

PDC Energy, Inc.
First Quarter 2019 Groundwater Monitoring Summary

March 27, 2019

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

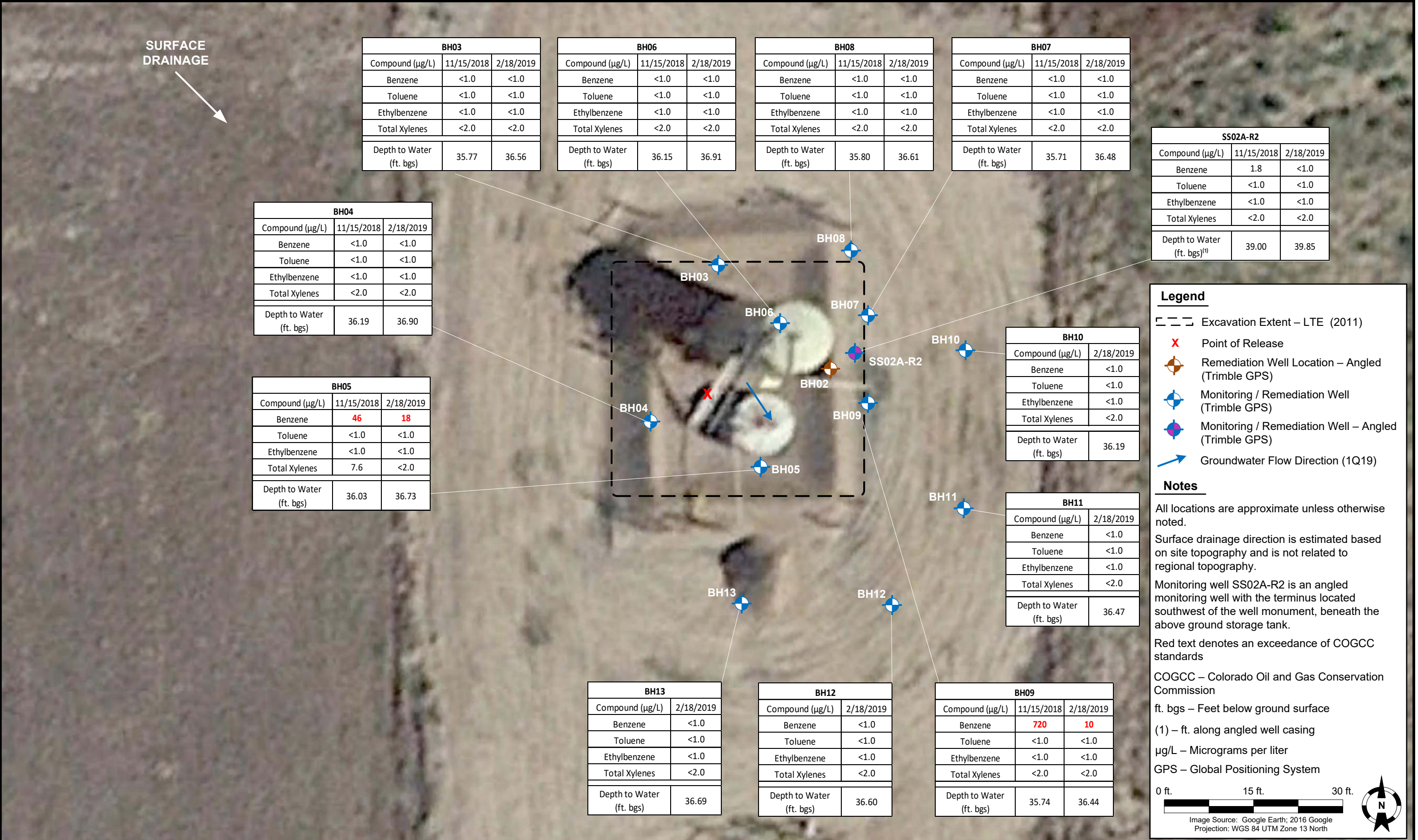
This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Barrell 41-4 tank battery. Per the Condition of Approval (COA) issued by the Colorado Oil and Gas Conservation Commission (COGCC) on February 7, 2018, four (4) additional monitoring wells (BH10 - BH13) were installed southeast of the existing monitoring well network on January 9 and January 10, 2019, to establish down-gradient point of compliance. On February 18, 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.

First quarter 2019 analytical results indicate that the benzene concentration is above the applicable COGCC Table 910-1 groundwater standard in monitoring wells BH05 and BH09. BTEX concentrations are below applicable regulatory standards in ten 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 SCE period of operation, approximately 1.82 pounds of hydrocarbon mass was removed from the subsurface. 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 second quarter 2019.

Second quarter 2019 groundwater sampling will be conducted during May 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:	March 18, 2019
DESIGNED BY:	C. Hamlin
DRAWN BY:	B. Nelson



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



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
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
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
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
BH06	10/16/2017	<1.0	<1.0	<1.0	<2.0	36.14
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

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	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
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
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
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
BH10	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.19
BH11	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.47
BH12	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.60
BH13	2/18/2019	<1.0	<1.0	<1.0	<2.0	36.69

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	

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 41-45 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

February 22, 2019

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Barrell 41-4

Enclosed are the results of analyses for samples received by Summit Scientific on 02/18/19 17:30. 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 cursive 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:
02/22/19 10:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH03	1902164-01	Water	02/18/19 11:11	02/18/19 17:30
BH04	1902164-02	Water	02/18/19 11:28	02/18/19 17:30
BH05	1902164-03	Water	02/18/19 14:00	02/18/19 17:30
BH06	1902164-04	Water	02/18/19 11:20	02/18/19 17:30
BH07	1902164-05	Water	02/18/19 12:00	02/18/19 17:30
BH08	1902164-06	Water	02/18/19 11:45	02/18/19 17:30
BH09	1902164-07	Water	02/18/19 13:35	02/18/19 17:30
SS02A-R2	1902164-08	Water	02/18/19 13:15	02/18/19 17:30
BH10	1902164-09	Water	02/18/19 12:15	02/18/19 17:30
BH11	1902164-10	Water	02/18/19 12:30	02/18/19 17:30
BH12	1902164-11	Water	02/18/19 12:45	02/18/19 17:30
BH13	1902164-12	Water	02/18/19 13:00	02/18/19 17:30

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

Page 1 of 2

Client: PDC / Tasman
Address: 6899 N Pecos
City/State/Zip: Denver/CO/80221
Phone: 9704816109 Max Dahlgren Fax:
Sampler Name: Max Dahlgren

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


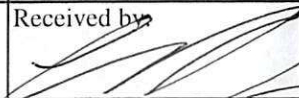
Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:												Special Instructions			
				HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	BTX														
BH03	2/18/19	1111	3	X				X				X														
BH04		1128																								
BH05		1400																								
BH06		1120																								
BH07		1200																								
BH08		1145																								
BH09		1339																								
SS02A-R2		1315																								
BH10		1215																								
BH11		1230																								

Relinquished by: <u>[Signature]</u>	Date/Time: <u>2/18/19</u> <u>1630</u>	Received by: <u>Lock Box</u>	Date/Time: <u>2/18/19</u> <u>1630</u>	Turn Around Time (Check) Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/> Sample Integrity: Temperature Upon Receipt: <u>7.3</u> Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Notes:
Relinquished by: <u>Lock Box</u>	Date/Time: <u>2.18.19</u> <u>1730</u>	Received by: <u>[Signature]</u>	Date/Time: <u>2.18.19</u> <u>1730</u>		
Relinquished by:	Date/Time:	Received in Lab by:	Date/Time:		

Summit Scientific

Page 2 of 2

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

				Preservative				Matrix				Analyze For:								Special Instructions
Sample Description	Date Sampled	Time Sampled	Number of Containers	HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	BTEX								
BH12	2/18/19	1245	3	X				X				X								
BH13	2/18/19	1300	3	X				X				X								
Relinquished by: 				Date/Time: 2/18/19 1630				Received by: Lock Box				Date/Time: 2/18/19 1630				Turn Around Time (Check)				Notes:
												Same Day <input type="checkbox"/> 72 Hours 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/>								
Relinquished by: Lock Box				Date/Time: 2.18.19 1730				Received by: 				Date/Time: 2-18-19 1730				Sample Integrity:				
Relinquished by:				Date/Time:				Received in Lab by:				Date/Time:				Temperature Upon Receipt: 7.3				
																Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				

Sample Receipt Checklist

S2 Work Order 1902164

Client: PDC / Tasman Client Project ID: Berrell 41-4

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

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

Temp (°C)	<u>7.3</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⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>HCl</u>
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Additional Comments (if any):

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

UP
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

2.18.19 1730
Date/Time



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

Project: Barrell 41-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/22/19 10:23

BH03
1902164-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 11:11**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 11:11**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		92.0 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.7 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.4 %	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:
02/22/19 10:23

BH04
1902164-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 11:28**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 11:28**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		89.7 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.6 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.1 %	21-167		"	"	"	"	

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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:
02/22/19 10:23

BH05
1902164-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 14:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	18	1.0		ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/18/19 14:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		92.3 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.1 %		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:
02/22/19 10:23

BH06
1902164-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 11:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 11:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		92.6 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.5 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.0 %	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:
02/22/19 10:23

BH07
1902164-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 12:00**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 12:00**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		91.4 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.1 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.3 %	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:
02/22/19 10:23

BH08
1902164-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 11:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 11:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		94.1 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.2 %	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:
02/22/19 10:23

BH09
1902164-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	10	1.0		ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/18/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		94.5 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.2 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.4 %		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:
02/22/19 10:23

SS02A-R2
1902164-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 13:15**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 13:15**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		92.9 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.5 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.6 %	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:
02/22/19 10:23

BH10
1902164-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 12:15**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 12:15**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		94.9 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.1 %	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:
02/22/19 10:23

BH11
1902164-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 12:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 12:30**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		92.0 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.1 %	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:
02/22/19 10:23

BH12
1902164-11 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 12:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 12:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.0 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.4 %	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:
02/22/19 10:23

BH13
1902164-12 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/18/19 13:00**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1902230	02/19/19	02/21/19	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **02/18/19 13:00**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		97.6 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.2 %	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:
02/22/19 10:23

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 1902230 - EPA 5030 Water MS

Blank (1902230-BLK1)

Prepared: 02/19/19 Analyzed: 02/20/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	11.4		"	13.3		85.4	23-173			
Surrogate: Toluene-d8	12.9		"	13.3		96.5	20-170			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.3	21-167			

LCS (1902230-BS1)

Prepared: 02/19/19 Analyzed: 02/20/19

Benzene	34.5	1.0	ug/l	33.3		104	70-130			
Toluene	34.9	1.0	"	33.3		105	70-130			
Ethylbenzene	37.7	1.0	"	33.3		113	70-130			
m,p-Xylene	71.7	2.0	"	66.7		108	70-130			
o-Xylene	35.0	1.0	"	33.3		105	70-130			
Surrogate: 1,2-Dichloroethane-d4	12.7		"	13.3		95.2	23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.3	20-170			
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3		99.8	21-167			

Matrix Spike (1902230-MS1)

Source: 1902162-01

Prepared: 02/19/19 Analyzed: 02/20/19

Benzene	34.7	1.0	ug/l	33.3	ND	104	70-130			
Toluene	35.3	1.0	"	33.3	ND	106	70-130			
Ethylbenzene	37.7	1.0	"	33.3	ND	113	70-130			
m,p-Xylene	72.4	2.0	"	66.7	ND	109	70-130			
o-Xylene	34.8	1.0	"	33.3	ND	104	70-130			
Surrogate: 1,2-Dichloroethane-d4	12.9		"	13.3		96.8	23-173			
Surrogate: Toluene-d8	13.0		"	13.3		97.4	20-170			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		96.7	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:
02/22/19 10:23

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 1902230 - EPA 5030 Water MS

Matrix Spike Dup (1902230-MSD1)	Source: 1902162-01			Prepared: 02/19/19 Analyzed: 02/20/19						
Benzene	34.4	1.0	ug/l	33.3	ND	103	70-130	0.782	30	
Toluene	35.0	1.0	"	33.3	ND	105	70-130	1.02	30	
Ethylbenzene	37.7	1.0	"	33.3	ND	113	70-130	0.159	30	
m,p-Xylene	72.3	2.0	"	66.7	ND	108	70-130	0.166	30	
o-Xylene	35.1	1.0	"	33.3	ND	105	70-130	0.888	30	
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.3		97.1	23-173			
Surrogate: Toluene-d8	13.0		"	13.3		97.2	20-170			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.3	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:
02/22/19 10:23

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