Atlantic Richfield Company

Shannon Couch
Operations Project Manager

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RECEIVED

3:01 pm, Nov 01, 2011

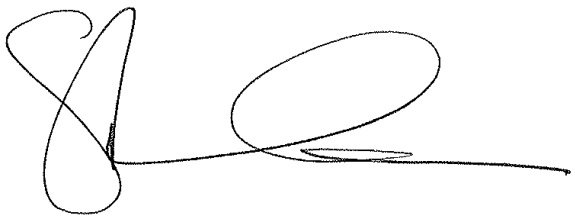
Alameda County
Environmental Health

October 31, 2011

Re: Third Quarter 2011 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,



Shannon Couch
Operations Project Manager

Attachment

Broadbent & Associates, Inc.
1324 Mangrove Ave., Suite 212
Chico, CA 95926
Voice (530) 566-1400
Fax (530) 566-1401

October 31, 2011

Project No. 09-88-601

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

Attn.: Ms. Shannon Couch

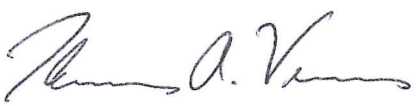
Re: Third Quarter 2011 Monitoring Report, Former Richfield Oil Company Station #472, 6415 International Boulevard, Oakland; ACEH Case #RO0002982

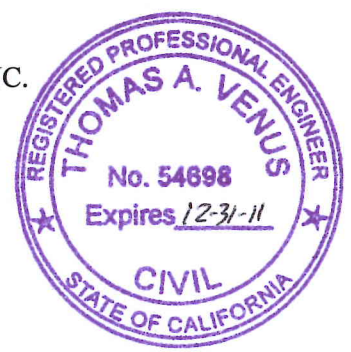
Dear Ms. Couch:

Attached is the Third Quarter 2011 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 2011.

Should you have questions regarding the work performed or results obtained, please do not hesitate to contact me at 530-566-1400.

Sincerely,
BROADBENT & ASSOCIATES, INC.





Thomas A. Venus, PE
Senior Engineer

Enclosures

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

THIRD QUARTER 2011
MONITORING REPORT
FORMER STATION #472, OAKLAND, CALIFORNIA

Broadbent & Associates, Inc. (BAI) is pleased to present this *Third Quarter 2011 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
Client Project Manager / Title:	Ms. Shannon Couch / RM Operations Project Manager
BAI Contact:	Mr. Tom Venus, PE / (530) 566-1400
BAI Project No.:	09-88-601
Primary Regulatory Agency / ID No.:	ACEH, Case #RO00002982 (GeoTracker ID #T10000000417)
Current phase of project:	Monitoring/Case Closure Petition
List of Acronyms / Abbreviations:	See end of report text for list of acronyms/abbreviations used in report.

WORK PERFORMED THIS QUARTER (Third Quarter 2011):

1. Submitted *Second Quarter 2010 Status Report* (BAI, 7/5/2011).
2. Conducted groundwater monitoring/sampling for Third Quarter 2011 on July 18, 2011.

WORK SCHEDULED FOR NEXT QUARTER (Fourth Quarter 2011):

1. Submit *Third Quarter 2011 Monitoring Report* (contained herein).
2. No environmental field work is presently scheduled at Former Station #472 during Fourth Quarter 2011.

ADDITIONAL WORK RECOMMENDED FOR NEXT QUARTER (Fourth Quarter 2011)

1. Submit *Case Evaluation and Justification for No Further Action.*

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:	7.99 (MW-1) to 9.20 (MW-3)	(ft below TOC)
Gradient direction:	NA	(compass direction)
Gradient magnitude:	NA	(ft/ft)
Average change in elevation:	-0.34	(ft since last measurement)

Laboratory Analytical Data

Summary: DRO was detected in MW-1 at 110 µg/L (quantitation of unknown hydrocarbons based on diesel); other petroleum hydrocarbon constituents were not detected above the reporting limits. DRO decreased in MW-1 relative to First Quarter 2011.

ACTIVITIES CONDUCTED & RESULTS:

Third Quarter 2011groundwater monitoring was conducted on July 18, 2011 by BAI personnel in accordance with the monitoring plan summary detailed above. No irregularities were noted during water level gauging with the exception of an abandoned car parked atop well MW-2, blocking access. When BAI personnel spoke with the manager of the auto repair shop on-site, he was informed the car had not been moved for some time and the owner was unknown. Light, Non-Aqueous Phase Liquid (LNAPL, or free product) was not noted to be present in the wells monitored during this event. Depth to water measurements ranged from 7.99 ft at MW-1 to 9.20 ft at MW-3. Resulting groundwater surface elevations ranged from 16.18 ft at MW-1 to 15.53 ft at MW-3. Groundwater elevations are summarized in Table 1. A potentiometric horizontal groundwater gradient was unable to be determined due to only two points of field data. 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.

Groundwater samples were collected on July 18, 2011 consistent with the current monitoring schedule. No irregularities were reported during sampling with the exception of an abandoned car parked atop well MW-2, blocking access. Samples were submitted under chain-of-custody protocol to Calscience Environmental Laboratories, Inc. (Garden Grove, California) for analysis of Gasoline-Range Organics (GRO, C6-C12) and Diesel-Range Organics (DRO, C10-C28) by EPA Method 8015M; for Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), Methyl Tertiary Butyl Ether (MTBE), Ethyl Tertiary Butyl Ether (ETBE), Tert-Amyl Methyl Ether (TAME), Di-Isopropyl Ether (DIPE), 1,2-Dibromomethane (EDB), 1,2-Dichloroethane (1,2-DCA), Tert-Butyl Alcohol (TBA) and Ethanol by EPA Method 8260. The DRO analysis by EPA Method 8015M for sample MW-1 was requested to be performed with and without the silica-gel extraction procedure. No significant irregularities were encountered during analysis of the samples with the following exception: The laboratory flagged the concentration reported during the DRO analysis of MW-1 with "LX – Quantitation of unknown hydrocarbon(s) in sample based on diesel. The laboratory analytical report, including chain-of-custody documentation, is provided in Appendix C.

Hydrocarbons in the DRO range were detected above the laboratory reporting limit at a concentration of 110 micrograms per liter (µg/L, parts per billion, ppb) in well MW-1 by standard procedure, and 83 µg/L following silica-gel extraction (both with the laboratory flag "LX = Quantitation of unknown hydrocarbon(s) in sample based on Diesel"). The remaining analytes were not detected above their laboratory reporting limits in the wells sampled this monitoring event. Groundwater monitoring laboratory analytical results are summarized in Table 1 and Table 2. The most recent GRO, Benzene, and MTBE concentrations are also presented in Drawing 2. Groundwater monitoring data (GEO_WELL) and laboratory analytical results (EDF) were uploaded to the GeoTracker AB2886 database. Consistent with past practice, the non-silica-gel extraction concentration for MW-1 was that reported to GeoTracker. Upload confirmation receipts are provided in Appendix D.

DISCUSSION:

Groundwater levels were between historic minimum and maximum elevations for each well. Due to just having two groundwater elevations, the potentiometric horizontal groundwater gradient was unable to be calculated.

This event's detected analytical concentrations were within the historic minimum and maximum ranges recorded for each well. The laboratory noted that the MW-1 concentration of 110 µg/L reported was a quantitation of unknown hydrocarbon(s) in sample based on diesel. This is consistent with past analyses. In the past, the laboratory noted the chromatogram did not resemble the laboratory standard for diesel and may be due to significant breakdown of aged fuel. No other constituents analyzed were detected above the laboratory reporting limits.

RECOMMENDATIONS:

Consistent with the revised monitoring schedule, no monitoring or sampling field work is planned for Fourth Quarter 2011. BAI has recently completed a *Case Evaluation and Justification for No Further Action* Report. In light of the findings contained therein, BAI recommends discontinuation of the periodic groundwater monitoring at this site. ACEH is requested to review the case as a candidate for site closure.

LIMITATIONS:

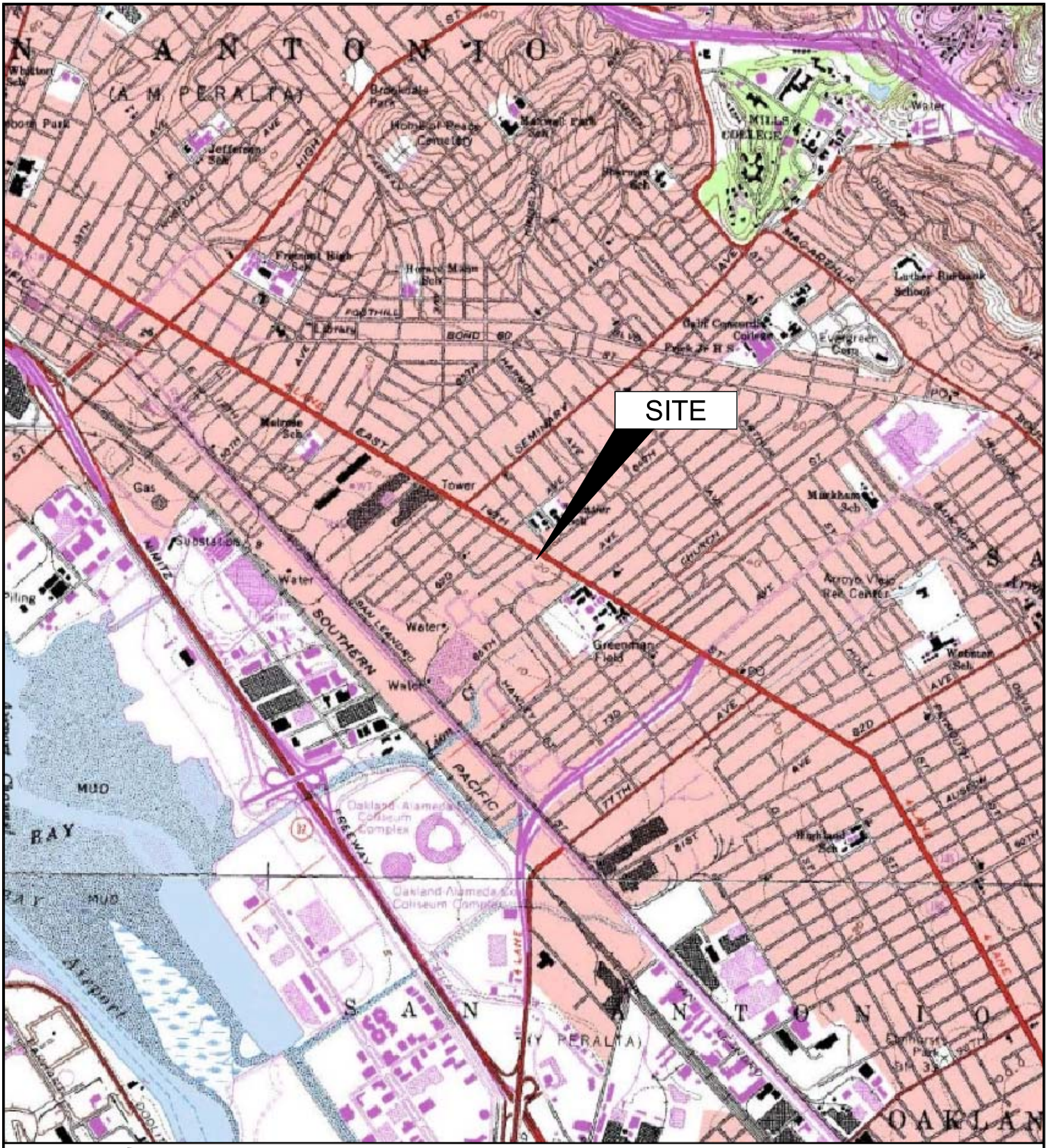
The findings presented in this report are based upon observations of field personnel, points investigated, results of laboratory tests performed by Calscience Environmental Laboratories, Inc. (Garden Grove, California), and our understanding of ACEH requirements. Our services were performed in accordance 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, 18 July 2011
Table 1:	Summary of Groundwater Monitoring Data: Water Elevations and Laboratory Analyses
Table 2:	Summary of Fuel Additives Analytical Data
Table 3:	Historic Groundwater Gradient – Direction and Magnitude
Appendix A:	Field Methods
Appendix B:	Field Data Sheets
Appendix C:	Laboratory Report and Chain-of-Custody Documentation
Appendix D:	GeoTracker Upload Confirmation Receipts

LIST OF COMMONLY USED ACCRONYMS/ABBREVIATIONS:

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



N

0 2000 4000

APPROXIMATE SCALE (ft)

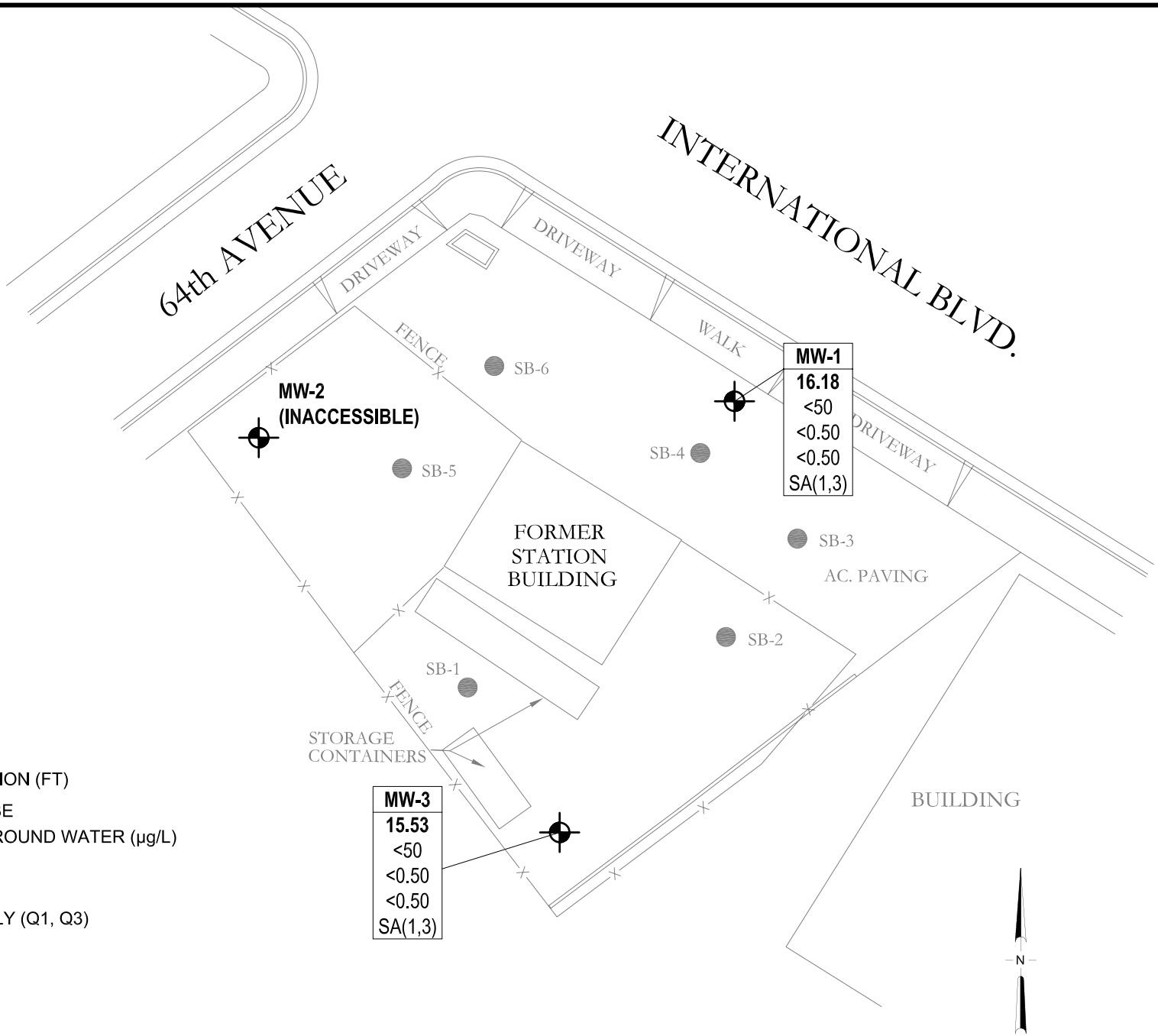
IMAGE SOURCE: USGS

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL
1324 Mangrove Ave. Suite 212, Chico, CA 95926
Project No.: 09-88-601 Date: 07/31/09

Former Station #472
6415 International Boulevard
Oakland, California

Site Location Map

Drawing
1



LEGEND

- MONITORING WELL
- SOIL BORING

Well	WELL DESIGNATION
ELEV	GROUNDWATER ELEVATION (FT)
GRO Benzene MTBE	GRO, BENZENE AND MTBE CONCENTRATIONS IN GROUND WATER (µg/L)
Q/SA/A	SAMPLING FREQUENCY

SA(1,3) SAMPLED SEMI-ANNUALLY (Q1, Q3)

0 30 60

SCALE (ft)

BROADBENT & ASSOCIATES, INC.

ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

1324 Mangrove Ave. Suite 212, Chico, California

Project No.: 09-88-601 Date: 8/16/2011

Former Station #472
6415 International Boulevard
Oakland, California

Groundwater Elevation and
and Analytical Summary Map
18 July 2011

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 Elevation (feet)	DTW (feet)	Product Thickness (feet)	Water Level Elevation (feet)	Concentrations in µg/L								DO (mg/L)	pH	Footnote
						GRO/ TPHg	DRO/ TPHd	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	MtBE	TOG			
MW-1																
8/25/2009	P	24.17	9.29	0.00	14.88	530	190	<0.50	<0.50	<0.50	<0.50	0.54	--	--	7.21	LX (DRO)
11/11/2009	NP		8.22	0.00	15.95	<50	--	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	
2/17/2010	NP		7.36	0.00	16.81	<50	70	<0.50	<0.50	<0.50	<0.50	<0.50	--	1.69	7.03	LX (DRO)
6/2/2010	NP		7.61	0.00	16.56	110	120	<0.50	<0.50	<0.50	<0.50	<0.50	--	1.21	7.0	LW (GRO), LX (DRO)
9/3/2010	NP		8.99	0.00	15.18	1,000	190	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.74	7.30	LW (GRO), LX (DRO)
2/8/2011	NP		7.69	0.00	16.48	<50	53	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.64	6.8	LX (DRO)
7/18/2011	**NP**		**7.99**	**0.00**	**16.18**	**<50**	**110**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**--**	**0.70**	**7.2**	**LX (DRO)**
MW-2																
8/25/2009	P	23.62	9.65	0.00	13.97	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	7.30	
11/11/2009	NP		8.09	0.00	15.53	<50	--	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	
2/17/2010	P		6.80	0.00	16.82	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	2.62	7.15	
6/2/2010	NP		7.11	0.00	16.51	<50	65	<0.50	<0.50	<0.50	<0.50	<0.50	--	2.85	7.3	LX (DRO)
9/3/2010	NP		8.79	0.00	14.83	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	1.19	7.90	
2/8/2011	NP		7.21	0.00	16.41	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	2.15	7.0	
7/18/2011	**--**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**Inaccessible**
MW-3																
8/25/2009	P	24.73	11.07	0.00	13.66	63	85	<0.50	1.2	<0.50	<0.50	<0.50	--	--	7.09	
11/11/2009	NP		9.56	0.00	15.17	88	--	<0.50	<0.50	<0.50	<0.50	<0.50	--	--	--	LW (GRO)
2/17/2010	NP		8.52	0.00	16.21	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	2.04	7.09	
6/2/2010	NP		8.64	0.00	16.09	100	130	<0.50	<0.50	<0.50	<0.50	<0.50	--	1.22	7.1	LW (GRO), LX (DRO)
9/3/2010	NP		8.41	0.00	16.32	200	140	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.87	6.9	LW (GRO), LX (DRO)
2/8/2011	NP		8.82	0.00	15.91	<50	<50	<0.50	<0.50	<0.50	<0.50	<0.50	--	0.88	7.0	
7/18/2011	**NP**		**9.20**	**0.00**	**15.53**	**<50**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**--**	**0.93**	**6.9**	

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, range C4-C12
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.

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**	
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**
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	
7/18/2011	**<300**	**<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 = Di-isopropyl ether
EDB = 1,2-Dibromoethane
ETBE = Ethyl tert-butyl ether
MTBE = Methyl tert-butyl ether
TAME = tert-Amyl methyl ether
TBA = tert-Butyl alcohol
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)**

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 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.

[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.

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 & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

DAILY REPORT
Page 1 of 1

Project: BP 472 Project No.: 09-88-601
Field Representative(s): SB & JR Day: Monday Date: 7/18/11
Time Onsite: From: 0900 To: 1070 ; From: _____ To: _____ ; From: _____ To: _____

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

Weather: Sunny
Equipment In Use: _____
Visitors: _____

TIME:	WORK DESCRIPTION:
0900	On-site
0930	Set up on MW-1 Sample @ 0945
0948	Car parked over MW-2. I talked to the manager of the store he said he did not know who owns the car and it been there for awhile. landlord?
0950	Set up on MW-3 Sample @ 1000
1070	off Site

Signature: _____

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

FIELD DATA REPORT

DATE: 7/12/11
PERSONNEL: SB & JH
WEATHER: Sunny

PROJECT NO.: 07-88-601
COMMENTS: 577

Equip:	Geosquirt	Tubing	Bailers	DO	wli	Ec/pH

Well ID	Time	MEASURING POINT	DTW (FT)	PRODUCT THICKNESS	pH	Cond. (X100)	Temp. (C/F)	DO (mg/l)	Redox (mV)	Iron (mg/l)	Alk. (mg/l)	WELL HEAD CONDITION: VAULT, BOLTS, CAP, LOCK, ETC
MW-1	0936	TOC	7.99									Car parked over well
MW-2	—	1	—									
MW-3	0952	—	9.20									

G:\ADMINISTRATION\BAI FORMS\WATER LVL MEAS FORM

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

Groundwater Sampling Data Sheet

Well I.D.: MW-1
Project Name/Location: BP 472 Project #: 09-88-601
Sampler's Name: SB & JN Date: 7/18/11
Purging Equipment: —
Sampling Equipment: bailer
Casing Type: PVC

Casing Diameter:		4	inch
Total Well Depth:		17.00	feet
Depth to Water:	-	7.99	feet
Water Column Thickness:	=		feet
Unit Casing Volume*:	x		gallon / foot
Casing Water Volume:	=		gallons
Casing Volume:	x	3	each
Estimated Purge Volume:	=		gallons

***UNIT CASING VOLUMES**
2" = 0.16 gal/lin ft.
3" = 0.37 gal/lin ft.
4" = 0.65 gal/lin ft.
6" = 1.47 gal/lin ft.

Free product measurement (if present):

Purged (gallons)	Time (24:00)	DO	ORP (mV)	Fe	Conductance (µS)	Temperature (~~Fahrenheit~~)	pH	Observations
0	0941	0.70	105	X	7133	21.5	7.2	
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				

Total Water Volume Purged: 0 gallons
Depth to Water at Sample Collection: — feet
Sample Collection Time: 0945 Purged Dry? (Y / (N))

Comments: NP

BROADBENT & ASSOCIATES, INC.
ENGINEERING, WATER RESOURCES & ENVIRONMENTAL

Groundwater Sampling Data Sheet

Well I.D.: MW-3
Project Name/Location: BP 472 Project #: 09-88-6071
Sampler's Name: SB & JR Date: 7/18/11
Purging Equipment: —
Sampling Equipment: Bailer
Casing Type: PVC
Casing Diameter: 4 inch
Total Well Depth: 17.0 feet
Depth to Water: - 9.20 feet
Water Column Thickness: = _____ feet
Unit Casing Volume*: x _____ gallon / foot
Casing Water Volume: = _____ gallons
Casing Volume: x 3 each
Estimated Purge Volume: = _____ gallons
Free product measurement (if present): _____

***UNIT CASING VOLUMES**
2" = 0.16 gal/lin ft.
3" = 0.37 gal/lin ft.
4" = 0.65 gal/lin ft.
6" = 1.47 gal/lin ft.

Purged (gallons)	Time (24:00)	DO	ORP (mV)	Fe	Conductance (µS)	Temperature (Fahrenheit)	pH	Observations
0	0958	0.93	13	—	1042	18.5	6.9	
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				
		X	X	X				

Total Water Volume Purged: 0 gallons
Depth to Water at Sample Collection: — feet
Sample Collection Time: 1000 Purged Dry? (Y (N)

Comments: NP

APPENDIX C

LABORATORY REPORT
AND CHAIN-OF-CUSTODY DOCUMENTATION

Calscience
Environmental & Marine Chemistry Laboratories

CALSCIENCE

WORK ORDER NUMBER: 11-07-1163

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Broadbent & Associates, Inc.

Client Project Name: ARCO 472

Attention: Tom Venus
1324 Mangrove Ave, Ste 212
Chico, CA 95926-2642

Approved for release on 08/1/2011 by:
Richard Villafania
Project Manager

ResultLink

Email your PM

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

Calscience Environmental Laboratories, Inc.

Analytical Report

Broadbent & Associates, Inc.	Date Received: 07/19/11
1324 Mangrove Ave, Ste 212	Work Order No: 11-07-1163
Chico, CA 95926-2642	Preparation: EPA 3510C
	Method: EPA 8015B (M)

Project: ARCO 472 Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1	**11-07-1163-1-G**	**07/18/11 09:45**	**Aqueous**	**GC 27**	**07/22/11**	**07/23/11 06:27**	**110722B06**

Comment(s): -LX Quantitated against diesel fuel.

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics (C10-C28)	110	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	84	68-140	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1	**11-07-1163-1-G**	**07/18/11 09:45**	**Aqueous**	**GC 27**	**07/22/11**	**07/26/11 04:13**	**110722B06**

Comment(s): -SG A silica gel cleanup procedure was performed.
-LX Quantitated against diesel fuel.

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics (C10-C28)	83	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	98	68-140	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-3	**11-07-1163-2-G**	**07/18/11 10:00**	**Aqueous**	**GC 27**	**07/22/11**	**07/23/11 06:45**	**110722B06**

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics (C10-C28)	ND	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	86	68-140	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-699-280**	**N/A**	**Aqueous**	**GC 27**	**07/22/11**	**07/23/11 00:42**	**110722B06**

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics (C10-C28)	ND	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
Decachlorobiphenyl	85	68-140	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Broadbent & Associates, Inc.		Date Received:	07/19/11
1324 Mangrove Ave, Ste 212		Work Order No:	11-07-1163
Chico, CA 95926-2642		Preparation:	EPA 5030C
		Method:	EPA 8015B (M)

Project: ARCO 472

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1	**11-07-1163-1-E**	**07/18/11 09:45**	**Aqueous**	**GC 57**	**07/20/11**	**07/20/11 14:29**	**110720B01**

Parameter	Result	RL	DF	Qual	Units
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
1,4-Bromofluorobenzene	67	38-134	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-3	**11-07-1163-2-D**	**07/18/11 10:00**	**Aqueous**	**GC 57**	**07/20/11**	**07/20/11 15:01**	**110720B01**

Parameter	Result	RL	DF	Qual	Units
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
1,4-Bromofluorobenzene	69	38-134	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-695-1,115**	**N/A**	**Aqueous**	**GC 57**	**07/20/11**	**07/20/11 11:21**	**110720B01**

Parameter	Result	RL	DF	Qual	Units
Gasoline Range Organics (C6-C12)	ND	50	1		ug/L

Surrogates:	REC (%)	Control Limits	Qual
1,4-Bromofluorobenzene	64	38-134	

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Broadbent & Associates, Inc.	Date Received:	07/19/11
1324 Mangrove Ave, Ste 212	Work Order No:	11-07-1163
Chico, CA 95926-2642	Preparation:	EPA 5030C
	Method:	EPA 8260B
	Units:	ug/L

Project: ARCO 472

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-1	**11-07-1163-1-A**	**07/18/11 09:45**	**Aqueous**	**GC/MS L**	**07/20/11**	**07/20/11 12:16**	**110720L02**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	0.50	1		Methyl-t-Butyl Ether (MTBE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alcohol (TBA)	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl Ether (DIPE)	ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl Ether (ETBE)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Methyl Ether (TAME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	ND	300	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
1,4-Bromofluorobenzene	98	68-120			Dibromofluoromethane	103	80-127		
1,2-Dichloroethane-d4	112	80-128			Toluene-d8	100	80-120		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
MW-3	**11-07-1163-2-A**	**07/18/11 10:00**	**Aqueous**	**GC/MS L**	**07/20/11**	**07/20/11 12:44**	**110720L02**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	0.50	1		Methyl-t-Butyl Ether (MTBE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alcohol (TBA)	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl Ether (DIPE)	ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl Ether (ETBE)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Methyl Ether (TAME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	ND	300	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
1,4-Bromofluorobenzene	94	68-120			Dibromofluoromethane	100	80-127		
1,2-Dichloroethane-d4	107	80-128			Toluene-d8	99	80-120		

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-703-1,793**	**N/A**	**Aqueous**	**GC/MS L**	**07/20/11**	**07/20/11 11:49**	**110720L02**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	0.50	1		Methyl-t-Butyl Ether (MTBE)	ND	0.50	1	
1,2-Dibromoethane	ND	0.50	1		Tert-Butyl Alcohol (TBA)	ND	10	1	
1,2-Dichloroethane	ND	0.50	1		Diisopropyl Ether (DIPE)	ND	0.50	1	
Ethylbenzene	ND	0.50	1		Ethyl-t-Butyl Ether (ETBE)	ND	0.50	1	
Toluene	ND	0.50	1		Tert-Amyl-Methyl Ether (TAME)	ND	0.50	1	
Xylenes (total)	ND	0.50	1		Ethanol	ND	300	1	
Surrogates:	REC (%)	Control Limits		Qual	Surrogates:	REC (%)	Control Limits		Qual
1,4-Bromofluorobenzene	98	68-120			Dibromofluoromethane	100	80-127		
1,2-Dichloroethane-d4	98	80-128			Toluene-d8	101	80-120		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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

Date Received: 07/19/11
Work Order No: 11-07-1163
Preparation: EPA 5030C
Method: EPA 8015B (M)

Project ARCO 472

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
11-07-1155-1	**Aqueous**	**GC 57**	**07/20/11**	**07/20/11**	**110720S01**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Gasoline Range Organics (C6-C12)	81	78	38-134	3	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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

Date Received: 07/19/11
Work Order No: 11-07-1163
Preparation: EPA 5030C
Method: EPA 8260B

Project ARCO 472

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
MW-1	**Aqueous**	**GC/MS L**	**07/20/11**	**07/20/11**	**110720S01**

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Benzene	103	101	76-124	2	0-20	
Carbon Tetrachloride	113	109	74-134	4	0-20	
Chlorobenzene	107	105	80-120	2	0-20	
1,2-Dibromoethane	105	101	80-120	4	0-20	
1,2-Dichlorobenzene	107	106	80-120	0	0-20	
1,2-Dichloroethane	105	103	80-120	2	0-20	
Ethylbenzene	108	106	78-126	2	0-20	
Toluene	105	102	80-120	3	0-20	
Trichloroethene	107	103	77-120	4	0-20	
Methyl-t-Butyl Ether (MTBE)	122	119	67-121	2	0-49	LM,AY
Tert-Butyl Alcohol (TBA)	121	113	36-162	7	0-30	
Diisopropyl Ether (DIPE)	116	120	60-138	4	0-45	
Ethyl-t-Butyl Ether (ETBE)	111	118	69-123	6	0-30	
Tert-Amyl-Methyl Ether (TAME)	107	105	65-120	2	0-20	
Ethanol	121	139	30-180	13	0-72	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Broadbent & Associates, Inc.	Date Received:	N/A
1324 Mangrove Ave, Ste 212	Work Order No:	11-07-1163
Chico, CA 95926-2642	Preparation:	EPA 3510C
	Method:	EPA 8015B (M)

Project: ARCO 472

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-699-280	**Aqueous**	**GC 27**	**07/22/11**	**07/23/11**	**110722B06**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Diesel Range Organics (C10-C28)	97	101	75-117	4	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Broadbent & Associates, Inc.	Date Received: N/A
1324 Mangrove Ave, Ste 212	Work Order No: 11-07-1163
Chico, CA 95926-2642	Preparation: EPA 5030C
	Method: EPA 8015B (M)

Project: ARCO 472

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-695-1,115	**Aqueous**	**GC 57**	**07/20/11**	**07/20/11**	**110720B01**

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Gasoline Range Organics (C6-C12)	94	93	78-120	1	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

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

Date Received: N/A
Work Order No: 11-07-1163
Preparation: EPA 5030C
Method: EPA 8260B

Project: ARCO 472

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-703-1,793	**Aqueous**	**GC/MS L**	**07/20/11**	**07/20/11**	**110720L02**

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Benzene	95	104	80-120	73-127	9	0-20	
Carbon Tetrachloride	107	115	74-134	64-144	7	0-20	
Chlorobenzene	99	108	80-120	73-127	8	0-20	
1,2-Dibromoethane	93	100	79-121	72-128	7	0-20	
1,2-Dichlorobenzene	97	107	80-120	73-127	10	0-20	
1,2-Dichloroethane	98	104	80-120	73-127	6	0-20	
Ethylbenzene	101	110	80-120	73-127	9	0-20	
Toluene	94	105	80-120	73-127	11	0-20	
Trichloroethene	95	106	79-127	71-135	11	0-20	
Methyl-t-Butyl Ether (MTBE)	99	114	69-123	60-132	14	0-20	
Tert-Butyl Alcohol (TBA)	109	104	63-123	53-133	5	0-20	
Diisopropyl Ether (DIPE)	102	118	59-137	46-150	15	0-37	
Ethyl-t-Butyl Ether (ETBE)	100	108	69-123	60-132	8	0-20	
Tert-Amyl-Methyl Ether (TAME)	98	105	70-120	62-128	7	0-20	
Ethanol	122	111	28-160	6-182	10	0-57	

Total number of LCS compounds : 15
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 11-07-1163

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

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

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

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Page ____ of ____

BP/ARC Project Name: ARCO 472 | Req Due Date (mm/dd/yy): STD-TAT | Rush TAT: Yes ____ No X

BP/ARC Facility No: 472 | Lab Work Order Number: ____

Lab Name: Cal Science	BP/ARC Facility Address: 6415 International Boulevard	Consultant/Contractor: Broadbent & Associates, Inc.
Lab Address: 7440 Lincoln Way	City, State, ZIP Code: Oakland, CA 94621	Consultant/Contractor Project No: 09-88-601-401-880
Lab PM: Richard Villafania	Lead Regulatory Agency: ACEH	Address: 1324 Mangrove Ave. Ste. 212, Chico, CA 95926
Lab Phone: 714-895-5494 / 714-895-7501 (fax)	California Global ID No.: T10000000417	Consultant/Contractor PM: Tom Venus
Lab Shipping Accnt: 9255	Enfos Proposal No: 005XP-0001	Phone: 530-566-1400 / 530-566-1401 (fax)
Lab Bottle Order No:	Accounting Mode: Provision X OOC-BU ____ OOC-RM ____	Email EDD To: tvenus@broadbentinc.com
Other Info:	Stage: Execute (4) Activity: Project Spend (80)	Invoice To: BP/ARC X Contractor ____

BP/ARC EBM: Shannon Couch
EBM Phone: 925-275-3804
EBM Email: shannon.couch@bp.com

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

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	Matrix: [blank]	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	HCl	Methanol	[blank]	Requested Analyses: GRO / DRO (8015M)	BTEX, 5 Oxys, EDB, 1,2-DCA, and Ethanol	[blank]	[blank]	[blank]	[blank]	[blank]	[blank]	[blank]	Comments
1	MW-1	7-18-11	0945		X			8	X			X			X	X								DRO Analysis WITH Silica-Gel Extraction
	~~MW-2~~ (DR)				~~X~~				~~X~~			~~X~~			~~X~~	~~X~~								if analysis WITHOUT detects DRO
2	MW-3	7-18-11	1000		X			8	X			X			X	X								in samples MW-1 through MW-3
3	TB - 472 - 110718	7-18-11	1005		X			2				X												ON HOLD

Sampler's Name: James R / Sam B	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: BAI	James Ramm	7-18-11	1500	[signature]	7/19/11	10:30
Shipment Method: GSO Ship Date: 7-18-11						
Shipment Tracking No: 107158385						

Special Instructions: Please cc results to bpedf@broadbentinc.com

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

BP/ARC LaMP COC Rev. 6 01/01/2009

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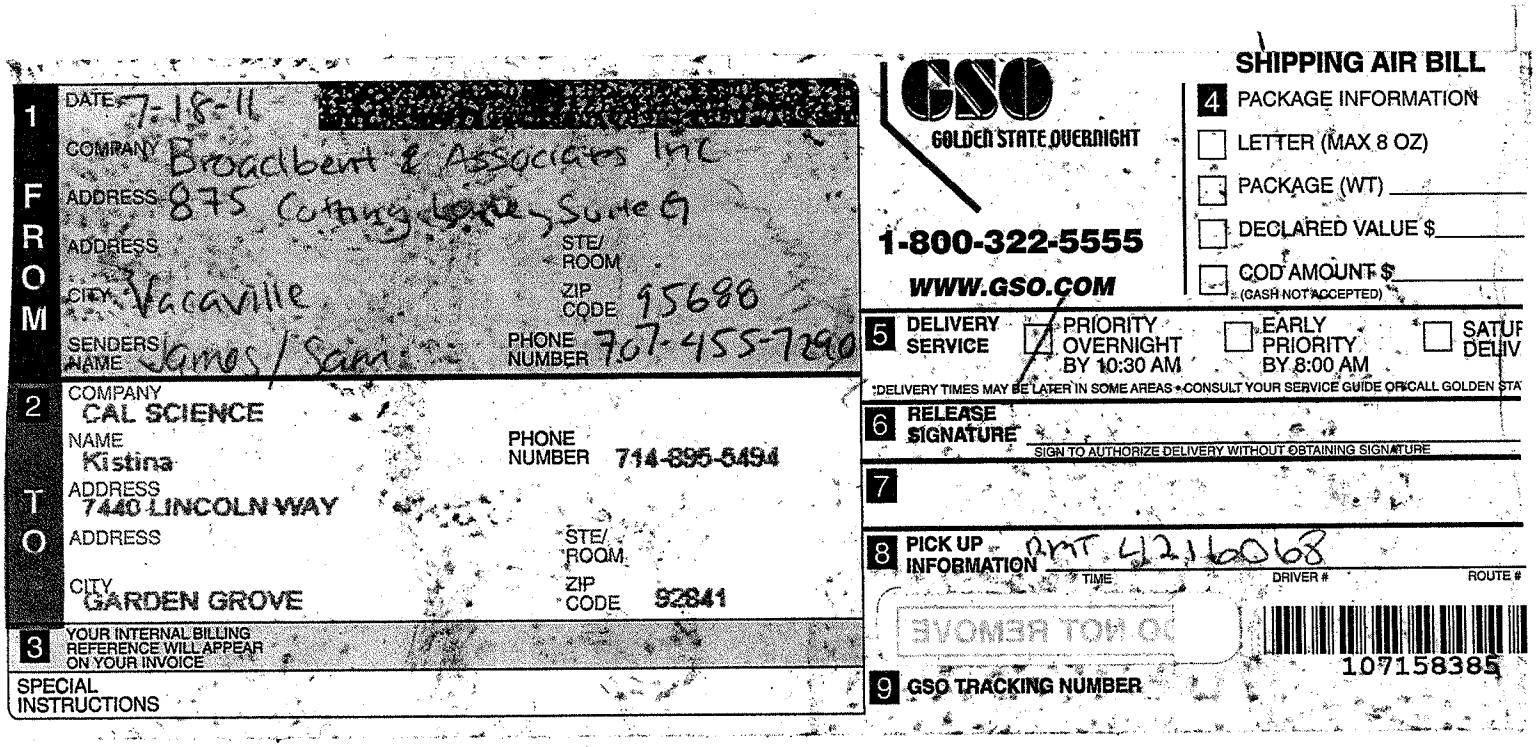

GSO
GOLDEN STATE OVERNIGHT

SHIPPING AIR BILL

1 FROM
DATE 7-18-11
COMPANY Broadbent & Associates Inc
ADDRESS 875 Cotting Lane, Suite G
ADDRESS
STE/ ROOM
CITY Vacaville
ZIP CODE 95688
SENDERS NAME Gino's / Sam
PHONE NUMBER 707-455-7290

2 TO
COMPANY CAL SCIENCE
NAME Kistina
PHONE NUMBER 714-895-5494
ADDRESS 7440 LINCOLN WAY
ADDRESS
STE/ ROOM
CITY GARDEN GROVE
ZIP CODE 92841

3 YOUR INTERNAL BILLING REFERENCE WILL APPEAR ON YOUR INVOICE

SPECIAL INSTRUCTIONS

1-800-322-5555
WWW.GSO.COM

4 PACKAGE INFORMATION
☐ LETTER (MAX 8 OZ)
☐ PACKAGE (WT) _____
☐ DECLARED VALUE $_____
☐ COD AMOUNT $_____ (CASH NOT ACCEPTED)

5 DELIVERY SERVICE
☒ PRIORITY OVERNIGHT BY 10:30 AM
☐ EARLY PRIORITY BY 8:00 AM
☐ SATUR DELIV

*DELIVERY TIMES MAY BE LATER IN SOME AREAS • CONSULT YOUR SERVICE GUIDE OR CALL GOLDEN STA

6 RELEASE SIGNATURE _____
SIGN TO AUTHORIZE DELIVERY WITHOUT OBTAINING SIGNATURE

7

8 PICK UP INFORMATION RMT 42160 68
TIME DRIVER # ROUTE #

DO NOT REMOVE

9 GSO TRACKING NUMBER 107158385

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-07-1163

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: BAJ

DATE: 07/19/11

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 1.2 °C + 0.5 °C (CF) = 1.7 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter Initial: RS

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Initial: RS

☐ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present Initial: WSc

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☐	☑	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	☑	☐	☐
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☑	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Water: ☐VOA ☑VOA**h** (6) ☐VOA**na$_2$** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na$_2$** ☐1AGB**s**

☐500AGB ☑500AGJ (2) ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐500PB ☐500PB**na**

☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na$_2$** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Summa® **Other:** ☐_____ **Trip Blank Lot#:** 110601A **Labeled/Checked by:** WSc

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** RS

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:** $Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **znna:** $ZnAc_2$+NaOH **f:** Field-filtered **Scanned by:** RS

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-07- 1 1 6 3

SAMPLE ANOMALY FORM

SAMPLES - CONTAINERS & LABELS:

Comments:

- ☐ **Sample(s)/Container(s) NOT RECEIVED but listed on COC**
- ☐ **Sample(s)/Container(s) received but NOT LISTED on COC**
- ☐ **Holding time expired** – list sample ID(s) and test
- ☐ **Insufficient quantities for analysis** – list test
- ☐ **Improper container(s) used** – list test
- ☐ **Improper preservative used** – list test
- ☐ **No preservative noted on COC or label** – list test & notify lab
- ☐ **Sample labels illegible** – note test/container type
- ☑ **Sample label(s) do not match COC** – Note in comments
  - ☐ **Sample ID**
  - ☐ **Date and/or Time Collected**
  - ☐ **Project Information**
  - ☑ **# of Container(s)**
  - ☐ **Analysis**
- ☐ **Sample container(s) compromised** – Note in comments
  - ☐ **Water present in sample container**
  - ☐ **Broken**
- ☐ **Sample container(s) not labeled**
- ☐ **Air sample container(s) compromised** – Note in comments
  - ☐ **Flat**
  - ☐ **Very low in volume**
  - ☐ **Leaking (Not transferred - duplicate bag submitted)**
  - ☐ **Leaking (transferred into Calscience Tedlar® Bag*)**
  - ☐ **Leaking (transferred into Client's Tedlar® Bag*)**
- ☐ **Other:** _____

Comments: -3) received / Trip blank only

HEADSPACE – Containers with Bubble > 6mm or ¼ inch:

Sample #	Container ID(s)	# of Vials Received	Sample #	Container ID(s)	# of Vials Received	Sample #	Container ID(s)	# of Cont. received	Analysis

Comments: _____

*Transferred at Client's request.

Initial / Date: WS 07/19/11

APPENDIX D

GEOTRACKER UPLOAD CONFIRMATION RECEIPTS

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER ESI

UPLOADING A GEO_WELL FILE

SUCCESS

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

Submittal Type:	**GEO_WELL**
Submittal Title:	**3Q11 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:	**67.118.40.90**
Submittal Date/Time:	**8/16/2011 2:47:39 PM**
Confirmation Number:	**6612934887**

STATE WATER RESOURCES CONTROL BOARD

GEOTRACKER ESI

UPLOADING A EDF FILE

SUCCESS

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

Submittal Type:	**EDF - Monitoring Report - Semi-Annually**
Submittal Title:	**3Q11 GW Monitoring**
Facility Global ID:	**T10000000417**
Facility Name:	**ARCO # / PLUCKY LIQUORS**
File Name:	**11071163.zip**
Organization Name:	**Broadbent & Associates, Inc.**
Username:	**BROADBENT-C**
IP Address:	**67.118.40.90**
Submittal Date/Time:	**8/16/2011 2:50:10 PM**
Confirmation Number:	**8123956263**

VIEW QC REPORT

VIEW DETECTIONS REPORT