

**PDC Energy, Inc.**  
**Second Quarter 2019 Groundwater Monitoring Summary**

May 21, 2019

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

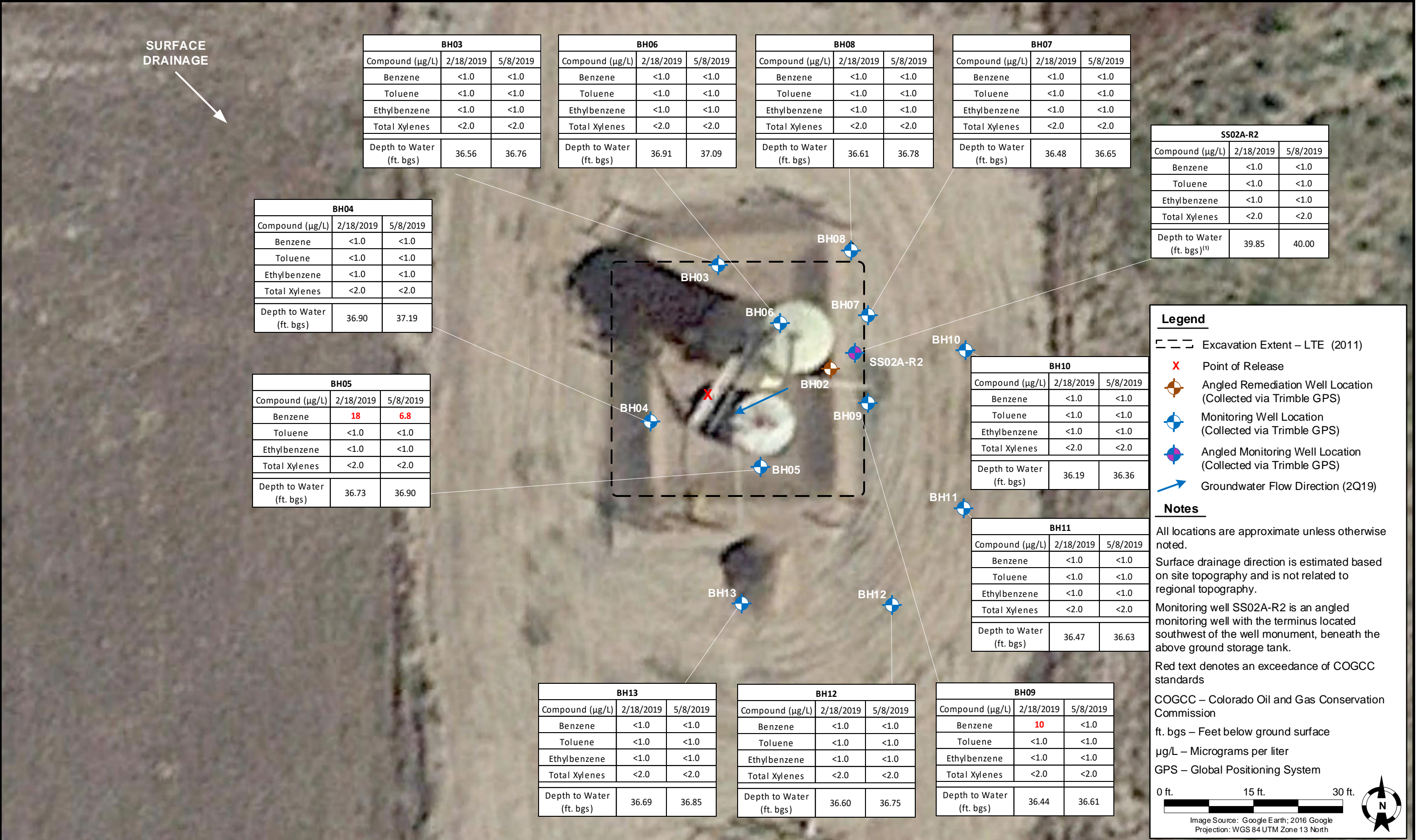
This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Barrell 41-4 tank battery. On May 8, 2019, groundwater monitoring was conducted at all 12 monitoring well locations (BH03 – BH13, and SS02A-R2). Twelve groundwater samples were submitted to Summit Scientific Laboratory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



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



**TASMAN**  
GEOSCIENCES

**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  
ANALYTICAL RESULTS  
MAP**

**FIGURE  
1**





DATE:	May 10, 2019
DESIGNED BY:	C. Hamlin
DRAWN BY:	C. Olson



**TASMAN**  
GEOSCIENCES

**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 <sup>(2)</sup> (feet)
<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
SS02A-R2 <sup>(3)</sup>	9/22/2017	120	150	120	1,200	39.08
SS02A-R2 <sup>(3)</sup>	11/16/2017	74	8.1	19	76	38.92
SS02A-R2 <sup>(3)</sup>	2/7/2018	9.0	<1.0	9.1	3.7	39.67
SS02A-R2 <sup>(3)</sup>	5/17/2018	6.6	<1.0	<1.0	7.4	40.03
SS02A-R2 <sup>(3)</sup>	8/9/2018	5.7	<1.0	2.1	3.3	39.54
SS02A-R2 <sup>(3)</sup>	11/15/2018	1.8	<1.0	<1.0	<2.0	39.00
SS02A-R2 <sup>(3)</sup>	2/18/2019	<1.0	<1.0	<1.0	<2.0	39.85
SS02A-R2 <sup>(3)</sup>	5/8/2019	<1.0	<1.0	<1.0	<2.0	40.00
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
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
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
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 <sup>(2)</sup> (feet)
<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
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	<b>470</b>	<1.0	6.0	8.0	35.65
BH09	2/7/2018	<b>240</b>	<1.0	<1.0	<2.0	36.29
BH09	5/17/2018	<b>11</b>	<1.0	<1.0	<2.0	36.58
BH09	8/9/2018	<b>150</b>	<1.0	<1.0	<2.0	36.25
BH09	11/15/2018	<b>720</b>	<1.0	<1.0	<2.0	35.74
BH09	2/18/2019	<b>10</b>	<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 <sup>(2)</sup> (feet)
<b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
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)
<b>Second Quarter 2014</b>						
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
<b>Quarterly Totals</b>		<b>18</b>	<b>0</b>		-	-
<b>Third Quarter 2014</b>						
9/3/2014	BH02	6	0	N/A	N/A	N/A
<b>Quarterly Totals</b>		<b>6</b>	<b>0</b>		-	-
<b>Fourth Quarter 2014</b>						
12/17/2014	BH02	6	0	N/A	N/A	N/A
<b>Quarterly Totals</b>		<b>6</b>	<b>0</b>		-	-
<b>First Quarter 2015</b>						
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
<b>Quarterly Totals</b>		<b>36</b>	<b>0</b>		-	-

**Notes:**

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute

## Attachment A



# Summit Scientific

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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 on a light blue background. The signature is written in a cursive style and reads "Muri Premer".

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

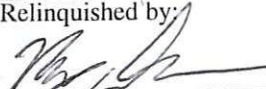

Summit Scientific

*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

Page 1 of 2

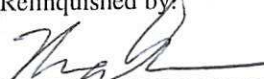
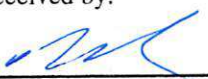
Project Manager:	Mark Longhurst
E-Mail:	mark.longhurst@pdce.com
Project Name:	Barrell 41-4
Project Number:	-

				Preservative				Matrix				Analyze For:											
Sample Description	Date Sampled	Time Sampled	Number of Containers	HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	BTEX											Special Instructions
BH03	5/8/19	1210	3			X		X				X											
BH04		1201																					
BH05		1300																					
BH06		1205																					
BH07		1215																					
BH08		1120																					
BH09		1300																					
5502A-R2		1245																					
BH10		1140																					
BH11		1234																					
Relinquished by: 				Date/Time: 5/8/19 1600				Received by: Lock Box				Date/Time: 5/8/19 1600				Turn Around Time (Check)						Notes:	
Relinquished by: Lock Box				Date/Time:				Received by: 				Date/Time: 5-8-19 17:22				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:				Date/Time:				Received in Lab by:				Date/Time:				Sample Integrity: Temperature Upon Receipt: 4.9 Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							

# Summit Scientific

Page 2 of 2

Project Manager: Mark Longhurst  
E-Mail: mark.longhurst@pdce.com  
Project Name: Barrill 41-4  
Project Number: -

				Preservative				Matrix		Analyze For:										
Sample Description	Date Sampled	Time Sampled	Number of Containers	HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)								Special Instructions	
BH12	5/8/19	1235	3			X		X				X								
BH13	5/8/19	1234	3			X		X				X								
Relinquished by: 				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: 5/8/19 17:22				Received by: 				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)	<u>49</u>
-----------	-----------

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C <sup>(1)</sup> ?	<u>+</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 <sup>(1)</sup> ?	<u>+</u>			
Was adequate sample volume provided <sup>(1)</sup> ?	<u>+</u>			
If custody seals are present, are they intact <sup>(1)</sup> ?			<u>+</u>	
Are samples with holding times due within 48 hours sample due within 48 hours present?		<u>+</u>		
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	<u>+</u>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<u>+</u>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<u>+</u>			
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	<u>+</u>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<u>+</u>		
Are samples preserved that require preservation (excluding cooling) <sup>(1)</sup> ?		<u>+</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 <sup>(1)</sup> ?			<u>+</u>	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?			<u>+</u>	
Additional Comments (if any):				

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

mg  
Custodian Printed Name or Initials

UP  
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								
<b>Benzene</b>	<b>6.8</b>	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

*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

**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

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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

**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

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

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

**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

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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

### 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