Atlantic Richfield Company

Chuck Carmel
Remediation Management Project Manager

PO Box 1257
San Ramon, CA 94583
Phone: (925) 275-3804
Mobile: (510) 798-8314
E-Mail: Chuck.Carmel@bp.com

February 25, 2014

Re: Case Closure Request Addendum
Atlantic Richfield Company Station #472
6415 International Boulevard, Oakland, California
ACEH Case #RO00002982

"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

February 25, 2014 Project No. 09-88-601

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

Attn.: Mr. Chuck Carmel

Re: Case Closure Request Addendum, Former Richfield Oil Company Station No.472, 6415 International Boulevard, Oakland, California; ACEH Case No. RO0002982

Dear Mr. Carmel

Broadbent & Associates, Inc. (Broadbent) is pleased to submit this *Case Closure Request Addendum* (Closure Addendum) for Former Richfield Oil Company Station No.472 (also known as Pluckey's Liquors) located at 6415 International Boulevard, Oakland, California (Site). The preceding documents entitled *Conceptual Site Model and Case Closure Request* (Closure Request) and *Conceptual Site Model and Case Closure Request Addendum* (Previous CCR Addendum) were submitted to the Alameda County Environmental Health Agency (ACEH) on June 19, 2013 and October 8, 2013; respectively. This Closure Addendum was prepared in order to evaluate this Site for case closure under the California *Low Threat Underground Storage Tank Case Closure Policy* (LTCP; CSWRCB, 2012). The 2013 Closure Request and Previous CCR Addendum were discussed at a meeting with the ACEH on January 10, 2014. During this meeting, the ACEH noted that a sufficient well search was not conducted for the conceptual site model (CSM) understanding. The ACEH also noted that due to the small number of monitoring wells associated with the Site (currently only three are present) and the somewhat inconsistent historical groundwater gradient direction, any nearby private "backyard well" used for irrigation or domestic purposes may be potentially impacted. While Broadbent and BP contended that the residual plume was highely degraded with no BTEX and only sporadic concentrations of gasoline range organics (GRO) and diesel range organics (DRO) historically detected above Evironmental Screening Levels (ESLs; CRWQCB, 2013) and that no reasonable threat was present, it was agreed to conduct additional well survey activities to strengthen the agument in favor of case closure for the Site. These activities agreed to were as follows:

- Retrieve well records from the Alameda County Public Works Agency (ACPWA) in addition to the California Department of Water Resources (DWR) search that had been previously conducted.
- Evaluate any potential risk to any nearby wells identified by comparing the distance of these potential wells from the Site to the distances used in the *Technical Justification for Groundwater Plume Lengths, Indicator Constituents, Concentrations, and Buffer Distances (Separation Distances) to Receptors* (LTCP Guidance; SWRCB, 2011), which is the guidance document used for plume lengths and concentraitons for the LTCP (SWRCB, 2012)

The results of these activities are presented below. Drawing 1 presents the locations of wells identified during this search.

Well Search Results

Well records for all wells within a 2000 feet radius of the Site were retrieved from the ACPWA. Of the well records obtained, only four out of 79 were wells that would be potential receptors. The remaining records were for monitoring, cathodic protection, or destroyed wells. Three of the potential use wells were designated as industrial, and the remaining was designated as irrigation. All of these wells are located over 1000 feet from the Site. Drawing 1 presents the locations of these wells.

Plume Lengths in Guidance Document

The purpose of the LTCP Guidance was to justify the plume lengths for the four groundwater plume scenarios as presented in the LTCP. This was achieved in this document by evaluating a great number of plume lengths for benzene, methyl tert butyl ether (MTBE), and total petroleum hydrocarbons as gasoline (TPHg; aka GRO). The results of the review of these plume sizes provided 50th and 90th percentile plume lengths for each constituent, as well as the longest plume length observed. The longest plume observed for each compound is presented therein as follows:

- TPHg – 855 feet from source
- Benzene – 554
- MTBE – 1,046

Based on the results of the study presented in the LTCP guidance, a safety factor of 100% to 400% is applied to each groundwater plume length scenario in the LTCP.

Potential for Plume t Impact Wells

Based on the data presented in the previous Closure Request and Previous CCR Addendum, as well as the result so the recently conducted wells survey, no risk exists to any well in the are from residual petroleum hydrocarbon impacts in groundwater beneath the Site. Historical analytical data is presented in Table 1. Groundwater gradient direction has primarily been calculated to the south-southwest (Drawing 2 and Table 2). Well MW-3 is located on the south-southwest corner of the Site, downgradient of any potential source area. During the most recent monitoring and sampling event, no petroleum compounds were detected in this well. No GRO above ESLs have ever been detected in this well with the exception of one event (3Q10) where GRO was detected at 200 micrograms per liter (µg/L). DRO has been detected sporadically in this well. However, the concentrations detected have generally been low with one relatively higher concentration of 600 µg/L during the 3Q12 sampling event. Since no other detection before or after the 3Q12 even exceeded 140 µg/L, this detection appears to be an anomaly. It appears that the petroleum plume at the Site is defined, small, and highly degraded with only sporadic, low concentrations remaining.

Due to the overall flat gradient present at the Site, it is likely that impacts have traveled in directions to a small degree other than the overall calculated direction. However, the magnitude of any impacts in these alternate directions are very unlikelty to extend in lateral distance further from the Site than impacts noted in the the south-southwest direction. The apparent highely degraded nature of the remaining plume (lack of BTEX, age of the plume) further supports this assumption. Therefore the plume size is reasonably assumed to be less than 100 feet in length, which would apply to Case 1 listed in the LTCP. A GRO Isoconcentration Map is presented as Drawing 3. In the unlikely scenario that the

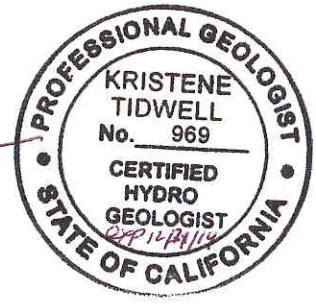
plume is slightly larger due to further impacts in the north diection, the plume would apply to Case 2 of the LTCP, as the nearest potential private use well is located over 1000 feet away.

Closing

The data and site evaluation presented in this Addendum as well as the Closure Request indicate that this Site meets the criteria of the Low Threat Closure UST Policy. Residual impacts in groundwater beneath the Site have degraded since the station was in operation several decades ago, and the most toxic compounds (BTEX) are not currently present in groundwater or soil at the Site. We recommend that a No Further Action Letter be issued for this Site. Well decommissioning and final closure activities will be coordinated upon concurrence with the Closure Request and this Addendum from the ACEH.

Should you have questions or require additional information, please do not hesitate to contact us at (707) 455-7290.

Sincerely,
BROADBENT & ASSOCIATES, INC.



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

Attachment

Drawing 1:	Area Well Locations
Drawing 2:	Groundwater Elevation and Analytical Summary Map – September 4, 2013
Drawing 3:	GRO Isoconcentration Maps – September 4, 2013
Table 1:	Summary of Groundwater Monitoring Data: Relative Water Elevations and Laboratory Analyses
Table 2 :	Historical Groundwater Gradient – Direction and Magnitude

References

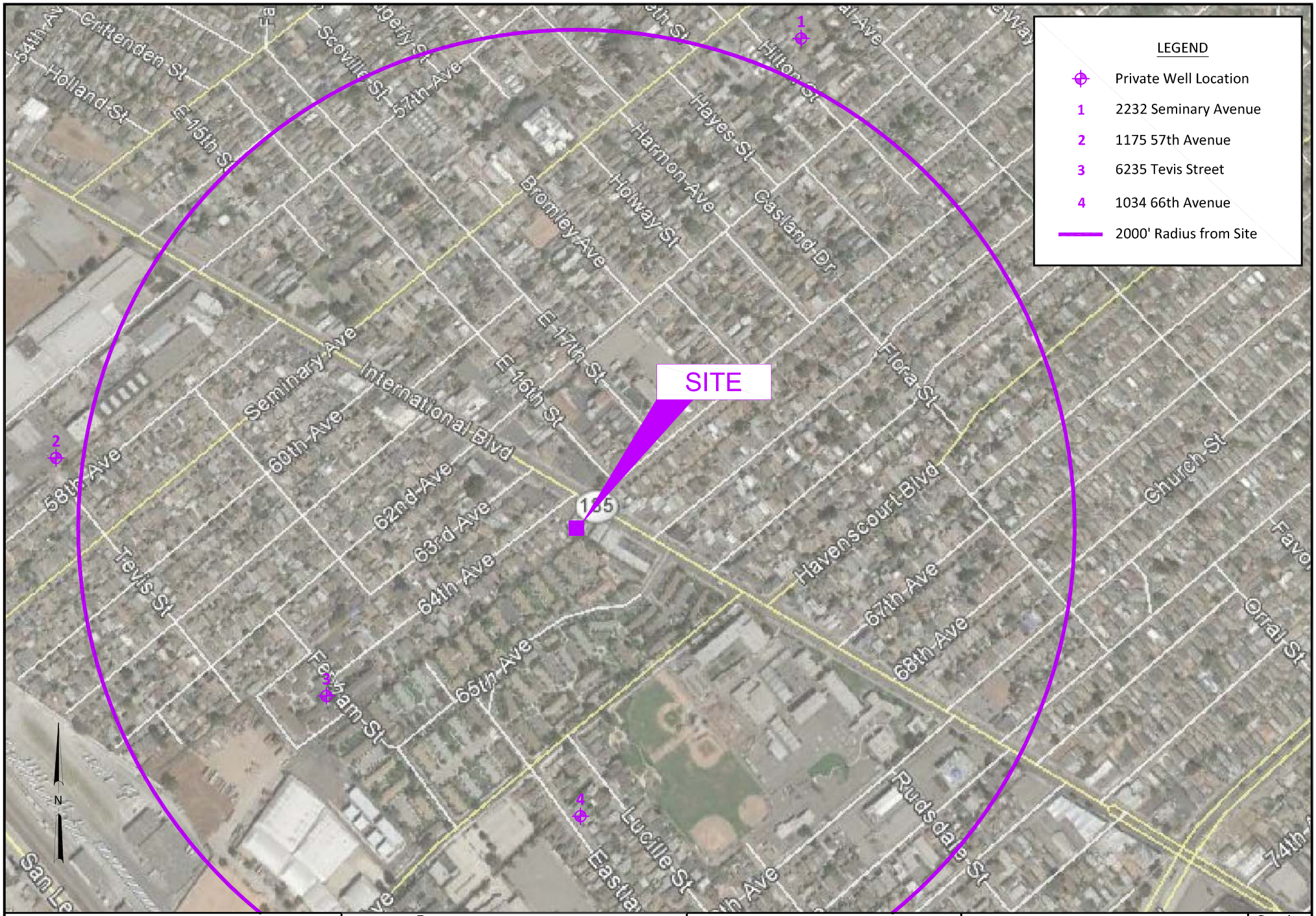
California Regional Water Quality Control Board (CRWQCB), 2013. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final – December.

State Water Resources Control Board (SWRCB), 2012. Low-Threat Underground Storage Tank Case Closure Policy, August 17.

State Water Resources Control Board (SWRCB), 2011. Technical Justification for Plume Lengths. July 12.

ATTACHMENTS

DRAWINGS



0 500 1000

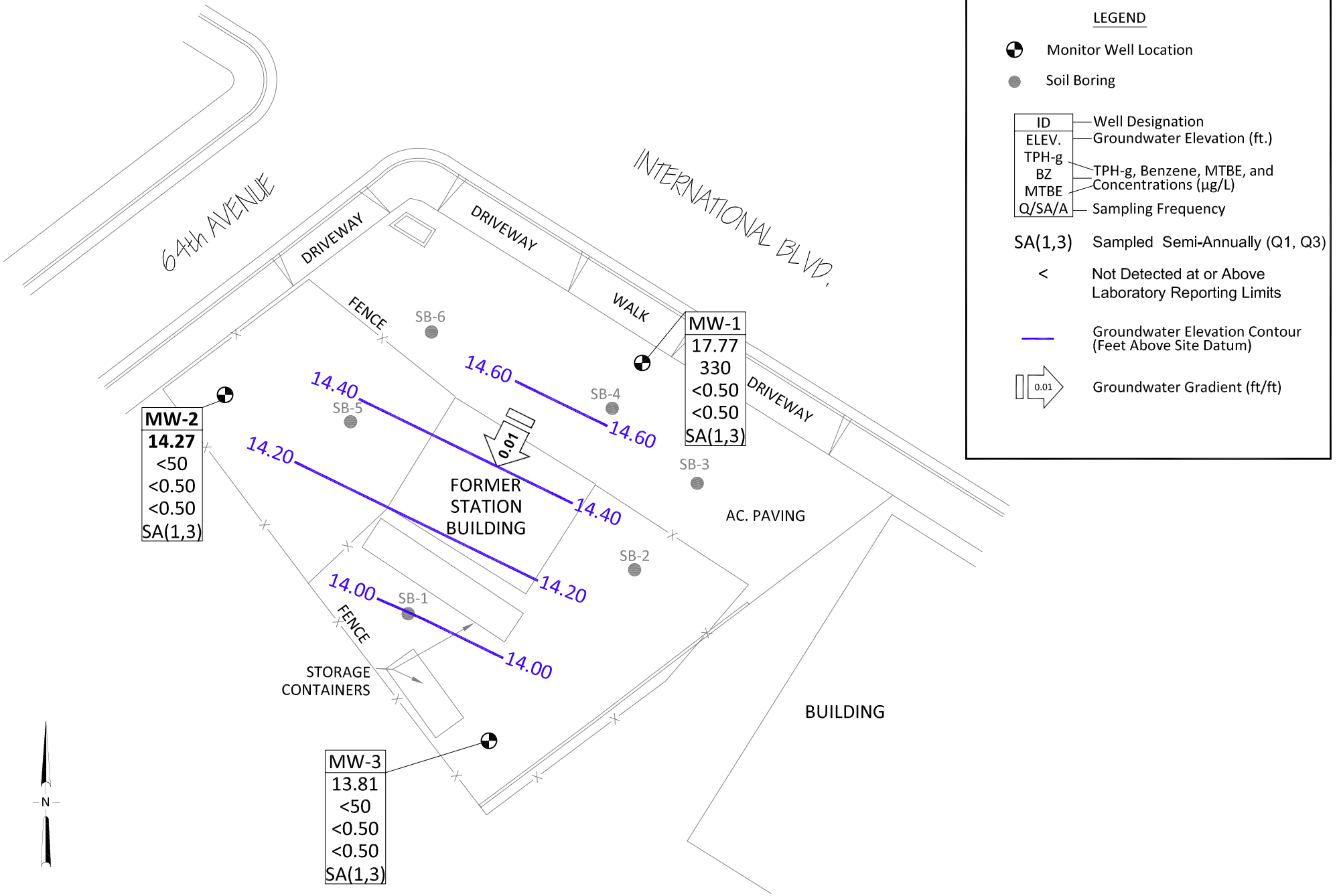
SCALE (ft)

BROADBENT
875 Cotting Lane, Suite G
Vacaville, California 95688
Project No.: 09-88-601 Date: 02/16/2014

ARCO Former Station № 472
6415 International Boulevard
Oakland, California

Area Well Locations

Drawing
1



0 30 60

SCALE (ft)

BROADBENT

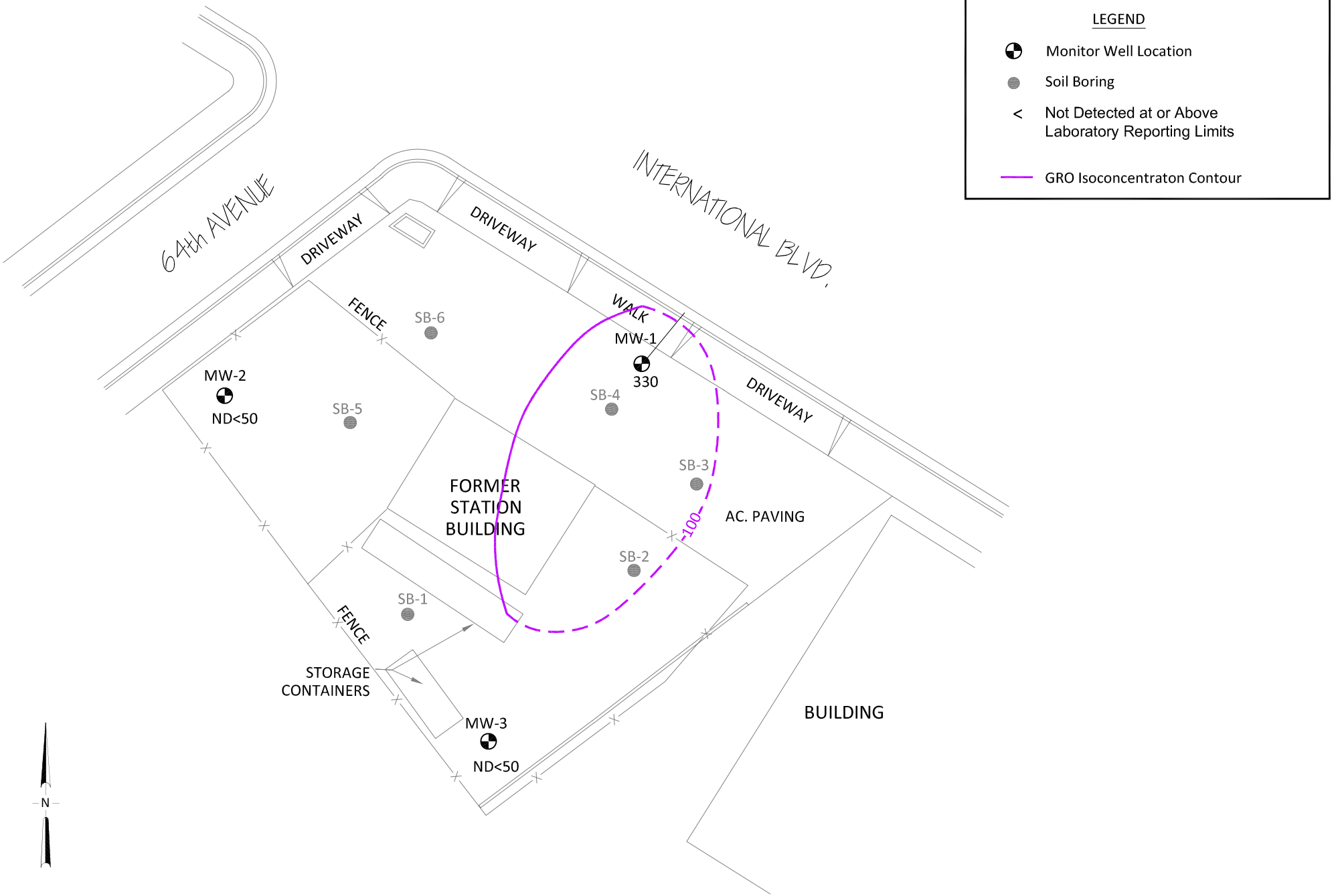
875 Cotting Lane, Suite G
Vacaville, California 95688

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



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

GRO Isoconcentration Map
September 4, 2013

Drawing
3

TABLES

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. 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-Southwest**	**0.01**

Footnotes:

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