

PDC Energy, Inc.
Fourth Quarter 2016 Groundwater Monitoring Summary

January 27, 2017

Ursula #2 Tank Battery
NENE Section 28 T2N R66W
Weld County, API # 05-123-09920
Facility # 441395
Remediation # 9281

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the Ursula #2 tank battery. On December 13, 2016, groundwater monitoring was conducted at eighteen (18) temporary groundwater monitoring locations (BH02, BH04, BH05, BH07 – BH10, BH13, BH15, BH16, BH18 – BH22, BH24, BH26, and BH28). All eighteen temporary monitoring wells were installed using a hand-auger, in active ranch or cropland. Temporary well casing was installed at each location and wells were purged, sampled, and subsequently abandoned. GPS points of the temporary wells were collected to ensure groundwater sample locations remain consistent between quarters. Monitoring wells BH01, BH03, BH06, BH11-BH12, BH14, BH17, BH23, BH25, and BH27 were removed from the monitoring well network and consequently not sampled. Eighteen (18) groundwater samples were submitted to Summit Scientific Laboratories 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. Fourth quarter 2016 analytical results indicate that BTEX concentrations are above applicable COGCC Table 910-1 groundwater standards in temporary monitoring wells BH04, BH05, BH07, BH09, BH15, BH18, BH19, BH20, and BH21. BTEX concentrations are below COGCC regulatory standards in the remaining nine temporary monitoring well locations.

Three mobile enhanced fluid recovery (EFR) and air sparge (AS) events were conducted on site during third quarter 2016. A summary of the mobile EFR/AS operational data is provided in Table 2.

Between June 13 and June 27, 2016, a soil vapor extraction (SVE)/AS remediation system was installed on site to address remaining hydrocarbon impacts in soil and groundwater. The remediation system became operational on September 22, 2016. The remediation well network is illustrated on Figure 2. Volatile organic compound (VOC) are collected from the system effluent on a monthly basis, in order to monitor performance and calculate the total contaminant mass removed. During the fourth quarter 2016, 28.36 pounds of hydrocarbon mass was removed. A total of 129.44 pounds of hydrocarbon mass has been removed by the SVE system since system start-up. Operation of the SVE/AS remediation system will continue as the selected remediation strategy through the first quarter 2017.

First quarter 2017 groundwater sampling will be conducted during March 2017.

TABLE 1
URSULA #2 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample Location 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	3/23/2015	800	<1.0	750	420	~ 6
GW01	10/29/2015	1.1	<1.0	<1.0	27	~ 7
GW02	10/29/2015	3.2	<1.0	16	180	~ 7
GW03	11/13/2015	21	<1.0	260	3,600	~ 7
GW03-R	11/18/2015	<1.0	<1.0	11	61	~ 7
GW04	11/18/2015	<1.0	<1.0	<1.0	2.6	~ 7
GW05	11/22/2015	3.3	<1.0	55	250	~ 7
GW06	12/1/2015	<1.0	<1.0	42	8.2	~ 7
GW07	12/9/2015	<1.0	<1.0	1.3	3.2	~ 7
GW08	12/16/2015	<1.0	<1.0	10	130	~ 7
BH01	4/6/2015	<1.0	<1.0	<1.0	<1.0	6.53
BH01	Removed From Monitoring Well Network -June 2016					
BH02	4/6/2015	24	<1.0	1,600	13,000	7.02
BH02	9/21/2016	11	<1.0	810	4,300	7.63
BH02	12/13/2016	<1.0	<1.0	30	160	7.46
BH03	4/6/2015	<1.0	<1.0	<1.0	5.0	7.78
BH03	Removed From Monitoring Well Network -June 2016					
BH04	4/6/2015	1,100	6.4	920	8,900	6.99
BH04	9/21/2016	2,000	11	1,700	18,000	7.28
BH04	12/13/2016	2,600	9.3	1,400	19,000	6.76
BH05	4/6/2015	1,100	7.0	1,200	9,400	9.23
BH05	9/21/2016	1,700	980	1,300	18,000	7.02
BH05	12/13/2016	1,200	7.4	1,200	15,000	6.44
BH06	4/6/2015	<1.0	<1.0	<1.0	<1.0	7.75
BH06	Removed From Monitoring Well Network -June 2016					
BH07	4/6/2015	450	<1.0	12	540	6.69
BH07	9/21/2016	1,500	<1.0	260	720	7.16
BH07	12/13/2016	670	<1.0	70	210	6.33
BH08	4/6/2015	15	<1.0	4.0	3.5	5.20

TABLE 1
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GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample Location 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	
BH08	9/21/2016	<1.0	<1.0	<1.0	<1.0	7.50
BH08	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.29
BH09	4/6/2015	28	200	130	2,700	6.00
BH09	9/21/2016	<1.0	<1.0	240	3,000	7.30
BH09	12/13/2016	<1.0	10	200	3,400	6.95
BH10	4/6/2015	2.5	1.6	2.5	5.0	8.81
BH10	9/21/2016	<1.0	<1.0	<1.0	<1.0	9.13
BH10	12/13/2016	<1.0	<1.0	<1.0	<1.0	8.45
BH11	4/10/2015	<1.0	<1.0	<1.0	<1.0	8.03
BH11	Removed From Monitoring Well Network -June 2016					
BH12	4/10/2015	<1.0	<1.0	<1.0	<1.0	9.16
BH12	Removed From Monitoring Well Network -June 2016					
BH13	4/10/2015	<1.0	<1.0	<1.0	<1.0	4.71
BH13	9/21/2016	<1.0	<1.0	3.3	2.2	7.91
BH13	12/13/2016	<1.0	<1.0	<1.0	<1.0	5.93
BH14	4/10/2015	<1.0	<1.0	<1.0	<1.0	5.53
BH14	Removed From Monitoring Well Network -June 2016					
BH15	2/15/2016	520	<1.0	1,200	620	6.81
BH15	9/21/2016	1,000	<1.0	1,200	12,000	7.22
BH15	12/13/2016	88	<1.0	250	1,800	6.31
BH16	2/15/2016	<1.0	<1.0	<1.0	<1.0	6.76
BH16	9/21/2016	<1.0	<1.0	<1.0	<1.0	7.57
BH16	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.05
BH17	2/15/2016	<1.0	<1.0	<1.0	<1.0	7.74
BH17	Removed From Monitoring Well Network -June 2016					
BH18	2/15/2016	100	44	140	4,200	7.29
BH18	9/21/2016	740	<1.0	840	7,200	7.34
BH18	12/13/2016	280	<1.0	480	4,100	6.18

TABLE 1
URSULA #2 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample Location 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	
BH19	2/15/2016	320	210	250	3,000	6.97
BH19	9/21/2016	750	290	700	16,000	7.62
BH19	12/13/2016	61	450	280	6,900	6.70
BH20	2/15/2016	1,100	45	340	2,600	6.84
BH20	9/21/2016	1,800	130	100	18,000	7.64
BH20	12/13/2016	250	<1.0	5.6	2,100	6.54
BH21	2/15/2016	34	<1.0	1.7	7.1	7.19
BH21	9/21/2016	12	<1.0	13	220	7.81
BH21	12/13/2016	79	<1.0	<1.0	<1.0	6.85
BH22	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.59
BH22	9/21/2016	<1.0	<1.0	<1.0	<1.0	7.49
BH22 ⁽³⁾	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.42
BH23 ⁽³⁾	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.79
BH23	Removed From Monitoring Well Network -June 2016					
BH24	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.64
BH24	9/21/2016	2.4	<1.0	3.6	<1.0	7.92
BH24 ⁽³⁾	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.69
BH25 ⁽³⁾	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.64
BH25	Removed From Monitoring Well Network -June 2016					
BH26	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.40
BH26	9/21/2016	<1.0	<1.0	<1.0	<1.0	8.47
BH26 ⁽³⁾	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.23
BH27 ⁽³⁾	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.55
BH27	Removed From Monitoring Well Network -June 2016					
BH28	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.42
BH28	9/21/2016	<1.0	<1.0	<1.0	<1.0	7.66
BH28 ⁽³⁾	12/13/2016	<1.0	<1.0	<1.0	<1.0	6.02
BH29 ⁽³⁾	2/18/2016	<1.0	<1.0	<1.0	<1.0	3.48
BH29	Removed From Monitoring Well Network -June 2016					

TABLE 1
URSULA #2 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample Location 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	
BH30 ⁽³⁾	2/18/2016	<1.0	<1.0	<1.0	<1.0	2.55
BH30	Removed From Monitoring Well Network -June 2016					

Notes:

COGCC = Colorado Oil and Gas Conservation Commission

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

2. Depth to water measured from top of well casing or ground surface for monitoring well samples and excavation samples, respectively.

3. Depth to water in samples BH22 - BH30 have been corrected to ground surface.

µg/L= Micrograms per liter

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

TABLE 2
URSULA #2 TANK BATTERY
EFR / AS OPERATIONAL SUMMARY TABLE

Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	Air Sparge Wells	Air Injection Pressure (psi)	Average Air Flow Rate (cfm)
Third Quarter 2016 Data						
7/15/2016	RW03, RW08, RW10, RW12, RW14	6	1260	RW04, RW07, RW09, RW11, RW13	20	21
7/29/2016	EFR01, EFR02, EFR03, EFR04, EFR06, EFR07	6	210	AS02, AS03, AS04, AS05	20	10
8/11/2016	RW06, RW09, RW10, RW12, RW14	6	1470	RW04, RW05, RW08, RW11, RW13	20	14
Totals		18	2940		-	-

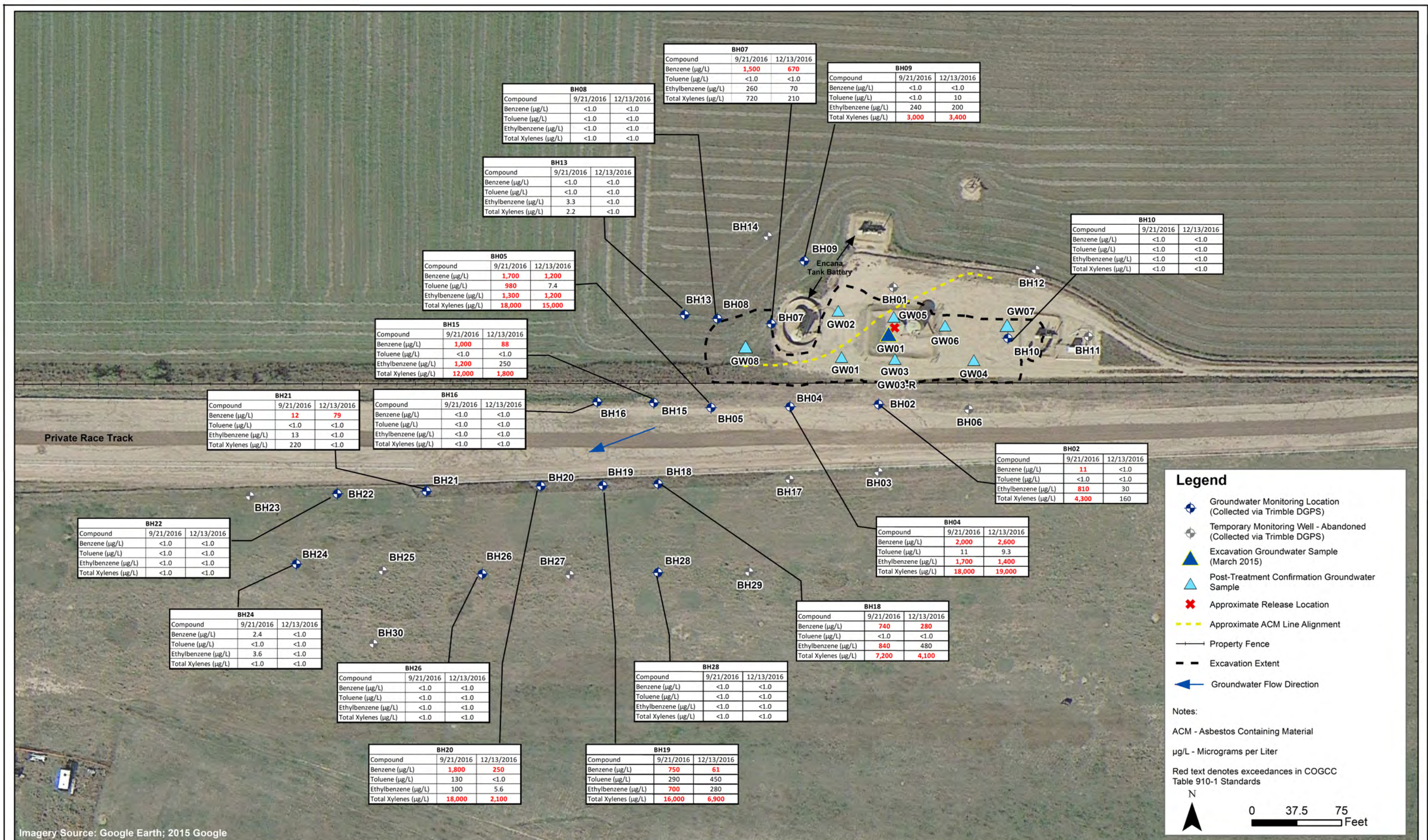
Notes:

EFR = Enhanced fluid recovery

AS = Air sparge

psi = Pounds per square inch

cfm = Cubic feet per minute



DATE:
December 2016

DESIGNED BY:
C. Hamlin

DRAWN BY:
D. Arnold




PDC Energy, Inc. - DJ Basin
Ursula #2 Tank Battery
NENE Section 28, Township 2 North, Range 66 West
Weld County, Colorado

Groundwater Analytical Results
Map
(December 13, 2016)

Figure
1



DATE: July 2016	 TASMAN Geosciences, Inc. 6899 Pecos Street - Unit C Denver, CO 80221	PDC Energy, Inc. - DJ Basin Ursula #2 Tank Battery NENE Section 28, Township 2 North, Range 66 West Weld County, Colorado	Remediation System Layout and Well Location Map	Figure 2
DESIGNED BY: C. Wasko				
DRAWN BY: D. Arnold				

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

December 21, 2016

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Ursula 2

Enclosed are the results of analyses for samples received by Summit Scientific on 12/14/16 07:33. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury

President



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

Project: Ursula 2

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH02	1612090-01	Water	12/13/16 12:41	12/14/16 07:33
BH04	1612090-02	Water	12/13/16 12:27	12/14/16 07:33
BH05	1612090-03	Water	12/13/16 12:22	12/14/16 07:33
BH07	1612090-04	Water	12/13/16 13:25	12/14/16 07:33
BH08	1612090-05	Water	12/13/16 13:20	12/14/16 07:33
BH09	1612090-06	Water	12/13/16 13:31	12/14/16 07:33
BH10	1612090-07	Water	12/13/16 13:41	12/14/16 07:33
BH13	1612090-08	Water	12/13/16 13:12	12/14/16 07:33
BH15	1612090-09	Water	12/13/16 12:11	12/14/16 07:33
BH16	1612090-10	Water	12/13/16 11:58	12/14/16 07:33
BH18	1612090-11	Water	12/13/16 10:59	12/14/16 07:33
BH19	1612090-12	Water	12/13/16 11:21	12/14/16 07:33
BH20	1612090-13	Water	12/13/16 11:34	12/14/16 07:33
BH21	1612090-14	Water	12/13/16 11:44	12/14/16 07:33
BH22	1612090-15	Water	12/13/16 10:17	12/14/16 07:33
BH24	1612090-16	Water	12/13/16 10:08	12/14/16 07:33
BH26	1612090-17	Water	12/13/16 10:31	12/14/16 07:33
BH28	1612090-18	Water	12/13/16 10:44	12/14/16 07:33

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.

Page 2 of 25

Page 3 of 25

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

Project: Ursula 2

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

Sample Receipt Checklist

S2 Work Order: 1612090

Client: PDC Energy

Client Project ID: Ursula #2

Shipped Via: P/U

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Airbill #: _____

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

Cooler ID					
Temp (°C)	<u>6.0</u>				

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature just above 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
NOTE: If samples are delivered the same day of sampling, this requirement is waived provided that there is evidence that cooling has begun.				
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 short holding time analytes or samples with HTs due within 48 hours present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>HCL</u>
Note the type of preservative in the Comments column – HCl, H ₂ SO ₄ , NaOH, HNO ₃ , ect				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Record the pH in Comments.				
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.

Nakita
Custodian Printed Name

MD
Signature or Initials of Custodian

12/13/16 1800
Date/Time





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

Project: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH02
1612090-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 12:41**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	30	1.0		"	"	"	"	"	"	
Xylenes (total)	160	1.0		"	"	"	"	"	"	

Date Sampled: **12/13/16 12:41**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		93.5 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %		45-146		"	"	"	"	

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

Project: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH04
1612090-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 12:27**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	2600	100	ug/l	100	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	9.3	1.0	"	1	"	"	"	"	
Ethylbenzene	1400	100	"	100	"	"	"	"	
Xylenes (total)	19000	100	"	"	"	"	"	"	

Date Sampled: **12/13/16 12:27**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		93.1 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		100 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

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

Project: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH05
1612090-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 12:22**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	1200	100		ug/l	100	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	7.4	1.0		"	1	"	"	"	"	
Ethylbenzene	1200	100		"	100	"	"	"	"	
Xylenes (total)	15000	100		"	"	"	"	"	"	

Date Sampled: **12/13/16 12:22**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		96.4 %		37-154		"	"	"	"	
Surrogate: Toluene-d8		99.5 %		45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %		45-146		"	"	"	"	

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

Project: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH07
1612090-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 13:25**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	670	100	ug/l	100	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
Ethylbenzene	70	1.0	"	"	"	"	"	"	
Xylenes (total)	210	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 13:25**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		99.4 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH08
1612090-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 13:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 13:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		92.1 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.5 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.8 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH09
1612090-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 13:31**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	10	1.0	"	"	"	"	"	"	
Ethylbenzene	200	1.0	"	"	"	"	"	"	
Xylenes (total)	3400	100	"	100	"	"	"	"	

Date Sampled: **12/13/16 13:31**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		100 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		100 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.3 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH10
1612090-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 13:41**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 13:41**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		99.5 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.9 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH13
1612090-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 13:12**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 13:12**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		99.5 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		100 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.6 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH15
1612090-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 12:11**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	88	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	250	1.0	"	"	"	"	"	"	
Xylenes (total)	1800	100	"	100	"	"	"	"	

Date Sampled: **12/13/16 12:11**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.3 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		102 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH16
1612090-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 11:58**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 11:58**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		91.5 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.0 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.6 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH18
1612090-11 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 10:59**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	280	100	ug/l	100	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
Ethylbenzene	480	100	"	100	"	"	"	"	
Xylenes (total)	4100	100	"	"	"	"	"	"	

Date Sampled: **12/13/16 10:59**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		94.1 %		37-154	"	"	"	"	
Surrogate: Toluene-d8		101 %		45-149	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.9 %		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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH19
1612090-12 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 11:21**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	61	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	450	100	"	100	"	"	"	"	
Ethylbenzene	280	1.0	"	1	"	"	"	"	
Xylenes (total)	6900	100	"	100	"	"	"	"	

Date Sampled: **12/13/16 11:21**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.6 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		102 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.5 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH20
1612090-13 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 11:34**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	250	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	5.6	1.0	"	"	"	"	"	"	
Xylenes (total)	2100	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 11:34**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.2 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		101 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		115 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH21
1612090-14 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 11:44**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	79	1.0	ug/l	1	1612159	12/16/16	12/16/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 11:44**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.2 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.0 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		109 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH22
1612090-15 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 10:17**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 10:17**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		95.0 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.3 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.2 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH24
1612090-16 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 10:08**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 10:08**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		93.8 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH26
1612090-17 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 10:31**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 10:31**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.5 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.7 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.8 %	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: Ursula 2
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

BH28
1612090-18 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **12/13/16 10:44**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1612159	12/15/16	12/15/16	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **12/13/16 10:44**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		96.9 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.2 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.9 %	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: Ursula 2

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

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 1612159 - EPA 5030 Water MS

Blank (1612159-BLK1)

Prepared & Analyzed: 12/15/16

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	12.2		"	13.3		91.9	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		97.0	45-149			
Surrogate: 4-Bromofluorobenzene	12.5		"	13.3		93.5	45-146			

LCS (1612159-BS1)

Prepared & Analyzed: 12/15/16

Benzene	33.2	1.0	ug/l	33.3		99.7	51-132			
Toluene	36.0	1.0	"	33.3		108	51-138			
Ethylbenzene	38.7	1.0	"	33.1		117	58-146			
m,p-Xylene	73.1	2.0	"	66.5		110	57-144			
o-Xylene	38.3	1.0	"	32.7		117	53-146			
Surrogate: 1,2-Dichloroethane-d4	12.6		"	13.3		94.6	37-154			
Surrogate: Toluene-d8	13.0		"	13.3		97.3	45-149			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		96.2	45-146			

Matrix Spike (1612159-MS1)

Source: 1612090-10

Prepared & Analyzed: 12/15/16

Benzene	33.4	1.0	ug/l	33.3	ND	100	34-141			
Toluene	36.1	1.0	"	33.3	ND	108	27-151			
Ethylbenzene	39.7	1.0	"	33.1	ND	120	29-160			
m,p-Xylene	75.5	2.0	"	66.5	ND	113	20-166			
o-Xylene	38.9	1.0	"	32.7	ND	119	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.3		97.1	37-154			
Surrogate: Toluene-d8	13.0		"	13.3		97.7	45-149			
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3		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: Ursula 2

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
12/21/16 07:49

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 1612159 - EPA 5030 Water MS

Matrix Spike Dup (1612159-MSD1)		Source: 1612090-10			Prepared & Analyzed: 12/15/16					
Benzene	32.8	1.0	ug/l	33.3	ND	98.3	34-141	1.90	32	
Toluene	35.6	1.0	"	33.3	ND	107	27-151	1.48	25	
Ethylbenzene	39.0	1.0	"	33.1	ND	118	29-160	1.88	50	
m,p-Xylene	72.0	2.0	"	66.5	ND	108	20-166	4.70	36	
o-Xylene	37.7	1.0	"	32.7	ND	115	33-159	3.29	26	
Surrogate: 1,2-Dichloroethane-d4	14.4		"	13.3		108	37-154			
Surrogate: Toluene-d8	12.9		"	13.3		97.1	45-149			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		96.9	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: Ursula 2

Project Number: [none]

Project Manager: Mark Longhurst

Reported:

12/21/16 07:49

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