2201 Broadway, Suite 101
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the IT group

R0716

December 8, 1999
Project 791808

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

Re: Quarterly Groundwater Monitoring Report, Third Quarter 1999, for ARCO Service Station No. 4931, located at 731 West MacArthur Boulevard, Oakland, California

Dear Mr. Supple:

Pinnacle Environmental Solutions, a member of The IT Group (Pinnacle), is submitting the attached report which presents the results of the third 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

Dan Easter, R.G.
Project Geologist

ENVIRONMENTAL PROTECTION
99 DEC 13 AM 9:53

Attachment: Quarterly Groundwater Monitoring Report, Third 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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Date: December 8, 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.: 791808
Primary Agency/Regulatory ID No.: ACHCSA

WORK PERFORMED THIS QUARTER (THIRD - 1999):

1. Prepared and submitted quarterly groundwater monitoring report for second quarter 1999.
2. Performed quarterly groundwater monitoring and sampling for third quarter 1999.
3. On August 20, 1999, installed ORC into wells A-9 and AR-1, and changed out ORC in wells A-4 and A-8.

WORK PROPOSED FOR NEXT QUARTER (FOURTH - 1999):

1. Prepare and submit quarterly groundwater monitoring report for third quarter 1999.
2. Perform quarterly groundwater monitoring and sampling for fourth 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:	10.0 feet
Groundwater Flow Direction and Gradient (Average):	0.02 ft/ft toward west-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, A-8, A-9 and AR-1.

ATTACHMENTS:

- Table 1 - Groundwater Elevation and Analytical Data
- Table 2 - Groundwater Flow Direction and Gradient
- 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 Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (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	NA	NM	
	05/22/96		5.25	50.23	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		10.45	45.03	<50	1.1	1.8	<0.5	1.3	<2.5	NA	NM	
	12/19/96		5.53	49.95	<50	<0.5	<0.5	<0.5	<0.5	2.7	NA	NM	
	04/01/97		8.77	46.71	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NM	
	05/27/97		9.87	45.61	<50	<0.5	<0.5	<0.5	<0.5	4.6	NA	NM	
	08/12/97		11.11	44.37	<50	<0.5	<0.5	<0.5	<0.5	5.6	NA	NM	
	11/14/97		10.63	44.85	<50	0.9	2.8	<0.5	2.4	27	NA	2.6	
	03/18/98		3.58	51.90	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	NM	
	05/19/98		4.82	50.66	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.30	P
	07/29/98		8.94	46.54	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.2	NP
	10/09/98		10.82	44.66	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	0.5	NP
	02/19/99		4.46	51.02	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	3.0	P
	06/02/99		5.59	49.89	<50	<0.5	0.6	<0.5	<0.5	<3	NA	5.35	NP
	08/26/99		10.67	44.81	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	0.79	NP
A-3	03/26/96	54.66	7.20	47.46	Not Sampled: Well Sampled Semiannually								
	05/22/96		7.70	46.96	<50	1.2	1.9	0.7	1.3	NA	NA	NM	
	08/22/96		10.88	43.78	Not Sampled: Well Sampled Semiannually								
	12/19/96		7.70	46.96	5,900	<25	<25	<25	<25	NA	5,300	NM	
	04/01/97		9.78	44.88	Not Sampled: Well Sampled Semiannually								
	05/27/97		10.55	44.11	2,300	<20	<20	<20	<20	3,800	NA	NM	
	08/12/97		11.12	43.54	Not Sampled: Well Sampled Semiannually								
	11/14/97		8.24	46.42	<1,000	<10	<10	<10	<10	1,500	NA	3.8	
	03/18/98		5.05	49.61	Not Sampled: Well Sampled Semiannually								
	05/19/98		9.00	45.66	<250	<2.5	<2.5	<2.5	<2.5	220	NA	4.60	P
	07/29/98		9.86	44.80	Not Sampled: Well Sampled Semiannually								
	10/09/98		11.36	43.30	<250	<2.5	<2.5	<2.5	<2.5	260	NA	1.0	NP
	02/19/99		6.19	48.47	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	2.5	NP
	06/02/99		10.82	43.84	120	<1	<1	<1	<1	160	NA	2.78	NP
	08/26/99		10.73	43.93	Not Sampled: Well Sampled Semiannually							0.95	

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 Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-4	03/26/96	54.73	7.95	46.78	8,900	1,200	21	200	220	NA	NA	NM	
	05/22/96		8.35	46.38	5,300	700	<10	170	130	NA	NA	NM	
	08/22/96		11.03	43.70	3,000	480	<5.0	75	26	150	NA	NM	
	12/19/96		8.67	46.06	<2,000	<20	<20	<20	<20	NA	15,000	NM	
	04/01/97		11.95	42.78	8,900	1,700	22	310	260	6,900	NA	NM	
	05/27/97		10.80	43.93	7,100	960	<20	150	74	7,900	NA	NM	
	08/12/97		11.38	43.35	4,300	670	12	51	27	2,800	NA	NM	
	11/14/97		7.74	46.99	<20,000	300	500	<200	<200	27,000	NA	2.2	
	03/18/98		6.80	47.93	4,700	600	<20	99	94	1,200	NA	1.0	
	05/19/98		9.06	45.67	<2000	<20	<20	<20	720	2,000	NA	1.28	P
	07/29/98		10.05	44.68	8,400	1,300	<20	290	130	1,800	NA	0.7	NP
	10/09/98		11.20	43.53	3,500	400	<20	54	<20	1,700	NA	1.0	NP
	02/19/99		6.85	47.88	<1,000	<10	<10	<10	12	650	NA	0.1	NP
	06/02/99		11.00	43.73	6,100	760	16	260	89	2,300	NA	1.12	NP
	08/26/99		10.80	43.93	1,100	68	5	8	4	1,400	NA	1.15	NP
A-5	03/26/96	54.17	7.93	46.24	Not Sampled: Well Sampled Semiannually								
	05/22/96		8.20	45.97	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		10.70	43.47	Not Sampled: Well Sampled Semiannually								
	12/19/96		8.39	45.78	9,900	1,100	330	230	700	NA	24	NM	
	04/01/97		10.83	43.34	Not Sampled: Well Sampled Semiannually								
	05/27/97		10.65	43.52	100	<0.5	<0.5	<0.5	<0.5	120	NA	NM	
	08/12/97		11.05	43.12	Not Sampled: Well Sampled Semiannually								
	11/14/97		10.51	43.66	<50	<0.5	<0.5	<0.5	<0.5	41	NA	4.8	
	03/18/98		8.10	46.07	Not Sampled: Well Sampled Semiannually								
	05/19/98		9.31	44.86	590	<5	<5	<5	<5	710	NA	2.48	P
	07/29/98		9.89	44.28	Not Sampled: Well Sampled Semiannually								
	10/09/98		11.02	43.15	690	<5	<5	<5	<5	710	NA	1.0	NP
	02/19/99		6.82	47.35	<2,000	<20	<20	<20	<20	2,300	NA	0.6	NP
	06/02/99		10.82	43.35	1,500	<0.5	2.3	<0.5	<0.5	2,400	NA	2.81	NP
	08/26/99		10.65	43.52	Not Sampled: Well Sampled Semiannually							0.49	

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Total Purgeable Petroleum Hydrocarbons
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ARCO Service Station 4931
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Well Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (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	NA	NM	
	05/22/96		7.35	47.82	<50	2.4	<0.5	0.88	1.7	NA	NA	NM	
	08/22/96		10.12	45.05	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NM	
	12/19/96		7.43	47.74	<50	1.7	<0.5	0.78	1.5	<2.5	NA	NM	
	04/01/97		9.97	45.20	<50	4.7	<0.5	1.9	3.2	<2.5	NA	NM	
	05/27/97		9.66	45.51	<50	0.69	<0.5	<0.5	<0.5	<2.5	NA	NM	
	08/12/97		10.43	44.74	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NM	
	11/14/97		9.76	45.41	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	<1.0	
	03/18/98		7.00	48.17	<50	6.2	0.5	2.3	2.6	<3	NA	3.0	
	05/19/98		8.27	46.90	<50	<0.5	<0.5	1.3	4.7	<3	NA	2.16	P
	07/29/98		8.96	46.21	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	0.8	NP
	10/09/98		10.23	44.94	<50	<0 5	<0.5	<0.5	<0.5	<3	NA	1.0	NP
	02/19/99		5 79	49.38	<50	<0.5	<0.5	<0.5	<0.5	5	NA	0.4	NP
	06/02/99		9.71	45.46	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	2.00	NP
	08/26/99		9.79	45.38	<50	<0.5	<0.5	<0.5	0.7	<3	NA	0.66	NP
A-7	03/26/96	54.71	6.90	47.81	Not Sampled: Well Sampled Semiannually								
	05/22/96		8.27	46.44	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		9.80	44.91	Not Sampled: Well Sampled Semiannually								
	12/19/96		7.19	47.52	Not Sampled: Well Sampled Annually								
	04/01/97		9.63	45.08	Not Sampled: Well Sampled Annually								
	05/27/97		9.34	45.37	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NM	
	08/12/97		10.10	44.61	Not Sampled: Well Sampled Annually								
	11/14/97		9.35	45.36	Not Sampled: Well Sampled Annually								
	03/18/98		6.75	47.96	Not Sampled: Well Sampled Annually								
	05/19/98		8.85	45.86	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.82	P
	07/29/98		8.84	45.87	Not Sampled: Well Sampled Annually								
	10/09/98		10.05	44.66	Not Sampled: Well Sampled Annually								
	02/19/99		5.57	49.14	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	4.7	NP
	06/02/99		9.56	45.15	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	2.17	NP
	08/26/99		9.66	45.05	Not Sampled: Well Sampled Annually							0.49	

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ARCO Service Station 4931
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Well Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (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	NA	NM	
	05/22/96		7.20	46.57	14,000	2,800	160	320	190	NA	NA	NM	
	08/22/96		11.57	42.20	8,000	1,000	76	150	96	4,300	NA	NM	
	12/19/96		8.04	45.73	12,000	450	110	210	230	<500	NA	NM	
	04/01/97		9.98	43.79	Not Sampled: Well Sampled Semiannually								
	05/27/97		11.45	42.32	11,000	1,600	100	220	210	2,300	NA	NM	
	08/12/97		11.59	42.18	Not Sampled: Well Sampled Semiannually								
	11/14/97		9.85	43.92	26,000	2,300	<200	400	400	4,100	NA	2.2	
	03/18/98		7.80	45.97	Not Sampled: Well Sampled Semiannually								
	05/19/98		8.78	44.99	88,000	4,200	150	640	600	6,700	NA	1.36	P
	07/29/98		9.59	44.18	46,000	4,900	160	620	580	13,000	NA	0.5	NP
	10/09/98		11.23	42.54	130,000	3,700	110	500	770	7,300	NA	1.0	NP
	02/19/99		6.51	47.26	<1,000	39	<10	<10	<10	840	NA	0.2	NP
	06/02/99		10.68	43.09	8,500	1,300	32	180	110	6,700	NA	1.31	NP
	08/26/99		10.43	43.34	6,200	870	17	64	60	3,700	NA	0.69	NP
A-9	03/26/96	53.04	7.05	45.99	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	05/22/96		7.20	45.84	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		9.68	43.36	<50	<0.5	<0.5	<0.5	<0.5	8.5	NA	NM	
	12/19/96		7.43	45.61	<50	<0.5	<0.5	<0.5	<0.5	2.6	NA	NM	
	04/01/97		9.95	43.09	Not Sampled: Well Sampled Semiannually								
	05/27/97		9.56	43.48	<50	2.3	<0.5	<0.5	<0.5	45	NA	NM	
	08/12/97		10.15	42.89	Not Sampled: Well Sampled Semiannually								
	11/14/97		8.64	44.40	<200	<2.0	<2.0	<2.0	<2.0	190	NA	9.6	
	03/18/98		6.45	46.59	Not Sampled: Well Sampled Semiannually								
	05/19/98		8.35	44.69	<50	<0.5	<0.5	<0.5	<0.5	7	NA	1.27	P
	07/29/98		8.74	44.30	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	0.99	NP
	10/09/98		10.05	42.99	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.0	NP
	02/19/99		6.91	46.13	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	2.0	NP
	06/02/99		9.72	43.32	<50	<0.5	<0.5	<0.5	<0.5	16	NA	2.32	NP
	08/26/99		9.48	43.56	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	0.71	NP

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Well Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-10	03/26/96	54.26	8.28	45.98	Not Sampled: Well Removed from Sampling Program								
	05/22/96		8.60	45.66	Not Sampled: Well Removed from Sampling Program								
	08/22/96		10.98	43.28	Not Sampled: Well Removed from Sampling Program								
	12/19/96		8.80	45.46	Not Sampled: Well Removed from Sampling Program								
	04/01/97		11.15	43.11	Not Sampled: Well Removed from Sampling Program								
	05/27/97		10.90	43.36	Not Sampled: Well Removed from Sampling Program								
	08/12/97		11.30	42.96	Not Sampled: Well Removed from Sampling Program								
	11/14/97		10.80	43.46	Not Sampled: Well Removed from Sampling Program								
	03/18/98		----------		Well Removed from Survey Program ----------								
A-11	03/26/96	53.74	8.10	45.64	Not Sampled: Well Sampled Semiannually								
	05/22/96		8.25	45.49	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		10.58	43.16	Not Sampled: Well Sampled Semiannually								
	12/19/96		8.37	45.37	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	NM	
	04/01/97		10.95	42.79	Not Sampled: Well Sampled Semiannually								
	05/27/97		10.60	43.14	<50	<0.5	<0.5	<0.5	<0.5	3.1	NA	NM	
	08/12/97		11.07	42.67	Not Sampled: Well Sampled Semiannually								
	11/14/97		10.58	43.16	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.6	
	03/18/98		8.14	45.60	Not Sampled: Well Sampled Semiannually								
	05/19/98		9.40	44.34	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.13	P
	07/29/98		10.32	43.42	Not Sampled: Well Sampled Semiannually								
	10/09/98		10.91	42.83	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	2.0	NP
	02/19/99		6.77	46.97	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	1.8	NP
	06/02/99		10.95	42.79	<50	<0.5	<0.5	<0.5	<0.5	6	NA	1.38	NP
	08/26/99		11.05	42.69	Not Sampled: Well Sampled Semiannually							0.49	

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Total Purgeable Petroleum Hydrocarbons
(TPPH as Gasoline, BTEX Compounds, and MTBE)

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

Well Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
A-12	03/26/96	52.05	7.83	44.22	Not Sampled: Well Sampled Semiannually								
	05/22/96		7.80	44.25	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	08/22/96		9.97	42.08	Not Sampled: Well Sampled Semiannually								
	12/19/96		8.18	43.87	85	<0.5	<0.5	<0.5	<0.5	170	NA	NM	
	04/01/97		10.30	41.75	Not Sampled: Well Sampled Semiannually								
	05/27/97		10.05	42.00	50	12	<0.5	<0.5	<0.5	96	NA	NM	
	08/12/97		10.46	41.59	Not Sampled: Well Sampled Semiannually								
	11/14/97		9.70	42.35	<50	<0.5	<0.5	<0.5	<0.5	75	NA	7.0	
	03/18/98		8.15	43.90	Not Sampled: Well Sampled Semiannually								
	05/19/98		9.15	42.90	<50	<0.5	<0.5	<0.5	<0.5	29	NA	1.47	P
	07/29/98		9.38	42.67	Not Sampled: Well Sampled Semiannually								
	10/09/98		10.21	41.84	<50	<0.5	<0.5	<0.5	<0.5	7	NA	2.0	NP
	02/19/99		6.96	45.09	<50	<0.5	<0.5	<0.5	<0.5	<3	NA	5.2	NP
	06/02/99		10.25	41.80	<50	<0.5	<0.5	<0.5	<0.5	7	NA	1.38	NP
	08/26/99		9.91	42.14	Not Sampled: Well Sampled Semiannually							0.51	
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 ----------										
	06/02/99		---------- Well Inaccessible ----------										
	08/26/99		---------- Well Inaccessible ----------										

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 Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (ppb)	Dissolved Oxygen (ppm)	Purged/ Not Purged (P/NP)
AR-1	03/26/96	54.72	8.13	46.59	6,200	110	64	38	520	NA	NA	NM	
	05/22/96		8.57	46.15	NS	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		10.97	43.75	5,600	100	28	29	310	960	NA	NM	
	12/19/96		8.93	45.79	Not Sampled: Well Removed from Sampling Program								
	04/01/97		11.78	42.94	Not Sampled: Well Removed from Sampling Program								
	05/27/97		10.76	43.96	Not Sampled: Well Removed from Sampling Program								
	08/12/97		11.40	43.32	Not Sampled: Well Removed from Sampling Program								
	11/14/97		10.80	43.92	Not Sampled: Well Removed from Sampling Program								
	03/18/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	05/19/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	07/29/98		10.17	44.55	Not Sampled: Well Removed from Sampling Program								
	10/09/98		11.25	43.47	Not Sampled: Well Removed from Sampling Program								
	02/19/99		7.02	47.70	Not Sampled: Well Removed from Sampling Program								
	06/02/99		11.00	43.72	Not Sampled: Well Removed from Sampling Program								
	08/26/99		10.96	43.76	Not Sampled: Well Removed from Sampling Program							0.39	
AR-2	03/26/96	54.77	4.93	49.84	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	NM	
	05/22/96		5.65	49.12	NS	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		7.27	47.50	<50	<0.5	<0.5	<0.5	<0.5	200	NA	NM	
	12/19/96		7.78	46.99	Not Sampled: Well Removed from Sampling Program								
	04/01/97		6.80	47.97	Not Sampled: Well Removed from Sampling Program								
	05/27/97		6.32	48.45	Not Sampled: Well Removed from Sampling Program								
	08/12/97		7.43	47.34	Not Sampled: Well Removed from Sampling Program								
	11/14/97		8.95	45.82	Not Sampled: Well Removed from Sampling Program								
	03/18/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	05/19/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	07/29/98		4.47	50.30	Not Sampled: Well Removed from Sampling Program								
	10/09/98		6.90	47.87	Not Sampled: Well Removed from Sampling Program								
	02/19/99		3.80	50.97	Not Sampled: Well Removed from Sampling Program								
	06/02/99		4 61	50.16	Not Sampled: Well Removed from Sampling Program								
	08/26/99		5.22	49.55	Not Sampled: Well Removed from Sampling Program							0.44	

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 Number	Date Gauged/ Sampled	Well Elevation (feet, MSL)	Depth to Water (feet, TOB)	Groundwater Elevation (feet, MSL)	TPH Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE 8020 (ppb)	MTBE 8260 (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	NA	NM	
	05/22/96		8.30	45.89	NS	NS	NS	NS	NS	NS	NS	NM	
	08/22/96		10.84	43.35	Not Sampled: Well Removed from Sampling Program								
	12/19/96		8.56	45.63	Not Sampled: Well Removed from Sampling Program								
	04/01/97		11.24	42.95	Not Sampled: Well Removed from Sampling Program								
	05/27/97		10.67	43.52	Not Sampled: Well Removed from Sampling Program								
	08/12/97		11.10	43.09	Not Sampled: Well Removed from Sampling Program								
	11/14/97		10.60	43.59	Not Sampled: Well Removed from Sampling Program								
	03/18/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	05/19/98		NM	NM	Not Sampled: Well Removed from Sampling Program								
	07/29/98		9.95	44.24	Not Sampled: Well Removed from Sampling Program								
	10/09/98		11.20	42.99	Not Sampled: Well Removed from Sampling Program								
	02/19/99		6.98	47.21	Not Sampled: Well Removed from Sampling Program								
	06/02/99		10.80	43.39	Not Sampled: Well Removed from Sampling Program								
	08/26/99		10.69	43.50	Not Sampled: Well Removed from Sampling Program							0.40	

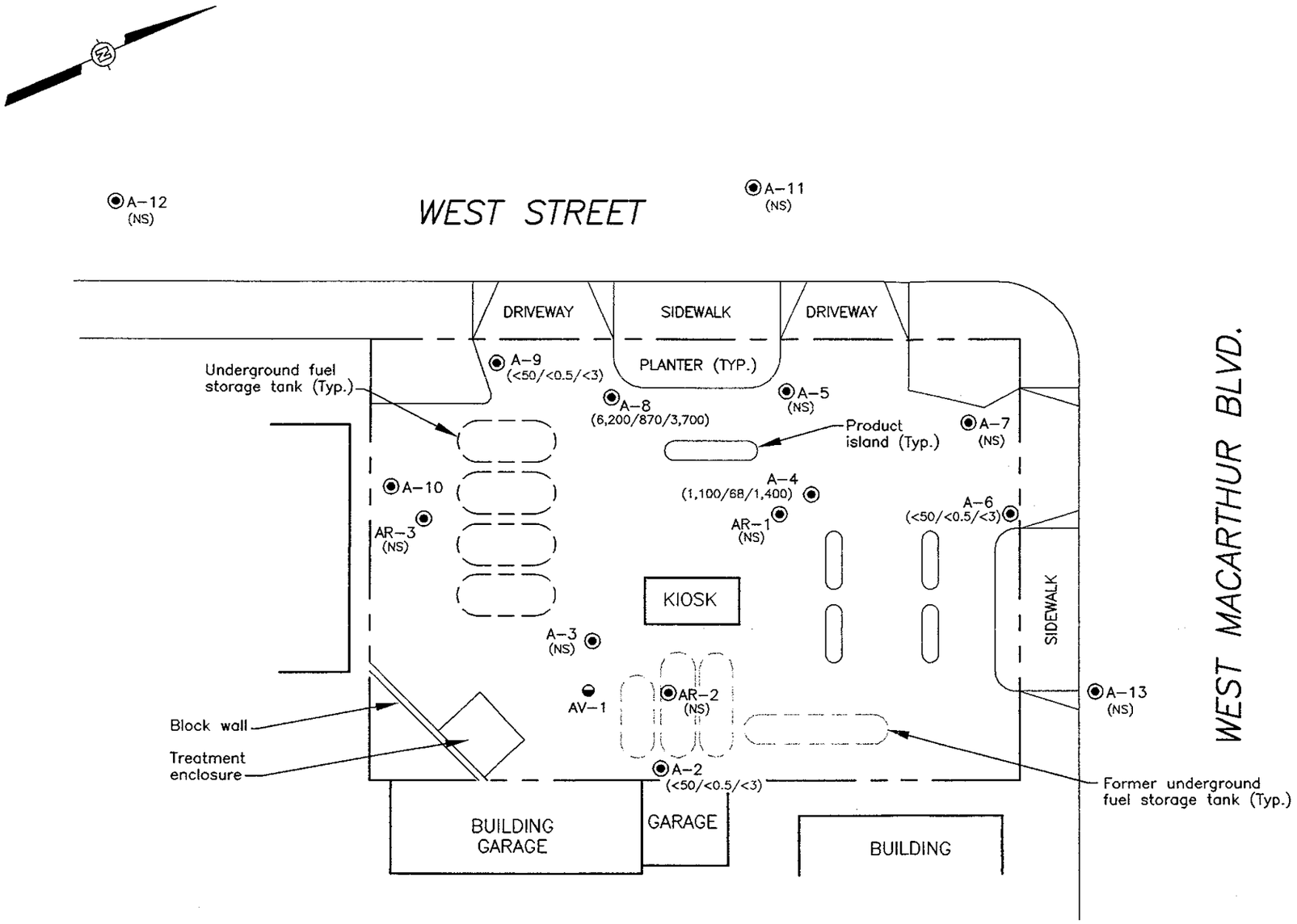
TPH = Total petroleum hydrocarbons by modified EPA method 8015
BTEX = Benzene, toluene, ethylbenzene, xylenes by EPA method 8020
MTBE = Methyl tert-butyl ether
MSL = Mean sea level
TOB = Top of box
ppb = Parts per billion
ppm = Parts per million
< = Less than laboratory detection limit stated to the right
NA = Not analyzed
NM = Not measured
NS = Not sampled

Table 2
Groundwater Flow Direction and Gradient

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

Date Measured	Average Flow Direction	Average Hydraulic Gradient
03/26/96	Southwest	0.03
05/22/96	Southwest	0.04
08/22/96	Southwest	0.02
12/19/96	Southwest	0.03
04/01/97	Southwest	0.03
05/27/97	Southwest	0.04
08/12/97	Southwest	0.02
11/14/97	Southwest	0.02
03/18/98	West	0.03
05/19/98	West-Southwest	0.02
07/29/98	West-Southwest	0.02
10/09/98	Southwest	0.007
02/19/99	Southwest	0.04
06/02/99	West	0.04
08/26/99	**West-Southwest**	**0.02**

DRAWN BY	PROJECT NUMBER
K. Black 11-29-99	791808



EXPLANATION

- ◉ Groundwater monitoring well
- ◒ Soil vapor well
- (1,100/68/1,400) Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 8/26/99
- < Not detected at or above the indicated laboratory detection limit
- NS Not sampled

SCALE
0 30 60 FEET

Base map from Pacific Environmental Group, Inc.

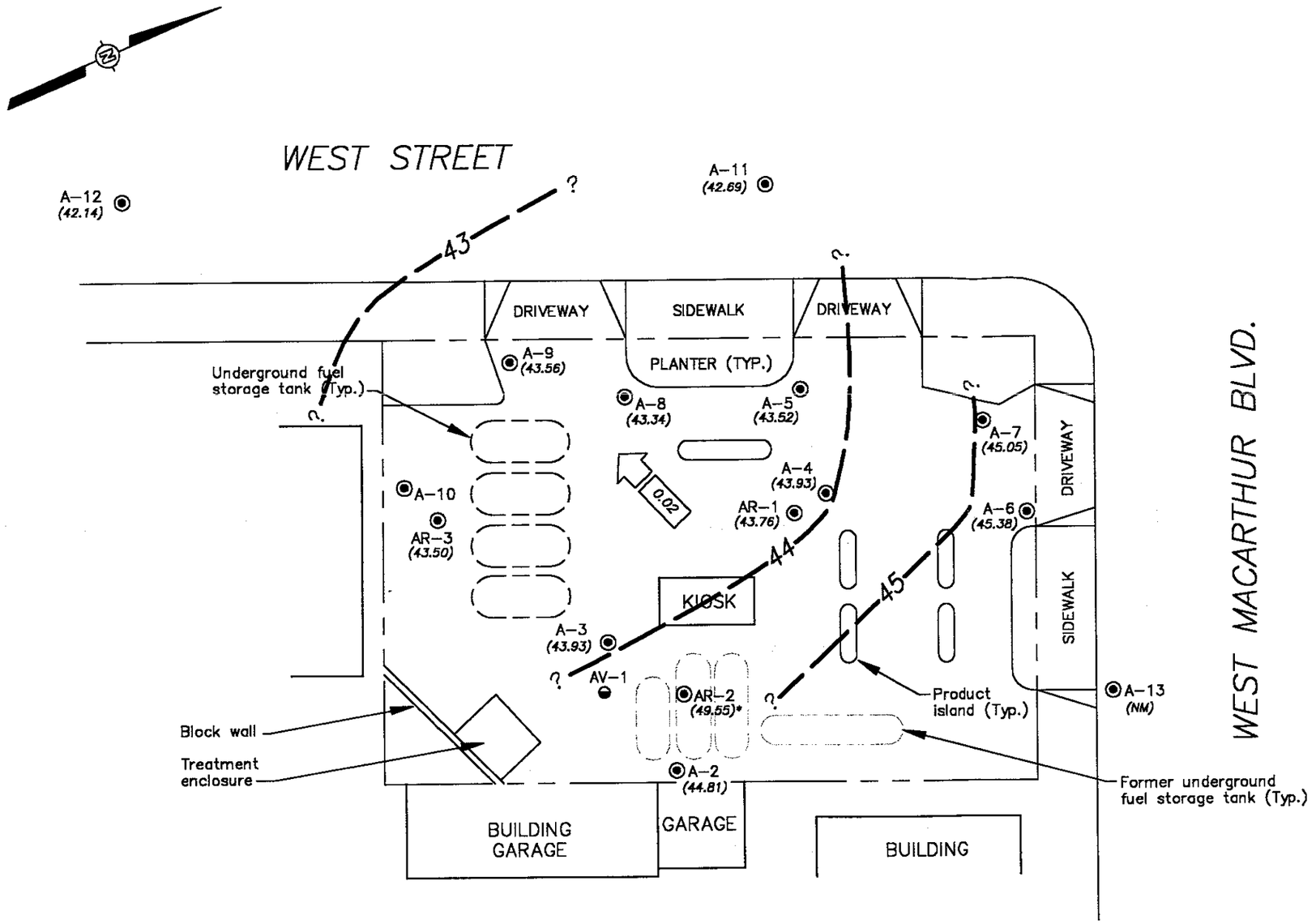
IT CORPORATION

ARCO PRODUCTS COMPANY
SERVICE STATION 4931

FIGURE 1
GROUNDWATER ANALYTICAL SUMMARY
THIRD QUARTER 1999
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SANJOSE/CADD: N:\cad\DWG\PINACL\4931\4931chem.dwg Mon, 29/Nov/99 10:18am kblack

PROJECT NUMBER	791808
DRAWN BY	11-29-99
K. Black	



EXPLANATION

- Groundwater monitoring well
- Soil vapor well
- (45.38) Groundwater elevation (Ft.–MSL); measured 8/26/99
- Groundwater elevation contour (Ft.–MSL)
- Approximate direction of groundwater flow showing gradient
- NM Not measured; well inaccessible
- * Not used to construct contours

SCALE

0 30 60 FEET

Base map from Pacific Environmental Group, Inc.

IT CORPORATION

ARCO PRODUCTS COMPANY
SERVICE STATION 4931

FIGURE 2
GROUNDWATER ELEVATION CONTOURS
THIRD QUARTER 1999
731 WEST MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SAN JOSE/CADD: N:\cad\DWG\PINACL\4931\4931qwc.dwg Mon, 29/Nov/99 10:35am 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 IT's San Jose or Sacramento office location for temporary storage. IT 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 IT 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 IT to an ARCO-approved laboratory by courier or taken directly to the laboratory by the environmental sampler. Sample shipments from IT 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

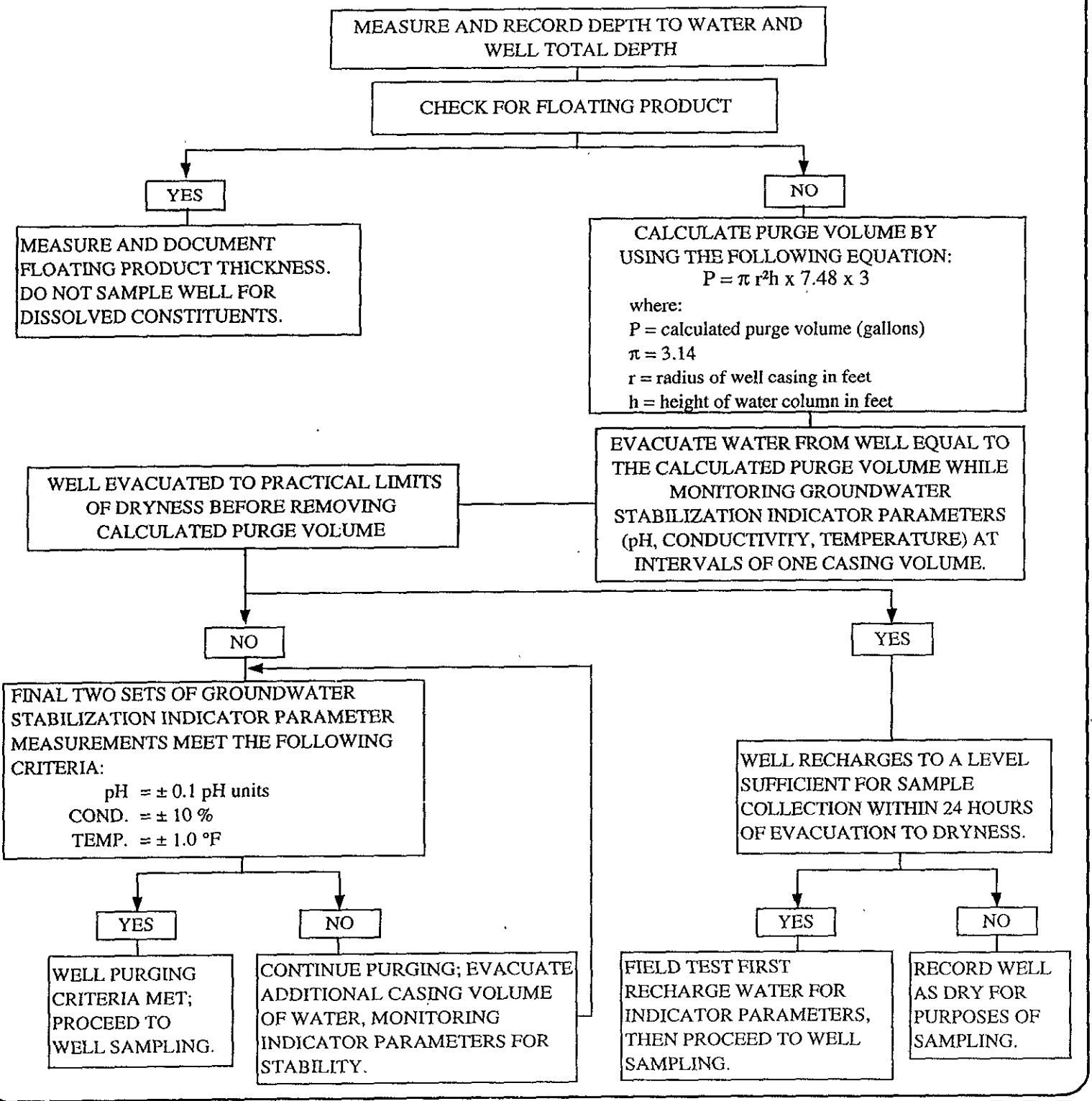
The ARCO chain-of-custody record initiated at the time of sampling contained, at a minimum, the sample designation (including the depth at which the sample was collected), sample type, analytical request, date of sampling, and the name of the sampler. The record sheet was signed, timed, and dated by 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 IT 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



MONITORING WELL PURGING PROTOCOL

FIGURE

A-1

WATER SAMPLE FIELD DATA SHEET

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 _____

WATER SAMPLE FIELD DATA SHEET

FIGURE A-2

IT - 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:

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

September 24, 1999

Service Request No.: S9902664

Mr. Glen Vanderveen
IT/EMCON
2201 Broadway, Suite 101
Oakland, CA 94612

RE: **TO#24118.00/RAT#8/4931 OAKLAND**

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on August 31, 1999. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 13, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 1496, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

Columbia Analytical Services, Inc.

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director

SEP 2 8 1999
BY:

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:**	S9902664
Project:	TO#24118.00/RAT#8/4931 OAKLAND	**Date Collected:**	08/26/1999
Sample Matrix:	Water	**Date Received:**	08/31/1999

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-6(23)	Units:	ug/L (ppb)
Lab Code:	S9902664-001	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	09/09/1999	ND	
Benzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Toluene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	09/09/1999	0.7	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	09/09/1999	ND	

Approved By: _____ Date: 09/24/99

IS22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9902664
Project:	TO#24118.00/RAT#8/4931 OAKLAND	**Date Collected:**	08/26/1999
Sample Matrix:	Water	**Date Received:**	08/31/1999

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-8(19)	*Units:*	*ug/L (ppb)*
Lab Code:	S9902664-002	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	10	NA	09/09/1999	6200	
Benzene	EPA 5030	8020	0.5	10	NA	09/09/1999	870	
Toluene	EPA 5030	8020	0.5	10	NA	09/09/1999	17	
Ethylbenzene	EPA 5030	8020	0.5	10	NA	09/09/1999	64	
Xylenes, Total	EPA 5030	8020	0.5	10	NA	09/09/1999	60	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	10	NA	09/09/1999	3700	

Approved By: _____ Date: 09/24/99

IS22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9902664
Project:	TO#24118.00/RAT#8/4931 OAKLAND	**Date Collected:**	08/26/1999
Sample Matrix:	Water	**Date Received:**	08/31/1999

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-9(36)	Units:	ug/L (ppb)
Lab Code:	S9902664-003	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	09/09/1999	ND	
Benzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Toluene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	09/09/1999	ND	

Approved By: _____ Date: 09/24/99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9902664
Date Collected: 08/26/1999
Date Received: 08/31/1999

BTEX, MTBE and TPH as Gasoline

Sample Name: A-2(18)
Lab Code: S9902664-004
Test Notes:

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	1	NA	09/09/1999	ND	
Benzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Toluene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	09/09/1999	ND	

Approved By: _____ Date: 09/24/99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9902664
Project:	TO#24118.00/RAT#8/4931 OAKLAND	**Date Collected:**	8/26/99
Sample Matrix:	Water	**Date Received:**	8/31/99

BTEX, MTBE and TPH as Gasoline

Sample Name:	A-4(18)	Units:	ug/L (ppb)
Lab Code:	S9902664-005	Basis:	NA
Test Notes:	O		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
TPH as Gasoline	EPA 5030	CA/LUFT	50	2	NA	9/10/99	1100	
Benzene	EPA 5030	8020	0.5	2	NA	9/10/99	68	
Toluene	EPA 5030	8020	0.5	2	NA	9/10/99	5	
Ethylbenzene	EPA 5030	8020	0.5	2	NA	9/10/99	8	
Xylenes, Total	EPA 5030	8020	0.5	2	NA	9/10/99	4	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	2	NA	9/10/99	1400	

O Sample was analyzed 1 day past the end of the recommended maximum holding time. Analyte concentration should be considered an estimate.

Approved By: _____ Date: 09/24/99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9902664
Project:	TO#24118.00/RAT#8/4931 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:	S990909-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	09/09/1999	ND	
Benzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Toluene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	09/09/1999	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	09/09/1999	ND	

Approved By: _____ Date: 09/24/99

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	ARCO Products Company	**Service Request:**	S9902664
Project:	TO#24118.00/RAT#8/4931 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:	S990910-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	09/10/1999	ND	
Benzene	EPA 5030	8020	0.5	1	NA	09/10/1999	ND	
Toluene	EPA 5030	8020	0.5	1	NA	09/10/1999	ND	
Ethylbenzene	EPA 5030	8020	0.5	1	NA	09/10/1999	ND	
Xylenes, Total	EPA 5030	8020	0.5	1	NA	09/10/1999	ND	
Methyl *tert*-Butyl Ether	EPA 5030	8020	3	1	NA	09/10/1999	ND	

Approved By: _____ Date: 09/24/99

IS22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9902664
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
A-6(23)	S9902664-001		89	78
A-8(19)	S9902664-002		79	120
A-9(36)	S9902664-003		92	105
A-2(18)	S9902664-004		89	104
A-4(18)	S9902664-005		83	144 S1
Lab Control Sample	S990909-LCS		104	101
Lab Control Sample	S990909-DLCS		101	98
Lab Control Sample	S990909-LCS		89	115
Lab Control Sample	S990909-DLCS		89	109
Method Blank	S990909-WB1		92	107
Method Blank	S990910-WB1		92	93

CAS Acceptance Limits: 69-116 72-139

S1 Surrogate recovery out of control limits due to matrix interference.

Approved By: _____ Date: 09/24/99

SUR2/020397p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9902664
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: ########

Laboratory Control Spike/Duplicate Summary
BTE

Sample Name: Lab Control Sample
Lab Code: S990909-LCS, S990909-DLCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	26	26	104	106	75-135	<1
Toluene	EPA 5030	8020	0.5	25	25	ND	23	24	92	97	73-136	4
Ethylbenzene	EPA 5030	8020	0.5	25	25	ND	25	26	100	105	69-142	4

Approved By: _____ Date: 09/24/99

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/4931 OAKLAND
Sample Matrix: Water

Service Request: S9902664
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: ########

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S990909-LCS, S990909-DLCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

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	Result Notes
Gasoline	EPA 5030	CA/LUFT	50	250	250	ND	233	224	93	90	75-135	4	

Approved By: _____ Date: 09/24/99

DMS/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: ARCO Products Company
Project: TO#24118.00/RAT#8/4931 OAKLAND

Service Request: S9902664
Date Analyzed: 09/09/1999

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	220	85-115	88	
Benzene	EPA 5030	8020	25	28	85-115	112	
Toluene	EPA 5030	8020	25	28	85-115	112	
Ethylbenzene	EPA 5030	8020	25	27	85-115	108	
Xylenes, Total	EPA 5030	8020	75	80	85-115	106	
Methyl *tert*-Butyl Ether	EPA 5030	8020	25	26	85-115	104	

Approved By: _____ Date: 09/24/99

ICV/032196

RCO Products Company 59902664
Division of Atlantic/Richfield Company

Task Order No. 24118.OC

Chain of Custody

RCO Facility no. 4931	City (Facility) Oakland	Project manager (Consultant) Glen VanderVeen	Laboratory Name CAS
RCO engineer Paul Supple	Telephone no. (ARCO)	Telephone no. (Consultant) (408) 453-7300	Fax no. (Consultant) (408) 437-9526
Consultant name EMCON	Address (Consultant) 2201 Broadway #101 Oakland, CA 94612		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 incl 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 Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐			
-6 (23')		2	(1)	X		X	HCL	8/24/99	1236		X												
-8 (8')		2	(2)	X		X	HCL	↓	1301		X												
-9 (3')		2	(3)	X		X	HCL	↓	1315		X												
-2 (48')		2	(4)	X		X	HCL	↓	1330		X												
-4 (8')		2	(5)	X		X	HCL	↓	1400		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

#791-65

Lab Number

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

Condition of sample: to cooler

Temperature received: Due: 9/15/99 R11 D3

Relinquished by sampler: D. Wofford	Date 8/30/99	Time 14:00	Received by: Joseph Machado CAS	8/31/99	845
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

ARCO Environmental Engineering; Pink Copy – Consultant

APPENDIX C

FIELD DATA SHEETS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 792283 STATION ADDRESS : 731 W. MacArthur Blvd. Oakland, CA DATE : 8/26/99

ARCO STATION # : 4931 FIELD TECHNICIAN : D Workers DAY : Thursday

DTW Order	WELL ID	Well Box Seal Condition	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	A-3	ok	G-5	NO	NONE	LWC	10.77	10.73	N.D.	—	16.3	0.95 mg/L 21.2°C
2	A-5	ok	Broken G-5	NO	NONE	LWC	10.65	10.65	N.D.	—	24.2	0.49 mg/L 20.4°C
3	A-6	ok	G-5	NO	NONE	LWC	9.79	9.79	N.D.	—	24.7	0.66 mg/L 20.7°C
4	A-7	ok	G-5	NO	NONE	LWC	9.66	9.66	N.D.	—	22.4	0.49 mg/L 20.3°C
5	A-8	ok	VAULT	YES	NONE	SLIP	10.43	10.43	N.D.	—	[redacted]	20.6 0.69 mg/L 20.8°C
6	A-9	ok	VAULT	YES	NONE	SLIP	9.48	9.48	N.D.	—	22.8	0.71 mg/L 20.1°C
7	A-2	ok	G-5	NO	NONE	LWC	10.47	10.67	N.D.	—	19.5	0.79 mg/L 19.6°C
8	A-4	ok	G-5	NO	NONE	LWC	10.80	10.80	N.D.	—	19.8	1.15 mg/L 20.2°C
9	A-11	ok	G-5	NO	NONE	LWC	11.05	11.05	N.D.	—	29.8	0.49 mg/L 20.3°C
10	A-12	ok	G-5	NO	NONE	LWC	9.91	9.91	N.D.	—	29.9	0.51 mg/L 19.7°C
11	A-13	I W										I W
12	AR-1	ok	VAULT	NO	NONE	LWC	10.96	10.94	N.D.	—	29.5	0.39 mg/L 19.7°C
13	AR-2	ok	VAULT	NO	NONE	LWC	5.22	5.28	N.D.	—	26.4	0.44 mg/L 22.3°C
14	AR-3	ok	VAULT	NO	NONE	SLIP	10.69	10.69	N.D.	—	29.2	0.40 mg/L 20.0°C

SURVEY POINTS ARE TOP OF WELL BOXES

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO.: 792283
PURGED BY: D Walton
SAMPLED BY: ✓

SAMPLE ID: A-2 (18')
CLIENT NAME: ARCO #4931
LOCATION: Oakland, California

TYPE: Groundwater X Surface Water ____ Leachate ____ Other ____

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

CASING ELEVATION (feet/MSL): N/A
DEPTH OF WELL (feet): 19.5
DEPTH OF WATER (feet): 10.67

VOLUME IN CASING (gal.): ~~3.5~~ 8.0
CALCULATED PURGE (gal.): ~~10.5~~ 24.0
ACTUAL PURGE VOL. (gal.): —

DATE PURGED: —
DATE SAMPLED: 8/26/99

END PURGE: —
SAMPLING TIME: 1330

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1330	—	7.46	509.0	67.7	Clear	Low

OTHER: Dissolved Oxygen= ____ ODOR: None ____ N/A (COBALT 0-100) ____ N/A (NTU 0-200)

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

PURGING EQUIPMENT

- ____ 2" Bladder Pump
- ____ Centrifugal Pump
- ____ Submersible Pump
- ____ Well WizardÔ
- ____ Bailer (Teflon)
- ____ Bailer (PVC)
- ____ Bailer (Stainless Steel)
- ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

- ____ 2" Bladder Pump
- ____ Bomb Sampler
- ____ Dipper
- ____ Well WizardÔ
- ____ Bailer (Teflon)
- ____ Bailer (Stainless Steel)
- ____ Submersible Pump
- ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: Good LOCK: None

REMARKS: See A-6

pH, E.C., Temp Meter Calibration Date: ____ Time: ____ Meter Serial No ____ (See A-6)

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

Temperature °F ____

SIGNATURE: DW REVIEWED BY: MO PAGE 1 OF 5

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792283 | SAMPLE ID : A-4 (18')

PURGED BY : Duplicate | CLIENT NAME : ARCO #4931

SAMPLED BY : ↓ | LOCATION : Oakland, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

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

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 60

DEPTH OF WELL (feet) : 19.8 | CALCULATED PURGE (gal.) : 180

DEPTH OF WATER (feet) : 10.80 | ACTUAL PURGE VOL. (gal.) : —

DATE PURGED : — | END PURGE : —

DATE SAMPLED : 8/26/99 | SAMPLING TIME : 1400

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1400	—	8.46	1993	69.5	clear	modest

OTHER: Dissolved Oxygen= | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good - Dec Sack | LOCK: none

REMARKS: SSC A-6

pH, E.C., Temp Meter Calibration Date: ____ Time: SS A-6 Meter Serial No ____

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

Temperature °F ____

SIGNATURE: DH REVIEWED BY: [illegible] PAGE 2 OF 5

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 792283
PURGED BY: Dwofkey
SAMPLED BY: "
SAMPLE ID: A-6 (23)
CLIENT NAME: ARCO #4931
LOCATION: Oakland, California

TYPE: Groundwater X Surface Water ___ Leachate ___ Other ___

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

CASING ELEVATION (feet/MSL): N/A
DEPTH OF WELL (feet): 24.7
DEPTH OF WATER (feet): 9.79
VOLUME IN CASING (gal.): 5.5
CALCULATED PURGE (gal.): 16.5
ACTUAL PURGE VOL. (gal.): —

DATE PURGED: —
DATE SAMPLED: 8/26/98
END PURGE: —
SAMPLING TIME: 1234

TIME (2400 HR)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1234	—	6.59	6430	68.9	Brown	Light

OTHER: Dissolved Oxygen= ODOR: NONE N/A (COBALT 0-100) N/A (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: Good - EAR Broke on CAP LOCK: NONE

REMARKS: DTW is Below Top of Screen
Taking Grab Sample

pH, E.C., Temp. Meter Calibration Date 8/26/98 Time 1225 Meter Serial No. 252

E.C. ~~1000~~ 1413 1424 / 1413 pH 7 6.77 / 7.00 pH 10 9.89 / 10.00 pH 4 4.06 / —

Temperature °F 88.5

SIGNATURE: [signature] REVIEWED BY: [signature] PAGE 3 OF 5

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792283 | SAMPLE ID : A-8 (19)

PURGED BY : Duplicate | CLIENT NAME : ARCO #4931

SAMPLED BY : | LOCATION : Oakland, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches) 2 ____ 3 X 4 X 4 5 ____ 6 ____ Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 4.0

DEPTH OF WELL (feet) : 206 | CALCULATED PURGE (gal.) : 12.0

DEPTH OF WATER (feet) : 10.43 | ACTUAL PURGE VOL. (gal.) : ____

DATE PURGED : ____ | END PURGE : ____

DATE SAMPLED : 8/24/99 | SAMPLING TIME : 1301

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1301	—	8.46	2026	69.6	Cloudy	High

OTHER: Dissolved Oxygen= | ODOR: Strong | N/A (COBALT 0-100) | N/A (NTU 0-200)

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

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)
____ Bomb Sampler ____ Bailer (Stainless Steel)
____ Dipper ____ Submersible Pump
____ Well WizardÔ ____ Dedicated
Other. Disposable Teflon Bailer

WELL INTEGRITY: Good - Orc Sock | LOCK: OK

REMARKS: 3" Casing

See A-6

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 MA | PAGE 4 OF 5

WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792283 SAMPLE ID A-9(36)

PURGED BY : Dwilson CLIENT NAME : ARCO #4931

SAMPLED BY : L LOCATION : Oakland, California

TYPE: Groundwater X Surface Water ____ Leachate ____ Other ____

CASING DIAMETER (inches): 2 ____ 3 ____ 4 ____ 4 5 ____ 6 X Other ____

CASING ELEVATION (feet/MSL) : N/A VOLUME IN CASING (gal.) : ____

DEPTH OF WELL (feet) : 37.8 CALCULATED PURGE (gal.) : ____

DEPTH OF WATER (feet) : 9.18 ACTUAL PURGE VOL. (gal.) : ____

DATE PURGED : — END PURGE : —

DATE SAMPLED : 8/24/99 SAMPLING TIME : 1315

TIME (2400 HR)	VOLUME (gal)	pH (units)	E.C (µmhos/cm@25°c)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1315	—	8.24	1440	67.4	LT Grey	moderate

OTHER: Dissolved Oxygen= ODOR: NONE N/A (COBALT 0-100) N/A (NTU 0-200)

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

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

____ Submersible Pump ____ Bailer (Stainless Steel)

____ Well WizardÔ ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well WizardÔ ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: Good LOCK: OK

REMARKS:

See A-6

pH, E.C., Temp Meter Calibration Date: ____ Time See A-6 Meter Serial No ____

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

Temperature °F ____

SIGNATURE: [signature] REVIEWED BY: [signature] PAGE 5 OF 5

EMCON Associates - Field Services | Historical Monitoring Well Data

1921 Ringwood Avenue | 1999 | ARCO 4931

San Jose, California | #792283

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product	Gallons
						First 15.00
						Second 0.00
						Third 0.00
						Fourth 0.00
A-2	First	02/19/99	15.00	YES	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	GRAB	NO	
	Fourth					
A-3	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	NA	NO	
	Fourth					
A-4	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	GRAB	NO	
	Fourth					
A-5	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	NA	NO	
	Fourth					
A-6	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	GRAB	NO	
	Fourth					
A-7	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	NA	NO	
	Fourth					
A-8	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	GRAB	NO	
	Fourth					
A-9	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	GRAB	NO	
	Fourth					
A-11	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	NA	NO	
	Fourth					
A-12	First	02/19/99	0.00	GRAB	NO	
	Second	06/02/99	0.00	GRAB	NO	
	Third	08/26/99	0.00	NA	NO	
	Fourth					

EMCON Associates - Field Services | Historical Monitoring Well Data

1921 Ringwood Avenue | 1999 | ARCO 4931

San Jose, California | #792283

Well ID	Quarter	Date	Purge Volume (gallons)	Did well dry	Well Contained Product		Gallons
						First	**15.00**
						Second	**0.00**
						Third	**0.00**
						Fourth	**0.00**
A-13	First	02/19/99	0.00	GRAB	NO		
	Second	06/02/99	0.00	IW	NO		
	Third	08/26/99	0.00	NA	NO		
	Fourth						
	First					Steam water (gal)	
	Second						
	Third						
	Fourth						

ARCO Products Company

Division of Atlantic/Richfield Company

Task Order No.

Chain of Custody

ARCO Facility no.	City (Facility)	Project manager (Consultant)	Laboratory Name
ARCO engineer	Telephone no. (ARCO)	Telephone no. (Consultant) / Fax no. (Consultant)	Contract Number
Consultant name	Address (Consultant)		

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		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☐			
			Soil	Water	Other	Ice	Acid																

Method of shipment

Special Detection Limit/reporting

Special QA/QC

Remarks

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	Time	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

APPENDIX D

REMEDIAL SYSTEM PERFORMANCE SUMMARY

APPENDIX D

REMEDIAL SYSTEM PERFORMANCE SUMMARY

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.

ORC is currently being used in wells A-4, A-8, A-9 and AR-1 to enhance biodegradation of dissolved oxygen (new ORC installed on August 20, 1999).