

# Atlantic Richfield Company

**Shannon Couch**  
Project Manager

PO Box 1257  
San Ramon, CA 94583  
Phone: (925) 275-3804  
Fax: (925) 275-3815  
E-Mail: shannon.couch@bp.com

**RECEIVED**

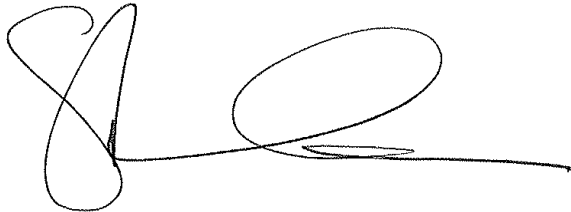
*By Alameda County Environmental Health at 9:52 am, Jan 30, 2013*

January 11, 2013

Re: Fourth Quarter 2012 Semi-Annual Groundwater Monitoring Report  
Atlantic Richfield Company Station #498  
286 South Livermore Avenue, Livermore, California  
ACEH Case No. 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,



Shannon Couch  
Project Manager

Attachment



**FOURTH QUARTER 2012 SEMI-ANNUAL  
GROUNDWATER MONITORING REPORT  
Atlantic Richfield Company Station #498  
286 South Livermore Ave.  
Livermore, Alameda County, California**

**Prepared for:**

Ms. Shannon Couch  
Atlantic Richfield Company  
P.O. Box 1257  
San Ramon, CA 94583

**Prepared by:**

Broadbent & Associates, Inc.  
1324 Mangrove Avenue, Suite 212  
Chico, California 95926  
(530) 566-1400

January 11, 2013

No. 08-82-603



1324 Mangrove Ave., Suite 212, Chico, CA 95926  
[T] 530-566-1400 [F] 530-566-1401  
broadbentinc.com

***Creating Solutions. Building Trust.***

January 11, 2013

Project No. 08-82-603

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

Attn.: Ms. Shannon Couch

Re: Fourth Quarter 2012 Semi-Annual Groundwater Monitoring Report, Atlantic Richfield Company Station #498, 286 South Livermore Avenue, Livermore, California; ACEH Case #RO0002873

Dear Ms. Couch:

Attached is the Fourth Quarter 2012 Semi-Annual Groundwater Monitoring Report for Atlantic Richfield Company Station #498 located at 286 South Livermore Avenue, Livermore, California. Should you have questions regarding the work performed or results obtained, please do not hesitate to contact us at (530) 566-1400.

Sincerely,  
BROADBENT & ASSOCIATES, INC.

Jason Duda  
Project Scientist

Matthew G. Herrick, P.G., C.HG  
Senior Hydrogeologist



Enclosure

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 2012  
SEMI-ANNUAL GROUNDWATER MONITORING REPORT  
STATION #498, LIVERMORE, CALIFORNIA**

Broadbent & Associates, Inc. (Broadbent) is pleased to present this *Fourth Quarter 2012 Semi-Annual Groundwater Monitoring Report* on behalf of Atlantic Richfield Company (a BP affiliated company) for Station #498 located in Livermore, Alameda County, California. Reporting is being submitted to Alameda County Environmental Health consistent with the requirements under the legal authority of the California Regional Water Quality Control Board, as codified by the California Code of Regulations Title 23, Section 2652(d). Details of work performed, discussion of results, and recommendations are provided below.

Facility Name / Address:	ARCO Station #498 / 286 South Livermore Avenue
Client Project Manager / Title:	Ms. Shannon Couch / Project Manager
Broadbent Contact:	Jason Duda, (530) 566-1400
Broadbent Project No.:	08-82-603
Primary Regulatory Agency / ID No.:	ACEH, Case #RO0002873
Current phase of project:	Monitoring and Assessment
List of Acronyms / Abbreviations:	See end of report text for list of acronyms/abbreviations used in report.

**WORK PERFORMED THIS QUARTER (Fourth Quarter 2012):**

1. Prepared and submitted *Third Quarter 2012 Status Report* (Broadbent, 10/26/2012).
2. Conducted groundwater monitoring/sampling for Fourth Quarter 2012 on October 9, 2012.
3. Prepared and submitted *Soil and Groundwater Investigation Work Plan* (Broadbent, 12/7/2012).

**WORK SCHEDULED FOR NEXT QUARTER (First Quarter 2013):**

1. Prepare and submit *Fourth Quarter 2012 Semi-Annual Groundwater Monitoring Report* (contained herein).
2. Conduct on-site soil and groundwater investigation activities.

**GROUNDWATER MONITORING PLAN SUMMARY:**

Groundwater level gauging:	MW-1 through MW-4	(2Q and 4Q)
Groundwater sample collection:	MW-1 through MW-4	(2Q and 4Q)
Biodegradation indicator parameter monitoring:	NA	

**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:	37.61 (MW-1) to 41.84 (MW-2)	(ft below TOC)
Gradient direction:	West-Northwest	(compass direction)
Gradient magnitude:	0.02	(ft/ft)
Average change in elevation:	-3.44	(ft since last measurement)

### Laboratory Analytical Data

#### Summary:

GRO were detected in two of the three wells sampled at a maximum concentration of 1,600 µg/L in well MW-3. Benzene was detected in well MW-3 at a concentration of 210 µg/L. MTBE was detected in each of the three wells sampled at a maximum concentration of 33 µg/L in well MW-3.

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### ACTIVITIES CONDUCTED & RESULTS:

Fourth Quarter 2012 groundwater monitoring was conducted on October 9, 2012 by Broadbent personnel in accordance with the monitoring plan summary detailed above. No irregularities were noted during water level gauging. Light, Non-Aqueous Phase Liquid (LNAPL, or free product) was not noted to be present in the wells monitored during this event. Depth to water measurements ranged from 37.61 ft at MW-1 to 41.84 ft at MW-2. Resulting groundwater surface elevations ranged from 453.51 ft at MW-2 to 459.11 ft at MW-1. Groundwater elevations are summarized in Table 1. Water level elevations yielded a groundwater gradient to the west-northwest at approximately 0.02 ft/ft. Field methods used during groundwater monitoring are provided in Appendix A. Field data sheets are included in Appendix B. A Site Location Map is presented as Drawing 1. Potentiometric groundwater elevation contours are presented in Drawing 2.

Groundwater samples were collected on October 9, 2012 from wells MW-1 through MW-3, generally consistent with the current monitoring schedule. There was insufficient water within the well casing in order to collect a sample from monitor well MW-4. No other irregularities were reported during sampling. Samples were submitted under chain-of-custody protocol to TestAmerica Laboratories, Inc. (Irvine, California) for analysis of GRO (C6-C12) by EPA Method 8015M; for BTEX, MTBE, ETBE, TAME, DIPE, EDB, 1,2-DCA, TBA, and Ethanol by EPA Method 8260. No significant irregularities were encountered during analysis of the samples. The laboratory analytical report, including chain-of-custody documentation, is provided in Appendix C.

Hydrocarbons in the GRO range were detected above the laboratory reporting limit in two of the three wells sampled at concentrations up to 1,600 µg/L in well MW-3. Benzene, Ethylbenzene, and Total Xylenes were detected above the laboratory reporting limits in well MW-3 at concentrations of 210 µg/L, 28 µg/L, and 7.4 µg/L, respectively. MTBE was detected above the laboratory reporting limit in each of the three wells sampled at a maximum concentration of 33 µg/L in well MW-3. TBA was detected above the laboratory reporting limit in two of the three wells sampled at a maximum concentration of 56 µg/L in well MW-3. The remaining analytes were not detected above their laboratory reporting limits in the wells sampled this monitoring event. Groundwater monitoring laboratory analytical results are summarized in Table 1 and Table 2. The most recent GRO, Benzene, and MTBE concentrations are also presented in Drawing 2. 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.

### DISCUSSION:

Groundwater levels were between historic minimum and maximum elevations for each well gauged this quarter with the exception of historic minimum elevations recorded for wells MW-1 and MW-4. Groundwater elevations yielded a groundwater gradient to the west-northwest at approximately 0.02 ft/ft, generally consistent with the historic gradient data presented in Table 3.

This event's detected analytical concentrations were within the historic minimum and maximum ranges recorded for each well with the following exceptions: GRO, Ethylbenzene and Total Xylenes reached historic minimum concentrations in well MW-3 and MTBE reached a historic minimum concentration in well MW-2. Recent and historic laboratory analytical results are summarized in Table 1 and Table 2. The next semi-annual groundwater monitoring and sampling event is scheduled to be conducted during the Second Quarter 2013.

#### **RECOMMENDATIONS:**

Broadbent submitted the *Soil and Groundwater Investigation Work Plan* dated December 7, 2012, which proposed on-Site soil and groundwater assessment activities to define the site stratigraphy and vertical and lateral distribution of contamination using Cone Penetration Testing (CPT) drilling techniques. Conditional approval of the proposed scope of work was received from ACEH in a letter dated December 24, 2012. ACEH requested that the depth of the borings be extended to a total depth of approximately 60 feet below ground surface rather than 55 feet. On-Site characterization activities, including the requested change in boring depth, are anticipated to be conducted during First Quarter 2013. Additionally, regular groundwater monitoring and sampling will take place according to the previously discussed schedule.

#### **LIMITATIONS:**

The findings presented in this report are based upon observations of field personnel, points investigated, and results of laboratory tests performed by TestAmerica Laboratories, Inc. (Irvine, California). 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 the Atlantic Richfield Company. 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, Fourth Quarter, 2012

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

Table 2: Summary of Fuel Additives Analytical Data

Table 3: Historic Groundwater Gradient – Direction and Magnitude

Appendix A: Field Methods

Appendix B: Field Data Sheets and Non-Hazardous Waste Data Form

Appendix C: Laboratory Report and Chain-of-Custody Documentation

Appendix D: GeoTracker Upload Confirmation Receipt

#### **LIST OF COMMONLY USED ACRONYMS/ABBREVIATIONS:**

ACEH:	Alameda County Environmental Health	gal:	Gallons
BTEX:	Benzene, Toluene, Ethylbenzene, Total Xylenes	GRO:	Gasoline-Range Organics
1,2-DCA:	1,2-Dichloroethane	LNAPL:	Light Non-Aqueous Phase Liquid
DIPE:	Di-Isopropyl Ether	MTBE:	Methyl Tertiary Butyl Ether
DO:	Dissolved Oxygen	NO <sub>3</sub> :	Nitrate as Nitrogen

DRO:	Diesel-Range Organics	ppb:	parts per billion
EDB:	1,2-Dibromomethane	SO <sub>4</sub> :	Sulfate
Eh:	Oxidation Reduction Potential	TAME:	Tert-Amyl Methyl Ether
EPA:	Environmental Protection Agency	TBA:	Tertiary Butyl Ether
ETBE:	Ethyl Tertiary Butyl Ether	TOC:	Top of Casing
Fe <sup>2+</sup> :	Ferrous Iron	µg/L:	micrograms per liter
ft/ft:	feet per foot		



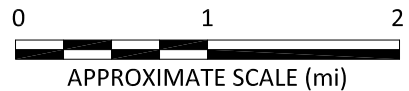
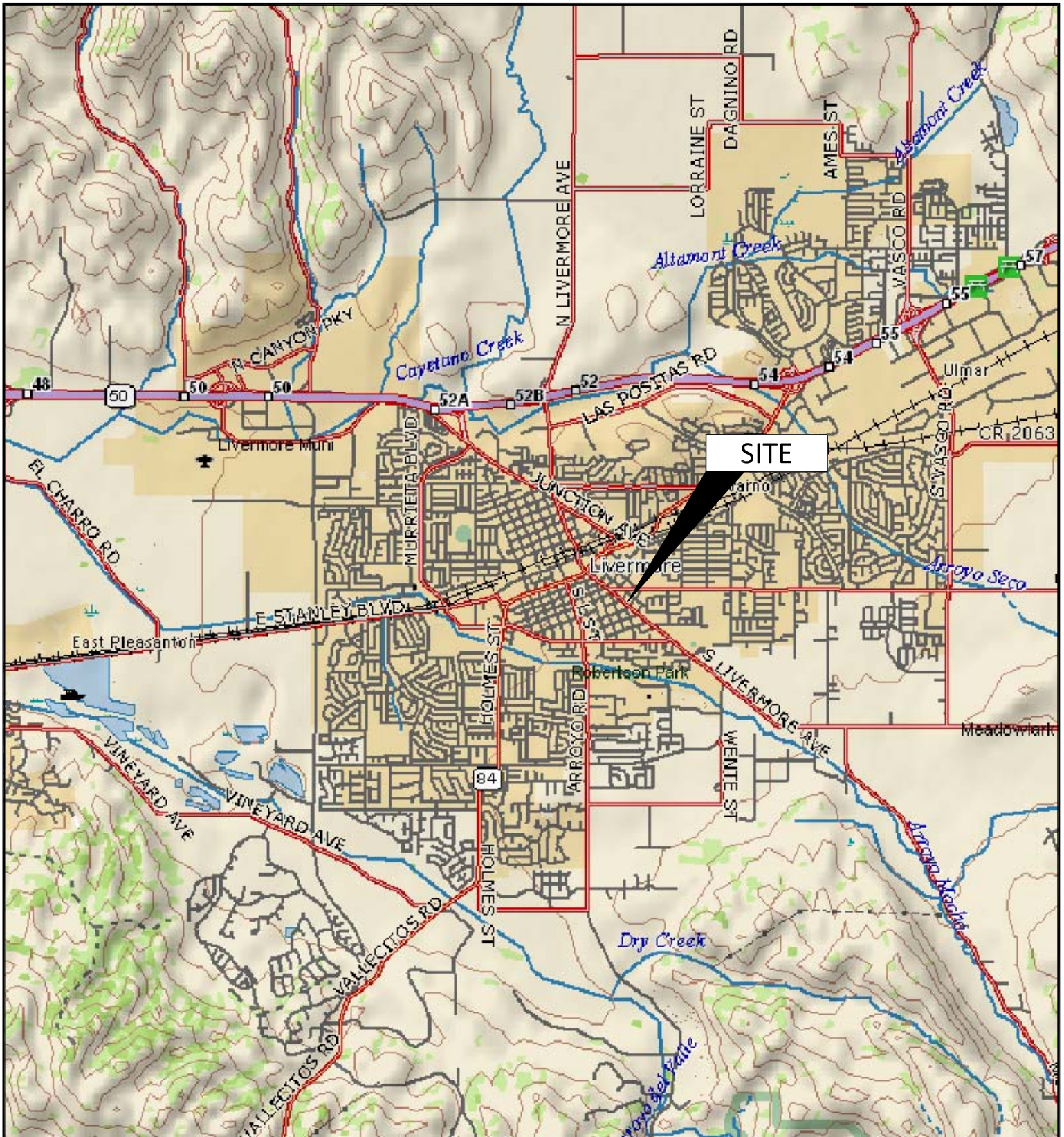


IMAGE SOURCE: DELORME

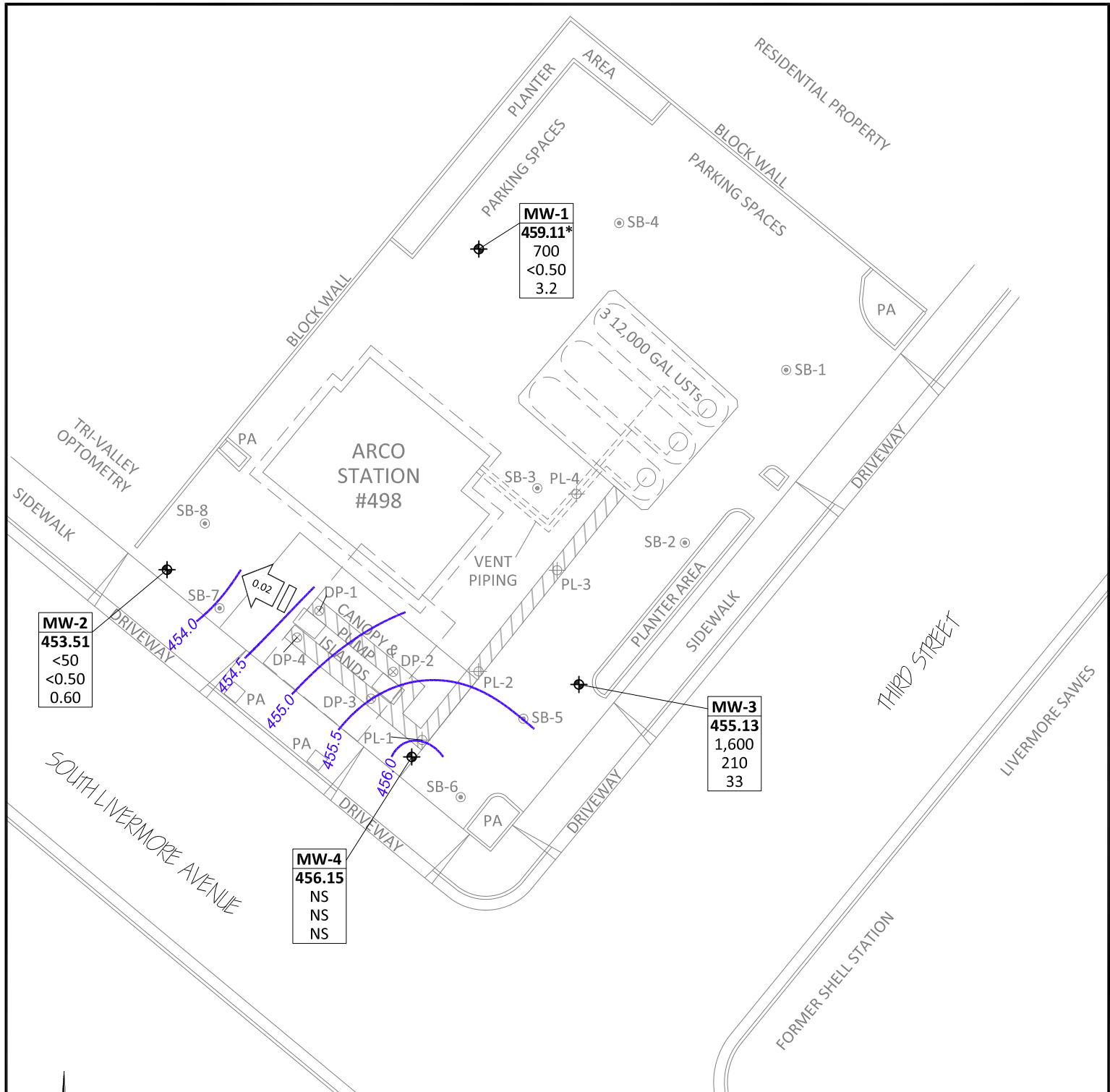
**BROADBENT**  
 1324 Mangrove Ave., Suite 212  
 Chico, California 95926  
 Project No.: 08-82-603 Date: 12/3/2012

Station #498  
 286 South Livermore Avenue  
 Livermore, California

Site Location Map

Drawing  
**1**



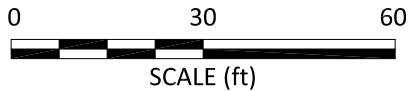


<b>MW-2</b>
453.51
<50
<0.50
0.60

<b>MW-1</b>
459.11*
700
<0.50
3.2

<b>MW-3</b>
455.13
1,600
210
33

<b>MW-4</b>
456.15
NS
NS
NS



LEGEND	
	Monitor Well Location
	Soil Boring (URS 2005)
	Product Line Soil Sample (Delta 2001)
	Dispenser Pump Soil Sample (Delta 2001)
	Well designation
	Groundwater elevation
	Concentration of GRO, Benzene, and MTBE in groundwater (µg/L)
	Product Line Excavation Trench
	Groundwater Elevation Contour (Feet Above Site Datum)
	Groundwater Gradient (ft/ft)
<	Not detected at or above laboratory reporting limits
NS	Not sampled
*	Not used in contouring

NOTES: SITE MAP ADAPTED FROM WATSON WEST, DELTA ENVIRONMENTAL AND WOOD RODGERS FIGURES. WOOD RODGERS SURVEY COMPLETED DECEMBER 2, 2008.

**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			
<b>MW-1</b>																
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)
<b>10/9/2012</b>	<b>NP</b>		<b>20.00</b>	<b>40.00</b>	<b>37.61</b>	<b>0.00</b>	<b>459.11</b>	<b>700</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;1.0</b>	<b>3.2</b>	<b>2.79</b>	<b>7.93</b>	
<b>MW-2</b>																
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	
<b>10/9/2012</b>	<b>P</b>		<b>37.00</b>	<b>57.00</b>	<b>41.84</b>	<b>0.00</b>	<b>453.51</b>	<b>&lt;50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;1.0</b>	<b>0.60</b>	<b>2.76</b>	<b>7.71</b>	
<b>MW-3</b>																
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	

**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			
<b>MW-3 Cont.</b>																
5/20/2010	P	496.32	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)
<b>10/9/2012</b>	<b>P</b>		<b>37.00</b>	<b>57.00</b>	<b>41.19</b>	<b>0.00</b>	<b>455.13</b>	<b>1,600</b>	<b>210</b>	<b>&lt;2.0</b>	<b>28</b>	<b>7.4</b>	<b>33</b>	<b>1.23</b>	<b>7.39</b>	
<b>MW-4</b>																
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
5/20/2010	P		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	
<b>10/9/2012</b>	<b>--</b>		<b>20.00</b>	<b>40.00</b>	<b>39.86</b>	<b>0.00</b>	<b>456.15</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>d</b>

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	
<b>MW-1</b>									
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	
<b>10/9/2012</b>	<b>&lt;150</b>	<b>47</b>	<b>3.2</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	
<b>MW-2</b>									
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	
<b>10/9/2012</b>	<b>&lt;150</b>	<b>&lt;10</b>	<b>0.60</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	<b>&lt;0.50</b>	
<b>MW-3</b>									
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	

**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	
<b>MW-3 Cont.</b>									
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	
<b>10/9/2012</b>	<b>&lt;600</b>	<b>56</b>	<b>33</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>	<b>&lt;2.0</b>	
<b>MW-4</b>									
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	



Symbols & Abbreviations:

--/-- = Not sampled/analyzed/applicable/measured/available

< = 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. Historical Groundwater Gradient - Direction and Magnitude**  
**ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA**

<b>Date Measured</b>	<b>Approximate Gradient Direction</b>	<b>Approximate Gradient Magnitude (ft/ft)</b>
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
<b>10/9/2012</b>	<b>West-Northwest</b>	<b>0.02</b>

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<sup>1</sup>. 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	± 0.2°C (± 0.36°F)
pH	± 0.1 standard units
Conductivity	± 3%
Dissolved oxygen	± 10%
Oxidation reduction potential	± 10 mV
Turbidity <sup>1</sup>	± 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 minimize drawdown and mixing of the water column in the well

<sup>1</sup> 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.

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)<sup>2</sup>, 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<sup>1</sup>. 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**

In accordance with 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)<sup>2</sup>, 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.

---

<sup>2</sup> 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 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 AND NON-HAZARDOUS WASTE DATA FORM



DAILY REPORT

Page 1 of 1

Project: BP 498 Project No.: 08-82-603

Field Representative(s): AM / JR Day: Tuesday Date: 10/9/12

Time Onsite: From: 1115 To: 1400 ; From: To: ; From: To:

- Signed HASP Safety Glasses Hard Hat Steel Toe Boots Safety Vest
UST Emergency System Shut-off Switches Located Proper Gloves
Proper Level of Barricading Other PPE (describe)

Weather: Sunny

Equipment In Use: Bladder pump, Horiba U53, water level meter, bailer

Visitors: None

Table with 2 columns: TIME and WORK DESCRIPTION. Contains handwritten entries for arrival, setup at various monitoring wells (MW-2, MW-4, MW-1, MW-3), and cleanup.

Signature: Alex Meckler





GROUNDWATER SAMPLING DATA SHEET

Project: MW-1 Project No.: 08-82-603 Date: 10/9/12
Field Representative: AM/SR
Well ID: MW-1 Start Time: - End Time: - Total Time (minutes): -

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

WELL HEAD INTEGRITY (cap, lock, vault, etc.) Comments: Good Improvement Needed (circle one)

PURGING/SAMPLING METHOD: Predetermined Well Volume, Low Flow, Other: Grab (circle one)

PREDETERMINED WELL VOLUME and LOW-FLOW sections with diagrams and calculation fields for casing diameters, well depth, and purge rates.

GROUNDWATER STABILIZATION PARAMETER RECORD

Table with 9 columns: Time (24:00), Cumulative Volume (L), Temperature (°C), pH, Conductivity (µS or mS), DO (mg/L), ORP (mV), Turbidity (NTU), NOTES. Includes handwritten data for Time 1251, Temp 24.59, pH 7.93, etc.

Previous Stabilized Parameters

PURGE COMPLETION RECORD: Low Flow & Parameters Stable, 3 Casing Volumes & Parameters Stable, 5 Casing Volumes, Other: Grab

SAMPLE COLLECTION RECORD and GEOCHEMICAL PARAMETERS sections with fields for depth to water, collection method, sample ID, and chemical parameters like DO, Iron, Redox Potential, Alkalinity.

Signature: Alex M...





GROUNDWATER SAMPLING DATA SHEET

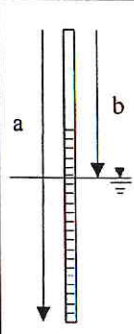
Project: BP 498 Project No.: 08-82-603 Date: 10/9/12  
 Field Representative: AM/JR  
 Well ID: MW-2 Start Time: - End Time: - Total Time (minutes): -

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

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					LOW-FLOW	
Casing Diameter   Unit Volume (gal/ft) (circle one)					Previous Low-Flow Purge Rate: _____ (lpm)	
1"   (0.04)	1.25"   (0.08)	2"   (0.17)	3"   (0.38)	Other: _____	Total Well Depth (a): <u>57.18</u> (ft)	
4"   (0.66)	6"   (1.50)	8"   (2.60)	12"   (5.81)	"   ( )	Initial Depth to Water (b): <u>41.84</u> (ft)	
Total Well Depth (a): _____ (ft)					Pump In-take Depth = b + (a-b)/2: <u>49.51</u> (ft)	
Initial Depth to Water (b): _____ (ft)					Maximum Allowable Drawdown = (a-b)/8: <u>1.91</u> (ft)	
Water Column Height (WCH) = (a - b): _____ (ft)					Low-Flow Purge Rate: <u>0.25</u> (Lpm)*	
Water Column Volume (WCV) = WCH x Unit Volume: _____ (gal)					Comments: _____	
Three Casing Volumes = WCV x 3: _____ (gal)					*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.	
Five Casing Volumes = WCV x 5: _____ (gal)						
Pump Depth (if pump used): _____ (ft)						



GROUNDWATER STABILIZATION PARAMETER RECORD

Time (24:00)	Cumulative Volume (L)	Temperature °C	pH	Conductivity μS or mS	DO mg/L	ORP mV	Turbidity NTU	NOTES Odor, color, sheen or other
1203	0.0	24.50	7.97	0.994	4.58	34	267	
1205	0.5	23.34	7.78	1.00	3.35	45	-	
1207	1.0	23.02	7.72	1.00	2.98	47	-	
1209	1.5	22.73	7.70	0.999	2.77	47	-	
1211	2.0	22.70	7.71	0.997	2.76	45	195	

Previous Stabilized Parameters

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

SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 41.84 (ft)  
 Sample Collected Via:  Disp. Bailer  Dedicated Pump Tubing  
 Disp. Pump Tubing Other:  
 Sample ID: MW-2 Sample Collection Time: 12:17 (24:00)  
 Containers (#): 6 VOA (  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:		









NO. 689908

# NON-HAZARDOUS WASTE DATA FORM

BESI #

GENERATOR	Generator's Name and Mailing Address BP WEST COAST PRODUCTS, LLC P.O. BOX 80249 RANCHO SANTA MARGARITA, CA 92688	Generator's Site Address (if different than mailing address) BP 498 286 S. Livermore Ave Livermore, CA 94550
	Generator's Phone: 949-460-5200	

GENERATOR	Container type removed from site: <input type="checkbox"/> Drums <input type="checkbox"/> Vacuum Truck <input type="checkbox"/> Roll-off Truck <input type="checkbox"/> Dump Truck <input type="checkbox"/> Other _____	Container type transported to receiving facility: <input type="checkbox"/> Drums <input type="checkbox"/> Vacuum Truck <input type="checkbox"/> Roll-off Truck <input type="checkbox"/> Dump Truck <input type="checkbox"/> Other _____																	
	Quantity <u>1.5 g</u>	Quantity _____ Volume _____																	
	WASTE DESCRIPTION <u>NON-HAZARDOUS WATER</u>	GENERATING PROCESS <u>WELL PURGING / DECON WATER</u>																	
	<table border="1"> <thead> <tr> <th>COMPONENTS OF WASTE</th> <th>PPM</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>1. WATER</td> <td></td> <td>99-100%</td> </tr> <tr> <td>2. TPH</td> <td></td> <td>&lt;1%</td> </tr> </tbody> </table>	COMPONENTS OF WASTE	PPM	%	1. WATER		99-100%	2. TPH		<1%	<table border="1"> <thead> <tr> <th>COMPONENTS OF WASTE</th> <th>PPM</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>3. _____</td> <td></td> <td></td> </tr> <tr> <td>4. _____</td> <td></td> <td></td> </tr> </tbody> </table>	COMPONENTS OF WASTE	PPM	%	3. _____			4. _____	
COMPONENTS OF WASTE	PPM	%																	
1. WATER		99-100%																	
2. TPH		<1%																	
COMPONENTS OF WASTE	PPM	%																	
3. _____																			
4. _____																			

Waste Profile \_\_\_\_\_ PROPERTIES: pH 7-10     SOLID     LIQUID     SLUDGE     SLURRY     OTHER \_\_\_\_\_

HANDLING INSTRUCTIONS: WEAR ALL APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT.

Generator Printed/Typed Name <u>James Ramos</u>	Signature <u>James Ramos</u>	Month <u>10</u>	Day <u>9</u>	Year <u>12</u>
--	---------------------------------	--------------------	-----------------	-------------------

The Generator certifies that the waste as described is 100% non-hazardous

TRANSPORTER	Transporter 1 Company Name <u>BROADBENT &amp; ASSOCIATES, INC&gt;</u>	Phone# <u>530-566-1400</u>			
	Transporter 1 Printed/Typed Name <u>James Ramos</u>	Signature <u>James Ramos</u>	Month <u>10</u>	Day <u>9</u>	Year <u>12</u>
	Transporter Acknowledgment of Receipt of Materials				
	Transporter 2 Company Name	Phone#			
Transporter 2 Printed/Typed Name	Signature	Month	Day	Year	
Transporter Acknowledgment of Receipt of Materials					

RECEIVING FACILITY	Designated Facility Name and Site Address <u>INSTRAT, INC.</u> <u>1105 AIRPORT RD.</u> <u>RIO VISTA, CA 94571</u>	Phone# <u>530-753-1829</u>			
	Printed/Typed Name	Signature	Month	Day	Year
	Designated Facility Owner or Operator: Certification of receipt of materials covered by this data form.				

**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: 440-26201-1  
Client Project/Site: ARCO 0498, Livermore

For:  
Broadbent & Associates, Inc.  
1324 Mangrove Ave  
Suite 212  
Chico, California 95926

Attn: Mr. Jason Duda



---

*Authorized for release by:  
10/23/2012 8:47:18 PM*

Pat Abe  
Project Manager I  
pat.abe@testamericainc.com

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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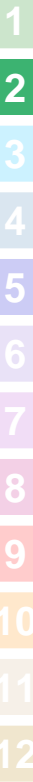
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# Sample Summary

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

TestAmerica Job ID: 440-26201-1

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-26201-1	MW-1	Water	10/09/12 12:55	10/10/12 10:00
440-26201-2	MW-2	Water	10/09/12 12:17	10/10/12 10:00
440-26201-3	MW-3	Water	10/09/12 13:30	10/10/12 10:00

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# Case Narrative

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

TestAmerica Job ID: 440-26201-1

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**Job ID: 440-26201-1**

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**Laboratory: TestAmerica Irvine**

**Narrative**

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**Job Narrative**  
**440-26201-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 10/10/2012 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.5° C.

**GC/MS VOA**

No analytical or quality issues were noted.

**GC VOA**

Method(s) 8015B: Surrogate recovery for the following sample(s) was outside control limits: MW-1 (440-26201-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method(s) 8015B: Surrogate recovery was outside control limits for the following sample: MW-3 (440-26196-1 MS). BFB coeluting with GRO standard. Data not impacted.

No other analytical or quality issues were noted.

**VOA Prep**

No analytical or quality issues were noted.





# Client Sample Results

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

TestAmerica Job ID: 440-26201-1

**Client Sample ID: MW-1**

**Lab Sample ID: 440-26201-1**

**Date Collected: 10/09/12 12:55**

**Matrix: Water**

**Date Received: 10/10/12 10:00**

**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			10/17/12 04:50	1
1,2-Dichloroethane	ND		0.50	ug/L			10/17/12 04:50	1
Benzene	ND		0.50	ug/L			10/17/12 04:50	1
Ethanol	ND		150	ug/L			10/17/12 04:50	1
Ethylbenzene	ND		0.50	ug/L			10/17/12 04:50	1
Ethyl-t-butyl ether (ETBE)	ND		0.50	ug/L			10/17/12 04:50	1
Isopropyl Ether (DIPE)	ND		0.50	ug/L			10/17/12 04:50	1
m,p-Xylene	ND		1.0	ug/L			10/17/12 04:50	1
<b>Methyl-t-Butyl Ether (MTBE)</b>	<b>3.2</b>		0.50	ug/L			10/17/12 04:50	1
o-Xylene	ND		0.50	ug/L			10/17/12 04:50	1
Tert-amyl-methyl ether (TAME)	ND		0.50	ug/L			10/17/12 04:50	1
<b>tert-Butyl alcohol (TBA)</b>	<b>47</b>		10	ug/L			10/17/12 04:50	1
Toluene	ND		0.50	ug/L			10/17/12 04:50	1
Xylenes, Total	ND		1.0	ug/L			10/17/12 04:50	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		80 - 120		10/17/12 04:50	1
Dibromofluoromethane (Surr)	103		80 - 120		10/17/12 04:50	1
Toluene-d8 (Surr)	103		80 - 120		10/17/12 04:50	1

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

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>GRO (C6-C12)</b>	<b>700</b>		50	ug/L			10/13/12 21:36	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	178	LH	65 - 140		10/13/12 21:36	1

# Client Sample Results

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

TestAmerica Job ID: 440-26201-1

**Client Sample ID: MW-2**

**Lab Sample ID: 440-26201-2**

**Date Collected: 10/09/12 12:17**

**Matrix: Water**

**Date Received: 10/10/12 10:00**

**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			10/17/12 05:20	1
1,2-Dichloroethane	ND		0.50	ug/L			10/17/12 05:20	1
Benzene	ND		0.50	ug/L			10/17/12 05:20	1
Ethanol	ND		150	ug/L			10/17/12 05:20	1
Ethylbenzene	ND		0.50	ug/L			10/17/12 05:20	1
Ethyl-t-butyl ether (ETBE)	ND		0.50	ug/L			10/17/12 05:20	1
Isopropyl Ether (DIPE)	ND		0.50	ug/L			10/17/12 05:20	1
m,p-Xylene	ND		1.0	ug/L			10/17/12 05:20	1
<b>Methyl-t-Butyl Ether (MTBE)</b>	<b>0.60</b>		0.50	ug/L			10/17/12 05:20	1
o-Xylene	ND		0.50	ug/L			10/17/12 05:20	1
Tert-amyl-methyl ether (TAME)	ND		0.50	ug/L			10/17/12 05:20	1
tert-Butyl alcohol (TBA)	ND		10	ug/L			10/17/12 05:20	1
Toluene	ND		0.50	ug/L			10/17/12 05:20	1
Xylenes, Total	ND		1.0	ug/L			10/17/12 05:20	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	91		80 - 120		10/17/12 05:20	1
Dibromofluoromethane (Surr)	103		80 - 120		10/17/12 05:20	1
Toluene-d8 (Surr)	100		80 - 120		10/17/12 05:20	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			10/13/12 22:04	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	120		65 - 140		10/13/12 22:04	1

# Client Sample Results

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

TestAmerica Job ID: 440-26201-1

**Client Sample ID: MW-3**

**Lab Sample ID: 440-26201-3**

**Date Collected: 10/09/12 13:30**

**Matrix: Water**

**Date Received: 10/10/12 10:00**

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

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane (EDB)	ND		2.0	ug/L			10/17/12 05:50	4
1,2-Dichloroethane	ND		2.0	ug/L			10/17/12 05:50	4
<b>Benzene</b>	<b>210</b>		2.0	ug/L			10/17/12 05:50	4
Ethanol	ND		600	ug/L			10/17/12 05:50	4
<b>Ethylbenzene</b>	<b>28</b>		2.0	ug/L			10/17/12 05:50	4
Ethyl-t-butyl ether (ETBE)	ND		2.0	ug/L			10/17/12 05:50	4
Isopropyl Ether (DIPE)	ND		2.0	ug/L			10/17/12 05:50	4
<b>m,p-Xylene</b>	<b>7.4</b>		4.0	ug/L			10/17/12 05:50	4
<b>Methyl-t-Butyl Ether (MTBE)</b>	<b>33</b>		2.0	ug/L			10/17/12 05:50	4
o-Xylene	ND		2.0	ug/L			10/17/12 05:50	4
Tert-amyl-methyl ether (TAME)	ND		2.0	ug/L			10/17/12 05:50	4
<b>tert-Butyl alcohol (TBA)</b>	<b>56</b>		40	ug/L			10/17/12 05:50	4
Toluene	ND		2.0	ug/L			10/17/12 05:50	4
<b>Xylenes, Total</b>	<b>7.4</b>		4.0	ug/L			10/17/12 05:50	4

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	94		80 - 120		10/17/12 05:50	4
Dibromofluoromethane (Surr)	102		80 - 120		10/17/12 05:50	4
Toluene-d8 (Surr)	102		80 - 120		10/17/12 05:50	4

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

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
<b>GRO (C6-C12)</b>	<b>1600</b>		500	ug/L			10/14/12 21:13	10

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	138		65 - 140		10/14/12 21:13	10

# Lab Chronicle

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

TestAmerica Job ID: 440-26201-1

**Client Sample ID: MW-1**

**Lab Sample ID: 440-26201-1**

Date Collected: 10/09/12 12:55

Matrix: Water

Date Received: 10/10/12 10:00

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	59593	10/17/12 04:50	RM	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	59025	10/13/12 21:36	TL	TAL IRV

**Client Sample ID: MW-2**

**Lab Sample ID: 440-26201-2**

Date Collected: 10/09/12 12:17

Matrix: Water

Date Received: 10/10/12 10:00

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	59593	10/17/12 05:20	RM	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	59025	10/13/12 22:04	TL	TAL IRV

**Client Sample ID: MW-3**

**Lab Sample ID: 440-26201-3**

Date Collected: 10/09/12 13:30

Matrix: Water

Date Received: 10/10/12 10:00

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		4	10 mL	10 mL	59593	10/17/12 05:50	RM	TAL IRV
Total/NA	Analysis	8015B/5030B		10	10 mL	10 mL	59025	10/14/12 21:13	TL	TAL IRV

**Laboratory References:**

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

# QC Sample Results

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

TestAmerica Job ID: 440-26201-1

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

Lab Sample ID: MB 440-59593/4

Matrix: Water

Analysis Batch: 59593

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			10/16/12 21:50	1
1,2-Dichloroethane	ND		0.50	ug/L			10/16/12 21:50	1
Benzene	ND		0.50	ug/L			10/16/12 21:50	1
Ethanol	ND		150	ug/L			10/16/12 21:50	1
Ethylbenzene	ND		0.50	ug/L			10/16/12 21:50	1
Ethyl-t-butyl ether (ETBE)	ND		0.50	ug/L			10/16/12 21:50	1
Isopropyl Ether (DIPE)	ND		0.50	ug/L			10/16/12 21:50	1
m,p-Xylene	ND		1.0	ug/L			10/16/12 21:50	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50	ug/L			10/16/12 21:50	1
o-Xylene	ND		0.50	ug/L			10/16/12 21:50	1
Tert-amyl-methyl ether (TAME)	ND		0.50	ug/L			10/16/12 21:50	1
tert-Butyl alcohol (TBA)	ND		10	ug/L			10/16/12 21:50	1
Toluene	ND		0.50	ug/L			10/16/12 21:50	1
Xylenes, Total	ND		1.0	ug/L			10/16/12 21:50	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	93		80 - 120		10/16/12 21:50	1
Dibromofluoromethane (Surr)	102		80 - 120		10/16/12 21:50	1
Toluene-d8 (Surr)	99		80 - 120		10/16/12 21:50	1

Lab Sample ID: LCS 440-59593/5

Matrix: Water

Analysis Batch: 59593

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	28.7		ug/L		115	75 - 125
1,2-Dichloroethane	25.0	27.8		ug/L		111	60 - 140
Benzene	25.0	23.9		ug/L		95	70 - 120
Ethanol	250	266		ug/L		107	40 - 155
Ethylbenzene	25.0	25.6		ug/L		103	75 - 125
Ethyl-t-butyl ether (ETBE)	25.0	24.5		ug/L		98	65 - 135
Isopropyl Ether (DIPE)	25.0	25.7		ug/L		103	60 - 135
m,p-Xylene	50.0	54.1		ug/L		108	75 - 125
Methyl-t-Butyl Ether (MTBE)	25.0	24.7		ug/L		99	60 - 135
o-Xylene	25.0	27.8		ug/L		111	75 - 125
Tert-amyl-methyl ether (TAME)	25.0	25.2		ug/L		101	60 - 135
tert-Butyl alcohol (TBA)	125	141		ug/L		113	70 - 135
Toluene	25.0	25.9		ug/L		104	70 - 120

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		80 - 120
Dibromofluoromethane (Surr)	109		80 - 120
Toluene-d8 (Surr)	102		80 - 120

# QC Sample Results

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

TestAmerica Job ID: 440-26201-1

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

Lab Sample ID: 440-26150-D-8 MS

Matrix: Water

Analysis Batch: 59593

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.
	Result	Qualifier	Added	Result	Qualifier				
1,2-Dibromoethane (EDB)	ND		25.0	26.5		ug/L		106	70 - 130
1,2-Dichloroethane	ND		25.0	26.1		ug/L		104	60 - 140
Benzene	ND		25.0	22.5		ug/L		90	65 - 125
Ethanol	ND		250	252		ug/L		101	40 - 155
Ethylbenzene	ND		25.0	24.8		ug/L		99	65 - 130
Ethyl-t-butyl ether (ETBE)	ND		25.0	21.5		ug/L		86	60 - 135
Isopropyl Ether (DIPE)	ND		25.0	23.0		ug/L		92	60 - 140
m,p-Xylene	ND		50.0	52.7		ug/L		105	65 - 130
Methyl-t-Butyl Ether (MTBE)	ND		25.0	21.8		ug/L		85	55 - 145
o-Xylene	ND		25.0	26.1		ug/L		104	65 - 125
Tert-amyl-methyl ether (TAME)	ND		25.0	22.4		ug/L		89	60 - 140
tert-Butyl alcohol (TBA)	100		125	246		ug/L		113	65 - 140
Toluene	ND		25.0	24.7		ug/L		99	70 - 125

Surrogate	MS	MS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	98		80 - 120
Dibromofluoromethane (Surr)	102		80 - 120
Toluene-d8 (Surr)	100		80 - 120

Lab Sample ID: 440-26150-D-8 MSD

Matrix: Water

Analysis Batch: 59593

Client Sample ID: Matrix Spike Duplicate

Prep Type: Total/NA

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier							
1,2-Dibromoethane (EDB)	ND		25.0	27.6		ug/L		110	70 - 130	4	25	
1,2-Dichloroethane	ND		25.0	25.7		ug/L		103	60 - 140	2	20	
Benzene	ND		25.0	23.4		ug/L		94	65 - 125	4	20	
Ethanol	ND		250	283		ug/L		113	40 - 155	11	30	
Ethylbenzene	ND		25.0	25.6		ug/L		103	65 - 130	3	20	
Ethyl-t-butyl ether (ETBE)	ND		25.0	22.7		ug/L		91	60 - 135	5	25	
Isopropyl Ether (DIPE)	ND		25.0	24.1		ug/L		97	60 - 140	5	25	
m,p-Xylene	ND		50.0	54.2		ug/L		108	65 - 130	3	25	
Methyl-t-Butyl Ether (MTBE)	ND		25.0	22.8		ug/L		90	55 - 145	5	25	
o-Xylene	ND		25.0	27.4		ug/L		110	65 - 125	5	20	
Tert-amyl-methyl ether (TAME)	ND		25.0	23.4		ug/L		94	60 - 140	5	30	
tert-Butyl alcohol (TBA)	100		125	241		ug/L		109	65 - 140	2	25	
Toluene	ND		25.0	24.8		ug/L		99	70 - 125	0	20	

Surrogate	MSD	MSD	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	98		80 - 120
Dibromofluoromethane (Surr)	102		80 - 120
Toluene-d8 (Surr)	100		80 - 120

# QC Sample Results

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

TestAmerica Job ID: 440-26201-1

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

**Lab Sample ID: MB 440-59025/3**

**Matrix: Water**

**Analysis Batch: 59025**

**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			10/13/12 19:45	1
Surrogate	MB %Recovery	MB Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	114		65 - 140				10/13/12 19:45	1

**Lab Sample ID: MB 440-59025/34**

**Matrix: Water**

**Analysis Batch: 59025**

**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			10/14/12 10:06	1
Surrogate	MB %Recovery	MB Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	117		65 - 140				10/14/12 10:06	1

**Lab Sample ID: LCS 440-59025/2**

**Matrix: Water**

**Analysis Batch: 59025**

**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	802		ug/L		100	80 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	129		65 - 140				

**Lab Sample ID: LCS 440-59025/33**

**Matrix: Water**

**Analysis Batch: 59025**

**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	831		ug/L		104	80 - 120
Surrogate	LCS %Recovery	LCS Qualifier	Limits				
4-Bromofluorobenzene (Surr)	129		65 - 140				

**Lab Sample ID: 440-25675-A-1 MS**

**Matrix: Water**

**Analysis Batch: 59025**

**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
GRO (C4-C12)	ND		800	752		ug/L		94	65 - 140
Surrogate	MS %Recovery	MS Qualifier	Limits						
4-Bromofluorobenzene (Surr)	133		65 - 140						

# QC Sample Results

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

TestAmerica Job ID: 440-26201-1

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

Lab Sample ID: 440-25675-A-1 MSD

Matrix: Water

Analysis Batch: 59025

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
GRO (C4-C12)	ND		800	790		ug/L		99	65 - 140	5	20
<b>Surrogate</b>	<b>%Recovery</b>	<b>MSD Qualifier</b>	<b>MSD Limits</b>								
4-Bromofluorobenzene (Surr)	121		65 - 140								

Lab Sample ID: 440-26196-A-1 MS

Matrix: Water

Analysis Batch: 59025

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	RPD	RPD Limit
GRO (C4-C12)	ND		800	748		ug/L		94	65 - 140		
<b>Surrogate</b>	<b>%Recovery</b>	<b>MS Qualifier</b>	<b>MS Limits</b>								
4-Bromofluorobenzene (Surr)	145	LH	65 - 140								

Lab Sample ID: 440-26196-A-1 MSD

Matrix: Water

Analysis Batch: 59025

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
GRO (C4-C12)	ND		800	756		ug/L		94	65 - 140	1	20
<b>Surrogate</b>	<b>%Recovery</b>	<b>MSD Qualifier</b>	<b>MSD Limits</b>								
4-Bromofluorobenzene (Surr)	137		65 - 140								



# QC Association Summary

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

TestAmerica Job ID: 440-26201-1

## GC/MS VOA

### Analysis Batch: 59593

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-26150-D-8 MS	Matrix Spike	Total/NA	Water	8260B/5030B	
440-26150-D-8 MSD	Matrix Spike Duplicate	Total/NA	Water	8260B/5030B	
440-26201-1	MW-1	Total/NA	Water	8260B/5030B	
440-26201-2	MW-2	Total/NA	Water	8260B/5030B	
440-26201-3	MW-3	Total/NA	Water	8260B/5030B	
LCS 440-59593/5	Lab Control Sample	Total/NA	Water	8260B/5030B	
MB 440-59593/4	Method Blank	Total/NA	Water	8260B/5030B	

## GC VOA

### Analysis Batch: 59025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25675-A-1 MS	Matrix Spike	Total/NA	Water	8015B/5030B	
440-25675-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8015B/5030B	
440-26196-A-1 MS	Matrix Spike	Total/NA	Water	8015B/5030B	
440-26196-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8015B/5030B	
440-26201-1	MW-1	Total/NA	Water	8015B/5030B	
440-26201-2	MW-2	Total/NA	Water	8015B/5030B	
440-26201-3	MW-3	Total/NA	Water	8015B/5030B	
LCS 440-59025/2	Lab Control Sample	Total/NA	Water	8015B/5030B	
LCS 440-59025/33	Lab Control Sample	Total/NA	Water	8015B/5030B	
MB 440-59025/3	Method Blank	Total/NA	Water	8015B/5030B	
MB 440-59025/34	Method Blank	Total/NA	Water	8015B/5030B	

## Definitions/Glossary

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

TestAmerica Job ID: 440-26201-1

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### Qualifiers

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#### GC VOA

Qualifier	Qualifier Description
LH	Surrogate Recoveries were higher than QC limits

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### Glossary

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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
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
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: 440-26201-1

## 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
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-13
New Mexico	State Program	6	N/A	01-31-13
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14
USEPA UCMR	Federal	1	CA01531	01-31-13



## 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: 440-24201

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: Pat Abe	Lead Regulatory Agency: ACEH	Address: 1324 Mangrove Ave., Suite 212, Chico, California
Lab Phone: 949-261-1022	California Global ID No.: T0600124081	Consultant/Contractor PM: Jason Duda
Lab Shipping Acct: Fed ex#: 11103-6633-7	Enfos Proposal No/ WR#: 0056X - 0002 / WR245438	Phone: 530-566-1400 / 530-566-1401 (f) Email: <a href="mailto:jduda@broadbentinc.com">jduda@broadbentinc.com</a>
Lab Bottle Order No:	Accounting Mode: Provision <input checked="" type="checkbox"/> OOC-BU <input type="checkbox"/> OOC-RM <input type="checkbox"/>	Email EDD To: <a href="mailto:jduda@broadbentinc.com">jduda@broadbentinc.com</a> and to <a href="mailto:lab_enfosdoc@bp.com">lab_enfosdoc@bp.com</a>
Other Info:	Stage: Execute (4) Activity: GWM (401)	Invoice To: BP <input checked="" type="checkbox"/> Contractor <input type="checkbox"/>

BP Project Manager (PM): Shannon Couch BP PM Phone: 925-275-3804 BP PM Email: <a href="mailto:shannon.couch@bp.com">shannon.couch@bp.com</a>				Matrix		No. Containers / Preservative								Requested Analyses								Report Type & QC Level	
				Soil / Solid	Water / Liquid	Air / Vapor	Is this location a well?	Total Number of Container	Unpreserved	H2SO4	HNO3	HCl	Methanol	GRO by 8015M	BTEX/S FO/EDB by 8260	1,2-DCA and Ethanol by 8260							Standard <input checked="" type="checkbox"/>
Lab No.	Sample Description	Date	Time																			Comments	
	MW-1	10-9-12	1255	x	y	6			x		x	x	x										
	MW-2		1217	x	y	6			x		x	x	x										
	MW-3		1330	x	y	6			x		x	x	x										
(JP)	<del>MW-4</del>			x	y	6			x		x	x	x										
	TB-498-10092012			x	n	2			x													On Hold	

Sampler's Name: <u>James Ramos</u>	Relinquished By / Affiliation:	Date: <u>10-9-12</u>	Time: <u>17:00</u>	Accepted By / Affiliation: <u>VanBuren TAI</u>	Date: <u>10/9/12</u>	Time: <u>10:00</u>
Sampler's Company: <u>Broadbent &amp; Associates</u>						
Shipment Method: <u>Fedex</u> Ship Date: <u>10-9-12</u>						
Shipment Tracking No: <u>5015 6248 5500</u>						

Special Instructions: THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No  Temp Blank: Yes / No  Cooler Temp on Receipt: 5.7 °C Trip Blank: Yes / No  MS/MSD Sample Submitted: Yes / No

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10/23/2012



## Login Sample Receipt Checklist

Client: Broadbent & Associates, Inc.

Job Number: 440-26201-1

**Login Number: 26201**

**List Number: 1**

**Creator: Perez, Angel**

**List Source: TestAmerica Irvine**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
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.	True	
Is the Field Sampler's name present on COC?	True	James Ramos
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.	True	
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.	N/A	
Residual Chlorine Checked.	N/A	

**APPENDIX D**

**GEOTRACKER UPLOAD CONFIRMATION RECEIPTS**

STATE WATER RESOURCES CONTROL BOARD  
**GEOTRACKER ESI**

UPLOADING A GEO\_WELL FILE

**SUCCESS**

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

<b><u>Submittal Type:</u></b>	<b>GEO_WELL</b>
<b><u>Report Title:</u></b>	<b>4Q12 GEO_WELL 498</b>
<b><u>Facility Global ID:</u></b>	<b>T0600124081</b>
<b><u>Facility Name:</u></b>	<b>ARCO #0498</b>
<b><u>File Name:</u></b>	<b>GEO_WELL.zip</b>
<b><u>Organization Name:</u></b>	<b>Broadbent &amp; Associates, Inc.</b>
<b><u>Username:</u></b>	<b>BROADBENT-C</b>
<b><u>IP Address:</u></b>	<b>67.118.40.90</b>
<b><u>Submittal Date/Time:</u></b>	<b>12/4/2012 9:58:35 AM</b>
<b><u>Confirmation Number:</u></b>	<b>6367141008</b>

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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!**

<b><u>Submittal Type:</u></b>	<b>EDF</b>
<b><u>Report Title:</u></b>	<b>4Q12 GW Monitoring</b>
<b><u>Report Type:</u></b>	<b>Monitoring Report - Semi-Annually</b>
<b><u>Facility Global ID:</u></b>	<b>T0600124081</b>
<b><u>Facility Name:</u></b>	<b>ARCO #0498</b>
<b><u>File Name:</u></b>	<b>440-26201-1_23 Oct 12 2146_EDF.zip</b>
<b><u>Organization Name:</u></b>	<b>Broadbent &amp; Associates, Inc.</b>
<b><u>Username:</u></b>	<b>BROADBENT-C</b>
<b><u>IP Address:</u></b>	<b>67.118.40.90</b>
<b><u>Submittal Date/Time:</u></b>	<b>12/4/2012 9:56:14 AM</b>
<b><u>Confirmation Number:</u></b>	<b>5892963469</b>

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