# Atlantic Richfield Company

**Chuck Carmel**
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July 31, 2014

**RECEIVED**
*By Alameda County Environmental Health at 11:45 am, Aug 04, 2014*

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

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

Submitted by,

Chuck Carmel
Remediation Management Project Manager

Attachment

# SECOND QUARTER 2014 SEMI-ANNUAL GROUNDWATER MONITORING REPORT
**Atlantic Richfield Company Station #498**
**286 South Livermore Ave.**
**Livermore, Alameda County, California**

**Prepared for:**

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

**Prepared by:**

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

July 31, 2014

No. 08-82-603

BROADBENT
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*Creating Solutions. Building Trust.*

July 31, 2014 Project No. 08-82-603

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

Attn.: Mr. Chuck Carmel

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

Dear Mr. Carmel:

Attached is the Second Quarter 2014 Semi-Annual Groundwater Monitoring Report for Atlantic Richfield Company Station No. 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 (707) 455-7290.

Sincerely,
BROADBENT & ASSOCIATES, INC.

PROFESSIONAL GEOLOGIST
KRISTENE TIDWELL
No. 969
CERTIFIED HYDRO GEOLOGIST
STATE OF CALIFORNIA

Kristene Tidwell, 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

**SECOND QUARTER 2014**
**SEMI-ANNUAL GROUNDWATER MONITORING REPORT**
**STATION #498, LIVERMORE, CALIFORNIA**

Broadbent & Associates, Inc. (Broadbent) is pleased to present this *Second Quarter 2014 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: | Mr. Chuck Carmel / Project Manager |
| Broadbent Contact: | Kristene Tidwell, P.G, C.HG, (707) 455-7290 |
| 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 (Second Quarter 2014):**

1. Prepared and submitted *First Quarter 2014 Status Monitoring Report* on April 30, 2014.
2. Conducted semi-annual groundwater monitoring/sampling for Second Quarter 2014 on February 21, 2014.

**WORK SCHEDULED FOR NEXT QUARTER (Third Quarter 2014):**

1. Prepare and submit *Second Quarter 2014 Semi-Annual Groundwater Monitoring Report* (contained herein).
2. Conduct groundwater monitoring/sampling for newly installed wells MW-5A, MW-5B, MW-6A, and MW-6B.

**GROUNDWATER MONITORING PLAN SUMMARY:**

| | | |
|---|---|---|
| Groundwater level gauging: | MW-1 through MW-3; MW-5A, MW-5B, MW-6A, MW-6B | (2Q and 4Q) |
| Groundwater sample collection: | MW-1 through MW-4; MW-5A, MW-5B, MW-6A, MW-6B | (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: | 32.28 (MW-1) to 41.64 (MW-6B) | (ft below TOC) |
| Gradient direction: | West-Northwest | (compass direction) |
| Gradient magnitude: | 0.02 | (ft/ft) |
| Average change in elevation: | -1.98 | (ft since last measurement) |

**Laboratory Analytical Data**

Summary: GRO were detected in three of the five wells sampled at a maximum concentration of 810 µg/L in well MW-3. Benzene was detected in one of the five wells sampled at a concentration of 170 µg/L in MW-3. MTBE was detected in four of the five wells sampled at a maximum concentration of 880 µg/L in well MW-6A.

**ACTIVITIES CONDUCTED & RESULTS:**

Second Quarter 2014 groundwater monitoring was conducted on February 21, 2014 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 32.28 ft at MW-1 to 41.64 ft at MW-6B. Resulting groundwater surface elevations ranged from 454.48 ft msl at MW-2 to 463.84 ft at MW-1. Well MW-1 was not used for contouring purposes due to its anomalous groundwater elevation presumed to be the result of the screen interval of the well and corresponding variations in the piezometric surface observed with depth in the clay and silty clay layers. 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 February 21, 2014 from wells MW-1 through MW-3, MW-5A, MW-5B, MW-6A, MW-6B, consistent with the current monitoring schedule. Well MW-4 was not sampled due to insufficient water. No 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 three of the five sampled at a maximum concentration of 1,500 µg/L in well MW-3. Benzene was detected above the laboratory reporting limit in one of the five wells sampled at a maximum concentration of 29 µg/L in well MW-3. MTBE was detected above the laboratory reporting limit in three of the five wells sampled at a maximum concentration of 880 µg/L in well MW-6B. Groundwater monitoring laboratory analytical results are summarized in Table 1 and Table 2 with the exception of Naphthalene. 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. 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 generally consistent with previous data with the following exceptions: TBA reached a historic maximum concentration in well MW-5A. 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 2014.

**RECOMMENDATIONS:**

New wells MW-5A and MW-5AB will continue to be monitored and sampled on a quarterly basis. If data is consistent in these new wells following the 3Q14 monitoring event, it is recommend a Conceptual Site Model be prepared for the Site for the purpose of evaluating the Site for closure.

**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, Second Quarter 2014

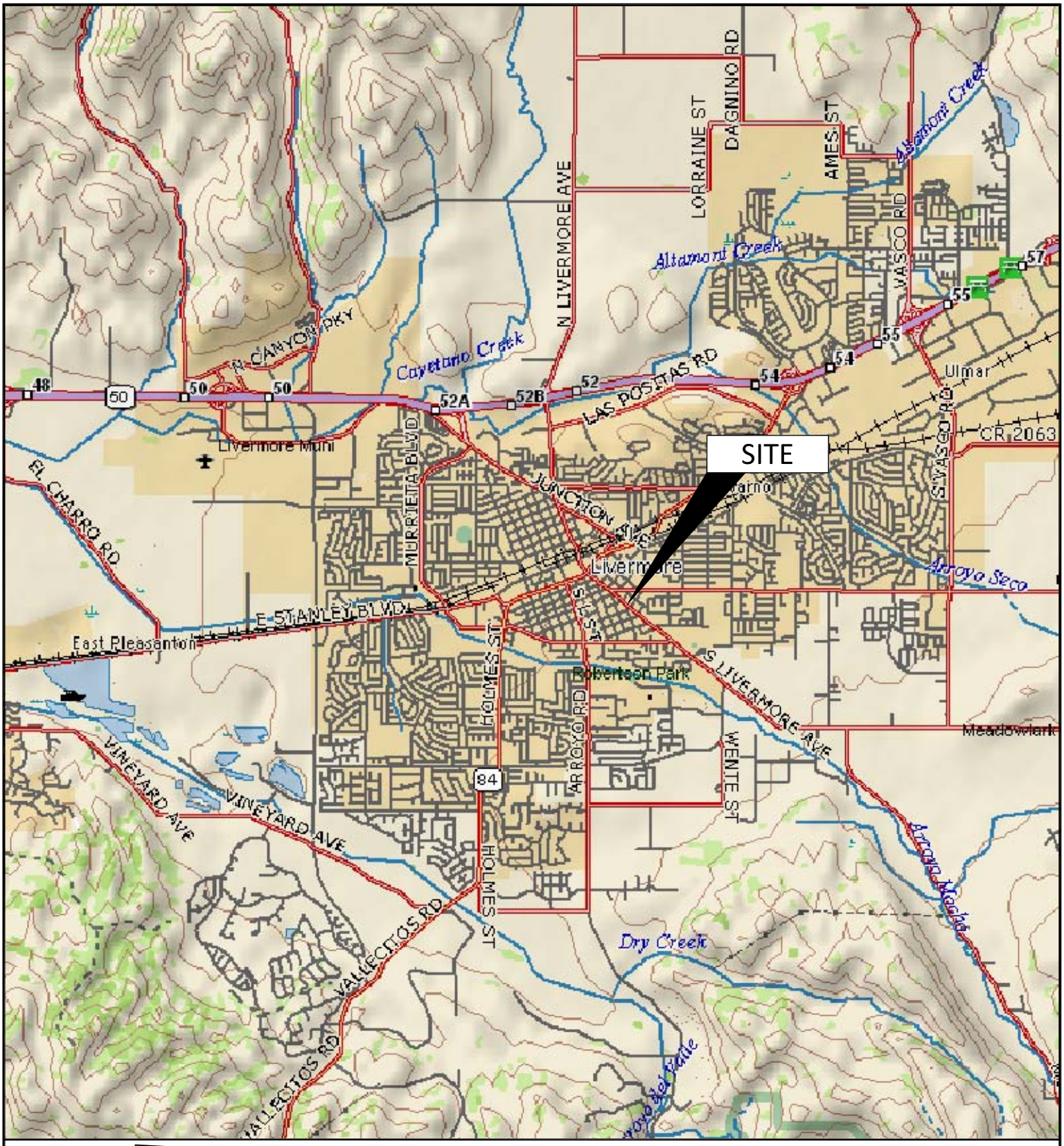
Table 1: Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
Table 2: Summary of Fuel Additives Analytical Data
Table 3: Historic Groundwater Gradient – Direction and Magnitude

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 Receipts

**LIST OF COMMONLY USED ACCRONYMS/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 | $NO_3$: | Nitrate as Nitrogen |
| DRO: | Diesel-Range Organics | ppb: | parts per billion |
| EDB: | 1,2-Dibromomethane | $SO_4$: | 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 |
| $Fe^{2+}$: | Ferrous Iron | µg/L: | micrograms per liter |
| ft/ft: | feet per foot | | |

**DRAWINGS**

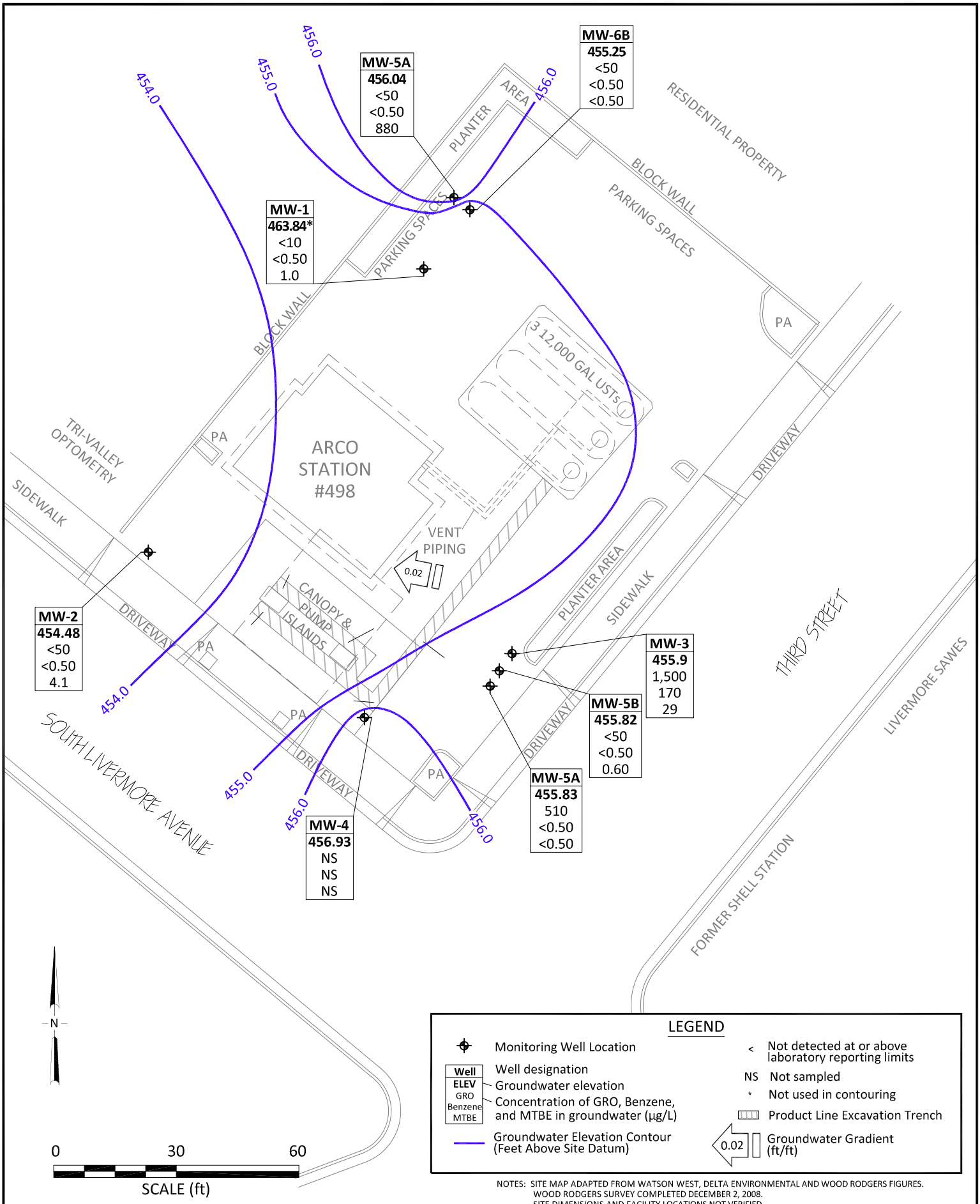



BROADBENT
1370 Ridgewood Dr., Suite 5
Chico, California 95973
Project No.: 08-82-603 Date: 12/3/2012

Station #498
286 South Livermore Avenue
Livermore, California

Site Location Map

Drawing
1




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

BROADBENT
4820 Business Center Drive, Suite 110
Fairfield, CA 94534
Project No.: 08-82-603 Date: 7/31/2014

Station #498
286 South Livermore Avenue
Livermore, California

Groundwater Elevation Contour and Analytical Summary Map
Second Quarter, 2014

Drawing
2

**TABLES**

| Well ID and Date Monitored | P/NP | TOC (feet) | Top of Screen (ft bgs) | Bottom of Screen (ft bgs) | DTW (feet) | Product Thickness (feet) | Water Level Elevation (feet) | Concentrations in µg/L | | | | | | DO (mg/L) | pH | Footnote |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRO/ TPHg | Benzene | Toluene | Ethyl-Benzene | Total Xylenes | MTBE | | | |
| **MW-1** 12/29/2008 | P | 496.72 | 20.00 | 40.00 | 28.81 | 0.00 | 467.91 | 1,100 | 38 | 1.2 | 4.0 | 3.3 | 17 | 2.72 | 6.83 | |
| 3/20/2009 | P | | 20.00 | 40.00 | 28.95 | 0.00 | 467.77 | 640 | 9.1 | <0.50 | 4.1 | <0.50 | 21 | 0.35 | 7.28 | |
| 6/2/2009 | P | | 20.00 | 40.00 | 30.90 | 0.00 | 465.82 | 600 | 1.6 | <0.50 | <0.50 | <0.50 | 32 | 0.59 | 7.17 | |
| 9/2/2009 | P | | 20.00 | 40.00 | 32.00 | 0.00 | 464.72 | 570 | <0.50 | <0.50 | <0.50 | <0.50 | 5.3 | 1.02 | 7.38 | |
| 11/9/2009 | P | | 20.00 | 40.00 | 31.82 | 0.00 | 464.90 | 1,000 | 130 | 12 | 35 | 39 | 140 | 1.39 | 7.02 | |
| 5/20/2010 | P | | 20.00 | 40.00 | 28.94 | 0.00 | 467.78 | 1,000 | 4.4 | <0.50 | 0.76 | 0.73 | 22 | 0.59 | 6.6 | |
| 11/2/2010 | P | | 20.00 | 40.00 | 32.03 | 0.00 | 464.69 | 1,300 | 83 | 20 | 40 | 61 | 39 | 0.72 | 6.0 | b (GRO), c |
| 5/25/2011 | P | | 20.00 | 40.00 | 26.69 | 0.00 | 470.03 | 2,900 | 32 | 3.1 | 20 | 2.9 | <0.50 | 0.68 | 7.0 | lw (GRO) |
| 10/25/2011 | P | | 20.00 | 40.00 | 30.11 | 0.00 | 466.61 | 1,100 | 20 | 3.7 | <0.50 | 5.4 | 21 | 0.78 | 7.4 | lw (GRO) |
| 4/10/2012 | P | | 20.00 | 40.00 | 30.35 | 0.00 | 466.37 | 1,300 | 13 | 2.0 | 7.0 | 7.1 | 5.0 | 0.20 | 6.71 | lw (GRO) |
| 10/9/2012 | NP | | 20.00 | 40.00 | 37.61 | 0.00 | 459.11 | 700 | <0.50 | <0.50 | <0.50 | <1.0 | 3.2 | 2.79 | 7.93 | |
| 4/24/2013 | P | | 20.00 | 40.00 | 29.48 | 0.00 | 467.24 | 1,600 | 87 | 12 | 87 | 15 | 12 | 1.49 | 7.22 | |
| 10/9/2013 | P | | 20.00 | 40.00 | 31.26 | 0.00 | 465.46 | 810 | 12 | 0.90 | 4.3 | 2.6 | 30 | 4.24 | 7.17 | |
| 2/21/2014 | P | | 20.00 | 40.00 | 30.67 | 0.00 | 466.05 | 1,300 | 19 | 3.0 | 30 | 4.2 | 2.5 | 1.23 | 7.22 | |
| **5/21/2014** | **P** | | **20.00** | **40.00** | **32.88** | **0.00** | **463.84** | **710** | **<0.50** | **<0.50** | **<0.50** | **<1.0** | **1.0** | **0.61** | **7.63** | |
| **MW-2** 12/29/2008 | P | 495.35 | 37.00 | 57.00 | 48.76 | 0.00 | 446.59 | 110 | 7.1 | <0.50 | <0.50 | 0.76 | 16 | 1.04 | 7.67 | |
| 3/20/2009 | P | | 37.00 | 57.00 | 38.78 | 0.00 | 456.57 | 200 | 3.9 | <1.0 | <1.0 | <1.0 | 56 | 0.41 | 7.51 | |
| 6/2/2009 | P | | 37.00 | 57.00 | 43.98 | 0.00 | 451.37 | 110 | 5.1 | <1.0 | <1.0 | <1.0 | 44 | 1.87 | 7.42 | |
| 9/2/2009 | P | | 37.00 | 57.00 | 50.25 | 0.00 | 445.10 | 88 | 0.79 | <0.50 | <0.50 | <0.50 | 12 | 1.55 | 6.91 | |
| 11/9/2009 | P | | 37.00 | 57.00 | 43.79 | 0.00 | 451.56 | 58 | 2.0 | <0.50 | <0.50 | <0.50 | 13 | 0.86 | 7.14 | |
| 5/20/2010 | P | | 37.00 | 57.00 | 32.07 | 0.00 | 463.28 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | 27 | 0.61 | 6.8 | |
| 11/2/2010 | P | | 37.00 | 57.00 | 39.23 | 0.00 | 456.12 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | 57 | 1.34 | 6.8 | |
| 5/25/2011 | P | | 37.00 | 57.00 | 28.19 | 0.00 | 467.16 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | 15 | 3.74 | 7.1 | |
| 10/25/2011 | P | | 37.00 | 57.00 | 33.33 | 0.00 | 462.02 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | 5.7 | 1.28 | 7.8 | |
| 4/10/2012 | P | | 37.00 | 57.00 | 39.25 | 0.00 | 456.10 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | 1.1 | 1.04 | 7.13 | |
| 10/9/2012 | P | | 37.00 | 57.00 | 41.84 | 0.00 | 453.51 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 0.60 | 2.76 | 7.71 | |
| 4/24/2013 | P | | 37.00 | 57.00 | 33.17 | 0.00 | 462.18 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 1.1 | 2.51 | 7.53 | |
| 10/9/2013 | P | | 37.00 | 57.00 | 35.23 | 0.00 | 460.12 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 5.9 | 4.30 | 7.46 | |
| 2/21/2014 | P | | 37.00 | 57.00 | 36.49 | 0.00 | 458.86 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 3.6 | 8.05 | 7.17 | |

| Well ID and Date Monitored | P/NP | TOC (feet) | Top of Screen (ft bgs) | Bottom of Screen (ft bgs) | DTW (feet) | Product Thickness (feet) | Water Level Elevation (feet) | Concentrations in µg/L | | | | | | DO (mg/L) | pH | Footnote |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRO/ TPHg | Benzene | Toluene | Ethyl-Benzene | Total Xylenes | MTBE | | | |
| **MW-2 Cont.** | | | | | | | | | | | | | | | | |
| **5/21/2014** | **P** | **495.35** | **37.00** | **57.00** | **40.87** | **0.00** | **454.48** | **<50** | **<0.50** | **<0.50** | **<0.50** | **<1.0** | **4.1** | **674** | **7.67** | |
| **MW-3** 12/29/2008 | P | 496.32 | 37.00 | 57.00 | 48.21 | 0.00 | 448.11 | 28,000 | 310 | 200 | 840 | 6,200 | 71 | 1.95 | 7.39 | |
| 3/20/2009 | P | | 37.00 | 57.00 | 38.48 | 0.00 | 457.84 | 11,000 | 360 | 84 | 600 | 1,500 | 71 | 0.56 | 7.25 | |
| 6/2/2009 | P | | 37.00 | 57.00 | 43.33 | 0.00 | 452.99 | 5,100 | 310 | 14 | 180 | 310 | 66 | 2.06 | 7.18 | a |
| 9/2/2009 | P | | 37.00 | 57.00 | 49.60 | 0.00 | 446.72 | 25,000 | 380 | 150 | 930 | 2,900 | 75 | 1.35 | 6.93 | |
| 11/9/2009 | P | | 37.00 | 57.00 | 43.25 | 0.00 | 453.07 | 6,900 | 390 | 27 | 480 | 680 | 69 | 0.54 | 6.9 | |
| 5/20/2010 | P | | 37.00 | 57.00 | 31.56 | 0.00 | 464.76 | 9,400 | 690 | <10 | 300 | 83 | 77 | 0.36 | 6.8 | |
| 11/2/2010 | P | | 37.00 | 57.00 | 38.68 | 0.00 | 457.64 | 4,400 | 420 | <10 | 110 | 33 | 70 | 0.59 | 6.8 | b (GRO) |
| 5/25/2011 | P | | 37.00 | 57.00 | 27.56 | 0.00 | 468.76 | 4,500 | 560 | <10 | 210 | 22 | 74 | 0.70 | 9.8 | lw (GRO) |
| 10/25/2011 | P | | 37.00 | 57.00 | 32.77 | 0.00 | 463.55 | 2,700 | 190 | <4.0 | 82 | 51 | 33 | 0.69 | 7.6 | |
| 4/10/2012 | P | | 37.00 | 57.00 | 38.69 | 0.00 | 457.63 | 3,000 | 440 | <4.0 | 69 | 10 | 46 | 0.28 | 6.57 | lw (GRO) |
| 10/9/2012 | P | | 37.00 | 57.00 | 41.19 | 0.00 | 455.13 | 1,600 | 210 | <2.0 | 28 | 7.4 | 33 | 1.23 | 7.39 | |
| 4/24/2013 | P | | 37.00 | 57.00 | 32.52 | 0.00 | 463.80 | 3,500 | 960 | 3.6 | 110 | 6.0 | 89 | 1.15 | 7.21 | |
| 10/9/2013 | P | | 37.00 | 57.00 | 34.59 | 0.00 | 461.73 | <50 | 390 | <2.5 | 33 | <5.0 | 94 | 4.12 | 7.27 | |
| 2/21/2014 | P | | 37.00 | 57.00 | 36.03 | 0.00 | 460.29 | 2,000 | 210 | <2.0 | 27 | <4.0 | 44 | 2.03 | 7.41 | |
| **5/21/2014** | **P** | | **37.00** | **57.00** | **40.41** | **0.00** | **455.91** | **1,500** | **170** | **1.0** | **15** | **<2.0** | **29** | **0.50** | **7.52** | |
| **MW-4** 12/29/2008 | -- | 496.01 | 20.00 | 40.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | Dry |
| 3/20/2009 | P | | 20.00 | 40.00 | 37.82 | 0.00 | 458.19 | 410 | 0.78 | <0.50 | <0.50 | 0.64 | 16 | 0.52 | 7.16 | |
| 6/2/2009 | -- | | 20.00 | 40.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | Dry |
| 9/2/2009 | -- | | 20.00 | 40.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | Dry |
| 11/9/2009 | -- | | 20.00 | 40.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | Dry |
| 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 | |
| 10/9/2012 | -- | | 20.00 | 40.00 | 39.86 | 0.00 | 456.15 | -- | -- | -- | -- | -- | -- | -- | -- | d |

| Well ID and Date Monitored | P/NP | TOC (feet) | Top of Screen (ft bgs) | Bottom of Screen (ft bgs) | DTW (feet) | Product Thickness (feet) | Water Level Elevation (feet) | Concentrations in µg/L | | | | | | DO (mg/L) | pH | Footnote |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | GRO/ TPHg | Benzene | Toluene | Ethyl-Benzene | Total Xylenes | MTBE | | | |
| **MW-4 Cont.** | | | | | | | | | | | | | | | | |
| 4/24/2013 | P | 496.01 | 20.00 | 40.00 | 32.50 | 0.00 | 463.51 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | 1.2 | 1.32 | 7.01 | |
| 10/9/2013 | P | | 20.00 | 40.00 | 34.77 | 0.00 | 461.24 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | 4.14 | 6.98 | |
| 2/21/2014 | P | | 20.00 | 40.00 | 35.88 | 0.00 | 460.13 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | 2.33 | 6.76 | |
| **5/21/2014** | **--** | | **20.00** | **40.00** | **39.08** | **0.00** | **456.93** | **--** | **--** | **--** | **--** | **--** | **--** | **--** | **--** | |
| **MW-5A** 2/21/2014 | P | 495.98 | 40.00 | 50.00 | 36.17 | 0.00 | 459.81 | 840 | 3.1 | <0.50 | 19 | 15 | 3.1 | 2.39 | 7.19 | |
| **5/21/2014** | **P** | | 40.00 | 50.00 | **40.15** | **0.00** | **455.83** | **510** | **<0.50** | **<0.50** | **<0.50** | **<1.0** | **<0.50** | **0.51** | **7.46** | |
| **MW-5B** 2/21/2014 | P | 496.04 | 56.00 | 66.00 | 35.84 | 0.00 | 460.20 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | 8.42 | 7.65 | |
| **5/21/2014** | **P** | | 56.00 | 66.00 | **40.22** | **0.00** | **455.82** | **<50** | **<0.50** | **<0.50** | **<0.50** | **<1.0** | **0.60** | **1.74** | **7.62** | |
| **MW-6A** 2/21/2014 | P | 496.69 | 40.00 | 50.00 | 37.40 | 0.00 | 459.29 | <50 | <5.0 | <5.0 | <5.0 | <10 | 780 | 9.15 | 7.36 | |
| **5/21/2014** | **P** | | 40.00 | 50.00 | **40.65** | **0.00** | **456.04** | **<50** | **<5.0** | **<5.0** | **<5.0** | **<10** | **880** | **0.57** | **7.64** | |
| **MW-6B** 2/21/2014 | P | 496.89 | 60.00 | 70.00 | 37.26 | 0.00 | 459.63 | <50 | <0.50 | <0.50 | <0.50 | <1.0 | <0.50 | 5.81 | 7.36 | |
| **5/21/2014** | **P** | | 60.00 | 70.00 | **41.64** | **0.00** | **455.25** | **<50** | **<0.50** | **<0.50** | **<0.50** | **<1.0** | **<0.50** | **2.43** | **7.57** | |

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

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 ag

**Table 2. Summary of Fuel Additives Analytical Data**

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

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

**Table 2. Summary of Fuel Additives Analytical Data**

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

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

**Table 2. Summary of Fuel Additives Analytical Data**

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

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

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

**Table 3. Summary of Groundwater Gradient - Direction and Magnitude**
**ARCO Service Station #498, 286 South Livermore Avenue, Livermore, CA**

| Date Measured | Approximate Gradient Direction | Approximate Gradient Magnitude (ft/ft) |
|---|---|---|
| 12/29/2008 | NA | NA |
| 3/20/2009 | North-Northwest | 0.02 |
| 6/2/2009 | NA | NA |
| 9/2/2009 | NA | NA |
| 11/9/2009 | NA | NA |
| 5/20/2010 | West-Northwest | 0.02 |
| 11/2/2010 | West-Northwest | 0.02 |
| 5/25/2011 | West-Northwest | 0.02 |
| 10/25/2011 | West-Northwest | 0.02 |
| 4/10/2012 | West-Northwest | 0.01 |
| 10/9/2012 | West-Northwest | 0.02 |
| 4/24/2013 | West-Northwest | 0.02 |
| 10/09/2013 | West-Northwest | 0.02 |
| 05/21/2014 | **West-Northwest** | 0.02 |

Symbols & Abbreviations:
NA = Not Available

**APPENDIX A**

FIELD METHODS

**QUALITY ASSURANCE/QUALITY CONTROL**
**FIELD METHODS**

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

## 1.0 Equipment Calibration

Equipment calibration was performed per equipment manufacturer specifications before use.

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

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

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

## 3.0 Well Purging and Groundwater Sample Collection

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

## 3.1 Purging a Predetermined Well Volume

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

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

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

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

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

## 3.2 Low-Flow Purging and Sampling

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

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

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

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

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

### 3.3 Minimal Purge, Discrete Depth, and Passive Sampling

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

---

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

## 4.0 Decontamination

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

## 5.0 Sample Containers, Labeling, and Storage

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

## 6.0 Chain of Custody Record and Procedure

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

## 7.0 Field Records

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

**APPENDIX B**

FIELD DATA SHEETS AND NON-HAZARDOUS WASTE DATA FORM

BROADBENT

# DAILY REPORT

Page ____ of ____

Project: BP 498 Project No.: 06-82-603

Field Representative(s): JR/SJ Day: ~~Tuesday~~ Wednesday Date: 5/21/14

Time Onsite: From: 0730 To: 1400; From: ____ To: ____; From: ____ To: ____

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

Weather: sunny; 79°F

Equipment In Use: Hornibrg, bladder, water level meter

Visitors: ____

| TIME: | WORK DESCRIPTION: |
|---|---|
| 0730 | Arrived onsite; proceeded w/safety meeting |
| | & tail gate meeting |
| 0810 | Completed safety meeting; proceeded to |
| 0814 | Setup at MW-4; well contains very little water-no sample |
| 0832 | Setup at MW-2 |
| 0930 | Setup at MW-1, MW-6A, MW-6B |
| 1135 | Finish sampling MW-1, MW-6A, MW-6B, |
| | took Lunch |
| 1205 | Return from lunch, Setup at MW-3, MW-5A, MW-5B |
| 1400 | Completed Sampling; cleaned up/packed & |
| | left site |

Signature: [signature]

BROADBENT

# GROUNDWATER MONITORING SITE SHEET

Page _____ of _____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: JR/SJ Elevation: _____

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

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

| WELL ID RECORD | | | | | WELL GAUGING RECORD | | | | | LAB ANALYSES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Well Sampling Order | As-Built Well Diameter (inches) | As-Built Well Screen Interval (ft) | Previous Depth to Water (ft) | Time (24:00) | Depth to LNAPL (ft) | Apparent LNAPL Thickness (ft)* | Depth to Water (ft) | Well Total Depth (ft) | | | | | | |
| MW-1 | | | | | 0935 | | | 32.86 | 40.30 | | | | | | |
| MW-2 | | | | | 0837 | | | 40.87 | 57.18 | | | | | | |
| MW-3 | | | | | 1218 | | | 40.41 | 55.43 | | | | | | |
| MW-4 | | | | | 0820 | | | 39.68 | 40.02 | | | | | | |
| MW-5A | | | | | 1225 | | | 40.15 | 49.65 | | | | | | |
| MW-5B | | | | | 1223 | | | 40.27 | 56.00 | | | | | | |
| MW-6A | | | | | 1015 | | | 40.65 | 49.57 | | | | | | |
| MW-6B | | | | | 1017 | | | 41.64 | [redacted] 100.0 | | | | | | |

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

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

Signature: _____

Revision: 1/24/2012

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-1 Start Time: _____ End Time: _____ Total Time (minutes): _____

PURGE EQUIPMENT ___ Disp. Bailer ___ 120V Pump X Flow Cell

X Disp. Tubing ___ 12V Pump ___ Peristaltic Pump Other/ID#: Bladder Pump

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

Good Improvement Needed *(circle one)*

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

## PREDETERMINED WELL VOLUME

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

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

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

Total Well Depth (a): _____ (ft)

Initial Depth to Water (b): _____ (ft)

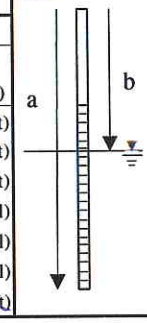
Water Column Height (WCH) = (a - b): _____ (ft)

Water Column Volume (WCV) = WCH x Unit Volume: _____ (gal)

Three Casing Volumes = WCV x 3: _____ (gal)

Five Casing Volumes = WCV x 5: _____ (gal)

Pump Depth (if pump used): _____ (ft)




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)

Total Well Depth (a): 40.20 (ft)

Initial Depth to Water (b): 32.88 (ft)

Pump In-take Depth = b + (a-b)/2: 36.59 (ft)

Maximum Allowable Drawdown = (a-b)/8: 0.92 (ft)

Low-Flow Purge Rate: 0.25 (Lpm)*

Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 0946 | 0.0 | 21.93 | 7.56 | 0.828 | 2.57 | -207 | 1000.0 | |
| 0948 | 0.5 | 21.05 | 7.56 | 0.811 | 1.10 | -211 | 758 | |
| 0950 | 1.0 | 21.03 | 7.62 | 0.808 | 0.97 | -211 | 589 | |
| 0952 | 1.5 | 20.82 | 7.55 | 0.808 | 0.72 | -212 | 301 | |
| 0954 | 2.0 | 20.76 | 7.63 | 0.808 | 0.61 | -214 | 162 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

___ Other:

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 34.17 (ft)

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

X Disp. Pump Tubing Other:

Sample ID: MW-1 Sample Collection Time: 0955 (24:00)

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

___ Other: _____ ___ Other: _____

___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: James Ramos

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-2 Start Time: _____ End Time: _____ Total Time (minutes): _____

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

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

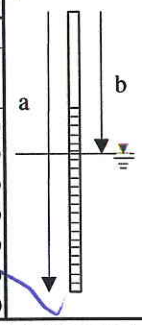
**PURGING/SAMPLING METHOD** Predetermined Well Volume Low-Flow X Other: *(circle one)*

## PREDETERMINED WELL VOLUME

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

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:
4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ____" | (____)

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




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)
Total Well Depth (a): 57.18 (ft)
Initial Depth to Water (b): 40.87 (ft)
Pump In-take Depth = b + (a-b)/2: 49.03 (ft)
Maximum Allowable Drawdown = (a-b)/8: 2.04 (ft)
Low-Flow Purge Rate: 0.25 (Lpm)*
Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 0853 | 0.0 | 19.87 | 7.67 | 1.05 | 0.673 | -32 | 49.7 | |
| 0855 | 0.5 | 19.78 | 7.61 | 1.05 | 0.673 | -28 | 43.4 | |
| 0857 | 1.0 | 19.79 | 7.61 | 1.05 | 0.673 | -29 | ~~39~~ 41.8 | |
| 0859 | 1.5 | 19.83 | 7.67 | 1.05 | 0.673 | -30 | 45.0 | |
| 0901 | 2.0 | 19.82 | 7.67 | 1.05 | 0.674 | -28 | 40.9 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 40.98 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-2 Sample Collection Time: 0905 (24:00)
Containers (#): X VOA ( 6 preserved or ___ unpreserved) ___ Liter Amber
___ Other: _____ ___ Other: _____
___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-3 Start Time: _____ End Time: _____ Total Time (minutes): _____

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

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

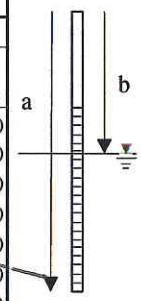
PURGING/SAMPLING METHOD Predetermined Well Volume Low-Flow X Other: *(circle one)*

## PREDETERMINED WELL VOLUME

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

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:
4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ____" | (____)

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




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)
Total Well Depth (a): ~~55.43~~ (ft)
Initial Depth to Water (b): 40.61 (ft)
Pump In-take Depth = b + (a-b)/2: ~~48.30~~ (ft)
Maximum Allowable Drawdown = (a-b)/8: 1.88 ~~1.85~~ (ft)
Low-Flow Purge Rate: 0.25 (Lpm)*
Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or ~~mS~~ | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 1237 | 0.0 | 24.15 | 7.56 | 0.969 | 2.29 | -212 | 0.0 | |
| 1239 | 0.5 | 22.66 | 7.50 | 0.999 | 1.30 | -219 | 0.0 | |
| 1241 | 1.0 | 22.12 | 7.50 | 0.999 | 1.00 | -221 | 0.0 | |
| 1243 | 1.5 | 21.54 | 7.49 | 1.01 | 0.56 | -228 | 0.0 | |
| 1245 | 2.0 | 21.41 | 7.52 | 1.00 | 0.50 | -229 | 0.0 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 40.80 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-3 Sample Collection Time: 1245 (24:00)
Containers (#): X VOA ( 6 preserved or ___ unpreserved) ___ Liter Amber
___ Other: _____ ___ Other: _____
___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-5A Start Time: _____ End Time: _____ Total Time (minutes): _____

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

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

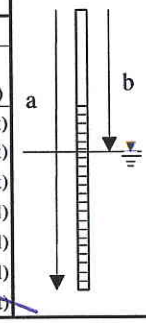
PURGING/SAMPLING METHOD Predetermined Well Volume Low-Flow Other: *(circle one)*

## PREDETERMINED WELL VOLUME

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

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:
4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ____" | (____)

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




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)
Total Well Depth (a): 49.65 ~~50.00~~ (ft)
Initial Depth to Water (b): 40.15 (ft)
Pump In-take Depth = b + (a-b)/2: 45.03 (ft)
Maximum Allowable Drawdown = (a-b)/8: 1.16 (ft)
Low-Flow Purge Rate: 0.25 (Lpm)*
Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 1325 | 0.0 | 23.91 | 7.51 | 1.06 | 6.13 | -133 | >1000.0 | |
| 1327 | 0.5 | 22.57 | 7.51 | 1.06 | 2.15 | -137 | >1000.0 | |
| 1329 | 1.0 | 22.07 | 7.46 | 1.05 | 1.11 | -144 | >1000.0 | |
| 1331 | 1.5 | 21.67 | 7.46 | 1.04 | 0.64 | -149 | 698 | |
| 1333 | 2.0 | 21.52 | 7.46 | 1.04 | 0.51 | -148 | 299 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 41.25 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-5A Sample Collection Time: 1335 (24:00)
Containers (#): X VOA ( 6 preserved or ___ unpreserved) ___ Liter Amber
___ Other: _____ ___ Other: _____
___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-5B Start Time: _____ End Time: _____ Total Time (minutes): _____

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

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

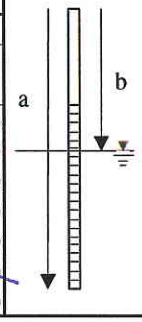
PURGING/SAMPLING METHOD Predetermined Well Volume X Low Flow Other: *(circle one)*

## PREDETERMINED WELL VOLUME

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

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:
4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ____" | (____)

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




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)
Total Well Depth (a): 60.00 (ft)
Initial Depth to Water (b): 40.22 (ft)
Pump In-take Depth = b + (a-b)/2: 48.11 (ft)
Maximum Allowable Drawdown = (a-b)/8: 1.97 (ft)
Low-Flow Purge Rate: 0.25 (Lpm)*
Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 1301 | 0.0 | 23.41 | 7.59 | 1.02 | 2.17 | -116 | 26.9 | |
| 1303 | 0.5 | 22.20 | 7.53 | 1.01 | 1.13 | -117 | 9.6 | |
| 1305 | 1.0 | 21.53 | 7.52 | 1.01 | 0.84 | -116 | 8.3 | |
| 1307 | 1.5 | 21.36 | 7.56 | 1.03 | 1.25 | -114 | 9.0 | |
| 1309 | 2.0 | 21.14 | 7.62 | 1.04 | 1.74 | -110 | 12.5 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 40.22 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-5B Sample Collection Time: 1310 (24:00)
Containers (#): X VOA (6 preserved or ___ unpreserved) ___ Liter Amber
___ Other: _____ ___ Other: _____
___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page ____ of ____

Project: BP 498 Project No.: 08-82-608 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-6A Start Time: _____ End Time: _____ Total Time (minutes): _____

**PURGE EQUIPMENT** ___ Disp. Bailer ___ 120V Pump X Flow Cell

X Disp. Tubing ___ 12V Pump ___ Peristaltic Pump Other/ID#: Bladder

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

Good Improvement Needed *(circle one)*

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

## PREDETERMINED WELL VOLUME

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

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

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

Total Well Depth (a): _____ (ft)

Initial Depth to Water (b): _____ (ft)

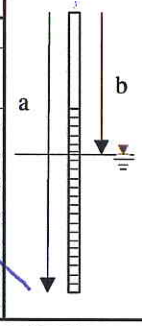
Water Column Height (WCH) = (a - b): _____ (ft)

Water Column Volume (WCV) = WCH x Unit Volume: _____ (gal)

Three Casing Volumes = WCV x 3: _____ (gal)

Five Casing Volumes = WCV x 5: _____ (gal)

Pump Depth (if pump used): _____ (ft)




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)

Total Well Depth (a): 49.57 ~~0.00~~ (ft)

Initial Depth to Water (b): 40.68 (ft)

Pump In-take Depth = b + (a-b)/2: 45.11 (ft)

Maximum Allowable Drawdown = (a-b)/8: 1.12 (ft)

Low-Flow Purge Rate: 0.25 (Lpm)*

Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 1036 | 0.0 | 22.37 | 7.63 | 1.41 | 2.71 | -46 | >1,000 | |
| 1038 | 0.5 | 21.23 | 7.62 | 1.43 | 1.47 | -51 | >1,000 | |
| 1040 | 1.0 | 20.79 | 7.56 | 1.40 | 0.76 | -61 | >1,000 | |
| 1042 | 1.5 | 20.71 | 7.59 | 1.39 | 0.70 | -64 | >1,000 | |
| 1044 | 2.0 | 20.71 | 7.64 | 1.37 | 0.57 | -71 | >1,000 | |
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| Previous Stabilized Parameters | | | | | | | | |

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

___ Other:

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 42.05 (ft)

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

X Disp. Pump Tubing Other:

Sample ID: MW-6A Sample Collection Time: 1045 (24:00)

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

___ Other: _____ ___ Other: _____

___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

BROADBENT

# GROUNDWATER SAMPLING DATA SHEET

Page _____ of _____

Project: BP 498 Project No.: 08-82-603 Date: 5/21/14

Field Representative: SJ + JR

Well ID: MW-6B Start Time: _____ End Time: _____ Total Time (minutes): _____

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

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

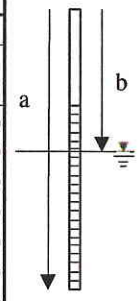
PURGING/SAMPLING METHOD Predetermined Well Volume Low-Flow Other: *(circle one)*

## PREDETERMINED WELL VOLUME

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

1" | (0.04) 1.25" | (0.08) 2" | (0.17) 3" | (0.38) Other:
4" | (0.66) 6" | (1.50) 8" | (2.60) 12" | (5.81) ____" | (____)

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




## LOW-FLOW

Previous Low-Flow Purge Rate: _____ (lpm)
Total Well Depth (a): 60.00 (ft)
Initial Depth to Water (b): 41.64 (ft)
Pump In-take Depth = b + (a-b)/2: 50.82 (ft)
Maximum Allowable Drawdown = (a-b)/8: 2.30 (ft)
Low-Flow Purge Rate: 0.25 (Lpm)*
Comments: _____

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

## GROUNDWATER STABILIZATION PARAMETER RECORD

| Time (24:00) | Cumulative Vol. gal or L | Temperature °C | pH | Conductivity µS or mS | DO mg/L | ORP mV | Turbidity NTU | NOTES Odor, color, sheen or other |
|---|---|---|---|---|---|---|---|---|
| 1105 | 0.0 | 23.41 | 7.56 | 1.09 | 3.41 | -46 | 66.2 | |
| 1107 | 0.5 | 22.01 | 7.49 | 1.08 | 2.97 | -38 | 22.7 | |
| 1109 | 1.0 | 22.04 | 7.50 | 1.07 | 2.56 | -38 | 8.8 | |
| 1111 | 1.5 | 20.77 | 7.57 | 1.07 | 2.43 | -42 | 6.5 | |
| 1113 | 2.0 | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| Previous Stabilized Parameters | | | | | | | | |

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

## SAMPLE COLLECTION RECORD

Depth to Water at Sampling: 41.65 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
___ Disp. Pump Tubing Other:
Sample ID: MW-6B Sample Collection Time: 1115 (24:00)
Containers (#): X VOA ( 6 preserved or ___ unpreserved) ___ Liter Amber
___ Other: _____ ___ Other: _____
___ Other: _____ ___ Other: _____

## GEOCHEMICAL PARAMETERS

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

Signature: _____

Revision: 3/15/2013

# Laboratory Management Program LaMP Chain of Custody Record

Page ____ of ____

BP Site Node Path: 08-82-603 | Req Due Date (mm/dd/yy): ____ | Rush TAT: Yes ____ No ____

BP Facility No: 498 | Lab Work Order Number: ____

| | | |
|---|---|---|
| Lab Name: Test America | Facility Address: 286 South Livermore Ave. | Consultant/Contractor: Broadbent and Associates, Inc. |
| Lab Address: 17461 Derian Avenue Suite #100, Irvine, CA 92614 | City, State, ZIP Code: Livermore, CA | Consultant/Contractor Project No: 08-82-603 |
| Lab PM: Kathleen Robb | Lead Regulatory Agency: ACEH | Address: 1370 Ridgewood Drive, Suite 5, Chico, CA 95973 |
| Lab Phone: 949-261-1022 | California Global ID No.: T0600124081 | Consultant/Contractor PM: Jason Duda |
| Lab Shipping Accnt: 1103-6633-7 | Enfos Proposal No: 0056X-0005 / WR 273478 | Phone: 530-566-1400 Fax: 530-566-1401 |
| Lab Bottle Order No: | Accounting Mode: Provision X OOC-BU ____ OOC-RM ____ | Email EDD To: jduda@broadbentinc.com and to lab.enfosdoc@bp.com |
| Other Info: | Stage: Execute (40) Activity: Project Spend (80) | Invoice To: BP x Contractor ____ |

BP Project Manager (PM): Chuck Carmel

BP PM Phone: 925-275-3804

BP PM Email: chuck.carmel@bp.com

Report Type & QC Level: Standard x; Full Data Package ____

| Lab No. | Sample Description | Time | Date | Time | Soil / Solid | Water / Liquid | Air / Vapor | Is this location a well? | Total Number of Container | Unpreserved | H2SO4 | HNO3 | HCl | Methanol | | GRO by 8015M | BTEX, 5 FO + EDB by 8260 | Ethanol & 1,2-DCA by 8260 | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Time | | | Matrix | | | | No. Containers / Preservative | | | | | | | Requested Analyses | | | |
| | MW-1 | 0955 | 5/21/14 | ~~0935~~ | | x | | y | 6 | | | | x | | | x | x | x | Correct times to left of Date Column |
| | MW-2 | 0905 | 5/21/14 | ~~0850~~ | | x | | y | 6 | | | | x | | | x | x | x | |
| | MW-3 | 1245 | 5/21/14 | ~~1210~~ | | x | | y | 6 | | | | x | | | x | x | x | |
| | ~~MW-4~~ | DRY NO SAMPLE | ~~5/21/14~~ | 0820 | DRY | | | y | 6 | | | | x | | | x | x | x | Dry well No Sample |
| | ~~MW-5A~~ | 1335 | 5/21/14 | ~~1225~~ | | x | | y | 6 | | | | x | | | x | x | x | |
| | MW-5B | | 5/21/14 | 1310 | | x | | y | 6 | | - | | x | | | x | x | x | times are Correct |
| | MW-6A | | 5/21/14 | 1045 | | x | | y | 6 | | | | x | | | x | x | x | |
| | MW-6B | | 5/21/14 | 1115 | | x | | y | 6 | | | | x | | | x | x | x | |
| | TB-498-05212014 | | -- | -- | | x | | n | 2 | | | | x | | | | | | On Hold |

| Sampler's Name: Sarah Jones + Jaime Ramos | Relinquished By / Affiliation | Date | Time | Accepted By / Affiliation | Date | Time |
|---|---|---|---|---|---|---|
| Sampler's Company: Broadbent and Associates | Sarah Jones | 5/21/14 | 1530 | | | |
| Shipment Method: Fed Ex Ship Date: 5/21/14 | | | | | | |
| Shipment Tracking No: | | | | | | |

Special Instructions:

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

**APPENDIX C**

LABORATORY REPORT
AND CHAIN-OF-CUSTODY DOCUMENTATION

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

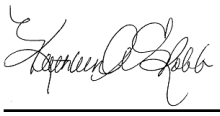
# ANALYTICAL REPORT

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

TestAmerica Job ID: 440-79190-1
Client Project/Site: ARCO 0498, Livermore

For:
Broadbent & Associates, Inc.
1370 Ridgewood Drive
Suite 5
Chico, California 95973

Attn: Mr. Jason Duda



*Authorized for release by:*
*6/2/2014 3:49:34 PM*

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

# Table of Contents

# Sample Summary

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

TestAmerica Job ID: 440-79190-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 440-79190-1 | MW-1 | Water | 05/21/14 09:55 | 05/22/14 14:22 |
| 440-79190-2 | MW-2 | Water | 05/21/14 09:05 | 05/22/14 14:22 |
| 440-79190-3 | MW-3 | Water | 05/21/14 12:45 | 05/22/14 14:22 |
| 440-79190-4 | MW-5A | Water | 05/21/14 13:35 | 05/22/14 14:22 |
| 440-79190-5 | MW-5B | Water | 05/21/14 13:10 | 05/22/14 14:22 |
| 440-79190-6 | MW-6A | Water | 05/21/14 10:45 | 05/22/14 14:22 |
| 440-79190-7 | MW-6B | Water | 05/21/14 11:15 | 05/22/14 14:22 |

## Job ID: 440-79190-1

**Laboratory: TestAmerica Irvine**

**Narrative**

**Job Narrative**
**440-79190-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 5/22/2014 9:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 5.6° C.

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

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

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

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-1**
**Date Collected: 05/21/14 09:55**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-1**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 11:50 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 11:50 | 1 |
| **Methyl-t-Butyl Ether (MTBE)** | **1.0** | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| **tert-Butyl alcohol (TBA)** | **12** | | 10 | | ug/L | | | 05/28/14 11:50 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 11:50 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 11:50 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *105* | | *80 - 120* | | *05/28/14 11:50* | *1* |
| *Dibromofluoromethane (Surr)* | *98* | | *76 - 132* | | *05/28/14 11:50* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *80 - 128* | | *05/28/14 11:50* | *1* |

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **GRO (C6-C12)** | **710** | | 50 | | ug/L | | | 06/01/14 01:20 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *135* | | *65 - 140* | | *06/01/14 01:20* | *1* |

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-2**
**Date Collected: 05/21/14 09:05**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-2**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 13:19 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 13:19 | 1 |
| **Methyl-t-Butyl Ether (MTBE)** | **4.1** | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 13:19 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 13:19 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 13:19 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *100* | | *80 - 120* | | *05/28/14 13:19* | *1* |
| *Dibromofluoromethane (Surr)* | *92* | | *76 - 132* | | *05/28/14 13:19* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *80 - 128* | | *05/28/14 13:19* | *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 | | | 06/01/14 01:46 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *115* | | *65 - 140* | | *06/01/14 01:46* | *1* |

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-3**
**Date Collected: 05/21/14 12:45**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-3**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| 1,2-Dichloroethane | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| **Benzene** | **170** | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| Ethanol | ND | | 300 | | ug/L | | | 05/29/14 00:59 | 2 |
| **Ethylbenzene** | **15** | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| Ethyl-t-butyl ether (ETBE) | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| Isopropyl Ether (DIPE) | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| m,p-Xylene | ND | | 2.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| **Methyl-t-Butyl Ether (MTBE)** | **29** | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| o-Xylene | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| Tert-amyl-methyl ether (TAME) | ND | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| **tert-Butyl alcohol (TBA)** | **46** | | 20 | | ug/L | | | 05/29/14 00:59 | 2 |
| **Toluene** | **1.0** | | 1.0 | | ug/L | | | 05/29/14 00:59 | 2 |
| Xylenes, Total | ND | | 2.0 | | ug/L | | | 05/29/14 00:59 | 2 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *105* | | *80 - 120* | | *05/29/14 00:59* | *2* |
| *Dibromofluoromethane (Surr)* | *90* | | *76 - 132* | | *05/29/14 00:59* | *2* |
| *Toluene-d8 (Surr)* | *109* | | *80 - 128* | | *05/29/14 00:59* | *2* |

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **GRO (C6-C12)** | **1500** | | 500 | | ug/L | | | 06/01/14 02:12 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *118* | | *65 - 140* | | *06/01/14 02:12* | *10* |

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-5A**
**Date Collected: 05/21/14 13:35**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-4**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 13:48 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 13:48 | 1 |
| Methyl-t-Butyl Ether (MTBE) | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 13:48 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 13:48 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 13:48 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *103* | | *80 - 120* | | *05/28/14 13:48* | *1* |
| *Dibromofluoromethane (Surr)* | *101* | | *76 - 132* | | *05/28/14 13:48* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *80 - 128* | | *05/28/14 13:48* | *1* |

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **GRO (C6-C12)** | **510** | | 50 | | ug/L | | | 06/01/14 02:38 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *114* | | *65 - 140* | | *06/01/14 02:38* | *1* |

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-5B**
**Date Collected: 05/21/14 13:10**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-5**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 14:18 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 14:18 | 1 |
| **Methyl-t-Butyl Ether (MTBE)** | **0.60** | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 14:18 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 14:18 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 14:18 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *102* | | *80 - 120* | | *05/28/14 14:18* | *1* |
| *Dibromofluoromethane (Surr)* | *100* | | *76 - 132* | | *05/28/14 14:18* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *80 - 128* | | *05/28/14 14:18* | *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 | | | 06/01/14 03:04 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *113* | | *65 - 140* | | *06/01/14 03:04* | *1* |

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

TestAmerica Job ID: 440-79190-1

**Client Sample ID: MW-6A**
**Date Collected: 05/21/14 10:45**
**Date Received: 05/22/14 14:22**

**Lab Sample ID: 440-79190-6**
**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| 1,2-Dichloroethane | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Benzene | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Ethanol | ND | | 1500 | | ug/L | | | 05/28/14 15:47 | 10 |
| Ethylbenzene | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Ethyl-t-butyl ether (ETBE) | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Isopropyl Ether (DIPE) | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| m,p-Xylene | ND | | 10 | | ug/L | | | 05/28/14 15:47 | 10 |
| **Methyl-t-Butyl Ether (MTBE)** | **880** | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| o-Xylene | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Tert-amyl-methyl ether (TAME) | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| **tert-Butyl alcohol (TBA)** | **130** | | 100 | | ug/L | | | 05/28/14 15:47 | 10 |
| Toluene | ND | | 5.0 | | ug/L | | | 05/28/14 15:47 | 10 |
| Xylenes, Total | ND | | 10 | | ug/L | | | 05/28/14 15:47 | 10 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *102* | | *80 - 120* | | *05/28/14 15:47* | *10* |
| *Dibromofluoromethane (Surr)* | *108* | | *76 - 132* | | *05/28/14 15:47* | *10* |
| *Toluene-d8 (Surr)* | *97* | | *80 - 128* | | *05/28/14 15:47* | *10* |

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| GRO (C6-C12) | ND | | 50 | | ug/L | | | 06/01/14 03:29 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *111* | | *65 - 140* | | *06/01/14 03:29* | *1* |

**Client Sample ID: MW-6B**
**Lab Sample ID: 440-79190-7**
**Date Collected: 05/21/14 11:15**
**Matrix: Water**
**Date Received: 05/22/14 14:22**

**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 | | | 05/28/14 14:48 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 14:48 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 14:48 | 1 |
| Methyl-t-Butyl Ether (MTBE) | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 14:48 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 14:48 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 14:48 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *104* | | *80 - 120* | | *05/28/14 14:48* | *1* |
| *Dibromofluoromethane (Surr)* | *104* | | *76 - 132* | | *05/28/14 14:48* | *1* |
| *Toluene-d8 (Surr)* | *94* | | *80 - 128* | | *05/28/14 14:48* | *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 | | | 06/01/14 03:55 | 1 |

| *Surrogate* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *110* | | *65 - 140* | | *06/01/14 03:55* | *1* |

# Method Summary

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

TestAmerica Job ID: 440-79190-1

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

**Protocol References:**

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

**Laboratory References:**

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

**Client Sample ID: MW-1** **Lab Sample ID: 440-79190-1**
**Date Collected: 05/21/14 09:55** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | 185160 | 05/28/14 11:50 | RM | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 01:20 | TN | TAL IRV |

**Client Sample ID: MW-2** **Lab Sample ID: 440-79190-2**
**Date Collected: 05/21/14 09:05** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | 185160 | 05/28/14 13:19 | RM | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 01:46 | TN | TAL IRV |

**Client Sample ID: MW-3** **Lab Sample ID: 440-79190-3**
**Date Collected: 05/21/14 12:45** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | | 2 | 10 mL | 10 mL | 185362 | 05/29/14 00:59 | AT | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 10 | 10 mL | 10 mL | 186019 | 06/01/14 02:12 | TN | TAL IRV |

**Client Sample ID: MW-5A** **Lab Sample ID: 440-79190-4**
**Date Collected: 05/21/14 13:35** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | 185160 | 05/28/14 13:48 | RM | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 02:38 | TN | TAL IRV |

**Client Sample ID: MW-5B** **Lab Sample ID: 440-79190-5**
**Date Collected: 05/21/14 13:10** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | 185160 | 05/28/14 14:18 | RM | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 03:04 | TN | TAL IRV |

**Client Sample ID: MW-6A** **Lab Sample ID: 440-79190-6**
**Date Collected: 05/21/14 10:45** **Matrix: Water**
**Date Received: 05/22/14 14:22**

| 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 | | 10 | 10 mL | 10 mL | 185160 | 05/28/14 15:47 | RM | TAL IRV |

# Lab Chronicle

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

TestAmerica Job ID: 440-79190-1

## Client Sample ID: MW-6A

**Lab Sample ID: 440-79190-6**

**Date Collected: 05/21/14 10:45**

**Matrix: Water**

**Date Received: 05/22/14 14:22**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 03:29 | TN | TAL IRV |

## Client Sample ID: MW-6B

**Lab Sample ID: 440-79190-7**

**Date Collected: 05/21/14 11:15**

**Matrix: Water**

**Date Received: 05/22/14 14:22**

| 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 | 185160 | 05/28/14 14:48 | RM | TAL IRV |
| Total/NA | Analysis | 8015B/5030B | | 1 | 10 mL | 10 mL | 186019 | 06/01/14 03:55 | TN | TAL IRV |

**Laboratory References:**

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

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

**Lab Sample ID: MB 440-185160/5**
**Matrix: Water**
**Analysis Batch: 185160**

**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 | | | 05/28/14 09:07 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 09:07 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 09:07 | 1 |
| Methyl-t-Butyl Ether (MTBE) | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 09:07 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 09:07 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 09:07 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *100* | | *80 - 120* | | *05/28/14 09:07* | *1* |
| *Dibromofluoromethane (Surr)* | *98* | | *76 - 132* | | *05/28/14 09:07* | *1* |
| *Toluene-d8 (Surr)* | *99* | | *80 - 128* | | *05/28/14 09:07* | *1* |

**Lab Sample ID: LCS 440-185160/6**
**Matrix: Water**
**Analysis Batch: 185160**

**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 | 25.6 | | ug/L | | 103 | 70 - 130 | | |
| 1,2-Dichloroethane | | | 25.0 | 25.7 | | ug/L | | 103 | 57 - 138 | | |
| Benzene | | | 25.0 | 20.0 | | ug/L | | 80 | 68 - 130 | | |
| Ethanol | | | 250 | 188 | | ug/L | | 75 | 50 - 149 | | |
| Ethylbenzene | | | 25.0 | 23.6 | | ug/L | | 94 | 70 - 130 | | |
| Ethyl-t-butyl ether (ETBE) | | | 25.0 | 24.4 | | ug/L | | 98 | 60 - 136 | | |
| Isopropyl Ether (DIPE) | | | 25.0 | 23.7 | | ug/L | | 95 | 58 - 139 | | |
| m,p-Xylene | | | 50.0 | 45.5 | | ug/L | | 91 | 70 - 130 | | |
| Methyl-t-Butyl Ether (MTBE) | | | 25.0 | 23.9 | | ug/L | | 96 | 63 - 131 | | |
| o-Xylene | | | 25.0 | 23.2 | | ug/L | | 93 | 70 - 130 | | |
| Tert-amyl-methyl ether (TAME) | | | 25.0 | 23.4 | | ug/L | | 94 | 57 - 139 | | |
| tert-Butyl alcohol (TBA) | | | 125 | 126 | | ug/L | | 101 | 70 - 130 | | |
| Toluene | | | 25.0 | 21.8 | | ug/L | | 87 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *102* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *103* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *96* | | *80 - 128* |

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

**Lab Sample ID: 440-79190-1 MS**
**Matrix: Water**
**Analysis Batch: 185160**

**Client Sample ID: MW-1**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 25.0 | 26.8 | | ug/L | | 107 | 70 - 131 |
| 1,2-Dichloroethane | ND | | 25.0 | 27.4 | | ug/L | | 110 | 56 - 146 |
| Benzene | ND | | 25.0 | 20.7 | | ug/L | | 83 | 66 - 130 |
| Ethanol | ND | | 250 | 207 | | ug/L | | 83 | 54 - 150 |
| Ethylbenzene | ND | | 25.0 | 22.9 | | ug/L | | 90 | 70 - 130 |
| Ethyl-t-butyl ether (ETBE) | ND | | 25.0 | 25.4 | | ug/L | | 101 | 70 - 130 |
| Isopropyl Ether (DIPE) | ND | | 25.0 | 24.7 | | ug/L | | 99 | 64 - 138 |
| m,p-Xylene | ND | | 50.0 | 44.0 | | ug/L | | 88 | 70 - 133 |
| Methyl-t-Butyl Ether (MTBE) | 1.0 | | 25.0 | 26.2 | | ug/L | | 101 | 70 - 130 |
| o-Xylene | ND | | 25.0 | 23.1 | | ug/L | | 92 | 70 - 133 |
| Tert-amyl-methyl ether (TAME) | ND | | 25.0 | 25.0 | | ug/L | | 100 | 68 - 133 |
| tert-Butyl alcohol (TBA) | 12 | | 125 | 144 | | ug/L | | 106 | 70 - 130 |
| Toluene | ND | | 25.0 | 21.9 | | ug/L | | 88 | 70 - 130 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *107* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *101* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *101* | | *80 - 128* |

**Lab Sample ID: 440-79190-1 MSD**
**Matrix: Water**
**Analysis Batch: 185160**

**Client Sample ID: MW-1**
**Prep Type: Total/NA**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 25.0 | 26.1 | | ug/L | | 104 | 70 - 131 | 3 | 25 |
| 1,2-Dichloroethane | ND | | 25.0 | 25.5 | | ug/L | | 102 | 56 - 146 | 8 | 20 |
| Benzene | ND | | 25.0 | 20.3 | | ug/L | | 81 | 66 - 130 | 2 | 20 |
| Ethanol | ND | | 250 | 202 | | ug/L | | 81 | 54 - 150 | 2 | 30 |
| Ethylbenzene | ND | | 25.0 | 22.5 | | ug/L | | 89 | 70 - 130 | 2 | 20 |
| Ethyl-t-butyl ether (ETBE) | ND | | 25.0 | 25.1 | | ug/L | | 101 | 70 - 130 | 1 | 25 |
| Isopropyl Ether (DIPE) | ND | | 25.0 | 24.0 | | ug/L | | 96 | 64 - 138 | 3 | 25 |
| m,p-Xylene | ND | | 50.0 | 44.2 | | ug/L | | 88 | 70 - 133 | 1 | 25 |
| Methyl-t-Butyl Ether (MTBE) | 1.0 | | 25.0 | 25.3 | | ug/L | | 97 | 70 - 130 | 3 | 25 |
| o-Xylene | ND | | 25.0 | 23.4 | | ug/L | | 93 | 70 - 133 | 1 | 20 |
| Tert-amyl-methyl ether (TAME) | ND | | 25.0 | 24.0 | | ug/L | | 96 | 68 - 133 | 4 | 30 |
| tert-Butyl alcohol (TBA) | 12 | | 125 | 142 | | ug/L | | 104 | 70 - 130 | 1 | 25 |
| Toluene | ND | | 25.0 | 21.8 | | ug/L | | 87 | 70 - 130 | 1 | 20 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *104* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *97* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *96* | | *80 - 128* |

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

**Lab Sample ID: MB 440-185362/4**
**Matrix: Water**
**Analysis Batch: 185362**

**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 | | | 05/28/14 20:12 | 1 |
| 1,2-Dichloroethane | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Benzene | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Ethanol | ND | | 150 | | ug/L | | | 05/28/14 20:12 | 1 |
| Ethylbenzene | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Ethyl-t-butyl ether (ETBE) | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Isopropyl Ether (DIPE) | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| m,p-Xylene | ND | | 1.0 | | ug/L | | | 05/28/14 20:12 | 1 |
| Methyl-t-Butyl Ether (MTBE) | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| o-Xylene | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Tert-amyl-methyl ether (TAME) | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| tert-Butyl alcohol (TBA) | ND | | 10 | | ug/L | | | 05/28/14 20:12 | 1 |
| Toluene | ND | | 0.50 | | ug/L | | | 05/28/14 20:12 | 1 |
| Xylenes, Total | ND | | 1.0 | | ug/L | | | 05/28/14 20:12 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *104* | | *80 - 120* | | *05/28/14 20:12* | *1* |
| *Dibromofluoromethane (Surr)* | *93* | | *76 - 132* | | *05/28/14 20:12* | *1* |
| *Toluene-d8 (Surr)* | *105* | | *80 - 128* | | *05/28/14 20:12* | *1* |

**Lab Sample ID: LCS 440-185362/5**
**Matrix: Water**
**Analysis Batch: 185362**

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

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | | | 25.0 | 27.3 | | ug/L | | 109 | 70 - 130 | | |
| 1,2-Dichloroethane | | | 25.0 | 25.0 | | ug/L | | 100 | 57 - 138 | | |
| Benzene | | | 25.0 | 25.6 | | ug/L | | 102 | 68 - 130 | | |
| Ethanol | | | 250 | 234 | | ug/L | | 94 | 50 - 149 | | |
| Ethylbenzene | | | 25.0 | 26.3 | | ug/L | | 105 | 70 - 130 | | |
| Ethyl-t-butyl ether (ETBE) | | | 25.0 | 26.1 | | ug/L | | 104 | 60 - 136 | | |
| Isopropyl Ether (DIPE) | | | 25.0 | 25.7 | | ug/L | | 103 | 58 - 139 | | |
| m,p-Xylene | | | 50.0 | 53.6 | | ug/L | | 107 | 70 - 130 | | |
| Methyl-t-Butyl Ether (MTBE) | | | 25.0 | 26.7 | | ug/L | | 107 | 63 - 131 | | |
| o-Xylene | | | 25.0 | 29.1 | | ug/L | | 116 | 70 - 130 | | |
| Tert-amyl-methyl ether (TAME) | | | 25.0 | 26.8 | | ug/L | | 107 | 57 - 139 | | |
| tert-Butyl alcohol (TBA) | | | 125 | 125 | | ug/L | | 100 | 70 - 130 | | |
| Toluene | | | 25.0 | 27.5 | | ug/L | | 110 | 70 - 130 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *104* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *99* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *107* | | *80 - 128* |

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

**Lab Sample ID: 440-78955-B-2 MS**
**Matrix: Water**
**Analysis Batch: 185362**

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

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 25.0 | 25.3 | | ug/L | | 101 | 70 - 131 |
| 1,2-Dichloroethane | ND | | 25.0 | 23.4 | | ug/L | | 93 | 56 - 146 |
| Benzene | 0.51 | | 25.0 | 25.6 | | ug/L | | 100 | 66 - 130 |
| Ethanol | ND | | 250 | 257 | | ug/L | | 103 | 54 - 150 |
| Ethylbenzene | 0.96 | | 25.0 | 26.5 | | ug/L | | 102 | 70 - 130 |
| Ethyl-t-butyl ether (ETBE) | ND | | 25.0 | 25.0 | | ug/L | | 100 | 70 - 130 |
| Isopropyl Ether (DIPE) | ND | | 25.0 | 24.4 | | ug/L | | 97 | 64 - 138 |
| m,p-Xylene | ND | | 50.0 | 52.6 | | ug/L | | 104 | 70 - 133 |
| Methyl-t-Butyl Ether (MTBE) | 8.0 | | 25.0 | 32.9 | | ug/L | | 99 | 70 - 130 |
| o-Xylene | ND | | 25.0 | 27.6 | | ug/L | | 111 | 70 - 133 |
| Tert-amyl-methyl ether (TAME) | ND | | 25.0 | 25.1 | | ug/L | | 101 | 68 - 133 |
| tert-Butyl alcohol (TBA) | 53 | | 125 | 176 | | ug/L | | 98 | 70 - 130 |
| Toluene | ND | | 25.0 | 26.7 | | ug/L | | 107 | 70 - 130 |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *102* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *96* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *104* | | *80 - 128* |

**Lab Sample ID: 440-78955-B-2 MSD**
**Matrix: Water**
**Analysis Batch: 185362**

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

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane (EDB) | ND | | 25.0 | 27.1 | | ug/L | | 108 | 70 - 131 | 7 | 25 |
| 1,2-Dichloroethane | ND | | 25.0 | 23.9 | | ug/L | | 95 | 56 - 146 | 2 | 20 |
| Benzene | 0.51 | | 25.0 | 26.4 | | ug/L | | 104 | 66 - 130 | 3 | 20 |
| Ethanol | ND | | 250 | 233 | | ug/L | | 93 | 54 - 150 | 10 | 30 |
| Ethylbenzene | 0.96 | | 25.0 | 27.6 | | ug/L | | 107 | 70 - 130 | 4 | 20 |
| Ethyl-t-butyl ether (ETBE) | ND | | 25.0 | 25.7 | | ug/L | | 103 | 70 - 130 | 3 | 25 |
| Isopropyl Ether (DIPE) | ND | | 25.0 | 25.4 | | ug/L | | 101 | 64 - 138 | 4 | 25 |
| m,p-Xylene | ND | | 50.0 | 54.9 | | ug/L | | 109 | 70 - 133 | 4 | 25 |
| Methyl-t-Butyl Ether (MTBE) | 8.0 | | 25.0 | 33.7 | | ug/L | | 103 | 70 - 130 | 2 | 25 |
| o-Xylene | ND | | 25.0 | 29.1 | | ug/L | | 116 | 70 - 133 | 5 | 20 |
| Tert-amyl-methyl ether (TAME) | ND | | 25.0 | 25.7 | | ug/L | | 103 | 68 - 133 | 2 | 30 |
| tert-Butyl alcohol (TBA) | 53 | | 125 | 176 | | ug/L | | 98 | 70 - 130 | 0 | 25 |
| Toluene | ND | | 25.0 | 27.7 | | ug/L | | 111 | 70 - 130 | 4 | 20 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *107* | | *80 - 120* |
| *Dibromofluoromethane (Surr)* | *96* | | *76 - 132* |
| *Toluene-d8 (Surr)* | *107* | | *80 - 128* |

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

**Lab Sample ID: MB 440-186019/4**
**Matrix: Water**
**Analysis Batch: 186019**

**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 | | | 05/31/14 19:19 | 1 |

| *Surrogate* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *110* | | *65 - 140* | | *05/31/14 19:19* | *1* |

**Lab Sample ID: LCS 440-186019/3**
**Matrix: Water**
**Analysis Batch: 186019**

**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 | 756 | | ug/L | | 94 | 80 - 120 | | |

| *Surrogate* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *113* | | *65 - 140* |

**Lab Sample ID: 440-78953-E-11 MS**
**Matrix: Water**
**Analysis Batch: 186019**

**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) | 500 | | 800 | 1160 | | ug/L | | 83 | 65 - 140 | | |

| *Surrogate* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *112* | | *65 - 140* |

**Lab Sample ID: 440-78953-E-11 MSD**
**Matrix: Water**
**Analysis Batch: 186019**

**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) | 500 | | 800 | 1210 | | ug/L | | 89 | 65 - 140 | 4 | 20 |

| *Surrogate* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *4-Bromofluorobenzene (Surr)* | *112* | | *65 - 140* |

## GC/MS VOA

### Analysis Batch: 185160

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-79190-1 | MW-1 | Total/NA | Water | 8260B/5030B | |
| 440-79190-1 MS | MW-1 | Total/NA | Water | 8260B/5030B | |
| 440-79190-1 MSD | MW-1 | Total/NA | Water | 8260B/5030B | |
| 440-79190-2 | MW-2 | Total/NA | Water | 8260B/5030B | |
| 440-79190-4 | MW-5A | Total/NA | Water | 8260B/5030B | |
| 440-79190-5 | MW-5B | Total/NA | Water | 8260B/5030B | |
| 440-79190-6 | MW-6A | Total/NA | Water | 8260B/5030B | |
| 440-79190-7 | MW-6B | Total/NA | Water | 8260B/5030B | |
| LCS 440-185160/6 | Lab Control Sample | Total/NA | Water | 8260B/5030B | |
| MB 440-185160/5 | Method Blank | Total/NA | Water | 8260B/5030B | |

### Analysis Batch: 185362

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-78955-B-2 MS | Matrix Spike | Total/NA | Water | 8260B/5030B | |
| 440-78955-B-2 MSD | Matrix Spike Duplicate | Total/NA | Water | 8260B/5030B | |
| 440-79190-3 | MW-3 | Total/NA | Water | 8260B/5030B | |
| LCS 440-185362/5 | Lab Control Sample | Total/NA | Water | 8260B/5030B | |
| MB 440-185362/4 | Method Blank | Total/NA | Water | 8260B/5030B | |

## GC VOA

### Analysis Batch: 186019

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 440-78953-E-11 MS | Matrix Spike | Total/NA | Water | 8015B/5030B | |
| 440-78953-E-11 MSD | Matrix Spike Duplicate | Total/NA | Water | 8015B/5030B | |
| 440-79190-1 | MW-1 | Total/NA | Water | 8015B/5030B | |
| 440-79190-2 | MW-2 | Total/NA | Water | 8015B/5030B | |
| 440-79190-3 | MW-3 | Total/NA | Water | 8015B/5030B | |
| 440-79190-4 | MW-5A | Total/NA | Water | 8015B/5030B | |
| 440-79190-5 | MW-5B | Total/NA | Water | 8015B/5030B | |
| 440-79190-6 | MW-6A | Total/NA | Water | 8015B/5030B | |
| 440-79190-7 | MW-6B | Total/NA | Water | 8015B/5030B | |
| LCS 440-186019/3 | Lab Control Sample | Total/NA | Water | 8015B/5030B | |
| MB 440-186019/4 | Method Blank | Total/NA | Water | 8015B/5030B | |

## Glossary

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

# Certification Summary

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

TestAmerica Job ID: 440-79190-1

## Laboratory: TestAmerica Irvine

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

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| Alaska | State Program | 10 | CA01531 | 06-30-14 |
| Arizona | State Program | 9 | AZ0671 | 10-13-14 |
| California | LA Cty Sanitation Districts | 9 | 10256 | 01-31-15 |
| California | State Program | 9 | 2706 | 06-30-14 |
| Guam | State Program | 9 | Cert. No. 12.002r | 01-23-15 |
| Hawaii | State Program | 9 | N/A | 01-29-15 * |
| Nevada | State Program | 9 | CA015312007A | 07-31-14 |
| New Mexico | State Program | 6 | N/A | 01-29-15 |
| Northern Mariana Islands | State Program | 9 | MP0002 | 01-31-14 * |
| Oregon | NELAP | 10 | 4005 | 01-29-15 |
| USDA | Federal | | P330-09-00080 | 06-06-15 |
| USEPA UCMR | Federal | 1 | CA01531 | 01-31-15 |

* Expired certification is currently pending renewal and is considered valid.

# bp rm — *Laboratory Management Program LaMP* Chain of Custody Record

Page ____ of ____   8-8

BP Site Node Path: 08-82-603   Req Due Date (mm/dd/yy): ____   Rush TAT: Yes ____ No ____

BP Facility No: 498   Lab Work Order Number: ____

| | | |
|---|---|---|
| Lab Name: Test America | Facility Address: 286 South Livermore Ave. | Consultant/Contractor: Broadbent and Associates, Inc. |
| Lab Address: 17461 Derian Avenue Suite #100, Irvine, CA 92614 | City, State, ZIP Code: Livermore, CA | Consultant/Contractor Project No: 08-82-603 |
| Lab PM: Kathleen Robb | Lead Regulatory Agency: ACEH | Address: 1370 Ridgewood Drive, Suite 5, Chico, CA 95973 |
| Lab Phone: 949-261-1022 | California Global ID No.: T0600124081 | Consultant/Contractor PM: Jason Duda |
| Lab Shipping Accnt: 1103-6633-7 | Enfos Proposal No: 0056X-0005 / WR 273478 | Phone: 530-566-1400 Fax: 530-566-1401 |
| Lab Bottle Order No: | Accounting Mode: Provision x OOC-BU ____ OOC-RM ____ | Email EDD To: jduda@broadbentinc.com and to lab.enfosdoc@bp.com |
| Other Info: | Stage: Execute (40) Activity: Project Spend (80) | Invoice To: BP x Contractor ____ |

BP Project Manager (PM): Chuck Carmel

BP PM Phone: 925-275-3804

BP PM Email: chuck.carmel@bp.com

| Lab No. | Sample Description | Date | Time | Matrix: Soil / Solid | Matrix: Water / Liquid | Matrix: Air / Vapor | Matrix: Is this location a well? | No. Containers / Preservative: Total Number of Containers | Unpreserved | H2SO4 | HNO3 | HCl | Methanol | Requested Analyses: GRO by 8015M | BTEX, 5 FO + EDB by 8260 | Ethanol & 1,2-DCA by 8260 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MW-1 | 5/21/14 | 0955 | | x | | y | 6 | | | | x | | x | x | x |
| | MW-2 | 5/21/14 | 0905 | | x | | y | 6 | | | | x | | x | x | x |
| | MW-3 | 5/21/14 | 1245 | | x | | y | 6 | | | | x | | x | x | x |
| | MW-4 | 5/21/14 | 0820 | DRY | | | y | FIELD NO SAMPLE | | | | | | | | |
| | MW-5A | 5/21/14 | 1335 | | x | | y | 6 | | | | x | | x | x | x |
| | MW-5B | 5/21/14 | 1310 | | x | | y | 6 | | - | | x | | x | x | x |
| | MW-6A | 5/21/14 | 1045 | | x | | y | 6 | | | | x | | x | x | x |
| | MW-6B | 5/21/14 | 1115 | | x | | y | 6 | | | | x | | x | x | x |
| | TB-498-05212014 | - | - | | x | | n | 2 | | | | x | | | | |

Report Type & QC Level: Standard x; Full Data Package ____

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

Correct times to left of Date Column

Dry well No Sample

Times are correct

On Hold

440-79190 Chain of Custody

| Sampler's Name: Sarah Jones + James Ramos | Relinquished By / Affiliation | Date | Time | Accepted By / Affiliation | Date | Time |
|---|---|---|---|---|---|---|
| Sampler's Company: Broadbent and Associates | Sarah Jones | 5/21/14 | 1530 | VuBank TAI | 5/22/14 | 9:50 |
| Shipment Method: Fed Ex Ship Date: 5/21/14 | | | | | | |
| Shipment Tracking No: | | | | | | |

Special Instructions: Fed-Ex 8055 9449 3641

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 5.9/5.6 °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

# Login Sample Receipt Checklist

Client: Broadbent & Associates, Inc.

Job Number: 440-79190-1

**Login Number: 79190**

**List Source: TestAmerica Irvine**

**List Number: 1**

**Creator: Kim, Guerry**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | 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. | True | |
| 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!**

| | |
|---|---|
| **Submittal Type:** | **GEO_WELL** |
| **Report Title:** | **Second Quarter Groundwater Monitoring Report** |
| **Facility Global ID:** | **T0600124081** |
| **Facility Name:** | **ARCO #0498** |
| **File Name:** | **geo_well.zip** |
| **Organization Name:** | **Broadbent & Associates, Inc.** |
| **Username:** | **BROADBENT-C** |
| **IP Address:** | **69.170.11.178** |
| **Submittal Date/Time:** | **7/28/2014 12:20:53 PM** |
| **Confirmation Number:** | **3133623242** |

STATE WATER RESOURCES CONTROL BOARD

# GEOTRACKER ESI

UPLOADING A EDF FILE

## SUCCESS

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

| | |
|---|---|
| **Submittal Type:** | **EDF** |
| **Report Title:** | **Second Quarter Groundwater Monitoring Report** |
| **Report Type:** | **Monitoring Report - Semi-Annually** |
| **Facility Global ID:** | **T0600124081** |
| **Facility Name:** | **ARCO #0498** |
| **File Name:** | **440-79190-1_02 Jun 14 1648_EDF.zip** |
| **Organization Name:** | **Broadbent & Associates, Inc.** |
| **Username:** | **BROADBENT-C** |
| **IP Address:** | **69.170.11.178** |
| **Submittal Date/Time:** | **7/28/2014 11:34:12 AM** |
| **Confirmation Number:** | **3047127902** |

VIEW QC REPORT

VIEW DETECTIONS REPORT