	<10	170	130	NA	NM	
	08/22/96		11.03	43.70	3,000	480	<5.0	75	26	150	NM	
	12/19/96		8.67	46.06	<2,000	<20	<20	<20	<20	15,000*	NM	
	04/01/97		11.95	42.78	8,900	1,700	22	310	260	6,900	NM	
	05/27/97		10.80	43.93	7,100	960	<20	150	74	7,900	NM	
	08/12/97		11.38	43.35	4,300	670	12	51	27	2,800	NM	
	11/14/97		7.74	46.99	<20,000	300	500	<200	<200	27,000	2.2	
	03/18/98		6.80	47.93	4,700	600	<20	99	94	1,200	1.0	
	05/19/98		9.06	45.67	<2000	<20	<20	<20	720	2,000	1.28	P
	07/29/98		10.05	44.68	8,400	1,300	<20	290	130	1,800	0.7	NP
	10/09/98		11.20	43.53	3,500	400	<20	54	<20	1,700	1.0	NP
	02/19/99		6.85	47.88	<1,000	<10	<10	<10	12	650	0.1	NP
A-5	03/26/96	54.17	7.93	46.24	---------- Well Sampled Semiannually ----------							
	05/22/96		8.20	45.97	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		10.70	43.47	---------- Well Sampled Semiannually ----------							
	12/19/96		8.39	45.78	9,900	1,100	330	230	700	24	NM	
	04/01/97		10.83	43.34	---------- Well Sampled Semiannually ----------							
	05/27/97		10.65	43.52	100	<0.5	<0.5	<0.5	<0.5	120	NM	
	08/12/97		11.05	43.12	---------- Well Sampled Semiannually ----------							
	11/14/97		10.51	43.66	<50	<0.5	<0.5	<0.5	<0.5	41	4.8	
	03/18/98		8.10	46.07	---------- Well Sampled Semiannually ----------							
	05/19/98		9.31	44.86	590	<5	<5	<5	<5	710	2.48	P
	07/29/98		9.89	44.28	---------- Well Sampled Semiannually ----------							
	10/09/98		11.02	43.15	690	<5	<5	<5	<5	710	1.0	NP
	02/19/99		6.82	47.35	<2,000	<20	<20	<20	<20	2,300	0.6	NP

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Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-6	03/26/96	55.17	7.15	48.02	52	2.7	<0.5	1.1	2.0	NA	NM	
	05/22/96		7.35	47.82	<50	2.4	<0.5	0.88	1.7	NA	NM	
	08/22/96		10.12	45.05	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NM	
	12/19/96		7.43	47.74	<50	1.7	<0.5	0.78	1.5	<2.5	NM	
	04/01/97		9.97	45.20	<50	4.7	<0.5	1.9	3.2	<2.5	NM	
	05/27/97		9.66	45.51	<50	0.69	<0.5	<0.5	<0.5	<2.5	NM	
	08/12/97		10.43	44.74	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NM	
	11/14/97		9.76	45.41	<50	<0.5	<0.5	<0.5	<0.5	<3	<1.0	
	03/18/98		7.00	48.17	<50	6.2	0.5	2.3	2.6	<3	3.0	
	05/19/98		8.27	46.90	<50	<0.5	<0.5	1.3	4.7	<3	2.16	P
	07/29/98		8.96	46.21	<50	<0.5	<0.5	<0.5	<0.5	<3	0.8	NP
	10/09/98		10.23	44.94	<50	<0.5	<0.5	<0.5	<0.5	<3	1.0	NP
	02/19/99		5.79	49.38	<50	<0.5	<0.5	<0.5	<0.5	5	0.4	NP
A-7	03/26/96	54.71	6.90	47.81	---------- Well Sampled Semiannually ----------							
	05/22/96		8.27	46.44	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		9.80	44.91	---------- Well Sampled Semiannually ----------							
	12/19/96		7.19	47.52	---------- Well Sampled Annually ----------							
	04/01/97		9.63	45.08	---------- Well Sampled Annually ----------							
	05/27/97		9.34	45.37	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NM	
	08/12/97		10.10	44.61	---------- Well Sampled Annually ----------							
	11/14/97		9.35	45.36	---------- Well Sampled Annually ----------							
	03/18/98		6.75	47.96	---------- Well Sampled Annually ----------							
	05/19/98		8.85	45.86	<50	<0.5	<0.5	<0.5	<0.5	<3	1.82	P
	07/29/98		8.84	45.87	---------- Well Sampled Annually ----------							
	10/09/98		10.05	44.66	---------- Well Sampled Annually ----------							
	02/19/99		5.57	49.14	<50	<0.5	<0.5	<0.5	<0.5	<3	4.7	NP

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Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-8	03/26/96	53.77	7.10	46.67	48,000	2,600	<100	650	1,100	NA	NM	
	05/22/96		7.20	46.57	14,000	2,800	160	320	190	NA	NM	
	08/22/96		11.57	42.20	8,000	1,000	76	150	96	4,300	NM	
	12/19/96		8.04	45.73	12,000	450	110	210	230	<500	NM	
	04/01/97		9.98	43.79	---------- Well Sampled Semiannually ----------							
	05/27/97		11.45	42.32	11,000	1,600	100	220	210	2,300	NM	
	08/12/97		11.59	42.18	---------- Well Sampled Semiannually ----------							
	11/14/97		9.85	43.92	26,000	2,300	<200	400	400	4,100	2.2	
	03/18/98		7.80	45.97	---------- Well Sampled Semiannually ----------							
	05/19/98		8.78	44.99	88,000	4,200	150	640	600	6,700	1.36	P
	07/29/98		9.59	44.18	46,000	4,900	160	620	580	13,000	0.5	NP
	10/09/98		11.23	42.54	130,000	3,700	110	500	770	7,300	1.0	NP
	02/19/99		6.51	47.26	<1,000	39	<10	<10	<10	840	0.2	NP
A-9	03/26/96	53.04	7.05	45.99	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	05/22/96		7.20	45.84	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		9.68	43.36	<50	<0.5	<0.5	<0.5	<0.5	8.5	NM	
	12/19/96		7.43	45.61	<50	<0.5	<0.5	<0.5	<0.5	2.6	NM	
	04/01/97		9.95	43.09	---------- Well Sampled Semiannually ----------							
	05/27/97		9.56	43.48	<50	2.3	<0.5	<0.5	<0.5	45	NM	
	08/12/97		10.15	42.89	---------- Well Sampled Semiannually ----------							
	11/14/97		8.64	44.40	<200	<2.0	<2.0	<2.0	<2.0	190	9.6	
	03/18/98		6.45	46.59	---------- Well Sampled Semiannually ----------							
	05/19/98		8.35	44.69	<50	<0.5	<0.5	<0.5	<0.5	7	1.27	P
	07/29/98		8.74	44.30	<50	<0.5	<0.5	<0.5	<0.5	<3	0.99	NP
	10/09/98		10.05	42.99	<50	<0.5	<0.5	<0.5	<0.5	<3	1.0	NP
	02/19/99		6.91	46.13	<50	<0.5	<0.5	<0.5	<0.5	<3	2.0	NP

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Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-10	03/26/96	54.26	8.28	45.98	---------- Well Removed from Sampling Program ----------							
	05/22/96		8.60	45.66	---------- Well Removed from Sampling Program ----------							
	08/22/96		10.98	43.28	---------- Well Removed from Sampling Program ----------							
	12/19/96		8.80	45.46	---------- Well Removed from Sampling Program ----------							
	04/01/97		11.15	43.11	---------- Well Removed from Sampling Program ----------							
	05/27/97		10.90	43.36	---------- Well Removed from Sampling Program ----------							
	08/12/97		11.30	42.96	---------- Well Removed from Sampling Program ----------							
	11/14/97		10.80	43.46	---------- Well Removed from Sampling Program ----------							
	03/18/98		----------	----------	---------- Well Removed from Survey Program ----------							
A-11	03/26/96	53.74	8.10	45.64	---------- Well Sampled Semiannually ----------							
	05/22/96		8.25	45.49	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		10.58	43.16	---------- Well Sampled Semiannually ----------							
	12/19/96		8.37	45.37	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NM	
	04/01/97		10.95	42.79	---------- Well Sampled Semiannually ----------							
	05/27/97		10.60	43.14	<50	<0.5	<0.5	<0.5	<0.5	3.1	NM	
	08/12/97		11.07	42.67	---------- Well Sampled Semiannually ----------							
	11/14/97		10.58	43.16	<50	<0.5	<0.5	<0.5	<0.5	<3	1.6	
	03/18/98		8.14	45.60	---------- Well Sampled Semiannually ----------							
	05/19/98		9.40	44.34	<50	<0.5	<0.5	<0.5	<0.5	<3	1.13	P
	07/29/98		10.32	43.42	---------- Well Sampled Semiannually ----------							
	10/09/98		10.91	42.83	<50	<0.5	<0.5	<0.5	<0.5	<3	2.0	NP
	02/19/99		6.77	46.97	<50	<0.5	<0.5	<0.5	<0.5	<3	1.8	NP

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Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-12	03/26/96	52.05	7.83	44.22	---------- Well Sampled Semiannually ----------							
	05/22/96		7.80	44.25	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	08/22/96		9.97	42.08	---------- Well Sampled Semiannually ----------							
	12/19/96		8.18	43.87	85	<0.5	<0.5	<0.5	<0.5	170	NM	
	04/01/97		10.30	41.75	---------- Well Sampled Semiannually ----------							
	05/27/97		10.05	42.00	50	12	<0.5	<0.5	<0.5	96	NM	
	08/12/97		10.46	41.59	---------- Well Sampled Semiannually ----------							
	11/14/97		9.70	42.35	<50	<0.5	<0.5	<0.5	<0.5	75	7.0	
	03/18/98		8.15	43.90	---------- Well Sampled Semiannually ----------							
	05/19/98		9.15	42.90	<50	<0.5	<0.5	<0.5	<0.5	29	1.47	P
	07/29/98		9.38	42.67	---------- Well Sampled Semiannually ----------							
	10/09/98		10.21	41.84	<50	<0.5	<0.5	<0.5	<0.5	7	2.0	NP
	02/19/99		6.96	45.09	<50	<0.5	<0.5	<0.5	<0.5	<3	5.2	NP
A-13	03/26/96	55.11	---------- Well Inaccessible ----------									
	05/22/96		---------- Well Inaccessible ----------									
	08/22/96		---------- Well Inaccessible ----------									
	12/19/96		---------- Well Inaccessible ----------									
	04/01/97		---------- Well Inaccessible ----------									
	05/27/97		---------- Well Inaccessible ----------									
	08/12/97		---------- Well Inaccessible ----------									
	11/14/97		---------- Well Inaccessible ----------									
	03/18/98		---------- Well Inaccessible ----------									
	05/19/98		---------- Well Inaccessible ----------									
	07/29/98		---------- Well Inaccessible ----------									
	10/09/98		---------- Well Inaccessible ----------									
	02/19/99		---------- Well Inaccessible ----------									

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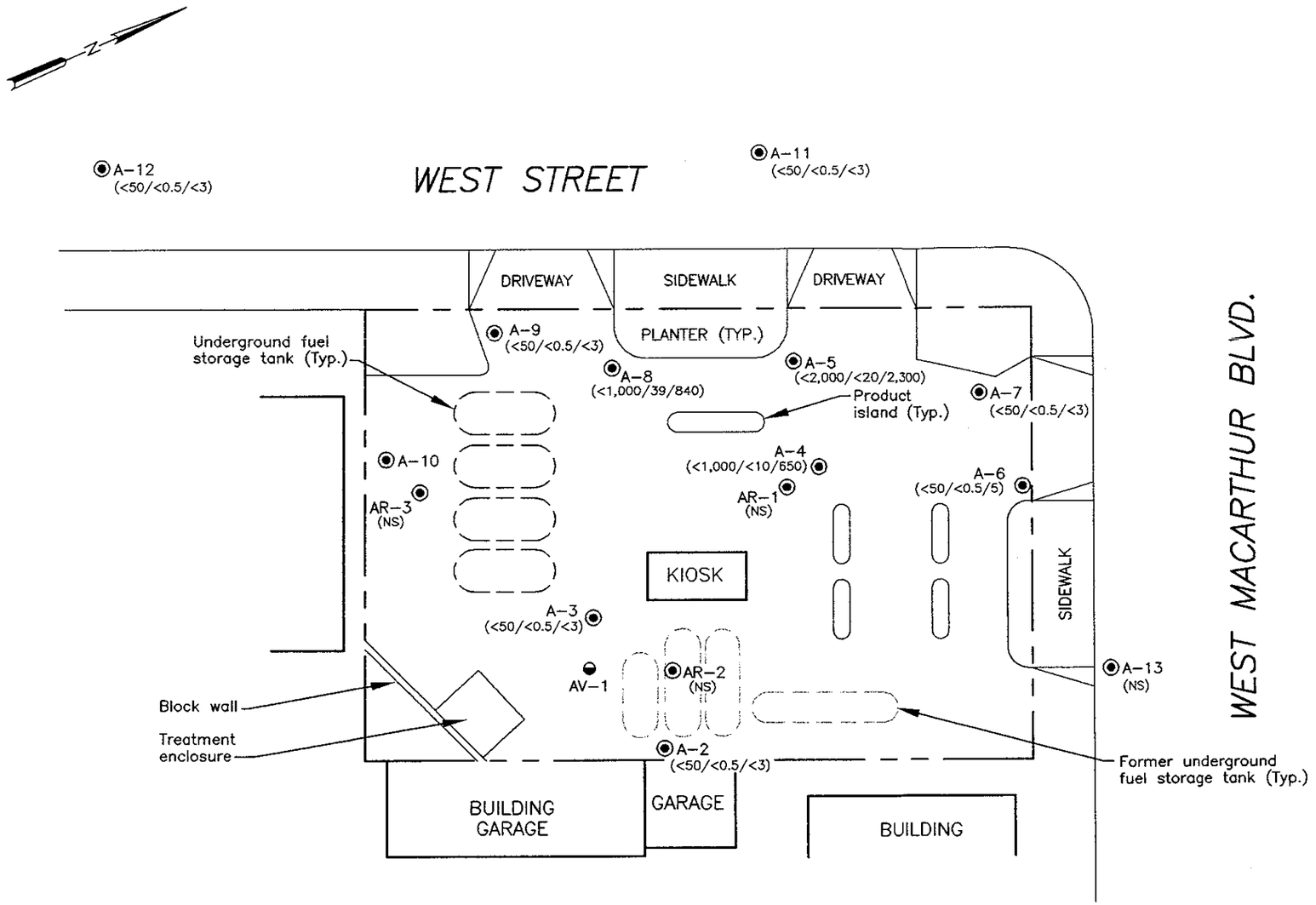
AR-1	03/26/96	54.72	8.13	46.59	6,200	110	64	38	520	NA	NM	
	05/22/96		8.57	46.15	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		10.97	43.75	5,600	100	28	29	310	960	NM	
	12/19/96		8.93	45.79	---------- Well Removed from Sampling Program ----------							
	04/01/97		11.78	42.94	---------- Well Removed from Sampling Program ----------							
	05/27/97		10.76	43.96	---------- Well Removed from Sampling Program ----------							
	08/12/97		11.40	43.32	---------- Well Removed from Sampling Program ----------							
	11/14/97		10.80	43.92	---------- Well Removed from Sampling Program ----------							
	05/19/98		--	--	---------- Well Removed from Sampling Program ----------							
	07/29/98		10.17	44.55	---------- Well Removed from Sampling Program ----------							
	10/09/98		11.25	43.47	---------- Well Removed from Sampling Program ----------							
	02/19/99		7.02	47.70	---------- Well Removed from Sampling Program ----------							
AR-2	03/26/96	54.77	4.93	49.84	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	05/22/96		5.65	49.12	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		7.27	47.50	<50	<0.5	<0.5	<0.5	<0.5	200	NM	
	12/19/96		7.78	46.99	---------- Well Removed from Sampling Program ----------							
	04/01/97		6.80	47.97	---------- Well Removed from Sampling Program ----------							
	05/27/97		6.32	48.45	---------- Well Removed from Sampling Program ----------							
	08/12/97		7.43	47.34	---------- Well Removed from Sampling Program ----------							
	11/14/97		8.95	45.82	---------- Well Removed from Sampling Program ----------							
	05/19/98		--	--	---------- Well Removed from Sampling Program ----------							
	07/29/98		4.47	50.30	---------- Well Removed from Sampling Program ----------							
	10/09/98		6.90	47.87	---------- Well Removed from Sampling Program ----------							
	02/19/99		3.80	50.97	---------- Well Removed from Sampling Program ----------							

Table 1
Groundwater Elevation and Analytical Data
Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MtBE)

ARCO Service Station 4931
731 West MacArthur Boulevard, Oakland, California

Well Numbe	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
AR-3	03/26/96	54.19	7.95	46.24	<50	<0.5	<0.5	<0.5	<0.5	NA	NM	
	05/22/96		8.30	45.89	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		10.84	43.35	---------- Well Removed from Sampling Program ----------							
	12/19/96		8.56	45.63	---------- Well Removed from Sampling Program ----------							
	04/01/97		11.24	42.95	---------- Well Removed from Sampling Program ----------							
	05/27/97		10.67	43.52	---------- Well Removed from Sampling Program ----------							
	08/12/97		11.10	43.09	---------- Well Removed from Sampling Program ----------							
	11/14/97		10.60	43.59	---------- Well Removed from Sampling Program ----------							
	05/19/98		--	--	---------- Well Removed from Sampling Program ----------							
	07/29/98		9.95	44.24	---------- Well Removed from Sampling Program ----------							
	10/09/98		11.20	42.99	---------- Well Removed from Sampling Program ----------							
	02/19/99		6.98	47.21	---------- Well Removed from Sampling Program ----------							

MSL = Mean sea level
TOB = Top of box
ppb = Parts per billion
ppm = Parts per million
< = Denotes laboratory detection limit
NA = Not analyzed
NM = Not measured
NS = Not sampled
* = MtBE results confirmed by EPA Method 8260.



EXPLANATION

- ◉ Groundwater monitoring well
- ◒ Soil vapor well
- (<1,000/<10/650) Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 2/19/99
- < Not detected at or above the indicated laboratory detection limit
- NS Not sampled

Base map from Pacific Environmental Group, Inc.

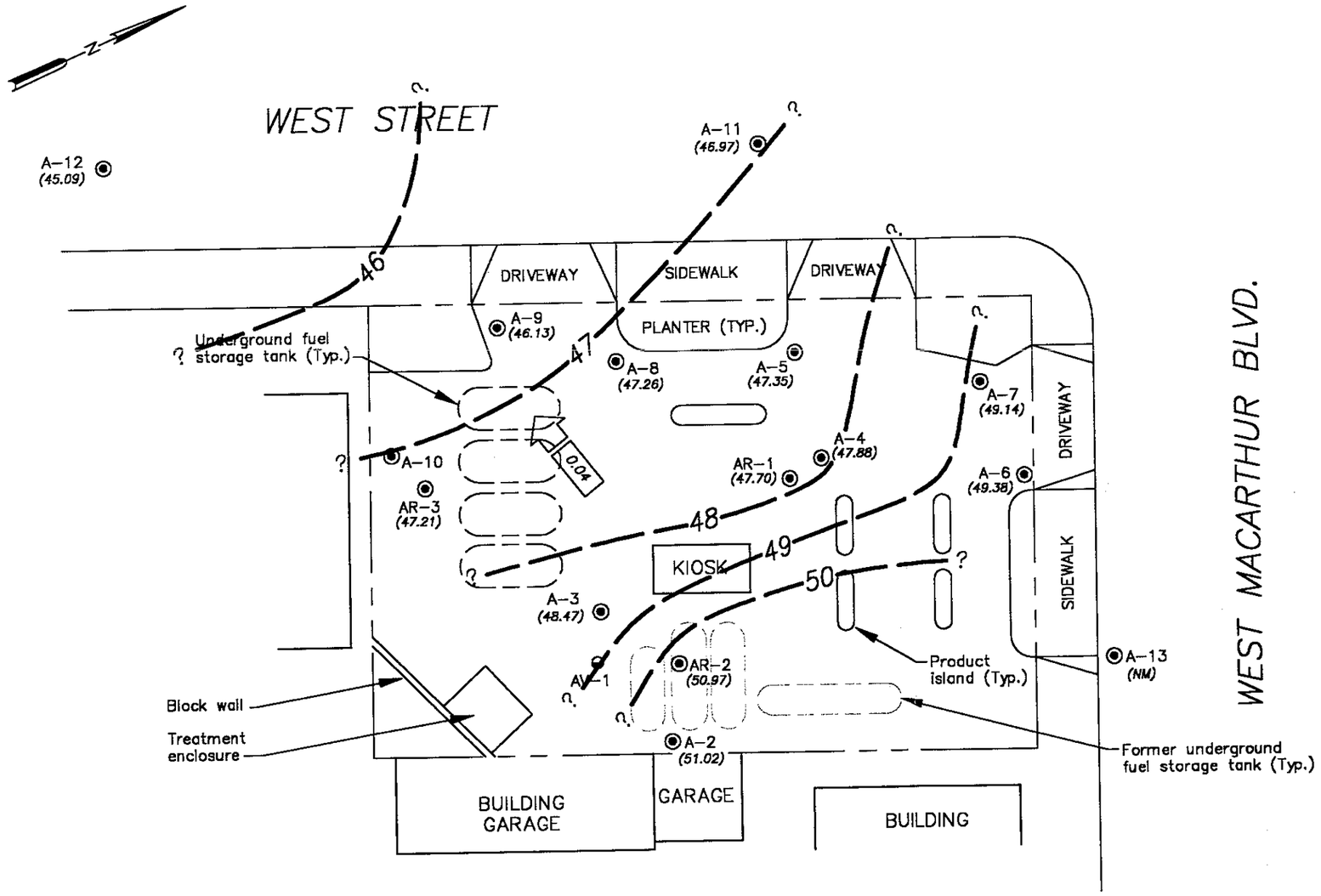
0 30 60
SCALE IN FEET

Pinnacle
ENVIRONMENTAL SOLUTIONS A DIVISION OF EMCON

DATE MAY 1999
DWN KAB
APP
REV 0
PROJECT NO. 20805-213.002

FIGURE 1
ARCO PRODUCTS COMPANY
SERVICE STATION 4931, 731 W. MACARTHUR BLVD.
OAKLAND, CALIFORNIA
GROUNDWATER ANALYTICAL SUMMARY
FIRST QUARTER 1999

IMAGE Files: <No Images>
XREF Files: <No Xrefs>
Dimscale: 30 Llscale: 30 Paltscale: 1
SANJOSE/CADD: N:\DWG\PINACL\4931\4931CHEM.DWG Thu, 20/May/99 11:03am kblack
1" 1/2" 0" 1"



EXPLANATION

- Groundwater monitoring well
- Soil vapor well
- (49.14) Groundwater elevation (Ft.–MSL); measured 2/19/99
- Groundwater elevation contour (Ft.–MSL)
- Approximate direction of groundwater flow showing gradient
- NM Not measured; well inaccessible

Base map from Pacific Environmental Group, Inc.

0 30 60
SCALE IN FEET

Pinnacle
ENVIRONMENTAL SOLUTIONS
A DIVISION OF EMCON

DATE MAY 1999
DWN KAB
APP
REV 0
PROJECT NO.
20805-213.002

FIGURE 2
ARCO PRODUCTS COMPANY
SERVICE STATION 4931, 731 W. MACARTHUR BLVD.
OAKLAND, CALIFORNIA
GROUNDWATER ELEVATION CONTOURS
FIRST QUARTER 1999

IMAGE Files: <No Images>
XREF Files: <No Xrefs>
Dimscale: 30 Ltscale: 30 Psltscale: 1
SANJOSE/CADD: N:\DWG\PINACL\4931\4931GWC.DWG Thu, 10/Jun/99 12:03pm kblack

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)

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:

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

where:

P = calculated purge volume (gallons)

$\pi = 3.14$

r = radius of well casing in feet

h = height of water column in feet

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

APPENDIX B

CERTIFIED ANALYTICAL REPORTS, AND CHAIN-OF-CUSTODY DOCUMENTATION

Columbia Analytical Services INC.
An Employee-Owned Company

March 4, 1999 Service Request No.: S9900588

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

RE: 20805-302.003/TO #24118.00/RAT8/4931 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 22, 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

Lori Tyler for
Regional QA Coordinator

2334 Victor Court • Santa Clara, CA 95054-2316 • Telephone (408) 748-9700 • Fax (408) 748-9860

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:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-3(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-001	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	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-7(7)	Units:	ug/L (ppb)
Lab Code:	S9900588-002	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	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-5(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-003	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	40	NA	2/27/99	<2000	C1
Benzene	EPA 5030	8020	0.5	40	NA	2/27/99	<20	C1
Toluene	EPA 5030	8020	0.5	40	NA	2/27/99	<20	C1
Ethylbenzene	EPA 5030	8020	0.5	40	NA	2/27/99	<20	C1
Xylenes, Total	EPA 5030	8020	0.5	40	NA	2/27/99	<20	C1
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	40	NA	2/27/99	2300	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-11(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-004	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	1	NA	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-12(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-005	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	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-6(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-006	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	1	NA	2/24/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/24/99	5	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-8(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-007	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	3/2/99	<1000	C1
Benzene	EPA 5030	8020	0.5	20	NA	3/2/99	39	
Toluene	EPA 5030	8020	0.5	20	NA	3/2/99	<10	C1
Ethylbenzene	EPA 5030	8020	0.5	20	NA	3/2/99	<10	C1
Xylenes, Total	EPA 5030	8020	0.5	20	NA	3/2/99	<10	C1
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	20	NA	3/2/99	840	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-9(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-008	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	2/24/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/24/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-2(29)	Units:	ug/L (ppb)
Lab Code:	S9900588-009	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	2/24/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/24/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	2/19/99
Sample Matrix:	Water	**Date Received:**	2/19/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-4(8)	Units:	ug/L (ppb)
Lab Code:	S9900588-010	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	2/28/99	<1000	C1
Benzene	EPA 5030	8020	0.5	20	NA	2/28/99	<10	C1
Toluene	EPA 5030	8020	0.5	20	NA	2/28/99	<10	C1
Ethylbenzene	EPA 5030	8020	0.5	20	NA	2/28/99	<10	C1
Xylenes, Total	EPA 5030	8020	0.5	20	NA	2/28/99	12	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	20	NA	2/28/99	650	

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank (GC1)	Units:	ug/L (ppb)
Lab Code:	S990224-WB5	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	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank (GC2)	Units:	ug/L (ppb)
Lab Code:	S990227-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	2/27/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/27/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank (GC2)	Units:	ug/L (ppb)
Lab Code:	S990302-WB2	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	3/2/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	3/2/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	3/2/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	3/2/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	3/2/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	3/2/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank (GC1)	Units:	ug/L (ppb)
Lab Code:	S990224-WB7	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	2/25/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/25/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/25/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: 20805-302.003/TO #24118.00/RAT8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9900588
Date Collected: NA
Date Received: NA

BTEX, MTBE and TPH as Gasoline

Sample Name: Method Blank (GC1)
Lab Code: S990224-WB2
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	2/24/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/24/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/24/99	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

BTEX, MTBE and TPH as Gasoline

Sample Name:	Method Blank (GC2)	Units:	ug/L (ppb)
Lab Code:	S990227-WB3	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	2/27/99	ND	
Benzene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Toluene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	2/27/99	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	2/27/99	ND	

APPENDIX A

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-302.003/TO #24118.00/RAT8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9900588
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

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

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			4-Bromofluorobenzene	a,a,a-Trifluorotoluene
A-3(8)	S9900588-001		99	87
A-7(7)	S9900588-002		98	88
A-5(8)	S9900588-003		89	88
A-11(8)	S9900588-004		98	87
A-12(8)	S9900588-005		98	89
A-6(8)	S9900588-006		100	98
A-8(8)	S9900588-007		90	86
A-9(8)	S9900588-008		97	95
A-2(29)	S9900588-009		98	93
A-4(8)	S9900588-010		88	77
Lab Control Sample	S990224-LCS		115	98
Lab Control Sample	S990224-DLCS		114	94
Method Blank (GC1)	S990224-WB5		103	92
Method Blank (GC2)	S990227-WB1		84	84
Method Blank (GC2)	S990302-WB2		89	94
Method Blank (GC1)	S990224-WB7		98	88
Method Blank (GC1)	S990224-WB2		97	95
Method Blank (GC2)	S990227-WB3		87	85

CAS Acceptance Limits: 69-116 69-116

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	ARCO Products Company	**Service Request:**	S9900588
Project:	20805-302.003/TO #24118.00/RAT8/4931 OAKLAND	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	2/24/99

Lab Control Sample/Duplicate Summary
BTE

Sample Name:	Lab Control Sample		Units:	ug/L (ppb)
Lab Code:	S990224-LCS,	S990224-DLCS	Basis:	NA
Test Notes:				

Analyte	Prep Method	Analysis Method	MRL	Spike Level LCS	Spike Level DLCS	Sample Result	Spike Result LCS	Spike Result DLCS	Percent Recovery LCS	Percent Recovery DLCS	CAS Acceptance Limits	Relative Percent Difference
Benzene	EPA 5030	8020	0.5	25	25	ND	24	24	96	96	75-135	<1
Toluene	EPA 5030	8020	0.5	25	25	ND	22	22	88	88	73-136	<1
Ethylbenzene	EPA 5030	8020	0.5	25	25	ND	22	22	88	88	69-142	<1

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: 20805-302.003/TO #24118.00/RAT8/4931 OAKLAND

Service Request: S9900588
Date Analyzed: 2/24/99

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 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	25	85-115	100	
Toluene	EPA 5030	8020	25	24	85-115	96	
Ethylbenzene	EPA 5030	8020	25	24	85-115	96	
Xylenes, Total	EPA 5030	8020	75	77	85-115	103	
Methyl *tert*-Butyl Ether	EPA 5030	8020	25	25	85-115	100	

ICV032196

ARCO Products Company
Division of Atlantic/Richfield Company

S9900588

Task Order No. 24118.00

Chain of Custody

ARCO Facility no. 4931	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 EnCon	Address (Consultant) 44-A Mayhew Way Walnut Creek, CA 94598		Contract Number

Method of shipment: Sampler will deliver

Special Detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

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 inc. MTBE 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 ☐			
A-3	(8)(1)	2		X		X	HCl	2/19/99	0845		X												
A-7	(9)(2)	2		X		X	HCl		0935		X												
A-5	(8)(3)	2		X		X	HCl		0905		X												
A-11	(8)(4)	2		X		X	HCl		1015		X												
A-12	(8)(5)	2		X		X	HCl		1000		X												
A-13	( )	2		X		X	HCl				X	→ WELL INACCESSIBLE TODAY						NO Samples					
A-6	(8)(6)	2		X		X	HCl		0920		X												
A-8	(8)(7)	2		X		X	HCl		1055		X												
A-9	(8)(8)	2		X		X	HCl		1115		X												
A-2	(9)(9)	2		X		X	HCl		1200		X												
A-4	(8)(10)	2		X		X	HCl	↓	1145		X												

Remarks: RAT 8 2-40ml/HCl VOAs #70805-302.03

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: Due: 3/5/99	R11/D3
Relinquished by sampler	Date 2/19/99 Time 1330	Received by Joseph Machado CAS	2/19/99 1330
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

APPENDIX C

FIELD DATA SHEETS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 21775-302.004 STATION ADDRESS : 731 W. MacArthur Blvd. Oakland, CA DATE : 2/19/99

ARCO STATION # : 4931 FIELD TECHNICIAN : Manuel Gallegos/ Mike Ross DAY : Friday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	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	A-3	OK	G-5	NO	~~NONE~~ ~~2357~~	LWC	6.19	6.19	NR	NR	17.2	
2	A-5	OK	G-5	NO	~~NONE~~ ~~2357~~	LWC	6.82	6.82	NR	NR	25.5	LID BROKEN INTO TWO PIECES NEED LONG NECK LOCK
3	A-6	OK	G-5	NO	~~NON~~ ~~2357~~	LWC	5.79	5.79	NR	NR	25.4	NEED LONG NECK LOCK
4	A-7	OK	G-5	NO	~~NONE~~ ~~2367~~	LWC	5.57	5.57	NR	NR	25.8	NEED LONG NECK LOCK
5	A-8	OK	VAULT	YES	NONE	SLIP	6.51	6.51	NR	NR	22.1	ONE SACK IN WELL, NEW 3300 LOCK
6	A-9	OK	VAULT	YES	NONE	SLIP	6.91	6.91	NR	NR	38.7	NEW 3300 LOCK
7	A-2	OK	G-5	NO	~~NONE~~ ~~2357~~	LWC	4.46	4.46	NR	NR	19.8	NEEDS LONG NECK LOCK
8	A-4	OK	G-5	NO	~~NON~~ ~~2357~~	LWC	6.85	6.85	NR	NR	23.2	ONE SACK IN WELL
9	A-11	OK	G-5	NO	NONE	LWC	6.77	6.77	NR	NR	30.0	NEED LONG NECK LOCK
10	A-12	OK	G-5	NO	NONE	LWC	6.96	6.96	NR	NR	30.4	NEED LONG NECK LOCK
11	A-13	WELL LABELED INACCESSIBLE ON MAP										
12	AR-1	OK	Vault	NO	none	LWC	7.02	7.02	NO	NR	29.9	AC 3015
13	AR-2	OK	"	"	"	LWC	3.90	3.80	"	"	27.2	"
14	AR-3	OK	"	"	"	SLIP	6.98	6.98	"	"	29.5	"

SURVEY POINTS ARE TOP OF WELL BOXES

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 | SAMPLE ID A-2(29)
PURGED BY M. Ross | CLIENT NAME ARCO 4931
SAMPLED BY M. Ross | LOCATION Dublin, 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.)	10.02
DEPTH OF WELL (feet)	19.8	CALCULATED PURGE (gal.)	30.5
DEPTH OF WATER (feet)	4.46	ACTUAL PURGE VOL (gal.)	15.0

DATE PURGED 2/19/99 | END PURGE 1152
DATE SAMPLED 2/19/99 | SAMPLING TIME 1200

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1151	10.5	6.13	553	64.6	BRN	Heavy
1152	Pump	DRY @	15.0	Gallons		
1200	Recharge	6.43	602	65.1	clr	clr

OTHER: D.O. 3.0 mg/L ODOR: None | NR (COBALT 0-100) | NR (NTU 0-200)

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

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: Disposable

WELL INTEGRITY: OK | LOCK: None

REMARKS: Needs a long neck lock.

pH, E.C., Temp. Meter Calibration: Date 2/19/99 | Time 0830 | Meter Serial No. 600235
E.C. 1000 ____ | pH 7 ____ | pH 10 ____ | pH 4 ____
Temperature °F ____

See A-3

SIGNATURE: [signature] | REVIEWED BY [signature] | PAGE 1 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-3L8 D
PURGED BY NR CLIENT NAME ARCO 4931
SAMPLED BY M. Ross 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) 17.2 CALCULATED PURGE (gal.) NR
DEPTH OF WATER (feet) 6.19 ACTUAL PURGE VOL (gal.) NR

DATE PURGED 2/19/99 END PURGE NR
DATE SAMPLED 2/19/99 SAMPLING TIME 0845

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0845	GRAB	6.73	158	61.2	clr	clr

OTHER: D.O. 2.5 mg/L ODOR None NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: None

WELL INTEGRITY: Ok

REMARKS: Grab Sample taken within column Below top of Screens

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No 600235
E.C. 1000 1000 / 1003 pH 7 7.00 / 6.98 pH 10 1000 / 9.94 pH 4 4.00 / 4.04
Temperature °F 56.4
SIGNATURE: Mike R REVIEWED BY MA PAGE 2 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-4 (8)
PURGED BY NR CLIENT NAME AREO 4931
SAMPLED BY M. Ross 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) 23.2 CALCULATED PURGE (gal.) NR
DEPTH OF WATER (feet) 6.85 ACTUAL PURGE VOL (gal.) NR

DATE PURGED: NR END PURGE NR
DATE SAMPLED 2/19/99 SAMPLING TIME 1145

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1145	GRAB	6.86	715	65.4	clr	clr

OTHER: D.O. 0.1 mg/L ODOR None NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK. None

WELL INTEGRITY: Gd

REMARKS: ORC Sock. IN WELL
GRAB Sample taken water level Below top of Screens.

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No 600235
E.C. 1000 ____/____ pH 7 ____/____ pH 10 ____/____ pH 4 ____/____
Temperature °F ____

See A-3

SIGNATURE: [signature] REVIEWED BY: [signature] PAGE 3 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.0004 | SAMPLE ID A-5(8)
PURGED BY NR | CLIENT NAME ARCO 4931
SAMPLED BY M. Ross | LOCATION Oakland, Ca.

TYPE Groundwater ✓ Surface Water ___ Leachate ___ Other ___

CASING DIAMETER (inches) 2 ___ 3 ✓ 4 ___ 4 5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL) NR
DEPTH OF WELL (feet) 25.5
DEPTH OF WATER (feet) 6.82

VOLUME IN CASING (gal.) NR
CALCULATED PURGE (gal.) NR
ACTUAL PURGE VOL (gal.) NR

DATE PURGED NR | END PURGE NR
DATE SAMPLED 2/19/99 | SAMPLING TIME 0905

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0905	GRAB	6.76	800	61.4	clr	clr

OTHER: D.O. 0.6 mg/L ODOR: None (COBALT 0-100): NR (NTU 0-200): NR

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: None

WELL INTEGRITY: OK

REMARKS:
Grab Sample taken Water level Below top of screen.
Need Lock Nut Lock To Secure well

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No. 607285
E.C. 1000 ___/___ pH 7 ___/___ pH 10 ___/___ pH 4 ___/___
Temperature °F ___

See A-3

SIGNATURE: [signature] REVIEWED BY NA PAGE 4 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004
PURGED BY NR
SAMPLED BY M. Ross

SAMPLE ID A-6 (8)
CLIENT NAME ARCO 4931
LOCATION Oakland, Ca

TYPE Groundwater ✓ Surface Water ___ Leachate ___ Other ___

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

CASING ELEVATION (feet/MSL) NM
DEPTH OF WELL (feet) 25.4
DEPTH OF WATER (feet) 5.79

VOLUME IN CASING (gal.) NR
CALCULATED PURGE (gal.) NR
ACTUAL PURGE VOL (gal.) NR

DATE PURGED NR
DATE SAMPLED 2/19/99

END PURGE NR
SAMPLING TIME 0920

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0920	GRAB	6.71	556	59.4	clr	clr

OTHER: D.O. 0.4 Mg/L ODOR None

COLOR (COBALT 0-100): NR
TURBIDITY (NTU 0-200): NR

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: None

WELL INTEGRITY: OK

REMARKS: Grab Sample taken with dipper Below top of Screens.
Need long neck lock To Secure well!

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No 602235
E.C. 1000 ___/___ pH 7 ___/___ pH 10 ___/___ pH 4 ___/___
Temperature °F ___

See A-3

SIGNATURE: Mike Ross REVIEWED BY: MA PAGE 5 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.024 | SAMPLE ID A-7(7)
PURGED BY NR | CLIENT NAME ARCO 4931
SAMPLED BY M. Ross | 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) 22.18 | CALCULATED PURGE (gal) NR
DEPTH OF WATER (feet) 5.57 | ACTUAL PURGE VOL (gal) NR

DATE PURGED: NR | END PURGE NR
DATE SAMPLED: 2/19/99 | SAMPLING TIME 0935

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0935	GRAB	6.85	298	60.2	clr	clr

OTHER: D.O. 4.7 mg/L ODOR None | NR (COBALT 0-100) | NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: None

WELL INTEGRITY: OK

REMARKS: Water above Bottom Top of screens, GRAB Sample taken
Need long neck lock

pH, E.C., Temp. Meter Calibration Date 2/19/99 Time 0835 Meter Serial No 600235
E.C. 1000 ____ / ____ pH 7 ____ / ____ pH 10 ____ / ____ pH 4 ____ / ____
Temperature °F ____
See A-3

SIGNATURE: Mike Ross REVIEWED BY: ____ PAGE 6 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-8(8)
PURGED BY NR CLIENT NAME ARCO 4931
SAMPLED BY M. Ross LOCATION Oakland, Ca.

TYPE Groundwater 1 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) 22.1 CALCULATED PURGE (gal.) NR
DEPTH OF WATER (feet) 6.51 ACTUAL PURGE VOL (gal.) NR

DATE PURGED NR END PURGE NR
DATE SAMPLED 2/19/99 SAMPLING TIME 1055

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1055	GRAB	7.16	556	64.5	Clr	Clr

OTHER: D.O. 0.2 mg/L ODOR Slight NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK: None

REMARKS: GRAB Sample taken - Water column Below Top of screens

ORC Sock IN well NOW 3400 Lock

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time: 0835 Meter Serial No. 6W235
E.C. 1000 ____ / ____ pH 7 ____ / ____ pH 10 ____ / ____ pH 4 ____ / ____
Temperature °F ____

SIGNATURE: Mike Ross REVIEWED BY: [illegible] PAGE 7 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-9(8)
PURGED BY NR CLIENT NAME ARCO 4931
SAMPLED BY M. Ross 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) ~~40~~ 38.7 CALCULATED PURGE (gal) NR
DEPTH OF WATER (feet) 6.91 ACTUAL PURGE VOL (gal) NR

DATE PURGED: NR END PURGE NR
DATE SAMPLED: 2/19/99 SAMPLING TIME 1115

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1115	GRAB	6.92	636	65.2	clr	clr

OTHER: D.O. 2.0 mg/L ODOR None NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: 3900

WELL INTEGRITY: OK

REMARKS: New 3900 Lock

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No 602238
E.C. 1000 ____ / ____ pH 7 ____ / ____ pH 10 ____ / ____ pH 4 ____ / ____
Temperature °F ____
SIGNATURE: [signature] See A-3 REVIEWED BY [signature] PAGE 8 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 | SAMPLE ID A-11(8)
PURGED BY NR | CLIENT NAME ARCO 4931
SAMPLED BY M. Ross | LOCATION Oakland, Ca.

TYPE Groundwater ✓ Surface Water ____ Leachate ____ Other ____

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

CASING ELEVATION (feet/MSL) NR
DEPTH OF WELL (feet) 30.0
DEPTH OF WATER (feet) 6.77

VOLUME IN CASING (gal.) NR
CALCULATED PURGE (gal.) NR
ACTUAL PURGE VOL (gal.) NR

DATE PURGED: NR
DATE SAMPLED 2/19/99

END PURGE NR
SAMPLING TIME 1015

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1015	GRAB	6.56	620	62.1	clr	clr

OTHER: D.O. 1.8 mg/L ODOR None NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: None

WELL INTEGRITY: OK

REMARKS: Water level Below top of Screens. Grab Sample taken. Well box needs work. To secure well.

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time 0835 Meter Serial No. 690235

E.C. 1000 ____ / ____ pH 7 ____ / ____ pH 10 ____ / ____ pH 4 ____ / ____

Temperature °F ____

See A-3

SIGNATURE: [signature] REVIEWED BY [signature] PAGE 9 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/97

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-12(8)
PURGED BY NR CLIENT NAME ARCO 4931
SAMPLED BY M. Ross 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) 30.4 CALCULATED PURGE (gal.) NR
DEPTH OF WATER (feet) 6.96 ACTUAL PURGE VOL. (gal.) NR

DATE PURGED: 2/19/99 END PURGE NR
DATE SAMPLED: 2/19/99 SAMPLING TIME: 1000

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E C (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1000	GRAB	6.23	220	62.5	clr	clr

OTHER: D.O. 5.2 mg/L ODOR: None COLOR: NR (COBALT 0-100) TURBIDITY: NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK: None

REMARKS: GRAB Sample taken, water level Below Top of screens.

Needs new body lock lock.

pH, E.C., Temp. Meter Calibration: Date 2/19/99 Time: 0835 Meter Serial No 600235
E.C. 1000 ____/____ pH 7 ____/____ pH 10 ____/____ pH 4 ____/____
Temperature °F See A-3
SIGNATURE: [signature] REVIEWED BY: [signature] PAGE 10 OF 11

WATER SAMPLE FIELD DATA SHEET

Rev 1/9

OWT

PROJECT NO 21775-302.004 SAMPLE ID A-13
PURGED BY NR CLIENT NAME ARCO 4931
SAMPLED BY NR 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) NR CALCULATED PURGE (gal.) NR
DEPTH OF WATER (feet) NR ACTUAL PURGE VOL (gal.) NR

DATE PURGED NR END PURGE NR
DATE SAMPLED NR SAMPLING TIME NR

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
	WELL INACCESSIBLE - IT HAS BEEN PAVED OVER					

OTHER: NR ODOR ____ NR (COBALT 0-100) NR (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

LOCK: ____

WELL INTEGRITY: ____

REMARKS: WELL Paved over AS noted on MAP.

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 11 OF 11

EMCON Associates - Field Services | Historical Monitoring Well Data

1921 Ringwood Avenue | 1999 | ARCO 4931

San Jose, California | 21775-302.004

	Gallons
First	15.00
Second	224.50
Third	0.00
Fourth	0.00

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product
A-2	First	02/19/99	15.00	YES	NO
	Second	05/19/98	15.00	YES	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-3	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	5.50	YES	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-4	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	11.00	YES	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-5	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	17.50	NO	NO
	Third	07/29/98	0.00	NA	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-6	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	19.00	NO	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-7	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	15.50	NO	NO
	Third	07/29/98	0.00	NA	NO
	Fourth	10/09/98	0.00	NA	NO
A-8	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	8.00	YES	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-9	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	133.00	NO	NO
	Third	07/29/98	0.00	GRAB	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-11	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	23.00	NO	NO
	Third	07/29/98	0.00	NA	NO
	Fourth	10/09/98	0.00	GRAB	NO
A-12	First	02/19/99	0.00	GRAB	NO
	Second	05/19/98	23.50	NO	NO
	Third	07/29/98	0.00	NA	NO
	Fourth	10/09/98	0.00	GRAB	NO

EMCON Associates - Field Services

1921 Ringwood Avenue

San Jose, California

1999

Historical Monitoring Well Data

ARCO 4931

21775-302.004

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product		Gallons
						First	**15.00**
						Second	**224.50**
						Third	**0.00**
						Fourth	**0.00**
A-13	First	02/19/99	0.00	GRAB	NO		
	Second	05/19/98	0.00	NA	NO		
	Third	07/29/98	0.00	NA	NO		
	Fourth	10/09/98	0.00	NA	NO		
	First					Steam water (gal)	
	Second						
	Third						
	Fourth						

ARCO Products Company
Division of Atlantic/Richfield Company

Task Order No. 24118.00

Chain of Custody

ARCO Facility no. 4921	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	Contract Number
Consultant name EMCON	Address (Consultant) 444 A Mayhew Way Walnut Creek, CA 94598		

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 Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐			
A-3(8)	2			X		X	HCl	2/19/95	0845		X												
A-7(7)	2			X		X	HCl		0935		X												
A-5(8)	2			X		X	HCl		0905		X												
A-11(6)	2			X		X	HCl		1015		X												
A-12(8)	2			X		X	HCl		1000		X												
A-13( )	2			X		X	HCl				X	→ WELL INACCESSIBLE TODAY							NO		Samples		
A-6(8)	2			X		X	HCl		0920		X												
A-8(8)	2			X		X	HCl		1055		X												
A-9(6)	2			X		X	HCl		1115		X												
A-2(11)	2			X		X	HCl		1200		X												
A-4(8)	2			X		X	HCl	V	1145		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 #70805-307.0

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	Date 2/19/95 Time 1330	Received by Joseph Machado CAS 2/19/95 1330	
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

APPENDIX D

REMEDIAL SYSTEM PERFORMANCE SUMMARY

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GWE System

Groundwater extraction (GWE) was conducted intermittently between November 10, 1992, and July 5, 1995. The GWE system was comprised of electric GWE pumps in Wells A-9, AR-1, AR-2, and AR-3, and three 1,500-pound granular activated carbon vessels arranged in series. The GWE system was permitted by East Bay Municipal Utility District Permit Account Number 502-62131. Based on Alameda County Health Care Services Agency authorization that GWE at the site was no longer required, the permit was relinquished during the second quarter 1996. Overall, 4.6 million gallons of groundwater were extracted and less than 0.06 gallon of benzene removed. Please refer to the Second Quarter 1997 Groundwater Monitoring Report for historical GWE system performance and analytical data.

Intrinsic Bioremediation Evaluation

At the request of ARCO, intrinsic bioremediation indicator parameters (bioparameters) were monitored during the fourth quarter 1996 groundwater monitoring event. Groundwater samples from Wells A-4, A-8, and A-12 were analyzed for biological oxygen demand (BOD), carbon dioxide (CO_2), chemical oxygen demand (COD), methane, nitrate, sulfate, dissolved oxygen (DO), and ferrous iron. Wells A-4 and A-8 are located within the plume; Well A-12 is located outside the plume. Based on analysis of the collected data, intrinsic bioremediation was occurring at the site. Please refer to the First Quarter 1997 Groundwater Monitoring Report for details.

Currently using ORC in wells A-4 and A-8 to enhance biodegredation of dissolved oxygen.