



PDC Energy, Inc.
First Quarter 2018 Groundwater Monitoring Summary

March 26, 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 January 25, 2018, groundwater monitoring was conducted at all ten monitoring well locations (BH01 – 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. First quarter 2018 analytical results indicate that benzene concentrations are above the applicable COGCC Table 910-1 groundwater standard in monitoring wells BH02 - BH04, and BH05. BTEX concentrations are below applicable regulatory standards in six 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 second 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. Second quarter 2018 groundwater sampling will be conducted during April 2018.

COUNTY ROAD 52

SURFACE DRAINAGE

BH07		
Compound (µg/L)	10/2/2017	1/25/2018
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)	5.90	7.42

BH06		
Compound (µg/L)	10/2/2017	1/25/2018
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)	6.61	8.04

BH03		
Compound (µg/L)	10/2/2017	1/25/2018
Benzene	13	33
Toluene	6.6	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	7.1	<2.0
Depth to Water (ft. bgs)	4.26	5.80

BH02		
Compound (µg/L)	10/2/2017	1/25/2018
Benzene	<1.0	11
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	6.04	7.49

BH08		
Compound (µg/L)	10/2/2017	1/25/2018
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)	4.01	5.43

BH01		
Compound (µg/L)	10/2/2017	1/25/2018
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)	5.20	6.55






BH04		
Compound (µg/L)	10/2/2017	1/25/2018
Benzene	63	350
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	6.9
Total Xylenes	16	30
Depth to Water (ft. bgs)	4.14	NM

BH05		
Compound (µg/L)	10/2/2017	1/25/2018
Benzene	<1.0	7.9
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	4.20	5.73

BH09		
Compound (µg/L)	10/2/2017	1/25/2018
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)	3.98	5.35

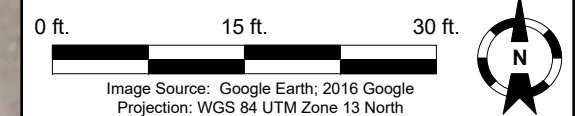
BH10		
Compound (µg/L)	10/2/2017	1/25/2018
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<2.0	<2.0
Depth to Water (ft. bgs)	4.03	5.41

Legend


-  Monitoring Well (Location collected via Trimble GPS)
-  Excavation Extent (Location collected via Trimble GPS)
-  Point of Release
-  Excavation Groundwater Sample
-  Groundwater Flow Direction (1Q18)

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
 NM – Not measured
 Red text denotes an exceedance of COGCC standards



DATE: February 2, 2018
 DESIGNED BY: C. Hamlin
 DRAWN BY: T. Blessing

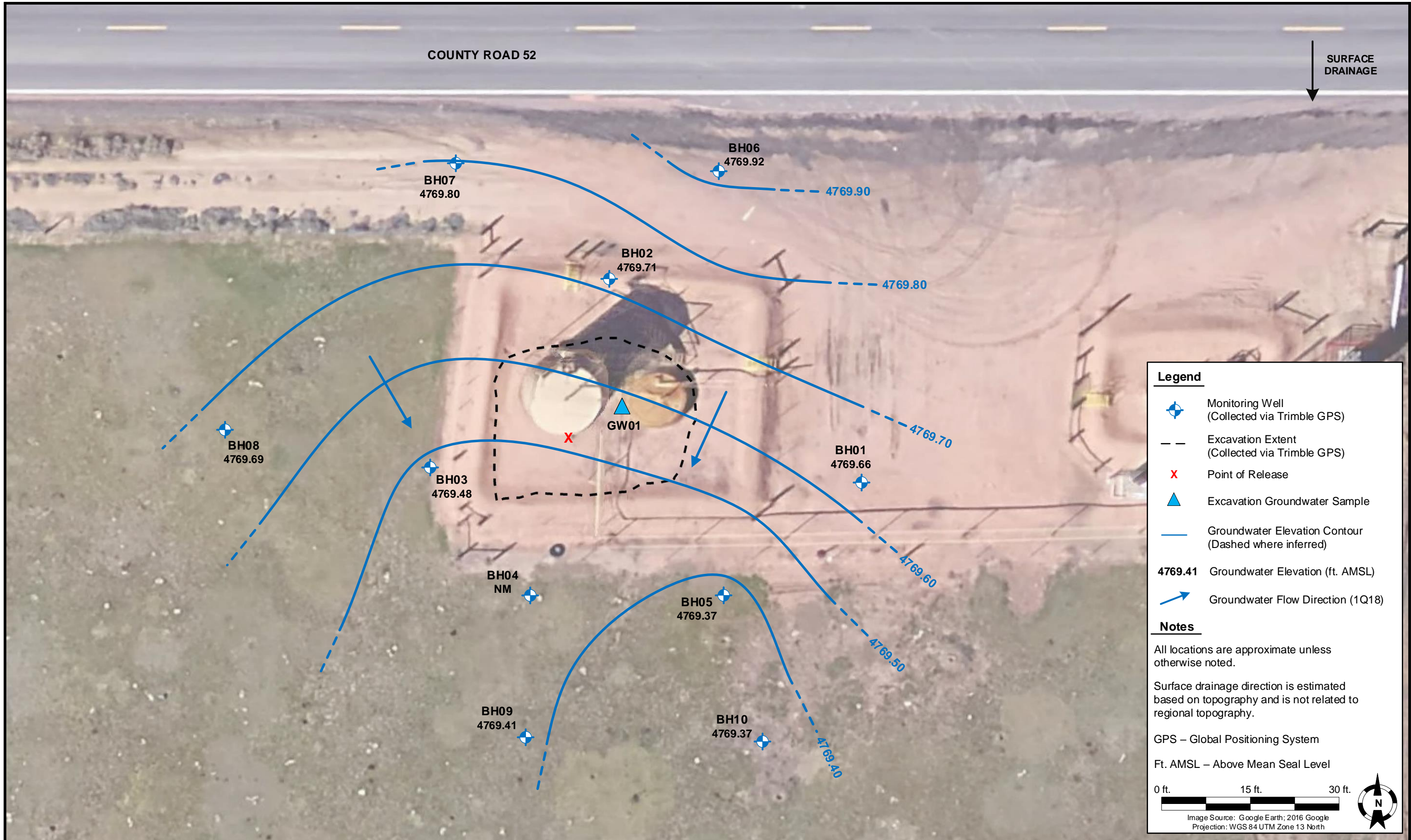


Tasman Geosciences, Inc.
 6899 Pecos Street – Unit C
 Denver, CO 80221

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)
- Excavation Extent (Collected via Trimble GPS)
- Point of Release
- Excavation Groundwater Sample
- Groundwater Elevation Contour (Dashed where inferred)
- Groundwater Elevation (ft. AMSL)
- Groundwater Flow Direction (1Q18)

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: March 27, 2018

DESIGNED BY: C. Hamlin

DRAWN BY: D. Cavinder

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
 ELEVATION CONTOUR
 MAP (01/25/2018)

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 ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
GW01	2/6/2017	210	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	5.19
BH01	10/2/2017	<1.0	<1.0	<1.0	<2.0	5.20
BH01	1/25/2018	<1.0	<1.0	<1.0	<2.0	6.55
BH02	6/5/2017	44	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	11	<1.0	<1.0	<2.0	7.49
BH03	6/5/2017	61	310	10	160	5.78
BH03	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.13
BH03	10/2/2017	13	6.6	<1.0	7.1	4.26
BH03	1/25/2018	33	<1.0	<1.0	<2.0	5.80
BH04	6/5/2017	220	690	18	260	5.62
BH04	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.12
BH04	10/2/2017	63	<1.0	<1.0	16	4.14
BH04 ⁽³⁾	1/25/2018	350	<1.0	6.9	30	NM
BH05	6/5/2017	450	24	<1.0	26	5.71
BH05	7/13/2017	<1.0	<1.0	<1.0	<2.0	4.21
BH05	10/2/2017	<1.0	<1.0	<1.0	<2.0	4.20
BH05	1/25/2018	7.9	<1.0	<1.0	<2.0	5.73
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
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
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

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 ⁽²⁾ (feet)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	
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
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

Notes:

- Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.
- Depth to water measurements were measured from top of well casing or ground surface for monitoring well samples and excavation samples, respectively. Subsequent monitoring well measurements were collected from top of casing and adjusted using survey data and product of 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)
First Quarter 2018						
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
3/14/2018	BH02, BH03, BH04,	6	180	BH02, BH03, BH04,	20	12.6
3/27/2018	BH05, BH09	6	170	BH05, BH07, BH09,	20	19.4
Quarterly Totals		39	1544		-	-

Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

January 30, 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 01/25/18 14:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury For Ben Shrewsbury
Laboratory Manager



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

Project: Nelson 11, 21-33

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/18 14:53

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1801278-01	Water	01/25/18 13:05	01/25/18 14:30
BH02	1801278-02	Water	01/25/18 13:25	01/25/18 14:30
BH03	1801278-03	Water	01/25/18 12:30	01/25/18 14:30
BH04	1801278-04	Water	01/25/18 12:20	01/25/18 14:30
BH05	1801278-05	Water	01/25/18 11:45	01/25/18 14:30
BH06	1801278-06	Water	01/25/18 13:40	01/25/18 14:30
BH07	1801278-07	Water	01/25/18 13:15	01/25/18 14:30
BH08	1801278-08	Water	01/25/18 12:45	01/25/18 14:30
BH09	1801278-09	Water	01/25/18 12:05	01/25/18 14:30
BH10	1801278-10	Water	01/25/18 11:55	01/25/18 14:30

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.

1801278

Sample Receipt Checklist

S2 Work Order: _____

Client: PDC/Tasman Client Project ID: Nelson 11; 21-33

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

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

Cooler ID					
Temp (°C)	<u>4.3</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"/>			
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present?			<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	
Additional Comments (if any):				
⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.				

Makita
Custodian Printed Name

[Signature]
Signature or Initials of Custodian

1/25/18 1600
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:
 01/30/18 14:53

BH01
1801278-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 13:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 13:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

Summit Scientific

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



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

Project: Nelson 11, 21-33

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/30/18 14:53

BH02
1801278-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 13:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	11	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 13:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		107 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		96.5 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.8 %	45-146		"	"	"	"	

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:
 01/30/18 14:53

BH03
1801278-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	33	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		108 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		95.8 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		102 %	45-146		"	"	"	"	

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:
 01/30/18 14:53

BH04
1801278-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 12:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	350	10	ug/l	10	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
Ethylbenzene	6.9	1.0	"	"	"	"	"	"	
Xylenes (total)	30	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 12:20**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		110 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		101 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		104 %	45-146		"	"	"	"	

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:
 01/30/18 14:53

BH05
1801278-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 11:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	7.9	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 11:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		106 %	37-154		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		94.8 %	45-149		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		99.5 %	45-146		"	"	"	"	

Summit Scientific

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



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

Project: Nelson 11, 21-33

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/30/18 14:53

BH06
1801278-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 13:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		110 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.7 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	45-146		"	"	"	"	

Summit Scientific

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

Project: Nelson 11, 21-33

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/30/18 14:53

BH07
1801278-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		105 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		94.1 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		102 %	45-146		"	"	"	"	

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

Project: Nelson 11, 21-33

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/30/18 14:53

BH08
1801278-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 12:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 12:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		95.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	45-146		"	"	"	"	

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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:
 01/30/18 14:53

BH09
1801278-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 12:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 12:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.1 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.0 %	45-146		"	"	"	"	

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 Denver CO, 80203

Project: Nelson 11, 21-33

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/30/18 14:53

BH10
1801278-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/25/18 11:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	1801288	01/27/18	01/27/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/25/18 11:55**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		108 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		96.8 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.9 %	45-146		"	"	"	"	

Summit Scientific

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Denver CO, 80203

Project: Nelson 11, 21-33

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/18 14:53

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 1801288 - EPA 5030 Water MS

Blank (1801288-BLK1)

Prepared & Analyzed: 01/27/18

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.2		"	13.3		99.2	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		96.7	45-149			
Surrogate: 4-Bromofluorobenzene	13.6		"	13.3		102	45-146			

LCS (1801288-BS1)

Prepared & Analyzed: 01/27/18

Benzene	37.2	1.0	ug/l	33.3		112	51-132			
Toluene	37.2	1.0	"	33.3		112	51-138			
Ethylbenzene	40.4	1.0	"	33.1		122	58-146			
m,p-Xylene	75.9	2.0	"	66.5		114	57-144			
o-Xylene	38.6	1.0	"	32.7		118	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.0		"	13.3		105	37-154			
Surrogate: Toluene-d8	13.2		"	13.3		98.9	45-149			
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3		100	45-146			

Matrix Spike (1801288-MS1)

Source: 1801278-01

Prepared & Analyzed: 01/27/18

Benzene	37.2	1.0	ug/l	33.3	ND	112	34-141			
Toluene	37.0	1.0	"	33.3	ND	111	27-151			
Ethylbenzene	40.8	1.0	"	33.1	ND	123	29-160			
m,p-Xylene	76.8	2.0	"	66.5	ND	115	20-166			
o-Xylene	39.5	1.0	"	32.7	ND	121	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.3		"	13.3		107	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		96.6	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.1	45-146			

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:
 01/30/18 14:53

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 1801288 - EPA 5030 Water MS

Matrix Spike Dup (1801288-MSD1)	Source: 1801278-01			Prepared & Analyzed: 01/27/18						
Benzene	37.4	1.0	ug/l	33.3	ND	112	34-141	0.562	32	
Toluene	37.8	1.0	"	33.3	ND	113	27-151	2.14	25	
Ethylbenzene	41.1	1.0	"	33.1	ND	124	29-160	0.830	50	
m,p-Xylene	77.9	2.0	"	66.5	ND	117	20-166	1.41	36	
o-Xylene	40.0	1.0	"	32.7	ND	123	33-159	1.43	26	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.6</i>		<i>"</i>	<i>13.3</i>		<i>110</i>	<i>37-154</i>			
<i>Surrogate: Toluene-d8</i>	<i>13.1</i>		<i>"</i>	<i>13.3</i>		<i>98.4</i>	<i>45-149</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.4</i>		<i>"</i>	<i>13.3</i>		<i>101</i>	<i>45-146</i>			

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Nelson 11, 21-33

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/18 14:53

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