

PDC Energy, Inc.
First Quarter 2020 Groundwater Monitoring Summary

March 13, 2020

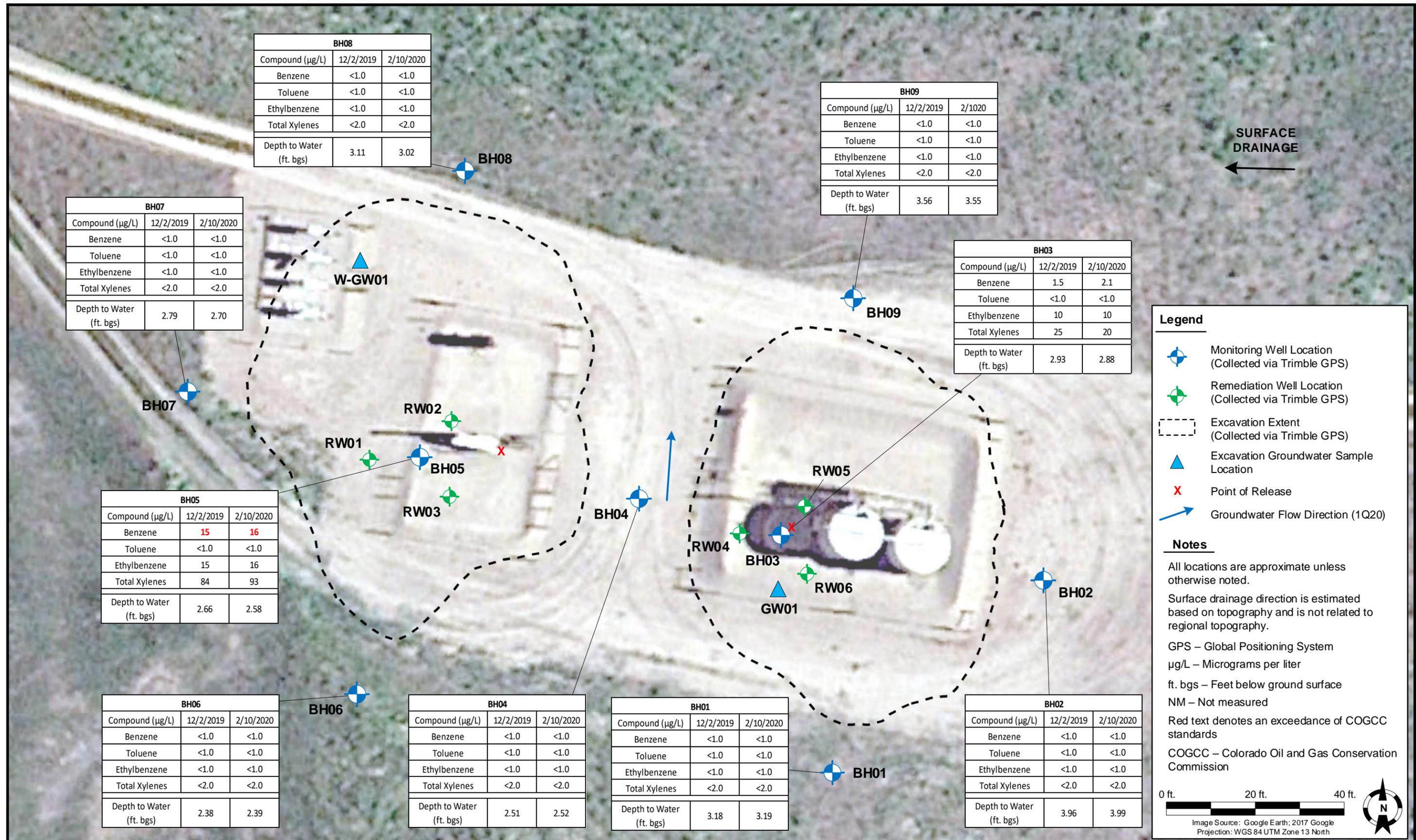
Former Mark 11, 12, 14-35 Tank Battery
NWSW Section 35 T4N R65W
Remediation # 12170

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the former Mark 11, 12, 14-35 tank battery. On February 10, 2020, groundwater monitoring was conducted at all nine monitoring well locations (BH01 – BH09). Nine 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 the benzene concentration was above the applicable COGCC Table 910-1 groundwater standard in monitoring well BH05. BTEX concentrations were below regulatory standards in the remaining eight monitoring well locations. Sample locations and corresponding analytical results are illustrated on Figure 1. Groundwater elevation data is illustrated in Figure 2. Analytical results are summarized in Table 1 and the laboratory report is included as Attachment A.

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the first quarter 2019 and continued through fourth quarter 2019. Due to persisting benzene concentrations, one air sparge (AS) and enhanced fluid recovery (EFR) event was conducted in November 2019. Based on the data collected during the event, EFR/AS will be the selected remediation strategy for the second quarter 2020. A summary of the EFR/AS operational data is provided in Table 2.

Second quarter 2020 groundwater sampling will be conducted during May 2020.



BH08		
Compound (µg/L)	12/2/2019	2/10/2020
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)	3.11	3.02

BH09		
Compound (µg/L)	12/2/2019	2/10/2020
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)	3.56	3.55

BH03		
Compound (µg/L)	12/2/2019	2/10/2020
Benzene	1.5	2.1
Toluene	<1.0	<1.0
Ethylbenzene	10	10
Total Xylenes	25	20
Depth to Water (ft. bgs)	2.93	2.88

BH07		
Compound (µg/L)	12/2/2019	2/10/2020
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)	2.79	2.70

BH05		
Compound (µg/L)	12/2/2019	2/10/2020
Benzene	15	16
Toluene	<1.0	<1.0
Ethylbenzene	15	16
Total Xylenes	84	93
Depth to Water (ft. bgs)	2.66	2.58

BH06		
Compound (µg/L)	12/2/2019	2/10/2020
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)	2.38	2.39

BH04		
Compound (µg/L)	12/2/2019	2/10/2020
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)	2.51	2.52

BH01		
Compound (µg/L)	12/2/2019	2/10/2020
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)	3.18	3.19

BH02		
Compound (µg/L)	12/2/2019	2/10/2020
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)	3.96	3.99

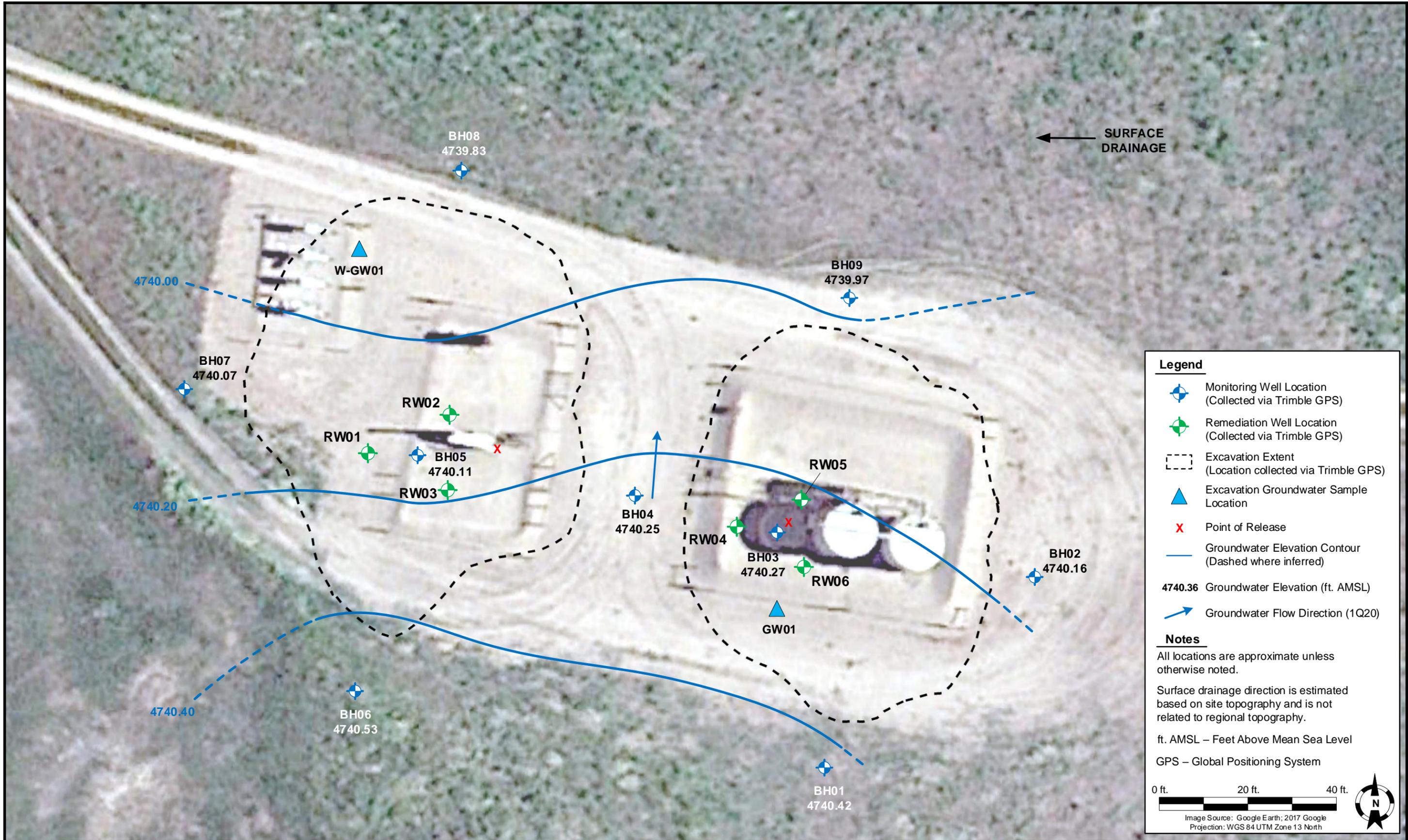
DATE: March 13, 2020
 DESIGNED BY: C. Hamlin
 DRAWN BY: M. Dahlgren

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

PDC Energy, Inc. – DJ Basin
Former Mark 11, 12, 14-35 Tank Battery
 NWSW, Section 35, Township 4 North, Range 65 West
 Weld County, Colorado

GROUNDWATER ANALYTICAL RESULTS MAP

FIGURE 1



DATE: February 11, 2020

DESIGNED BY: C. Hamlin

DRAWN BY: L. Martin



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

PDC Energy, Inc. – DJ Basin
Former Mark 11, 12, 14-35 Tank Battery
NWSW, Section 35, Township 4 North, Range 65 West
Weld County, Colorado

**GROUNDWATER
ELEVATION CONTOUR
MAP (02/10/2020)**

**FIGURE
2**

TABLE 1
FORMER MARK 11, 12, 14-35 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	11/19/2018	21	4.5	3.6	710	~ 7	NM
W-GW01	11/27/2018	2.9	<1.0	<1.0	22	~ 7	NM
BH01	2/11/2019	<1.0	<1.0	<1.0	<2.0	3.28	4740.33
BH01	5/1/2019	<1.0	<1.0	<1.0	<2.0	3.25	4740.36
BH01	8/8/2019	<1.0	<1.0	<1.0	<2.0	4.75	4738.86
BH01	12/2/2019	<1.0	<1.0	<1.0	<2.0	3.18	4740.43
BH01	2/10/2020	<1.0	<1.0	<1.0	<2.0	3.19	4740.42
BH02	2/11/2019	<1.0	<1.0	<1.0	<2.0	4.08	4740.07
BH02	5/1/2019	<1.0	<1.0	<1.0	<2.0	4.04	4740.11
BH02	8/8/2019	<1.0	<1.0	<1.0	<2.0	4.44	4739.71
BH02	12/2/2019	<1.0	<1.0	<1.0	<2.0	3.96	4740.19
BH02	2/10/2020	<1.0	<1.0	<1.0	<2.0	3.99	4740.16
BH03	2/11/2019	18	<1.0	8.3	76	2.96	4740.19
BH03	5/1/2019	8.6	<1.0	5.9	23	2.97	4740.18
BH03	8/8/2019	28	<1.0	<1.0	58	4.17	4738.98
BH03	12/2/2019	1.5	<1.0	10	25	2.93	4740.22
BH03	2/10/2020	2.1	<1.0	9.6	20	2.88	4740.27
BH04	2/11/2019	<1.0	<1.0	<1.0	<2.0	2.59	4740.18
BH04	5/1/2019	<1.0	<1.0	<1.0	<2.0	2.56	4740.21
BH04	8/8/2019	<1.0	<1.0	<1.0	<2.0	4.00	4738.77
BH04	12/2/2019	<1.0	<1.0	<1.0	<2.0	2.51	4740.26
BH04	2/10/2020	<1.0	<1.0	<1.0	<2.0	2.52	4740.25
BH05	2/11/2019	420	<1.0	50	360	2.62	4740.07
BH05	5/1/2019	190	<1.0	15	100	2.60	4740.09
BH05 ⁽³⁾	8/8/2019	<1.0	<1.0	<1.0	7.4	NM	NM
BH05	12/2/2019	15	<1.0	15	84	2.66	4740.03
BH05	2/10/2020	16	<1.0	16	93	2.58	4740.11
BH06	2/11/2019	<1.0	<1.0	<1.0	<2.0	2.42	4740.50
BH06	5/1/2019	<1.0	<1.0	<1.0	<2.0	2.33	4740.59
BH06	8/8/2019	<1.0	<1.0	<1.0	<2.0	5.04	4737.88
BH06	12/2/2019	<1.0	<1.0	<1.0	<2.0	2.38	4740.54
BH06	2/10/2020	<1.0	<1.0	<1.0	<2.0	2.39	4740.53
BH07	2/11/2019	<1.0	<1.0	<1.0	<2.0	2.79	4739.98
BH07	5/1/2019	<1.0	<1.0	<1.0	<2.0	2.65	4740.12

TABLE 1
FORMER MARK 11, 12, 14-35 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		
BH07	8/8/2019	<1.0	<1.0	<1.0	<2.0	5.47	4737.30
BH07	12/2/2019	<1.0	<1.0	<1.0	<2.0	2.79	4739.98
BH07	2/10/2020	<1.0	<1.0	<1.0	<2.0	2.70	4740.07
BH08	2/11/2019	<1.0	<1.0	<1.0	<2.0	3.10	4739.75
BH08	5/1/2019	<1.0	<1.0	<1.0	<2.0	3.05	4739.80
BH08	8/8/2019	<1.0	<1.0	<1.0	<2.0	4.66	4738.19
BH08	12/2/2019	<1.0	<1.0	<1.0	<2.0	3.11	4739.74
BH08	2/10/2020	<1.0	<1.0	<1.0	<2.0	3.02	4739.83
BH09	2/11/2019	<1.0	<1.0	<1.0	<2.0	3.63	4739.89
BH09	5/1/2019	<1.0	<1.0	<1.0	<2.0	3.64	4739.88
BH09	8/8/2019	<1.0	<1.0	<1.0	<2.0	4.12	4739.40
BH09	12/2/2019	<1.0	<1.0	<1.0	<2.0	3.56	4739.96
BH09	2/10/2020	<1.0	<1.0	<1.0	<2.0	3.55	4739.97

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.
3. Initial water level measurement prevented by obstruction. Purge volume calculation and sample collection performed following obstruction removal.

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

BOLD = Analytical result is in exceedance of COGCC groundwater standards.

NM = Not measured

TABLE 2
FORMER MARK 11, 12, 14-25 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)
Fourth Quarter 2019						
11/6/2019	BH03, BH05	6	168	None	0	0
Quarterly Totals		6	168		-	-

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 13, 2020

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Mark 11,12,14-35

Work Order #2002075

Enclosed are the results of analyses for samples received by Summit Scientific on 02/10/20 17:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Paul Shrewsbury

President



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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
02/13/20 12:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2002075-01	Water	02/10/20 12:12	02/10/20 17:30
BH02	2002075-02	Water	02/10/20 11:55	02/10/20 17:30
BH03	2002075-03	Water	02/10/20 12:05	02/10/20 17:30
BH04	2002075-04	Water	02/10/20 12:25	02/10/20 17:30
BH05	2002075-05	Water	02/10/20 12:23	02/10/20 17:30
BH06	2002075-06	Water	02/10/20 12:00	02/10/20 17:30
BH07	2002075-07	Water	02/10/20 12:13	02/10/20 17:30
BH08	2002075-08	Water	02/10/20 11:49	02/10/20 17:30
BH09	2002075-09	Water	02/10/20 11:38	02/10/20 17:30

Summit Scientific

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2002075

Summit Scientific

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

Page 1 of 1

Client: PDC / Tasman
Address: 6855 W 119th Ave
City/State/Zip: Broomfield / CO / 80020
Phone: 303-487-1228 Fax: -
Sampler Name: Alison Dahl

Project Manager: Mark Longhurst
E-Mail: mark.longhurst@pdce.com
Project Name: Mark 11, 12, 14-35
Project Number: n/a

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)	B	T	E	X			
BH01	2/10/20	1212	3	X				X				X						
BH02	2/10/20	1155	3	X				X				X						
BH03	2/10/20	1205	3	X				X				X						
BH04	2/10/20	1225	3	X				X				X						
BH05	2/10/20	1223	3	X				X				X						
BH06	2/10/20	1200	3	X				X				X						
BH07	2/10/20	1213	3	X				X				X						
BH08	2/10/20	1149	3	X				X				X						
BH09	2/10/20	1138	3	X				X				X						

Relinquished by: <u>Alison Dahl</u> Date/Time: <u>2/10/2020</u> <u>1645</u>	Received by: <u>Tasman's Lock Box</u> Date/Time: <u>2/10/2020</u> <u>1645</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"/>	Notes:
Relinquished by: <u>Tasman's Lock Box</u> Date/Time: <u>02/10/2020</u> <u>1730</u>	Received by: <u>[Signature]</u> Date/Time: <u>02/10/2020</u> <u>1730</u>	Sample Integrity: Temperature Upon Receipt: <u>4.8</u> Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Relinquished by:	Received in Lab by:		

Sample Receipt Checklist

S2 Work Order 2002075

Client: PDC / TASMAN

Client Project ID: MARK 11,12,14-35

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

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

Temp (°C)	4.8
-----------	-----

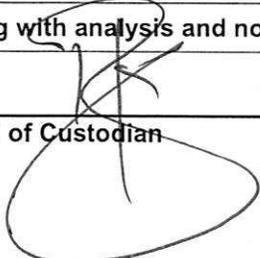
Thermometer ID: 61857155-K

	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

2/10/20
Date/Time



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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH01
2002075-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:12**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/11/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:12**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		108 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		100 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.6 %		21-167		"	"	"	"	

Summit Scientific

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



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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH02
2002075-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 11:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/11/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 11:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		114 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.7 %		21-167		"	"	"	"	

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

Project: Mark 11,12,14-35

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH03
2002075-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	2.1	1.0		ug/l	1	2002098	02/11/20	02/11/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	9.6	1.0		"	"	"	"	"	"	
Xylenes (total)	20	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		116 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.2 %		21-167		"	"	"	"	

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH04
2002075-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/11/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		108 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.0 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH05
2002075-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	16	1.0		ug/l	1	2002098	02/11/20	02/12/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	16	1.0		"	"	"	"	"	"	
Xylenes (total)	93	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		108 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		100 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		104 %		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: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH06
2002075-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/12/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		113 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.8 %		21-167		"	"	"	"	

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH07
2002075-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 12:13**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/12/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 12:13**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		112 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.1 %		21-167		"	"	"	"	

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH08
2002075-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 11:49**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/12/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 11:49**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		104 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		97.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.3 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

BH09
2002075-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **02/10/20 11:38**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	2002098	02/11/20	02/12/20	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **02/10/20 11:38**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		116 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.8 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Mark 11,12,14-35

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/13/20 12:32

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 2002098 - EPA 5030 Water MS

Blank (2002098-BLK1)

Prepared & Analyzed: 02/11/20

Benzene	ND	1.0	ug/l								
Toluene	ND	1.0	"								
Ethylbenzene	ND	1.0	"								
Xylenes (total)	ND	2.0	"								
Surrogate: 1,2-Dichloroethane-d4	14.4		"	13.3		108		23-173			
Surrogate: Toluene-d8	13.5		"	13.3		101		20-170			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.2		21-167			

LCS (2002098-BS1)

Prepared & Analyzed: 02/11/20

Benzene	29.5	1.0	ug/l	33.3		88.5		51-132			
Toluene	20.2	1.0	"	33.3		60.7		51-138			
Ethylbenzene	26.7	1.0	"	33.3		80.0		58-146			
m,p-Xylene	52.9	2.0	"	66.7		79.4		57-144			
o-Xylene	26.9	1.0	"	33.3		80.6		53-146			
Surrogate: 1,2-Dichloroethane-d4	14.2		"	13.3		107		23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.1		20-170			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.4		21-167			

Matrix Spike (2002098-MS1)

Source: 2002075-01

Prepared & Analyzed: 02/11/20

Benzene	30.0	1.0	ug/l	33.3	ND	90.1		34-141			
Toluene	20.7	1.0	"	33.3	ND	62.1		27-151			
Ethylbenzene	27.7	1.0	"	33.3	ND	83.0		29-160			
m,p-Xylene	55.1	2.0	"	66.7	ND	82.6		20-166			
o-Xylene	27.4	1.0	"	33.3	ND	82.2		33-159			
Surrogate: 1,2-Dichloroethane-d4	15.2		"	13.3		114		23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.1		20-170			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.3		21-167			

Summit Scientific

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

Project: Mark 11,12,14-35

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
 02/13/20 12:32

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 2002098 - EPA 5030 Water MS

Matrix Spike Dup (2002098-MSD1)

Source: 2002075-01

Prepared & Analyzed: 02/11/20

Benzene	30.4	1.0	ug/l	33.3	ND	91.1	34-141	1.06	30	
Toluene	21.2	1.0	"	33.3	ND	63.6	27-151	2.39	30	
Ethylbenzene	26.7	1.0	"	33.3	ND	80.1	29-160	3.57	30	
m,p-Xylene	51.0	2.0	"	66.7	ND	76.6	20-166	7.61	30	
o-Xylene	26.8	1.0	"	33.3	ND	80.4	33-159	2.18	30	
Surrogate: 1,2-Dichloroethane-d4	15.5		"	13.3		116	23-173			
Surrogate: Toluene-d8	13.7		"	13.3		103	20-170			
Surrogate: 4-Bromofluorobenzene	12.5		"	13.3		94.0	21-167			

Summit Scientific

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

Project: Mark 11,12,14-35

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
02/13/20 12:32

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