

PDC Energy, Inc.
Third Quarter 2018 Groundwater Monitoring Summary

October 29, 2018

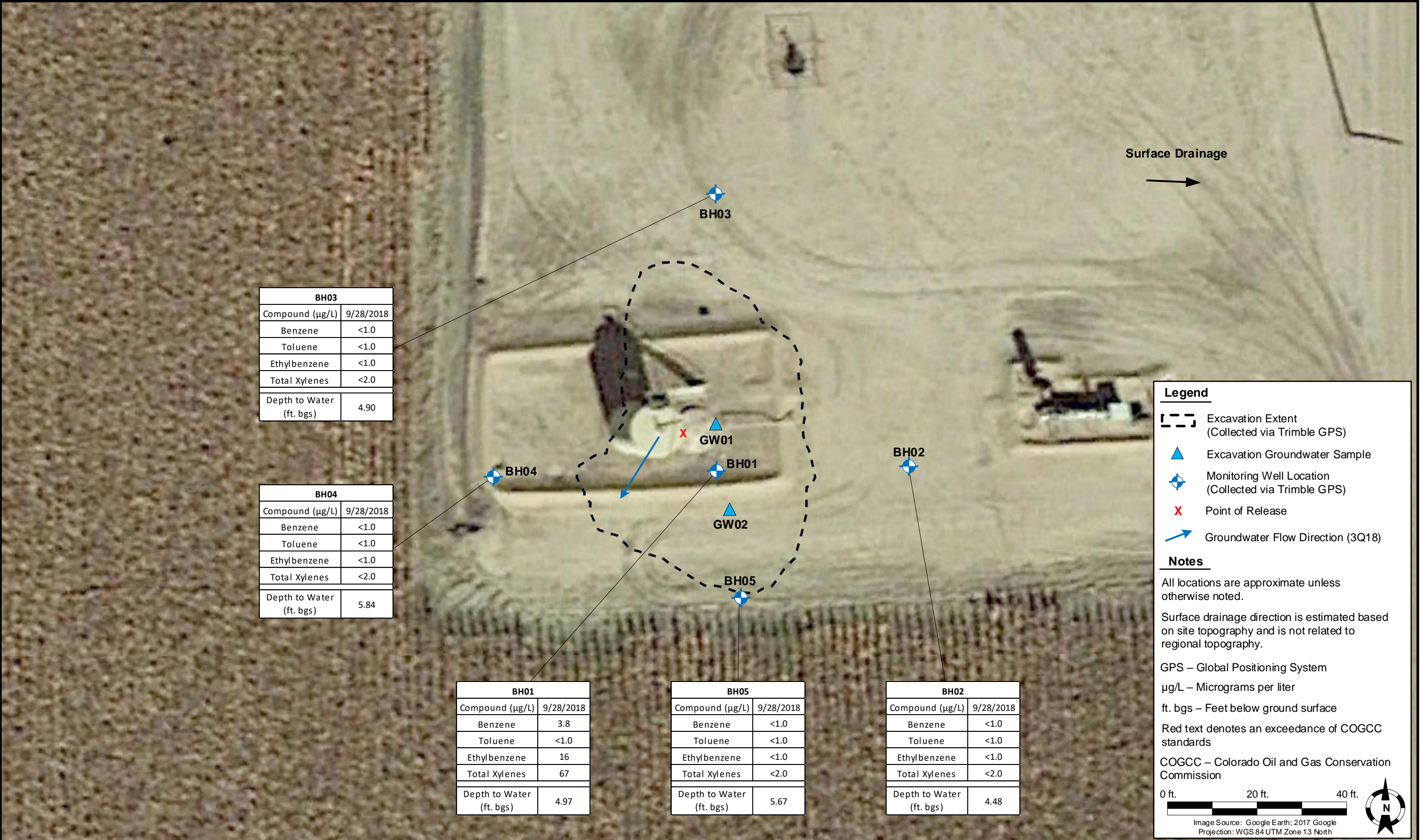
Former Swanson 34-20 Tank Battery
SWSE Section 20 T6N R66W
Spill Point ID # 436120
Remediation # 11750

This groundwater monitoring summary has been prepared by Tasman Geosciences, Inc. for the former Swanson 34-20 tank battery. On September 26, 2018, five monitoring wells (BH01 – BH05) were installed to delineate the extent of dissolved phase hydrocarbons associated with the release discovered on July 26, 2018. On September 28, 2018, groundwater monitoring was conducted at all five monitoring well locations (BH01 – BH05). Five (5) 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.

Third quarter 2018 analytical results indicate that BTEX concentrations are below applicable COGCC Table 910-1 groundwater standards in all monitoring well locations

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the third quarter 2018 and will remain the selected remediation strategy for the fourth quarter 2018.

Fourth quarter 2018 groundwater sampling will be conducted during December 2018.



DATE:	October 17, 2018
DESIGNED BY:	C. Hamlin
DRAWN BY:	T. Blessing



TASMAN
GEOSCIENCES

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

PDC Energy, Inc. – DJ Basin
Former Swanson 34-20 Tank Battery
SWSE, Section 20, Township 6 North, Range 66 West
Weld County, Colorado

**GROUNDWATER
ANALYICAL RESULTS
MAP**

**FIGURE
2**

TABLE 1
FORMER SWANSON 34-20 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)	Groundwater Elevation (ft AMSL)
COGCC Table 910-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400		
GW01	8/17/2018	13	<1.0	<1.0	<2.0	~ 8.0	NM
GW02	8/22/2018	72	<1.0	25	490	~ 8.0	NM
BH01	9/28/2018	3.8	<1.0	16	67	4.97	4726.39
BH02	9/28/2018	<1.0	<1.0	<1.0	<2.0	4.48	4726.24
BH03	9/28/2018	<1.0	<1.0	<1.0	<2.0	4.90	4726.88
BH04	9/28/2018	<1.0	<1.0	<1.0	<2.0	5.84	4725.62
BH05	9/28/2018	<1.0	<1.0	<1.0	<2.0	5.67	4725.18

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective May 1, 2018.
2. Depth to water 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 AMSL = Feet Above Mean Sea Level

NM = Not Measured

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

ATTACHMENT A

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

October 05, 2018

Mark Longhurst

PDC Energy

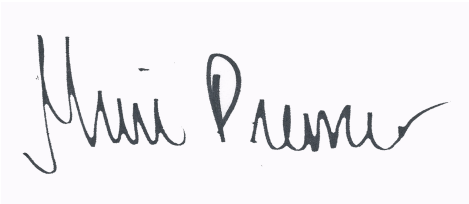
1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Swanson 34-20

Enclosed are the results of analyses for samples received by Summit Scientific on 09/28/18 18:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, reading "Muri Premier", on a light blue background.

Muri Premier For Paul Shrewsbury

President



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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1809434-01	Water	09/28/18 12:25	09/28/18 18:30
BH02	1809434-02	Water	09/28/18 12:20	09/28/18 18:30
BH03	1809434-03	Water	09/28/18 12:06	09/28/18 18:30
BH04	1809434-04	Water	09/28/18 11:53	09/28/18 18:30
BH05	1809434-05	Water	09/28/18 12:02	09/28/18 18:30

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Summit Scientific



1809434

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

Page 1 of 1

Client: PDC
Address: _____
City/State/Zip: _____
Phone: _____ Fax: _____
Sampler Name: Tyler Blessing

Project Manager: Mark Longhurst
E-Mail: Mark.Longhurst@pdce.com
Project Name: Swanson 34-20
Project Number: _____

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)	BTEX (8260)													
BH01	9/28/2018	12:25	3			X		X					X												
BH02	9/28/2018	12:20	3			X		X					X												
BH03	9/28/2018	12:06	3			X		X					X												
BH04	9/28/2018	11:53	3			X		X					X												
BH05	9/28/2018	12:02	3			X		X					X												
Relinquished by: 				Date/Time: <u>9/28/18 18:30</u>				Received by: 				Date/Time: <u>9.28.18 1830</u>				Turn Around Time (Check)									
Relinquished by: _____				Date/Time: _____				Received by: _____				Date/Time: _____				Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/> 24 Hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 Hours <input type="checkbox"/>									
Relinquished by: _____				Date/Time: _____				Received in Lab by: _____				Date/Time: _____				Sample Integrity: Temperature Upon Receipt: <u>3.1</u> Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>									

Sample Receipt Checklist

S2 Work Order 1809434

Client: PDC Client Project ID: Swanson 34-20

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

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

Temp (°C)	3.1
-----------	-----

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.	/			
Were all samples received intact ⁽¹⁾ ?	/			
Was adequate sample volume provided ⁽¹⁾ ?	/			
If custody seals are present, are they intact ⁽¹⁾ ?			/	
Are samples with holding times due within 48 hours sample due within 48 hours present?			/	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	/			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	/			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	/			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	/			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		/		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?			/	
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?			/	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?			/	
Additional Comments (if any):				

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

UP
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

9.28.18 1830
Date/Time



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

Project: Swanson 34-20

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

BH01
1809434-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/28/18 12:25**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	3.8	1.0	ug/l	1	1810019	10/01/18	10/04/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	16	1.0	"	"	"	"	"	"	
Xylenes (total)	67	2.0	"	"	"	"	"	"	

Date Sampled: **09/28/18 12:25**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		102 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		104 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.6 %	21-167		"	"	"	"	

Summit Scientific

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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

BH02
1809434-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/28/18 12:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1810019	10/01/18	10/04/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **09/28/18 12:20**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		104 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.6 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.4 %	21-167		"	"	"	"	

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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

BH03
1809434-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/28/18 12:06**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1810019	10/01/18	10/05/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **09/28/18 12:06**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		104 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.4 %	21-167		"	"	"	"	

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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

BH04
1809434-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/28/18 11:53**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1810019	10/01/18	10/05/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **09/28/18 11:53**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		98.3 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.5 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.5 %	21-167		"	"	"	"	

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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

BH05
1809434-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/28/18 12:02**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1810019	10/01/18	10/05/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **09/28/18 12:02**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		101 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.4 %	21-167		"	"	"	"	

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

Project: Swanson 34-20

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

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 1810019 - EPA 5030 Water MS

Blank (1810019-BLK1)

Prepared: 10/01/18 Analyzed: 10/02/18

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.2		105	23-173			
Surrogate: Toluene-d8	13.0		"	13.3		97.4	20-170			
Surrogate: 4-Bromofluorobenzene	12.2		"	13.3		91.9	21-167			

LCS (1810019-BS1)

Prepared: 10/01/18 Analyzed: 10/02/18

Benzene	29.8	1.0	ug/l	33.3		89.5	70-130			
Toluene	32.9	1.0	"	33.3		98.7	70-130			
Ethylbenzene	35.3	1.0	"	33.3		106	70-130			
m,p-Xylene	71.4	2.0	"	66.7		107	70-130			
o-Xylene	35.9	1.0	"	33.3		108	70-130			
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.2		105	23-173			
Surrogate: Toluene-d8	12.8		"	13.3		96.3	20-170			
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3		94.9	21-167			

Matrix Spike (1810019-MS1)

Source: 1809433-01

Prepared: 10/01/18 Analyzed: 10/02/18

Benzene	28.8	1.0	ug/l	33.3	ND	86.3	70-130			
Toluene	31.7	1.0	"	33.3	ND	95.1	70-130			
Ethylbenzene	34.3	1.0	"	33.3	ND	103	70-130			
m,p-Xylene	69.0	2.0	"	66.7	ND	104	70-130			
o-Xylene	34.7	1.0	"	33.3	ND	104	70-130			
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.2		105	23-173			
Surrogate: Toluene-d8	12.8		"	13.3		95.8	20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.9	21-167			

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

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
10/05/18 15:26

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 1810019 - EPA 5030 Water MS

Matrix Spike Dup (1810019-MSD1)	Source: 1809433-01			Prepared: 10/01/18 Analyzed: 10/02/18						
Benzene	31.3	1.0	ug/l	33.3	ND	93.9	70-130	8.39	30	
Toluene	35.0	1.0	"	33.3	ND	105	70-130	9.98	30	
Ethylbenzene	36.5	1.0	"	33.3	ND	109	70-130	6.22	30	
m,p-Xylene	74.4	2.0	"	66.7	ND	112	70-130	7.46	30	
o-Xylene	37.3	1.0	"	33.3	ND	112	70-130	7.03	30	
Surrogate: 1,2-Dichloroethane-d4	13.7		"	13.2		104	23-173			
Surrogate: Toluene-d8	12.8		"	13.3		96.2	20-170			
Surrogate: 4-Bromofluorobenzene	12.3		"	13.3		92.6	21-167			

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PDC Energy

1775 Sherman St. STE. 3000

Denver CO, 80203

Project: Swanson 34-20

Project Number: [none]

Project Manager: Mark Longhurst

Reported:

10/05/18 15:26

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