



Corporate Office

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October 10, 2017

Mr. Chris Canfield, P.G.
Environmental Protection Specialist
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, CO 80203

**RE: FORM 27 SUPPLEMENT AND REQUEST FOR NO FURTHER ACTION (NFA)
JACOBUCCI 13-32, 23-32 TANK BATTERY
NWSW S32 T1N R67W
FACILITY #: 331008
REMEDIATION #: 7952**

Dear Mr. Canfield:

PDC Energy, Inc. (PDC) is submitting this Form 27 Supplement and Request for No Further Action (NFA) to the Colorado Oil and Gas Conservation Commission (COGCC) to summarize additional remediation and environmental sampling activities that were performed by Tasman Geosciences, Inc. (Tasman), on behalf of PDC at the Jacobucci 13, 32, 23-32 tank battery (Site).

On February 11, 2013, a historic release was discovered during dump line replacement activities, as described in the Form 19 submitted to the COGCC on March 25, 2013. The proposed remedial strategy was submitted to the COGCC in a Form 27 on June 17, 2013, and Remediation Number 7952 was issued to the project.

A summary of remediation and environmental sampling activities conducted in accordance with the approved Form 27 is provided below.

Groundwater Monitoring and Remediation Activities

Quarterly groundwater monitoring was initiated on April 15, 2013, at seven monitoring wells (BH01 – BH07) [Figure 1]. Prior to the third quarter 2014 quarterly groundwater sampling event, one additional monitoring well (BH08) was added to the monitoring network. Groundwater samples were submitted to Summit Scientific Laboratories (Summit) in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency (USEPA) Method 8260B. Quarterly groundwater monitoring data is summarized in Table 1.

Enhanced fluid recovery (EFR) and air sparge (AS) was the selected remediation strategy for the Site between second quarter 2013 and fourth quarter 2015. A summary of EFR/AS operational data is provided in Table 2. Due to a Site-wide decrease in dissolved-phase BTEX concentrations, monitored natural attenuation (MNA) was initiated during the first quarter 2016.

During the fourth quarter 2017, four consecutive quarters of post-remediation BTEX concentrations in compliance with COGCC Table 910-1 standards were achieved. Groundwater analytical results from the third and fourth quarters of 2017 are illustrated on Figure 1. The laboratory reports are included in Attachment A.

Request for No Further Action

Based on the groundwater analytical data provided herein, remaining petroleum hydrocarbon impacts above regulatory standards are no longer present on Site. Consequently, PDC is requesting a No Further Action (NFA) determination from the COGCC for this release.

Should you have any questions regarding this location, please contact me by phone at (303) 318-6106.

Sincerely,
PDC Energy, Inc.

Karen Shanahan Olson
Senior EHS Manager

Enclosures:

Figure 1 – Groundwater Analytical Results Map
Table 1 – Groundwater Analytical Results Summary Table
Table 2 – EFR/AS Operational Summary Table
Attachment A – Laboratory Analytical Reports

BH02			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	<1.0	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	<2.0	<2.0	
Depth to Water (ft. bgs)	2.72	1.95	

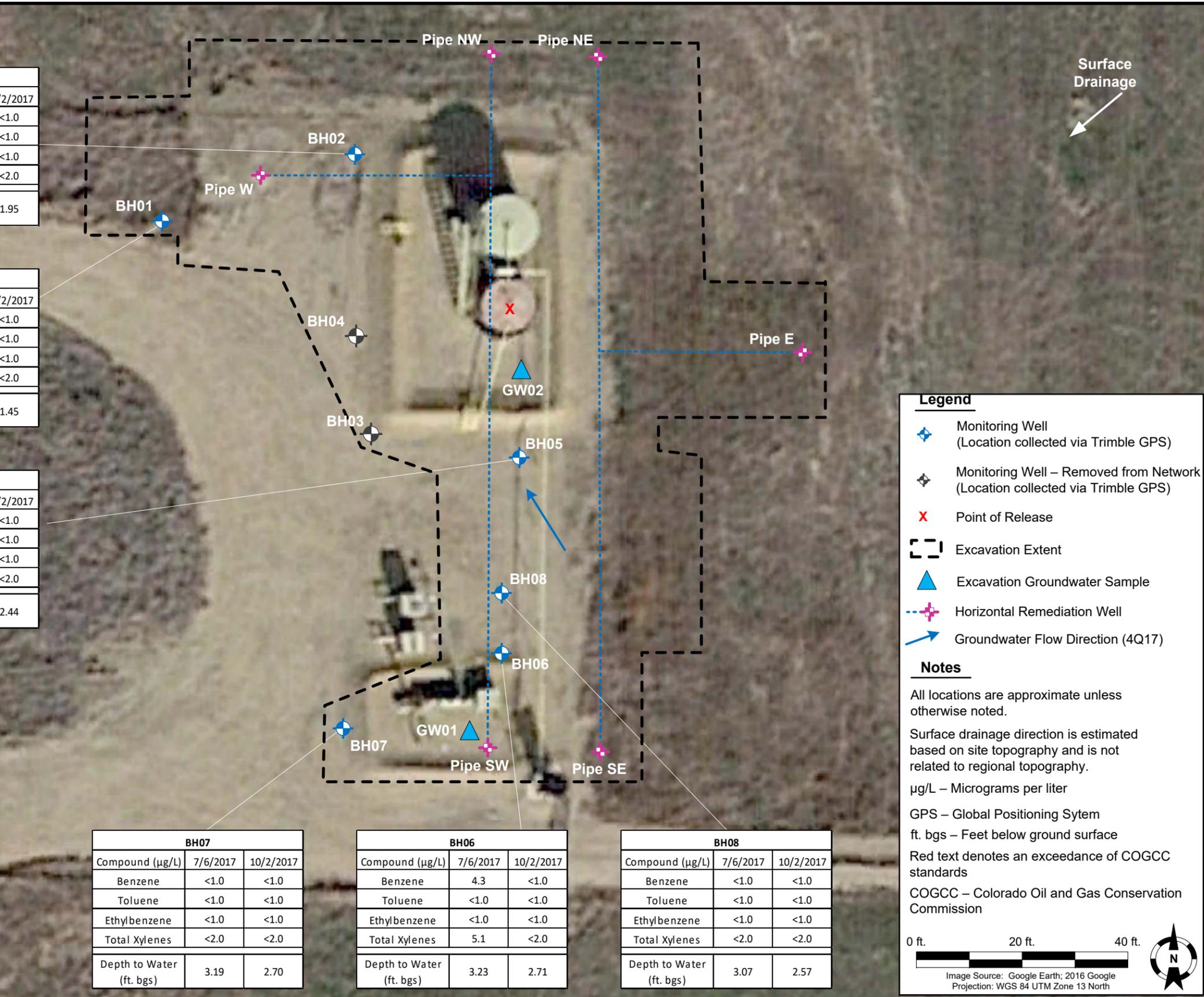
BH01			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	<1.0	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	<2.0	<2.0	
Depth to Water (ft. bgs)	2.93	1.45	

BH05			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	<1.0	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	<2.0	<2.0	
Depth to Water (ft. bgs)	2.93	2.44	

BH07			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	<1.0	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	<2.0	<2.0	
Depth to Water (ft. bgs)	3.19	2.70	

BH06			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	4.3	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	5.1	<2.0	
Depth to Water (ft. bgs)	3.23	2.71	

BH08			
Compound (µg/L)	7/6/2017	10/2/2017	
Benzene	<1.0	<1.0	
Toluene	<1.0	<1.0	
Ethylbenzene	<1.0	<1.0	
Total Xylenes	<2.0	<2.0	
Depth to Water (ft. bgs)	3.07	2.57	



Weld County Road 15

DATE: October 9, 2017

DESIGNED BY: C. Hamlin

DRAWN BY: T. Blessing

Tasman Geosciences, Inc.
6899 Pecos Street – Unit C
Denver, CO 80221

PDC Energy, Inc. – DJ Basin
Jacobucci 13-32, 23-32 Tank Battery
NWSW, Section 32, Township 1 North, Range 67 West
Weld County, Colorado

GROUNDWATER ANALYTICAL RESULTS MAP

FIGURE 1

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	3.09
BH01	2/6/2017	<1.0	<1.0	<1.0	<1.0	2.42
BH01	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.47
BH01	7/6/2017	<1.0	<1.0	<1.0	<2.0	2.93
BH01	10/2/2017	<1.0	<1.0	<1.0	<2.0	1.45
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

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COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
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	3.22
BH02	1/20/2017	<1.0	<1.0	<1.0	<1.0	2.33
BH02	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.30
BH02	7/6/2017	<1.0	<1.0	<1.0	<2.0	2.72
BH02	10/2/2017	<1.0	<1.0	<1.0	<2.0	1.95
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	3.69
BH03	1/20/2017	<1.0	<1.0	<1.0	<1.0	2.89
BH03	4/18/2017	Well Removed From Monitoring Network				
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

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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	
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	3.59
BH04	1/20/2017	<1.0	<1.0	<1.0	<1.0	2.60
BH04	4/18/2017	Well Removed From Monitoring Network				
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
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	3.56
BH05	1/20/2017	<1.0	<1.0	<1.0	<1.0	2.78
BH05	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.52
BH05	7/6/2017	<1.0	<1.0	<1.0	<2.0	2.93
BH05	10/2/2017	<1.0	<1.0	<1.0	<2.0	2.44
BH06	4/15/2013	10,000	31,000	950	14,000	NM
BH06	7/25/2013	1,500	61	150	5,900	6.77

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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	
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	3.84
BH06	1/20/2017	<1.0	<1.0	<1.0	<1.0	3.06
BH06	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.82
BH06	7/6/2017	4.3	<1.0	<1.0	5.1	3.23
BH06	10/2/2017	<1.0	<1.0	<1.0	<2.0	2.71
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
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	4.69
BH07	1/20/2017	<1.0	<1.0	<1.0	<1.0	3.11

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	
BH07	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.79
BH07	7/6/2017	<1.0	<1.0	<1.0	<2.0	3.19
BH07	10/2/2017	<1.0	<1.0	<1.0	<2.0	2.70
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	3.69
BH08	1/20/2017	2.4	<1.0	<1.0	<1.0	2.91
BH08	4/18/2017	<1.0	<1.0	<1.0	<2.0	2.67
BH08	7/6/2017	<1.0	<1.0	<1.0	<2.0	3.07
BH08	10/2/2017	<1.0	<1.0	<1.0	<2.0	2.57

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.
2. Depth to water measurements collected prior to fourth quarter 2016 were measured from top of casing or ground surface for monitoring well samples and excavation samples, respectively. Subsequent monitoring well measurements were collected from top of casing and adjusted using survey data and product thickness to reflect depth of water from ground surface.

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)	Average Air Flow Rate (cfm)
Second Quarter 2013						
4/25/2013	BH02, BH05, BH06	6	130	BH02, BH05, BH06	10	NR
4/26/2013	Pipe, BH02	5.5	120	BH05, BH06	10	NR
5/16/2013	BH03, BH05, BH07	6.5	90	BH02, BH03, BH05, BH06, BH07	10	NR
5/28/2013	BH02, BH03, BH07	4	80	BH05, BH06, BH07	10	NR
6/7/2013	BH05, BH06, BH07	7	183		10	NR
6/19/2013	BH03, BH05, BH06, BH07	6.5	265	BH03, BH05, BH06, BH07	10	NR
Quarterly Totals		35.5	868		-	-
Third Quarter 2013						
7/9/2013	BH02, BH03, BH05, BH07	6	142	BH03, BH05, BH06	10	NR
7/23/2013	BH02, BH03, BH07	6	160	BH03, BH05, BH06, BH07	10	NR
8/7/2013	BH02, BH03, BH05, BH06, BH07	7	290	BH02, BH03, BH05, BH06, BH07	10	NR
8/23/2013		6.5	180		10	NR
9/10/2013		6.5	210		10	NR
9/23/2013	BH02, BH03, BH04, BH05, BH06, BH07	6	100	BH02, BH03, BH04, BH05, BH06, BH07	10	NR
Quarterly Totals		38	1082		-	-
Fourth Quarter 2013						
10/8/2013	BH02, BH03, BH05, BH06	6	450	BH02, BH03, BH05, BH06	10	NR
10/15/2013	BH02, BH05, BH06	6	180	BH02, BH05, BH06	15	NR
11/5/2013	BH02, BH03, BH05, BH06	6	270	BH02, BH03, BH05, BH06	10	NR
11/19/2013	BH05, BH06	6	120	BH05, BH06	10	NR
12/3/2013		6	60		10	NR
12/23/2013		6	50		10	NR
Quarterly Totals		36	1130		-	-
First Quarter 2014						
1/16/2014	BH05, BH06	6	120	BH05, BH06	10	NR
2/3/2014	BH02, BH06	5.5	114	BH02, BH06	10	15
2/10/2014		5	0		10	9
3/3/2014		6	115		10	27
3/12/2014		6	135		10	11.5
3/19/2014		6	135		10	9
Quarterly Totals		34.5	619		-	-
Second Quarter 2014						
4/10/2014	BH02, BH06	7	165	BH02, BH06	15	22.5
4/22/2014	BH02, BH04, BH06, BH07	8	450		20	35
5/9/2014		6	220		20	28
5/22/2014		6	220		10	17.5
6/6/2014		6	180		10	19.5
6/30/2014		6	50		20	50
Quarterly Totals		39	1285		-	-

**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)	Average Air Flow Rate (cfm)
Third Quarter 2014						
7/17/2014	BH04, BH06, BH07, BH08	6	150	BH02, BH06, BH08	10	25
8/10/2014	BH02, BH04, BH06, BH07, BH08	6	450		10	23
8/26/2014	BH01, BH02, BH03, BH04, BH05	6	1260	BH01, BH02, BH03, BH04, BH05	20	33.2
9/12/2014	BH02, BH04, BH06, BH07, BH08	6	500	BH02, BH06, BH08	20	20
9/24/2014		6	300		20	20
Quarterly Totals		30	2660		-	-
Fourth Quarter 2014						
10/21/2014	Pipe SW, Pipe SE	6	1890	BH06, BH07, BH08	10	30
11/4/2014		6	2520		10	30
11/18/2014		6	0		10	30
Quarterly Totals		18	4410		-	-
First Quarter 2015						
1/2/2015	Pipe NE, Pipe NW	6	1890	BH06, BH07, BH08	15	26.7
1/13/2015	Pipe SW, Pipe SE	6	2100		20	31.7
2/5/2015		6	1680		8	26.7
3/6/2015		6	2688	BH03, BH06, BH07, BH08	20	15
3/18/2015	6	1890	20		23.8	
Quarterly Totals		30	10248		-	-
Second Quarter 2015						
4/8/2015	Pipe SW, Pipe SE	6	58	BH03, BH06, BH07, BH08	20	22
4/14/2015		6	1470		30	25
4/29/2015		6	2436		20	20
5/13/2015		6	80		20	15
5/27/2015	Pipe SW, Pipe SE, BH08	6	3318	BH03, BH06, BH07	20	25
6/10/2015		6	336		20	20
6/24/2015		6	3150		20	35
Quarterly Totals		42	10848		-	-
Third Quarter 2015						
7/8/2015	Pipe SW, Pipe SE, BH08	6	3360	BH03, BH06, BH07	30	25
7/22/2015		6	3192		20	20
8/5/2015		6	3780		20	15
8/19/2015		6	3360		20	25
9/2/2015		6	2940		20	20
9/18/2015		6	3360		20	20
Quarterly Totals		36	19992			-

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)	Average Air Flow Rate (cfm)
Fourth Quarter 2015						
10/2/2015	Pipe SW, Pipe SE, BH08	6	3360	BH06, BH07, BH08	20	15
10/14/2015		6	3444	BH06, BH07	20	22
10/30/2015		6	3780	BH03, BH06, BH07	20	25
11/9/2015	Pipe SW, Pipe SE, BH03, BH06	6	3360	BH07, BH08	20	24
11/24/2015		6	3570		20	20
12/11/2015		6	2730		20	16
Quarterly Totals		36	20244		-	-

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute

NR = Not recorded

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

July 13, 2017

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 07/06/17 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 'Ben Shrewsbury', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury
Laboratory Manager



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/13/17 16:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1707030-01	Water	07/06/17 09:05	07/06/17 17:00
BH02	1707030-02	Water	07/06/17 09:43	07/06/17 17:00
BH05	1707030-03	Water	07/06/17 09:37	07/06/17 17:00
BH06	1707030-04	Water	07/06/17 09:40	07/06/17 17:00
BH07	1707030-05	Water	07/06/17 09:45	07/06/17 17:00
BH08	1707030-06	Water	07/06/17 09:47	07/06/17 17:00

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/13/17 16:32

Summit Scientific

1707030

741 Corporate Circle Suite 1 • Golden, Colorado 80401
303-277-9310 • 303-374-5933 Fax

Page 1 of 1

Client: PDC / Tasman Geosciences	Project Manager: Mark Longhurst
Address: 6899 Pecos St, Unit C	E-Mail: mark.longhurst@pdce.com
City/State/Zip: Denver, CO 80221	Project Name: <u>Jacobucci 13-32, 23-32</u>
Phone: 303-487-1228 Fax:	Project Number: N/A
Sampler Name: <u>Max G. Mith W., Bradley A.</u>	

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				
BK01	7/6/17	09 05	3	X				X								
BK02		09 43														
BK05		09 37														
BK06		09 40														
BK07		09 45														
BK08		09 47														

Relinquished by: <u>Max G. Mith W.</u>	Date/Time: <u>7/6/17 1700</u>	Received by: <u>MA</u>	Date/Time: <u>7/6/17 1700</u>	Turn Around Time (Check)	Notes:
Relinquished by: <u>MA</u>	Date/Time: <u>7/6/17 1745</u>	Received by:	Date/Time:	Same Day <input type="checkbox"/>	72 Hours <input type="checkbox"/>
Relinquished by:	Date/Time:	Received in Lab by:	Date/Time:	24 Hours <input type="checkbox"/>	Standard <input checked="" type="checkbox"/>
				48 Hours <input type="checkbox"/>	
				Sample Integrity:	
				Temperature Upon Receipt: <u>8.4°C</u>	
				Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<u>on ice</u>

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Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/13/17 16:32

Sample Receipt Checklist

S2 Work Order: 1707030
Client: PDC (Tasman) Client Project ID: Jacobucci 13-32, 23-32
Shipped Via: PV (UPS, FedEx, Hand Delivered, Pick-up, etc.) Airbill #: _____
Matrix (check all that apply): Air Soil/Solid Water Other: _____ (Describe)

Cooler ID					
Temp (°C)	<u>8.4</u>				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			<u>on ice</u>
NOTE: If samples are delivered the same day of sampling, this requirement is met 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?			<input checked="" type="checkbox"/>	
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"/>			<u>HCC</u>
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect				
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

7/6/17 1745
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:
 07/13/17 16:32

BH01
1707030-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		121 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		91.6 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.0 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

BH02
1707030-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:43**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		117 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		90.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.9 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

BH05
1707030-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:37**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:37**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		121 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		91.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		98.7 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

BH06
1707030-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	4.3	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	5.1	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		119 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		90.3 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.8 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

BH07
1707030-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		121 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		90.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.7 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

BH08
1707030-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **07/06/17 09:47**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1707053	07/08/17	07/08/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **07/06/17 09:47**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		121 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		90.2 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		100 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/13/17 16:32

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1707053 - EPA 5030 Water MS

Blank (1707053-BLK1)

Prepared & Analyzed: 07/07/17

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	15.0		"	13.3		112	37-154			
Surrogate: Toluene-d8	12.6		"	13.3		94.6	45-149			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		101	45-146			

LCS (1707053-BS1)

Prepared & Analyzed: 07/07/17

Benzene	30.2	1.0	ug/l	33.3		90.6	51-132			
Toluene	31.0	1.0	"	33.3		93.2	51-138			
Ethylbenzene	31.9	1.0	"	33.1		96.5	58-146			
m,p-Xylene	58.5	2.0	"	66.5		87.9	57-144			
o-Xylene	30.0	1.0	"	32.7		91.7	53-146			
Surrogate: 1,2-Dichloroethane-d4	15.0		"	13.3		112	37-154			
Surrogate: Toluene-d8	14.3		"	13.3		107	45-149			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3		102	45-146			

Matrix Spike (1707053-MS1)

Source: 1707032-01

Prepared & Analyzed: 07/07/17

Benzene	32.8	1.0	ug/l	33.3	ND	98.5	34-141			
Toluene	34.2	1.0	"	33.3	ND	103	27-151			
Ethylbenzene	38.2	1.0	"	33.1	ND	115	29-160			
m,p-Xylene	70.1	2.0	"	66.5	ND	105	20-166			
o-Xylene	35.8	1.0	"	32.7	ND	110	33-159			
Surrogate: 1,2-Dichloroethane-d4	16.1		"	13.3		121	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		99.5	45-149			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3		101	45-146			

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 07/13/17 16:32

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

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

Batch 1707053 - EPA 5030 Water MS

Matrix Spike Dup (1707053-MSD1)	Source: 1707032-01			Prepared & Analyzed: 07/07/17						
Benzene	35.0	1.0	ug/l	33.3	ND	105	34-141	6.51	32	
Toluene	35.8	1.0	"	33.3	ND	107	27-151	4.43	25	
Ethylbenzene	43.2	1.0	"	33.1	ND	131	29-160	12.3	50	
m,p-Xylene	77.8	2.0	"	66.5	ND	117	20-166	10.3	36	
o-Xylene	40.1	1.0	"	32.7	ND	123	33-159	11.1	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>16.6</i>		<i>"</i>	<i>13.3</i>		<i>124</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.5</i>		<i>"</i>	<i>13.3</i>		<i>93.8</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.3</i>		<i>"</i>	<i>13.3</i>		<i>100</i>	<i>45-146</i>			

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
07/13/17 16:32

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

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

October 05, 2017

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 10/02/17 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 'Ben Shrewsbury', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury
Laboratory Manager



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/05/17 18:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1710004-01	Water	10/02/17 10:20	10/02/17 17:00
BH02	1710004-02	Water	10/02/17 10:39	10/02/17 17:00
BH05	1710004-03	Water	10/02/17 10:35	10/02/17 17:00
BH06	1710004-04	Water	10/02/17 10:21	10/02/17 17:00
BH07	1710004-05	Water	10/02/17 10:55	10/02/17 17:00
BH08	1710004-06	Water	10/02/17 10:46	10/02/17 17:00

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

1710004

Sample Receipt Checklist

S2 Work Order: _____

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

Shipped Via: P/U Airbill #: _____
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

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

Cooler ID					
Temp (°C)	4.8				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
NOTE: If samples are delivered the same day of sampling, this requirement is met 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?			<input checked="" type="checkbox"/>	
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				
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.				

Nakita
 Custodian Printed Name

[Signature]
 Signature or Initials of Custodian

10/2/17 1745
 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:
 10/05/17 18:10

BH01
1710004-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		111 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.7 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.8 %	45-146		"	"	"	"	

Summit Scientific

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

BH02
1710004-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:39**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:39**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		111 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.9 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

BH05
1710004-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

BH06
1710004-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:21**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:21**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		107 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.7 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.5 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

BH07
1710004-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.6 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

BH08
1710004-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/02/17 10:46**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1710018	10/05/17	10/05/17	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **10/02/17 10:46**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.6 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.3 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/05/17 18:10

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

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

Batch 1710018 - EPA 5030 Water MS

Blank (1710018-BLK1)

Prepared & Analyzed: 10/04/17

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	12.7		"	13.3		95.6	37-154			
Surrogate: Toluene-d8	10.7		"	13.3		80.0	45-149			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.4	45-146			

LCS (1710018-BS1)

Prepared & Analyzed: 10/04/17

Benzene	43.0	1.0	ug/l	33.3		129	51-132			
Toluene	32.2	1.0	"	33.3		96.6	51-138			
Ethylbenzene	36.4	1.0	"	33.1		110	58-146			
m,p-Xylene	66.9	2.0	"	66.5		101	57-144			
o-Xylene	33.2	1.0	"	32.7		102	53-146			
Surrogate: 1,2-Dichloroethane-d4	16.9		"	13.3		126	37-154			
Surrogate: Toluene-d8	12.6		"	13.3		94.1	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.1	45-146			

Matrix Spike (1710018-MS1)

Source: 1710003-01

Prepared & Analyzed: 10/04/17

Benzene	39.3	1.0	ug/l	33.3	ND	118	34-141			
Toluene	31.7	1.0	"	33.3	ND	95.0	27-151			
Ethylbenzene	42.2	1.0	"	33.1	ND	128	29-160			
m,p-Xylene	77.5	2.0	"	66.5	ND	116	20-166			
o-Xylene	38.4	1.0	"	32.7	ND	117	33-159			
Surrogate: 1,2-Dichloroethane-d4	15.1		"	13.3		113	37-154			
Surrogate: Toluene-d8	13.5		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		96.6	45-146			

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 10/05/17 18:10

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

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

Batch 1710018 - EPA 5030 Water MS

Matrix Spike Dup (1710018-MSD1)	Source: 1710003-01			Prepared & Analyzed: 10/04/17						
Benzene	37.0	1.0	ug/l	33.3	ND	111	34-141	5.97	32	
Toluene	29.5	1.0	"	33.3	ND	88.5	27-151	7.03	25	
Ethylbenzene	42.0	1.0	"	33.1	ND	127	29-160	0.452	50	
m,p-Xylene	76.5	2.0	"	66.5	ND	115	20-166	1.21	36	
o-Xylene	38.2	1.0	"	32.7	ND	117	33-159	0.340	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.3</i>		<i>"</i>	<i>13.3</i>		<i>107</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>10.3</i>		<i>"</i>	<i>13.3</i>		<i>77.6</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.8</i>		<i>"</i>	<i>13.3</i>		<i>95.9</i>	<i>45-146</i>			

Summit Scientific

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

Project: Jacobucci 13-32, 23-32

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/05/17 18:10

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