



PDC Energy, Inc.
Second Quarter 2022 Groundwater Monitoring Summary

July 6, 2022

Former Willman 42-16 Wellhead
SENE Section 16 T4N R65W
Remediation # 18936

This groundwater monitoring summary has been prepared by Tasman, Inc. for the former Willman 42-16 Wellhead.

Site History and Background

On September 30, 2021, a historic hydrocarbon release was discovered at the wellhead location during decommissioning activities. Following the discovery, mitigation activities were initiated, and on October 7, 2021, approximately 35 cubic yards of impacted material were removed from the former excavation. During excavation activities, groundwater was encountered in the excavation at approximately 6 feet below ground surface (bgs). Groundwater vacuum recovery operations were conducted concurrent with excavation activities and approximately 5 barrels of groundwater were removed from site.

Monitoring Well Installation Activities

On June 7, 2022, five monitoring wells (BH01 – BH05) were installed via hand auger to confirm the absence of dissolved-phase hydrocarbon impacts within and adjacent to the former excavation extent. Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions were recorded for each borehole. The boring and well completion logs are included as Attachment A.

Groundwater Monitoring Activities

On June 10, 2022, groundwater monitoring was conducted at all five monitoring wells (BH01 – BH05). Five groundwater samples were submitted to Summit Scientific Laboratories for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB by EPA Method 8260B, chloride and sulfate anions by EPA Method 300.0 and total dissolved solids (TDS) by Method SM 2540C.

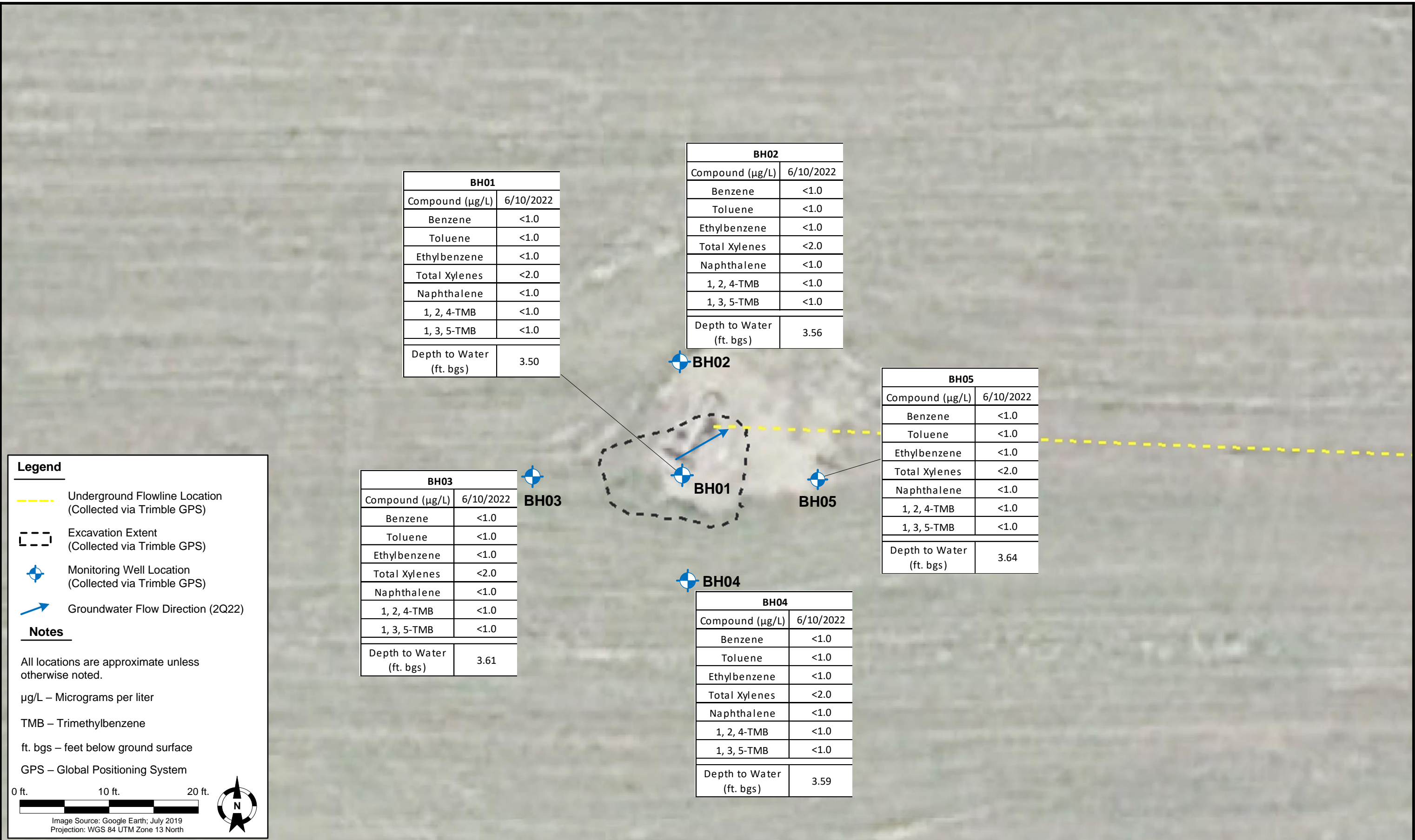
Second quarter 2022 analytical results indicated that organic constituent concentrations were below the applicable COGCC Table 915-1 groundwater standards in all monitoring well locations. Additionally, the sulfate anion concentration was in exceedance of the applicable regulatory

standard and above 1.25x the background concentrations of the up- and cross-gradient monitoring wells (BH02 and BH03) in monitoring well BH01. TDS and chloride anion concentrations were in compliance with the applicable regulatory standards and within 1.25x the background concentrations in all five monitoring well locations. Sample locations and corresponding analytical results are illustrated on Figures 1 and 2. Groundwater elevation data is illustrated on Figure 3. Groundwater analytical results are summarized in Tables 1 and 2. The laboratory analytical report is included as Attachment B.


Current Remediation Activities and Path Forward

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the second quarter 2022 and will remain the selected remediation strategy through the third quarter 2022.

Third quarter 2022 groundwater sampling will be conducted in September 2022.



DATE:	July 5, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	S. Anderson

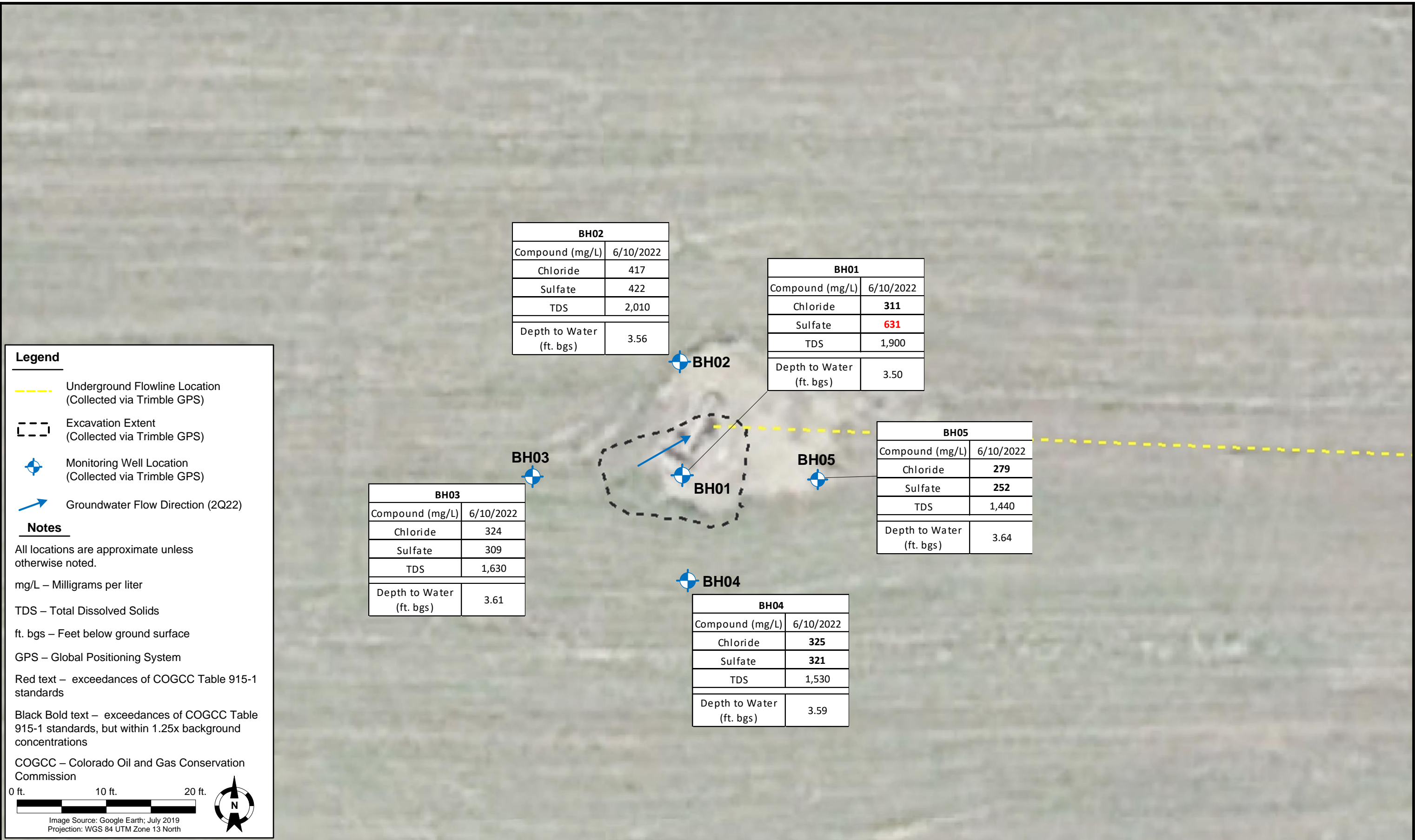


TASMAN
Tasman, Inc.
6855 W. 119th Ave.
Broomfield, CO 80020


PDC Energy, Inc. – DJ Basin
Former Willman 42-16 Wellhead
SENE, Section 16, Township 4 North, Range 65 West
Weld County, Colorado

GROUNDWATER
ANALYTICAL RESULTS
MAP

FIGURE
1



DATE:	July 5, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	S. Anderson

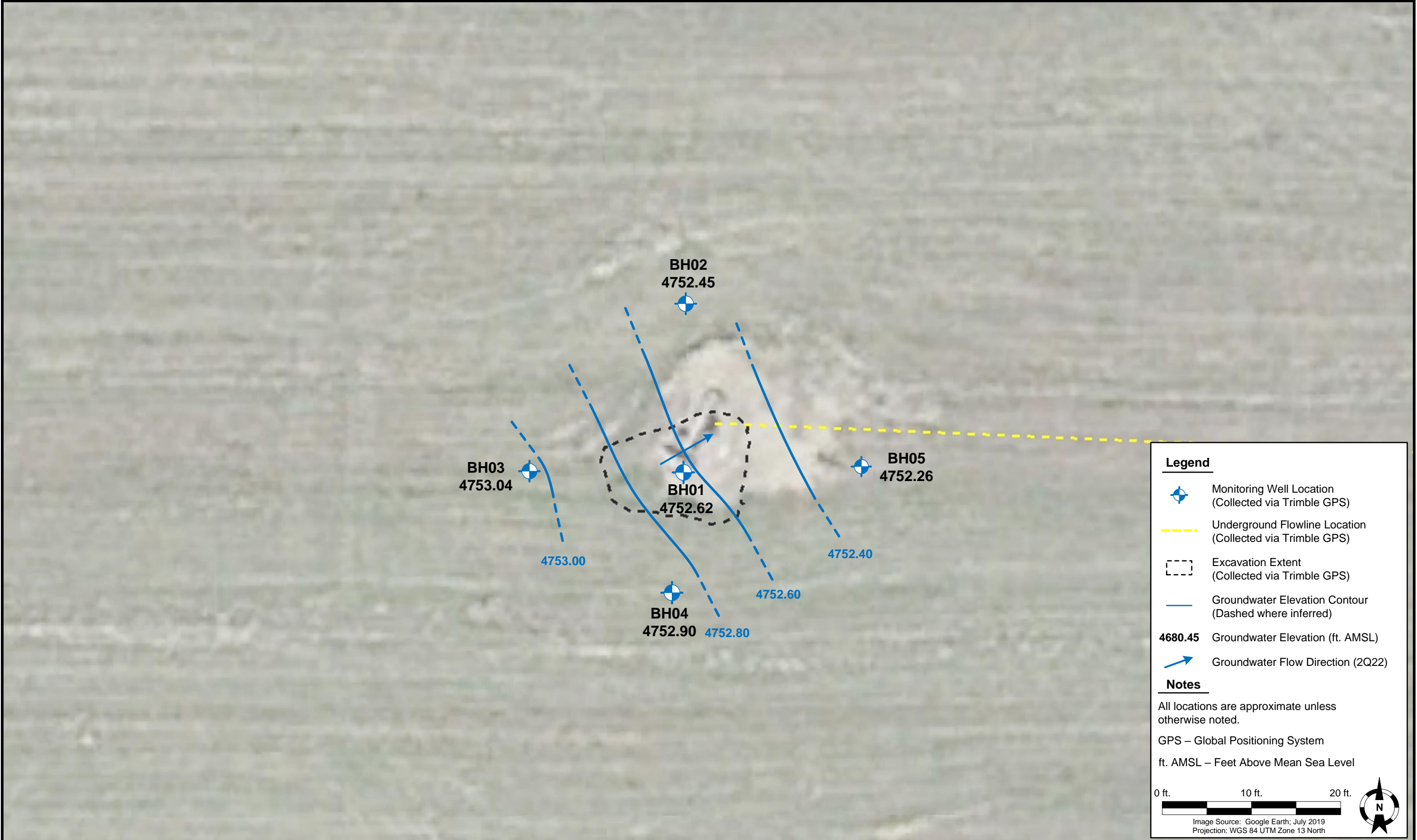


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PDC Energy, Inc. – DJ Basin
Former Willman 42-16 Wellhead
SENE, Section 16, Township 4 North, Range 65 West
Weld County, Colorado

GROUNDWATER
ANALYTICAL RESULTS
MAP
(INORGANIC PARAMETERS)

FIGURE
2



DATE:	July 6, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	J. Clonts



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

PDC Energy, Inc. – DJ Basin
Former Willman 42-16 Wellhead
SENE, Section 16, Township 4 North, Range 65 West
Weld County, Colorado

**GROUNDWATER
ELEVATION CONTOUR
MAP (06/10/2022)**

**FIGURE
3**

TABLE 1
FORMER WILLMAN 42-16 WELLHEAD
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE
ORGANIC COMPOUNDS

Sample ID	Date Sampled	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Naphthalene (µg/L)	1,2,4-TMB (µg/L)	1,3,5-TMB (µg/L)	Depth to Water ⁽²⁾ (ft.)	Groundwater Elevation (ft. AMSL)
COGCC Table 915-1 Groundwater Standard (µg/L) ⁽¹⁾		5	560	700	1,400	140	67	67	-	-
BH01	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.50	4752.62
BH02	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.56	4752.45
BH03	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.61	4753.04
BH04	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.59	4752.90
BH05	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.64	4752.26

Notes:

1. Groundwater standards referenced from 2 CCR 404-1, Table 915-1, January 15, 2021.
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.

TMB = Trimethylbenzene

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

TABLE 2
FORMER WILLMAN 42-16 TANK BATTERY
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE
INORGANIC PARAMETERS

Sample ID	Date Sampled	TDS (unit)	Chloride Ion (mg/L)	Sulfate Ion (mg/L)	Depth to Water ⁽²⁾ (ft.)	Groundwater Elevation (ft. AMSL)
COGCC Table 915-1 Groundwater Standard (mg/L) (1)		<1.25 x BCKG	250 or <1.25 x BCKG	250 or <1.25 x BCKG	-	-
BH01	6/10/2022	1,900	311	631	3.50	4752.62
BH02	6/10/2022	2,010	417	422	3.56	4752.45
BH03	6/10/2022	1,630	324	309	3.61	4753.04
BH04	6/10/2022	1,530	325	321	3.59	4752.90
BH05	6/10/2022	1,440	279	252	3.64	4752.26

Notes:

- Groundwater standards referenced from 2 CCR 404-1, Table 915-1, January 15, 2021.
- 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.

TDS = Total dissolved solids

COGCC = Colorado Oil and Gas Conservation Commission

BCKG = Background

mg/L = Milligrams per liter

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

ft. = Feet

AMSL = Above Mean Sea Level

Up- / cross-gradient well locations used for background concentration.

BOLD = Analycal result is in exceedance of applicable standard and above 1.25x the background concentration.

BOLD = Analycal result is in exceedance of applicable standard but within 1.25x the background concentration.

Attachment A

**TASMAN****Borehole Logging Form**

BOREHOLE ID: <u>BH01</u>		SITE NAME: <u>Willman 42-16 WH</u>		CLIENT NAME: <u>PDC ENERGY</u>			
Date Completed: <u>6/7/20</u>		Location: <u>Source</u>					
Drilling Company: <u>Tasman</u>		Surface Completion: <u>Flush</u>		DTW: <u>4'</u>	TD: <u>7'</u>		
Type of Drill: <u>Hand Auger</u>		Geologist: <u>Mike Connolly</u>		Project Manager: <u>B. Nelson</u>			
Bit Size: <u>2 3/8"</u>		Logging Method:					
Well Const. Material: Diameter: <u>1"</u> Screen: <u>Sch 40 PVC Slotted 0.010</u> Riser: <u>Sch 40 PVC Blank</u>							
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1		↑ HA ↓	↑ 100% ↓	0.0		SW	Brown, sand, fine to medium grain, poorly sorted, dry, no odor
2				0.0			
3				0.1		SC	Brown, clayey sand, fine grain, well sorted, trace medium grain, no st, no odor
4				0.3			-Saturated at 4'
5				0.5			
6				0.6			
7				0.1			-As above
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

**TASMAN****Borehole Logging Form**

BOREHOLE ID: <u>BH02</u>		SITE NAME: <u>Willman 42-16WH</u>		CLIENT NAME: <u>PDC ENERGY</u>				
Date Completed: <u>6/7/22</u>		Location: <u>N of source</u>						
Drilling Company: <u>Tasman</u>		Surface Completion:		DTW: <u>4</u>	TD: <u>91</u>			
Type of Drill: <u>Hand Auger</u>		Geologist: <u>E. Wozniak</u>		Project Manager: <u>B. Nelson</u>				
Bit Size: <u>2 3/8"</u>		Logging Method:						
Well Const. Material: Diameter: <u>1"</u> Screen: <u>Sch 40 PVC Slotted 0.010</u> Riser: <u>Sch 40 PVC Blank</u>								
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description	
1		↑	↑	0.9		SW	Brown, sand fine to medium grain, poorly sorted, dry, no odor	
2				0.8				
3				1.1				
4		↓	HA	100	0.3		SC	Brown, clayey sand, fine grain well sorted, trace medium grain, moist, no odor
5		0.5				same as above, saturated		
6		0.0			CL	tan sandy clay, low plasticity, saturated, no odor		
7				0.0				
8				0.0				
9			↓	↓	0.0		CH	same as above, brown.
10								
11								
12								
13								
14								
15								
16								
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19								
20								
21								
22								
23								
24								
25								

**TASMAN****Borehole Logging Form**

BOREHOLE ID: <u>BH03</u>		SITE NAME: <u>William 42-16 WH</u>		CLIENT NAME: <u>PDC ENERGY</u>			
Date Completed: <u>6/17/22</u>		Location: <u>W of Source</u>					
Drilling Company: <u>Tasman</u>		Surface Completion: <u>Flush</u>		DTW: <u>4.5'</u>	TD: <u>8'</u>		
Type of Drill: <u>Hand Auger</u>		Geologist: <u>Mike Connolly</u>		Project Manager: <u>B. Nelson</u>			
Bit Size: <u>2 3/8"</u>		Logging Method:					
Well Const. Material: Diameter: <u>1"</u> Screen: <u>Sch 40 PVC Slotted 0.010</u> Riser: <u>Sch 40 PVC Blank</u>							
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1		↑ HA ↓	↑ 100% ↓	0.1		SW	Brown, sand fine to medium grain, poorly sorted, dry, no odor
2				0.0			
3				0.0			
4				0.3	SC	Brown to tan, clayey sand, fine to medium grain, poorly sorted, moist, no odor	
5				0.5		-Saturated at 4.5'	
6				0.1			
7				0.4	CL	Brown to tan, clay, medium plasticity, saturated, no odor	
8				0.1		-As above, brown to light gray	
9							
10							
11							
12							
13							
14							
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16							
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18							
19							
20							
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22							
23							
24							
25							



Borehole Logging Form

BOREHOLE ID: BH04		SITE NAME: Willman 42-16 WH		CLIENT NAME: PDC ENERGY			
Date Completed: 6/7/22		Location: South of Source					
Drilling Company: Tasman		Surface Completion: Concrete/Well cover		DTW: 4.5' TD: 8'			
Type of Drill: Hand Auger		Geologist: Sam Anderson		Project Manager: B. Nelson			
Bit Size: 2 3/8"		Logging Method:					
Well Const. Material: Diameter: 1" Screen: Sch 40 PVC Slotted 0.010 Riser: Sch 40 PVC Blank							
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1		HA	100%	0.4			
2				0.2		SW	0-1' = Brown, sand, poorly sorted, Fine-med. grain, dry, no HC odor.
3				0.3			
4				0.3		SC	1-3' = Brown, clayey sand, Fine-med grain, poorly sorted, moist, no HC odor.
5				0.2			Saturated at 4.5'
6				0.2		CL	3-6' = Tan, Sandy clay, moderate plasticity, saturated, no HC odor.
7				0.3			
8				0.2		CH	6-8' = Tan clay, high plasticity, saturated, no HC odor.
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

**TASMAN****Borehole Logging Form**

BOREHOLE ID: BH05		SITE NAME: Willman 42-16 WH		CLIENT NAME: PDC ENERGY					
Date Completed: 6/7/22		Location: East of Source							
Drilling Company: Tasman		Surface Completion: Concrete / Well Casing DTW: 4' TD: 9'							
Type of Drill: Hand Auger		Geologist: Sam Anderson		Project Manager: B. Nelson					
Bit Size: 2 3/8"		Logging Method:							
Well Const. Material: Diameter: 1" Screen: Sch 40 PVC Slotted 0.010 Riser: Sch 40 PVC Blank									
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description		
1		↑	↑	0.3					
2				0.7			SW	0-1' = Brown, Sand, poorly sorted, fine-medium grain, dry, no HC odor.	
3				0.2					
4				0.4					
5				HA	100%	0.2		SC	1-4' = Brown/Tan, clayey sand, moderately sorted, fine-medium grain, saturated, no odor.
6						0.4		CL	4-5' = Tan, sandy clay, low plasticity, saturated, no odor.
7						0.2		CL	5-6.5' = Tan, clay, moderate plasticity, saturated, no odor.
8						0.3			
9					↓	↓	0.2		CH
10							*Geologic refusal at 9'		
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Attachment B

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

June 16, 2022

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Willman 42-16

Work Order #2206179

Enclosed are the results of analyses for samples received by Summit Scientific on 06/10/22 17:15. 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: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2206179-01	Water	06/10/22 10:35	06/10/22 17:15
BH02	2206179-02	Water	06/10/22 10:45	06/10/22 17:15
BH03	2206179-03	Water	06/10/22 10:55	06/10/22 17:15
BH04	2206179-04	Water	06/10/22 11:32	06/10/22 17:15
BH05	2206179-05	Water	06/10/22 11:47	06/10/22 17:15

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.

Summit Scientific

2206179

S₂

4653 Table Mountain Drive ♦ Golden, Colorado 80403

303-277-9310

Page 2 of 2

Client:	PDC / Tasman	Project Manager:	Mark Longhurst
Address:	6855 W 119th Ave	E-Mail:	mark.longhurst@PDCE.com
City/State/Zip:	Broomfield/ CO/ 80020		
Phone:	303-487-1228	Project Name:	willman Y2-16
Sampler Name:	Tyler Muffli	Project Number:	

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested						Special Instructions	
					HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	BTEXN - 8260B	1,2,4 & 1,3,5-TMB	TDS, CL, SO4					
1	BH01	6.10.22	1035	4	X				X					X	X	X				
2	BH02	↓	1045	↓	↓				↓					↓	↓	↓				
3	BH03	↓	1055	↓	↓				↓					↓	↓	↓				
4	BH04	↓	1132	↓	↓				↓					↓	↓	↓				
5	BH05	↓	1147	↓	↓				↓					↓	↓	↓				
6																				
7																				
8																				
9																				
10																				

Relinquished by:	Date/Time:	Received by:	Date/Time:	Turn Around Time	(Check)	Notes:
<i>Alan</i>	6.10.22 1340	Tasman's Lock Box		Same Day	72 hours	
Relinquished by:	Date/Time:	Received by:	Date/Time:	24 hours	Standard	
Tasman's Lock Box	6/10/22 1715	<i>[Signature]</i>	6/10/22 1715	48 hours	<input checked="" type="checkbox"/>	
Relinquished by:	Date/Time:	Received by:	Date/Time:	Sample Integrity:		
				Temperature Upon Receipt:	3.0	
				Samples Intact:	Yes No	

S₂

Sample Receipt Checklist

S2 Work Order# 2206179

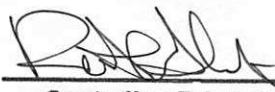
Client: Rac TOSman Client Project ID: willnan 42-16

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

	-			
--	---	--	--	--

Matrix (Check all that apply) Air ☐ Soil/Solid ☐ Water ☒ Other ☐Temp (°C) 3.0 Thermometer # 1

	Yes	No	N/A	Comments (if any)
If samples require cooling, is the temperature < 6 °C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	-			On ICE
Were all samples received intact ⁽¹⁾ ?	-			
Was adequate sample volume provided ⁽¹⁾ ?	-			
If custody seals are present, are they intact ⁽¹⁾ ?	-			
Are samples due within 48 hours present?	1/11	-		Standard
Are water samples with short hold times present? Note the short hold analysis in the comments column - pH, Nitrate/Nitrite, Ferrous Iron (Fe ²⁺), Hexavalent Chromium (Cr ⁶⁺ , Cr VI), COD/BOD, Total Coliform, E. Coli, Total Residual Chlorine (TRC), Dissolved Oxygen			-	
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, H ₂ SO ₄ , NaOH, HNO ₃ , etc.	-			HCl
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.


Custodian Printed Name

6/10/22

Date/Time



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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

BH01
2206179-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/10/22 10:35**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	1.0	ug/l	1	BFF0357	06/13/22	06/14/22	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	
Naphthalene	ND	1.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/10/22 10:35**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4	7.59	56.9 %	23-173		"	"	"	"	
Surrogate: Toluene-d8	11.9	89.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	11.0	82.5 %	21-167		"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **06/10/22 10:35**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Chloride	311	12.0	mg/L	200	BFF0412	06/15/22	06/15/22	EPA 300.0	
Sulfate	631	60.0	"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **06/10/22 10:35**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Total Dissolved Solids	1900	10.0	mg/L	1	BFF0395	06/14/22	06/14/22	SM2540C	

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: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

BH02
2206179-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/10/22 10:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	BFF0357	06/13/22	06/14/22	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	
Naphthalene	ND	1.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/10/22 10:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4	7.98	59.9 %	23-173		"	"	"	"	
Surrogate: Toluene-d8	12.2	91.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	11.3	84.8 %	21-167		"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **06/10/22 10:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chloride	417	12.0	mg/L	200	BFF0412	06/15/22	06/16/22	EPA 300.0	
Sulfate	422	60.0	"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **06/10/22 10:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Total Dissolved Solids	2010	10.0	mg/L	1	BFF0395	06/14/22	06/14/22	SM2540C	

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

BH03
2206179-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/10/22 10:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	BFF0357	06/13/22	06/14/22	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	
Naphthalene	ND	1.0		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0		"	"	"	"	"	"	

Date Sampled: **06/10/22 10:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4	7.85	58.9 %		23-173		"	"	"	"	
Surrogate: Toluene-d8	12.1	90.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	11.6	86.7 %		21-167		"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **06/10/22 10:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	324	12.0		mg/L	200	BFF0412	06/15/22	06/16/22	EPA 300.0	
Sulfate	309	60.0		"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **06/10/22 10:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	1630	10.0		mg/L	1	BFF0395	06/14/22	06/14/22	SM2540C	

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

BH04
2206179-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/10/22 11:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	BFF0357	06/13/22	06/14/22	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	
Naphthalene	ND	1.0		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0		"	"	"	"	"	"	

Date Sampled: **06/10/22 11:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4	8.10	60.8 %		23-173		"	"	"	"	
Surrogate: Toluene-d8	11.8	88.4 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	12.7	95.4 %		21-167		"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **06/10/22 11:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	325	12.0		mg/L	200	BFF0412	06/15/22	06/16/22	EPA 300.0	
Sulfate	321	60.0		"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **06/10/22 11:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	1530	10.0		mg/L	1	BFF0395	06/14/22	06/14/22	SM2540C	

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

BH05
2206179-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **06/10/22 11:47**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	BFF0357	06/13/22	06/14/22	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	
Naphthalene	ND	1.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	

Date Sampled: **06/10/22 11:47**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4	8.50	63.8 %	23-173		"	"	"	"	
Surrogate: Toluene-d8	11.8	88.8 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	10.2	76.3 %	21-167		"	"	"	"	

Anions by EPA Method 300.0

Date Sampled: **06/10/22 11:47**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chloride	279	12.0	mg/L	200	BFF0412	06/15/22	06/16/22	EPA 300.0	
Sulfate	252	60.0	"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **06/10/22 11:47**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Total Dissolved Solids	1440	10.0	mg/L	1	BFF0395	06/14/22	06/14/22	SM2540C	

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

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 BFF0357 - EPA 5030 Water MS

Blank (BFF0357-BLK1)

Prepared: 06/13/22 Analyzed: 06/14/22

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Naphthalene	ND	1.0	"							
1,2,4-Trimethylbenzene	ND	1.0	"							
1,3,5-Trimethylbenzene	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	10.4		"	13.3		77.6	23-173			
Surrogate: Toluene-d8	12.1		"	13.3		90.5	20-170			
Surrogate: 4-Bromofluorobenzene	12.1		"	13.3		90.5	21-167			

LCS (BFF0357-BS1)

Prepared: 06/13/22 Analyzed: 06/14/22

Benzene	20.3	1.0	ug/l	33.3		61.0	51-132			
Toluene	28.3	1.0	"	33.3		84.9	51-138			
Ethylbenzene	37.9	1.0	"	33.3		114	58-146			
m,p-Xylene	79.7	2.0	"	66.7		120	57-144			
o-Xylene	39.0	1.0	"	33.3		117	53-146			
Naphthalene	32.3	1.0	"	33.3		96.9	70-130			
1,2,4-Trimethylbenzene	35.7	1.0	"	33.3		107	70-130			
1,3,5-Trimethylbenzene	38.1	1.0	"	33.3		114	70-130			
Surrogate: 1,2-Dichloroethane-d4	10.3		"	13.3		77.3	23-173			
Surrogate: Toluene-d8	11.9		"	13.3		89.2	20-170			
Surrogate: 4-Bromofluorobenzene	8.98		"	13.3		67.4	21-167			

Matrix Spike (BFF0357-MS1)

Source: 2206177-21

Prepared: 06/13/22 Analyzed: 06/14/22

Benzene	20.4	1.0	ug/l	33.3	ND	61.3	34-141			
Toluene	29.6	1.0	"	33.3	ND	89.0	27-151			
Ethylbenzene	34.2	1.0	"	33.3	ND	103	29-160			
m,p-Xylene	75.4	2.0	"	66.7	ND	113	20-166			
o-Xylene	37.4	1.0	"	33.3	ND	112	33-159			
Naphthalene	34.3	1.0	"	33.3	ND	103	70-130			
1,2,4-Trimethylbenzene	37.3	1.0	"	33.3	ND	112	70-130			
1,3,5-Trimethylbenzene	38.1	1.0	"	33.3	ND	114	70-130			
Surrogate: 1,2-Dichloroethane-d4	8.27		"	13.3		62.0	23-173			
Surrogate: Toluene-d8	12.2		"	13.3		91.7	20-170			
Surrogate: 4-Bromofluorobenzene	11.5		"	13.3		86.0	21-167			

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

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 BFF0357 - EPA 5030 Water MS

Matrix Spike Dup (BFF0357-MSD1)		Source: 2206177-21			Prepared: 06/13/22 Analyzed: 06/14/22					
Benzene	19.3	1.0	ug/l	33.3	ND	57.8	34-141	5.84	30	
Toluene	28.7	1.0	"	33.3	ND	86.1	27-151	3.26	30	
Ethylbenzene	33.7	1.0	"	33.3	ND	101	29-160	1.38	30	
m,p-Xylene	73.2	2.0	"	66.7	ND	110	20-166	3.04	30	
o-Xylene	36.9	1.0	"	33.3	ND	111	33-159	1.27	30	
Naphthalene	36.8	1.0	"	33.3	ND	110	70-130	7.14	30	
1,2,4-Trimethylbenzene	37.1	1.0	"	33.3	ND	111	70-130	0.457	30	
1,3,5-Trimethylbenzene	38.0	1.0	"	33.3	ND	114	70-130	0.0525	30	
<hr/>										
Surrogate: 1,2-Dichloroethane-d4	8.36		"	13.3		62.7	23-173			
Surrogate: Toluene-d8	12.3		"	13.3		92.0	20-170			
Surrogate: 4-Bromofluorobenzene	11.3		"	13.3		84.8	21-167			

Summit Scientific

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

Project: Willman 42-16
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

Anions by EPA Method 300.0 - Quality Control
Summit Scientific

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

Batch BFF0412 - General Preparation

Blank (BFF0412-BLK1)

Prepared & Analyzed: 06/15/22

Chloride	ND	0.0600	mg/L
Sulfate	ND	0.300	"

LCS (BFF0412-BS1)

Prepared & Analyzed: 06/15/22

Chloride	2.98	0.0600	mg/L	3.00	99.2	90-110
Sulfate	14.4	0.300	"	15.0	96.2	90-110

Duplicate (BFF0412-DUP1)

Source: 2206178-01

Prepared & Analyzed: 06/15/22

Chloride	112	12.0	mg/L	118	5.24	20
Sulfate	215	60.0	"	192	11.3	20

Matrix Spike (BFF0412-MS1)

Source: 2206178-01

Prepared & Analyzed: 06/15/22

Chloride	767	12.0	mg/L	600	118	108	80-120
Sulfate	3370	60.0	"	3000	192	106	80-120

Summit Scientific

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

Project: Willman 42-16

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

Total Dissolved Solids by SM2540C - Quality Control

Summit Scientific

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

Batch BFF0395 - General Preparation

Blank (BFF0395-BLK1)

Prepared & Analyzed: 06/14/22

Total Dissolved Solids ND 10.0 mg/L

Duplicate (BFF0395-DUP1)

Source: 2206178-01

Prepared & Analyzed: 06/14/22

Total Dissolved Solids 1120 10.0 mg/L 1080 3.74 20

Summit Scientific

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

Project: Willman 42-16

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
06/16/22 15:21

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