Atlantic Richfield Company

Chuck Carmel
Remediation Management Project Manager

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

October 29, 2013

Re: Third Quarter 2013 Monitoring Report
Former Richfield Oil Company Station #472
6415 International Boulevard, Oakland, California
ACEH Case #RO0002982

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

BROADBENT
875 Cotting Ln., Suite G, Vacaville, CA 95688
[T] 707-455-7290 [F] 707-455-7295
broadbentinc.com

CREATING SOLUTIONS, BUILDING TRUST.

October 29, 2013

Project No. 09-88-601

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

Attn.: Mr. Chuck Carmel

Re: Third Quarter 2013 Monitoring Report, Former Richfield Oil Company Station #472, 6415 International Boulevard, Oakland; ACEH Case #RO0002982

Dear Mr. Carmel:

Attached is the Third Quarter 2013 Monitoring Report for the Former Richfield Oil Company Station #472 located at 6415 International Boulevard, Oakland, California. This report presents results of groundwater sampling recently conducted and a summary of current developments at the Site through the Third Quarter of 2013.

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

Sincerely,
BROADBENT & ASSOCIATES, INC.

PROFESSIONAL GEOLOGIST
KRISTENE TIDWELL
No. 969
CERTIFIED HYDRO GEOLOGIST
12/31/14
STATE OF CALIFORNIA

Kristene Tidwell, P.G., C.HG.
Senior Geologist

Enclosures

cc: Ms. Dilan Roe, P.E., Alameda County Environmental Health (submitted via ACEH ftp site)
Mr. Mahmud Ghanem, 6207 International Blvd, Oakland, California 94621
Electronic copy uploaded to GeoTracker

THIRD QUARTER 2013
MONITORING REPORT
FORMER STATION #472, OAKLAND, CALIFORNIA

Broadbent & Associates, Inc. (Broadbent) is pleased to present this *Third Quarter 2013 Monitoring Report* on behalf of Atlantic Richfield Company (a BP affiliated company) for Former Richfield Oil Company Station #472 (also previously known as Pluckey's Liquors) located in Oakland, Alameda County, California. Quarterly reporting is being submitted to the Alameda County Environmental Health Services Agency (ACEH) consistent with their requirements under the legal authority of the California Regional Water Quality Control Board, as codified by the California Code of Regulations Title 23, Section 2652(d). Details of work performed, discussion of results, and recommendations are provided below.

Facility Name / Address:	Former Station #472 / 6415 International Boulevard, Oakland; Drawing 1
Client Project Manager / Title:	Ms. Shannon Couch / RM Operations Project Manager
Broadbent Contact:	Ms. Kristene Tidwell, PG, CHG / 707-455-7290
Broadbent Project No.:	09-88-601
Primary Regulatory Agency / ID No.:	ACEH, Case #RO00002982 (GeoTracker ID #T10000000417)
Current phase of project:	Monitoring
List of Acronyms / Abbreviations:	See end of report text for list of acronyms/abbreviations used in report.

WORK PERFORMED THIS QUARTER (Third Quarter 2013):

1. Attended a meeting regarding the *Conceptual Site Model and Case Closure Request* prepared by Broadbent and submitted June 19, 2013.
2. Conducted groundwater monitoring/sampling for Third Quarter 2013 on September 4, 2013.

WORK SCHEDULED FOR NEXT QUARTER (Fourth Quarter 2013):

1. Submit *Third Quarter 2013 Monitoring Report* (contained herein).
2. Submit and Addendum to the June 19, 2013 *Conceptual Site Model and Case Closure Request* per request by the ACEH.
3. No environmental field work is presently scheduled at Former Station #472 during Fourth Quarter 2013.

ADDITIONAL WORK RECOMMENDED FOR NEXT QUARTER (Fourth Quarter 2013)

1. Well decommissioning can be carried out once the ACEH issues and No Further Action letter for the Site.

GROUNDWATER MONITORING PLAN SUMMARY:

Groundwater level gauging:	MW-1 through MW-3	(1Q & 3Q)
Groundwater sample collection:	MW-1 through MW-3	(1Q & 3Q)
Biodegradation indicator parameter monitoring:	MW-1 through MW-3	(1Q & 3Q)

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:	9.35 (MW-2) to 10.92 (MW-3)	(ft below TOC)
Gradient direction:	South-Southeast	(compass direction)
Gradient magnitude:	0.01	(ft/ft)
Average change in elevation:	-2.25	(ft since last measurement)

Laboratory Analytical Data

Summary:

- GRO was detected above reporting limits in one well (MW-1) with a concentration of 330 µg/L
- DRO was detected above reporting limits in one well (MW-1) with a concentration of 130 µg/L

ACTIVITIES CONDUCTED & RESULTS:

Third Quarter 2013 groundwater monitoring was conducted on September 4, 2013 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 9.35 ft-bgs at well MW-2 to 10.92 ft-bgs at well MW-3. Resulting groundwater surface elevations ranged from 13.81 ft-msl at well MW-3 to 14.77 ft-msl at well MW-2. Groundwater elevations are summarized in Table 1. Water level elevations yielded a potentiometric groundwater gradient to the south-southeast at approximately 0.01 ft/ft, which is consistent with historical measurements. Field methods used during groundwater monitoring are provided in Appendix A. Field data sheets are included in Appendix B.

Groundwater samples were collected on September 4, 2013 consistent with the current monitoring schedule. No irregularities were reported during sampling activities. Samples were submitted under chain-of-custody protocol to TestAmerica Laboratories, Inc. (Irvine, California) for analysis of GRO and DRO 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 is included in Appendix C.

Results of the sampling event are included in the laboratory analytical summary presented above. The results indicate that the highest overall concentrations of petroleum hydrocarbons are presented in well MW-3. Concentrations of DRO decreased in well MW-3 from 95 µg/L during the First Quarter 2013 monitoring event to <50 µg/L during the Third Quarter 2013 monitoring event. No petroleum hydrocarbons were detected in well MW-3. DRO and GRO were detected in well MW-1 at concentrations consistent with historical ranges. No other analytes were detected in any monitoring well sample. Groundwater monitoring laboratory analytical results are summarized in Table 1 and Table 2. The most recent GRO, Benzene, and MTBE concentrations are also presented in Drawing 2. Groundwater monitoring data (GEO_WELL) and laboratory analytical results (EDF) were uploaded to the GeoTracker AB2886 database. Upload confirmation receipts are provided in Appendix D.

DISCUSSION:

Groundwater levels were between historic minimum and maximum elevations for each well. The current detected analytical concentrations were within the historic minimum and maximum ranges recorded for each well. Concentrations trends show that petroleum hydrocarbons are sporadically non-detect to low (generally less than 500 µg/L), and limited in extent, as evidenced by the absence of any petroleum hydrocarbon detections currently in downgradient well MW-3. Due to the hydrocarbon signature in groundwater consisting of only minor sporadic detections of DRO/GRO and no detections ever of any BTEX and/or fuel oxygenates, and the age of the release (USTs removed in 1976); it appears that the remaining hydrocarbon plume is highly degraded and has almost completely attenuated over time. The remaining, minor residuals are of very low threat to receptors, and will continue to attenuate over time.

RECOMMENDATIONS:

Consistent with the revised monitoring schedule, no monitoring or sampling field work is planned for Fourth Quarter 2013. An addendum to the June 19, 2013 *Conceptual Site Model and Case Closure Request* was submitted October 8, 2013. Upon concurrence with this addendum and a No Further Action letter is received by the ACEH, well decommissioning activities will be carried out.

LIMITATIONS:

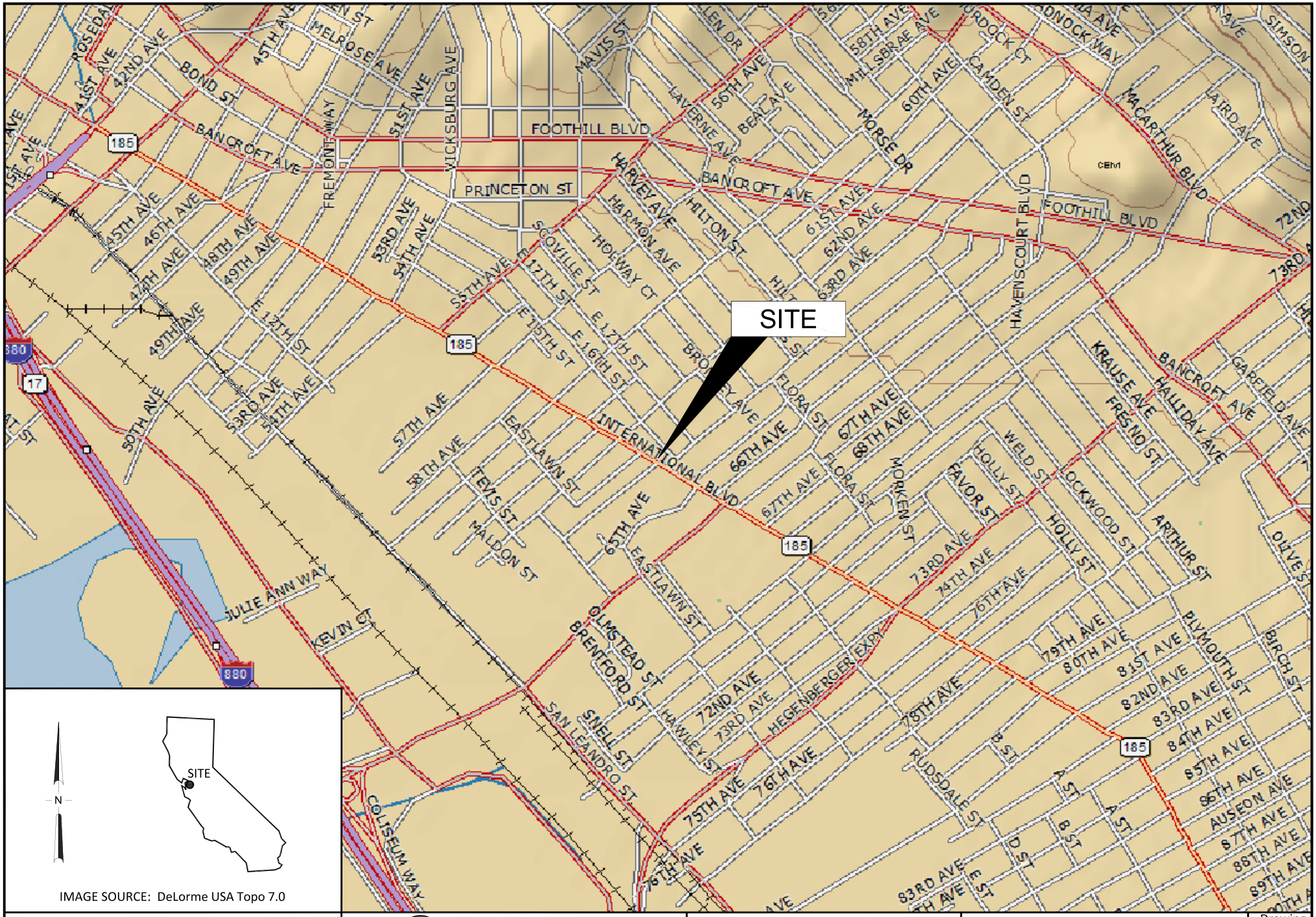
The findings presented in this report are based upon observations of field personnel, points investigated, results of laboratory tests performed by TestAmerica, and our understanding of ACEH requirements. Our services were performed in accordance with the generally accepted standard of practice at the 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 and Analytical Summary Map, September 4, 2013
Table 1:	Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
Table 2:	Summary of Fuel Additives Analytical Data
Table 3:	Historic Groundwater Gradient – Direction and Magnitude
Appendix A:	Field Methods
Appendix B:	Field Data Sheets
Appendix C:	Laboratory Report and Chain-of-Custody Documentation
Appendix D:	GeoTracker Upload Confirmation Receipts

LIST OF COMMONLY USED ACCRONYMS/ABBREVIATIONS:

ACEH:	Alameda County Environmental Health	ft/ft:	feet per foot
ACPWA:	Alameda County Public Works Agency	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

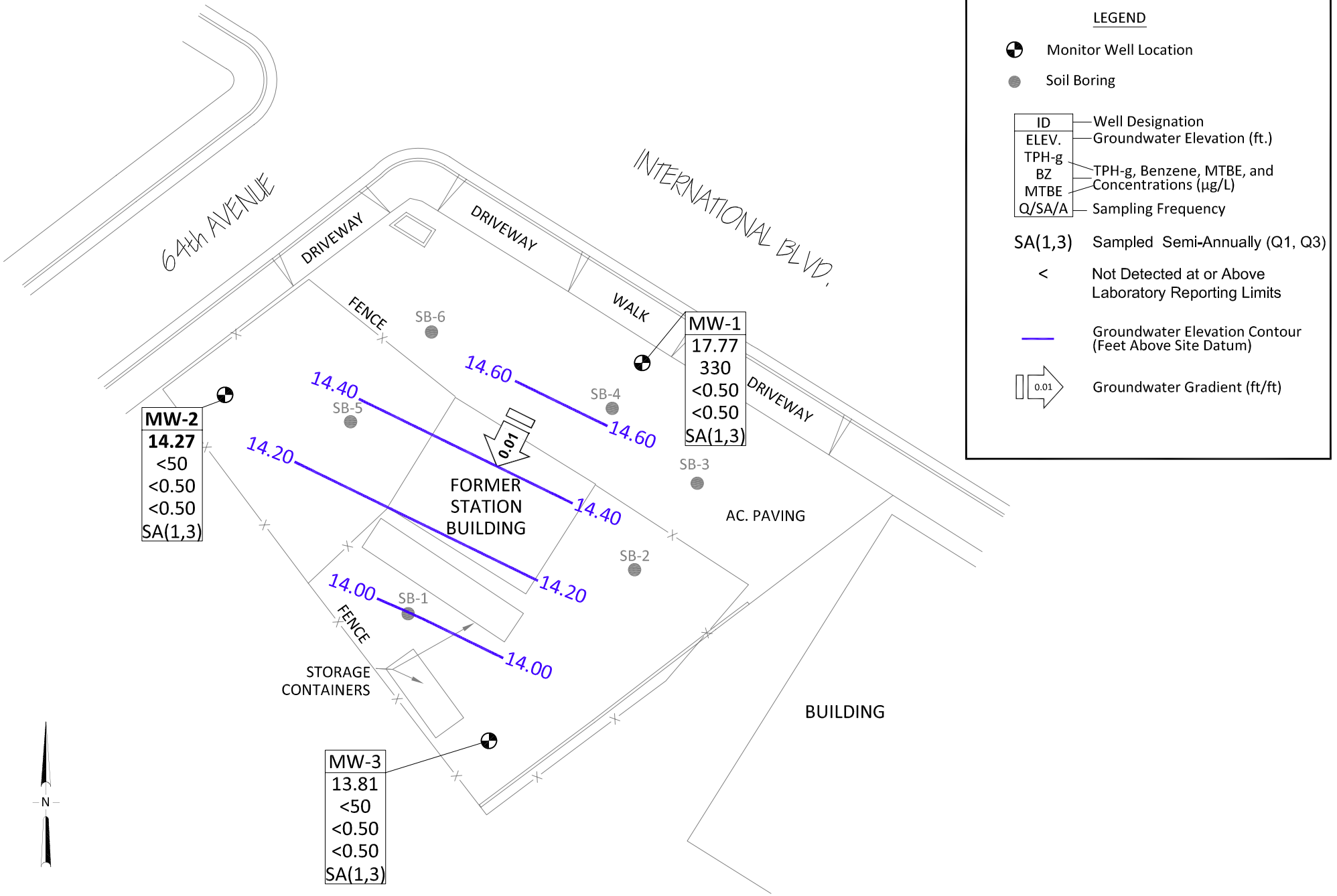


BROADBENT
1370 Ridgewood Dr., Suite 5
Chico, California 95973
Project No.: 09-88-601 Date: 4/2/2013

Former Station #472
6415 International Boulevard
Oakland, California

Site Location Map

Drawing
1



0 30 60

SCALE (ft)

BROADBENT

875 Cotting Lane, Suite G
Vacaville, California 95688

Project No.: 09-88-601 Date: 10/01/2013

ARCO Former Station № 472
6415 International Boulevard
Oakland, California

Groundwater Elevation and Analytical Summary Map
September 4, 2013

Drawing
2

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

ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	Concentrations in µg/L							DO (mg/L)	pH	Footnote
							DRO/ TPHd	GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-1																
8/25/2009	P	24.17	7.00	17.00	9.29	14.88	190	530	<0.50	<0.50	<0.50	<0.50	0.54	--	7.21	LX (DRO)
11/11/2009	NP		7.00	17.00	8.22	15.95	--	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	
2/17/2010	NP		7.00	17.00	7.36	16.81	70	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.69	7.03	LX (DRO)
6/2/2010	NP		7.00	17.00	7.61	16.56	120	110	<0.50	<0.50	<0.50	<0.50	<0.50	1.21	7.0	LW (GRO), LX (DRO)
9/3/2010	NP		7.00	17.00	8.99	15.18	190	1,000	<0.50	<0.50	<0.50	<0.50	<0.50	0.74	7.30	LW (GRO), LX (DRO)
2/8/2011	NP		7.00	17.00	7.69	16.48	53	<50	<0.50	<0.50	<0.50	<0.50	<0.50	0.64	6.8	LX (DRO)
7/18/2011	NP		7.00	17.00	7.99	16.18	110	<50	<0.50	<0.50	<0.50	<0.50	<0.50	0.70	7.2	LX (DRO)
3/1/2012	P		7.00	17.00	8.20	15.97	140	500	<0.50	<0.50	<0.50	<0.50	<0.50	0.71	7.01	
8/15/2012	P		7.00	17.00	8.89	15.28	220	490	<0.50	<0.50	<0.50	<1.0	<0.50	8.90	7.53	
2/21/2013	P		7.00	17.00	7.63	16.54	<51	<50	<0.50	<0.50	<0.50	<1.0	<0.50	1.78	7.54	
9/4/2013	**P**		**7.00**	**17.00**	**9.40**	**14.77**	**130**	**330**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<0.50**	**1.48**	**7.37**	
MW-2																
8/25/2009	P	23.62	7.00	17.00	9.65	13.97	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	7.30	
11/11/2009	NP		7.00	17.00	8.09	15.53	--	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	
2/17/2010	P		7.00	17.00	6.80	16.82	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	2.62	7.15	
6/2/2010	NP		7.00	17.00	7.11	16.51	65	<50	<0.50	<0.50	<0.50	<0.50	<0.50	2.85	7.3	LX (DRO)
9/3/2010	NP		7.00	17.00	8.79	14.83	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.19	7.90	
2/8/2011	NP		7.00	17.00	7.21	16.41	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	2.15	7.0	
7/18/2011	--		7.00	17.00	--	--	--	--	--	--	--	--	--	--	--	Inaccessible
3/1/2012	P		7.00	17.00	7.41	16.21	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	1.89	7.34	
8/15/2012	P		7.00	17.00	8.79	14.83	<47	<50	<0.50	<0.50	<0.50	<1.0	<0.50	3.3	7.48	
2/21/2013	P		7.00	17.00	6.89	16.73	<52	<50	<0.50	<0.50	<0.50	<1.0	<0.50	1.35	7.73	
9/4/2013	**P**		**7.00**	**17.00**	**9.35**	**14.27**	**<48**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<0.50**	**1.21**	**7.48**	
MW-3																
8/25/2009	P	24.73	7.00	17.00	11.07	13.66	85	63	<0.50	1.2	<0.50	<0.50	<0.50	--	7.09	
11/11/2009	NP		7.00	17.00	9.56	15.17	--	88	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	LW (GRO)

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

ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	Concentrations in µg/L							DO (mg/L)	pH	Footnote
							DRO/ TPHd	GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			
MW-3 Cont.																
2/17/2010	NP	24.73	7.00	17.00	8.52	16.21	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	2.04	7.09	
6/2/2010	NP		7.00	17.00	8.64	16.09	130	100	<0.50	<0.50	<0.50	<0.50	<0.50	1.22	7.1	LW (GRO), LX (DRO)
9/3/2010	NP		7.00	17.00	8.41	16.32	140	200	<0.50	<0.50	<0.50	<0.50	<0.50	0.87	6.9	LW (GRO), LX (DRO)
2/8/2011	NP		7.00	17.00	8.82	15.91	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	0.88	7.0	
7/18/2011	NP		7.00	17.00	9.20	15.53	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	0.93	6.9	
3/1/2012	P		7.00	17.00	9.13	15.60	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	0.63	6.91	
8/15/2012	P		7.00	17.00	10.45	14.28	600	<50	<0.50	<0.50	<0.50	<1.0	<0.50	2.99	7.38	*(DRO)
2/21/2013	P		7.00	17.00	8.39	16.34	95	<50	<0.50	<0.50	<0.50	<1.0	<0.50	1.30	7.76	
9/4/2013	**P**		**7.00**	**17.00**	**10.92**	**13.81**	**<48**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<0.50**	**0.97**	**8.01**	

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

ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Well ID and Date Monitored	P/NP	TOC (feet)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	DTW (feet)	Water Level Elevation (feet)	Concentrations in µg/L							DO (mg/L)	pH	Footnote
							DRO/ TPHd	GRO/ TPHg	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MTBE			

Symbols & Abbreviations:
--- = Not analyzed/applicable/measured/available
< = Not detected at or above specified laboratory reporting limit
DO = Dissolved oxygen
DRO = Diesel range organics
DTW = Depth to water in ft bgs
GRO = Gasoline range organics
GWE = Groundwater elevation measured in ft
HVOC = Halogenated volatile organic compounds
mg/L = Milligrams per liter
MTBE = Methyl tert-butyl ether
NP = Well not purged prior to sampling
P = Well purged prior to sampling
TOC = Top of casing measured in ft
TOG = Total oil and grease
TPH-d = Total petroleum hydrocarbons as diesel
TPH-g = Total petroleum hydrocarbons as gasoline
µg/L = Micrograms per liter
CEL = CalScience Environmental Laboratories, Inc.
* = Hydrocarbon result partly due to individual peak(s) in the quantitation range

Footnotes:
LW = Quantitation of unknown hydrocarbon(s) in sample based on gasoline
LX = Quantitation of unknown hydrocarbon(s) in sample based on diesel

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-1									
8/25/2009	<300	<10	0.54	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/17/2010	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
6/2/2010	<50	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.72 µg/L sec-Butylbenzene, 1.4 µg/L tert-Butylben
9/3/2010	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/8/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
7/18/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
3/1/2012	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	LW (GRO), LX (DRO)
8/15/2012	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/21/2013	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/4/2013	**<150**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-2									
8/25/2009	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/17/2010	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
6/2/2010	<50	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/3/2010	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/8/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
7/18/2011	--	--	--	--	--	--	--	--	Inaccessible
3/1/2012	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
8/15/2012	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/21/2013	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/4/2013	**<150**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	
MW-3									
8/25/2009	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
11/11/2009	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/17/2010	<300	<20	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
6/2/2010	<50	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/3/2010	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/8/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	

Table 2. Summary of Fuel Additives Analytical Data

ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Well ID and Date Monitored	Concentrations in µg/L								Footnote
	Ethanol	TBA	MTBE	DIPE	ETBE	TAME	1,2-DCA	EDB	
MW-3 Cont.									
7/18/2011	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
3/1/2012	<300	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
8/15/2012	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
2/21/2013	<150	<10	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	
9/4/2013	**<150**	**<10**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	

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

Notes:
All volatile organic compounds were analyzed using EPA Method 8260B

Table 3. Historical Groundwater Gradient - Direction and Magnitude
ARCO Service Station #472, 6415 International Boulevard, Oakland, CA

Date Measured	Approximate Gradient Direction	Approximate Gradient Magnitude (ft/ft)
8/25/2009	Southwest	0.01
11/11/2009	South-Southwest	0.008
2/17/2010	South	0.006
6/2/2010	South	0.003
9/3/2010	North-Northwest	0.015
2/8/2011	South	0.006
7/18/2011	(a)	(a)
3/1/2012	South-Southeast	0.006
8/15/2012	South-Southwest	0.011
2/21/2013	South-Southeast	0.004
9/4/2013	**South-Southeast**	**0.01**

Footnotes:

a = Groundwater gradient unable to be calculated due to MW-2 being inaccessible

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

BROADBENT

DAILY REPORT

Project: BP 472 Project No.: 09-88-601

Field Representative(s): A. Martinez / J. Ramos Day: Wednesday Date: 9/4/13

Time Onsite: From: 1300 To: 1500; From: _____ To: _____; From: _____ To: _____

x Signed HASP x Safety Glasses x Hard Hat x Steel Toe Boots x Safety Vest

N/A UST Emergency System Shut-off Switches Located x Proper Gloves

x Proper Level of Barricading ___ Other PPE (describe) _____

Weather: Sunny

Equipment In Use: H_2O meter, UST meter, peristaltic pump

Visitors: None

TIME:	WORK DESCRIPTION:
1300	Arrived onsite, conducted tailgate
1330	Set up @ MW-3
1405	Set up @ MW-1
1425	Set up @ MW-2
1500	Completed fieldwork & offsite

Signature: Alex Martinez

BROADBENT

GROUNDWATER MONITORING SITE SHEET

Project: BP 472 Project No.: 09-88-601 Date: 9/4/13

Field Representative: AM / JR 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					NOTES
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					1406	—	—	9.40	16.70	
MW-2					1426	—	—	9.35	17.09	
MW-3					1340	—	—	10.92	17.09	

* 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: _____

BROADBENT

GROUNDWATER SAMPLING DATA SHEET

Project: BP 472 Project No.: 09-88-601 Date: 9/4/13

Field Representative: AM / 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 X Peristaltic Pump Other/ID#:

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

(Good) Improvement Needed *(circle one)*

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

PREDETERMINED WELL VOLUME

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)

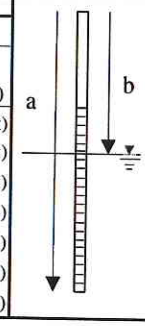
Water Column Height (WCH) = (a - b): ___ (ft)

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): 16.70 (ft)

Initial Depth to Water (b): 9.40 (ft)

Pump In-take Depth = b + (a-b)/2: 13.05 (ft)

Maximum Allowable Drawdown = (a-b)/8: 0.91 (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
1409	0.0	25.58	7.90	0.466	1.63	-56	130	
1411	0.5	26.13	7.60	0.465	1.50	-56	127	
1413	1.0	25.38	7.47	0.465	1.47	-56	127	
1415	1.5	25.16	7.40	0.471	1.50	-57	127	
1417	2.0	25.14	7.37	0.465	1.48	-57	127	
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: 9.73 (ft)

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

X Disp. Pump Tubing Other:

Sample ID: MW-1 Sample Collection Time: 1420 (24:00)

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

2 Other: 1 L NP Amber ___ Other:

___ Other: ___ Other:

GEOCHEMICAL PARAMETERS

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

Signature:

BROADBENT

GROUNDWATER SAMPLING DATA SHEET

Project: BP 472 Project No.: 09-88-601 Date: 9/4/13

Field Representative: AM / 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 X Peristaltic Pump Other/ID#:

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

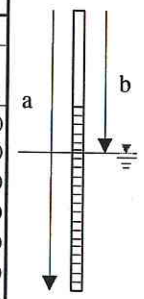
PURGING/SAMPLING METHOD Predetermined Well Volume (Low-Flow) Other: *(circle one)*

PREDETERMINED WELL VOLUME

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): 17.09 (ft)
Initial Depth to Water (b): 9.35 (ft)
Pump In-take Depth = b + (a-b)/2: 13.22 (ft)
Maximum Allowable Drawdown = (a-b)/8: 0.96 (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
1429	0.0	22.87	7.78	0.303	1.22	9	125	
1431	0.5	22.39	7.65	0.303	1.08	7	125	
1433	1.0	22.22	7.58	0.303	1.26	3	126	
1435	1.5	22.14	7.51	0.303	1.18	-1	126	
1437	2.0	22.14	7.48	0.302	1.21	-3	126	
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: 9.40 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-2 Sample Collection Time: 1440 (24:00)
Containers (#): 6 VOA (X preserved or ___ unpreserved) ___ Liter Amber
2 Other: 1 L NP Amber ___ Other:
___ Other: ___ Other:

GEOCHEMICAL PARAMETERS

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

Signature: Alex Mackie

BROADBENT

GROUNDWATER SAMPLING DATA SHEET

Project: BP 472 Project No.: 09-88-601 Date: 9/4/13

Field Representative: AM / 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 X Peristaltic Pump Other/ID#:

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

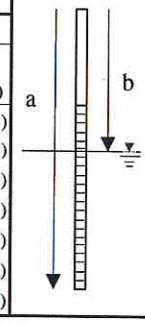
PURGING/SAMPLING METHOD Predetermined Well Volume (Low-Flow) Other: *(circle one)*

PREDETERMINED WELL VOLUME

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): 17.09 (ft)
Initial Depth to Water (b): 10.92 (ft)
Pump In-take Depth = b + (a-b)/2: 14.00 (ft)
Maximum Allowable Drawdown = (a-b)/8: 0.77 (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
1348	0.0	27.73	9.88	0.587	2.10	-148	130	
1350	0.5	26.23	8.92	0.605	1.58	-136	130	
1352	1.0	25.21	8.47	0.624	1.33	-127	131	
1354	1.5	24.11	8.21	0.642	1.17	-123	132	
1356	2.0	23.99	8.01	0.650	0.97	-119	133	
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: 11.10 (ft)
Sample Collected Via: ___ Disp. Bailer ___ Dedicated Pump Tubing
X Disp. Pump Tubing Other:
Sample ID: MW-3 Sample Collection Time: 1400 (24:00)
Containers (#): 6 VOA (X preserved or ___ unpreserved) ___ Liter Amber
2 Other: 1 L NP Amber ___ Other:
___ Other: ___ Other:

GEOCHEMICAL PARAMETERS

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

Signature: Alex Hooker

APPENDIX C

LABORATORY REPORT
AND CHAIN-OF-CUSTODY DOCUMENTATION

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

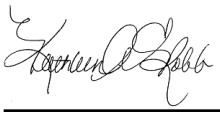
ANALYTICAL REPORT

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

TestAmerica Job ID: 440-56329-1
Client Project/Site: ARCO 0472, Oakland

For:
Broadbent & Associates, Inc.
875 Cotting Lane
Suite G
Vacaville, California 95688

Attn: Kristene Tidwell



Authorized for release by:
9/17/2013 3:24:14 PM

Kathleen Robb, Project Manager II
kathleen.robb@testamericainc.com

Table of Contents

Sample Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-56329-1	MW-1	Water	09/04/13 14:20	09/05/13 10:05
440-56329-2	MW-2	Water	09/04/13 14:40	09/05/13 10:05
440-56329-3	MW-3	Water	09/04/13 14:00	09/05/13 10:05

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Job ID: 440-56329-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-56329-1

Comments
No additional comments.

Receipt
The samples were received on 9/5/2013 10:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2º C.

Except:

One or more containers for the following sample(s) was received broken or leaking:
Sample #1-F -40ml voa with HCL .. 1 of 6 received broken.

GC/MS VOA
No analytical or quality issues were noted.

GC VOA
Method(s) 8015B: Surrogate recovery was outside control limits for the following sample: (440-56329-2 MS), (440-56329-2 MSD), (CCV 440-129967/16), (CCV 440-129967/23), (CCVRT 440-129967/1), (LCS 440-129967/2). The GRO standard coeluted with the 4-bromofluorobenzene surrogate. Data not impacted.

Method(s) 8015B: Surrogate recovery for the following sample(s) was outside control limits: MW-1 (440-56329-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed.

Method(s) 8015B: Surrogate recovery was outside control limits for the following sample: (CCV 440-129967/11). The GRO standard coeluted with the 4-bromofluorobenzene surrogate. Data not impacted.

No other analytical or quality issues were noted.

GC Semi VOA
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

VOA Prep
No analytical or quality issues were noted.

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Client Sample ID: MW-1
Date Collected: 09/04/13 14:20
Date Received: 09/05/13 10:05

Lab Sample ID: 440-56329-1
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			09/09/13 13:14	1
1,2-Dichloroethane	ND		0.50		ug/L			09/09/13 13:14	1
Benzene	ND		0.50		ug/L			09/09/13 13:14	1
Ethanol	ND		150		ug/L			09/09/13 13:14	1
Ethylbenzene	ND		0.50		ug/L			09/09/13 13:14	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			09/09/13 13:14	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			09/09/13 13:14	1
m,p-Xylene	ND		1.0		ug/L			09/09/13 13:14	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			09/09/13 13:14	1
o-Xylene	ND		0.50		ug/L			09/09/13 13:14	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			09/09/13 13:14	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			09/09/13 13:14	1
Toluene	ND		0.50		ug/L			09/09/13 13:14	1
Xylenes, Total	ND		1.0		ug/L			09/09/13 13:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*118*		*80 - 120*		*09/09/13 13:14*	*1*
Dibromofluoromethane (Surr)	*99*		*80 - 120*		*09/09/13 13:14*	*1*
Toluene-d8 (Surr)	*110*		*80 - 120*		*09/09/13 13:14*	*1*

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

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
GRO (C6-C12)	**330**		50		ug/L			09/09/13 16:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*188*	*LH*	*65 - 140*		*09/09/13 16:38*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC) Low Level

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
DRO (C10-C28)	**130**		48		ug/L		09/06/13 11:58	09/06/13 19:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*71*		*45 - 120*	*09/06/13 11:58*	*09/06/13 19:57*	*1*

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Client Sample ID: MW-2
Date Collected: 09/04/13 14:40
Date Received: 09/05/13 10:05

Lab Sample ID: 440-56329-2
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			09/09/13 14:35	1
1,2-Dichloroethane	ND		0.50		ug/L			09/09/13 14:35	1
Benzene	ND		0.50		ug/L			09/09/13 14:35	1
Ethanol	ND		150		ug/L			09/09/13 14:35	1
Ethylbenzene	ND		0.50		ug/L			09/09/13 14:35	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			09/09/13 14:35	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			09/09/13 14:35	1
m,p-Xylene	ND		1.0		ug/L			09/09/13 14:35	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			09/09/13 14:35	1
o-Xylene	ND		0.50		ug/L			09/09/13 14:35	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			09/09/13 14:35	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			09/09/13 14:35	1
Toluene	ND		0.50		ug/L			09/09/13 14:35	1
Xylenes, Total	ND		1.0		ug/L			09/09/13 14:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*109*		*80 - 120*		*09/09/13 14:35*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*09/09/13 14:35*	*1*
Toluene-d8 (Surr)	*111*		*80 - 120*		*09/09/13 14:35*	*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			09/09/13 12:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*65 - 140*		*09/09/13 12:50*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC) Low Level

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
DRO (C10-C28)	ND		48		ug/L		09/06/13 11:58	09/06/13 20:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*72*		*45 - 120*	*09/06/13 11:58*	*09/06/13 20:18*	*1*

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Client Sample ID: MW-3
Date Collected: 09/04/13 14:00
Date Received: 09/05/13 10:05

Lab Sample ID: 440-56329-3
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		0.50		ug/L			09/09/13 15:02	1
1,2-Dichloroethane	ND		0.50		ug/L			09/09/13 15:02	1
Benzene	ND		0.50		ug/L			09/09/13 15:02	1
Ethanol	ND		150		ug/L			09/09/13 15:02	1
Ethylbenzene	ND		0.50		ug/L			09/09/13 15:02	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			09/09/13 15:02	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			09/09/13 15:02	1
m,p-Xylene	ND		1.0		ug/L			09/09/13 15:02	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			09/09/13 15:02	1
o-Xylene	ND		0.50		ug/L			09/09/13 15:02	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			09/09/13 15:02	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			09/09/13 15:02	1
Toluene	ND		0.50		ug/L			09/09/13 15:02	1
Xylenes, Total	ND		1.0		ug/L			09/09/13 15:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*112*		*80 - 120*		*09/09/13 15:02*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*09/09/13 15:02*	*1*
Toluene-d8 (Surr)	*110*		*80 - 120*		*09/09/13 15:02*	*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			09/09/13 14:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*108*		*65 - 140*		*09/09/13 14:06*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC) Low Level

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
DRO (C10-C28)	ND		48		ug/L		09/06/13 11:58	09/06/13 20:38	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*75*		*45 - 120*	*09/06/13 11:58*	*09/06/13 20:38*	*1*

Method Summary

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

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

Protocol References:

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

Laboratory References:

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

Lab Chronicle

Client: Broadbent & Associates, Inc.
Project/Site: ARCO 0472, Oakland

TestAmerica Job ID: 440-56329-1

Client Sample ID: MW-1

Lab Sample ID: 440-56329-1

Date Collected: 09/04/13 14:20

Matrix: Water

Date Received: 09/05/13 10:05

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	129779	09/09/13 13:14	AL	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	129967	09/09/13 16:38	PH	TAL IRV
Total/NA	Prep	3510C			1050 mL	1 mL	129504	09/06/13 11:58	LBP	TAL IRV
Total/NA	Analysis	8015B		1			129620	09/06/13 19:57	KW	TAL IRV

Client Sample ID: MW-2

Lab Sample ID: 440-56329-2

Date Collected: 09/04/13 14:40

Matrix: Water

Date Received: 09/05/13 10:05

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	129779	09/09/13 14:35	AL	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	129967	09/09/13 12:50	PH	TAL IRV
Total/NA	Prep	3510C			1050 mL	1 mL	129504	09/06/13 11:58	LBP	TAL IRV
Total/NA	Analysis	8015B		1			129620	09/06/13 20:18	KW	TAL IRV

Client Sample ID: MW-3

Lab Sample ID: 440-56329-3

Date Collected: 09/04/13 14:00

Matrix: Water

Date Received: 09/05/13 10:05

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	129779	09/09/13 15:02	AL	TAL IRV
Total/NA	Analysis	8015B/5030B		1	10 mL	10 mL	129967	09/09/13 14:06	PH	TAL IRV
Total/NA	Prep	3510C			1050 mL	1 mL	129504	09/06/13 11:58	LBP	TAL IRV
Total/NA	Analysis	8015B		1			129620	09/06/13 20:38	KW	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 440-129779/4
Matrix: Water
Analysis Batch: 129779

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			09/09/13 12:10	1
1,2-Dichloroethane	ND		0.50		ug/L			09/09/13 12:10	1
Benzene	ND		0.50		ug/L			09/09/13 12:10	1
Ethanol	ND		150		ug/L			09/09/13 12:10	1
Ethylbenzene	ND		0.50		ug/L			09/09/13 12:10	1
Ethyl-t-butyl ether (ETBE)	ND		0.50		ug/L			09/09/13 12:10	1
Isopropyl Ether (DIPE)	ND		0.50		ug/L			09/09/13 12:10	1
m,p-Xylene	ND		1.0		ug/L			09/09/13 12:10	1
Methyl-t-Butyl Ether (MTBE)	ND		0.50		ug/L			09/09/13 12:10	1
o-Xylene	ND		0.50		ug/L			09/09/13 12:10	1
Tert-amyl-methyl ether (TAME)	ND		0.50		ug/L			09/09/13 12:10	1
tert-Butyl alcohol (TBA)	ND		10		ug/L			09/09/13 12:10	1
Toluene	ND		0.50		ug/L			09/09/13 12:10	1
Xylenes, Total	ND		1.0		ug/L			09/09/13 12:10	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*111*		*80 - 120*		*09/09/13 12:10*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*09/09/13 12:10*	*1*
Toluene-d8 (Surr)	*109*		*80 - 120*		*09/09/13 12:10*	*1*

Lab Sample ID: LCS 440-129779/5
Matrix: Water
Analysis Batch: 129779

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	27.8		ug/L		111	70 - 130		
1,2-Dichloroethane			25.0	27.7		ug/L		111	57 - 138		
Benzene			25.0	25.2		ug/L		101	68 - 130		
Ethanol			250	246		ug/L		98	50 - 149		
Ethylbenzene			25.0	27.7		ug/L		111	70 - 130		
Ethyl-t-butyl ether (ETBE)			25.0	26.4		ug/L		106	60 - 136		
Isopropyl Ether (DIPE)			25.0	26.7		ug/L		107	58 - 139		
m,p-Xylene			50.0	52.9		ug/L		106	70 - 130		
Methyl-t-Butyl Ether (MTBE)			25.0	26.7		ug/L		107	63 - 131		
o-Xylene			25.0	26.8		ug/L		107	70 - 130		
Tert-amyl-methyl ether (TAME)			25.0	26.2		ug/L		105	57 - 139		
tert-Butyl alcohol (TBA)			125	131		ug/L		105	70 - 130		
Toluene			25.0	27.3		ug/L		109	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*104*		*80 - 120*
Dibromofluoromethane (Surr)	*101*		*80 - 120*
Toluene-d8 (Surr)	*109*		*80 - 120*

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

Lab Sample ID: 440-56329-1 MS
Matrix: Water
Analysis Batch: 129779

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	30.4		ug/L		122	70 - 131
1,2-Dichloroethane	ND		25.0	29.1		ug/L		117	56 - 146
Benzene	ND		25.0	24.7		ug/L		99	66 - 130
Ethanol	ND		250	275		ug/L		110	54 - 150
Ethylbenzene	ND		25.0	30.2		ug/L		121	70 - 130
Ethyl-t-butyl ether (ETBE)	ND		25.0	26.2		ug/L		105	70 - 130
Isopropyl Ether (DIPE)	ND		25.0	26.3		ug/L		105	64 - 138
m,p-Xylene	ND		50.0	57.2		ug/L		114	70 - 133
Methyl-t-Butyl Ether (MTBE)	ND		25.0	26.0		ug/L		102	70 - 130
o-Xylene	ND		25.0	29.1		ug/L		116	70 - 133
Tert-amyl-methyl ether (TAME)	ND		25.0	27.2		ug/L		109	68 - 133
tert-Butyl alcohol (TBA)	ND		125	139		ug/L		111	70 - 130
Toluene	ND		25.0	28.2		ug/L		113	70 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*108*		*80 - 120*
Dibromofluoromethane (Surr)	*102*		*80 - 120*
Toluene-d8 (Surr)	*108*		*80 - 120*

Lab Sample ID: 440-56329-1 MSD
Matrix: Water
Analysis Batch: 129779

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	29.8		ug/L		119	70 - 131	2	25
1,2-Dichloroethane	ND		25.0	28.5		ug/L		114	56 - 146	2	20
Benzene	ND		25.0	23.9		ug/L		96	66 - 130	3	20
Ethanol	ND		250	273		ug/L		109	54 - 150	1	30
Ethylbenzene	ND		25.0	28.8		ug/L		115	70 - 130	5	20
Ethyl-t-butyl ether (ETBE)	ND		25.0	25.7		ug/L		103	70 - 130	2	25
Isopropyl Ether (DIPE)	ND		25.0	25.2		ug/L		101	64 - 138	4	25
m,p-Xylene	ND		50.0	54.5		ug/L		109	70 - 133	5	25
Methyl-t-Butyl Ether (MTBE)	ND		25.0	25.6		ug/L		100	70 - 130	2	25
o-Xylene	ND		25.0	27.4		ug/L		110	70 - 133	6	20
Tert-amyl-methyl ether (TAME)	ND		25.0	26.7		ug/L		107	68 - 133	2	30
tert-Butyl alcohol (TBA)	ND		125	139		ug/L		111	70 - 130	0	25
Toluene	ND		25.0	27.6		ug/L		110	70 - 130	2	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*111*		*80 - 120*
Dibromofluoromethane (Surr)	*102*		*80 - 120*
Toluene-d8 (Surr)	*110*		*80 - 120*

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

Lab Sample ID: MB 440-129967/3
Matrix: Water
Analysis Batch: 129967

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			09/09/13 11:57	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*123*		*65 - 140*		*09/09/13 11:57*	*1*

Lab Sample ID: LCS 440-129967/2
Matrix: Water
Analysis Batch: 129967

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	744		ug/L		93	80 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*203*	*LH*	*65 - 140*

Lab Sample ID: 440-56329-2 MS
Matrix: Water
Analysis Batch: 129967

Client Sample ID: MW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
GRO (C4-C12)	ND		800	727		ug/L		91	65 - 140		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*208*	*LH*	*65 - 140*

Lab Sample ID: 440-56329-2 MSD
Matrix: Water
Analysis Batch: 129967

Client Sample ID: MW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
GRO (C4-C12)	ND		800	724		ug/L		90	65 - 140	0	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*204*	*LH*	*65 - 140*

Method: 8015B - Diesel Range Organics (DRO) (GC) Low Level

Lab Sample ID: MB 440-129504/1-A
Matrix: Water
Analysis Batch: 129620

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 129504

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
DRO (C10-C28)	ND		50		ug/L		09/06/13 11:58	09/06/13 18:05	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane	*78*		*45 - 120*	*09/06/13 11:58*	*09/06/13 18:05*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC) Low Level (Continued)

Lab Sample ID: LCS 440-129504/2-A
Matrix: Water
Analysis Batch: 129620

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 129504

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
DRO (C10-C28)			1000	669		ug/L		67	40 - 115		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
n-Octacosane	*72*		*45 - 120*

Lab Sample ID: 440-56194-X-7-A MS
Matrix: Water
Analysis Batch: 129620

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 129504

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
DRO (C10-C28)	ND		957	715		ug/L		75	40 - 120		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
n-Octacosane	*75*		*45 - 120*

Lab Sample ID: 440-56194-X-7-B MSD
Matrix: Water
Analysis Batch: 129620

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 129504

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
DRO (C10-C28)	ND		957	675		ug/L		71	40 - 120	6	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
n-Octacosane	*73*		*45 - 120*

GC/MS VOA

Analysis Batch: 129779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-56329-1	MW-1	Total/NA	Water	8260B/5030B	
440-56329-1 MS	MW-1	Total/NA	Water	8260B/5030B	
440-56329-1 MSD	MW-1	Total/NA	Water	8260B/5030B	
440-56329-2	MW-2	Total/NA	Water	8260B/5030B	
440-56329-3	MW-3	Total/NA	Water	8260B/5030B	
LCS 440-129779/5	Lab Control Sample	Total/NA	Water	8260B/5030B	
MB 440-129779/4	Method Blank	Total/NA	Water	8260B/5030B	

GC VOA

Analysis Batch: 129967

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-56329-1	MW-1	Total/NA	Water	8015B/5030B	
440-56329-2	MW-2	Total/NA	Water	8015B/5030B	
440-56329-2 MS	MW-2	Total/NA	Water	8015B/5030B	
440-56329-2 MSD	MW-2	Total/NA	Water	8015B/5030B	
440-56329-3	MW-3	Total/NA	Water	8015B/5030B	
LCS 440-129967/2	Lab Control Sample	Total/NA	Water	8015B/5030B	
MB 440-129967/3	Method Blank	Total/NA	Water	8015B/5030B	

GC Semi VOA

Prep Batch: 129504

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-56194-X-7-A MS	Matrix Spike	Total/NA	Water	3510C	
440-56194-X-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	3510C	
440-56329-1	MW-1	Total/NA	Water	3510C	
440-56329-2	MW-2	Total/NA	Water	3510C	
440-56329-3	MW-3	Total/NA	Water	3510C	
LCS 440-129504/2-A	Lab Control Sample	Total/NA	Water	3510C	
MB 440-129504/1-A	Method Blank	Total/NA	Water	3510C	

Analysis Batch: 129620

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-56194-X-7-A MS	Matrix Spike	Total/NA	Water	8015B	129504
440-56194-X-7-B MSD	Matrix Spike Duplicate	Total/NA	Water	8015B	129504
440-56329-1	MW-1	Total/NA	Water	8015B	129504
440-56329-2	MW-2	Total/NA	Water	8015B	129504
440-56329-3	MW-3	Total/NA	Water	8015B	129504
LCS 440-129504/2-A	Lab Control Sample	Total/NA	Water	8015B	129504
MB 440-129504/1-A	Method Blank	Total/NA	Water	8015B	129504

Qualifiers

GC VOA

Qualifier	Qualifier Description
LH	Surrogate Recoveries were higher than QC limits

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
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 0472, Oakland

TestAmerica Job ID: 440-56329-1

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	10-13-13
California	LA Cty Sanitation Districts	9	10256	01-31-14
California	NELAP	9	1108CA	01-31-14
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-28-14 *
Hawaii	State Program	9	N/A	01-31-14
Nevada	State Program	9	CA015312007A	07-31-14
New Mexico	State Program	6	N/A	01-31-14
Northern Mariana Islands	State Program	9	MP0002	01-31-14
Oregon	NELAP	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14
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 ____

BP Site Node Path: 09-88-601 | Req Due Date (mm/dd/yy): ____ | Rush TAT: Yes ____ No ____

BP Facility No: 472 | Lab Work Order Number: 440-56329

Lab Name: Test America	Facility Address: 6415 International Blvd.	Consultant/Contractor: Broadbent and Associates, Inc.
Lab Address: 17461 Derian Avenue Suite #100, Irvine, CA 92641	City, State, ZIP Code: Oakland, CA	Consultant/Contractor Project No: 09-88-601
Lab PM: Kathleen Robb	Lead Regulatory Agency: ACEH	Address: 875 Cotting Lane, Suite G, Vacaville, CA 95688
Lab Phone: 949-261-1022	California Global ID No.: T10000000417	Consultant/Contractor PM: Kristene Tidwell
Lab Shipping Accnt: 1103-6633-7	Enfos Proposal No: 005XP-0002 / WR245684	Phone: 707-455-7290 Fax: 707-455-7295
Lab Bottle Order No:	Accounting Mode: Provision _x_ OOC-BU ____ OOC-RM ____	Email EDD To: ktidwell@broadbentinc.com and to lab enfosdoc@bp.com
Other Info:	Stage: Execute (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 UNo.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	Matrix: Is this location a well?	No. Containers / Preservative: Total Number of Container	Unpreserved	H2SO4	HNO3	HCl	Methanol	Requested Analyses: GRO by 8015M	BTEX/5 FO & EDB by 8260	1,2-DCA & Ethanol by 8260	DRO by 8015M	Comments
	MW-1	9/4/2013	1426		x		y	8	2			6		x	x	x	x	
	MW-2	9/4/2013	1440		x		y	8	2			6		x	x	x	x	
	MW-3	9/4/2013	1400		x		y	8	2			6		x	x	x	x	
	TB-472-09042013	--	--		x		n	2				x						On Hold

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.

Sampler's Name: Alex Martinez & James Ramos	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: Broadbent and Associates	James Ramos BA	9/4/13	1700			
Shipment Method: Fed Ex Ship Date: 9/4/2013	Alex Martinez BA	9/4/13	1700		9-5-13	1005
Shipment Tracking No:						

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 2-4/2-2 F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

440-56329 Chain of Custody

OO 9/6/13 9:50

Page 1 of 1

9/4/2013

Login Sample Receipt Checklist

Client: Broadbent & Associates, Inc.

Job Number: 440-56329-1

Login Number: 56329

List Source: TestAmerica Irvine

List Number: 1

Creator: Escalante, Maria

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	ALEX MARTINEZ & JAMES RAMOS
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	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:	**3Q13 GEO_WELL 472**
Facility Global ID:	**T10000000417**
Facility Name:	**ARCO # / PLUCKY LIQUORS**
File Name:	**GEO_WELL.zip**
Organization Name:	**Broadbent & Associates, Inc.**
Username:	**BROADBENT-C**
IP Address:	**216.241.56.58**
Submittal Date/Time:	**10/11/2013 10:49:43 AM**
Confirmation Number:	**5829772233**

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:	**3Q13 GW Monitoring**
Report Type:	**Monitoring Report - Semi-Annually**
Facility Global ID:	**T10000000417**
Facility Name:	**ARCO # / PLUCKY LIQUORS**
File Name:	**440-56329-1_17 Sep 13 1329_EDF.zip**
Organization Name:	**Broadbent & Associates, Inc.**
Username:	**BROADBENT-C**
IP Address:	**216.241.56.58**
Submittal Date/Time:	**10/11/2013 10:48:14 AM**
Confirmation Number:	**1058155119**

VIEW QC REPORT

VIEW DETECTIONS REPORT