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C A M B R I A

March 28, 2002

Ms. eva chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

APR 08 2002

Re: **Quarterly Groundwater Monitoring Report
First Quarter 2002**
ARCO Service Station No. 6113
785 East Stanley Boulevard
Livermore, California
Cambria Project #439-1812



Dear Ms. chu:

On behalf of ARCO, Cambria Environmental Technology, Inc. (Cambria) is submitting the attached report which presents the results of the first quarter 2002 groundwater monitoring program at ARCO Service Station No. 6113, located at 785 East Stanley Boulevard, Livermore, California. The monitoring program complies with the Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

Please call if you have any questions.

Sincerely,
Cambria Environmental Technology, Inc.

Ron Scheele

Ron Scheele, RG
Senior Project Manager

Attachment: Quarterly Groundwater Monitoring Report, First Quarter 2002

cc: Ms. Danielle Stefani, City of Livermore Fire Department, 4550 East Ave, Livermore, CA 94550
Mr. Paul Supple, ARCO, PO Box 6549 Moraga, CA 94570

Oakland, CA
San Ramon, CA
Sonoma, CA

**Cambria
Environmental
Technology, Inc.**

1144 65th Street
Suite B
Oakland, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

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Quarterly Groundwater Monitoring Report

First Quarter 2002

Arco Service Station 6113
785 East Stanley Boulevard
Livermore, California
Cambria Project #439-1812



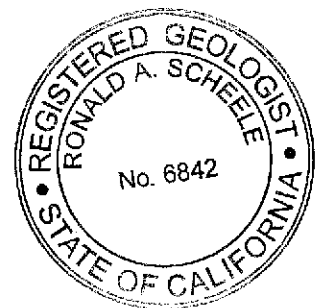
Prepared For:

Mr. Paul Supple
ARCO

March 28, 2002

Prepared By:

Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, California 94608



Written by:

Sara Dwight
Sara Dwight
Staff Environmental Scientist

Ron Scheele
Ron Scheele, RG
Senior Project Manager

ARCO QUARTERLY GROUNDWATER MONITORING REPORT

Station No.: 6113 Address: 785 East Stanley Boulevard, Livermore, California
 ARCO Environmental Engineer: Paul Supple
 Consulting Co./Contact Person: Cambria Environmental Technology Inc. / Ron Scheele, RG
 Consultant Project No.: 439-1812
 Primary Agency/Regulatory ID No.: ACHCSA

WORK PERFORMED THIS QUARTER (FIRST - 2002):

1. Prepared and submitted groundwater monitoring report for fourth quarter 2001.
2. Performed first quarter groundwater monitoring and sampling on January 21, 2002.

WORK PROPOSED FOR NEXT QUARTER (SECOND - 2002):

1. Prepare and submit quarterly groundwater monitoring report for first quarter 2002.
2. Perform second quarter groundwater monitoring and sampling.

MONITORING:

Current Phase of Project: Semi-Annual Groundwater Monitoring
 Frequency of Sampling: Annual (4th Quarter): MW-1, MW-2, MW-3, MW-8, MW-9, MW-10
Semi-Annual (2nd/4th Quarter): MW-4, MW-6, MW-7, MW-11, MW-12, MW-13, VW-1
 Frequency of Monitoring: Semi-Annual (groundwater)
 Is Free Product (FP) Present On-site: No
 Bulk Soil Removed This Quarter : None
 Bulk Soil Removed to Date : 288 cubic yards of TPH impacted soil
 Water Wells or Surface Waters, within 2001 ft., impacted by site: None
 Current Remediation Techniques: Natural attenuation
 Average Depth to Groundwater 26.12 feet
 Groundwater Flow Direction and Gradient : 0.033 ft/ft toward Northeast

DISCUSSION:

Based on field measurements collect on January 21, 2002, groundwater beneath the site flows towards the northeast, at a gradient of 0.033 ft/ft. This is consistent with the historic groundwater flow direction and gradient.

Hydrocarbon concentrations detected this quarter are consistent with the previous sampling event. The maximum TPHg and MTBE concentrations were detected in recently installed well MW-13 at 15,000 and 5,200 micrograms per liter (µg/L), respectively. The maximum benzene concentrations were detected in well VW-1 at 810 µg/L.



ATTACHMENTS:

- Figure 1 – Groundwater Elevation Contour and Analytical Summary Map
- Table 1 – Historical Groundwater Elevation and Analytical Data
- Table 2 – Groundwater Flow Direction and Gradient
- Appendix A – Field and Laboratory Procedures
- Appendix B – Certified Analytical Report, Chain-of-Custody Documentation
- Appendix C – Field Data Sheets



EXPLANATION

- MW-1 ● Monitoring well location
- VW-1 ◄ Vapor Extraction Well Location
- MW-5 ⊗ Abandoned Well Location

Well ID	ELEV	TPH _g	Benzene	MTBE
Well Designation				
Groundwater Elevation				
Concentration of total petroleum hydrocarbons as gasoline, benzene, and MTBE in groundwater in micrograms per liter (µg/l). Samples collected on 01/21/02				
— Data Not Reported				
NS Well Not Sampled				
* Groundwater elevation anomalous, not used for contouring				
— 434.00 Groundwater elevation contour				
◄ Approximate groundwater flow direction and gradient				

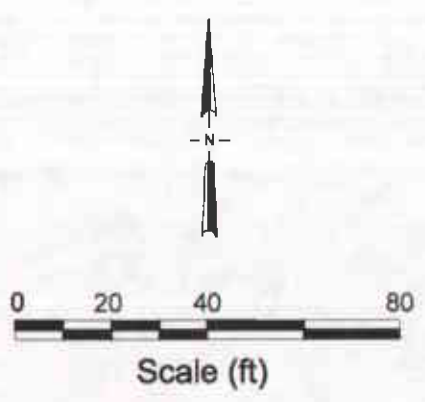
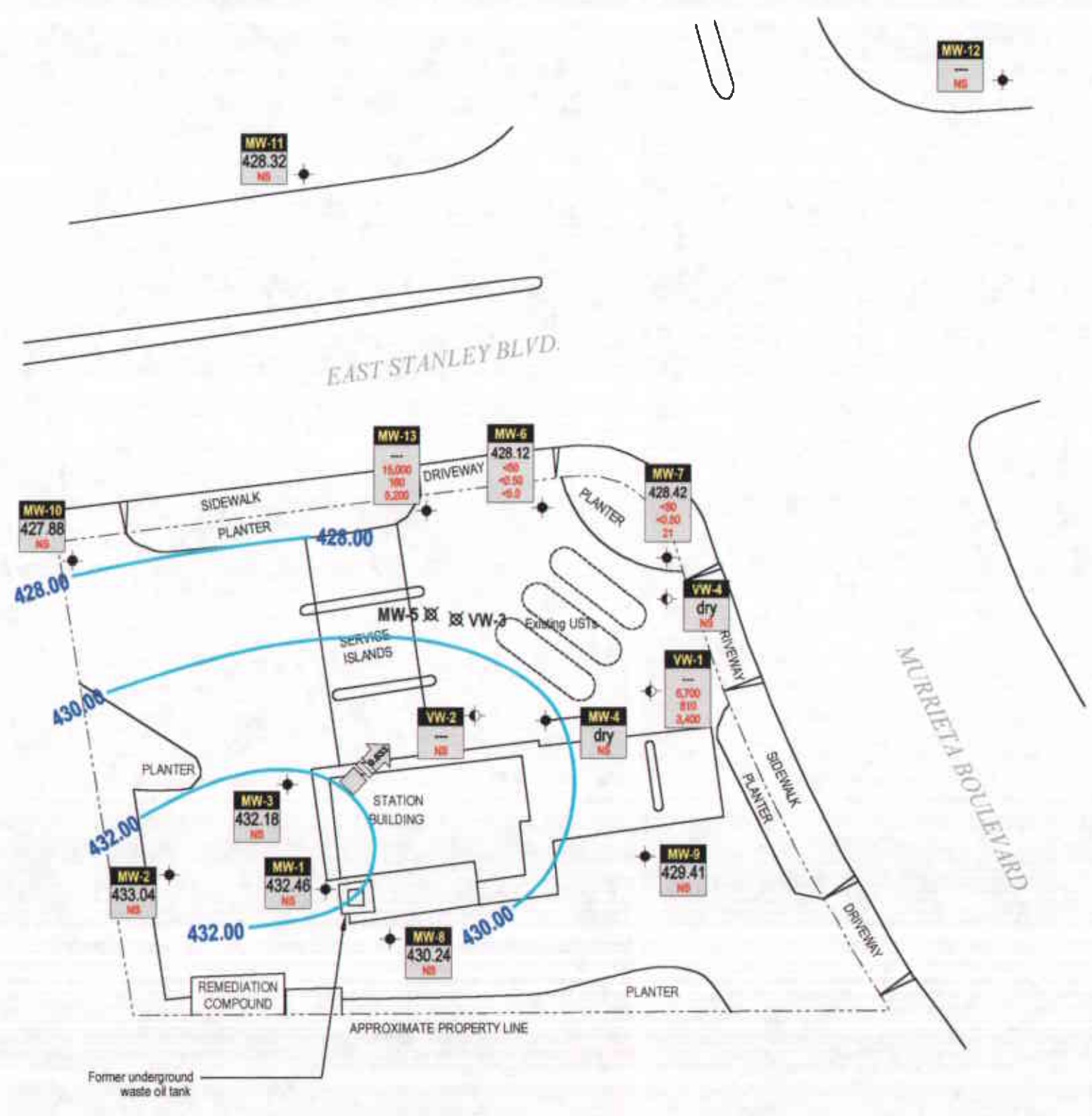


FIGURE
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Table 1
Historical Groundwater Elevation and Analytical Data
Petroleum Hydrocarbons and Their Constituents
1995 - Present*

ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Well Number	Date Gauged	Top of Casing	Depth to	Groundwater		TPH					MTBE 8021B ($\mu\text{g/L}$)	MTBE 8260 ($\mu\text{g/L}$)	Dissolved Oxygen (mg/L)	Purged/Not Purged (P/NP)
		Elevation (ft-MSL)	Water (feet)	Elevation (ft-MSL)	Date Sampled	Gasoline ($\mu\text{g/L}$)	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethyl-benzene ($\mu\text{g/L}$)	Total Xylenes ($\mu\text{g/L}$)				
MW-1	03-23-95	457.04	14.12	442.92	03-23-95	Not sampled: well sampled annually, during the fourth quarter								
MW-1	05-31-95	457.04	14.45	442.59	05-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-1	08-31-95	457.04	17.12	439.92	08-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-1	11-28-95	457.04	16.34	440.70	11-28-95	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-1	02-22-96	457.04	13.23	443.81	02-22-96	Not sampled: well sampled annually, during the fourth quarter								
MW-1	05-23-96	457.04	14.02	443.02	05-23-96	Not sampled: well sampled annually, during the fourth quarter								
MW-1	08-08-96	457.04	16.13	440.91	08-08-96	Not sampled: well sampled annually, during the fourth quarter								
MW-1	11-07-96	457.04	17.28	439.76	11-08-96	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-1	03-27-97	457.04	14.91	442.13	03-28-97	Not sampled: well sampled annually, during the fourth quarter								
MW-1	05-19-97	457.04	16.47	440.57	05-19-97	Not sampled: well sampled annually, during the fourth quarter								
MW-1	05-18-98	457.04	14.69	442.35	05-18-98	Not sampled: well sampled annually, during the fourth quarter								
MW-1	11-02-98	457.04	25.94	431.10	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-1	06-04-99	457.04	17.38	439.66	06-04-99	Not sampled: well sampled annually, during the fourth quarter								
MW-1	11-11-99	457.04	18.63	438.41	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		1.03	P
MW-1	06-20-00	457.04	17.09	439.95	06-20-00	Not sampled: well sampled annually, during the fourth quarter							3.1	
MW-1	08-29-00	457.04	18.20	438.84	08-29-00	Not sampled: well sampled annually, during the fourth quarter							2.66	
MW-1	11-29-00	457.04	20.30	436.74	11-29-00	<50.0	<0.500	<0.500	<0.500	1.36	<2.50		0.71	P
MW-1	05-02-01	457.04	22.39	434.65	05-02-01	Not sampled: well sampled annually, during the fourth quarter								
MW-1	08-15-01	457.04	24.97	432.07	08-15-01	Not sampled: well sampled annually, during the fourth quarter								
MW-1	10-05-01	457.04	25.09	431.95	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.78	P
MW-1	01-21-02	457.04	24.58	432.46	01-21-02	Not sampled: well sampled annually, during the fourth quarter								
MW-2	03-23-95	457.74	14.15	443.59	03-23-95	Not sampled: well sampled annually, during the fourth quarter								
MW-2	05-31-95	457.74	14.67	443.07	05-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-2	08-31-95	457.74	17.24	440.50	08-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-2	11-28-95	457.74	16.40	441.34	11-29-95	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-2	02-22-96	457.74	13.55	444.19	02-22-96	Not sampled: well sampled annually, during the fourth quarter								
MW-2	05-23-96	457.74	14.29	443.45	05-23-96	Not sampled: well sampled annually, during the fourth quarter								
MW-2	08-08-96	457.74	16.19	441.55	08-08-96	Not sampled: well sampled annually, during the fourth quarter								
MW-2	11-07-96	457.74	17.50	440.24	11-07-96	65	0.6	7.4	2.1	12	5			
MW-2	03-27-97	457.74	15.32	442.42	03-28-97	Not sampled: well sampled annually, during the fourth quarter								
MW-2	05-19-97	457.74	16.62	441.12	05-19-97	Not sampled: well sampled annually, during the fourth quarter								
MW-2	05-18-98	457.74	15.12	442.62	05-18-98	Not sampled: well sampled annually, during the fourth quarter								
MW-2	11-02-98	457.74	26.66	431.08	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-2	06-04-99	457.74	17.74	440.00	06-04-99	Not sampled: well sampled annually, during the fourth quarter								
MW-2	11-11-99	457.74	18.75	438.99	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		0.82	P
MW-2	06-20-00	457.74	17.21	440.53	06-20-00	Not sampled: well sampled annually, during the fourth quarter							2.6	

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						Gasoline ($\mu\text{g/L}$)	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethyl-benzene ($\mu\text{g/L}$)	Total Xylenes ($\mu\text{g/L}$)				
MW-2	08-29-00	457.74	18.25	439.49	08-29-00	Not sampled: well sampled annually, during the fourth quarter						2.65		
MW-2	11-29-00	457.74	20.69	437.05	11-29-00	<50.0	<0.500	0.581	0.827	4.38	<2.50		0.88	P
MW-2	05-02-01	457.74	22.69	435.05	05-02-01	Not sampled: well sampled annually, during the fourth quarter								
MW-2	08-15-01	457.74	25.15	432.59	08-15-01	Not sampled: well sampled annually, during the fourth quarter								
MW-2	10-05-01	457.74	25.22	432.52	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.80	P
MW-2	01-21-02	457.74	24.70	433.04	01-21-02	Not sampled: well sampled annually, during the fourth quarter								
MW-3	03-23-95	456.97	14.13	442.84	03-23-95	Not sampled: well sampled annually, during the fourth quarter								
MW-3	05-31-95	456.97	14.46	442.51	05-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-3	08-31-95	456.97	17.06	439.91	08-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-3	11-28-95	456.97	16.27	440.70	11-28-95	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-3	02-22-96	456.97	13.14	443.83	02-22-96	Not sampled: well sampled annually, during the fourth quarter								
MW-3	05-23-96	456.97	13.95	443.02	05-23-96	Not sampled: well sampled annually, during the fourth quarter								
MW-3	08-08-96	456.97	16.03	440.94	08-08-96	Not sampled: well sampled annually, during the fourth quarter								
MW-3	11-07-96	456.97	17.26	439.71	11-07-96	<50	<0.5	0.9	<0.5	1.5	<3			
MW-3	03-27-97	456.97	14.85	442.12	03-28-97	Not sampled: well sampled annually, during the fourth quarter								
MW-3	05-19-97	456.97	16.40	440.57	05-19-97	Not sampled: well sampled annually, during the fourth quarter								
MW-3	05-18-98	456.97	14.66	442.31	05-18-98	Not sampled: well sampled annually, during the fourth quarter								
MW-3	11-02-98	456.97	25.85	431.12	11-02-98	<1,000	<10	<10	<10	<10	1,700			
MW-3	06-04-99	456.97	17.35	439.62	06-04-99	Not sampled: well sampled annually, during the fourth quarter								
MW-3	11-11-99	456.97	18.58	438.39	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		0.79	P
MW-3	06-20-00	456.97	17.03	439.94	06-20-00	Not sampled: well sampled annually, during the fourth quarter							2.8	
MW-3	08-29-00	456.97	18.25	438.72	08-29-00	Not sampled: well sampled annually, during the fourth quarter							3.39	
MW-3	11-29-00	456.97	20.27	436.70	11-29-00	<50.0	<0.500	<0.500	1.08	3.34	<2.50		0.67	
MW-3	05-02-01	456.97	22.33	434.64	05-02-01	Not sampled: well sampled annually, during the fourth quarter								
MW-3	08-15-01	456.97	25.03	431.94	08-15-01	Not sampled: well sampled annually, during the fourth quarter								
MW-3	10-05-01	456.97	25.17	431.80	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.79	P
MW-3	01-21-02	456.97	24.79	432.18	01-21-02	Not sampled: well sampled annually, during the fourth quarter								

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785 East Stanley Boulevard, Livermore, California

Well Number	Date Gauged	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	Groundwater		TPH				Total Xylenes (µg/L)	MTBE 8021B (µg/L)	MTBE 8260 (µg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
				Elevation (ft-MSL)	Date Sampled	Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)					
MW-4	03-23-95	456.55	15.39	441.16	03-23-95	210	2.1	0.6	0.8	2.1	--			
MW-4	05-31-95	456.55	15.32	441.23	05-31-95	190	1.6	<0.5	0.7	0.9	--			
MW-4	08-31-95	456.55	17.86	438.69	08-31-95	160	1.2	0.7	<0.5	<2	<3			
MW-4	11-28-95	456.55	17.18	439.37	11-29-95	150	0.7	<0.5	0.7	1.4	<3			
MW-4	02-22-96	456.55	14.80	441.75	02-22-96	100	<0.5	<0.5	<0.6	0.8	<3			
MW-4	05-23-96	456.55	14.43	442.12	05-23-96	86	<0.5	<0.5	<0.5	<0.7	<3			
MW-4	08-08-96	456.55	16.80	439.75	08-08-96	98	<0.5	<0.5	<0.5	1.3	<3			
MW-4	11-07-96	456.55	17.90	438.65	11-13-96	140	<0.5	<0.5	<0.9	1.3	<3			
MW-4	03-27-97	456.55	15.22	441.33	03-28-97	<50	1.1	<0.5	<0.5	1.6	<3			
MW-4	05-19-97	456.55	16.98	439.57	05-19-97	62	<0.5	<0.5	<0.5	0.6	<3			
MW-4	05-18-98	456.55	14.99	441.56	05-18-98	<50	<0.5	<0.5	<0.5	<0.5	64			
MW-4	11-02-98	456.55	25.29	431.26	11-02-98	74	<0.5	<0.5	<0.5	<0.5	96			
MW-4	06-04-99	456.55	17.95	438.60	06-04-99	100	<0.5	<0.5	<0.5	<0.5	38			P
MW-4	11-11-99	456.55	19.25	437.30	11-11-99	88	<0.5	<0.5	<0.5	<1	10		0.77	P
DUP 1	06-20-00	NR	NR	NR	06-20-00	<50.0	<0.500	<0.500	<0.500	<0.500	62.3			
MW-4	06-20-00	456.55	17.79	438.76	06-20-00	<50.0	<0.500	<0.500	<0.500	<0.500	82.4		1.3	P
MW-4	08-29-00	456.55	18.90	437.65	08-29-00	56.0	<0.500	<0.500	<0.500	<0.500	47.9		0.97	P
MW-4	11-29-00	456.55	20.50	436.05	11-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	9.88	10.4	0.59	P
MW-4	05-02-01	456.55	22.65	433.90	05-02-01	<50.0	<0.500	<0.500	<0.500	<0.500	61.1	70.9	0.74	P
DUP 1	05-02-01	NR	NR	NR	05-02-01	<50.0	<0.500	<0.500	<0.500	<0.500	59.4	68.4		
MW-4	08-15-01	NR	NR	NR	08-15-01	Not sampled: well dry								
MW-4	10-05-01	NR	NR	NR	10-05-01	Not sampled: well dry								
MW-4	01-21-02	NR	NR	NR	01-21-02	Not sampled: well dry								
MW-5	03-23-95	455.84	13.97	441.87	03-23-95	68	4.2	3.4	2.3	12	--			
MW-5	05-31-95	455.84	NR	NR	05-31-95	Not sampled: well was inaccessible								
MW-5	08-31-95	455.84	NR	NR	08-31-95	Not sampled: well was inaccessible								
MW-5	11-28-95	455.84	16.46	439.38	11-29-95	960	41	24	38	210	<5			
MW-5	02-22-96	455.84	13.34	442.50	02-22-96	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-5	05-23-96	455.84	14.36	441.48	05-23-96	7,100	440	180	270	1,700	<50			
MW-5	08-08-96	455.84	16.38	439.46	08-08-96	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-5	11-07-96	455.84	17.26	438.58	11-13-96	5,600	230	86	210	1,100	<80			

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Petroleum Hydrocarbons and Their Constituents
1995 - Present***

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785 East Stanley Boulevard, Livermore, California**

Well Number	Date Gauged	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	Groundwater Elevation (ft-MSL)	Date Sampled	TPH				Total Xylenes (µg/L)	MTBE 8021B (µg/L)	MTBE 8260 (µg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
						Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)					
MW-5	03-27-97	455.84	15.95	439.89	03-28-97	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-5	05-19-97	455.84	16.64	439.20	05-20-97	7,600	480	140	400	1,200	<40			
MW-5	05-18-98	455.84	14.75	441.09	05-18-98	990	46	13	45	180	4			
MW-5	11-02-98	455.84	27.83	428.01	11-02-98	14,000	690	140	550	2,200	100			
MW-5	06-04-99	455.84	17.47	438.37	06-04-99	8,300	690	370	90	440	1,400		P	
MW-5	11-11-99	455.84	18.80	437.04	11-11-99	18,000	900	190	1,100	3,200	72	0.86	P	
MW-5	06-20-00	455.84	17.14	438.70	06-20-00	10,200	618	122	832	2,020	<50.0	1.6	P	
MW-5	08-29-00	455.84	18.60	437.24	08-29-00	12,300	436	166	711	2,120	517	0.79	P	
MW-5	11-29-00	455.84	20.57	435.27	11-29-00	26,000	491	149	1,090	3,810	671	<20.0	0.51	P
MW-5	05-02-01	NR	NR	NR	05-02-01	Well Abandoned								
MW-6	03-23-95	454.93	13.38	441.55	03-23-95	<50	1.5	<0.5	<0.5	0.9	--			
MW-6	05-31-95	454.93	13.96	440.97	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--			
MW-6	08-31-95	454.93	16.71	438.22	08-31-95	150	9	1.8	4	12	<3			
MW-6	11-28-95	454.93	15.65	439.28	11-29-95	<50	0.6	<0.5	<0.5	0.8	<3			
MW-6	02-22-96	454.93	12.53	442.40	02-22-96	<50	1.9	<0.5	0.8	2.1	<3			
MW-6	05-23-96	454.93	13.24	441.69	05-23-96	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-6	08-08-96	454.93	16.65	438.28	08-08-96	<50	0.5	<0.5	<0.5	0.5	<3			
MW-6	11-07-96	454.93	16.65	438.28	11-08-96	110	5.3	1.3	3.1	6.6	<3			
MW-6	03-27-97	454.93	14.25	440.68	03-28-97	<50	2.3	<0.5	0.9	3.5	4			
MW-6	05-19-97	454.93	15.87	439.06	05-20-97	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-6	05-18-98	454.93	14.00	440.93	05-18-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-6	11-02-98	454.93	24.95	429.98	11-02-98	<50	1.2	<0.5	<0.5	<0.5	3			
MW-6	06-04-99	454.93	16.68	438.25	06-04-99	310	41	3.8	11	19	33		P	
MW-6	11-11-99	454.93	16.12	438.81	11-11-99	<50	0.5	<0.5	<0.5	<1	<3	0.92	P	
MW-6	06-20-00	454.93	16.63	438.30	06-20-00	<50.0	<0.500	<0.500	<0.500	<0.500	17.3	1.9	P	
DUP	08-29-00	NR	NR	NR	08-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50			
MW-6	08-29-00	454.93	17.91	437.02	08-29-00	<50.0	<0.500	0.551	<0.500	<0.500	<2.50	1.67	P	
MW-6	11-29-00	454.93	20.30	434.63	11-29-00	<50.0	<0.500	<0.500	<0.500	1.03	<2.50	0.79	P	
MW-6	05-02-01	454.93	22.20	432.73	05-02-01	3,230	1,300	33.6	89.4	136	1,810	2,310	0.95	P
MW-6	08-15-01	454.93	27.95	426.98	08-15-01	<50	<0.50	<0.50	<0.50	<0.50	21	25	0.63	P
MW-6	10-05-01	454.93	28.05	426.88	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.85	P
MW-6	01-21-02	454.93	26.81	428.12	01-21-02	<50	<0.50	<0.50	<0.50	<0.50	<5.0		0.91	P

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Well Number	Date Gauged	Top of Casing	Depth to	Groundwater		TPH					MTBE 8021B ($\mu\text{g/L}$)	MTBE 8260 ($\mu\text{g/L}$)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)	
		Elevation (ft-MSL)	Water (feet)	Elevation (ft-MSL)	Date Sampled	Gasoline ($\mu\text{g/L}$)	Benzene ($\mu\text{g/L}$)	Toluene ($\mu\text{g/L}$)	Ethyl-benzene ($\mu\text{g/L}$)	Total Xylenes ($\mu\text{g/L}$)					
MW-7	03-23-95	454.92	13.29	441.63	03-23-95	<50	<0.5	<0.5	<0.5	<0.5	--				
MW-7	05-31-95	454.92	13.72	441.20	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--				
MW-7	08-31-95	454.92	16.53	438.39	08-31-95	<50	<0.5	<0.5	<0.5	1.2	<3				
MW-7	11-28-95	454.92	15.50	439.42	11-29-95	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	02-22-96	454.92	12.30	442.62	02-22-96	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	05-23-96	454.92	13.02	441.90	05-23-96	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	08-08-96	454.92	NR	NR	08-08-96	Not sampled: unable to locate well									
MW-7	11-07-96	454.92	16.50	438.42	11-08-96	<50	<0.5	<0.5	<0.5	0.8	<3				
MW-7	03-27-97	454.92	14.22	440.70	03-28-97	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	05-19-97	454.92	15.74	439.18	05-20-97	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	05-18-98	454.92	13.82	441.10	05-18-98	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-7	11-02-98	454.92	24.80	430.12	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	4				
MW-7	06-04-99	454.92	16.55	438.37	06-04-99	<50	<0.5	<0.5	<0.5	<0.5	<3			P	
MW-7	11-11-99	454.92	18.02	436.90	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		1.03	P	
MW-7	06-20-00	454.92	16.50	438.42	06-20-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50		1.3	P	
MW-7	08-29-00	454.92	17.80	437.12	08-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50		1.67	P	
MW-7	11-29-00	454.92	19.61	435.31	11-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50		0.51	P	
MW-7	05-02-01	454.92	22.05	432.87	05-02-01	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	2.66	0.9	P	
MW-7	08-15-01	454.92	27.55	427.37	08-15-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.84	P	
MW-7	10-05-01	454.92	27.59	427.33	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.62	P	
MW-7	01-21-02	454.92	26.50	428.42	01-21-02	<50	<0.50	<0.50	<0.50	<0.50	15	21	0.65	P	
MW-8	03-23-95	456.97	11.55	445.42	03-23-95	Not sampled: well sampled annually, during the fourth quarter									
MW-8	05-31-95	456.97	12.37	444.60	05-31-95	Not sampled: well sampled annually, during the fourth quarter									
MW-8	08-31-95	456.97	15.68	441.29	08-31-95	Not sampled: well sampled annually, during the fourth quarter									
MW-8	11-28-95	456.97	14.15	442.82	11-28-95	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-8	02-22-96	456.97	10.97	446.00	02-22-96	Not sampled: well sampled annually, during the fourth quarter									
MW-8	05-23-96	456.97	11.90	445.07	05-23-96	Not sampled: well sampled annually, during the fourth quarter									
MW-8	08-08-96	456.97	13.85	443.12	08-08-96	Not sampled: well sampled annually, during the fourth quarter									
MW-8	11-07-96	456.97	15.08	441.89	11-08-96	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-8	03-27-97	456.97	12.96	444.01	03-28-97	Not sampled: well sampled annually, during the fourth quarter									
MW-8	05-19-97	456.97	14.35	442.62	05-19-97	Not sampled: well sampled annually, during the fourth quarter									
MW-8	05-18-98	456.97	12.97	444.00	05-18-98	Not sampled: well sampled annually, during the fourth quarter									
MW-8	11-02-98	456.97	26.01	430.96	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	<3				
MW-8	06-04-99	456.97	15.53	441.44	06-04-99	Not sampled: well sampled annually, during the fourth quarter									
MW-8	11-11-99	456.97	16.67	440.30	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		1.01	P	
MW-8	06-20-00	456.97	15.29	441.68	06-20-00	Not sampled: well sampled annually, during the fourth quarter							2.4		

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Well Number	Date Gauged	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	Groundwater Elevation (ft-MSL)	Date Sampled	TPH					MTBE 8021B (µg/L)	MTBE 8260 (µg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
						Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)				
MW-8	08-29-00	456.97	16.59	440.38	08-29-00	Not sampled: well sampled annually, during the fourth quarter						3.37		
MW-8	11-29-00	456.97	19.80	437.17	11-29-00	<50.0	<0.500	<0.500	<0.500	0.772	<2.50		1.35	P
MW-8	05-02-01	456.97	22.12	434.85	05-02-01	Not sampled: well sampled annually, during the fourth quarter								
MW-8	08-15-01	456.97	27.63	429.34	08-15-01	Not sampled: well sampled annually, during the fourth quarter								
MW-8	10-05-01	456.97	27.65	429.32	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		1.07	P
MW-8	01-21-02	456.97	26.73	430.24	01-21-02	Not sampled: well sampled annually, during the fourth quarter								
MW-9	03-23-95	456.18	13.18	443.00	03-23-95	Not sampled: well sampled annually, during the fourth quarter								
MW-9	05-31-95	456.18	12.66	443.52	05-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-9	08-31-95	456.18	14.40	441.78	08-31-95	Not sampled: well sampled annually, during the fourth quarter								
MW-9	11-28-95	456.18	14.26	441.92	11-29-95	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-9	02-22-96	456.18	12.05	444.13	02-22-96	Not sampled: well sampled annually, during the fourth quarter								
MW-9	05-23-96	456.18	12.07	444.11	05-23-96	Not sampled: well sampled annually, during the fourth quarter								
MW-9	08-08-96	456.18	14.12	442.06	08-08-96	Not sampled: well sampled annually, during the fourth quarter								
MW-9	11-07-96	456.18	15.42	440.76	11-08-96	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-9	03-27-97	456.18	13.01	443.17	03-28-97	Not sampled: well sampled annually, during the fourth quarter								
MW-9	05-19-97	456.18	14.60	441.58	05-19-97	Not sampled: well sampled annually, during the fourth quarter								
MW-9	05-18-98	456.18	12.60	443.58	05-18-98	Not sampled: well sampled annually, during the fourth quarter								
MW-9	11-02-98	456.18	25.08	431.10	11-02-98	Not sampled								
MW-9	06-04-99	456.18	15.87	440.31	06-04-99	<50	<0.5	<0.5	<0.5	<0.5	<3			P
MW-9	11-11-99	456.18	17.02	439.16	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3		0.96	P
MW-9	06-20-00	456.18	15.54	440.64	06-20-00	Not sampled: well sampled annually, during the fourth quarter						2.1		
MW-9	08-29-00	456.18	16.81	439.37	08-29-00	Not sampled: well sampled annually, during the fourth quarter						2.59		
MW-9	11-29-00	456.18	18.81	437.37	11-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50		0.81	P
MW-9	05-02-01	456.18	22.09	434.09	05-02-01	Not sampled: well sampled annually, during the fourth quarter								
MW-9	08-15-01	456.18	27.59	428.59	08-15-01	Not sampled: well sampled annually, during the fourth quarter								
MW-9	10-05-01	456.18	27.63	428.55	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5		0.93	P
DUP	10-05-01	NR	NR	NR	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5			
MW-9	01-21-02	456.18	26.77	429.41	01-21-02	Not sampled: well sampled annually, during the fourth quarter								

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Well Number	Date Gauged	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	Groundwater		TPH						Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
				Elevation (ft-MSL)	Date Sampled	Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)	MTBE 8021B (µg/L)		
MW-10	03-23-95	456.85	14.86	441.99	03-23-95	Not sampled: well sampled annually, during the fourth quarter							
MW-10	05-31-95	456.85	15.63	441.22	05-31-95	Not sampled: well sampled annually, during the fourth quarter							
MW-10	08-31-95	456.85	14.40	442.45	08-31-95	Not sampled: well sampled annually, during the fourth quarter							
MW-10	11-28-95	456.85	17.24	439.61	11-29-95	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-10	02-22-96	456.85	14.30	442.55	02-22-96	Not sampled: well sampled annually, during the fourth quarter							
MW-10	05-23-96	456.85	14.93	441.92	05-23-96	Not sampled: well sampled annually, during the fourth quarter							
MW-10	08-08-96	456.85	17.20	439.65	08-08-96	Not sampled: well sampled annually, during the fourth quarter							
MW-10	11-07-96	456.85	18.25	438.60	11-08-96	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-10	03-27-97	456.85	15.77	441.08	03-28-97	Not sampled: well sampled annually, during the fourth quarter							
MW-10	05-19-97	456.85	17.38	439.47	05-19-97	Not sampled: well sampled annually, during the fourth quarter							
MW-10	05-18-98	456.85	15.47	441.38	05-18-98	Not sampled: well sampled annually, during the fourth quarter							
MW-10	11-02-98	456.85	26.94	429.91	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-10	06-04-99	456.85	17.19	439.66	06-04-99	Not sampled: well sampled annually, during the fourth quarter							
MW-10	11-11-99	456.85	19.35	437.50	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3	0.68	P
MW-10	06-20-00	456.85	17.92	438.93	06-20-00	Not sampled: well sampled annually, during the fourth quarter						2.9	
MW-10	08-29-00	456.85	19.15	437.70	08-29-00	Not sampled: well sampled annually, during the fourth quarter						1.54	
MW-10	11-29-00	456.85	21.30	435.55	11-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	0.95	P
MW-10	05-02-01	456.85	29.95	426.90	05-02-01	Not sampled: well sampled annually, during the fourth quarter							
MW-10	08-15-01	456.85	30.74	426.11	08-15-01	Not sampled: well sampled annually, during the fourth quarter							
MW-10	10-05-01	456.85	30.95	425.90	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5	0.89	P
MW-10	01-21-02	456.85	28.97	427.88	01-21-02	Not sampled: well sampled annually, during the fourth quarter							
MW-11	03-23-95	455.07	17.34	437.73	03-23-95	Not sampled: well sampled semi-annually, during the second and fourth quarters							
MW-11	05-31-95	455.07	16.68	438.39	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--		
MW-11	08-31-95	455.07	20.20	434.87	08-31-95	Not sampled: well sampled semi-annually, during the second and fourth quarters							
MW-11	11-28-95	455.07	17.80	437.27	11-28-95	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-11	02-22-96	455.07	15.97	439.10	02-22-96	Not sampled: well sampled semi-annually, during the second and fourth quarters							
MW-11	05-23-96	455.07	15.50	439.57	05-23-96	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-11	08-08-96	455.07	17.77	437.30	08-08-96	Not sampled: well sampled semi-annually, during the second and fourth quarters							
MW-11	11-07-96	455.07	17.45	437.62	11-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3		
MW-11	03-27-97	455.07	15.77	439.30	03-28-97	Not sampled: well sampled semi-annually, during the second and fourth quarters							

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Well Number	Date Gauged	Top of Casing	Depth to	Groundwater	Date Sampled	TPH			Ethyl-	Total	MTBE	MTBE	Dissolved	Purged/
		Elevation (ft-MSL)	Water (feet)	Elevation (ft-MSL)		Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	benzene (µg/L)	Xylenes (µg/L)	8021B (µg/L)	8260 (µg/L)	Oxygen (mg/L)	Not Purged (P/NP)
MW-11	05-19-97	455.07	16.80	438.27	05-19-97	<50	1.1	4.5	<0.5	2.2	<3			
MW-11	05-18-98	455.07	15.38	439.69	05-18-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-11	11-02-98	455.07	24.15	430.92	11-02-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-11	06-04-99	455.07	18.39	436.68	06-04-99	<50	<0.5	<0.5	<0.5	<0.5	<3			P
MW-11	11-11-99	455.07	18.62	436.45	11-11-99	<50	<0.5	<0.5	<0.5	<1	<3	1.01		P
MW-11	06-20-00	455.07	17.82	437.25	06-20-00	<50.0	0.631	<0.500	<0.500	<0.500	<2.50	4.1		P
MW-11	08-29-00	455.07	19.50	435.57	08-29-00	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-11	11-29-00	455.07	20.60	434.47	11-29-00	<50.0	<0.500	<0.500	<0.500	1.63	<2.50	0.97		P
MW-11	05-02-01	455.07	22.42	432.65	05-02-01	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	1.04		P
MW-11	08-15-01	455.07	27.41	427.66	08-15-01	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-11	10-05-01	455.07	27.59	427.48	10-05-01	<50	<0.50	<0.50	<0.50	<0.50	<2.5	1.05		P
MW-11	01-21-02	455.07	26.75	428.32	01-21-02	Not sampled: well sampled annually, during the fourth quarter								
MW-12	03-23-95	455.04	15.54	439.50	03-23-95	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-12	05-31-95	455.04	15.66	439.38	05-31-95	<50	<0.5	<0.5	<0.5	<0.5	--			
MW-12	08-31-95	455.04	18.23	436.81	08-31-95	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-12	11-28-95	455.04	17.53	437.51	11-28-95	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-12	02-22-96	455.04	14.45	440.59	02-22-96	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-12	05-23-96	455.04	14.88	440.16	05-23-96	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-12	08-08-96	455.04	17.30	437.74	08-08-96	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-12	11-07-96	455.04	18.30	436.74	11-13-96	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-12	03-27-97	455.04	15.69	439.35	03-28-97	Not sampled: well sampled semi-annually, during the second and fourth quarters								
MW-12	05-19-97	455.04	17.41	437.63	05-19-97	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-12	05-18-98	455.04	15.21	439.83	05-18-98	<50	<0.5	<0.5	<0.5	<0.5	<3			
MW-12	11-02-98	455.04	NR	NR	11-02-98	Not sampled: unable to locate well								
MW-12	06-04-99	455.04	NR	NR	06-04-99	Not sampled: unable to locate well								
MW-12	11-11-99	455.04	NR	NR	11-11-99	Not sampled: unable to locate well								
MW-12	06-20-00	455.04	NR	NR	06-20-00	Not sampled: unable to locate well								
MW-12	08-29-00	455.04	NR	NR	08-29-00	Not sampled: unable to locate well								
MW-12	11-29-00	455.04	NR	NR	11-29-00	Not sampled: unable to locate well								
MW-12	05-02-01	455.04	NR	NR	05-02-01	Not sampled: unable to locate well								
MW-12	08-15-01	455.04	NR	NR	08-15-01	Not sampled: unable to locate well								
MW-12	10-05-01	455.04	NR	NR	10-05-01	Not sampled: unable to locate well								
MW-12	01-21-02	455.04	NR	NR	01-21-02	Not sampled: unable to locate well								
MW-13	01-21-02	NR	24.61	NR	01-21-02	15,000	160	68	1,700	3,200	4,900	5,200	0.71	P

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Well Number	Date Gauged	Top of Casing	Depth to	Groundwater	Date Sampled	TPH					MTBE 8021B	MTBE 8260	Dissolved Oxygen	Purged/ Not Purged (P/NP)
		Elevation (ft-MSL)	Water (feet)	Elevation (ft-MSL)		Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Total Xylenes (µg/L)				
VW-1	08-29-00	NR	17.40	NR	08-29-00	2,360	27.6	11.6	26.3	33.2	110		4.47	P
VW-1	11-29-00	NR	18.75	NR	11-29-00	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50		0.46	P
VW-1	05-02-01	NR	21.59	NR	05-02-01	Well not sampled								
VW-1	08-15-01	NR	24.62	NR	08-15-01	1,200	6.3	4.3	1.7	1.3	20	17		P
DUP	08-15-01	NR	NR	NR	08-15-01	1,200	6.2	4.1	1.8	1.1	20	17		
VW-1	10-05-01	NR	24.75	NR	10-05-01	1,500	140	55	28	82	610	660	0.71	P
VW-1	01-21-02	NR	24.59	NR	01-21-02	6,700	810	350	270	1,100	2,600	3,400	0.69	P
DUP	01-21-02	NR	NR	NR	01-21-02	8,000	770	320	96	1,100	2,500	3,200		
VW-2	08-29-00	NR	NR	NR	08-29-00	Well inaccessible								
VW-2	11-29-00	NR	NR	NR	11-29-00	Well inaccessible								
VW-2	05-02-01	NR	NR	NR	05-02-01	Well not sampled								
VW-2	05-02-01	NR	NR	NR	08-15-01	Well not sampled								
VW-2	10-05-01	NR	NR	NR	10-05-01	Well inaccessible								
VW-2	01-21-02	NR	NR	NR	01-21-02	Well inaccessible								
VW-3	08-29-00	NR	17.93	NR	08-29-00	25,400	3,540	10,600	1,280	43,000	44,700			P
VW-3	11-29-00	NR	19.75	NR	11-29-00	54,200	9,450	1,870	2,350	9,400	12,300	15,100	0.47	P
VW-3	05-02-01	NR	NR	NR	05-02-01	Well abandoned								
VW-4	08-29-00	NR	NR	NR	08-29-00	Well inaccessible								
VW-4	11-29-00	NR	19.45	NR	11-29-00	37,500	4,510	206	2,100	9,030	6,770	7,880	0.42	P
DUP	11-29-00	NR	NR	NR	11-29-00	36,100	3,700	206	1,850	7,890	6,430	8,460		
VW-4	05-02-01	NR	21.66	NR	05-02-01	Well not sampled								
VW-4	08-15-01	NR	NR	NR	08-15-01	Well not sampled								
VW-4	10-05-01	NR	NR	NR	10-05-01	Not sampled: well dry								
VW-4	01-21-02	NR	NR	NR	01-21-02	Not sampled: well dry								

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

**ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California**

Well Number	Date Gauged	Top of Casing Elevation (ft-MSL)	Depth to Water (feet)	Groundwater Elevation (ft-MSL)	Date Sampled	TPH					MTBE 8021B (µg/L)	MTBE 8260 (µg/L)	Dissolved Oxygen (mg/L)	Purged/ Not Purged (P/NP)
						Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl- benzene (µg/L)	Total Xylenes (µg/L)				

Notes:

--: Not analyzed, not applicable

NR: not reported; data not available or not measurable

TPH: Total petroleum hydrocarbons by modified EPA method 8015

BTEX: Benzene, toluene, ethylbenzene, total xylenes by EPA method 8021B. (EPA method 8020 prior to 11/11/99)

MTBE: Methyl tertiary butyl ether by EPA method 8021B. (EPA method 8020 prior to 11/11/99). Any MTBE Detection by 8021B was confirmed by EPA method 8260 beginning Third Quarter 2000 (08-29-00 Results)

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

µg/L: micrograms per liter

mg/L: milligrams per liter

<: less than laboratory detection limit stated to the right

*: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6113, Livermore, California*, (EMCON, February 26, 1996).

DUP: duplicate

Table 2
Groundwater Flow Direction and Gradient
ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California

Date Measured	Average Flow Direction	Average Hydraulic Gradient
03-23-95	Northwest	0.035
05-31-95	North-Northwest	0.028
08-31-95	North-Northwest	0.03
11-28-95	North-Northwest	0.025
02-22-96	North-Northwest	0.031
05-23-96	North-Northwest	0.025
08-08-96	North	0.019
11-07-96	North-Northeast	0.019
03-27-97	North-Northwest	0.021
05-19-97	North	0.019
05-18-98	North	0.02
11-02-98	North	0.02
06-04-99	North	0.02
11-11-99	North	0.03
06-20-00	North-Northeast	0.014
08-29-00	North-Northeast	0.013
11-29-00	North-Northwest	0.026
05-02-01	Northeast	0.026
08-15-01	Northeast	0.047
10-05-01	Northeast	0.031
01-21-02	Northeast	0.033

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 tap water. During field sampling, equipment surfaces that were placed in the well or came into

contact with groundwater during field sampling were washed with detergent and double rinsed with tap 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 after each use. A bottom-filling, clear disposable 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 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, otherwise non-purge groundwater samples were collected. Before sampling occurred, a polyvinyl chloride (PVC) bailer, centrifugal pump, low-flow submersible pump, or disposable bailer was used to purge standing water in the casing and gravel pack from the monitoring well. 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 240-gallon truck-mounted tank to Integrated Waste Management's Milpitas storage facility for disposal.

Field measurements of pH, specific conductance, and temperature were recorded in a waterproof field logbook. 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 disposable 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 disposable 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 or ice 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.

Samples were transferred from Cambria to an ARCO-approved laboratory by courier or taken directly to the laboratory by the environmental sampler. Sample shipments from Cambria to laboratories performing the selected analyses routinely occurred within two to three days 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
- Sampler's initials
- Sample number (i.e., well designation)
- Date and time of collection
- Sample depth
- 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 Cambria 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
- Well number
- Site-specific instructions
- Well specifications (expected total depth, depth of water, and product thickness)
- Specific analytical parameters

APPENDIX B

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



**Sequoia
Analytical**

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FAX (650) 232-9612
www.sequoialabs.com

6 February, 2002

Ron Scheele
Cambria Environmental [1]
6262 Hollis St.
Emeryville, CA 94608

RE: ARCO
Sequoia Report: L201113

Enclosed are the results of analyses for samples received by the laboratory on 01/24/02 14:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Wayne Stevenson For Latonya Pelt
Project Manager

CA ELAP Certificate #2360



Cambria Environmental [1]
6262 Hollis St.
Emeryville CA, 94608

Project: ARCO
Project Number: ARCO#6113, Livermore
Project Manager: Ron Scheele

Reported:
02/06/02 08:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-6	L201113-01	Water	01/21/02 05:20	01/24/02 14:45
MW-7	L201113-02	Water	01/21/02 06:00	01/24/02 14:45
MW-13	L201113-03	Water	01/21/02 06:30	01/24/02 14:45
VW-1	L201113-04	Water	01/21/02 04:35	01/24/02 14:45
DUP	L201113-05	Water	01/21/02 00:00	01/24/02 14:45

There were no custody seals that were received with this project.

Sequoia Analytical - San Carlos

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Wayne Stevenson For Latonya Pelt, Project Manager



Cambria Environmental [1]
6262 Hollis St.
Emeryville CA, 94608

Project: ARCO
Project Number: ARCO#6113, Livermore
Project Manager: Ron Scheele

Reported:
02/06/02 08:37

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B

Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-6 (L201113-01) Water Sampled: 01/21/02 05:20 Received: 01/24/02 14:45									
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l	1	2010101	01/30/02	01/31/02	EPA 8021B	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	ND	5.0	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		95.2 %	70-130		"	"	"	"	
MW-7 (L201113-02) Water Sampled: 01/21/02 06:00 Received: 01/24/02 14:45									
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l	1	2010101	01/30/02	01/31/02	EPA 8021B	
Benzene	ND	0.50	"	"	"	"	"	"	
Toluene	ND	0.50	"	"	"	"	"	"	
Ethylbenzene	ND	0.50	"	"	"	"	"	"	
Xylenes (total)	ND	0.50	"	"	"	"	"	"	
Methyl tert-butyl ether	15	5.0	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		93.1 %	70-130		"	"	"	"	
MW-13 (L201113-03) Water Sampled: 01/21/02 06:30 Received: 01/24/02 14:45									
Purgeable Hydrocarbons as Gasoline	15000	2500	ug/l	50	2010100	01/30/02	01/31/02	EPA 8021B	P-02
Benzene	160	25	"	"	"	"	"	"	
Toluene	68	25	"	"	"	"	"	"	
Ethylbenzene	1700	25	"	"	"	"	"	"	
Xylenes (total)	3200	25	"	"	"	"	"	"	
Methyl tert-butyl ether	4900	250	"	"	"	"	"	"	
<i>Surrogate: a,a,a-Trifluorotoluene</i>		96.6 %	70-130		"	"	"	"	



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Cambria Environmental [1]
 6262 Hollis St.
 Emeryville CA, 94608

Project: ARCO
 Project Number: ARCO#6113, Livermore
 Project Manager: Ron Scheele

Reported:
 02/06/02 08:37

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B

Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
VW-1 (L201113-04) Water Sampled: 01/21/02 04:35 Received: 01/24/02 14:45									
Purgeable Hydrocarbons as Gasoline	6700	2500	ug/l	50	2010100	01/30/02	01/31/02	EPA 8021B	P-01
Benzene	810	25	"	"	"	"	"	"	
Toluene	350	25	"	"	"	"	"	"	
Ethylbenzene	270	25	"	"	"	"	"	"	
Xylenes (total)	1100	25	"	"	"	"	"	"	
Methyl tert-butyl ether	2600	250	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		94.3 %	70-130		"	"	"	"	
DUP (L201113-05) Water Sampled: 01/21/02 00:00 Received: 01/24/02 14:45									
Purgeable Hydrocarbons as Gasoline	8000	2500	ug/l	50	2010104	01/31/02	01/31/02	EPA 8021B	P-01
Benzene	770	25	"	"	"	"	"	"	
Toluene	320	25	"	"	"	"	"	"	
Ethylbenzene	96	25	"	"	"	"	"	"	
Xylenes (total)	1100	25	"	"	"	"	"	"	
Methyl tert-butyl ether	2500	250	"	"	"	"	"	"	
Surrogate: a,a,a-Trifluorotoluene		117 %	70-130		"	"	"	"	

Cambria Environmental [1]
6262 Hollis St.
Emeryville CA, 94608

Project: ARCO
Project Number: ARCO#6113, Livermore
Project Manager: Ron Scheele

Reported:
02/06/02 08:37

**MTBE Confirmation by EPA Method 8260B
Sequoia Analytical - San Carlos**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
MW-7 (L201113-02) Water Sampled: 01/21/02 06:00 Received: 01/24/02 14:45									
Methyl tert-butyl ether	21	1.0	ug/l	1	2010106	02/04/02	02/04/02	EPA 8260B	
Surrogate: 1,2-Dichloroethane-d4		99.2 %	70-130		"	"	"	"	
MW-13 (L201113-03) Water Sampled: 01/21/02 06:30 Received: 01/24/02 14:45									
Methyl tert-butyl ether	5200	50	ug/l	50	2010106	02/04/02	02/04/02	EPA 8260B	
Surrogate: 1,2-Dichloroethane-d4		97.2 %	70-130		"	"	"	"	
VW-1 (L201113-04) Water Sampled: 01/21/02 04:35 Received: 01/24/02 14:45									
Methyl tert-butyl ether	3400	25	ug/l	25	2010106	02/04/02	02/04/02	EPA 8260B	
Surrogate: 1,2-Dichloroethane-d4		106 %	70-130		"	"	"	"	
DUP (L201113-05) Water Sampled: 01/21/02 00:00 Received: 01/24/02 14:45									
Methyl tert-butyl ether	3200	25	ug/l	25	2010106	02/04/02	02/04/02	EPA 8260B	
Surrogate: 1,2-Dichloroethane-d4		103 %	70-130		"	"	"	"	

Cambria Environmental [1]
 6262 Hollis St.
 Emeryville CA, 94608

 Project: ARCO
 Project Number: ARCO#6113, Livermore
 Project Manager: Ron Scheele

Reported:
 02/06/02 08:37

**Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control
 Sequoia Analytical - San Carlos**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010100 - EPA 5030B (P/T)										
Blank (2010100-BLK1)										
Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l							
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	5.0	"							
<i>Surrogate: a,a,a-Trifluorotoluene</i>	11.3		"	10.0		113	70-130			
LCS (2010100-BS1)										
Prepared & Analyzed: 01/30/02										
Benzene	9.27	0.50	ug/l	10.0		92.7	70-130			
Toluene	9.37	0.50	"	10.0		93.7	70-130			
Ethylbenzene	9.23	0.50	"	10.0		92.3	70-130			
Xylenes (total)	27.9	0.50	"	30.0		93.0	70-130			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	11.5		"	10.0		115	70-130			
LCS (2010100-BS2)										
Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	215	50	ug/l	250		86.0	70-130			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	11.7		"	10.0		117	70-130			
Matrix Spike (2010100-MS1)										
Source: L201102-04 Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	177	50	ug/l	250	ND	70.8	60-140			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	11.5		"	10.0		115	70-130			
Matrix Spike Dup (2010100-MSD1)										
Source: L201102-04 Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	198	50	ug/l	250	ND	79.2	60-140	11.2	25	
<i>Surrogate: a,a,a-Trifluorotoluene</i>	10.6		"	10.0		106	70-130			



Cambria Environmental [1]
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Project: ARCO
Project Number: ARCO#6113, Livermore
Project Manager: Ron Scheele

Reported:
02/06/02 08:37

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control

Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010101 - EPA 5030B (P/T)										
Blank (2010101-BLK1)										
Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l							
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	5.0	"							
Surrogate: a,a,a-Trifluorotoluene	8.86		"	10.0		88.6	70-130			
LCS (2010101-BS1)										
Prepared & Analyzed: 01/30/02										
Benzene	9.80	0.50	ug/l	10.0		98.0	70-130			
Toluene	9.84	0.50	"	10.0		98.4	70-130			
Ethylbenzene	9.70	0.50	"	10.0		97.0	70-130			
Xylenes (total)	29.8	0.50	"	30.0		99.3	70-130			
Surrogate: a,a,a-Trifluorotoluene	9.33		"	10.0		93.3	70-130			
LCS (2010101-BS2)										
Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	234	50	ug/l	250		93.6	70-130			
Surrogate: a,a,a-Trifluorotoluene	10.2		"	10.0		102	70-130			
Matrix Spike (2010101-MS1)										
Source: L201102-02 Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	273	50	ug/l	250	ND	109	60-140			
Surrogate: a,a,a-Trifluorotoluene	9.43		"	10.0		94.3	70-130			
Matrix Spike Dup (2010101-MSD1)										
Source: L201102-02 Prepared & Analyzed: 01/30/02										
Purgeable Hydrocarbons as Gasoline	270	50	ug/l	250	ND	108	60-140	1.10	25	
Surrogate: a,a,a-Trifluorotoluene	9.77		"	10.0		97.7	70-130			



Cambria Environmental [1]
 6262 Hollis St.
 Emeryville CA, 94608

Project: ARCO
 Project Number: ARCO#6113, Livermore
 Project Manager: Ron Scheele

Reported:
 02/06/02 08:37

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control
Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2010104 - EPA 5030B (P/T)										
Blank (2010104-BLK1) Prepared & Analyzed: 01/31/02										
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l							
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	5.0	"							
Surrogate: a,a,a-Trifluorotoluene	11.6		"	10.0		116	70-130			
Blank (2010104-BLK2) Prepared & Analyzed: 02/01/02										
Purgeable Hydrocarbons as Gasoline	ND	50	ug/l							
Benzene	ND	0.50	"							
Toluene	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Xylenes (total)	ND	0.50	"							
Methyl tert-butyl ether	ND	5.0	"							
Surrogate: a,a,a-Trifluorotoluene	10.9		"	10.0		109	70-130			
LCS (2010104-BS1) Prepared & Analyzed: 01/31/02										
Benzene	9.98	0.50	ug/l	10.0		99.8	70-130			
Toluene	10.1	0.50	"	10.0		101	70-130			
Ethylbenzene	10.0	0.50	"	10.0		100	70-130			
Xylenes (total)	30.5	0.50	"	30.0		102	70-130			
Surrogate: a,a,a-Trifluorotoluene	10.3		"	10.0		103	70-130			
LCS (2010104-BS2) Prepared & Analyzed: 01/31/02										
Purgeable Hydrocarbons as Gasoline	189	50	ug/l	250		75.6	70-130			
Surrogate: a,a,a-Trifluorotoluene	11.3		"	10.0		113	70-130			

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 Project Manager: Ron Scheele

Reported:
 02/06/02 08:37

Total Purgeable Hydrocarbon (C6-C12) by EPA 8015M and BTEX/MTBE by EPA 8021B - Quality Control
Sequoia Analytical - San Carlos

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2010104 - EPA 5030B (P/T)
LCS (2010104-BS3)

Prepared & Analyzed: 02/01/02

Benzene	9.94	0.50	ug/l	10.0		99.4	70-130			
Toluene	9.88	0.50	"	10.0		98.8	70-130			
Ethylbenzene	9.87	0.50	"	10.0		98.7	70-130			
Xylenes (total)	29.6	0.50	"	30.0		98.7	70-130			

Surrogate: a,a,a-Trifluorotoluene

10.7 " 10.0 107 70-130

LCS (2010104-BS4)

Prepared & Analyzed: 02/01/02

Purgeable Hydrocarbons as Gasoline	259	50	ug/l	250		104	70-130			
<i>Surrogate: a,a,a-Trifluorotoluene</i>	11.5		"	10.0		115	70-130			

Matrix Spike (2010104-MS1)

Source: L201118-08

Prepared & Analyzed: 02/01/02

Benzene	9.69	0.50	ug/l	10.0	ND	96.9	60-140			
Toluene	9.61	0.50	"	10.0	ND	96.1	60-140			
Ethylbenzene	9.59	0.50	"	10.0	ND	95.9	60-140			
Xylenes (total)	28.4	0.50	"	30.0	ND	94.7	60-140			

Surrogate: a,a,a-Trifluorotoluene

10.9 " 10.0 109 70-130

Matrix Spike Dup (2010104-MSD1)

Source: L201118-08

Prepared: 02/01/02 Analyzed: 02/02/02

Benzene	9.28	0.50	ug/l	10.0	ND	92.8	60-140	4.32	25	
Toluene	9.17	0.50	"	10.0	ND	91.7	60-140	4.69	25	
Ethylbenzene	9.19	0.50	"	10.0	ND	91.9	60-140	4.26	25	
Xylenes (total)	27.7	0.50	"	30.0	ND	92.3	60-140	2.50	25	

Surrogate: a,a,a-Trifluorotoluene

9.79 " 10.0 97.9 70-130

Cambria Environmental [1]
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Emeryville CA, 94608

Project: ARCO
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Reported:
02/06/02 08:37

**MTBE Confirmation by EPA Method 8260B - Quality Control
Sequoia Analytical - San Carlos**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC	Limit	RPD	RPD Limit	Notes
Batch 2010106 - EPA 5030B [P/T]										
Blank (2010106-BLK1) Prepared & Analyzed: 01/31/02										
Methyl tert-butyl ether	ND	1.0	ug/l							
Surrogate: 1,2-Dichloroethane-d4	49.7		"	50.0		99.4	70-130			
Blank (2010106-BLK2) Prepared & Analyzed: 02/04/02										
Methyl tert-butyl ether	ND	1.0	ug/l							
Surrogate: 1,2-Dichloroethane-d4	53.8		"	50.0		108	70-130			
LCS (2010106-BS1) Prepared & Analyzed: 01/31/02										
Methyl tert-butyl ether	53.3	1.0	ug/l	50.0		107	70-130			
Surrogate: 1,2-Dichloroethane-d4	50.7		"	50.0		101	70-130			
LCS (2010106-BS2) Prepared & Analyzed: 02/04/02										
Methyl tert-butyl ether	50.8	1.0	ug/l	50.0		102	70-130			
Surrogate: 1,2-Dichloroethane-d4	47.6		"	50.0		95.2	70-130			
Matrix Spike (2010106-MS1) Source: L201123-09 Prepared & Analyzed: 01/31/02										
Methyl tert-butyl ether	171	1.0	ug/l	50.0	120	102	60-140			
Surrogate: 1,2-Dichloroethane-d4	52.3		"	50.0		105	70-130			
Matrix Spike Dup (2010106-MSD1) Source: L201123-09 Prepared & Analyzed: 01/31/02										
Methyl tert-butyl ether	156	1.0	ug/l	50.0	120	72.0	60-140	9.17	25	
Surrogate: 1,2-Dichloroethane-d4	50.7		"	50.0		101	70-130			


Cambria Environmental [1]
6262 Hollis St.
Emeryville CA, 94608

Project: ARCO
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Reported:
02/06/02 08:37

Notes and Definitions

P-01 Chromatogram Pattern: Gasoline C6-C12
P-02 Chromatogram Pattern: Weathered Gasoline C6-C12
DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

ARCO Products Company 

Division of Atlantic Richfield Company

Task Order No.

Chain of Custody

ARCO Facility no. 6113	City (Facility) Livermore	Project manager (Consultant) Ron Scheele	Laboratory name Sequoia
ARCO engineer Paul Supple	Telephone no. (ARCO) 925-299-8291	Telephone no. (Consultant) 510-450-1983	Contract number
Consultant name Cambria Env. Tech		Address (Consultant) 6262 Hollis St. Emeryville, Ca	FOX NO. (Consultant) 510-450-8295

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	STEX EPA 802	BTEX/TPH EPA 1631/8016	TPH Modified 8015 Gas <input type="checkbox"/> Dissol <input type="checkbox"/>	Oil and Grease 4131 <input type="checkbox"/> 4132 <input type="checkbox"/>	TPH EPA 418.1/516/8016	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metal <input type="checkbox"/> VOC <input type="checkbox"/> VOAC <input type="checkbox"/>	SEM Metal <input type="checkbox"/> VOC <input type="checkbox"/> VOAC <input type="checkbox"/>	CM VIALS EPA 801/8010 110 <input type="checkbox"/> 510 <input type="checkbox"/>	Lead EPA 7430/7421 <input type="checkbox"/>	
			Soil	Water	Other	Ice	Acid															
MW-6	01	4		X		X	X	1-21-02	5:20		X											
MW-7	02	4		X		X	X	1-21-02	6:00		X											
MW-13	03	4		X		X	X	1-21-02	6:30		X											
VW-1	04	4		X		X	X	1-21-02	4:35		X											
DUP	05	4		X		X	X	1-21-02			X											

Method of shipment
Special detection Limit/reporting Lowest Possible
Special QAVOC
Remarks Confirm all MTBE by 8260 Report results in EDF format
Lab number 20113
Turnaround time
Priority Rush 1 Business Day <input type="checkbox"/>
Rush 2 Business Days <input type="checkbox"/>
Expedited 5 Business Days <input type="checkbox"/>
Standard 10 Business Days <input checked="" type="checkbox"/>

Condition of sample:		Temperature received:	
Relinquished by (Sampler) S. Will	Date 1/21/02	Time 1:45	Received by Xeri Lee
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by

APPENDIX C

FIELD DATA SHEETS

WELL DEPTH MEASUREMENTS

Well ID	Time	Product Depth	Water Depth	Product Thickness	Well Depth	Comments
MW-1	2:50		24.58			
MW-2	2:55		24.70			
MW-3	3:00		24.79			
- MW-4	3:05		dry			
- MW-6	3:10		26.81			
- MW-7	3:15		26.50			
MW-8	2:45		26.73			
MW-9	2:40		26.77			
MW-11	2:30		26.75			
MW-12		unable to locate				
- MW-13	3:30		24.61		30.25	
- VW-1	3:20		24.59			
- VW-2		unable to open				
- VW-4	3:35		dry			
MW-10	3:25		28.97			

Project Name: Asco 6113

Project Number: 439-1812

Measured By: S. Gill

Date: 1-21-02

CAMBRIA

WELL SAMPLING FORM

Project Name: ARCO 6113	Cambria Mgr: RS	Well ID: MW-6
Project Number: 439-1812 4038-1811	Date: 1-21-02 ADVISORY	Well Yield: ---
Site Address: 785 East Stanley Blvd Livermore, Ca	Sampling Method: Disposable bailer	Well Diameter: 4" pvc
Initial Depth to Water: 26.81	Total Well Depth: 68.00	Technician(s): SG
Volume/ft: 0.65	1 Casing Volume: 26.77	Water Column Height: 41.19
Purging Device: 4" disposable bailer	Did Well Dewater?: NO	3 Casing Volumes: 80.32
Start Purge Time: 4:45	Stop Purge Time: 5:14	Total Gallons Purged: 2700
		Total Time: 29mins

1 Casing Volume = Water column height x Volume/ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.57

Time	Casing Volume	Temp. C	pH	Cond. uS	Comments
4:55	1 26 9	15.1	7.14	1219	
5:05	2 26 18	15.0	7.30	984	
5:15	3 26 27	15.3	7.27	1015	DD = 0.91 mg/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-6	1-21-02 ADVISORY	5:20	41 VOA	HCl	TPH, BTEX, MTBE	8015/8020/8260

CAMBRIA

WELL SAMPLING FORM

Project Name: ARCO 6113	Cambria Mgr: RS	Well ID: MW-7
Project Number: 439-1812 438-1812	Date: 1-21-02 1-21-01	Well Yield: ---
Site Address: 785 East Stanley Blvd Livermore, Ca	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
Initial Depth to Water: 26.50	Total Well Depth: 68.00	Technician(s): SG
Volume/ft: 0.65	1 Casing Volume: 26.90	Water Column Height: 41.5
Purging Device: 4" pvc bailer	Did Well Dewater?: NO	3 Casing Volumes: 80.92
Start Purge Time: 5:30	Stop Purge Time: 5:54	Total Gallons Purged: 27
		Total Time: 24 mins

1 Casing Volume = Water column height x Volume/ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp. C	pH	Cond. uS	Comments
5:40	9	15.3	7.18	1390	
5:50	18	15.1	7.04	1317	
5:55	27	15.4	7.10	1345	

DD = 0.65 mg/l

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-7	1-21-02 1-21-01	6:00	4 v o a	HCl	TPH, BTEX, MTBE	8015/8020/8260
MW-						

CAMBRIA

WELL SAMPLING FORM

Project Name: Arco 6113	Cambria Mgr: RS	Well ID: MW-13
Project Number: 438-1611	Date: 1-21-02 10/23/04	Well Yield: ---
Site Address: 785 East Stanley Blvd Livermore, Ca	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
Initial Depth to Water: 24.61	Total Well Depth: 30.25	Technician(s): SG
Volume/ft: 0.16	Casing Volume: 0.90	Water Column Height: 5.64
Purging Device: disposable bailer	Did Well Dewater?: no	Casing Volumes: 9.0
Start Purge Time: 6:10	Stop Purge Time: 6:22	Total Gallons Purged: 12
		Total Time: 12 mins

1 Casing Volume = Water column height x Volume/ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
1"	0.65
6"	1.47

Time	Casing Volume	Temp. C	pH	Cond. uS	Comments
6:11	1	15.1	7.19	3999	dirty brown silty
6:12	2	15.3	7.37	3999	" " "
6:13	3	15.3	7.40	3999	" " "
6:14	4	15.3	7.32	3999	" " "
6:15	5	15.7	7.35	3999	" " "
6:16	6	15.3	7.30	3999	" " "
6:17	7	15.4	7.25	3999	clear
6:18	8	15.7	7.13	2015	"
6:19	9	15.4	7.19	1217	" DTB = 30.25
6:20	10	15.4	7.20	1211	
6:21	11	15.4	7.20	1282	DD = 0.71mg/l
6:22	12	15.4	7.19	1290	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-13	1-21-02 10/23/04	6:30	1000	HCl	TPH, BTEX, MTBE	8015/8020/8260
MW-						

CAMBRIA

WELL SAMPLING FORM

Project Name: Acid 6113	Cambria Mgr: RS	Well ID: WVW-1 VW-1
Project Number: 438-1611	Date: 1-21-02 10/2/01	Well Yield: -----
Site Address: 785 East Stanley Blvd Livermore, Ca	Sampling Method: Disposable bailer	Well Diameter: 2" pvc Technician(s): SG
Initial Depth to Water: 24.59	Total Well Depth: 45.00	Water Column Height: 20.41
Volume/ft: 0.65	1 Casing Volume: 13.26	3 Casing Volumes: 39.79
Purging Device: 4" pvc bailer	Did Well Dewater?: NO	Total Gallons Purged: 26
Start Purge Time: 4:00	Stop Purge Time: 4:29	Total Time: 29 mins

1 Casing Volume = Water column height x Volume/ft.

Well Diam.	Volume/ft (gallons)
2"	0.16
4"	0.65
6"	1.47

Time	Casing Volume	Temp. C	pH	Cond. uS	Comments
4:10	13	15.3	7.19	1375	
4:20	20	15.1	7.27	1311	
4:30	26	15.1	7.25	1319	
					DO = 0.69 mg/L

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
WVW-1 VW-1	1-21-02 1-21-02	4:35	21 v o a	HCl	TPH, BTEX, MTBE	8015/8020/8760
DGP						