

PDC Energy, Inc.
Fourth Quarter 2016 Groundwater Monitoring Summary

January 13, 2017

Jacobucci 13-32, 23-32 Tank Battery
NWSW Section 32 T1N R67W
Weld County, API # 05-123-20024
Facility ID # 331008
Remediation # 7952

This groundwater summary has been prepared by Tasman Geosciences, Inc. for the Jacobucci 13-32, 23-32 tank battery. On October 10, 2016 groundwater sampling activities were conducted at all eight temporary monitoring well locations (BH01 – BH08). Eight groundwater samples were submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B. Analytical results are summarized in Table 1 and the laboratory report is included in Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Fourth quarter 2016 analytical results indicate that BTEX concentrations are below the applicable COGCC Table 910-1 groundwater standards at all eight well locations.

Tasman initiated enhanced fluid recovery (EFR) and air sparge (AS) events at the site during the second quarter 2013. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS continued as the selected remediation strategy through the end of the fourth quarter 2015. Monitored natural attenuation (MNA) was implemented as the selected remediation strategy during the first quarter 2016, and will continue as the selected remediation strategy through the first quarter 2017.

Historical groundwater sampling results for naphthalene and gasoline range organics (GRO) are presented in Table 3. Analysis of these constituents was discontinued following the second quarter 2013.

The first quarter 2017 groundwater sampling event will be conducted during January 2017.

TABLE 1
JACOBUCCI 13-32, 23-32 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
GW01	2/12/2013	510	3,400	190	3,000	~ 4
GW02	2/19/2013	690	2,800	94	1,500	~ 4
BH01	4/15/2013	<1.0	<1.0	<1.0	<1.0	NM
BH01	7/25/2013	<1.0	<1.0	<1.0	<1.0	6.04
BH01	10/30/2013	<1.0	<1.0	<1.0	<1.0	5.66
BH01	1/22/2014	<1.0	<1.0	<1.0	<1.0	4.32
BH01	4/28/2014	<1.0	<1.0	<1.0	<1.0	4.52
BH01	7/24/2014	<1.0	<1.0	<1.0	<1.0	6.02
BH01	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.44
BH01	1/19/2015	<1.0	<1.0	<1.0	<1.0	4.16
BH01	4/21/2015	<1.0	<1.0	<1.0	<1.0	3.14
BH01	7/20/2015	<1.0	<1.0	<1.0	<1.0	4.03
BH01	10/15/2015	<1.0	<1.0	<1.0	<1.0	4.05
BH01	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.05
BH01	4/11/2016	<1.0	<1.0	<1.0	<1.0	3.21
BH01	7/12/2016	<1.0	<1.0	<1.0	<1.0	4.94
BH01	10/10/2016	<1.0	<1.0	<1.0	<1.0	4.73
BH02	4/15/2013	12	1.6	5.3	130	NM
BH02	7/25/2013	7.7	<1.0	7.1	16	6.00
BH02	10/30/2013	<1.0	<1.0	<1.0	<1.0	4.33
BH02	1/22/2014	31	<1.0	<1.0	<1.0	4.50
BH02	4/28/2014	<1.0	<1.0	<1.0	<1.0	4.54
BH02	7/24/2014	<1.0	<1.0	<1.0	<1.0	5.68
BH02	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.52
BH02	1/19/2015	<1.0	<1.0	<1.0	<1.0	4.10
BH02	4/21/2015	<1.0	<1.0	<1.0	<1.0	3.29
BH02	7/20/2015	<1.0	<1.0	<1.0	<1.0	3.49
BH02	10/15/2015	<1.0	<1.0	<1.0	<1.0	2.09
BH02	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.29
BH02	4/11/2016	100	3.2	<1.0	4.3	3.23
BH02	4/25/2016	15	<1.0	<1.0	<1.0	3.18
BH02	7/12/2016	<1.0	<1.0	<1.0	<1.0	4.93
BH02	10/10/2016	<1.0	<1.0	<1.0	<1.0	5.16

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GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH03	4/15/2013	3.1	<1.0	<1.0	<1.0	NM
BH03	7/25/2013	<1.0	2.2	<1.0	5.0	6.37
BH03	10/30/2013	<1.0	<1.0	<1.0	<1.0	4.52
BH03	1/22/2014	<1.0	<1.0	<1.0	<1.0	4.74
BH03	4/28/2014	<1.0	<1.0	<1.0	<1.0	4.88
BH03	7/24/2014	<1.0	<1.0	<1.0	<1.0	6.35
BH03	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.72
BH03	1/19/2015	6.5	<1.0	<1.0	<1.0	4.48
BH03	4/21/2015	<1.0	<1.0	<1.0	<1.0	3.10
BH03	7/20/2015	<1.0	<1.0	<1.0	<1.0	4.07
BH03	10/15/2015	<1.0	<1.0	<1.0	<1.0	3.87
BH03	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.09
BH03	4/11/2016	<1.0	<1.0	<1.0	<1.0	3.04
BH03	7/12/2016	<1.0	<1.0	<1.0	<1.0	4.81
BH03	10/10/2016	<1.0	<1.0	<1.0	<1.0	4.84
BH04	4/15/2013	<1.0	<1.0	<1.0	<1.0	NM
BH04	7/25/2013	2.7	<1.0	<1.0	2.4	5.95
BH04	10/30/2013	<1.0	<1.0	<1.0	<1.0	3.99
BH04	1/22/2014	<1.0	<1.0	<1.0	<1.0	4.22
BH04	4/28/2014	<1.0	<1.0	<1.0	<1.0	4.81
BH04	7/24/2014	<1.0	<1.0	<1.0	<1.0	6.21
BH04	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.38
BH04	1/19/2015	<1.0	<1.0	<1.0	<1.0	4.25
BH04	4/21/2015	<1.0	<1.0	<1.0	<1.0	3.41
BH04	7/20/2015	<1.0	<1.0	<1.0	<1.0	3.87
BH04	10/15/2015	<1.0	<1.0	<1.0	<1.0	4.25
BH04	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.11
BH04	4/11/2016	<1.0	<1.0	<1.0	<1.0	3.09
BH04	7/12/2016	<1.0	<1.0	<1.0	<1.0	4.76
BH04	10/10/2016	<1.0	<1.0	<1.0	<1.0	5.03
BH05	4/15/2013	67	590	19	370	NM
BH05	7/25/2013	5.2	<1.0	<1.0	3.0	6.14
BH05	10/30/2013	<1.0	<1.0	<1.0	<1.0	4.51

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GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH05	1/22/2014	<1.0	<1.0	<1.0	<1.0	4.64
BH05	4/28/2014	1.9	<1.0	<1.0	<1.0	4.81
BH05	7/24/2014	<1.0	<1.0	<1.0	<1.0	6.29
BH05	10/27/2014	<1.0	<1.0	<1.0	<1.0	4.64
BH05	1/19/2015	<1.0	<1.0	<1.0	<1.0	4.41
BH05	4/21/2015	<1.0	<1.0	<1.0	<1.0	3.37
BH05	7/20/2015	<1.0	<1.0	<1.0	<1.0	4.06
BH05	10/15/2015	<1.0	<1.0	<1.0	<1.0	4.16
BH05	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.18
BH05	4/11/2016	2.7	<1.0	<1.0	<1.0	3.15
BH05	7/12/2016	<1.0	<1.0	<1.0	<1.0	4.93
BH05	10/10/2016	<1.0	<1.0	<1.0	<1.0	4.95
BH06	4/15/2013	10,000	31,000	950	14,000	NM
BH06	7/25/2013	1,500	61	150	5,900	6.77
BH06	10/30/2013	39	<1.0	<1.0	8.4	4.84
BH06	1/22/2014	64	<1.0	40	570	5.03
BH06	4/28/2014	65	<1.0	56	680	5.01
BH06	7/24/2014	35	<1.0	4.4	320	6.46
BH06	10/27/2014	8.8	<1.0	8.1	12	4.87
BH06	1/19/2015	1.4	<1.0	4.0	13	5.55
BH06	4/21/2015	1.4	<1.0	1.8	13	3.74
BH06	7/20/2015	<1.0	<1.0	<1.0	<1.0	4.52
BH06	10/15/2015	<1.0	<1.0	<1.0	<1.0	4.35
BH06	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.57
BH06	4/11/2016	<1.0	<1.0	<1.0	<1.0	3.50
BH06	7/12/2016	<1.0	<1.0	<1.0	<1.0	5.28
BH06	10/10/2016	<1.0	<1.0	<1.0	<1.0	5.32
BH07	4/15/2013	4.7	39	2.8	41	NM
BH07	7/25/2013	<1.0	<1.0	<1.0	<1.0	6.87
BH07	10/30/2013	<1.0	<1.0	<1.0	<1.0	4.67
BH07	1/22/2014	<1.0	<1.0	<1.0	<1.0	4.73
BH07	4/28/2014	<1.0	<1.0	<1.0	<1.0	4.95
BH07	7/24/2014	<1.0	<1.0	<1.0	<1.0	6.66

TABLE 1
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GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth to Water ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
BH07	10/27/2014	<1.0	<1.0	<1.0	<1.0	5.02
BH07	1/19/2015	<1.0	<1.0	<1.0	<1.0	5.31
BH07	4/21/2015	<1.0	<1.0	<1.0	<1.0	4.18
BH07	7/20/2015	<1.0	<1.0	<1.0	<1.0	5.89
BH07	10/15/2015	<1.0	<1.0	<1.0	<1.0	4.95
BH07	1/6/2016	<1.0	<1.0	<1.0	<1.0	4.78
BH07	4/11/2016	<1.0	<1.0	<1.0	<1.0	4.83
BH07	7/12/2016	<1.0	<1.0	<1.0	<1.0	6.06
BH07	10/10/2016	<1.0	<1.0	<1.0	<1.0	6.43
BH08	7/24/2014	17	1.6	<1.0	61	6.97
BH08	10/27/2014	8.4	<1.0	1.9	19	5.26
BH08	1/19/2015	91	<1.0	18	110	4.89
BH08	4/21/2015	40	<1.0	2.7	8.5	4.04
BH08	7/20/2015	3.3	<1.0	<1.0	<1.0	4.74
BH08	10/15/2015	1.3	<1.0	<1.0	9.5	4.84
BH08	1/6/2016	<1.0	<1.0	<1.0	<1.0	3.65
BH08	4/11/2016	6.4	<1.0	<1.0	<1.0	3.79
BH08	4/25/2016	3.7	<1.0	<1.0	<1.0	3.59
BH08	7/12/2016	39	<1.0	1.4	2.7	5.58
BH08	10/10/2016	2.1	<1.0	<1.0	<1.0	5.61

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.
2. Depth to water measured from top of well casing or ground surface for monitoring well samples and excavation samples, respectively.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

(<) = Analytical result is less than the indicated laboratory reporting limit.

NM = Not Measured

BOLD = Analytical result is in exceedance of COGCC groundwater standards.

TABLE 2
JACOBUCCI 13-32, 23-32 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Second Quarter 2013					
4/25/2013	BH02, BH05, BH06	6	130	BH02, BH05, BH06	10
4/26/2013	Pipe, BH02	5.5	120	BH05, BH06	10
5/16/2013	BH03, BH05, BH07	6.5	90	BH02, BH03, BH05, BH06, BH07	10
5/28/2013	BH02, BH03, BH07	4	80	BH05, BH06, BH07	10
6/7/2013	BH05, BH06, BH07	7	183		10
6/19/2013	BH03, BH05, BH06, BH07	6.5	265	BH03, BH05, BH06, BH07	10
Quarterly Totals		35.5	868		-
Third Quarter 2013					
7/9/2013	BH02, BH03, BH05, BH07	6	142	BH03, BH05, BH06	10
7/23/2013	BH02, BH03, BH07	6	160	BH03, BH05, BH06, BH07	10
8/7/2013	BH02, BH03, BH05, BH06, BH07	7	290	BH02, BH03, BH05, BH06, BH07	10
8/23/2013		6.5	180		10
9/10/2013		6.5	210		10
9/23/2013	BH02, BH03, BH04, BH05, BH06, BH07	6	100	BH02, BH03, BH04, BH05, BH06, BH07	10
Quarterly Totals		38	1082		-
Fourth Quarter 2013					
10/8/2013	BH02, BH03, BH05, BH06	6	450	BH02, BH03, BH05, BH06	10
10/15/2013	BH02, BH05, BH06	6	180	BH02, BH05, BH06	15
11/5/2013	BH02, BH03, BH05, BH06	6	270	BH02, BH03, BH05, BH06	10
11/19/2013	BH05, BH06	6	120	BH05, BH06	10
12/3/2013		6	60		10
12/23/2013		6	50		10
Quarterly Totals		36	1130		-
First Quarter 2014					
1/16/2014	BH05, BH06	6	120	BH05, BH06	10
2/3/2014	BH02, BH06	5.5	114	BH02, BH06	10
2/10/2014		5	0		10
3/3/2014		6	115		10
3/12/2014		6	135		10
3/19/2014		6	135		10
Quarterly Totals		34.5	619		-

TABLE 2
JACOBUCCI 13-32, 23-32 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Second Quarter 2014					
4/10/2014	BH02, BH06	7	165	BH02, BH06	15
4/22/2014	BH02, BH04, BH06, BH07	8	450		20
5/9/2014		6	220		20
5/22/2014		6	220		10
6/6/2014		6	180		10
6/30/2014		6	50		20
Quarterly Totals		39	1285		
Third Quarter 2014					
7/17/2014	BH04, BH06, BH07,BH08	6	150	BH02, BH06, BH08	10
8/10/2014	BH02, BH04, BH06, BH07,BH08	6	450		10
8/26/2014	BH01, BH02, BH03, BH04, BH05	6	1260	BH01, BH02, BH03, BH04, BH05	20
9/12/2014	BH02, BH04, BH06, BH07, BH08	6	500	BH02, BH06, BH08	20
9/24/2014		6	300		20
Quarterly Totals		30	2660		
Fourth Quarter 2014					
10/21/2014	Pipe SW, Pipe SE	6	1890	BH06, BH07, BH08	10
11/4/2014		6	2520		10
11/18/2014		6	0		10
Quarterly Totals		18	4410		
First Quarter 2015					
1/2/2015	Pipe NE, Pipe NW	6	1890	BH06, BH07, BH08	15
1/13/2015	Pipe SW, Pipe SE	6	2100		20
2/5/2015		6	1680		8
3/6/2015		6	2688	BH03, BH06, BH07, BH08	20
3/18/2015		6	1890		20
Quarterly Totals		30	10248		
Second Quarter 2015					
4/8/2015	Pipe SW, Pipe SE	6	58	BH03, BH06, BH07, BH08	20
4/14/2015		6	1470		30
4/29/2015		6	2436		20
5/13/2015		Pipe SW, Pipe SE, BH08	6	80	BH03, BH06, BH07
5/27/2015	6		3318	20	
6/10/2015	6		336	20	
6/24/2015	6		3150	20	
Quarterly Totals		42	10848		

TABLE 2
JACOBUCCI 13-32, 23-32 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)
Third Quarter 2015					
7/8/2015	Pipe SW, Pipe SE, BH08	6	3360	BH03, BH06, BH07	30
7/22/2015		6	3192		20
8/5/2015		6	3780		20
8/19/2015		6	3360		20
9/2/2015		6	2940		20
9/18/2015		6	3360		20
Quarterly Totals		36	19992		
Fourth Quarter 2015					
10/2/2015	Pipe SW, Pipe SE, BH08	6	3360	BH06, BH07, BH08	20
10/14/2015		6	3444	BH06, BH07	20
10/30/2015		6	3780	BH03, BH06, BH07	20
11/9/2015	Pipe SW, Pipe SE, BH03, BH06	6	3360	BH07, BH08	20
11/24/2015		6	3570		20
12/11/2015		6	2730		20
Quarterly Totals		36	20244		

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

TABLE 3
JACOBUCCI 13-32, 23-32 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE
GRO / NAPHTHALENE

Sample ID	Date Sampled	Naphthalene (µg/L)	TPH-GRO (µg/L)
CDPHE WQCC Groundwater Standard ⁽¹⁾		140	NS
BH01	4/15/2013	<1.0	<500
BH02	4/15/2013	<1.0	<500
BH03	4/15/2013	<1.0	<500
BH04	4/15/2013	<1.0	<500
BH05	4/15/2013	<1.0	2,100
BH06	4/15/2013	85	120,000
BH07	4/15/2013	<1.0	<500

Notes:

1. Groundwater standards referenced from Colorado Department of Public Health Water Quality Control Commission 5CCR 1002-41 Basic Standards for Groundwater.

TPH-GRO = Total Petroleum Hydrocarbons - Gasoline Range Organics

µg/L = Micrograms per liter

(<) = Analytical result is less than the indicated laboratory reporting limit.

NS = No Standard

NA = Not Analyzed

BOLD = Analytical result is in exceedance of applicable groundwater standards.



BH02		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH01		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH04		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH03		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH07		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH06		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

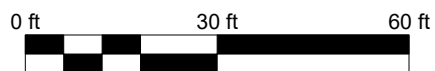
BH05		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	2.7	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH08		
Compound (µg/L)	7/12/2016	10/10/2016
Benzene	39	2.1
Toluene	<1.0	<1.0
Ethylbenzene	1.4	<1.0
Total Xylenes	2.7	<1.0

Surface
Drainage

Private
Property

Note: Surface drainage direction
is estimated based on site
topography and is not related to
regional topography.



DRAWN BY: TJB

DATE: 10/24/2016

Facility Diagram
PDC Energy – DJ Basin
Jacobucci 13-32, 23-32 Tank Battery
NWSW S32 T1N R67W
Weld County, CO



6899 Pecos Street
Unit C
Denver, CO 80221

LEGEND

- Excavation Extent
- Excavation Groundwater Sample Location
- Monitoring Well
- Horizontal Remediation Well
- Point of Release

Groundwater Flow
Direction

All locations are
approximate unless
otherwise noted

FIGURE 1
GROUNDWATER
ANALYTICAL
RESULTS MAP

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

October 17, 2016

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: Jacobucci 13-32, 23-32

Enclosed are the results of analyses for samples received by Summit Scientific on 10/10/16 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury
President



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1610076-01	Water	10/10/16 14:25	10/10/16 17:00
BH02	1610076-02	Water	10/10/16 14:31	10/10/16 17:00
BH03	1610076-03	Water	10/10/16 14:45	10/10/16 17:00
BH04	1610076-04	Water	10/10/16 14:38	10/10/16 17:00
BH05	1610076-05	Water	10/10/16 14:50	10/10/16 17:00
BH06	1610076-06	Water	10/10/16 14:57	10/10/16 17:00
BH07	1610076-07	Water	10/10/16 15:12	10/10/16 17:00
BH08	1610076-08	Water	10/10/16 15:04	10/10/16 17:00

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Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

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1610076

741 Corporate Circle Suite I • Golden, Colorado 80401
303-277-9310 • 303-374-5933 Fax

Client: PDC Energy
Address:
City/State/Zip:
Phone: Fax:
Sampler Name: Tyler Blessing

Page 1 of 1

Project Manager: Mark Longhurst
E-Mail: mark.longhurst@pdce.com
Project Name: Jacobucci 13-32, 23-32
Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:				Special Instructions
				HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	BTEX 8260			
BH01	10/10/16	14:25	3	X				X				X			
BH02		14:31													
BH03		14:45													
BH04		14:38													
BH05		14:50													
BH06		14:57													
BH07		15:12													
BH08		15:04													

Relinquished by: [Signature]	Date/Time: 10/10/16 1700	Received by: [Signature]	Date/Time: 10/10/16 1700	Turn Around Time (Check) Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/> Sample Integrity: Temperature Upon Receipt: 2.2°C Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Notes: on ice
Relinquished by: [Signature]	Date/Time: 10/10/16 1715	Received by: [Signature]	Date/Time: 10/10/16 1715		
Relinquished by:	Date/Time:	Received in Lab by:	Date/Time:		

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Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

Sample Receipt Checklist

S2 Work Order: 1610076

Client: PDC Energy

Client Project ID: Jacobucci 13-32, 23-32

Shipped Via: PIU

Airbill #: _____

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Matrix (check all that apply): ☐ Air ☐ Soil/Solid ☒ Water ☐ Other: _____ (Describe)

Cooler ID					
Temp (°C)	<u>2.2</u>				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature just above 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
NOTE: If samples are delivered the same day of sampling, this requirement is waived provided that there is evidence that cooling has begun.				
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present?				
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect				<u>HCL</u>
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.

Nakitz
Custodian Printed Name

[Signature]
Signature or Initials of Custodian

10/10/16 1215
Date/Time



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH01
1610076-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.8 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH02
1610076-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:31**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:31**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		112 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.1 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH03
1610076-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH04
1610076-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:38**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:38**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		111 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH05
1610076-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		107 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.3 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		103 %	45-146		"	"	"	"	

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Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH06
1610076-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 14:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 14:57**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		97.7 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH07
1610076-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 15:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 15:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

BH08
1610076-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/10/16 15:04**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	2.1	1.0	ug/l	1	1610128	10/13/16	10/13/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/10/16 15:04**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %	45-146		"	"	"	"	

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Project: Jacobucci 13-32, 23-32
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Volatile Organic Compounds by EPA Method 8260B - Quality Control
Summit Scientific

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 1610128 - EPA 5030 Water MS

Blank (1610128-BLK1)

Prepared & Analyzed: 10/13/16

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.3	101	37-154				
Surrogate: Toluene-d8	12.9		"	13.3	96.9	45-149				
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3	102	45-146				

LCS (1610128-BS1)

Prepared & Analyzed: 10/13/16

Benzene	38.8	1.0	ug/l	33.3	116	51-132				
Toluene	39.3	1.0	"	33.3	118	51-138				
Ethylbenzene	42.7	1.0	"	33.1	129	58-146				
m,p-Xylene	76.2	2.0	"	66.5	115	57-144				
o-Xylene	40.3	1.0	"	32.7	123	53-146				
Surrogate: 1,2-Dichloroethane-d4	14.1		"	13.3	106	37-154				
Surrogate: Toluene-d8	13.3		"	13.3	99.6	45-149				
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3	99.6	45-146				

Matrix Spike (1610128-MS1)

Source: 1610075-01

Prepared & Analyzed: 10/13/16

Benzene	38.8	1.0	ug/l	33.3	ND	116	34-141			
Toluene	40.8	1.0	"	33.3	ND	122	27-151			
Ethylbenzene	43.4	1.0	"	33.1	ND	131	29-160			
m,p-Xylene	77.2	2.0	"	66.5	ND	116	20-166			
o-Xylene	40.8	1.0	"	32.7	1.74	120	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.5		"	13.3	109	37-154				
Surrogate: Toluene-d8	13.4		"	13.3	101	45-149				
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3	95.9	45-146				

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Project: Jacobucci 13-32, 23-32
Project Number: [none]
Project Manager: Mark Longhurst

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Volatile Organic Compounds by EPA Method 8260B - Quality Control
Summit Scientific

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

Batch 1610128 - EPA 5030 Water MS

Matrix Spike Dup (1610128-MSD1)	Source: 1610075-01			Prepared & Analyzed: 10/13/16						
Benzene	38.6	1.0	ug/l	33.3	ND	116	34-141	0.724	32	
Toluene	40.8	1.0	"	33.3	ND	122	27-151	0.196	25	
Ethylbenzene	43.6	1.0	"	33.1	ND	132	29-160	0.598	50	
m,p-Xylene	77.7	2.0	"	66.5	ND	117	20-166	0.646	36	
o-Xylene	41.1	1.0	"	32.7	1.74	120	33-159	0.635	26	
Surrogate: 1,2-Dichloroethane-d4	14.5		"	13.3		109	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.5	45-146			

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Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/17/16 11:37

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference