# **Atlantic Richfield Company**

Shannon Couch
Operations Project Manager

**RECEIVED** 

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

July 29, 2011

9:30 am, Aug 01, 2011 Alameda County Environmental Health

Re: Second Quarter 2011 Semi-Annual Monitoring Report

Atlantic Richfield Company Station #2162

15135 Hesperian Boulevard, San Leandro, California

ACEH Case #RO0000190

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

Operations Project Manager

Attachment





July 29, 2011

Project No. 06-88-620

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

Attn.: Ms. Shannon Couch

Re: Second Quarter 2011 Semi-Annual Monitoring Report, Atlantic Richfield Company

Station #2162, 15135 Hesperian Boulevard, San Leandro, California;

ACEH Case #RO0000190

Dear Ms. Couch:

Attached is the Second Quarter 2011 Semi-Annual Monitoring Report for Atlantic Richfield Company Station #2162 located at 15135 Hesperian Boulevard in San Leandro, California. Should you have questions regarding the work performed or results obtained, please do not hesitate to contact me at 530-566-1400.

Sincerely,

BROADBENT & ASSOCIATES, INC.

Thomas A. Venus, PE Senior Engineer

Enclosures

cc:

Mr. Paresh Khatri, Alameda County Environmental Health (submitted via ACEH ftp site)

Electronic copy uploaded to GeoTracker

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#### SECOND QUARTER 2011 SEMI-ANNUAL MONITORING REPORT ARCO STATION #2162, SAN LEANDRO, CALIFORNIA

Broadbent & Associates, Inc. (BAI) is pleased to present this *Second Quarter 2011 Semi-Annual Monitoring Report* on behalf of Atlantic Richfield Company (a BP affiliated company) for ARCO Station #2162 located in San Leandro, Alameda County, California. Quarterly reporting is being submitted to the Alameda County Environmental Health Services Agency (ACEH) consistent with their 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 #2162 / 15135 Hesperian Boulevard, San Leandro
Client Project Manager / Title:	Ms. Shannon Couch / Remediation Management Project Manager
BAI Contact:	Mr. Tom Venus, PE / (530) 566-1400
BAI Project No.:	06-88-620
Primary Regulatory Agency / ID No.:	ACEH, Case #RO0000190
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 (Second Quarter 2011):**

- 1. Submitted First Quarter 2011 Status Report (BAI, 4/15/2011).
- 2. Conducted groundwater monitoring/sampling for Second Quarter 2011 on May 19, 2011.

## **WORK SCHEDULED FOR NEXT QUARTER (Third Quarter 2011):**

- 1. Submit Second Quarter 2011 Semi-Annual Monitoring Report (contained herein).
- 2. Submit offsite groundwater plume delineation work plan.
- 3. No environmental field work is presently scheduled at Station #2162 during the Third Quarter 2011.

#### **GROUNDWATER MONITORING PLAN SUMMARY:**

Groundwater level gauging:	MW-1 through MW-6	(2Q & 4Q)
Groundwater sample		
collection:	MW-1 through MW-6	(2Q & 4Q)
Biodegradation indicator		
parameter monitoring:	MW-1 through MW-6	(2Q & 4Q)

#### **OUARTERLY RESULTS SUMMARY:**

#### LNAPL

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

#### **Groundwater Elevation and Gradient:**

Depth to groundwater:	7.12 (MW-2) to 8.24 (MW-4)	(ft below TOC)
Gradient direction:	South-Southeast	(compass direction)
	0.00	(2.12.)

Gradient magnitude: 0.003 (ft/ft)

Average change in elevation: +1.48 (ft since last measurement)

**Laboratory Analytical Data** 

Summary: GRO was detected in MW-3, MW-5, and MW-6. Benzene was

detected in MW-6. Ethylbenzene was detected in MW-6. MTBE was

detected in MW-3, and MW-6. TAME was detected in MW-6.

#### **ACTIVITIES CONDUCTED & RESULTS:**

Second Quarter 2011 semi-annual groundwater monitoring was conducted on May 19, 2011 by BAI personnel. 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 7.12 ft at MW-2 to 8.24 ft at MW-4. Resulting groundwater surface elevations ranged from 25.66 ft at MW-3 to 25.94 ft at wells MW-4 and MW-5. Groundwater elevations are summarized in Table 1. Water level elevations yielded a potentiometric horizontal groundwater gradient to the South-Southeast at approximately 0.003 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 May 19, 2011. No irregularities were reported during sampling. Samples were submitted under chain-of-custody protocol to Calscience Environmental Laboratories, Inc. (Garden Grove, California) for analysis of Gasoline-Range Organics (GRO, C6-C12) by EPA Method 8015M; for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), Methyl Tertiary Butyl Ether (MTBE), Ethyl Tertiary Butyl Ether (ETBE), Tert-Amyl Methyl Ether (TAME), Di-Isopropyl Ether (DIPE), 1,2-Dibromomethane (EDB), 1,2-Dichloroethane (1,2-DCA), Tert-Butyl Alcohol (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 three wells sampled at concentrations up to 7,100 micrograms per liter ( $\mu$ g/L) in well MW-6. Benzene was detected above the laboratory reporting limit in well MW-6 at a concentration of 4  $\mu$ g/L. Ethylbenzene was detected above the laboratory reporting limit in well MW-6 sampled at a concentration of 7.9  $\mu$ g/L. MTBE was detected above the laboratory reporting limit in two wells sampled at concentrations up to 76  $\mu$ g/L in well MW-6. TAME was detected above the laboratory reporting limit in well MW-6 at a concentration of 6.1  $\mu$ g/L. The remaining analytes were not detected above their laboratory reporting limits in the wells sampled during 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 wells MW-1, MW-2, MW-3, and MW-4. New historic maximum groundwater elevations were established in wells MW-5, and MW-6. Significantly above average precipitation over the winter is a possible reason for the high groundwater levels. Groundwater elevations yielded a horizontal potentiometric groundwater gradient to the South-Southeast at approximately 0.003 ft/ft, generally consistent with the historic groundwater gradient and magnitude 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: The sample from well MW-6 contained a new maximum concentration of GRO (7,100  $\mu$ g/L). It is possible that the seasonally higher groundwater levels mobilized petroleum hydrocarbons previously bound within vadose zone soils in the capillary fringe. Recent and historic laboratory analytical results are summarized in Table 1 and Table 2.

#### **RECOMMENDATIONS:**

Groundwater monitoring and sampling is scheduled to be conducted at ARCO Station #2162 during Fourth Quarter 2011, consistent with the normal sampling plan. In order to progress this case towards closure,

a Soil & Water Investigation Work Plan is in preparation with the objective of delineating the extents of offsite groundwater impacts.

#### LIMITATIONS:

The findings presented in this report are based upon: observations of BAI field personnel (see Appendix A), the points investigated, and results of laboratory tests performed by Calscience Environmental Laboratories, Inc. (Garden Grove, 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 Atlantic Richfield Company (a BP affiliated 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 Contours and Analytical Summary Map, 19 May 2011

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

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

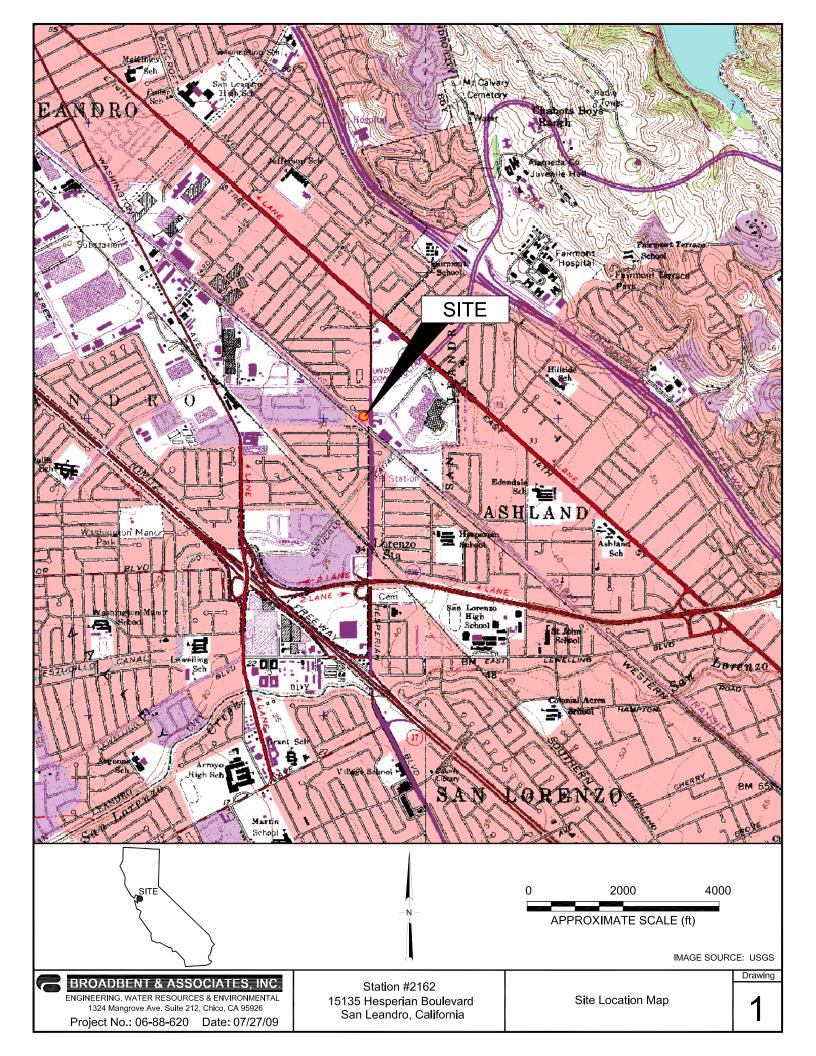
Appendix D: GeoTracker Upload Confirmation Receipts

#### LIST OF COMMONLY USED ACCRONYMS/ABBREVIATIONS:

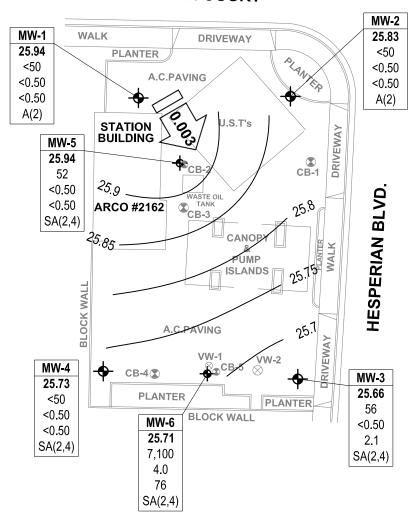
ACEH:	Alameda County Environmental Health	ft/ft:	feet per foot
BAI:	Broadbent & Associates, Inc.	gal:	Gallons
BTEX:	Benzene, Toluene, Ethylbenzene, Total Xylenes	GRO:	Gasoline-Range Organics
1,2-DCA	: 1,2-Dichloroethane	LNAPL:	Light Non-Aqueous Phase Liquid
DIPE:	Di-Isopropyl Ether	MTBE:	Methyl Tertiary Butyl Ether
DO:	Dissolved Oxygen	$NO_3$ :	Nitrate as Nitrogen

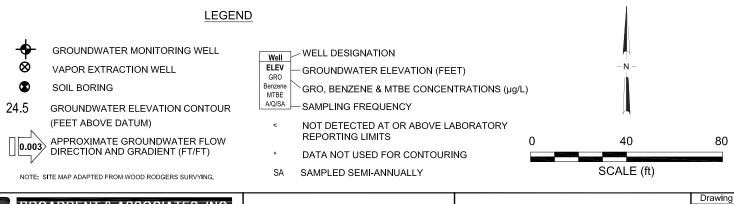
DO: Dissolved Oxygen NO<sub>3</sub>: Nitrate as Nitrog DRO: Diesel-Range Organics ppb: parts per billion EDB: 1,2-Dibromomethane SO<sub>4</sub>: Sulfate

Oxidation Reduction Potential Tert-Amyl Methyl Ether Eh: TAME: EPA: **Environmental Protection Agency** TBA: Tertiary Butyl Ether ETBE: Ethyl Tertiary Butyl Ether TOC: Top of Casing  $Fe^{2+}$ : Ferrous Iron micrograms per liter μg/L:



#### **RUTH COURT**





BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
1324 Mangrove Ave. Suite 212, Chico, California

Date: 07/17/11

Project No.: 06-88-620

Station #2162 15135 Hesperian Boulevard San Leandro, California

Groundwater Elevation Contours and Analytical Summary Map 19 May 2011

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

			Top of	Bottom of		Water Level			Concentra	tions in (μ	g/L)				
Well and		TOC	Screen	Screen	DTW	Elevation	GRO/			Ethyl-	Total		DO		
Sample Date	P/NP	(feet)	(ft bgs)	(ft bgs)	(feet)	(feet)	TPHg	Benzene	Toluene	Benzene	Xylenes	MTBE	(mg/L)	pН	Footnote
MW-1															
6/20/2000		31.19	8.00	16.00	8.33	22.86	< 50	< 0.5	0.8	< 0.5	<1.0	<10			
9/29/2000			8.00	16.00	9.07	22.12	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
12/17/2000			8.00	16.00	8.69	22.50	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
3/23/2001			8.00	16.00	8.19	23.00	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
6/20/2001			8.00	16.00	8.97	22.22	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
9/22/2001			8.00	16.00	9.56	21.63	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
12/28/2001			8.00	16.00	8.40	22.79	< 50	< 0.5	< 0.5	< 0.5	0.63	<2.5			
3/14/2002			8.00	16.00	8.05	23.14	< 50	< 0.5	< 0.5	< 0.5	< 0.5	170			
4/18/2002			8.00	16.00	8.27	22.92	< 50	< 0.5	< 0.5	< 0.5	< 0.5				
7/19/2002	NP		8.00	16.00	8.88	22.31	< 50	< 0.5	< 0.5	< 0.5	< 0.5	11	1.0	8.2	
10/09/02	NP		8.00	16.00											a
03/28/2003	NP		8.00	16.00											a, c
4/7/2003	NP		8.00	16.00	8.28	22.91	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.6	6.9	
7/9/2003	NP		8.00	16.00	8.62	22.57	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.1	7.2	
10/08/2003		31.13	8.00	16.00	9.19	21.94									d, e
01/13/2004			8.00	16.00	8.35	22.78									
04/05/2004		33.70	8.00	16.00	7.29	26.41									
07/12/2004	NP		8.00	16.00	9.00	24.70	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.8	7.0	
10/19/2004			8.00	16.00	9.47	24.23									
01/11/2005			8.00	16.00	7.64	26.06									
04/14/2005			8.00	16.00	7.35	26.35									
08/01/2005			8.00	16.00	8.21	25.49									
7/31/2006			8.00	16.00	8.10	25.60									
6/12/2009	P		8.00	16.00	8.93	24.77	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.59	7.40	
11/6/2009			8.00	16.00	9.18	24.52									
6/4/2010	P		8.00	16.00	8.13	25.57	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.31	7.2	
11/19/2010			8.00	16.00	9.28	24.42									
5/19/2011	P		8.00	16.00	7.76	25.94	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.36	6.8	
MW-2															
6/20/2000		30.38	8.00	16.00	7.38	23.00									

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

			Top of	Bottom of		Water Level	Concentrations in (µg/L)								
Well and		TOC	Screen	Screen	DTW	Elevation	GRO/			Ethyl-	Total		DO		
Sample Date	P/NP	(feet)	(ft bgs)	(ft bgs)	(feet)	(feet)	TPHg	Benzene	Toluene	Benzene	Xylenes	MTBE	(mg/L)	pН	Footnote
MW-2 Cont.															
9/29/2000		30.38	8.00	16.00	8.08	22.30	266	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
12/17/2000			8.00	16.00	7.80	22.58	175	< 0.5	< 0.5	0.659	< 0.5	<2.5			
3/23/2001			8.00	16.00	7.23	23.15	351	< 0.5	< 0.5	0.912	< 0.5	<2.5			
6/20/2001			8.00	16.00	7.98	22.40	360	< 0.5	< 0.5	0.74	< 0.5	<2.5			
9/22/2001			8.00	16.00	8.55	21.83	190	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
12/28/2001			8.00	16.00	7.53	22.85	130	< 0.5	0.93	< 0.5	0.51	<2.5			
3/14/2002			8.00	16.00	7.17	23.21	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
4/18/2002			8.00	16.00	7.31	23.07	74	< 0.5	< 0.5	< 0.5	< 0.5				
7/19/2002	P		8.00	16.00	7.93	22.45	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5	1.1	7.6	
10/9/2002	P		8.00	16.00	8.55	21.83	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5	0.7	7.3	
03/28/2003	P		8.00	16.00	7.30	23.08	< 50	< 0.50	0.83	< 0.50	< 0.50	< 0.50	1.48	7.7	c
4/7/2003	P		8.00	16.00	7.36	23.02	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.4	7.0	
7/9/2003	P		8.00	16.00	7.71	22.67	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.5	7.6	
10/08/2003			8.00	16.00	8.25	22.13									
01/13/2004			8.00	16.00	7.55	22.83									
04/05/2004		32.97	8.00	16.00	7.29	25.68									
07/12/2004	NP		8.00	16.00	8.09	24.88	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.4	7.2	
10/19/2004			8.00	16.00	8.29	24.68									
01/11/2005			8.00	16.00	6.81	26.16									
04/14/2005			8.00	16.00	6.69	26.28									
08/01/2005			8.00	16.00	7.40	25.57									
7/31/2006			8.00	16.00	7.22	25.75									
6/12/2009	P	32.95	8.00	16.00	8.18	24.77	51	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.60	7.55	
11/6/2009			8.00	16.00	8.32	24.63									
6/4/2010	P		8.00	16.00	7.24	25.71	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		7.33	
11/19/2010			8.00	16.00	8.38	24.57									
5/19/2011	P		8.00	16.00	7.12	25.83	< 50	<0.50	<0.50	<0.50	<0.50	< 0.50	1.24	9.0	
MW-3															
6/20/2000		30.30	8.00	15.00	7.75	22.55									
9/29/2000			8.00	15.00	8.46	21.84	<50	< 0.5	< 0.5	< 0.5	< 0.5	128			

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

			Top of	Bottom of		Water Level			Concentra	tions in (µ;	g/L)				
Well and		TOC	Screen	Screen	DTW	Elevation	GRO/			Ethyl-	Total		DO		
Sample Date	P/NP	(feet)	(ft bgs)	(ft bgs)	(feet)	(feet)	TPHg	Benzene	Toluene	Benzene	Xylenes	MTBE	(mg/L)	pН	Footnote
MW-3 Cont.															
12/17/2000		30.30	8.00	15.00	8.01	22.29	< 50	< 0.5	< 0.5	< 0.5	< 0.5	46.7			
3/23/2001			8.00	15.00	7.70	22.60	< 50	< 0.5	< 0.5	< 0.5	< 0.5	26.8			
6/20/2001			8.00	15.00	8.23	22.07	< 50	< 0.5	< 0.5	< 0.5	< 0.5	30			
9/22/2001			8.00	15.00	8.89	21.41	< 50	< 0.5	< 0.5	< 0.5	< 0.5	12			
12/28/2001			8.00	15.00	7.83	22.47	< 50	< 0.5	< 0.5	< 0.5	< 0.5	6.2			
3/14/2002			8.00	15.00	7.48	22.82	< 50	< 0.5	< 0.5	< 0.5	< 0.5	47			
4/18/2002			8.00	15.00	7.62	22.68	< 50	< 0.5	< 0.5	< 0.5	< 0.5				
7/19/2002	P		8.00	15.00	8.23	22.07	100	<1.0	<1.0	<1.0	<1.0	330	0.9	7.6	b (TPH-g)
10/9/2002	P		8.00	15.00	8.83	21.47	< 50	< 0.5	< 0.5	< 0.5	< 0.5	61	0.5	7.4	
03/28/2003	P		8.00	15.00	7.85	22.45	52	< 0.50	1.2	< 0.50	< 0.50	45	1.42	7.6	c
4/7/2003	P		8.00	15.00	7.71	22.59	56	< 0.50	< 0.50	< 0.50	< 0.50	56	1.1	6.8	
7/9/2003	P		8.00	15.00	8.00	22.30	< 500	< 5.0	< 5.0	< 5.0	< 5.0	87	1.6	7.4	
10/08/2003	P		8.00	15.00	8.59	21.71	< 50	< 0.50	< 0.50	< 0.50	< 0.50	25	0.9		
01/15/2004	P		8.00	15.00	7.90	22.40	< 50	< 0.50	< 0.50	< 0.50	< 0.50	9.8	2.9	7.3	
04/05/2004	P	32.89	8.00	15.00	7.61	25.28	< 50	< 0.50	< 0.50	< 0.50	< 0.50	15	1.5	7.0	
07/12/2004	P		8.00	15.00	8.45	24.44	< 50	< 0.50	< 0.50	< 0.50	< 0.50	7.3	1.6	6.9	
10/19/2004	P		8.00	15.00	8.95	23.94	< 50	< 0.50	< 0.50	< 0.50	< 0.50	5.0	0.96	7.1	
01/11/2005	P		8.00	15.00	7.27	25.62	< 50	< 0.50	< 0.50	< 0.50	< 0.50	2.3		7.2	
04/14/2005	P		8.00	15.00	7.10	25.79	< 50	< 0.50	< 0.50	< 0.50	1.5	5.6	2.0	7.2	
08/01/2005	P		8.00	15.00	7.71	25.18	< 50	< 0.50	< 0.50	< 0.50	< 0.50	5.2	1.18	7.0	
7/31/2006	P		8.00	15.00	7.64	25.25	< 50	< 0.50	< 0.50	< 0.50	< 0.50	4.3		6.8	
6/12/2009	P	32.88	8.00	15.00	8.36	24.52	< 50	0.75	< 0.50	< 0.50	< 0.50	0.53	0.61	7.45	
11/6/2009	P		8.00	15.00	8.58	24.30	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.51	7.17	
6/4/2010	P		8.00	15.00	7.60	25.28	< 50	< 0.50	< 0.50	< 0.50	< 0.50	1.9	0.69	7.4	
11/19/2010	NP		8.00	15.00	8.63	24.25	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.69	7.0	
5/19/2011	P		8.00	15.00	7.22	25.66	56	<0.50	<0.50	<0.50	<0.50	2.1	0.83	9.2	
MW-4															
6/20/2000		30.39	10.00	18.00	8.87	21.52									
9/29/2000		2 2.07	10.00	18.00	9.61	20.78	<50	1.02	<0.5	<0.5	<0.5	12.2			
12/17/2000			10.00	18.00	9.17	21.22	<50	<0.5	<0.5	<0.5	<0.5	5.81			

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

			Top of	Bottom of		Water Level			Concentra	tions in (μ	g/L)				
Well and		TOC	Screen	Screen	DTW	Elevation	GRO/			Ethyl-	Total		DO		
Sample Date	P/NP	(feet)	(ft bgs)	(ft bgs)	(feet)	(feet)	TPHg	Benzene	Toluene	Benzene	Xylenes	MTBE	(mg/L)	pН	Footnote
MW-4 Cont.															
3/23/2001		30.39	10.00	18.00	8.70	21.69	< 50	< 0.5	< 0.5	< 0.5	< 0.5	3.04			
6/20/2001			10.00	18.00	9.51	20.88	< 50	< 0.5	< 0.5	< 0.5	< 0.5	<2.5			
9/22/2001			10.00	18.00	10.06	20.33	< 50	< 0.5	< 0.5	< 0.5	< 0.5	5.2			
12/28/2001			10.00	18.00	8.86	21.53	< 50	< 0.5	< 0.5	< 0.5	< 0.5	4.3			
3/14/2002			10.00	18.00	8.52	21.87	< 50	< 0.5	< 0.5	< 0.5	< 0.5	5.1			
4/18/2002			10.00	18.00	8.76	21.63	< 50	< 0.5	< 0.5	< 0.5	< 0.5				
7/19/2002	NP		10.00	18.00	9.39	21.00	< 50	< 0.5	< 0.5	< 0.5	< 0.5	30	1.8	7.8	
10/9/2002	NP		10.00	18.00	10.08	20.31	< 50	< 0.5	< 0.5	< 0.5	< 0.5	28	1.0	8.0	
03/28/2003	NP		10.00	18.00	8.88	21.51	< 50	< 0.50	1.3	< 0.50	< 0.50	4.4	0.98	7.2	c
4/7/2003	NP		10.00	18.00	8.78	21.61	< 50	< 0.50	< 0.50	< 0.50	< 0.50	14	1.1	7.0	
7/9/2003	NP		10.00	18.00	9.14	21.25	< 50	< 0.50	< 0.50	< 0.50	< 0.50	1.8	1.6	7.4	
10/08/2003	NP		10.00	18.00	9.77	20.62	< 50	< 0.50	< 0.50	< 0.50	< 0.50	3.1	2.6	6.4	
01/15/2004	P		10.00	18.00	8.68	21.71	< 50	1.4	0.84	< 0.50	1.5	6.6	2.9	7.1	
04/05/2004	NP	33.97	10.00	18.00	8.77	25.20	< 50	< 0.50	< 0.50	< 0.50	< 0.50	1.3	1.2	7.0	
07/12/2004	NP		10.00	18.00	9.46	24.51	< 50	< 0.50	< 0.50	< 0.50	< 0.50	1.0	2.5	6.6	
10/19/2004	NP		10.00	18.00	9.91	24.06	< 50	< 0.50	< 0.50	< 0.50	< 0.50	4.4	1.21	7.9	
01/11/2005	P		10.00	18.00	7.80	26.17	59	2.0	< 0.50	< 0.50	< 0.50	11	0.9	7.1	
04/14/2005	NP		10.00	18.00	8.07	25.90	< 50	< 0.50	< 0.50	< 0.50	< 0.50	0.64	2.8	7.4	
08/01/2005	NP		10.00	18.00	8.58	25.39	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.48	5.7	
7/31/2006	P		10.00	18.00	8.75	25.22	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		6.7	
6/12/2009	P		10.00	18.00	9.51	24.46	< 50	0.68	< 0.50	< 0.50	< 0.50	< 0.50	0.70	7.51	
11/6/2009	P		10.00	18.00	9.74	24.23	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.15	7.15	
6/4/2010	P		10.00	18.00	8.71	25.26	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.70	7.24	
11/19/2010	P		10.00	18.00	9.83	24.14	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.09	7.1	
5/19/2011	P		10.00	18.00	8.24	25.73	< 50	<0.50	<0.50	<0.50	<0.50	<0.50	0.88	7.5	
MW-5															
6/12/2009	NP	33.96	8.00	16.00	9.25	24.71	85	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.59	7.50	
11/6/2009	P		8.00	16.00	9.49	24.47	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.56	7.1	
6/4/2010	NP		8.00	16.00	8.42	25.54	67	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.24	7.65	
11/19/2010	NP		8.00	16.00	9.58	24.38	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.72	7.3	

Table 1. Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

Well and Sample Date	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	GRO/ TPHg	Benzene	Concentra Toluene	tions in (µş Ethyl- Benzene	g/L) Total Xylenes	МТВЕ	DO (mg/L)	pН	Footnote
MW-5 Cont.															
5/19/2011	NP	33.96	8.00	16.00	8.02	25.94	52	<0.50	<0.50	<0.50	<0.50	< 0.50	2.17	9.1	
MW-6															
6/12/2009	NP	33.48	8.00	16.00	9.02	24.46	1,800	4.9	< 0.50	2.8	< 0.50	59	0.68	7.39	
11/6/2009	P		8.00	16.00	9.21	24.27	880	1.7	< 0.50	0.77	< 0.50	37	0.43	6.9	
6/4/2010	NP		8.00	16.00	8.22	25.26	6,200	15	1.6	8.2	1.2	190	0.87	7.16	
11/19/2010	NP		8.00	16.00	9.30	24.18	5,600	8.0	1.2	9.9	<1.0	130	0.78	6.8	
5/19/2011	P		8.00	16.00	7.77	25.71	7,100	4.0	<2.0	7.9	<2.0	76	1.40	8.2	

Symbols & Abbreviations:

- --- = Not analyzed/applicable/measured/available
- < = Not detected at or above laboratory reporting limit

DO = Dissolved oxygen

DTW = Depth to water in feet below ground surface

ft bgs = feet below ground surface

GRO = Gasoline Range Organics, range C4-C12

GWE = Groundwater elevation measured in feet

mg/L = Milligrams per liter

MTBE = Methyl tert butyl ether

NP = Well not purged prior to sampling

P = Well purged prior to sampling

TOC = Top of casing measured in feet above mean sea level

TPH-g = Total petroleum hydrocarbons as gasoline

ug/L = Micrograms per liter

#### Footnotes:

a = Well not accessable - car parked over.

b = Hydrocarbon pattern is present in the requested fuel quantitation range but does not represent the pattern of the requested fuel

c =TPH-g, BTEX and MTBE analyzed by EPA method 8260 beginning on 1st Quarter 2003 sampling event (3/28/03)

- d = Guaged with stinger in well
- e = Well casing lowered 0.06 feet during well repairs on 9/17/2003

#### Notes:

Beginning in the fourth quarter 2003, the laboratory modified the reported analyte list. TPHg was changed to GRO. The resulting data may be impacted by the potential of non-TPHg analytes within the requested fuel range resulting in a higher concentration being reported

Beginning in the second quarter 2004, the carbon range for GRO was changed from C6-C10 to C4-C12

Wells were originally surveyed to NAVD'88 datum by URS Corporation on February 23, 2004

Wells were resurveyed to NAVD'88 datum by Wood Rodgers Surveying on May 11, 2009

Values for DO and pH were obtained through field measurements

GRO analysis was completed by EPA method 8260B (C4-C12) for samples collected from the time period April 2006 through February 4, 2008. The analysis for GRO was changed to EPA method 8015B (C6-C12) for samples collected from the time period February 5, 2008 through the present

The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information

Well and				Concentration					
Sample Date	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	Footnote
MW-1									
6/20/2000			<10						
9/29/2000			<2.5						
12/17/2000			<2.5						
3/23/2001			<2.5						
6/20/2001			<2.5						
9/22/2001			<2.5						
12/28/2001			<2.5						
3/14/2002			170						
7/19/2002			11						
4/7/2003	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
7/9/2003	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
07/12/2004	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/12/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
5/19/2011	<300	<10	< 0.50	<0.50	<0.50	< 0.50	< 0.50	< 0.50	
MW-2									
9/29/2000			<2.5						
12/17/2000			<2.5						
3/23/2001			<2.5						
6/20/2001			<2.5						
9/22/2001			<2.5						
12/28/2001			<2.5						
3/14/2002			<2.5						
7/19/2002			<2.5						
10/9/2002			<2.5						
03/28/2003	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4/7/2003	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
7/9/2003	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
07/12/2004	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/12/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	

Well and				Concentration					
Sample Date	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	Footnote
MW-2 Cont.									
5/19/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-3									
9/29/2000			128						
12/17/2000			46.7						
3/23/2001			26.8						
6/20/2001			30						
9/22/2001			12						
12/28/2001			6.2						
3/14/2002			47						
7/19/2002			330						
10/9/2002			61						
03/28/2003	<100	<20	45	< 0.50	< 0.50	0.73	< 0.50	< 0.50	
4/7/2003	<100	<20	56	< 0.50	< 0.50	0.72	< 0.50	< 0.50	
7/9/2003	<1,000	<200	87	<5.0	<5.0	<5.0	<5.0	<5.0	
10/08/2003	<100	<20	25	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
01/15/2004	<100	<20	9.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	a (TBA and EDB)
04/05/2004	<100	<20	15	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
07/12/2004	<100	<20	7.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
10/19/2004	<100	<20	5.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
01/11/2005	<100	<20	2.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	b
04/14/2005	<100	<20	5.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
08/01/2005	<100	<20	5.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	b
7/31/2006	<300	<20	4.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	c
6/12/2009	<300	<10	0.53	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/6/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	<10	1.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/19/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
5/19/2011	<300	<10	2.1	<0.50	<0.50	<0.50	<0.50	<0.50	d
MW-4									
9/29/2000			12.2						

Well and				Concentration	ons in (µg/L)				
Sample Date	Ethanol	TBA	MTBE	DIPE	ЕТВЕ	TAME	1,2-DCA	EDB	Footnote
MW-4 Cont.									
12/17/2000			5.81						
3/23/2001			3.04						
6/20/2001			<2.5						
9/22/2001			5.2						
12/28/2001			4.3						
3/14/2002			5.1						
7/19/2002			30						
10/9/2002			28						
03/28/2003	<100	<20	4.4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
4/7/2003	<100	<20	14	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
7/9/2003	<100	<20	1.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
10/08/2003	<100	<20	3.1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
01/15/2004	<100	<20	6.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	a (TBA and EDB)
04/05/2004	<100	<20	1.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
07/12/2004	<100	<20	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
10/19/2004	<100	<20	4.4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
01/11/2005	<100	<20	11	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	b
04/14/2005	<100	<20	0.64	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
08/01/2005	<100	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	b
7/31/2006	<300	<20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	c
6/12/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/6/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/19/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
5/19/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
MW-5									
6/12/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/6/2009	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
11/19/2010	<300	<10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
5/19/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	< 0.50	d

Well and				Concentration	ons in (µg/L)				
Sample Date	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	Footnote
MW-6									
6/12/2009	<300	<10	59	< 0.50	< 0.50	5.2	< 0.50	< 0.50	
11/6/2009	<300	24	37	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
6/4/2010	<300	17	190	< 0.50	< 0.50	17	< 0.50	< 0.50	
11/19/2010	<600	<20	130	<1.0	<1.0	<1.0	<1.0	<1.0	
5/19/2011	<1,200	<40	76	<2.0	<2.0	6.1	<2.0	<2.0	

#### Symbols & Abbreviations:

- < = Not detected at or above specified laboratory reporting limit
- --- = Not analyzed/applicable/measured/available
- 1,2-DCA = 1,2-Dichloroethane

DIPE = Di-isopropyl ether

EDB = 1,2-Dibromoethane

ETBE = Ethyl tert-butyl ether

MTBE = Methyl tert-butyl ether

TAME = Tert-amyl methyl ether

TBA = Tert-butyl alcohol

ug/L = Micrograms per liter

#### Footnotes:

- a = The result was reported with a possible high bias due to the continuing calibration verification falling outside acceptance criteria
- b = The calbration verification for ethanol was within method limits but outside contract limits
- c = LCS rec. above meth. control limits. Analyte ND. Data not impacted
- d = Quantitated against gasoline

#### Notes:

All fuel oxygenate compounds analyzed using EPA Method 8260B

The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information

Table 3. Historical Groundwater Gradient - Direction and Magnitude ARCO Service Station #2162, 15135 Hesperian Blvd., San Leandro, CA

Date Measured	Approximate Gradient Direction	Approximate Gradient Magnitude (ft/ft)
3/23/2001	Southwest	0.011
6/20/2001	Southwest	0.013
9/22/2001	Southwest	0.012
12/28/2001	Southwest	0.010
3/14/2002	Southwest	0.011
4/18/2002	Southwest	0.012
7/19/2002	Southwest	0.012
10/9/2002	Southwest	0.013
3/28/2003	Southwest	0.013
4/7/2003	Southwest	0.011
7/9/2003	Southwest	0.010
10/8/2003	Southwest	0.010
1/15/2004	Southwest	0.008
4/5/2004	South-Southwest	0.004
7/12/2004	South and Southwest	0.003 and 0.005
10/19/2004	Southwest	0.004
1/11/2005	Southwest (a) to Southeast (b)	0.005 to 0.004
4/14/2005	Southeast	0.004
8/1/2005	Southwest	0.002
7/31/2006	South-Southwest	0.003
6/12/2009	South	0.003
11/6/2009	South-Southwest	0.003
6/4/2010	South-Southwest	0.004
11/19/2010	South-Southwest	0.003
5/19/2011	South-Southeast	0.003

#### Footnotes:

a = Direction at underground storage tanks

b = Direction at dispensers

#### Notes:

The data within this table collected prior to April 2006 was provided to Broadbent & Associates, Inc. by Atlantic Richfield Company and their previous consultants. Broadbent & Associates, Inc. has not verified the accuracy of this information

## APPENDIX A

FIELD METHODS

#### BROADBENT & ASSOCIATES INC. FIELD PROCEDURES

#### A.1 QUALITY ASSURANCE/QUALITY CONTROL FIELD PROTOCOLS

Field protocols have been implemented to enhance the accuracy and reliability of data collection, groundwater sample collection, transportation and laboratory analysis. Discussion of these protocols is provided below.

#### A.1.1 Water Level & Free-Product Measurement

Prior to groundwater sample collection from each monitoring well, the presence of separate-phase hydrocarbons (SPH or free product, FP) and depth to groundwater shall be measured. Depth to groundwater will be measured with a standard water level indicator that has been decontaminated prior to its use in accordance with procedures discussed below. Depth to groundwater will be gauged from a saw cut notch at the top of the well casing on each well head. Where FP is suspected, the initial gauging will be done with an oil-water interface probe. Once depth to water has been measured, the first retrieval of a new disposable bailer will be scrutinized for the presence of SPH/FP.

#### A.1.2 Monitoring Well Purging

Subsequent to measuring depth to groundwater and prior to the collection of groundwater samples, purging of standing water within the monitoring well will be performed if called for. Consistent with the American Society for Testing and Materials (ASTM) Standard D6452-99, Section 7.1, the well will be purged of approximately three wetted-casing volumes of water, or until the well is dewatered, or until monitored field parameters indicate stabilization. The well will be purged using a pre-cleaned disposable bailer or submersible pump and disposable plastic tubing dedicated to each individual well. The well will be purged at a low flow rate to minimize the possibility of purging the well dry. So that the sample collected is representative of formation water, several field parameters will be monitored during the purging process. The sample will not be collected until these parameters (i.e. temperature, pH, and conductivity) have stabilized to within 10% of the previously measured value. If a well is purged dry, the sample should not be collected until the well has recovered to a minimum 50% of its initial volume.

#### A.1.3 Groundwater Sample Collection

Once the wells are satisfactorily purged, water samples will be collected from each well. Water samples for organic analyses will be collected using a pre-cleaned, new, disposable bailer and transferred into the appropriate, new, laboratory-prepared containers such that no head space or air bubbles are present in the sample container (if appropriate to the analysis). The samples will be properly labeled (i.e. sample identification, sampler initials, date/time of collection, site location, requested analyses), placed in an ice chest with bagged ice or ice substitute, and delivered to the contracted analytical laboratory.

#### A.1.4 Surface Water Sample Collection

Unless specified otherwise, surface water samples will be collected from mid-depth in the central area of the associated surface water body. Water samples will be collected into appropriate, new, laboratory-prepared containers by dipping the container into the surface water unless the container has a preservative present. If a sample preservative is present, a new, cleaned non-preserved surrogate container will be used to obtain the sample which will then be directly transferred into a new, laboratory-provided, preserved container. Samples will be properly labeled and transported as described above.

#### A.1.5 Decontamination Protocol

Prior to use in each well, re-usable groundwater sampling equipment (e.g., water level indicator, oil-interface probe, purge pump, etc.) will be decontaminated. Decontamination protocol will include thoroughly cleaning with a solution of Liquinox, rinsing with clean water, and final rinsing with control water (potable water of known quality, distilled, or de-ionized water). Pre-cleaned new disposable bailers and disposable plastic tubing will be dedicated to each individual well.

#### A.1.6 Chain of Custody Procedures

Sample identification documents will be carefully prepared so identification and chain of custody can be maintained and sample disposition can be controlled. The sample identification documents include Chain-of-Custody (COC) records and Daily Field Report forms. Chain of custody procedures are outlined below.

#### Field Custody Procedures

The field sampler is individually responsible for the care and custody of the samples collected until they are properly transferred.

Samples will have unique labels. The information on these labels will correspond to the COC which shows the identification of individual samples and the contents of the shipping container. The original COC will accompany the shipment and a copy will be retained by the field sampler.

#### Transfer of Custody and Shipment

A COC will accompany samples during transfer and shipment. When transferring samples, the individual relinquishing and the individual receiving the samples will each sign, date, and note the time on the COC. This documents the sample custody transfer.

Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate COC accompanying each shipment. Shipments will be accompanied by the original COC. Samples will be delivered by BAI personnel to the laboratory, or shipped by responsible courier. When a shipping courier is utilized, the sample shipment number will be identified on the COC.

#### A.1.7 Field Records

In addition to sample identification numbers and COC records, Daily Field Report records will be maintained by field staff to provide daily records of significant events, observations, and measurements during field investigations. These documents will contain observed information such as: the personnel present, site conditions, sampling procedures, measurement procedures, calibration records, equipment used, supplies used, etc. Field measurements will be recorded on the appropriate forms. Entries on the data forms will be signed and dated. The data forms will be kept as permanent file records.

## APPENDIX B

FIELD DATA SHEETS



DAI	LY	REP	ORT
Page	1	of	

Project: BP/ARIO 2162	Project No.: 0688-620
Field Representative(s): SB & JR	Day: Nursday Date: 5/18/9/11
Гime Onsite: From: <u>0830</u> То: 1140; Fro	om: To: ; From: To:
Signed HASP Safety Glasses  UST Emergency System Shut-off Switches  Proper Level of Barricading X Other I	_
Weather: Suny/Walm	
Equipment In Use: <u>Gum Eguy</u>	ment-
Visitors:	
A ALTACO	RK DESCRIPTION:
0830 on Site Filling Sufety meeting Canon Set Sp on Wh	1-4 Sample @ 0925
0931 Set up on mu-	
0947 Set up on MW	
1011 Set up on mh	1-2 Sample @ 1030
1046 Set up on mu	-5 Sample @ 1055
1100 Set up on mw 1140 left-site	-1 Sample C 1115
Signature:	



PROJECT NO.: 06-88-620 COMMENTS: BP/ARCO 7/62 DATE: 5/19/11
PERSONNEL: SB JJR
WEATHER: SUNAY/WWM Equip: Geosquirt Tubing Bailers DO wli Ec/pH WELL HEAD CONDITION: Alk. VAULT, BOLTS, CAP, LOCK, ETC Temp. DO (mg/l) Redox Iron (mg/l) Cond. PRODUCT THICKNESS (mg/l) MEASURING рΗ (C/F) (X100) DTW (FT) Time Well ID POINT 7.16 mw-1 1105 TOC mw 7 101) 7.72 MW-30945 8.24 mw-4 0911 8.02 mw-5/051 7.77 mw/0 0937



Vell I.D.:				V	nw-1			
roject Nam	ie/Locati	ion:[	SP/ARC	0 21	50	Pr	oject#:	06-88-620
Sampler's N	lame:		SB C	HJR			ate: 5	119/11
ourging Equ	ipment:	-	Daile	1				*
Sampling E	quipmer	nt:	bail-					700 180 - 11 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Casing Type	e: PVC							•
Casing Diar	neter:			-4	inch		*UNIT	CASING VOLUMES
Total Well I	Depth:			/6-0	<u>)                                    </u>		2" =	= 0.16 gal/lin ft.
Depth to W	ater:			<u> </u>	<u>) (</u>	· ·	3" =	= 0.37 gal/lin ft.
Water Colu	mn Thic	kness:	=	<u> 8,2</u>	9 feet		4 <sup>n</sup> =	= 0.65 gal/lin ft.
Unit Casing	y Volume	e*:		(0,0	25 gallon / fo	ot	6" =	= 1.47 gal/lin ft.
Casing Wa	ter Volu	me:	=	= <u>_5,</u>	<u>S</u> gallons			•
Casing Vol	ume:		<u></u> :	x3	each each			
Estimated	Purge V	olume:	:	= <u>/(</u> 0	). <i>(</i> ) gallons			
Free produ	ıct meas	uremer	nt (if pre	sent):				
Purged	Time	DO	ORP	Fe	Conductance	Temperature	рН	Observations
(gallons)	(24:00)		(mV)		(μS)	(Fahrenheit)		
0	<del> </del>	1.36		Voca-morphishte	808	21.5	6,5	
2	MO	Х	Х	X	795.	19.4	6.7	
4	1113	Х	Х	X	789	19.7	6.8	
		Х	x	Х				
	. :	х	х	Х				
		х	×	×				
		×	×	Х				
		×	×	×				
Total Wa	ter Volu	me Purg	jed:		4,0	gallon	 S	
Depth to	Water a	t Samp	le Colle	ction;	-	fee		
Sample	Collecti	ion Tím	ie:		1115			irged Dry?(Y/N)
Commen	its:							
		_						
				· · · · · · · · · · · · · · · · · · ·				
						· · · · · · · · · · · · · · · · · · ·		



ell I.D.:					2-Z					
roject Nan	ne/Locat	ion:	BY /AK	(O) 7	162	Pr	oject#:	06-88-620		
ampler's N	lame:		SB .	J 1/6	·		vate: 5/19/11			
urging Eqi	uipment:	: _	Dail	er						
ampling E	quipmer	nt: _	Dail	Le/						
asing Typ	e: PVC			è,						
asing Dia	meter:				inch		*UNIT	CASING VOLUMES		
otal Well	Depth:			160	0feet		2" =	= 0.16 gal/lin ft.		
epth to W	/ater:			<u> 7, 1</u>	2 feet ·		3" =	= 0.37 gal/lin ft.		
Vater Colu	ımn Thio	kness:	=	= <u>\$.8</u>	8feet		4" :	= 0.65 gal/lin ft.		
Init Casing	g Volum	e*:		x <u>O al</u>	gallon / fo	ot	6" :	= 1.47 gal/lin ft.		
asing Wa	ter Volu	me:		= <u> </u>	ੋ gallons			•		
asing Vol	lume:			x3						
stimated	Purge V	olume:		= 12	∠3 gallons					
ree produ	uct meas	suremei	nt (if pre	esent):			· · · · · · · · · · · · · · · · · · ·			
Purged	Time	Oα	ORP	Fe	Conductance	Temperature	рН	Observations		
(gallons)	(24:00)		(mV)		(μS)	(Fahrenheit)		V-/1		
<u> </u>	1020	1.24	***************************************	***************************************	80 /	17.0	8,7			
2	1027	Х	Х	Х	786	18.9	8.9			
4	1025	Х	Х	Х	775	18,0	9.0			
		х	х	Х				-		
	-	х	Х	х						
		х	х	×						
		×	Х	Х						
		х	×	×						
Total Wa	ter Volu	me Purg	ged:		4.0	gailon	5			
Depth to	Water a	t Samp	le Collec	ction:	dispression of the second seco	fee				
Sample	Collecti	ion Tim	ie:		1030			irged Dry? (Y/N)		
Commen	its:									
		· · · · · · · · · · · · · · · · · · ·		<u>.</u>						
				·						
		į								
			· · · · · · · · · · · · · · · · · · ·							



Well I.D.:					Mw-3	>		
Project Nam	ne/Locat	ion: 🗍	SP/AR	02	162	<del></del>		06-88-650
Sampler's N	lame:			JR_	•	D	ate: 🥙	\$ 5/19/4
Purging Equ	uipment	•	pa.l	u/				7
Sampling E	qulpmer	nt:	Buil	2/				
Casing Typ	e: PVC							·
Casing Dia	meter:				inch		*UNIT	CASING VOLUMES
Total Well	Depth:			15.9	00feet	•	2" =	= 0.16 gal/lin ft.
Depth to W	/ater:			- 7	ZZ feet ·		3" =	= 0.37 gal/lin ft.
Water Colu	ımn Thio	kness:	=	=	<u>78</u> feet		4" =	= 0.65 gal/lin ft.
Unit Casin	g Volum	e*:	·	x <u>0.6</u>	25_gallon / fo	oot	6" =	= 1.47 gal/lin ft.
Casing Wa	ter Volu	me:	:	= <u>5</u> .	O gallons			
Casing Vol	ume:			×3				
Estimated	Purge V	olume:		= <u>15</u>	<u>し</u> gallons			
Free produ	ıct mea	suremer	it (if pre	esent):				
Purged	Time	OO	ORP	Fe	Conductance	Temperature	рН	Observations
(gallons)	(24:00)	ൃഷ്യ	(mV)		(μS)	(Fahrenheit).		
	0953	0.83	4-0-24-00-00-00-00-00-00-00-00-00-00-00-00-00		806	21.5	8.9	
2	0956	Х	Х	Х	784.	20.7	9.1	
4	0458	Х	Х	X	788	20,4	9.2	
		Х	X	×				·
		Х	Х	х		·		·
		х	х	х				
:		х	×	х	,			
		х	×	х				
Total Wa	ter Volu	me Purg	ed:		4.0	gailon	_ <del>`</del> S	
Depth to	Water a	t Samp	e Colle	ction:	Adjust and the property of the Parket of the	fee	_	
Sample	Collecti	ion Tim	e:		1000	)	_	rged Dry? (Y/(N)
Commen	ts:		·····			···		
				· · · · · · · · · · · · · · · · · · ·				
							-	
		· · · · · · · · · · · · · · · · · · ·		<del></del>				**************************************



Well I.D.:		_		MW.	- 4			
Project Nar	me/Local	tion: _	BP/	ARCO_	2162	P	roject #:	06-88-62
Sampler's	Name:		_SB	$J_{i}J_{i}$		D	ate:	19/11
Purging Eq	uipment	: _	boil	وّب				
Sampling l	Equipme	nt:	Dui.	1-eV				
Casing Typ	e: PVC							· · · · · · · · · · · · · · · · · · ·
Casing Dia	meter:		·	<u> </u>	inch		*UNIT	CASING VOLUMES
Total Well	Depth:			<u>18.C</u>	O feet		2" =	= 0.16 gal/lin ft.
Depth to V	Water:			- 🔏 .2	<u> </u>		3" =	= 0.37 gal/lin ft.
Water Col	umn Thic	kness:		= <u>9.7</u>	6 feet		4" :	= 0.65 gal/lin ft.
Unit Casin	g Volum	e*:		x <u>ပ.(</u>	25 gallon / fo	ot	6" :	= 1.47 gal/lin ft.
Casing Wa	ater Volu	me:		= <u>(o (</u>	34gattons			
Casing Vo	iume:		<del> </del>	×	each			
Estimated	l Purge V	olume:	<del></del>	= 19.	<u>O</u> gallons			
Free prod	uct meas	suremer	nt (if pro	esent):				
Purged	Пте	DO	ORP	Fe	Conductance	Temperature	рН	Observations
(gallons)	(24:00)	A <70	(mV)		(μS)	(Fehrenheit)		
C	0915	000	Video de Esperante	parameter and the second	800 803	71.4	7.9	
2	0917	Х	Х	Х	795	19.9	7.5	
4	0920	Х	х	х	795	19.4	7,4	
<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>	0973	х	×	×	794	19.3	7.5	-
		х	х	Х				
		х	×	×				
		х	Х	х				
		х	×	Х				
Total Wa	ter Volur	ne Purg	ed:		(0.0)	gallons	<del>-1,</del> -	<u> </u>
Depth to	Water a	t Sampl	e Colle	ction:	4	fee	_	
Sample	Collecti	on Tím	e:		0929	>	_	rged Dry?(Y/N)
Commen	ts:			_				
			<del></del>				<del></del>	
		•	<del>-</del>	•				
		- i						



Well I.D.:					MW-63	5					
Project Nan	ne/Locat	tion: _	BO/M	5 W	162	Project #: 06-88-620					
Sampler's I	Name:		30	-JR			ate: 5/				
Purging Eqi	uipment	:	- Annie - Anni								
Sampling E	quipme	nt:	Dail	e/							
Casing Typ	e: PVC							•			
Casing Dia	meter:		-	_4	inch		*UNIT	CASING VOLUMES			
Total Well	Depth:			160	<u>Cfeet</u>	2" = 0.16 gal/lin ft.					
Depth to V	Vater:			- <u>8.0</u>	し feet		3" =	= 0.37 gal/lin ft.			
Water Colu	ımn Thic	ckness:	=	<b>=</b>	feet		4" :	= 0.65 gal/lin ft.			
Unit Casin	g Volum	e*:		x	gallon / fo	iot	6" =	= 1.47 gal/lin ft.			
Casing Wa	ter Volu	me:			gallons						
Casing Vo	lume:			×3	each						
Estimated	Purge V	/olume:		=	gailons						
Free produ	uct mea	suremer	nt (if pre	eșent): _							
Purged	Time	DO	ORP	Fe	Conductance	Temperature	рН	Observations			
(gallons)	(24:00)		(mV)		(μS)	(Fehrenheit)					
	1053	2.17		***************************************	824	15.02	9.11				
	1	х	Х	х							
		Х	Х	X		·					
		х	Х	Х							
	-	Х	Х	X							
		x	х	x⁄							
		×	×	х				-			
		×	×	×							
Total Wa	tor Volu	me Purc	led:	<u> </u>				<u> </u>			
Depth to				ction:	propries and the second	gallon	····				
Sample		•		CIOII.	1055	fee	_	10.00			
Jampie	Conce		-ton-	/	(0)		Pu	rged Dry?(Y/N)			
Commen	its:	N/V	J (c	AG:							
		<del></del>		····							
<u> </u>	dir.	:		<del></del>							
	<u>.</u>										
						······································					

1. BESI #

# **NON-HAZARDOUS WASTE DATA FORM**

·····		***************************************			mara-nome					
	Generator's Name and Mailing Address		Generator's Site Ad							
	BP WEST COAST PRODUCTS, LLC		BY	2	06	0e ric		in.	f)	
	P.O. BOX 80249		15	35	Hesi	0000	an	BIV	$\mathcal{O}'$	and Wash
	RANCHO SANTA MARGARITA, CA 92688		ا حمد ع وصح		o	1	~ A			
			Sau	1 L	2an (	tro,	1			
	Generator's Phone: (949) 460-5200		74401	io eme	RGENC	Y PHON	IT- /04	91 699 3	27nc	
	3. Transporter 1 Company Name	,	605-2 C 4 601-4	or X to House Q T to Seaso.		ne#	agree a Cape.a	wy 1200 c	. 6 45.45	
	Broadbent & Associates, Inc. 4. Transporter 2 Company Name				( (	530) 566-	1400			
	4. Transporter 2 Company Name					ne #				
	Gomes Excavating				***************************************	7 <mark>07) 374-</mark>	2881			
	5. Designated Facility Name and Site Address					one#				
	INTRAT, INC.		•		***	530) 753-	-1828			
	1105 AIRPORT RD #C									
	RIO VISTA, CA 94571									
				7. Cont	ainers	8. Total	9. Unit			
Œ	6. Waste Shipping Name and Description			No.	Type	Quantity	Wt/Vol	10. P	rofile No.	1
GENERATOR	Α.		, and a second			1 0				
Z	NON-HAZARDOUS WATER			Agr.	T	10	G			
Ш	B.		···			····	-		***************************************	
	u.									
J										
	C.	***************************************		***************************************						
										ĺ
										ļ
	D.									
	11. Special Handling Instructions and Additional Information		·····		<u> </u>				***************************************	
	WEAR ALL APPROPRIATE PROTECTIVE CLO	THING								
The state of the s	WELL PURGING / DECON WATER									
					-					
	12. GENERATOR'S CERTIFICATION: I certify the materials described above on this		-hazardous.			***************************************	·			
	Generator's/Offeror's Printed/Typed Name	Signature	7 10 m	k				Month	Day 1 ZØ 1	Year £/
	JOHNES LEGINOS		<i>U</i> • • • • • • • • • • • • • • • • • • •	<u></u>				<u> </u>		1
		$-\nu$								
T	13. Transporter Acknowledgment of Receipt of Materials								3 1003 100414	***************************************
Ш	Transporter 1_Printed/Typed Name	Signature		<i>lu</i>	STANCE OF THE PROPERTY OF THE			Month	Day	Year
ď	James Kamos	Lot	The	fine	with the same of t			5	10	11
10	Transporter 2 Printed/Typed Name	Signature						Month	Day	Year
<u>\( \frac{1}{2} \)</u>		Ľ.	notes and a fact of the second			5 s. se se 1425 1436 145			أحججت	110010
Z										
TRANSPORTER										
	14. Designated Facility Owner or Operator: Certification of receipt of materials cove	ered by this data fo	ırm.						1500 100000	····
FACILITY		Signature						Month	Day	Year
FAC										[
L	L									<u> </u>

## APPENDIX C

# LABORATORY REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION





June 02, 2011

Tom Venus Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642

Calscience Work Order No.: 11-05-1316

Client Reference: **BP 2162** 

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 5/20/2011 and analyzed in accordance with the attached chain-of-custody.

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Calscience Environmental Laboratories, Inc.

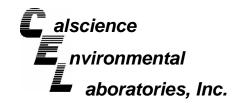
Richard Villafania

Richard Vellar.

Project Manager

NELAP ID: 03220CA · DoD-ELAP ID: L10-41 **CSDLAC ID: 10109** 

SCAQMD ID: 93LA0830



# **Analytical Report**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642 Date Received: Work Order No: Preparation: Method: 05/20/11 11-05-1316 EPA 5030C EPA 8015B (M)

Project: BP 2162 Page 1 of 2

								.90 . 0. =
Client Sample Number		Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1		11-05-1316-1-D	05/19/11 11:15	Aqueous	GC 11	05/26/11	05/26/11 15:05	110526B01
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>			
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L			
Surrogates:	REC (%)	Control Limits		<u>Qual</u>				
1,4-Bromofluorobenzene	78	38-134						
MW-2		11-05-1316-2-E	05/19/11 10:30	Aqueous	GC 11	05/26/11	05/26/11 20:28	110526B01
Parameter	Result	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>			
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L			
Surrogates:	REC (%)	Control Limits		<u>Qual</u>				
1,4-Bromofluorobenzene	81	38-134						
MW-3		11-05-1316-3-E	05/19/11 10:00	Aqueous	GC 11	05/26/11	05/26/11 18:43	110526B01
Comment(s): -LW Quantitated	against gasoline.							
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	<u>Units</u>			
Gasoline Range Organics (C6-C12)	56	50	1		ug/L			
Surrogates:	REC (%)	Control Limits		Qual				
1,4-Bromofluorobenzene	79	38-134						
MW-4		11-05-1316-4-E	05/19/11 09:25	Aqueous	GC 11	05/26/11	05/26/11 19:18	110526B01
<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>			
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L			
Surrogates:	REC (%)	Control Limits		<u>Qual</u>				
1,4-Bromofluorobenzene	79	38-134						

Market RL-Rej

DF - Dilution Factor ,

Qual - Qualifiers



# **Analytical Report**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642 Date Received: Work Order No: Preparation: Method: 05/20/11 11-05-1316 EPA 5030C EPA 8015B (M)

Project: BP 2162 Page 2 of 2

110,000. 21 2102								xg0
Client Sample Number		Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-5		11-05-1316-5-E	05/19/11 10:55	Aqueous	GC 11	05/26/11	05/26/11 19:53	110526B01
Comment(s): -LW Quantitated	against gasoline.							
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	<u>Units</u>			
Gasoline Range Organics (C6-C12)	52	50	1		ug/L			
Surrogates:	REC (%)	Control Limits		Qual				
1,4-Bromofluorobenzene	84	38-134						
MW-6		11-05-1316-6-E	05/19/11 09:45	Aqueous	GC 11	05/26/11	05/26/11 18:08	110526B01
Parameter	Result	<u>RL</u>	DF	Qual	Units			
Gasoline Range Organics (C6-C12)	7100	250	5		ug/L			
Surrogates:	REC (%)	Control Limits		<u>Qual</u>				
1,4-Bromofluorobenzene	136	38-134						
Method Blank		099-12-695-1,082	N/A	Aqueous	GC 11	05/26/11	05/26/11 14:29	110526B01
Doromotor	Popult	DI	DE	Ougl	Unito			
Parameter Gasoline Range Organics (C6-C12)	<u>Result</u> ND	<u>RL</u> 50	<u>DF</u> 1	<u>Qual</u>	<u>Units</u> ug/L			
Surrogates:	REC (%)	Control Limits		<u>Qual</u>				
	· · · · · · ·	<u> </u>		<u>Quai</u>				
1,4-Bromofluorobenzene	77	38-134						



# **Analytical Report**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642

Date Received: Work Order No: Preparation: Method: Units:

11-05-1316 **EPA 5030C EPA 8260B** ug/L

05/20/11

Project: BP 2162

Page 1 of 3

Project: BP 2162										Pa	ige 1 of 3
Client Sample Number				b Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/1 Analy		QC Batch ID
MW-1			11-05-1	1316-1-A	05/19/11 11:15	Aqueous	GC/MS BB	05/26/11	05/26 15:5		110526L01
<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	Qual	<u>Parameter</u>			Result	<u>RL</u>	<u>DF</u>	<u>Qual</u>
Benzene	ND	0.50	1		Methyl-t-Butyl	l Ether (MTB	BE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alc	ohol (TBA)		ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	ther (DIPE)		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl E	Ether (ETBE	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	ethyl Ether (T	AME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol			ND	300	1	
Surrogates:	REC (%)	Control Limits	<u>Qua</u>	<u>ıl</u>	Surrogates:			REC (%)	Control Limits		<u>Qual</u>
1,2-Dichloroethane-d4	93	80-128			Dibromofluoro	omethane		90	80-127		
Toluene-d8	91	80-120			1,4-Bromofluo	orobenzene		98	68-120		
MW-2			11-05-1	I316-2-A	05/19/11 10:30	Aqueous	GC/MS BB	05/26/11	05/26 23:1		110526L01
<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	Qual	<u>Parameter</u>			Result	<u>RL</u>	DF	<u>Qual</u>
Benzene	ND	0.50	1		Methyl-t-Butyl	l Ether (MTB	BE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alc	cohol (TBA)	,	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	ther (DIPE)		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl E	Ether (ETBE	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	ethyl Ether (T	AME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	,	,	ND	300	1	
Surrogates:	REC (%)	Control Limits	Qua	<u>al</u>	Surrogates:			REC (%)	Control Limits		Qual
1,2-Dichloroethane-d4	100	80-128			Dibromofluoro	omethane		97	80-127		
Toluene-d8	92	80-120			1,4-Bromofluo			99	68-120		
MW-3			11-05-1	I316-3-A	05/19/11 10:00	Aqueous	GC/MS BB	05/26/11	05/26 23:4		110526L01
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	<u>Parameter</u>			Result	<u>RL</u>	<u>DF</u>	Qual
Benzene	ND	0.50	1		Methyl-t-Butyl	l Ether (MTB	BE)	2.1	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alc	,	,	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	, ,		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl E	,	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	,	,	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	•	,	ND	300	1	
Surrogates:	REC (%)	Control Limits	Qua	<u>al</u>	Surrogates:			REC (%)	Control Limits	-	Qual
1,2-Dichloroethane-d4	101	80-128			Dibromofluoro	omethane		94	80-127		
Toluene-d8	92	80-120			1,4-Bromofluo			98	68-120		
					.,. 2.551140						

DF - Dilution Factor

Qual - Qualifiers



### **Analytical Report**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642 Date Received:
Work Order No:
Preparation:
Method:
Units:

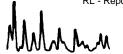
11-05-1316 EPA 5030C EPA 8260B ug/L

05/20/11

Project: BP 2162

Page 2 of 3

1 Toject. Di 2 To2										1 0	ge 2 01 3
Client Sample Number				Sample umber	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/\ Analy		QC Batch II
MW-4			11-05-13	316-4-A	05/19/11 09:25	Aqueous	GC/MS BB	05/26/11	05/27 00:		110526L01
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	<u>Parameter</u>			Result	<u>RL</u>	<u>DF</u>	<u>Qual</u>
Benzene	ND	0.50	1		Methyl-t-Buty	l Ether (MTB	BE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Ald	•	,	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	, ,		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl	Ether (ETBE	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	ethyl Ether (T	AME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	, ,	,	ND	300	1	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:			REC (%)	Control Limits		Qual
1,2-Dichloroethane-d4	99	80-128			Dibromofluor	omethane		94	80-127		
Toluene-d8	91	80-120			1,4-Bromoflu	orobenzene		98	68-120		
MW-5			11-05-13	316-5-A	05/19/11 10:55	Aqueous	GC/MS BB	05/26/11	05/27 00:4		110526L01
Parameter	Result	RL	<u>DF</u>	Qual	Parameter			Result	RL	DF	Qual
Benzene	ND	0.50	1		Methyl-t-Buty	d Ethor (MTD	)E\	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Ald	,	,L)	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	` ,		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl	,	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	•	,	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	Suryi Euror (1	/ tiviL)	ND	300	1	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:			REC (%)	Control Limits	-	<u>Qual</u>
1,2-Dichloroethane-d4	100	80-128			Dibromofluor	omethane		95	80-127		
Toluene-d8	92	80-120			1.4-Bromoflu			98	68-120		
MW-6			11-05-13	316-6-A	05/19/11 09:45	Aqueous	GC/MS BB	05/26/11	05/26 16:2		110526L01
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	Parameter			Result	<u>RL</u>	DF	<u>Qual</u>
Benzene	4.0	2.0	4		Methyl-t-Buty	l Ether (MTB	BE)	76	2.0	4	
1,2-Dibromoethane	ND	2.0	4		Tert-Butyl Ald	•	-	ND	40	4	
1,2-Dichloroethane	ND	2.0	4		Diisopropyl E	ther (DIPE)		ND	2.0	4	
Ethylbenzene	7.9	2.0	4		Ethyl-t-Butyl	Ether (ETBE	)	ND	2.0	4	
Toluene	ND	2.0	4		Tert-Amyl-Me	•	,	6.1	2.0	4	
Xylenes (total)	ND	2.0	4		Ethanol	•	•	ND	1200	4	
Surrogates:	REC (%)	Control Limits	Qual		Surrogates:			REC (%)	Control Limits		Qual
1,2-Dichloroethane-d4	92	80-128			Dibromofluor	omethane		94	80-127		
Toluene-d8	91	80-120			1,4-Bromoflu			97	68-120		
. 5.5510 40	<u>.</u>	30 120			,, , Diomona	0.0001120110		•	20 120		



DF - Dilution Factor , Qual - Qualifiers



### **Analytical Report**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642

Project: BP 2162

Date Received:
Work Order No:
Preparation:
Method:
Units:

05/20/11 11-05-1316 EPA 5030C EPA 8260B ug/L

Page 3 of 3

Client Sample Number			L	ab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/1 Analy		QC Batch ID
Method Blank			099-1	2-703-1,722	N/A	Aqueous	GC/MS BB	05/26/11	05/26 15:3		110526L01
<u>Parameter</u>	Result	<u>RL</u>	<u>DF</u>	Qual	<u>Parameter</u>			Result	<u>RL</u>	DF	<u>Qual</u>
Benzene	ND	0.50	1		Methyl-t-Butyl	Ether (MTE	BE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alc	ohol (TBA)		ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl E	ther (DIPE)		ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl E	Ether (ETBE	)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Me	thyl Ether (T	AME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol			ND	300	1	
Surrogates:	<b>REC (%)</b>	Control	Qu	<u>al</u>	Surrogates:			REC (%)	Control	<u>C</u>	<u>Qual</u>
		<u>Limits</u>							<u>Limits</u>		
1,2-Dichloroethane-d4	90	80-128			Dibromofluoro	omethane		93	80-127		
Toluene-d8	91	80-120			1,4-Bromofluo	orobenzene		97	68-120		



### **Quality Control - Spike/Spike Duplicate**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642 Date Received: Work Order No: Preparation: Method: 05/20/11 11-05-1316 EPA 5030C EPA 8015B (M)

#### Project BP 2162

Quality Control Sample ID	Matrix	Instrument	Date Prepared		Date Analyzed	MS/MSD Batch Number
MW-1	Aqueous	GC 11	05/26/11		05/26/11	110526S01
<u>Parameter</u>	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Gasoline Range Organics (C6-C12)	90	92	38-134	2	0-25	

MMM\_



### **Quality Control - Spike/Spike Duplicate**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642

Date Received: Work Order No: Preparation: Method: 05/20/11 11-05-1316 EPA 5030C EPA 8260B

#### Project BP 2162

Quality Control Sample ID	Matrix	Instrument	Date Prepared		Date Analyzed	MS/MSD Batch Number
MW-1	Aqueou	is GC/MS BB	05/26/11		05/26/11	110526\$01
<u>Parameter</u>	MS %REC	MSD %REC	%REC CL	<u>RPD</u>	RPD CL	Qualifiers
Benzene	97	96	76-124	1	0-20	
Carbon Tetrachloride	82	84	74-134	2	0-20	
Chlorobenzene	104	98	80-120	6	0-20	
1,2-Dibromoethane	102	95	80-120	8	0-20	
1,2-Dichlorobenzene	105	96	80-120	10	0-20	
1,2-Dichloroethane	99	96	80-120	3	0-20	
Ethylbenzene	99	95	78-126	4	0-20	
Toluene	90	89	80-120	2	0-20	
Trichloroethene	95	92	77-120	3	0-20	
Methyl-t-Butyl Ether (MTBE)	91	94	67-121	3	0-49	
Tert-Butyl Alcohol (TBA)	106	97	36-162	9	0-30	
Diisopropyl Ether (DIPE)	88	93	60-138	5	0-45	
Ethyl-t-Butyl Ether (ETBE)	91	94	69-123	4	0-30	
Tert-Amyl-Methyl Ether (TAME)	93	91	65-120	2	0-20	
Ethanol	113	97	30-180	14	0-72	

MMM\_

RPD - Relative Percent Difference , CL - Control Limit



### **Quality Control - LCS/LCS Duplicate**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642 Date Received: Work Order No: Preparation: Method:

11-05-1316 EPA 5030C EPA 8015B (M)

N/A

Project: BP 2162

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyz		LCS/LCSD Batc Number	h
099-12-695-1,082	Aqueous	GC 11	05/26/11	05/26/	11	110526B01	
<u>Parameter</u>	LCS %	6REC LCSD	%REC %	REC CL	<u>RPD</u>	RPD CL	Qualifiers
Gasoline Range Organics (C6-C12)	95	88		78-120	7	0-20	

RPD - Rei



### **Quality Control - LCS/LCS Duplicate**



Broadbent & Associates, Inc. 1324 Mangrove Ave, Ste 212 Chico, CA 95926-2642

Date Received: Work Order No: Preparation: Method:

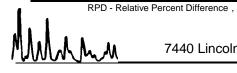
N/A 11-05-1316 EPA 5030C EPA 8260B

Project: BP 2162

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Da Anal	ate yzed	LCS/LCSD I Numbe	
099-12-703-1,722	Aqueous	GC/MS BB	05/26/11	05/26	/11	110526L0	01
<u>Parameter</u>	LCS %REC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
Benzene	94	97	80-120	73-127	3	0-20	
Carbon Tetrachloride	83	87	74-134	64-144	5	0-20	
Chlorobenzene	100	104	80-120	73-127	5	0-20	
1,2-Dibromoethane	98	101	79-121	72-128	4	0-20	
1,2-Dichlorobenzene	101	108	80-120	73-127	7	0-20	
1,2-Dichloroethane	95	96	80-120	73-127	1	0-20	
Ethylbenzene	99	104	80-120	73-127	5	0-20	
Toluene	91	93	80-120	73-127	3	0-20	
Trichloroethene	92	96	79-127	71-135	5	0-20	
Methyl-t-Butyl Ether (MTBE)	87	88	69-123	60-132	2	0-20	
Tert-Butyl Alcohol (TBA)	96	97	63-123	53-133	2	0-20	
Diisopropyl Ether (DIPE)	87	88	59-137	46-150	2	0-37	
Ethyl-t-Butyl Ether (ETBE)	88	90	69-123	60-132	2	0-20	
Tert-Amyl-Methyl Ether (TAME)	89	90	70-120	62-128	2	0-20	
Ethanol	111	101	28-160	6-182	9	0-57	

Total number of LCS compounds: 15 Total number of ME compounds: 0 Total number of ME compounds allowed:

LCS ME CL validation result: Pass





### **Glossary of Terms and Qualifiers**



Work Order Number: 11-05-1316

Qualifier	<u>Definition</u>
AX	Sample too dilute to quantify surrogate.
ВА	Relative percent difference out of control.
BA,AY	BA = Relative percent difference out of control. AY = Matrix interference suspected.
BB	Sample > 4x spike concentration.
BF	Reporting limits raised due to high hydrocarbon background.
ВН	Reporting limits raised due to high level of non-target analytes.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
BY	Sample received at improper temperature.
BZ	Sample preserved improperly.
CL	Initial analysis within holding time but required dilution.
CQ	Analyte concentration greater than 10 times the blank concentration.
CU	Surrogate concentration diluted to not detectable during analysis.
DF	Reporting limits elevated due to matrix interferences.
DU	Insufficient sample quantity for matrix spike/dup matrix spike.
ET	Sample was extracted past end of recommended max. holding time.
ET	Sample was extracted past end of recommended maximum holding time.
EY	Result exceeds normal dynamic range; reported as a min est.
GR	Internal standard recovery is outside method recovery limit.
IB	CCV recovery abovelimit; analyte not detected.
IH	Calibrtn. verif. recov. below method CL for this analyte.
IJ	Calibrtn. verif. recov. above method CL for this analyte.
J,DX	J=EPA Flag -Estimated value; DX= Value < lowest standard (MQL), but > than MDL.
LA	Confirmatory analysis was past holding time.
LG,AY	LG= Surrogate recovery below the acceptance limit. AY= Matrix interference suspected.
LH,AY	LH= Surrogate recovery above the acceptance limit. AY= Matrix interference suspected.
LM,AY	LM= MS and/or MSD above acceptance limits. See Blank Spike (LCS). AY= Matrix
	interference suspected.
LN,AY	LN= MS and/or MSD below acceptance limits. See Blank Spike (LCS). AY= Matrix
	interference suspected.
LQ	LCS recovery above method control limits.
LR	LCS recovery below method control limits.
LW	Quantitation of unknown hydrocarbon(s) in sample based on gasoline.
LX	Quantitation of unknown hydrocarbon(s) in sample based on diesel.
MB	Analyte present in the method blank.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
PC	Sample taken from VOA vial with air bubble > 6mm diameter.
PI 	Primary and confirm results varied by > than 40% RPD.
RB	RPD exceeded method control limit; % recoveries within limits.
SG	A silica gel cleanup procedure was performed.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.



## Laboratory Management Program La Chain of Custody Record

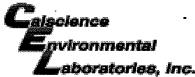
BP/ARC Project Name: BP 2162

or Custoay Record	(1316)	Р	
Req Due Date (mm/dd/yy):	(1510)	Rush TAT:	Yes_

•	A BP affiliated company	BP/ARC Fac	cility No:									,	2162		Lab	Work	( Ord	er Nı	umbe	r:							
Lab Na	ame: Calscience			BP/A	RC	Facili	ty Ad	dress	:	3310	Park	Blvd.							Cons	ultant	/Contr	actor:		Broad	dbent & Associates,	Inc.	
Lab Ac	idress: 7440 Lincoln Way			City,	Stat	e, ZIF	Coc	de:		Oakl	and, C	A							Cons	Consultant/Contractor Project No: 06-88-620-5-822							
Lab PN	1: Richard Villafania			Lead	Reg	gulato	ry Ag	gency		ACE	Н								Address: 1324 Mangrove Ave. Ste. 212, Chico, CA 95926								
Lab Pr	none: 714-895-5494			Califo	ornia	Glob	al ID	No.:		T060	01000	84							Consultant/Contractor PM: Tom Venus								
Lab Sh	nipping Acent:		9225	Enfo	s Pro	oposa	l No:			0060	4-000	1			Phone: 530-566-1400												
Lab Bo	ottle Order No:			Acco	Accounting Mod				Pro	vision	X	00	C-BU		000	C-RM			Emai	Email EDD To: tvenus@broadbentinc.com							
Other I	info:			Stage:			tage: Execute (4) Activity: Pr				Proj	ect S	Spend	08) k	)				Invoid	ce To:		BP	/ARC	X	Contractor		
BP/AR	C EBM: Chuck Carmel			Matrix No. Containers / Preservative			ive			F	Requ	estec	d Ana	alyse	5			Report Typ	pe & QC L	evel							
EBM P	Phone:							ည																	Sta	ndard _X_	
EBM E	mail:							Containe							_	6	6		(00	6					Full Data Pad	ckage	
Lab No.	Sample Description	Date	Time	Soil / Solid	Water / Liquid	Air / Vapor		Total Number of Con	Unpreserved	+SO <sub>4</sub>	HNO3	HCI	Methanol		GRO (8015)	BTEX (8260)	5 Oxys (8260)	EDB (8260)	1,2-DCA (8260)	Ethanol (8260)					Con Note: If sample not c Sample" in comment and initial any preprin	ts and single-s	trike out
Ì	MW-1	5-19-4	1115		Х			6				х			х	х	х	х	х	х							
2	MW-2	5-19-11			Х			6				х			х	х	х	х	х	X							
3	MW-3	5-19-11			Х			6				×			х	х	X	Х	х	X							
4	MW-4		0925		Х			6				х			х	х	х	х	х	х							
	MW-5		1055		х			6				×			х	х	×	х	х	х							
6	MW-6	<b>V</b>	0945		Х			6	<u> </u>			×			х	х	х	Х	x	х							
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7	TB-2162- 110519	5-19-11	1/20						<u> </u>																		
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	er's Company: BAI	<u> </u>	5 100 11			4	av	m	/	2	<u>~</u>				5-19	77)	10	30					1	A /	)	<b> </b>	900
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	THIS LINE - LAB USE ONLY: Custoo	ay Seals In Plac	e: Yes / No	<u> </u>	emp	o Blar	ik: Ye	es / N	0	С	ooler	ıemp	on Re	ceipt:			_°F/C		I ri	p Blar	nk: Ye	s/No		MS	MSD Sample Subr	nitted: Yes /	NO



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1 DATES-19-11	AND THE PART OF THE PART OF THE PART		SHIPPING AIR BILL
			4 PACKAGE INFORMATION
COMPANY Broad bent 4	Associates into	GOLDEN STATE OVERNIGHT	LETTER (MAX 8 OZ)
ADDRESS 8+5 WORTHIN	K Commu Suite G		PACKAGE (WT)
ADDRESS -	STE/- ROOM	1-800-322-5555	DECLARED VALUE \$
Vacaville	TENES ZIP OFLOS	WWW.GSO.COM	COD AMOUNT \$
SENDERS JOINES ROME SAME	CODE 10 COU		(CASH NOT ACCEPTED)
CALSCIENCE	何を、MANUMBER 7º /: パラン・イン	SERVICE OVERNIGHT	BY 8:00 AM
			CONSULT YOUR SERVICE GUIDE OR CALL GOLDEN STATE OF
NAME Kistina	W. W. J. 995-5494	SIGNATURE	IVERY WITHOUT OBTAINING SIGNATURE
ADDRESS LINCOLN WAY		7	A 20 WINDS OF STAINING SIGNATURE
ADDRESS	STE/***		1
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	ZIP CODE 92841	17	DRIVER # RC1
YOUR INTERNAL BILLING REFERENCE WILL APPEAR ON YOUR INVOICE		107138280	PEEL OFF HERE
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WORK ORDER #: 11-05- 1 3 1 6

SAMPLE RECEIPT FO	RM	Cooler <u> </u>	of <u> </u>
CLIENT: Broadbert	DATE:	05/20	/11
TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C - 6.0 °C, not frozer  Temperature 3 6 °C + 0.5 °C (CF) = 3 6 °C °C  Sample(s) outside temperature criteria (PM/APM contacted by:).  Sample(s) outside temperature criteria but received on ice/chilled on same definition.  Received at ambient temperature, placed on ice for transport by Co  Ambient Temperature:	Blank ay of sampli	☐ Sample  ng.  Initial:	
CUSTODY SEALS INTACT:			<u></u>
Cooler	□ N/A	Initial: Initial:	20 PT
SAMPLE CONDITION: Chain-Of-Custody (COC) document(s) received with samples  COC document(s) received complete	,	No	N/A
<ul> <li>□ Collection date/time, matrix, and/or # of containers logged in based on sample labels.</li> <li>□ No analysis requested.</li> <li>□ Not relinquished.</li> <li>□ No date/time relinquished.</li> </ul>			
Sample container label(s) consistent with COC			
Sample container label(s) consistent with COC			
Proper containers and sufficient volume for analyses requested	. 🗹		
Analyses received within holding time	Ø		
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours.	/		
Proper preservation noted on COC or sample container	Ø		
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace			
Tedlar bag(s) free of condensation  CONTAINER TYPE:			Z
Solid:     40zCGJ   80zCGJ   160zCGJ   Sleeve ()   EnCores	s <sup>®</sup> □Terra	Cores <sup>®</sup> □	
Water: □VOA DVOAh □VOAna₂ □125AGB □125AGBh □125AGBp	□1AGB [	]1AGB <b>na₂</b> □	1AGB <b>s</b>
□500AGB □500AGJ □500AGJs □250AGB □250CGBs	□1PB [	□500PB □50	0PB <b>na</b>
□250PB □250PBn □125PB □125PBznna □100PJ □100PJna <sub>2</sub> □			
Air: ☐Tedlar® ☐Summa® Other: ☐ Trip Blank Lot#: ☐ Container: C: Clear A: Amber P: Plastic G: Glass J: Jar B: Bottle Z: Ziploc/Resealable Bag E: Preservative: h: HCL n: HNO3 na2:Na2S2O3 na: NaOH p: H3PO4 s: H2SO4 znna: ZnAc2+NaOH f:	Envelope <b>F</b>	Reviewed by: _	



WORK ORDER #: 11-05- 1 3 1 6

## SAMPLE ANOMALY FORM

SAMPLES - CONTA	AINERS & LA	Comme	nts:							
□ Sample(s)/Container(s) received but NOT LISTED on COC         □ Sample(s)/Container(s) received but NOT LISTED on COC         □ Holding time expired – list sample ID(s) and test         □ Insufficient quantities for analysis – list test         □ Improper container(s) used – list test         □ Improper preservative used – list test         □ No preservative noted on COC or label – list test & notify lab         □ Sample labels illegible – note test/container type         □ Sample label(s) do not match COC – Note in comments         □ Sample label(s) do not match COC – Note in comments         □ Project Information         □ # of Container(s)         □ Analysis         □ Sample container(s) compromised – Note in comments         □ Water present in sample container         □ Broken         □ Sample container(s) not labeled         □ Air sample container(s) compromised – Note in comments         □ Flat         □ Very low in volume         □ Leaking (Not transferred - duplicate bag submitted)         □ Leaking (transferred into Client's Tedlar® Bag*)         □ Leaking (transferred into Client's Tedlar® Bag*)							as MW-6 with and date as 05/19/11			
☐ Other:	ntainers witl	n Bubble >	6mm o	r ¼ inch:						
Sample # Container # of \ ID(s) Rece		Container ID(s)	# of Vials Received	Sample #	Container ID(s)	# of Cont. received	Analysis			
							·			
Comments:	Comments:									
*Transferred at Client's request.  Initial / Date: PT 05 /20										

#### 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!

Submittal Type: GEO\_WELL

Submittal Title: 2Q11 GEO\_WELL 2162

Facility Global ID: T0600100084
Facility Name: ARCO #2162
File Name: GEO\_WELL.zip

Organization Name: Broadbent & Associates, Inc.

<u>Username:</u> BROADBENT-C IP Address: 67.118.40.90

**Submittal Date/Time:** 6/7/2011 4:19:36 PM

**Confirmation Number:** 6891987621

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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!

Submittal Type: EDF - Monitoring Report - Semi-Annually

Submittal Title: 2Q11 GW Monitoring

 Facility Global ID:
 T0600100084

 Facility Name:
 ARCO #2162

 File Name:
 11051316.zip

Organization Name: Broadbent & Associates, Inc.

<u>Username:</u> BROADBENT-C IP Address: 67.118.40.90

<u>Submittal Date/Time:</u> 6/7/2011 4:07:14 PM

Confirmation Number: 5408822596

**VIEW QC REPORT** 

**VIEW DETECTIONS REPORT** 

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