Atlantic Richfield Company

Chuck Carmel
Remediation Management Project Manager

PO Box 1257
San Ramon, CA 94583
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January 15, 2015

RECEIVED
By Alameda County Environmental Health at 2:13 pm, Jan 16, 2015

Re: Fourth Quarter 2014 Status Report
Atlantic Richfield Company Station #498
286 South Livermore Ave, Livermore, California
ACEH Case #RO0002873

"I declare, that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached document are true and correct."

Submitted by,

Chuck Carmel
Remediation Management Project Manager

Attachment

FOURTH QUARTER 2014 MONITORING REPORT
Atlantic Richfield Company Station #498
286 South Livermore Avenue,
Livermore, Alameda County, California

Prepared for:

Mr. Chuck Carmel
Atlantic Richfield Company
P.O. Box 1257
San Ramon, CA 94583

Prepared by:

Broadbent & Associates, Inc.
4820 Business Center Drive, Suite 110
Fairfield, California 94534
(707) 455-7290

January 15, 2015

No. 08-88-603

BROADBENT
4820 Business Center Drive, Suite 110
Fairfield, CA 94534
[T] 707-455-7290 [F] 707-863-9046
broadbentinc.com

January 15, 2015

Project No. 08-88-603

Atlantic Richfield Company
P.O. Box 1257
San Ramon, CA 94583
Submitted via ENFOS

Attn.: Mr. Chuck Carmel

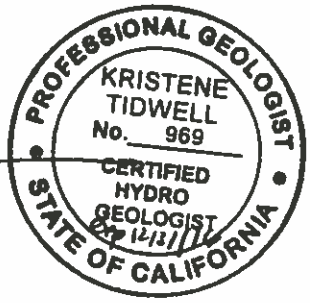
Re: Fourth Quarter 2014 Groundwater Monitoring Report, Atlantic Richfield Company Station No. 498, 286 South Livermore Avenue, Livermore, California; ACEH Case #RO0002873

Dear Mr. Carmel:

Attached is the *Fourth Quarter 2014 Groundwater Monitoring Report* for Atlantic Richfield Company (a BP affiliated company) Station No. 498 located at 286 South Livermore Avenue in Livermore, Alameda County, California (Site). This report presents results of groundwater monitoring conducted at the Site during the Fourth Quarter 2014.

Should you have questions regarding the work performed or results obtained, please do not hesitate to contact us at (707) 455-7290.

Sincerely,
BROADBENT & ASSOCIATES



Kristene Tidwell, P.G., C.HG.
Associate Hydrogeologist

Enclosures

cc: Mr. Jerry Wickham, Alameda County Environmental Health, 1131 Harbor Bay Parkway, Suite 250, Alameda, CA 84502 (Submitted via ACEH ftp Site)
Electronic copy uploaded to GeoTracker

FOURTH QUARTER 2014
MONITORING REPORT
ATLANTIC RICHFIELD COMPANY STATION No. 498
LIVERMORE, CALIFORNIA

Broadbent and Associates, Inc. (Broadbent) is pleased to present this *Fourth Quarter 2014 Groundwater Monitoring Report* on behalf of Atlantic Richfield Company (ARC, a BP affiliated company) for Station No. 498 located at 286 South Livermore Avenue in Livermore, Alameda County, California (the Site). Monitoring activities at the Site were performed in accordance with an agency directive issued by the Alameda County Environmental Health (ACEH). Details of work performed, discussion of results, and recommendations are provided below.

Facility Name / Address:	Station No. 498 / 286 South Livermore Ave., Livermore, California; Drawing 1
Client Project Manager / Title:	Mr. Chuck Carmel / Remediation Management Project Manager
Broadbent Contact:	Ms. Kristene Tidwell, P.G., C.HG., (707) 455-7290
Broadbent Project No.:	08-88-603
Primary Regulatory Agency / ID No.:	ACEH / Case # RO0002873
Current phase of project:	Monitoring
List of Acronyms / Abbreviations:	See end of report text for list of acronyms/abbreviations used in report.

WORK PERFORMED THIS QUARTER (Fourth Quarter 2014):

1. Submitted *Third Quarter 2014 Status Report*.
2. Conducted groundwater monitoring/sampling event for Fourth Quarter 2014 on November 20, 2014.

WORK SCHEDULED FOR NEXT QUARTER (First Quarter 2015):

1. Submit *Fourth Quarter 2014 Groundwater Monitoring Report* (contained herein).
2. Conduct groundwater monitoring/sampling event for First Quarter 2015.

QUARTERLY MONITORING PLAN SUMMARY:

Groundwater level gauging:	MW-1, MW-2, MW-3, MW-4, MW-5A/B and MW-6A/B	Quarterly
Groundwater sample collection:	MW-1, MW-2, MW-3, MW-4, MW-5A/B and MW-6A/B	Quarterly
Biodegradation indicator parameter monitoring:	None	(Quarterly)

QUARTERLY RESULTS SUMMARY:

LNAPL

LNAPL observed this quarter:	No	(yes\no)
LNAPL recovered this quarter:	None	(gal)
Cumulative LNAPL recovered:	None	(gal)

Groundwater Elevation and Gradient:

Depth to groundwater:	39.69 ft (MW-1) to 58.23 ft (MW-6B)	(ft below TOC)
Gradient direction:	Radially inward	(compass direction)
Gradient magnitude:	0.02	(ft/ft)
Average change in elevation:	-1.21	(ft since last measurement)

Laboratory Analytical Data

Summary: Analytical Results are as follows:

- **All wells contained insufficient water for sampling with the exception of wells MW-5B and MW-6B.**
- GRO was not detected in either well.
- Benzene was not detected in either well.
- Ethylbenzene was not detected in either well.
- Total Xylenes were not detected in either well.
- MTBE was not detected in either well.
- Toluene was not detected in either well.

ACTIVITIES CONDUCTED & RESULTS:

Fourth Quarter 2014 groundwater monitoring and sampling activities were conducted on November 20, 2014 by Broadbent personnel in accordance with the Fourth Quarter groundwater monitoring plan. No irregularities were noted during gauging. Light Non-Aqueous Phase Liquid (LNAPL) was not present in the wells monitored during this event. Depth to groundwater ranged from 39.69 ft in MW-1 to 58.23 ft in MW-6B. As shown on Drawing 2, groundwater gradient on November 20, 2014 was 0.02 ft/ft in a radially inward direction. Current and historic groundwater elevations and groundwater sample analytical data are provided in Tables 1 and 2. Historical groundwater gradient information is provided in Table 3. Drawing 2 presents a groundwater elevation contours and analytical summary map for the current monitoring event. Field procedures used during groundwater monitoring are provided in Appendix A. Field data sheets are included in Appendix B.

Groundwater samples from wells MW-5B and MW-6B were collected on November 20, 2014. All other monitoring wells contained insufficient water for sampling. No irregularities were reported during sampling. Samples were submitted to Test America Laboratories, Inc. (Test America) of Irvine, California for analyses of GRO, by EPA Method 8015B; for BTEX, MTBE, ETBE, TAME, DIPE, TBA, EDB, 1,2-DCA and ethanol by EPA Method 8260B. No irregularities were encountered during analysis of the samples. Laboratory analytical report and chain of custody record are provided in Appendix C. Groundwater monitoring data (GEO_WELL) and laboratory analytical results (EDF) were uploaded to the GeoTracker AB2886 database. Upload confirmation receipts are provided in Appendix D.

Results of the sampling event are included in the laboratory analytical data summary above. These results are identical to the concentrations from the previous sampling event for these particular wells. Further discussion of these results is presented below.

DISCUSSION:

Review of historical groundwater gradient data indicates that levels were within historical limits for all wells. Groundwater elevations yielded a potentiometric groundwater gradient radially inward at 0.02 ft/ft (see Drawing 2), consistent with the historic gradient data presented in Table 3.

Review of historical groundwater results indicate that concentration levels for the Fourth Quarter 2014 were within historical limits. The two sampled wells showed non-detectable amounts of the tested constituents. Tables 1 and 2 show the change in concentrations from the previous sampling event.

Only two water samples were collected during the Fourth Quarter sampling event due to insufficient water in six of the eight wells (MW-1, MW-2, MW-3, MW-4, MW-5A and MW-6A). The nearly dry wells are likely a result

from agricultural use and the ensuing drought conditions seen throughout the surrounding region. It is anticipated that these dry well conditions will improve during the next quarter groundwater monitoring event.

RECOMMENDATIONS:

The next quarterly monitoring event is scheduled for the First Quarter 2015. Data collected to date indicates that the site may be eligible for closure under the California State Water Resources Control Board's low threat UST closure policy. After the first quarter 2015 groundwater sampling event the sites conceptual site model (CSM) will be updated to aid in determining the site's closure eligibility.

LIMITATIONS:

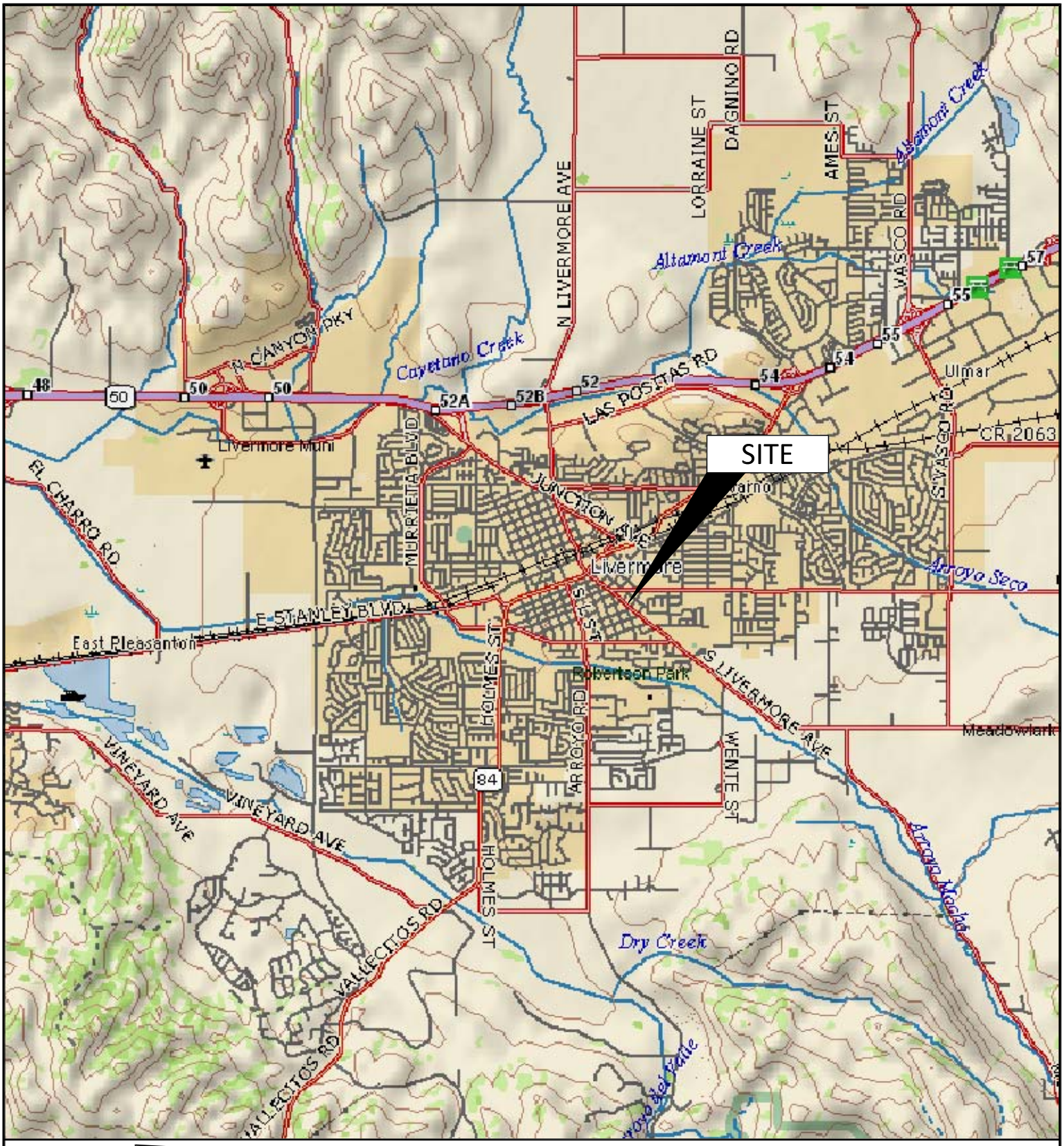
The findings presented in this report are based upon observations of field personnel, points investigated, results of laboratory tests performed by Test America, and our understanding of ACEH guidelines. Our services were performed in accordance with the generally accepted standard of practice at the time this report was written. No other warranty, expressed or implied was made. This report has been prepared for the exclusive use of ARC. It is possible that variations in soil or groundwater conditions could exist beyond points explored in this investigation. Also, changes in Site conditions could occur in the future due to variations in rainfall, temperature, regional water usage, or other factors.

ATTACHMENTS:

Drawing 1:	Site Location Map
Drawing 2:	Groundwater Elevation Contour and Analytical Summary Map, November 20, 2014
Table 1:	Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
Table 2:	Summary of Fuel Additives Analytical Data
Table 3:	Historical Groundwater Gradient - Direction and Magnitude
Appendix A:	Field Methods
Appendix B:	Field Data Sheets
Appendix C:	Laboratory Report and Chain-of-Custody Documentation
Appendix D:	GeoTracker Upload Confirmation Receipts

LIST OF COMMONLY USED ACCRONYMS/ABBREVIATIONS:

ACEH	Alameda County Environmental Health	gal:	gallons
ARC:	Atlantic Richfield Company	GRO:	Gasoline Range Organics (C6-12)
Broadbent	Broadbent & Associates	LNAPL:	Light Non-Aqueous Phase Liquid
BTEX:	Benzene, Toluene, Ethylbenzene, Total Xylenes	MTBE:	Methyl Tertiary Butyl Ether
1,2-DCA:	1,2-Dichloroethane	TAME:	Tert-Amyl Methyl Ether
DIPE:	Di-Isopropyl Ether	TBA:	Tert-Butyl Alcohol
EDB:	1,2-Dibromomethane	TOC:	Top of Casing
EPA:	Environmental Protection Agency	µg/L:	Micrograms Per Liter
ETBE:	Ethyl Tert-Butyl Ether	1Q:	First Quarter
ft:	feet	3Q:	Third Quarter
ft/ft:	foot per foot	ft bgs:	Feet Below Ground Surface

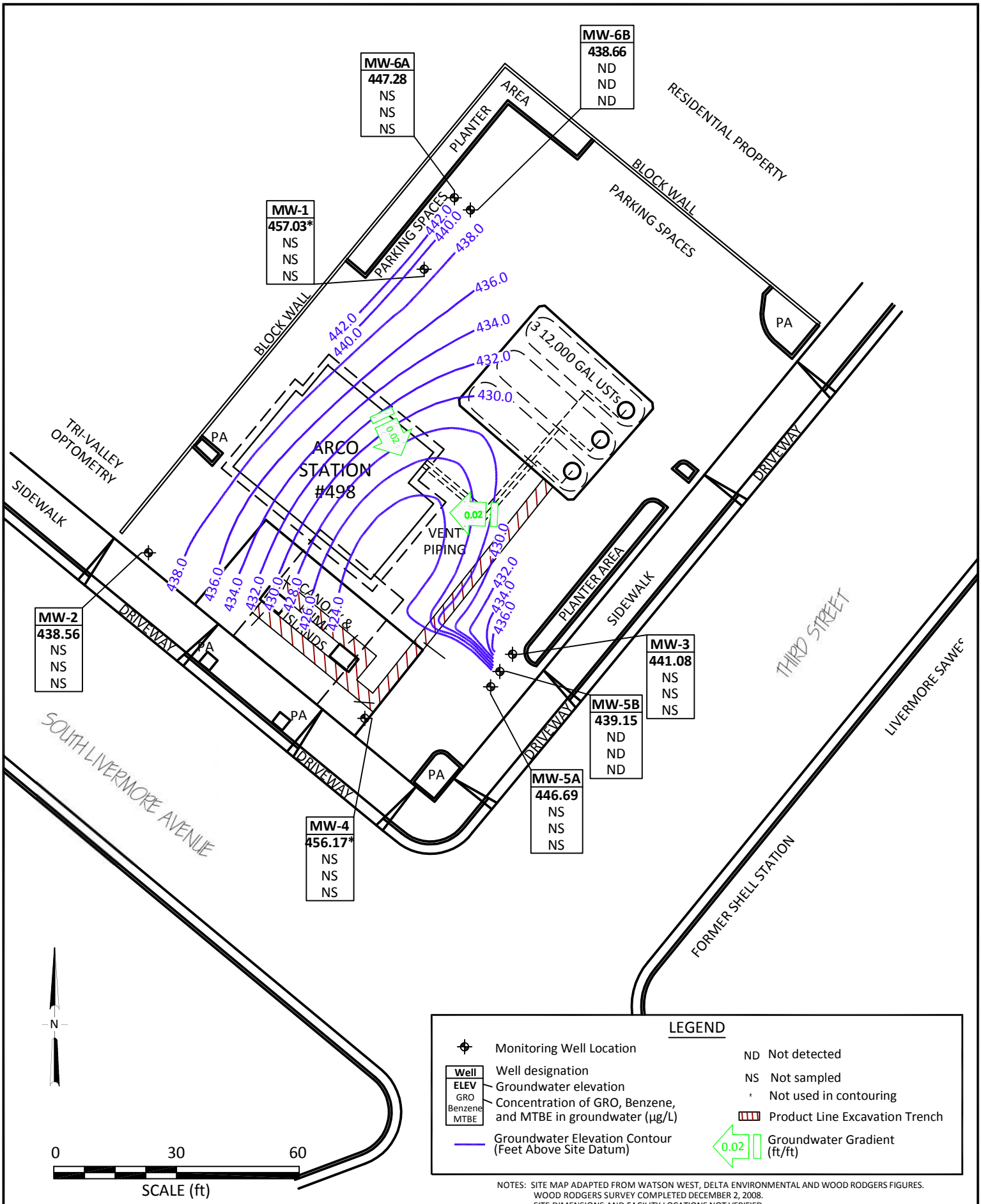


BROADBENT
1370 Ridgewood Dr., Suite 5
Chico, California 95973
Project No.: 08-82-603 Date: 12/3/2012

Station #498
286 South Livermore Avenue
Livermore, California

Site Location Map

Drawing
1



LEGEND

- Monitoring Well Location
- Well designation
- Groundwater elevation
- Concentration of GRO, Benzene, and MTBE in groundwater (µg/L)
- Groundwater Elevation Contour (Feet Above Site Datum)
- ND Not detected
- NS Not sampled
- * Not used in contouring
- Product Line Excavation Trench
- 0.02 Groundwater Gradient (ft/ft)

NOTES: SITE MAP ADAPTED FROM WATSON WEST, DELTA ENVIRONMENTAL AND WOOD RODGERS FIGURES. WOOD RODGERS SURVEY COMPLETED DECEMBER 2, 2008. SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

BROADBENT
4820 Business Center Drive, Suite 110
Fairfield, CA 94534
Project No.: 08-82-603 Date: 12/18/2014

Station #498
286 South Livermore Avenue
Livermore, California

Groundwater Elevation Contour and Analytical Summary Map
Fourth Quarter, 2014

Drawin
2

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Product Thickness (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
								GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-1																
12/29/2008	P	496.72	20.00	40.00	28.81	0.00	467.91	1,100	38	1.2	4.0	3.3	17	2.72	6.83	
3/20/2009	P		20.00	40.00	28.95	0.00	467.77	640	9.1	<0.50	4.1	<0.50	21	0.35	7.28	
6/2/2009	P		20.00	40.00	30.90	0.00	465.82	600	1.6	<0.50	<0.50	<0.50	32	0.59	7.17	
9/2/2009	P		20.00	40.00	32.00	0.00	464.72	570	<0.50	<0.50	<0.50	<0.50	5.3	1.02	7.38	
11/9/2009	P		20.00	40.00	31.82	0.00	464.90	1,000	130	12	35	39	140	1.39	7.02	
5/20/2010	P		20.00	40.00	28.94	0.00	467.78	1,000	4.4	<0.50	0.76	0.73	22	0.59	6.6	
11/2/2010	P		20.00	40.00	32.03	0.00	464.69	1,300	83	20	40	61	39	0.72	6.0	b (GRO), c
5/25/2011	P		20.00	40.00	26.69	0.00	470.03	2,900	32	3.1	20	2.9	<0.50	0.68	7.0	lw (GRO)
10/25/2011	P		20.00	40.00	30.11	0.00	466.61	1,100	20	3.7	<0.50	5.4	21	0.78	7.4	lw (GRO)
4/10/2012	P		20.00	40.00	30.35	0.00	466.37	1,300	13	2.0	7.0	7.1	5.0	0.20	6.71	lw (GRO)
10/9/2012	NP		20.00	40.00	37.61	0.00	459.11	700	<0.50	<0.50	<0.50	<1.0	3.2	2.79	7.93	
4/24/2013	P		20.00	40.00	29.48	0.00	467.24	1,600	87	12	87	15	12	1.49	7.22	
10/9/2013	P		20.00	40.00	31.26	0.00	465.46	810	12	0.90	4.3	2.6	30	4.24	7.17	
2/21/2014	P		20.00	40.00	30.67	0.00	466.05	1,300	19	3.0	30	4.2	2.5	1.23	7.22	
5/21/2014	P		20.00	40.00	32.88	0.00	463.84	710	<0.50	<0.50	<0.50	<1.0	1.0	0.61	7.63	
8/19/2014	--		20.00	40.00	39.67	0.00	457.05	--	--	--	--	--	--	--	--	d
11/20/2014	**--**		**20.00**	**40.00**	**39.69**	**0.00**	**457.03**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-2																
12/29/2008	P	495.35	37.00	57.00	48.76	0.00	446.59	110	7.1	<0.50	<0.50	0.76	16	1.04	7.67	
3/20/2009	P		37.00	57.00	38.78	0.00	456.57	200	3.9	<1.0	<1.0	<1.0	56	0.41	7.51	
6/2/2009	P		37.00	57.00	43.98	0.00	451.37	110	5.1	<1.0	<1.0	<1.0	44	1.87	7.42	
9/2/2009	P		37.00	57.00	50.25	0.00	445.10	88	0.79	<0.50	<0.50	<0.50	12	1.55	6.91	
11/9/2009	P		37.00	57.00	43.79	0.00	451.56	58	2.0	<0.50	<0.50	<0.50	13	0.86	7.14	
5/20/2010	P		37.00	57.00	32.07	0.00	463.28	<50	<0.50	<0.50	<0.50	<0.50	27	0.61	6.8	
11/2/2010	P		37.00	57.00	39.23	0.00	456.12	<50	<0.50	<0.50	<0.50	<0.50	57	1.34	6.8	
5/25/2011	P		37.00	57.00	28.19	0.00	467.16	<50	<0.50	<0.50	<0.50	<0.50	15	3.74	7.1	
10/25/2011	P		37.00	57.00	33.33	0.00	462.02	<50	<0.50	<0.50	<0.50	<0.50	5.7	1.28	7.8	
4/10/2012	P		37.00	57.00	39.25	0.00	456.10	<50	<0.50	<0.50	<0.50	<0.50	1.1	1.04	7.13	
10/9/2012	P		37.00	57.00	41.84	0.00	453.51	<50	<0.50	<0.50	<0.50	<1.0	0.60	2.76	7.71	
4/24/2013	P		37.00	57.00	33.17	0.00	462.18	<50	<0.50	<0.50	<0.50	<1.0	1.1	2.51	7.53	

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Product Thickness (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
								GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE			
MW-2 Cont.																
10/9/2013	P	495.35	37.00	57.00	35.23	0.00	460.12	<50	<0.50	<0.50	<0.50	<1.0	5.9	4.30	7.46	
2/21/2014	P		37.00	57.00	36.49	0.00	458.86	<50	<0.50	<0.50	<0.50	<1.0	3.6	8.05	7.17	
5/21/2014	P		37.00	57.00	40.87	0.00	454.48	<50	<0.50	<0.50	<0.50	<1.0	4.1	674	7.67	
8/19/2014	P		37.00	57.00	51.54	0.00	443.81	<50	<0.50	<0.50	<0.50	<1.0	0.60	7.33	8.37	
11/20/2014	--		**37.00**	**57.00**	**56.79**	**0.00**	**438.56**	--	--	--	--	--	--	--	--	
MW-3																
12/29/2008	P	496.32	37.00	57.00	48.21	0.00	448.11	28,000	310	200	840	6,200	71	1.95	7.39	
3/20/2009	P		37.00	57.00	38.48	0.00	457.84	11,000	360	84	600	1,500	71	0.56	7.25	
6/2/2009	P		37.00	57.00	43.33	0.00	452.99	5,100	310	14	180	310	66	2.06	7.18	a
9/2/2009	P		37.00	57.00	49.60	0.00	446.72	25,000	380	150	930	2,900	75	1.35	6.93	
11/9/2009	P		37.00	57.00	43.25	0.00	453.07	6,900	390	27	480	680	69	0.54	6.9	
5/20/2010	P		37.00	57.00	31.56	0.00	464.76	9,400	690	<10	300	83	77	0.36	6.8	
11/2/2010	P		37.00	57.00	38.68	0.00	457.64	4,400	420	<10	110	33	70	0.59	6.8	b (GRO)
5/25/2011	P		37.00	57.00	27.56	0.00	468.76	4,500	560	<10	210	22	74	0.70	9.8	lw (GRO)
10/25/2011	P		37.00	57.00	32.77	0.00	463.55	2,700	190	<4.0	82	51	33	0.69	7.6	
4/10/2012	P		37.00	57.00	38.69	0.00	457.63	3,000	440	<4.0	69	10	46	0.28	6.57	lw (GRO)
10/9/2012	P		37.00	57.00	41.19	0.00	455.13	1,600	210	<2.0	28	7.4	33	1.23	7.39	
4/24/2013	P		37.00	57.00	32.52	0.00	463.80	3,500	960	3.6	110	6.0	89	1.15	7.21	
10/9/2013	P		37.00	57.00	34.59	0.00	461.73	<50	390	<2.5	33	<5.0	94	4.12	7.27	
2/21/2014	P		37.00	57.00	36.03	0.00	460.29	2,000	210	<2.0	27	<4.0	44	2.03	7.41	
5/21/2014	P		37.00	57.00	40.41	0.00	455.91	1,500	170	1.0	15	<2.0	29	0.50	7.52	
8/19/2014	P		37.00	57.00	51.01	0.00	445.31	2,300	160	8.9	220	70	25	0.19	6.57	
11/20/2014	--		**37.00**	**57.00**	**55.24**	**0.00**	**441.08**	--	--	--	--	--	--	--	--	
MW-4																
12/29/2008	--	496.01	20.00	40.00	--	--	--	--	--	--	--	--	--	--	--	Dry
3/20/2009	P		20.00	40.00	37.82	0.00	458.19	410	0.78	<0.50	<0.50	0.64	16	0.52	7.16	
6/2/2009	--		20.00	40.00	--	--	--	--	--	--	--	--	--	--	--	Dry
9/2/2009	--		20.00	40.00	--	--	--	--	--	--	--	--	--	--	--	Dry
11/9/2009	--		20.00	40.00	--	--	--	--	--	--	--	--	--	--	--	Dry

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Product Thickness (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
								GRO/ TPHg	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	MTBE			
MW-4 Cont.																
5/20/2010	P	496.01	20.00	40.00	31.29	0.00	464.72	290	<2.0	<2.0	<2.0	<2.0	10	0.82	6.6	
11/2/2010	NP		20.00	40.00	38.42	0.00	457.59	51	<2.0	<2.0	<2.0	<2.0	5.1	1.12	6.4	b (GRO), c
5/25/2011	P		20.00	40.00	27.58	0.00	468.43	94	<1.0	<1.0	<1.0	<1.0	6.2	0.86	6.9	lw (GRO)
10/25/2011	P		20.00	40.00	32.51	0.00	463.50	73	<0.50	<0.50	<0.50	<0.50	4.3	0.49	7.4	lw (GRO)
4/10/2012	--		20.00	40.00	38.47	0.00	457.54	<50	<0.50	<0.50	<0.50	<0.50	0.85	--	7.06	
10/9/2012	--		20.00	40.00	39.86	0.00	456.15	--	--	--	--	--	--	--	--	d
4/24/2013	P		20.00	40.00	32.50	0.00	463.51	<50	<0.50	<0.50	<0.50	<1.0	1.2	1.32	7.01	
10/9/2013	P		20.00	40.00	34.77	0.00	461.24	<50	<0.50	<0.50	<0.50	<1.0	<0.50	4.14	6.98	
2/21/2014	P		20.00	40.00	35.88	0.00	460.13	<50	<0.50	<0.50	<0.50	<1.0	<0.50	2.33	6.76	
5/21/2014	--		20.00	40.00	39.08	0.00	456.93	--	--	--	--	--	--	--	--	
8/19/2014	--		20.00	40.00	39.82	0.00	456.19	--	--	--	--	--	--	--	--	d
11/20/2014	**--**		**20.00**	**40.00**	**39.84**	**0.00**	**456.17**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-5A																
2/21/2014	P	495.98	--	--	36.17	0.00	459.81	840	3.1	<0.50	19	15	3.1	2.39	7.19	
5/21/2014	P		--	--	40.15	0.00	455.83	510	<0.50	<0.50	<0.50	<1.0	<0.50	0.51	7.46	
8/19/2014	--		--	--	49.26	0.00	446.72	--	--	--	--	--	--	--	--	d
11/20/2014	**--**		**--**	**--**	**49.29**	**0.00**	**446.69**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-5B																
2/21/2014	P	496.04	--	--	35.84	0.00	460.20	<50	<0.50	<0.50	<0.50	<1.0	<0.50	8.42	7.65	
5/21/2014	P		--	--	40.22	0.00	455.82	<50	<0.50	<0.50	<0.50	<1.0	0.60	1.74	7.62	
8/19/2014	P		--	--	50.85	0.00	445.19	<50	<0.50	<0.50	<0.50	<1.0	<0.50	10.86	7.03	
11/20/2014	**P**		**--**	**--**	**56.89**	**0.00**	**439.15**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<0.50**	**4.10**	**7.50**	
MW-6A																
2/21/2014	P	496.69	--	--	37.40	0.00	459.29	<50	<5.0	<5.0	<5.0	<10	780	9.15	7.36	
5/21/2014	P		--	--	40.65	0.00	456.04	<50	<5.0	<5.0	<5.0	<10	880	0.57	7.64	
8/19/2014	--		--	--	49.30	0.00	447.39	--	--	--	--	--	--	--	--	d
11/20/2014	**--**		**--**	**--**	**49.41**	**0.00**	**447.28**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	
MW-6B																

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Product Thickness (feet)	Water Level Elevation (feet)	Concentrations in µg/L						DO (mg/L)	pH	Footnote
								GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-6B Cont.																
2/21/2014	P	496.89	--	--	37.26	0.00	459.63	<50	<0.50	<0.50	<0.50	<1.0	<0.50	5.81	7.36	
5/21/2014	P		--	--	41.64	0.00	455.25	<50	<0.50	<0.50	<0.50	<1.0	<0.50	2.43	7.57	
8/19/2014	P		--	--	52.25	0.00	444.64	<50	<0.50	<0.50	<0.50	<1.0	<0.50	8.33	7.41	
11/20/2014	**P**		**--**	**--**	**58.23**	**0.00**	**438.66**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<0.50**	**5.06**	**7.53**	

Symbols & Abbreviations:
-- = Not sampled/analyzed/applicable/measured/ available
< = Not detected at or above specified laboratory reporting limit
DO = Dissolved oxygen
DTW = Depth to water in ft bgs
ft bgs= feet below ground surface
ft MSL= feet above mean sea level
GRO = Gasoline range organics
GWE = Groundwater elevation measured in ft MSL
mg/L = Milligrams per liter
MTBE = Methyl tert-butyl ether
NP = Not purged before sampling
P = Purged before sampling
TOC = Top of casing measured in ft MSL
µg/L = Micrograms per liter

Footnotes:
a = Sample preserved improperly
b = Quantitation of unknown hydrocarbon(s) in sample based on gasoline
c = Hydrocarbon odor
d = Insufficient water within well casing to collect sample
lw = Quantitated against gasoline

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-1									
12/29/2008	<300	<10	17	<0.50	<0.50	<0.50	<0.50	<0.50	
3/20/2009	<300	25	21	<0.50	<0.50	<0.50	<0.50	<0.50	
6/2/2009	<300	28	32	<0.50	<0.50	<0.50	<0.50	<0.50	
9/2/2009	<300	17	5.3	<0.50	<0.50	<0.50	<0.50	<0.50	
11/9/2009	<300	47	140	<0.50	<0.50	3.1	<0.50	<0.50	
5/20/2010	<300	75	22	<0.50	<0.50	<0.50	<0.50	<0.50	
11/2/2010	<300	50	39	<0.50	<0.50	<0.50	<0.50	<0.50	
5/25/2011	<300	32	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
10/25/2011	<300	78	21	<0.50	<0.50	0.72	<0.50	<0.50	
4/10/2012	<300	49	5.0	<0.50	<0.50	<0.50	<0.50	<0.50	
10/9/2012	<150	47	3.2	<0.50	<0.50	<0.50	<0.50	<0.50	
4/24/2013	<150	43	12	<0.50	<0.50	<0.50	<0.50	<0.50	
10/9/2013	<150	79	30	<0.50	<0.50	0.52	<0.50	<0.50	
2/21/2014	<150	12	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	
5/21/2014	<150	12	1.0	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-2									
12/29/2008	<300	22	16	<0.50	<0.50	<0.50	<0.50	<0.50	
3/20/2009	<600	62	56	<1.0	<1.0	<1.0	<1.0	<1.0	
6/2/2009	<600	83	44	<1.0	<1.0	<1.0	<1.0	<1.0	
9/2/2009	<300	37	12	<0.50	<0.50	<0.50	<0.50	<0.50	
11/9/2009	<300	41	13	<0.50	<0.50	<0.50	<0.50	<0.50	
5/20/2010	<300	22	27	<0.50	<0.50	<0.50	<0.50	<0.50	
11/2/2010	<300	26	57	<0.50	<0.50	<0.50	<0.50	<0.50	
5/25/2011	<300	<10	15	<0.50	<0.50	<0.50	<0.50	<0.50	
10/25/2011	<300	<10	5.7	<0.50	<0.50	<0.50	<0.50	<0.50	
4/10/2012	<300	<10	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	
10/9/2012	<150	<10	0.60	<0.50	<0.50	<0.50	<0.50	<0.50	
4/24/2013	<150	<10	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	
10/9/2013	<150	<10	5.9	<0.50	<0.50	<0.50	<0.50	<0.50	
2/21/2014	<150	<10	3.6	<0.50	<0.50	<0.50	<0.50	<0.50	
5/21/2014	<150	<10	4.1	<0.50	<0.50	<0.50	<0.50	<0.50	

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-2 Cont.									
8/19/2014	<150	<10	0.60	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-3									
12/29/2008	<30,000	<1,000	71	<50	<50	<50	<50	<50	
3/20/2009	<7,500	<250	71	<12	<12	<12	<12	<12	
6/2/2009	<3,000	100	66	<5.0	<5.0	<5.0	<5.0	<5.0	
9/2/2009	<7,500	<250	75	<12	<12	<12	<12	<12	
11/9/2009	<3,000	<100	69	<5.0	<5.0	<5.0	<5.0	<5.0	
5/20/2010	<6,000	<200	77	<10	<10	<10	<10	<10	
11/2/2010	<6,000	<200	70	<10	<10	<10	<10	<10	
5/25/2011	<6000	<200	74	<10	<10	<10	<10	<10	
10/25/2011	<2,400	<80	33	<4.0	<4.0	<4.0	<4.0	<4.0	
4/10/2012	<2,400	<80	46	<4.0	<4.0	<4.0	<4.0	<4.0	
10/9/2012	<600	56	33	<2.0	<2.0	<2.0	<2.0	<2.0	
4/24/2013	<380	71	89	<1.3	<1.3	<1.3	<1.3	<1.3	
10/9/2013	<750	100	94	<2.5	<2.5	<2.5	<2.5	<2.5	
2/21/2014	<600	58	44	<2.0	<2.0	<2.0	<2.0	<2.0	
5/21/2014	<300	46	29	<1.0	<1.0	<1.0	<1.0	<1.0	
8/19/2014	<600	<40	25	<2.0	<2.0	<2.0	<2.0	<2.0	
MW-4									
3/20/2009	<300	2,000	16	<0.50	<0.50	<0.50	<0.50	<0.50	
5/20/2010	<1,200	1,000	10	<2.0	<2.0	<2.0	<2.0	<2.0	
11/2/2010	<1,200	500	5.1	<2.0	<2.0	<2.0	<2.0	<2.0	
5/25/2011	<600	230	6.2	<1.0	<1.0	<1.0	<1.0	<1.0	
10/25/2011	<300	150	4.3	<0.50	<0.50	<0.50	<0.50	<0.50	
4/10/2012	<300	<10	0.85	<0.50	<0.50	<0.50	<0.50	<0.50	
4/24/2013	<150	24	1.2	<0.50	<0.50	<0.50	<0.50	<0.50	
10/9/2013	<150	13	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/21/2014	<150	37	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-5A									
2/21/2014	<150	19	3.1	<0.50	<0.50	<0.50	<0.50	<0.50	

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-5A Cont.									
5/21/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-5B									
2/21/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
5/21/2014	<150	<10	0.60	<0.50	<0.50	<0.50	<0.50	<0.50	
8/19/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
11/20/2014	**<150**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-6A									
2/21/2014	<1,500	<100	780	<5.0	<5.0	<5.0	<5.0	<5.0	
5/21/2014	<1,500	130	880	<5.0	<5.0	<5.0	<5.0	<5.0	
MW-6B									
2/21/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
5/21/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
8/19/2014	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
11/20/2014	**<150**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	

Symbols & Abbreviations:
--/--- = Not sampled/analyzed/applicable/measured/avaliable
< = Not detected at or above specified laboratory reporting limit
1,2-DCA = 1,2-Dichloroethane
DIPE = Diisopropyl ether
EDB= 1,2-Dibromoethane
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether
TAME = tert-Amyl methyl ether
TBA = tert-Butyl alcohol
µg/L = Micrograms per liter

Table 3. Summary of Groundwater Gradient - Direction and Magnitude

ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA

Date Measured	Approximate Gradient Direction	Approximate Gradient Magnitude (ft/ft)
12/29/2008	NA	NA
3/20/2009	North-Northwest	0.02
6/2/2009	NA	NA
9/2/2009	NA	NA
11/9/2009	NA	NA
5/20/2010	West-Northwest	0.02
11/2/2010	West-Northwest	0.02
5/25/2011	West-Northwest	0.02
10/25/2011	West-Northwest	0.02
4/10/2012	West-Northwest	0.01
10/9/2012	West-Northwest	0.02
4/24/2013	West-Northwest	0.02
10/9/2013	West-Northwest	0.02
2/21/2014	West-Northwest	0.02
8/19/2014	West-Northwest	0.02
11/20/2014	**Radially Inward**	**0.02**

Symbols & Abbreviations:
NA = Not Available

APPENDIX A

FIELD METHODS

QUALITY ASSURANCE/QUALITY CONTROL
FIELD METHODS

Field methods discussed herein were implemented to provide for accuracy and reliability of field activities, data collection, sample collection, and handling. Discussion of these methods is provided below.

1.0 Equipment Calibration

Equipment calibration was performed per equipment manufacturer specifications before use.

2.0 Depth to Groundwater and Light Non-Aqueous Phase Liquid Measurement

Depth to groundwater was measured in wells identified for gauging in the scope of work using a decontaminated water level indicator. The depth to water measurement was taken from a cut notch or permanent mark at the top of the well casing to which the well head elevation was originally surveyed.

Once depth to water was measured, an oil/water interface meter or a new disposable bailer was utilized to evaluate the presence and, if present, to measure the "apparent" thickness of light non-aqueous phase liquid (LNAPL) in the well. If LNAPL was present in the well, groundwater purging and sampling were not performed, unless sampling procedures in the scope of work specified collection of samples in the presence of LNAPL. Otherwise, time allowing, LNAPL was bailed from the well using either a new disposable bailer, or the disposal bailer previously used for initial LNAPL assessment. Bailing of LNAPL continued until the thickness of LNAPL (or volume) stabilized in each bailer pulled from the well, or LNAPL was no longer present. After LNAPL thickness either stabilized or was eliminated, periodic depth to water and depth to LNAPL measurements were collected as product came back into the well to evaluate product recovery rate and to aid in further assessment of LNAPL in the subsurface. LNAPL thickness measurements were recorded as "apparent." If a bailer was used for LNAPL thickness measurement, the field sampler noted the bailer entry diameter and chamber diameter to enable correction of thickness measurements. Recovered LNAPL was stored on-site in a labeled steel drum(s) or other appropriate container(s) prior to disposal.

3.0 Well Purging and Groundwater Sample Collection

Well purging and groundwater sampling were performed in wells specified in the scope of work after measuring depth to groundwater and evaluating the presence of LNAPL. Purging and sampling were performed using one of the methods detailed below. The method used was noted in the field records. Purge water was stored on-site in labeled steel drum(s) or other appropriate container(s) prior to disposal or on-site treatment (in cases where treatment using an on-site system is authorized).

3.1 Purging a Predetermined Well Volume

Purging a predetermined well volume is performed per ASTM International (ASTM) D4448-01. This purging method has the objective of removing a predetermined volume of stagnant water from the well prior to sampling. The volume of stagnant water is defined as either the volume of water contained within the well casing, or the volume within the well casing and sand/gravel in the annulus if natural flow through these is deemed insufficient to keep them flushed out.

This purging method involves removal of a minimum of three stagnant water volumes from the well using a decontaminated pump with new disposable plastic discharge or suction tubing, dedicated well tubing, or using a new disposable or decontaminated reusable bailer. If a new disposable bailer was used for assessment of LNAPL, that bailer may be used for purging. The withdrawal rate used is one that minimizes drawdown while satisfying time constraints.

To evaluate when purging is complete, one or more groundwater stabilization parameters are monitored and recorded during purging activities until stabilization is achieved. Most commonly, stabilization parameters include temperature, conductivity, and pH, but field procedures detailed in the scope of work may also include monitoring of dissolved oxygen concentrations, oxidation reduction potential, and/or turbidity[1]. Parameters are considered stable when two (2) consecutive readings recorded three (3) minutes apart fall within ranges provided below in Table 1. In the event that the parameters have not stabilized and five (5) well casing volumes have been removed, purging activities will cease and be considered complete. Once the well is purged, a groundwater sample(s) is collected from the well using a new disposable bailer. If a new disposable bailer was used for purging, that bailer may be used to collect the sample(s). A sample is not collected if the well is inadvertently purged dry.

Table 1. Criteria for Defining Stabilization of Water-Quality Indicator Parameters

Parameter	Stabilization Criterion
Temperature	± 0.2ºC (± 0.36ºF)
pH	± 0.1 standard units
Conductivity	± 3%
Dissolved oxygen	± 10%
Oxidation reduction potential	± 10 mV
Turbidity[1]	± 10% or 1.0 NTU (whichever is greater)

3.2 Low-Flow Purging and Sampling

“Low-Flow”, “Minimal Drawdown”, or "Low-Stress” purging is performed per ASTM D6771-02. It is a method of groundwater removal from within a well’s screened interval that is intended to

[1] As stated in ASTM D6771-02, turbidity is not a chemical parameter and not indicative of when formation-quality water is being purged; however, turbidity may be helpful in evaluating stress on the formation during purging. Turbidity measurements are taken at the same time that stabilization parameter measurements are made, or, at a minimum, once when purging is initiated and again just prior to sample collection, after stabilization parameters have stabilized. To avoid artifacts in sample analysis, turbidity should be as low as possible when samples are collected. If turbidity values are persistently high, the withdrawal rate is lowered until turbidity decreases. If high turbidity persists even after lowering the withdrawal rate, the purging is stopped for a period of time until turbidity settles, and the purging process is then restarted. If this fails to solve the problem, the purging/sampling process for the well is ceased, and well maintenance or redevelopment is considered.

minimize drawdown and mixing of the water column in the well casing. This is accomplished by pumping the well using a decontaminated pump with new disposable plastic discharge or suction tubing or dedicated well tubing at a low flow rate while evaluating the groundwater elevation during pumping.

The low flow pumping rate is well specific and is generally established at a volume that is less than or equal to the natural recovery rate of the well. A pump with adjustable flow rate control is positioned with the intake at or near the mid-point of the submerged well screen. The pumping rate used during low-flow purging is low enough to minimize mobilization of particulate matter and drawdown (stress) of the water column. Low-flow purging rates will vary based on the individual well characteristics; however, the purge rate should not exceed 1.0 Liter per minute (L/min) or 0.25 gallon per minute (gal/min). Low-flow purging should begin at a rate of approximately 0.1 L/min (0.03 gal/min)[2], or the lowest rate possible, and be adjusted based on an evaluation of drawdown. Water level measurements should be recorded at approximate one (1) to two (2) minute intervals until the low-flow rate has been established, and drawdown is minimized. As a general rule, drawdown should not exceed 25% of the distance between the top of the water column and the pump in-take.

To evaluate when purging is complete, one or more groundwater stabilization parameters are monitored and recorded during purging activities until stabilization is achieved. Most commonly, stabilization parameters include temperature, conductivity, and pH, but field procedures detailed in the scope of work may also include monitoring of dissolved oxygen concentrations, oxidation reduction potential, and/or turbidity[1]. The frequency between measurements will be at an interval of one (1) to three (3) minutes; however, if a flow cell is used, the frequency will be determined based on the time required to evacuate one cell volume. Stabilization is defined as three (3) consecutive readings recorded several minutes apart falling within ranges provided in Table 1. Samples will be collected by filling appropriate containers from the pump discharge tubing at a rate not to exceed the established pumping rate.

3.3 Minimal Purge, Discrete Depth, and Passive Sampling

Per ASTM D4448-01, sampling techniques that do not rely on purging, or require only minimal purging, may be used if a particular zone within a screened interval is to be sampled or if a well is not capable of yielding sufficient groundwater for purging. To properly use these sampling techniques, a water sample is collected within the screened interval with little or no mixing of the water column within the casing. These techniques include minimal purge sampling which uses a dedicated sampling pump capable of pumping rates of less than 0.1 L/min (0.03 gal/min)[2], discrete depth sampling using a bailer that allows groundwater entry at a controlled depth (e.g. differential pressure bailer), or passive (diffusion) sampling. These techniques are based on certain studies referenced in ASTM D4448-01 that indicate that under certain conditions, natural groundwater flow is laminar and horizontal with little or no mixing within the well screen.

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[2] According to ASTM D4448-01, studies have indicated that at flow rates of 0.1 L/min, low-density polyethylene (LDPE) and plasticized polypropylene tubing materials are prone to sorption. Therefore, TFE-fluorocarbon or other appropriate tubing material is used, particularly when tubing lengths of 50 feet or longer are used.

4.0 Decontamination

Reusable groundwater sampling equipment were cleaned using a solution of Alconox or other acceptable detergent, rinsed with tap water, and finally rinsed with distilled water prior to use in each well. Decontamination water was stored on-site in labeled steel drum(s) or other appropriate container(s) prior to disposal.

5.0 Sample Containers, Labeling, and Storage

Samples were collected in laboratory prepared containers with appropriate preservative (if preservative was required). Samples were properly labeled (site name, sample I.D., sampler initials, date, and time of collection) and stored chilled (refrigerator or ice chest with ice) until delivery to a certified laboratory, under chain of custody procedures.

6.0 Chain of Custody Record and Procedure

The field sampler was personally responsible for care and custody of the samples collected until they were properly transferred to another party. To document custody and transfer of samples, a Chain of Custody Record was prepared. The Chain of Custody Record provided identification of the samples corresponding to sample labels and specified analyses to be performed by the laboratory. The original Chain of Custody Record accompanied the shipment, and a copy of the record was stored in the project file. When the samples were transferred, the individuals relinquishing and receiving them signed, dated, and noted the time of transfer on the record.

7.0 Field Records

Daily Report and data forms were completed by staff personnel to provide daily record of significant events, observations, and measurements. Field records were signed, dated, and stored in the project file.

APPENDIX B

FIELD DATA SHEETS

BROADBENT

GROUNDWATER MONITORING SITE SHEET

Project: BP 498 Project No.: 08-82-603 Date: 11/20/14

Field Representative: UR/JC Elevation: _____

Formation recharge rate is historically: High Low *(circle one)*

W. L. Indicator ID #: _____ Oil/Water Interface ID #: _____ *(List #s of all equip used.)*

WELL ID RECORD					WELL GAUGING RECORD					LAB ANALYSES						
Well ID	Well Sampling Order	As-Built Well Diameter (inches)	As-Built Well Screen Interval (ft)	Previous Depth to Water (ft)	Time (24:00)	Depth to LNAPL (ft)	Apparent LNAPL Thickness (ft)*	Depth to Water (ft)	Well Total Depth (ft)							
MW-1	3			39.67	910			39.69	40.33							NS
MW-2	2			51.54	950			56.79	56.91							NS
MW-3	8			51.01	920			55.24	55.33							NS
MW-4	1			39.82	940			39.84	40.67							NS
MW-5A	6			49.26	930			49.29	49.66							NS
MW-5B	7			50.85	925			56.89	65.79							
MW-6A	5			49.30	905			49.41	49.65							NS
MW-6B	4			52.25	900			53.23	69.60							

* Device used to measure LNAPL thickness: Bailer Oil/Water Interface Meter *(circle one)*

If bailer used, note bailer dimensions (inches): Entry Diameter _____ Chamber Diameter _____

Signature: [signature]

BROADBENT

GROUNDWATER SAMPLING DATA SHEET

Project: BP 498 Project No.: 05826003 Date: 11/20/14

Field Representative: Chmes / Jessica

Well ID: MW-6B Start Time: 1030 End Time: 1115 Total Time (minutes): 45

PURGE EQUIPMENT ___ Disp. Bailer ___ 120V Pump ___ Flow Cell ___ Disp. Tubing ___ 12V Pump ___ Peristaltic Pump Other/ID#: Bladder Pump

WELL HEAD INTEGRITY (cap, lock, vault, etc.) Comments:

(Good) Improvement Needed *(circle one)*

PURGING/SAMPLING METHOD Predetermined Well Volume (Low-Flow) Other: *(circle one)*

PREDETERMINED WELL VOLUME

Casing Diameter | Unit Volume (gal/ft) *(circle one)*

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:

4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ___" | (___)

Total Well Depth (a):	___ (ft)
Initial Depth to Water (b):	___ (ft)
Water Column Height (WCH) = (a - b):	___ (ft)
Water Column Volume (WCV) = WCH x Unit Volume:	___ (gal)
Three Casing Volumes = WCV x 3:	___ (gal)
Five Casing Volumes = WCV x 5:	___ (gal)
Pump Depth (if pump used):	___ (ft)

LOW-FLOW

Previous Low-Flow Purge Rate:	___ (lpm)
Total Well Depth (a):	61.60 (ft)
Initial Depth to Water (b):	58.23 (ft)
Pump In-take Depth = b + (a-b)/2:	122.15 (ft)
Maximum Allowable Drawdown = (a-b)/8:	1.42 (ft)
Low-Flow Purge Rate:	0.25 (Lpm)*

Comments:

**Low-flow purge rate should be within range of instruments used but should not exceed 0.25 gpm. Drawdown should not exceed Maximum Allowable Drawdown.*

GROUNDWATER STABILIZATION PARAMETER RECORD

Time (24:00)	Cumulative Vol. gal or (L)	Temperature °C	pH	Conductivity µS or (mS)	DO mg/L	ORP mV	Turbidity NTU	NOTES Odor, color, sheen or other
1049	0	20.26	7.10	0	9.02	202	17.9	Silty
1051	0.5	20.94	7.66	1.08	8.44	211	-5.0	↓
1053	1.0	20.67	7.62	1.08	6.11	210	-5.0	
1055	1.5	20.49	7.58	1.07	5.47	209	-5.0	
1057	2.0	20.34	7.53	1.07	5.06	209	-5.0	
Previous Stabilized Parameters								

PURGE COMPLETION RECORD X Low Flow & Parameters Stable ___ 3 Casing Volumes & Parameters Stable ___ 5 Casing Volumes

___ Other:

SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 58.20 (ft)

Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing ___ Disp. Pump Tubing Other: Bladder Pump

Sample ID: MW-6B Sample Collection Time: 1057 (24:00)

Containers (#): 4 VOA (4 preserved or ___ unpreserved) ___ Liter Amber

___ Other: ___ ___ Other: ___

___ Other: ___ ___ Other: ___

GEOCHEMICAL PARAMETERS

Parameter	Time	Measurement
DO (mg/L)		
Ferrous Iron (mg/L)		
Redox Potential (mV)		
Alkalinity (mg/L)		
Other:		
Other:		

Signature:

BROADBENT

GROUNDWATER SAMPLING DATA SHEET

Project: BP 498 Project No.: 0882603 Date: 11/20/14

Field Representative: James/Jessica

Well ID: MW-5B Start Time: 1120 End Time: 1215 Total Time (minutes): 55

PURGE EQUIPMENT ___ Disp. Bailer ___ 120V Pump ___ Flow Cell ___ Disp. Tubing ___ 12V Pump ___ Peristaltic Pump Other/ID#: Bladder Pump

WELL HEAD INTEGRITY (cap, lock, vault, etc.) Comments:

(Good) Improvement Needed *(circle one)*

PURGING/SAMPLING METHOD Predetermined Well Volume (Low-Flow) Other: *(circle one)*

PREDETERMINED WELL VOLUME

Casing Diameter | Unit Volume (gal/ft) *(circle one)*

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other: ___" | (___)

4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81)

Total Well Depth (a):	(ft)
Initial Depth to Water (b):	(ft)
Water Column Height (WCH) = (a - b):	(ft)
Water Column Volume (WCV) = WCH x Unit Volume:	(gal)
Three Casing Volumes = WCV x 3:	(gal)
Five Casing Volumes = WCV x 5:	(gal)
Pump Depth (if pump used):	(ft)

a

LOW-FLOW

Previous Low-Flow Purge Rate:	(lpm)
Total Well Depth (a):	65.79 (ft)
Initial Depth to Water (b):	56.89 (ft)
Pump In-take Depth = b + (a-b)/2:	118.23 (ft)
Maximum Allowable Drawdown = (a-b)/8:	1.11 (ft)
Low-Flow Purge Rate:	0.25 (Lpm)*

Comments:

**Low-flow purge rate should be within range of instruments used but should not exceed 0.25 gpm. Drawdown should not exceed Maximum Allowable Drawdown.*

GROUNDWATER STABILIZATION PARAMETER RECORD

Time (24:00)	Cumulative Vol. gal or L	Temperature °C	pH	Conductivity µS or (mS)	DO mg/L	ORP mV	Turbidity NTU	NOTES Odor, color, sheen or other
1130	0	19.81	7.70	1.07	6.79	236	-5.0	none
1132	0.5	20.44	7.59	1.06	5.58	236	-5.0	
1134	1.0	20.31	7.59	1.04	3.87	233	-5.0	
1136	1.5	20.18	7.52	1.05	3.95	232	-5.0	
1138	2.0	20.10	7.50	1.06	4.10	231	-5.0	
Previous Stabilized Parameters								

PURGE COMPLETION RECORD X Low Flow & Parameters Stable ___ 3 Casing Volumes & Parameters Stable ___ 5 Casing Volumes ___ Other:

SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 56.87 (ft)

Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing ___ Disp. Pump Tubing Other: Bladder Pump

Sample ID: MW-5B Sample Collection Time: 1138 (24:00)

Containers (#): X VOA (6 preserved or ___ unpreserved) ___ Liter Amber

___ Other: ___ ___ Other: ___

___ Other: ___ ___ Other: ___

GEOCHEMICAL PARAMETERS

Parameter	Time	Measurement
DO (mg/L)		
Ferrous Iron (mg/L)		
Redox Potential (mV)		
Alkalinity (mg/L)		
Other:		
Other:		

Signature: Jim Colin

APPENDIX C

LABORATORY REPORT
AND CHAIN-OF-CUSTODY DOCUMENTATION

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

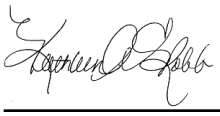
ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-94115-1
Client Project/Site: ARCO 0498, Livermore

For:
Broadbent & Associates, Inc.
4820 Business Center Drive
#110
Fairfield, California 94534

Attn: Kristene Tidwell



Authorized for release by:
12/9/2014 1:43:23 PM

Kathleen Robb, Project Manager II
(949)261-1022
kathleen.robb@testamericainc.com

Table of Contents

Sample Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-94115-1	MW-5B	Water	11/20/14 11:38	11/22/14 10:30
440-94115-2	MW-6B	Water	11/20/14 10:57	11/22/14 10:30

Job ID: 440-94115-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-94115-1

Comments
No additional comments.

Receipt
The samples were received on 11/22/2014 10:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.0º C.

Except:

The following sample(s) was received at the laboratory without a sample collection time documented on the chain of custody: MW-5B (440-94115-1), MW-6B (440-94115-2), TB-498-11202014 (440-94115-3). Sample dates and times were taken from container labels.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Client Sample ID: MW-5B
Date Collected: 11/20/14 11:38
Date Received: 11/22/14 10:30

Lab Sample ID: 440-94115-1
Matrix: Water

Method: 8260B/5030B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane (EDB)	ND		0.50		ug/L			12/02/14 04:04	1
1,2-Dichloroethane	ND		0.50		ug/L			12/02/14 04:04	1
Benzene	ND		0.50		ug/L			12/02/14 04:04	1
Ethanol	ND		150		ug/L			12/02/14 04:04	1
Ethylbenzene	ND		0.50		ug/L			12/02/14 04:04	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			12/02/14 04:04	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			12/02/14 04:04	1
m,p-Xylene	ND		1.0		ug/L			12/02/14 04:04	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			12/02/14 04:04	1
o-Xylene	ND		0.50		ug/L			12/02/14 04:04	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			12/02/14 04:04	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			12/02/14 04:04	1
Toluene	ND		0.50		ug/L			12/02/14 04:04	1
Xylenes, Total	ND		1.0		ug/L			12/02/14 04:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*		*12/02/14 04:04*	*1*
Dibromofluoromethane (Surr)	*106*		*76 - 132*		*12/02/14 04:04*	*1*
Toluene-d8 (Surr)	*104*		*80 - 128*		*12/02/14 04:04*	*1*

Method: 8015B/5030B - Gasoline Range Organics (GC)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C12)	ND		50		ug/L			11/26/14 12:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*65 - 140*		*11/26/14 12:24*	*1*

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Client Sample ID: MW-6B
Date Collected: 11/20/14 10:57
Date Received: 11/22/14 10:30

Lab Sample ID: 440-94115-2
Matrix: Water

Method: 8260B/5030B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane (EDB)	ND		0.50		ug/L			12/02/14 04:30	1
1,2-Dichloroethane	ND		0.50		ug/L			12/02/14 04:30	1
Benzene	ND		0.50		ug/L			12/02/14 04:30	1
Ethanol	ND		150		ug/L			12/02/14 04:30	1
Ethylbenzene	ND		0.50		ug/L			12/02/14 04:30	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			12/02/14 04:30	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			12/02/14 04:30	1
m,p-Xylene	ND		1.0		ug/L			12/02/14 04:30	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			12/02/14 04:30	1
o-Xylene	ND		0.50		ug/L			12/02/14 04:30	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			12/02/14 04:30	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			12/02/14 04:30	1
Toluene	ND		0.50		ug/L			12/02/14 04:30	1
Xylenes, Total	ND		1.0		ug/L			12/02/14 04:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*		*12/02/14 04:30*	*1*
Dibromofluoromethane (Surr)	*105*		*76 - 132*		*12/02/14 04:30*	*1*
Toluene-d8 (Surr)	*102*		*80 - 128*		*12/02/14 04:30*	*1*

Method: 8015B/5030B - Gasoline Range Organics (GC)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C12)	ND		50		ug/L			11/26/14 12:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*65 - 140*		*11/26/14 12:50*	*1*

Method Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Method	Method Description	Protocol	Laboratory
8260B/5030B	Volatile Organic Compounds (GC/MS)	SW846	TAL IRV
8015B/5030B	Gasoline Range Organics (GC)	SW846	TAL IRV

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Lab Chronicle

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Client Sample ID: MW-5B

Lab Sample ID: 440-94115-1

Date Collected: 11/20/14 11:38

Matrix: Water

Date Received: 11/22/14 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/5030B		1	10 mL	10 mL	221805	12/02/14 04:04	MP	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	221117	11/26/14 12:24	IM	TAL IRV

Client Sample ID: MW-6B

Lab Sample ID: 440-94115-2

Date Collected: 11/20/14 10:57

Matrix: Water

Date Received: 11/22/14 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B/5030B		1	10 mL	10 mL	221805	12/02/14 04:30	MP	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	221117	11/26/14 12:50	IM	TAL IRV

Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Method: 8260B/5030B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 440-221805/4
Matrix: Water
Analysis Batch: 221805

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane (EDB)	ND		0.50		ug/L			12/01/14 19:15	1
1,2-Dichloroethane	ND		0.50		ug/L			12/01/14 19:15	1
Benzene	ND		0.50		ug/L			12/01/14 19:15	1
Ethanol	ND		150		ug/L			12/01/14 19:15	1
Ethylbenzene	ND		0.50		ug/L			12/01/14 19:15	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			12/01/14 19:15	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			12/01/14 19:15	1
m,p-Xylene	ND		1.0		ug/L			12/01/14 19:15	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			12/01/14 19:15	1
o-Xylene	ND		0.50		ug/L			12/01/14 19:15	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			12/01/14 19:15	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			12/01/14 19:15	1
Toluene	ND		0.50		ug/L			12/01/14 19:15	1
Xylenes, Total	ND		1.0		ug/L			12/01/14 19:15	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*80 - 120*		*12/01/14 19:15*	*1*
Dibromofluoromethane (Surr)	*102*		*76 - 132*		*12/01/14 19:15*	*1*
Toluene-d8 (Surr)	*105*		*80 - 128*		*12/01/14 19:15*	*1*

Lab Sample ID: LCS 440-221805/5
Matrix: Water
Analysis Batch: 221805

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,2-Dibromoethane (EDB)			25.0	27.7		ug/L		111	70 - 130		
1,2-Dichloroethane			25.0	25.4		ug/L		102	57 - 138		
Benzene			25.0	25.8		ug/L		103	68 - 130		
Ethanol			1250	1210		ug/L		97	50 - 149		
Ethylbenzene			25.0	26.4		ug/L		105	70 - 130		
Ethyl-t-butyl ether (ETBE)			25.0	23.7		ug/L		95	60 - 136		
Isopropyl Ether (DIPE)			25.0	23.1		ug/L		92	58 - 139		
m,p-Xylene			25.0	27.6		ug/L		111	70 - 130		
Methyl-t-Butyl Ether (MTBE)			25.0	26.3		ug/L		105	63 - 131		
o-Xylene			25.0	27.0		ug/L		108	70 - 130		
Tert-amyl-methyl ether (TAME)			25.0	25.0		ug/L		100	57 - 139		
tert-Butyl alcohol (TBA)			250	247		ug/L		99	70 - 130		
Toluene			25.0	26.7		ug/L		107	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*80 - 120*
Dibromofluoromethane (Surr)	*100*		*76 - 132*
Toluene-d8 (Surr)	*104*		*80 - 128*

Method: 8260B/5030B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 440-94179-B-8 MS
Matrix: Water
Analysis Batch: 221805

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2-Dibromoethane (EDB)	ND		250	269		ug/L		107	70 - 131
1,2-Dichloroethane	ND		250	258		ug/L		103	56 - 146
Benzene	ND		250	257		ug/L		103	66 - 130
Ethanol	ND		12500	12700		ug/L		102	54 - 150
Ethylbenzene	ND		250	252		ug/L		101	70 - 130
Ethyl-t-butyl ether (ETBE)	ND		250	246		ug/L		98	70 - 130
Isopropyl Ether (DIPE)	ND		250	235		ug/L		94	64 - 138
m,p-Xylene	ND		250	262		ug/L		105	70 - 133
Methyl-t-Butyl Ether (MTBE)	ND		250	265		ug/L		106	70 - 130
o-Xylene	ND		250	262		ug/L		104	70 - 133
Tert-amyl-methyl ether (TAME)	ND		250	261		ug/L		104	68 - 133
tert-Butyl alcohol (TBA)	ND		2500	2600		ug/L		104	70 - 130
Toluene	ND		250	259		ug/L		103	70 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*102*		*80 - 120*
Dibromofluoromethane (Surr)	*98*		*76 - 132*
Toluene-d8 (Surr)	*102*		*80 - 128*

Lab Sample ID: 440-94179-B-8 MSD
Matrix: Water
Analysis Batch: 221805

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,2-Dibromoethane (EDB)	ND		250	261		ug/L		104	70 - 131	3	25
1,2-Dichloroethane	ND		250	249		ug/L		100	56 - 146	4	20
Benzene	ND		250	251		ug/L		100	66 - 130	2	20
Ethanol	ND		12500	13300		ug/L		106	54 - 150	4	30
Ethylbenzene	ND		250	254		ug/L		102	70 - 130	1	20
Ethyl-t-butyl ether (ETBE)	ND		250	242		ug/L		97	70 - 130	2	25
Isopropyl Ether (DIPE)	ND		250	236		ug/L		95	64 - 138	0	25
m,p-Xylene	ND		250	261		ug/L		104	70 - 133	1	25
Methyl-t-Butyl Ether (MTBE)	ND		250	260		ug/L		104	70 - 130	2	25
o-Xylene	ND		250	265		ug/L		105	70 - 133	1	20
Tert-amyl-methyl ether (TAME)	ND		250	250		ug/L		100	68 - 133	4	30
tert-Butyl alcohol (TBA)	ND		2500	2620		ug/L		105	70 - 130	1	25
Toluene	ND		250	259		ug/L		103	70 - 130	0	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*80 - 120*
Dibromofluoromethane (Surr)	*99*		*76 - 132*
Toluene-d8 (Surr)	*102*		*80 - 128*

Method: 8015B/5030B - Gasoline Range Organics (GC)

Lab Sample ID: MB 440-221117/5
Matrix: Water
Analysis Batch: 221117

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C12)	ND		50		ug/L			11/26/14 11:59	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*65 - 140*		*11/26/14 11:59*	*1*

Lab Sample ID: LCS 440-221117/4
Matrix: Water
Analysis Batch: 221117

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
GRO (C4-C12)			800	700		ug/L		87	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*83*		*65 - 140*

Lab Sample ID: 440-94115-1 MS
Matrix: Water
Analysis Batch: 221117

Client Sample ID: MW-5B
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
GRO (C4-C12)	ND		800	790		ug/L		95	65 - 140		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*89*		*65 - 140*

Lab Sample ID: 440-94115-1 MSD
Matrix: Water
Analysis Batch: 221117

Client Sample ID: MW-5B
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
GRO (C4-C12)	ND		800	828		ug/L		100	65 - 140	5	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*65 - 140*

QC Association Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

GC/MS VOA

Analysis Batch: 221805

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-94115-1	MW-5B	Total/NA	Water	8260B/5030B	
440-94115-2	MW-6B	Total/NA	Water	8260B/5030B	
440-94179-B-8 MS	Matrix Spike	Total/NA	Water	8260B/5030B	
440-94179-B-8 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B/5030B	
LCS 440-221805/5	Lab Control Sample	Total/NA	Water	8260B/5030B	
MB 440-221805/4	Method Blank	Total/NA	Water	8260B/5030B	

GC VOA

Analysis Batch: 221117

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-94115-1	MW-5B	Total/NA	Water	8015B/5030B	
440-94115-1 MS	MW-5B	Total/NA	Water	8015B/5030B	
440-94115-1 MSD	MW-5B	Total/NA	Water	8015B/5030B	
440-94115-2	MW-6B	Total/NA	Water	8015B/5030B	
LCS 440-221117/4	Lab Control Sample	Total/NA	Water	8015B/5030B	
MB 440-221117/5	Method Blank	Total/NA	Water	8015B/5030B	

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0498, Livermore

TestAmerica Job ID: 440-94115-1

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska	State Program	10	CA01531	06-30-15
Arizona	State Program	9	AZ0671	10-13-15
California	LA Cty Sanitation Districts	9	10256	01-31-15
California	State Program	9	2706	06-30-16
Guam	State Program	9	Cert. No. 12.002r	01-23-15
Hawaii	State Program	9	N/A	01-29-15 *
Nevada	State Program	9	CA015312007A	07-31-15
New Mexico	State Program	6	N/A	01-29-15
Northern Mariana Islands	State Program	9	MP0002	01-29-15
Oregon	NELAP	10	4005	01-29-15
USDA	Federal		P330-09-00080	06-06-15
USEPA UCMR	Federal	1	CA01531	01-31-15

* Certification renewal pending - certification considered valid.

Laboratory Management Program LaMP Chain of Custody Record

BP Site Node Path: BP 498 **Req Due Date (mm/dd/yy):** _____ **Rush TAT:** Yes ____ No ____

BP Facility No: 498 **Lab Work Order Number:** _____

Lab Name: Test America	Facility Address: 286 South Livermore Avenue	Consultant/Contractor: Broadbent & Associates Inc.	
Lab Address: 17461 Derian Avenue, Suite 100, Irvine, CA	City, State, ZIP Code: Livermore, California	Consultant/Contractor Project No: 08- 82-603	
Lab PM: Kathleen Robb	Lead Regulatory Agency: ACEH	Address: 4820 Business Center Drive, Suite 110, Fairfield , CA 94534	
Lab Phone: 949-261-1022	California Global ID No.: T0600124081	Consultant/Contractor PM: Kristene Tidwell	
Lab Shipping Accnt: Fed ex#: 11103-6633-7	Enfos Proposal No/ WR#: 0056X - 0005 / WR273478	Phone: 707-455-7290 / 707-863-9046 (f)	Email: ktidwell@broadbentinc.com
Lab Bottle Order No:	Accounting Mode: Provision x OOC-BU ____ OOC-RM ____	Email EDD To: ktidwell@broadbentinc.com	and to lab.enfosdoc@bp.com
Other Info:	Stage: Execute (4) Activity: GWM (401)	Invoice To: BP x	Contractor ____

BP Project Manager (PM): Chuck Carmel

BP PM Phone: 925-275-3803

BP PM Email: charles.carmel@bp.com

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	Matrix: Is this location a well?	No. Containers / Preservative: Total Number of Container	Unpreserved	H2SO4	HNO3	HCl	Methanol	Requested Analyses: GRO by 8015M	BTEX/5 FO/EDB by 8260	1,2-DCA and Ethanol by 8260	
	~~MW-1~~				x		y	6				x		x	x	x	JC
	~~MW-2~~				x		y	6				x		x	x	x	JC
	~~MW-3~~				x		y	6				x		x	x	x	JC
	~~MW-4~~				x		y	6				x		x	x	x	JC
	~~MW-5A~~				x		y	6				x		x	x	x	JC
	MW-5B				x		y	6				x		x	x	x	
	~~MW-6A~~				x		y	6				x		x	x	x	JC
	MW-6B				x		y	6				x		x	x	x	
	TB-498-11202014				x		n	2				x					

440-94115 Chain of Custody

Report Type & QC Level

Standard x

Full Data Package ____

Comments

Note: If sample not collected, indicate "No Sample" in comments and single-strike out and initial any preprinted sample description.

No Sample
No Sample
No Sample
No Sample
No Sample

No Sample

ON HOLD

Sampler's Name: James Ramos	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: Broadbent & Associates						
Shipment Method: Fed Ex Ship Date: 11/21/2014	Broadbent	11-21-14	1700	TAI	11/21/14	10:30
Shipment Tracking No:						

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: _____ °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

IR#4 = 5.2 5.0°C

8037 8050 3423

Login Sample Receipt Checklist

Client: Broadbent & Associates, Inc.

Job Number: 440-94115-1

Login Number: 94115

List Source: TestAmerica Irvine

List Number: 1

Creator: Soderblom, Tim

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	No sample date and/or time on COC, logged in per container labels.
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	False	No date or time on COC, logged in per container labels.
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX D

GEOTRACKER UPLOAD CONFIRMATION RECEIPTS

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER ESI

UPLOADING A EDF FILE

SUCCESS

Processing is complete. No errors were found!
Your file has been successfully submitted!

Submittal Type:	**EDF**
Report Title:	**Fourth Quarter 2014 Monitoring Report EDF**
Report Type:	**Monitoring Report - Quarterly**
Facility Global ID:	**T0600124081**
Facility Name:	**ARCO #0498**
File Name:	**440-94115-1_09 Dec 14 1439_EDF.zip**
Organization Name:	**Broadbent & Associates, Inc.**
Username:	**BROADBENT-C**
IP Address:	**69.170.11.178**
Submittal Date/Time:	**1/16/2015 10:47:39 AM**
Confirmation Number:	7351877570

VIEW QC REPORT

VIEW DETECTIONS REPORT