

PDC Energy, Inc.
First Quarter 2020 Groundwater Monitoring Summary

February 4, 2020,

Bauer 5; 12, 21-4 Tank Battery
NWNW Section 4 T5N R64W
Remediation # 13570

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Bauer 5; 12, 21-4 tank battery. On January 23, 2020, groundwater monitoring was conducted at all five monitoring wells (BH01 – BH05). Five groundwater samples were submitted to Summit Scientific Laboratory for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 8260B.

First quarter 2020 analytical results indicated that BTEX concentrations were below the applicable COGCC Table 910-1 standards in all five monitoring well locations. Sample locations and corresponding analytical results are illustrated on Figure 1. Groundwater elevation data is illustrated on Figure 2. Groundwater analytical results are summarized in Table 1. The laboratory analytical report is included in Attachment A.

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the fourth quarter 2019 and will remain the selected remediation strategy for the second quarter 2020.

Second quarter 2020 groundwater sampling will be conducted in April 2020.



DATE:	February 4, 2020
DESIGNED BY:	B. Nelson
DRAWN BY:	M. Dahlgren



TASMAN
GEOSCIENCES

Tasman Geosciences, Inc.
6855 W. 119th Ave.
Broomfield, CO 80020

PDC Energy, Inc. – DJ Basin
Bauer 5; 12, 21-4 Tank Battery
NWNW, Section 4, Township 5 North, Range 64 West
Weld County, Colorado

GROUNDWATER
ANALYTICAL RESULTS
MAP

FIGURE
1



TABLE 1
BAUER 5; 12, 21-4 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⁾ (ft.)	Groundwater Elevation (ft. AMSL)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400		
GW01	7/3/2019	3.5	<1.0	1.6	16	~16	NM
BH01	10/31/2019	<1.0	<1.0	<1.0	<2.0	15.52	4612.68
BH01	1/23/2020	<1.0	<1.0	<1.0	<2.0	16.64	4611.56
BH02	10/31/2019	<1.0	<1.0	<1.0	<2.0	16.00	4612.22
BH02	1/23/2020	<1.0	<1.0	<1.0	<2.0	17.22	4611.00
BH03	10/31/2019	<1.0	<1.0	<1.0	<2.0	14.21	4613.61
BH03	1/23/2020	<1.0	<1.0	<1.0	<2.0	15.55	4612.27
BH04	10/31/2019	<1.0	<1.0	<1.0	<2.0	13.94	4613.81
BH04	1/23/2020	<1.0	<1.0	<1.0	<2.0	14.97	4612.78
BH05	10/31/2019	<1.0	<1.0	<1.0	<2.0	13.70	4613.71
BH05	1/23/2020	<1.0	<1.0	<1.0	<2.0	14.78	4612.63

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 to reflect depth of water from ground surface.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

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

ft. = Feet

AMSL = Above Mean Sea Level

NM = Not measured

Attachment A

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

January 30, 2020

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

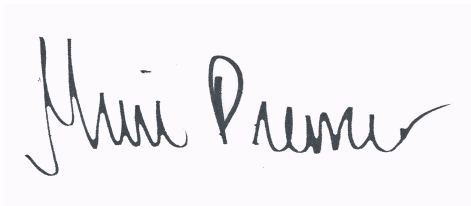
Denver, CO 80203

RE: Bauer 5; 12, 21-4

Work Order #2001264

Enclosed are the results of analyses for samples received by Summit Scientific on 01/23/20 17:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Muri Premer", is displayed on a light purple rectangular background.

Muri Premer For Paul Shrewsbury
President



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

Project: Bauer 5; 12, 21-4

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2001264-01	Water	01/23/20 10:25	01/23/20 17:30
BH02	2001264-02	Water	01/23/20 09:55	01/23/20 17:30
BH03	2001264-03	Water	01/23/20 10:13	01/23/20 17:30
BH04	2001264-04	Water	01/23/20 10:24	01/23/20 17:30
BH05	2001264-05	Water	01/23/20 10:05	01/23/20 17:30

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Page 1 of 1

Project Manager: Mark Longhurst
E-Mail: mark.longhurst@PDCE.com
Project Name: Bauer 5; 12, 21-4
Project Number: N/A

www.s2scientific.com

1

Sample Receipt Checklist

S2 Work Order 2001264

Client: PDC / TASMAN

Client Project ID: BAUER 5 ; 12 , 21 -4

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

☐ ☒ ☐ ☐ ☐

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

Temp (°C)	5.5
-----------	-----

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 checked="" type="checkbox"/>	<input 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"/>	HCL
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.

RZ

Custodian Printed Name or Initials

Signature of Custodian

1/23/20

Date/Time



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

Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

BH01
2001264-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/23/20 10:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2001341	01/24/20	01/28/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **01/23/20 10:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		117 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		96.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %		21-167		"	"	"	"	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

BH02
2001264-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/23/20 09:55**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	2001341	01/24/20	01/28/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/23/20 09:55**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		119 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		111 %	21-167		"	"	"	"	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

BH03
2001264-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/23/20 10:13**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	2001341	01/24/20	01/28/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/23/20 10:13**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		125 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		107 %	21-167		"	"	"	"	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

BH04
2001264-04 (Water)

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Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/23/20 10:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	2001341	01/24/20	01/28/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/23/20 10:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		118 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %	21-167		"	"	"	"	

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1775 Sherman St. STE. 3000
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Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

BH05
2001264-05 (Water)

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Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **01/23/20 10:05**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	2001341	01/24/20	01/28/20	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **01/23/20 10:05**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		119 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		95.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %	21-167		"	"	"	"	

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Bauer 5; 12, 21-4

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

Volatile Organic Compounds by EPA Method 8260B - Quality Control

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

Batch 2001341 - EPA 5030 Water MS

Blank (2001341-BLK1)

Prepared: 01/24/20 Analyzed: 01/28/20

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	15.4		"	13.3		115	23-173			
Surrogate: Toluene-d8	13.2		"	13.3		98.9	20-170			
Surrogate: 4-Bromofluorobenzene	14.0		"	13.3		105	21-167			

LCS (2001341-BS1)

Prepared: 01/24/20 Analyzed: 01/28/20

Benzene	38.8	1.0	ug/l	33.3		116	51-132			
Toluene	38.5	1.0	"	33.3		115	51-138			
Ethylbenzene	41.4	1.0	"	33.3		124	58-146			
m,p-Xylene	73.8	2.0	"	66.7		111	57-144			
o-Xylene	39.6	1.0	"	33.3		119	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.9		"	13.3		112	23-173			
Surrogate: Toluene-d8	13.4		"	13.3		100	20-170			
Surrogate: 4-Bromofluorobenzene	13.5		"	13.3		101	21-167			

Matrix Spike (2001341-MS1)

Source: 2001263-01

Prepared: 01/24/20 Analyzed: 01/28/20

Benzene	37.4	1.0	ug/l	33.3	ND	112	34-141			
Toluene	38.3	1.0	"	33.3	ND	115	27-151			
Ethylbenzene	40.7	1.0	"	33.3	ND	122	29-160			
m,p-Xylene	72.8	2.0	"	66.7	ND	109	20-166			
o-Xylene	39.1	1.0	"	33.3	ND	117	33-159			
Surrogate: 1,2-Dichloroethane-d4	15.3		"	13.3		115	23-173			
Surrogate: Toluene-d8	13.4		"	13.3		100	20-170			
Surrogate: 4-Bromofluorobenzene	13.4		"	13.3		100	21-167			

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

Project: Bauer 5; 12, 21-4
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

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 2001341 - EPA 5030 Water MS

Matrix Spike Dup (2001341-MSD1)	Source: 2001263-01			Prepared: 01/24/20 Analyzed: 01/28/20						
Benzene	37.9	1.0	ug/l	33.3	ND	114	34-141	1.46	30	
Toluene	38.8	1.0	"	33.3	ND	116	27-151	1.43	30	
Ethylbenzene	41.6	1.0	"	33.3	ND	125	29-160	2.26	30	
m,p-Xylene	73.9	2.0	"	66.7	ND	111	20-166	1.57	30	
o-Xylene	40.1	1.0	"	33.3	ND	120	33-159	2.50	30	
Surrogate: 1,2-Dichloroethane-d4	15.0		"	13.3		113	23-173			
Surrogate: Toluene-d8	13.3		"	13.3		99.8	20-170			
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3		99.5	21-167			

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

Project: Bauer 5; 12, 21-4

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
01/30/20 10:48

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