



**PDC Energy, Inc.**  
Second Quarter 2018 Groundwater Monitoring Summary

July 19, 2018

Nelson 11, 21-33 Tank Battery  
NWNW Section 33 T5N R67W  
Spill Point ID # 448930  
Remediation # 10053

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Nelson 11, 21-33 tank battery. On February 26, 2018, monitoring well BH04 was replaced (BH04R) due to a well casing failure. On April 17, 2018, groundwater monitoring was conducted at all ten monitoring well locations (BH01 – BH03, BH04R, BH05 – BH10). Ten groundwater samples were submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B. Analytical results are summarized in Table 1 and the laboratory report is included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Second quarter 2018 analytical results indicate that benzene concentrations are above the applicable COGCC Table 910-1 groundwater standard in monitoring wells BH03, BH04R, and BH05. BTEX concentrations are below applicable regulatory standards in seven monitoring well locations.

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the second quarter 2017. Due to persisting elevated benzene concentrations, enhanced fluid recovery (EFR) and air sparge (AS) was initiated at the site during the first quarter 2018. A summary of the EFR/AS operational data is provided in Table 2. EFR/AS will remain the selected remediation strategy for the site through the third quarter 2018.

Per the Condition of Approval (COA) issued by the COGCC on August 2, 2017, groundwater elevation contours indicating groundwater flow direction are illustrated on the attached Figure 2. Third quarter 2018 groundwater sampling will be conducted during July 2018.

COUNTY ROAD 52

SURFACE DRAINAGE

BH07		
Compound (µg/L)	1/25/2018	4/17/2018
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)	7.42	7.87

BH06		
Compound (µg/L)	1/25/2018	4/17/2018
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)	8.04	8.70

BH03		
Compound (µg/L)	1/25/2018	4/17/2018
Benzene	<b>33</b>	<b>7.3</b>
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	5.69	6.16

BH02		
Compound (µg/L)	1/25/2018	4/17/2018
Benzene	<b>11</b>	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	7.49	8.17

BH08		
Compound (µg/L)	1/25/2018	4/17/2018
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)	5.43	5.96

BH01		
Compound (µg/L)	1/25/2018	4/17/2018
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)	6.50	7.06

BH04/BH04R		
Compound (µg/L)	1/25/2018	4/17/2018
Benzene	<b>350</b>	<b>43</b>
Toluene	<1.0	<1.0
Ethylbenzene	6.9	<1.0
Total Xylenes	30	5.1
Depth to Water (ft. bgs)	NM	5.98

BH05		
Compound (µg/L)	1/25/2018	4/17/2018
Benzene	<b>7.9</b>	<b>10</b>
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	5.67	6.10

BH09		
Compound (µg/L)	1/25/2018	4/17/2018
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)	5.35	5.76

BH10		
Compound (µg/L)	1/25/2018	4/17/2018
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)	5.41	5.91

**Legend**

- Monitoring Well (Location collected via Trimble GPS)
- Replacement Monitoring Well (Location collected via Trimble GPS)
- Excavation Extent (Location collected via Trimble GPS)
- Point of Release
- Excavation Groundwater Sample
- Groundwater Flow Direction (2Q18)

**Notes**

All locations are approximate unless otherwise noted.

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

GPS – Global Positioning System

µg/L – Micrograms per liter

ft. bgs – Feet below ground surface

COGCC – Colorado Oil and Gas Conservation Commission

Red text denotes an exceedance of COGCC standards


0 ft. 15 ft. 30 ft.

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

DATE: April 26, 2018

DESIGNED BY: C. Hamlin

DRAWN BY: T. Blessing



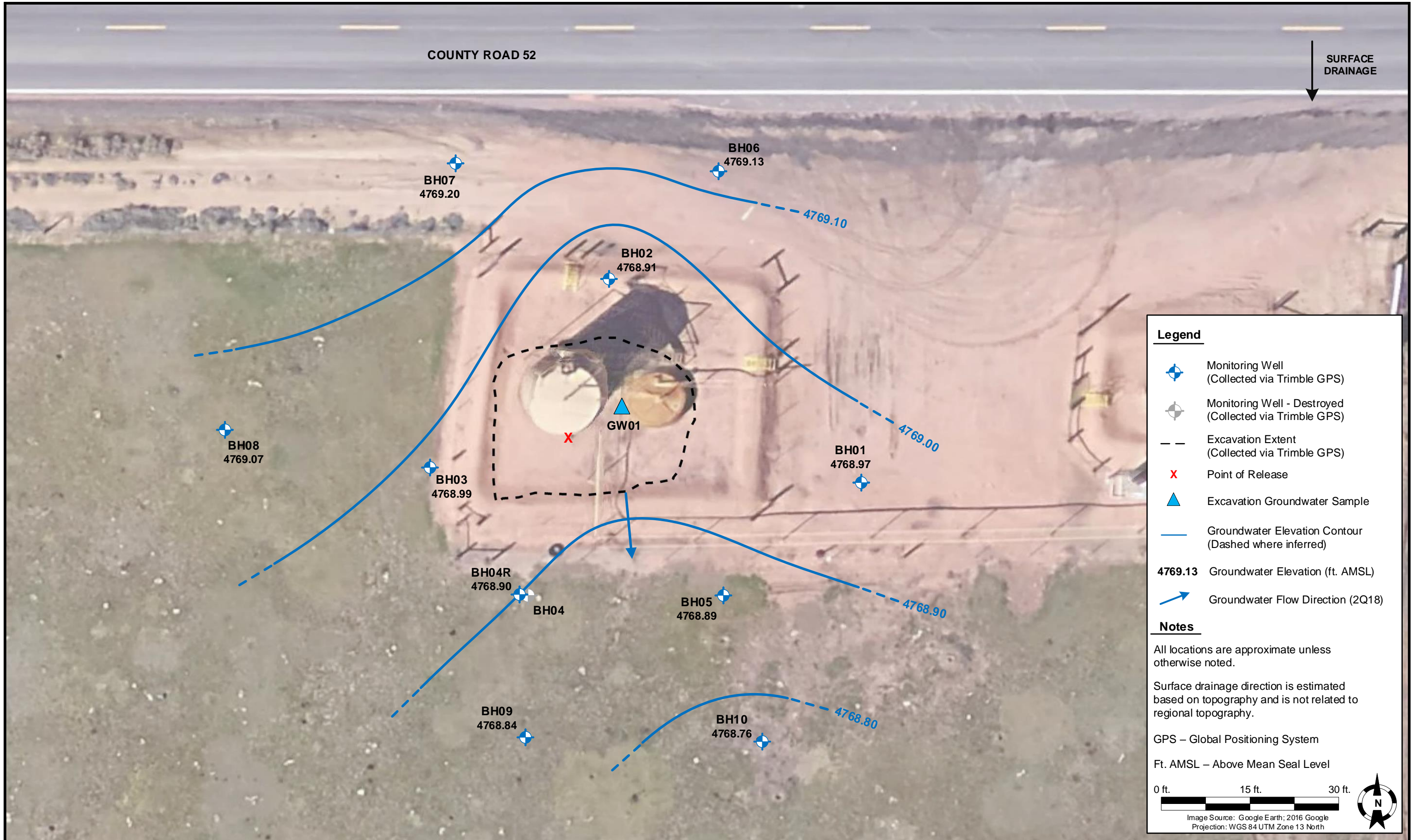
**TASMAN**  
GEOSCIENCES

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

**PDC Energy, Inc. – DJ Basin**  
**Nelson 11, 21-33 Tank Battery**  
NWNW, Section 33, Township 5 North, Range 67 West  
Weld County, Colorado

GROUNDWATER  
ANALYTICAL RESULTS  
MAP

FIGURE  
1



**Legend**

- Monitoring Well (Collected via Trimble GPS)
- Monitoring Well - Destroyed (Collected via Trimble GPS)
- Excavation Extent (Collected via Trimble GPS)
- Point of Release
- Excavation Groundwater Sample
- Groundwater Elevation Contour (Dashed where inferred)

**4769.13** Groundwater Elevation (ft. AMSL)

Groundwater Flow Direction (2Q18)

**Notes**

All locations are approximate unless otherwise noted.

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

GPS – Global Positioning System

Ft. AMSL – Above Mean Seal Level

0 ft. 15 ft. 30 ft.

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

DATE: May 18, 2018

DESIGNED BY: C. Hamlin

DRAWN BY: D. Cavinder



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

**PDC Energy, Inc. – DJ Basin**  
**Nelson 11, 21-33 Tank Battery**  
NWNW, Section 33, Township 5 North, Range 67 West  
Weld County, Colorado

**GROUNDWATER ELEVATION CONTOUR MAP (04/17/2018)**

**FIGURE 2**

**TABLE 1**  
**NELSON 11, 21-33 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>	
GW01	2/6/2017	<b>210</b>	350	6.2	360	~ 10
BH01	6/5/2017	<1.0	<1.0	<1.0	<2.0	6.80
BH01	7/13/2017	<1.0	<1.0	<1.0	<2.0	5.14
BH01	10/2/2017	<1.0	<1.0	<1.0	<2.0	5.15
BH01	1/25/2018	<1.0	<1.0	<1.0	<2.0	6.50
BH01	4/17/2018	<1.0	<1.0	<1.0	<2.0	7.06
BH02	6/5/2017	<b>44</b>	160	5.3	80	7.62
BH02	7/13/2017	<1.0	<1.0	<1.0	<2.0	5.88
BH02	10/2/2017	<1.0	<1.0	<1.0	<2.0	6.04
BH02	1/25/2018	<b>11</b>	<1.0	<1.0	<2.0	7.49
BH02	4/17/2018	<1.0	<1.0	<1.0	<2.0	8.17
BH03	6/5/2017	<b>61</b>	310	10	160	5.78
BH03	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.02
BH03	10/2/2017	<b>13</b>	6.6	<1.0	7.1	4.15
BH03	1/25/2018	<b>33</b>	<1.0	<1.0	<2.0	5.69
BH03	4/17/2018	<b>7.3</b>	<1.0	<1.0	<2.0	6.16
BH04	6/5/2017	<b>220</b>	<b>690</b>	18	260	5.62
BH04	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.06
BH04	10/2/2017	<b>63</b>	<1.0	<1.0	16	4.08
BH04 <sup>(3)</sup>	1/25/2018	<b>350</b>	<1.0	6.9	30	NM
BH04	1/25/2018	Destroyed				
BH04R	4/17/2018	<b>43</b>	<1.0	<1.0	5.1	5.98
BH05	6/5/2017	<b>450</b>	24	<1.0	26	5.71
BH05	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.15
BH05	10/2/2017	<1.0	<1.0	<1.0	<2.0	4.14
BH05	1/25/2018	<b>7.9</b>	<1.0	<1.0	<2.0	5.67
BH05	4/17/2018	<b>10</b>	<1.0	<1.0	<2.0	6.10
BH06	7/13/2017	<1.0	<1.0	<1.0	<2.0	6.33
BH06	10/2/2017	<1.0	<1.0	<1.0	<2.0	6.61
BH06	1/25/2018	<1.0	<1.0	<1.0	<2.0	8.04

**TABLE 1**  
**NELSON 11, 21-33 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	4/17/2018	<1.0	<1.0	<1.0	<2.0	8.70
BH07	7/13/2017	<1.0	<1.0	<1.0	<2.0	5.61
BH07	10/2/2017	<1.0	<1.0	<1.0	<2.0	5.90
BH07	1/25/2018	<1.0	<1.0	<1.0	<2.0	7.42
BH07	4/17/2018	<1.0	<1.0	<1.0	<2.0	7.87
BH08	7/13/2017	<1.0	<1.0	<1.0	<2.0	3.89
BH08	10/2/2017	<1.0	<1.0	<1.0	<2.0	4.01
BH08	1/25/2018	<1.0	<1.0	<1.0	<2.0	5.43
BH08	4/17/2018	<1.0	<1.0	<1.0	<2.0	5.96
BH09	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.03
BH09	10/2/2017	<1.0	<1.0	<1.0	<2.0	3.98
BH09	1/25/2018	<1.0	<1.0	<1.0	<2.0	5.35
BH09	4/17/2018	<1.0	<1.0	<1.0	<2.0	5.76
BH10	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.11
BH10	10/2/2017	<1.0	<1.0	<1.0	<2.0	4.03
BH10	1/25/2018	<1.0	<1.0	<1.0	<2.0	5.41
BH10	4/17/2018	<1.0	<1.0	<1.0	<2.0	5.91

**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 BH04's casing was removed during EFR event on January 3, 2018. 1Q18 groundwater sample was collected from the remaining borehole as a grab sample.
- 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**  
**NELSON 11,21-33 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>First Quarter 2018</b>						
1/3/2018	BH04, BH10	3	100	BH03, BH05, BH07, BH08, BH09	20	14
1/18/2018	BH02, BH03, BH05, BH09, BH10	6	84	BH02, BH03, BH05, BH07, BH08, BH09, BH10	20	14.4
1/31/2018		6	410	BH02, BH05, BH07, BH08, BH09, BH10	20	22
2/13/2018		6	300	BH02, BH03, BH05, BH07, BH08, BH09, BH10	15	10.9
2/27/2018	BH02, BH03, BH04, BH05, BH09, BH10	6	300	BH02, BH03, BH05, BH07, BH08, BH09, BH10	20	22
3/14/2018	BH02, BH03, BH04, BH05, BH09	6	180	BH02, BH03, BH04, BH05, BH07, BH09,	20	12.6
3/27/2018		6	170	BH05, BH07, BH09,	20	19.4
<b>Quarterly Totals</b>		<b>39</b>	<b>1544</b>		-	-
<b>Second Quarter 2018</b>						
4/10/2018	BH02, BH03, BH04, BH05, BH09	6	300	BH02, BH03, BH04, BH05, BH07, BH08, BH09, BH10	20	17.4
4/26/2018		6	600	BH02, BH03, BH04, BH05, BH07, BH08, BH09, BH10	20	15.9
5/9/2018		6	380	BH02, BH03, BH04, BH05, BH07, BH09, BH10	20	18
5/22/2018		6	126	BH02, BH03, BH04, BH05, BH07, BH09, BH10	20	18.3
6/6/2018		6	300	BH02, BH03, BH04, BH05, BH07, BH09, BH10	20	17.7
6/20/2018		6	300	BH02, BH03, BH04, BH05, BH07, BH09, BH10	20	22.3
<b>Quarterly Totals</b>		<b>36</b>	<b>2006</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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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

April 24, 2018

Mark Longhurst  
PDC Energy  
1775 Sherman St. STE. 3000  
Denver, CO 80203  
RE: Nelson 11, 21-33

Enclosed are the results of analyses for samples received by Summit Scientific on 04/17/18 17:05. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury For Ben Shrewsbury  
President / Laboratory Director



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

Project: Nelson 11, 21-33

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/24/18 12:36

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1804259-01	Water	04/17/18 12:25	04/17/18 17:05
BH02	1804259-02	Water	04/17/18 12:15	04/17/18 17:05
BH03	1804259-03	Water	04/17/18 12:55	04/17/18 17:05
BH04R	1804259-04	Water	04/17/18 13:10	04/17/18 17:05
BH05	1804259-05	Water	04/17/18 13:30	04/17/18 17:05
BH06	1804259-06	Water	04/17/18 12:30	04/17/18 17:05
BH07	1804259-07	Water	04/17/18 12:15	04/17/18 17:05
BH08	1804259-08	Water	04/17/18 12:50	04/17/18 17:05
BH09	1804259-09	Water	04/17/18 13:00	04/17/18 17:05
BH10	1804259-10	Water	04/17/18 13:15	04/17/18 17:05

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

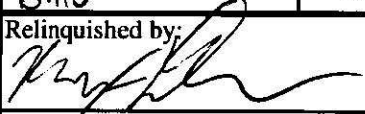
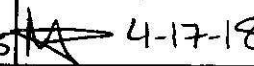
1804259

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

Page 1 of 1

Client: PDC / Tasman  
Address: 6899 N Pecos St  
City/State/Zip: Denver/CO/80221  
Phone: 9704816909 Fax: \_\_\_\_\_  
Sampler Name: \_\_\_\_\_

Project Manager: Mark Longhurst  
E-Mail: mark.longhurst@PDCE.com  
Project Name: Nelson IL 21-33  
Project Number: \_\_\_\_\_

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:						Special Instructions		
				HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)								
BH01	4/17/18	1225	3		X			X											
BH02		1215																	
BH03		1255																	
BH04R		1310																	
BH05		1330																	
BH06		1230																	
BH07		1215																	
BH08		1280																	
BH09		1300																	
BH10		1315																	
Relinquished by: 				Date/Time: 4/17/18 17:05		Received by:  4-17-18				Date/Time: 17:05		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:				Date/Time:		Received in Lab by:				Date/Time:		Sample Integrity:							
												Temperature Upon Receipt: <u>7.1</u>							
												Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>							

**Sample Receipt Checklist**

S2 Work Order: 1804259

Client: PDC/Tasman

Client Project ID: Nelson 11, 21-33

Shipped Via: P.O.  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #: \_\_\_\_\_

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

Temp (°C)	<u>7.1</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> NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	X			
Were all samples received intact <sup>(1)?</sup>	X			
Was adequate sample volume provided <sup>(1)?</sup>	X			
If custody seals are present, are they intact <sup>(1)?</sup>			X	
Are short holding time analytes or samples due within 48 hours present?			X	
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)?</sup>	X			
Does the COC agree with the number and type of sample bottles received <sup>(1)?</sup>	X			
Do the sample IDs on the bottle labels match the COC <sup>(1)?</sup>	X			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)?</sup>	X			
For volatiles in water – is there headspace present? If yes, <b>contact client and note in narrative.</b>		X		
Are samples preserved that require preservation (excluding cooling) <sup>(1)?</sup> Note the type of preservative in the Comments column – HCL, H2SO4, NaOH, HNO3, etc.			X	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)?</sup> Record the pH in Comments.			X	
If dissolved metals are requested, were samples field filtered?			X	

Additional Comments (if any):

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

Muri  
Custodian Printed Name or Initials

4-17-18  
Signature of Custodian

18:00  
Date/Time



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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH01**  
**1804259-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		81.1 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		88.6 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.7 %	70-130		"	"	"	"	

Summit Scientific

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH02**  
**1804259-02 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		85.0 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		86.9 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.3 %	70-130		"	"	"	"	

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: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH03**  
**1804259-03 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>7.3</b>	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		86.8 %	70-130		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		90.1 %	70-130		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		94.4 %	70-130		"	"	"	"	

Summit Scientific

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH04R**  
**1804259-04 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 13:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>43</b>	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>5.1</b>	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 13:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		89.8 %	70-130		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		91.7 %	70-130		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		95.2 %	70-130		"	"	"	"	

Summit Scientific

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH05**  
**1804259-05 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 13:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>10</b>	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 13:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		89.2 %	70-130		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		88.7 %	70-130		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		95.5 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH06**  
**1804259-06 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		88.2 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		89.6 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.9 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH07**  
**1804259-07 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		87.0 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		88.4 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.5 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH08**  
**1804259-08 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 12:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 12:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		85.3 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		89.1 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.5 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH09**  
**1804259-09 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 13:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 13:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		88.6 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		90.1 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.9 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**BH10**  
**1804259-10 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **04/17/18 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1804196	04/20/18	04/22/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **04/17/18 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		87.3 %	70-130		"	"	"	"	
Surrogate: Toluene-d8		88.1 %	70-130		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.0 %	70-130		"	"	"	"	

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

Project: Nelson 11, 21-33

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
04/24/18 12:36

**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 1804196 - EPA 5030 Water MS**

**Blank (1804196-BLK1)**

Prepared: 04/20/18 Analyzed: 04/21/18

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	10.6		"	13.2		80.4	70-130			
Surrogate: Toluene-d8	11.7		"	13.3		87.6	70-130			
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3		94.7	70-130			

**LCS (1804196-BS1)**

Prepared: 04/20/18 Analyzed: 04/21/18

Benzene	30.8	1.0	ug/l	33.3		92.4	70-130			
Toluene	34.2	1.0	"	33.3		102	70-130			
Ethylbenzene	38.9	1.0	"	33.3		117	70-130			
m,p-Xylene	80.9	2.0	"	66.7		121	70-130			
o-Xylene	38.7	1.0	"	33.3		116	70-130			
Xylenes (total)	120	2.0	"				63-131			
Surrogate: 1,2-Dichloroethane-d4	11.0		"	13.2		83.5	70-130			
Surrogate: Toluene-d8	12.0		"	13.3		90.2	70-130			
Surrogate: 4-Bromofluorobenzene	12.2		"	13.3		91.3	70-130			

**Matrix Spike (1804196-MS1)**

Source: 1804247-01

Prepared: 04/20/18 Analyzed: 04/21/18

Benzene	527	1.0	ug/l	33.3	439	262	70-130			QM-07
Toluene	34.9	1.0	"	33.3	ND	105	70-130			
Ethylbenzene	91.0	1.0	"	33.3	59.6	94.1	70-130			
m,p-Xylene	186	2.0	"	66.7	123	94.2	70-130			
o-Xylene	39.4	1.0	"	33.3	1.85	112	70-130			
Xylenes (total)	225	2.0	"		125		63-131			
Surrogate: 1,2-Dichloroethane-d4	11.5		"	13.2		86.9	70-130			
Surrogate: Toluene-d8	12.2		"	13.3		91.9	70-130			
Surrogate: 4-Bromofluorobenzene	12.0		"	13.3		90.4	70-130			

Summit Scientific

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

Project: Nelson 11, 21-33

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/24/18 12:36

**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 1804196 - EPA 5030 Water MS**

<b>Matrix Spike Dup (1804196-MSD1)</b>	<b>Source: 1804247-01</b>			Prepared: 04/20/18		Analyzed: 04/21/18					
Benzene	499	1.0	ug/l	33.3	439	178	70-130	5.43	30		QM-07
Toluene	35.9	1.0	"	33.3	ND	108	70-130	2.91	30		
Ethylbenzene	87.0	1.0	"	33.3	59.6	82.1	70-130	4.52	30		
m,p-Xylene	178	2.0	"	66.7	123	83.2	70-130	4.06	30		
o-Xylene	39.6	1.0	"	33.3	1.85	113	70-130	0.507	30		
Xylenes (total)	218	2.0	"		125		63-131	3.25	20		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>11.3</i>		<i>"</i>	<i>13.2</i>		<i>85.3</i>	<i>70-130</i>				
<i>Surrogate: Toluene-d8</i>	<i>12.8</i>		<i>"</i>	<i>13.3</i>		<i>95.9</i>	<i>70-130</i>				
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>12.1</i>		<i>"</i>	<i>13.3</i>		<i>90.6</i>	<i>70-130</i>				

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

Project: Nelson 11, 21-33

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/24/18 12:36

### Notes and Definitions

- QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS/LCSD recovery.
- 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