

PDC Energy, Inc.
Second Quarter 2019 Groundwater Monitoring Summary

May 21, 2019

Barrell 41-4 Tank Battery
NENE Section 4 T6N R64W
Remediation # 7846

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Barrell 41-4 tank battery. On May 8, 2019, groundwater monitoring was conducted at all 12 monitoring well locations (BH03 – BH13, and SS02A-R2). Twelve groundwater samples were submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B.

Second quarter 2019 analytical results indicated that the benzene concentration was above the applicable COGCC Table 910-1 groundwater standard in monitoring well BH05. BTEX concentrations were below applicable regulatory standards in the remaining 11 sample locations.

A solar SVE system was installed at the site during first quarter 2013. The SVE system was operational for six months before being decommissioned during the third quarter 2013. During the solar SVE period of operation, approximately 1.82 pounds of hydrocarbon mass were removed from the sub-surface. Enhanced fluid recovery (EFR), which extracted soil vapor only, was conducted between May 2014 and March 2015. A summary of EFR/AS operation data is provided in Table 2.

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the fourth quarter 2017 and will remain as the selected remediation strategy through the third quarter 2019.

Third quarter 2019 groundwater sampling will be conducted during August 2019. Analytical results are summarized in Table 1 and the laboratory report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Groundwater elevation data is illustrated on Figure 2.

SURFACE DRAINAGE



BH03		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.56	36.76

BH06		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.91	37.09

BH08		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.61	36.78

BH07		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.48	36.65

SS02A-R2		
Compound (µg/L)	2/18/2019	5/8/2019
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) ⁽¹⁾	39.85	40.00

BH04		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.90	37.19

BH05		
Compound (µg/L)	2/18/2019	5/8/2019
Benzene	18	6.8
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	36.73	36.90

BH13		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.69	36.85

BH12		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.60	36.75

BH09		
Compound (µg/L)	2/18/2019	5/8/2019
Benzene	10	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	36.44	36.61

BH10		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.19	36.36

BH11		
Compound (µg/L)	2/18/2019	5/8/2019
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)	36.47	36.63

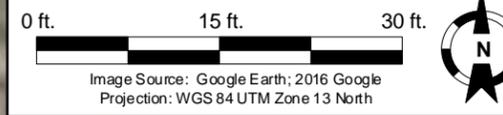


Legend

- Excavation Extent – LTE (2011)
- Point of Release
- Angled Remediation Well Location (Collected via Trimble GPS)
- Monitoring Well Location (Collected via Trimble GPS)
- Angled Monitoring Well Location (Collected via Trimble GPS)
- Groundwater Flow Direction (2Q19)

Notes

All locations are approximate unless otherwise noted.
 Surface drainage direction is estimated based on site topography and is not related to regional topography.
 Monitoring well SS02A-R2 is an angled monitoring well with the terminus located southwest of the well monument, beneath the above ground storage tank.
 Red text denotes an exceedance of COGCC standards
 COGCC – Colorado Oil and Gas Conservation Commission
 ft. bgs – Feet below ground surface
 µg/L – Micrograms per liter
 GPS – Global Positioning System



DATE: May 21, 2019
 DESIGNED BY: C. Hamlin
 DRAWN BY: J. McCarver



PDC Energy, Inc. – DJ Basin
Barrell 41-4 Tank Battery
 NENE, Section 4, Township 6 North, Range 64 West
 Weld County, Colorado

GROUNDWATER ANALYTICAL RESULTS MAP

FIGURE 1



Legend

- Excavation Extent – LTE (2011)
- Point of Release
- Angled Remediation Well Location (Collected via Trimble GPS)
- Monitoring Well Location (Collected via Trimble GPS)
- Angled Monitoring Well Location (Collected via Trimble GPS)
- Groundwater Elevation Contour (Dashed where inferred)
- Groundwater Flow Direction (2Q19)

Notes

All locations are approximate unless otherwise noted.

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

Monitoring well SS02A-R2 is an angled monitoring well with the terminus located southwest of the well monument, beneath the above ground storage tank.

ft. AMSL – Feet Above Mean Sea Level

GPS – Global Positioning System

0 ft. 15 ft. 30 ft.

Image Source: Google Earth; 2016 Google
Projection: WGS 84 UTM Zone 13 North

DATE: May 10, 2019

DESIGNED BY: C. Hamlin

DRAWN BY: C. Olson



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

**PDC Energy, Inc. – DJ Basin
Barrell 41-4 Tank Battery**
NENE, Section 4, Township 6 North, Range 64 West
Weld County, Colorado

**GROUNDWATER
ELEVATION CONTOUR
MAP (05/08/2019)**

**FIGURE
2**

TABLE 1
BARRELL 41-4 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	
SS02A-R2 ⁽³⁾	9/22/2017	120	150	120	1,200	39.08
SS02A-R2 ⁽³⁾	11/16/2017	74	8.1	19	76	38.92
SS02A-R2 ⁽³⁾	2/7/2018	9.0	<1.0	9.1	3.7	39.67
SS02A-R2 ⁽³⁾	5/17/2018	6.6	<1.0	<1.0	7.4	40.03
SS02A-R2 ⁽³⁾	8/9/2018	5.7	<1.0	2.1	3.3	39.54
SS02A-R2 ⁽³⁾	11/15/2018	1.8	<1.0	<1.0	<2.0	39.00
SS02A-R2 ⁽³⁾	2/18/2019	<1.0	<1.0	<1.0	<2.0	39.85
SS02A-R2 ⁽³⁾	5/8/2019	<1.0	<1.0	<1.0	<2.0	40.00
<hr/>						
BH03	10/16/2017	<1.0	<1.0	<1.0	<2.0	35.74
BH03	11/16/2017	<1.0	<1.0	<1.0	<2.0	35.68
BH03	2/7/2018	<1.0	<1.0	<1.0	12	36.47
BH03	5/17/2018	<1.0	<1.0	<1.0	<2.0	36.77
BH03	8/9/2018	<1.0	<1.0	<1.0	<2.0	36.21
BH03	11/15/2018	<1.0	<1.0	<1.0	<2.0	35.77
BH03	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.56
BH03	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.76
<hr/>						
BH04	10/16/2017	<1.0	1.7	<1.0	<2.0	36.21
BH04	11/16/2017	<1.0	<1.0	<1.0	<2.0	36.10
BH04	2/7/2018	<1.0	<1.0	<1.0	<2.0	35.76
BH04	5/17/2018	<1.0	<1.0	<1.0	<2.0	37.08
BH04	8/9/2018	<1.0	<1.0	<1.0	<2.0	36.67
BH04	11/15/2018	<1.0	<1.0	<1.0	<2.0	36.19
BH04	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.90
BH04	5/8/2019	<1.0	<1.0	<1.0	<2.0	37.19
<hr/>						
BH05	10/16/2017	<1.0	<1.0	<1.0	<2.0	36.07
BH05	11/16/2017	17	<1.0	<1.0	<2.0	35.94
BH05	2/7/2018	130	<1.0	<1.0	<2.0	36.56
BH05	5/17/2018	51	<1.0	<1.0	<2.0	36.90
BH05	8/9/2018	150	<1.0	<1.0	<2.0	36.56
BH05	11/15/2018	46	<1.0	<1.0	7.6	36.03
BH05	2/18/2019	18	<1.0	<1.0	<2.0	36.73
BH05	5/8/2019	6.8	<1.0	<1.0	<2.0	36.90
<hr/>						
BH06	10/16/2017	<1.0	<1.0	<1.0	<2.0	36.14

TABLE 1
BARRELL 41-4 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	
BH06	11/16/2017	<1.0	<1.0	<1.0	<2.0	36.04
BH06	2/7/2018	<1.0	<1.0	<1.0	<2.0	36.76
BH06	5/17/2018	<1.0	<1.0	<1.0	<2.0	37.12
BH06	8/9/2018	<1.0	<1.0	<1.0	<2.0	36.62
BH06	11/15/2018	<1.0	<1.0	<1.0	<2.0	36.15
BH06	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.91
BH06	5/8/2019	<1.0	<1.0	<1.0	<2.0	37.09
BH07	11/16/2017	<1.0	<1.0	<1.0	<2.0	32.63
BH07	2/7/2018	<1.0	<1.0	<1.0	<2.0	36.31
BH07	5/17/2018	<1.0	<1.0	<1.0	<2.0	36.63
BH07	8/9/2018	<1.0	<1.0	<1.0	<2.0	36.20
BH07	11/15/2018	<1.0	<1.0	<1.0	<2.0	35.71
BH07	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.48
BH07	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.65
BH08	11/16/2017	<1.0	<1.0	<1.0	<2.0	35.71
BH08	2/7/2018	<1.0	<1.0	<1.0	<2.0	36.45
BH08	5/17/2018	<1.0	<1.0	<1.0	<2.0	36.78
BH08	8/9/2018	<1.0	<1.0	<1.0	<2.0	36.27
BH08	11/15/2018	<1.0	<1.0	<1.0	<2.0	35.80
BH08	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.61
BH08	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.78
BH09	11/16/2017	470	<1.0	6.0	8.0	35.65
BH09	2/7/2018	240	<1.0	<1.0	<2.0	36.29
BH09	5/17/2018	11	<1.0	<1.0	<2.0	36.58
BH09	8/9/2018	150	<1.0	<1.0	<2.0	36.25
BH09	11/15/2018	720	<1.0	<1.0	<2.0	35.74
BH09	2/18/2019	10	<1.0	<1.0	<2.0	36.44
BH09	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.61
BH10	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.19
BH10	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.36
BH11	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.47
BH11	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.63

TABLE 1
BARRELL 41-4 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	
BH12	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.60
BH12	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.75
BH13	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.69
BH13	5/8/2019	<1.0	<1.0	<1.0	<2.0	36.85

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective May 1, 2018.
2. Depth to water measurements were measured from ground surface for excavation samples. 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.
3. Monitoring well SS02A-R2 was drilled as an angled remediation well. Depth to water does not represent true depth to water.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

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

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

TABLE 2
BARRELL 41-4 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
Second Quarter 2014						
5/15/2014	BH02	6	0	N/A	N/A	N/A
5/29/2014	BH02	6	0		N/A	N/A
6/12/2014	BH02	6	0		N/A	N/A
Quarterly Totals		18	0		-	-
Third Quarter 2014						
9/3/2014	BH02	6	0	N/A	N/A	N/A
Quarterly Totals		6	0		-	-
Fourth Quarter 2014						
12/17/2014	BH02	6	0	N/A	N/A	N/A
Quarterly Totals		6	0		-	-
First Quarter 2015						
1/29/2015	BH02	6	0	N/A	N/A	N/A
1/30/2015		6	0		N/A	N/A
2/3/2015		6	0		N/A	N/A
2/10/2015		6	0		N/A	N/A
2/17/2015		6	0		N/A	N/A
3/5/2015	BH01	6	0		N/A	N/A
Quarterly Totals		36	0		-	-

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute

Attachment A

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

May 15, 2019

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Barrell 41-4

Work Order # 1905100

Enclosed are the results of analyses for samples received by Summit Scientific on 05/08/19 17:22. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Ben Shrewsbury

Laboratory Manager



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

Project: Barrell 41-4

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
05/15/19 16:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH03	1905100-01	Water	05/08/19 12:10	05/08/19 17:22
BH04	1905100-02	Water	05/08/19 12:01	05/08/19 17:22
BH05	1905100-03	Water	05/08/19 13:00	05/08/19 17:22
BH06	1905100-04	Water	05/08/19 12:05	05/08/19 17:22
BH07	1905100-05	Water	05/08/19 12:15	05/08/19 17:22
BH08	1905100-06	Water	05/08/19 11:20	05/08/19 17:22
BH09	1905100-07	Water	05/08/19 13:00	05/08/19 17:22
SS02A-R2	1905100-08	Water	05/08/19 12:45	05/08/19 17:22
BH10	1905100-09	Water	05/08/19 11:40	05/08/19 17:22
BH11	1905100-10	Water	05/08/19 12:34	05/08/19 17:22
BH12	1905100-11	Water	05/08/19 12:35	05/08/19 17:22
BH13	1905100-12	Water	05/08/19 12:34	05/08/19 17:22

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.

Summit Scientific

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

Client: PDC / Tasman
 Address: 6899 N Pecos
 City/State/Zip: Denver/CO/80221
 Phone: Max Dahlgren Fax:
 Sampler Name: Max Dahlgren

Project Manager: Mark Longhurst
 E-Mail: mark.longhurst@pdce.com
 Project Name: Barril 41-4
 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)					
BH12	5/8/19	1235	3			X		X								
BH13	I	1234	3			I		I								
Relinquished by: <u>[Signature]</u>		Date/Time: 5/8/19 1600		Received by: Lock Box				Date/Time: 5/8/19 1600				Turn Around Time (Check)				Notes:
												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"/>				
Relinquished by: Lock Box		Date/Time:		Received by: <u>[Signature]</u>				Date/Time: 5-8-19 17:22				Sample Integrity:				
Relinquished by:		Date/Time:		Received in Lab by:				Date/Time:				Temperature Upon Receipt: 4.9				
												Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				

Sample Receipt Checklist

S2 Work Order 1905100

Client: PDC Client Project ID: Barrett 414

Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other _____ Airbill #: _____

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

Temp (°C)	49
-----------	----

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?	+			
<small>NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.</small>				
Were all samples received intact ⁽¹⁾ ?	+			
Was adequate sample volume provided ⁽¹⁾ ?	+			
If custody seals are present, are they intact ⁽¹⁾ ?			+	
Are samples with holding times due within 48 hours sample due within 48 hours present?		+		
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	+			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	+			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	+			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	+			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		+		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?		+		
<small>Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect</small>				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			+	
<small>Record the pH in Comments.</small>				
If dissolved metals are requested, were samples field filtered?			+	
Additional Comments (if any): 				
⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.				


Custodian Printed Name or Initials


Signature of Custodian

5-8-19 18:10
Date/Time



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH03
1905100-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:10**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:10**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		104 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.3 %		21-167		"	"	"	"	

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: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH04
1905100-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:01**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:01**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		104 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.6 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.0 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH05
1905100-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	6.8	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		106 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.6 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH06
1905100-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		102 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.2 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH07
1905100-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		109 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.3 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH08
1905100-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 11:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 11:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		105 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.5 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH09
1905100-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		94.2 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.6 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.5 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

SS02A-R2
1905100-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		98.7 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.3 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH10
1905100-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 11:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 11:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		106 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.7 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH11
1905100-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:34**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:34**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		107 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.4 %		21-167		"	"	"	"	

Summit Scientific



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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH12
1905100-11 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/11/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		107 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.6 %		21-167		"	"	"	"	

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: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

BH13
1905100-12 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **05/08/19 12:34**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1905134	05/09/19	05/15/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **05/08/19 12:34**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		105 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.7 %		21-167		"	"	"	"	

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: Barrell 41-4

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
05/15/19 16:35

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1905134 - EPA 5030 Water MS

Blank (1905134-BLK1)

Prepared: 05/09/19 Analyzed: 05/10/19

Benzene	ND	1.0	ug/l								
Toluene	ND	1.0	"								
Ethylbenzene	ND	1.0	"								
Xylenes (total)	ND	2.0	"								
Surrogate: 1,2-Dichloroethane-d4	14.0		"	13.3		105		23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.3		20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.6		21-167			

LCS (1905134-BS1)

Prepared: 05/09/19 Analyzed: 05/10/19

Benzene	39.9	1.0	ug/l	41.7		95.7		70-130			
Toluene	41.5	1.0	"	41.7		99.6		70-130			
Ethylbenzene	42.5	1.0	"	41.7		102		70-130			
m,p-Xylene	80.0	2.0	"	83.3		96.0		70-130			
o-Xylene	41.7	1.0	"	41.7		100		70-130			
Surrogate: 1,2-Dichloroethane-d4	14.0		"	13.3		105		23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.3		20-170			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.4		21-167			

Matrix Spike (1905134-MS1)

Source: 1905100-01

Prepared: 05/09/19 Analyzed: 05/11/19

Benzene	42.4	1.0	ug/l	41.7	ND	102		70-130			
Toluene	44.4	1.0	"	41.7	ND	106		70-130			
Ethylbenzene	44.6	1.0	"	41.7	ND	107		70-130			
m,p-Xylene	84.8	2.0	"	83.3	ND	102		70-130			
o-Xylene	43.7	1.0	"	41.7	ND	105		70-130			
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.3		104		23-173			
Surrogate: Toluene-d8	13.5		"	13.3		101		20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.9		21-167			

Summit Scientific

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

Project: Barrell 41-4

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 05/15/19 16:35

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1905134 - EPA 5030 Water MS

Matrix Spike Dup (1905134-MSD1)

Source: 1905100-01

Prepared: 05/09/19 Analyzed: 05/11/19

Benzene	41.0	1.0	ug/l	41.7	ND	98.3	70-130	3.48	30	
Toluene	41.9	1.0	"	41.7	ND	101	70-130	5.71	30	
Ethylbenzene	43.1	1.0	"	41.7	ND	104	70-130	3.24	30	
m,p-Xylene	82.9	2.0	"	83.3	ND	99.5	70-130	2.22	30	
o-Xylene	42.7	1.0	"	41.7	ND	102	70-130	2.38	30	
Surrogate: 1,2-Dichloroethane-d4	14.5		"	13.3		109	23-173			
Surrogate: Toluene-d8	13.2		"	13.3		98.9	20-170			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.6	21-167			

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: Barrell 41-4

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
05/15/19 16:35

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