



**PDC Energy, Inc.**  
**Third Quarter 2022 Groundwater Monitoring Summary**

October 4, 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. 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.

### **Groundwater Monitoring Activities**

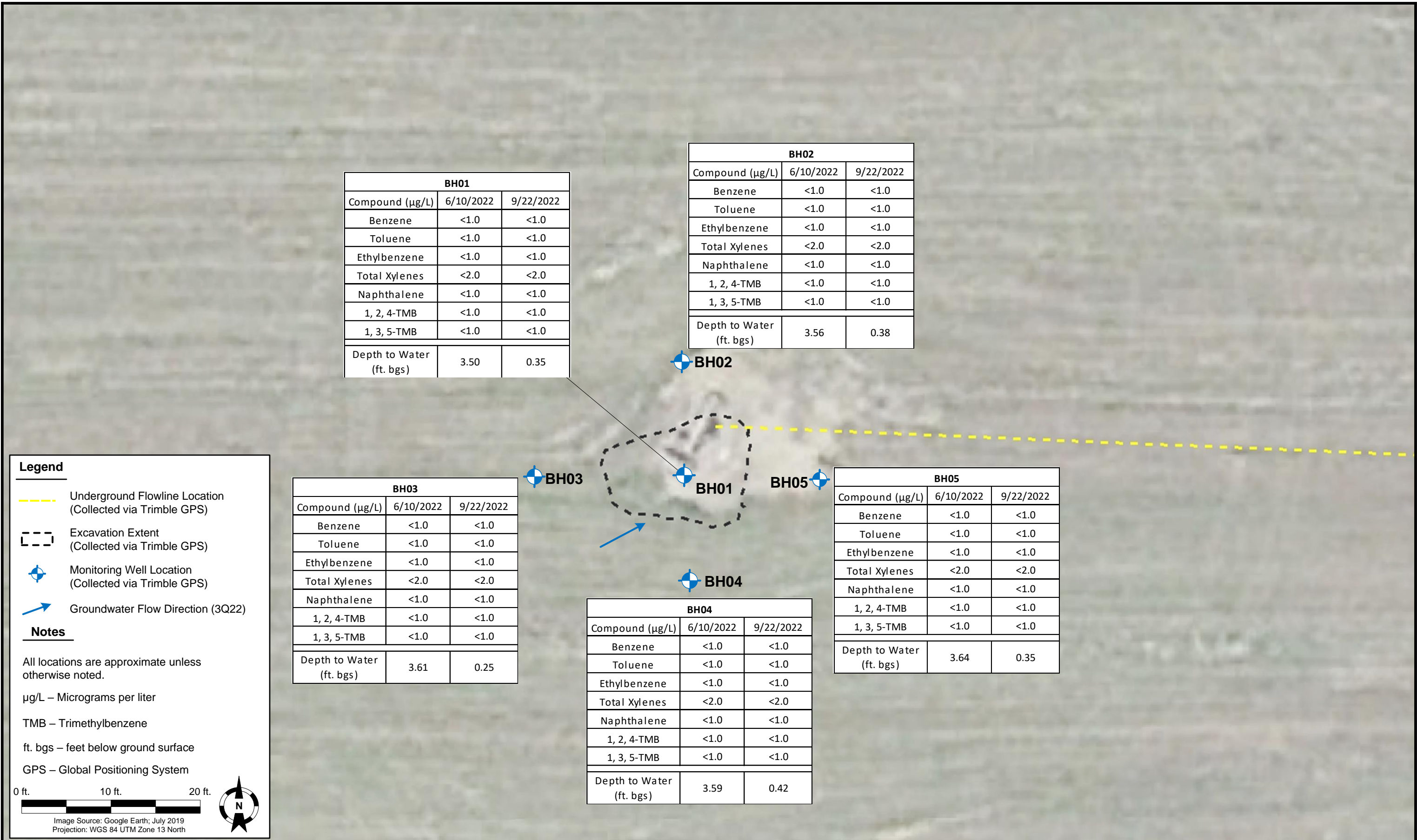
On September 22, 2022, groundwater monitoring was conducted at all five monitoring wells (BH01 – BH05). Five groundwater samples were submitted to Summit Scientific Laboratories for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB by EPA Method 8260B, chloride and sulfate anions by EPA Method 300.0 and total dissolved solids (TDS) by Method SM 2540C.

Third quarter 2022 analytical results indicated that organic constituent concentrations were in compliance with the applicable COGCC Table 915-1 groundwater standards in all monitoring well locations. Additionally, inorganic parameters were in compliance with the applicable regulatory standards or within 1.25x the background concentrations of the up- and cross-gradient monitoring wells (BH02 and BH03) 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 A.

### **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 fourth quarter 2022.

Fourth quarter 2022 groundwater sampling will be conducted in December 2022.





Legend

Underground Flowline Location  
(Collected via Trimble GPS)

Excavation Extent  
(Collected via Trimble GPS)

Monitoring Well Location  
(Collected via Trimble GPS)

Groundwater Flow Direction (3Q22)

Notes

All locations are approximate unless otherwise noted.

mg/L – Milligrams per liter

TDS – Total Dissolved Solids

ft. bgs – Feet below ground surface

GPS – Global Positioning System

Red text – exceedances of COGCC Table 915-1 standards

Black Bold text – exceedances of COGCC Table 915-1 standards, but within 1.25x background concentrations

COGCC – Colorado Oil and Gas Conservation Commission

0 ft.10 ft.20 ft.

Image Source: Google Earth; July 2019  
Projection: WGS 84 UTM Zone 13 North

N

**BH01**

Compound (mg/L)	6/10/2022	9/22/2022
Chloride	<b>311</b>	234
Sulfate	<b>631</b>	<b>441</b>
TDS	1,900	1,560
Depth to Water (ft. bgs)	3.50	0.35

**BH02**

Compound (mg/L)	6/10/2022	9/22/2022
Chloride	417	359
Sulfate	422	603
TDS	2,010	2,010
Depth to Water (ft. bgs)	3.56	0.38

**BH03**

Compound (mg/L)	6/10/2022	9/22/2022
Chloride	324	296
Sulfate	309	398
TDS	1,630	1,580
Depth to Water (ft. bgs)	3.61	0.25

**BH04**

Compound (mg/L)	6/10/2022	9/22/2022
Chloride	<b>325</b>	231
Sulfate	<b>321</b>	<b>291</b>
TDS	1,530	1,250
Depth to Water (ft. bgs)	3.59	0.42

**BH05**

Compound (mg/L)	6/10/2022	9/22/2022
Chloride	<b>279</b>	<b>340</b>
Sulfate	<b>252</b>	<b>476</b>
TDS	1,440	1,830
Depth to Water (ft. bgs)	3.64	0.35

DATE:	October 4, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	S. Anderson

TASMAN

Tasman, Inc.

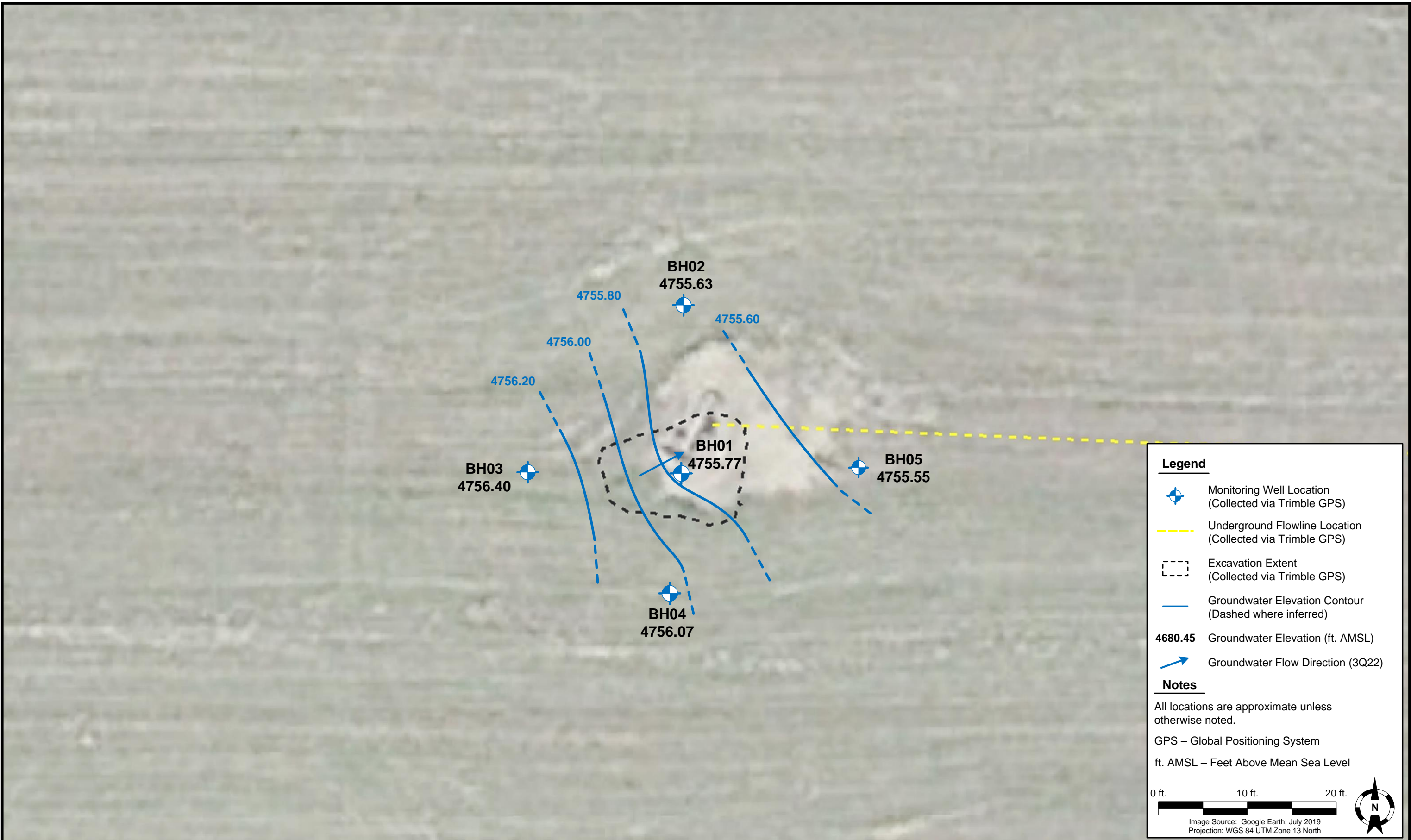
6855 W. 119<sup>th</sup> Ave.

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  
(INORGANIC PARAMETERS)

FIGURE  
2



DATE:	October 14, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	J. Marcus

**TASMAN**

**Tasman, Inc.**  
6855 W. 119<sup>th</sup> 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 (09/22/2022)**

**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 <sup>(2)</sup> (ft.)	Groundwater Elevation (ft. AMSL)
<b>COGCC Table 915-1 Groundwater Standard (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	<b>140</b>	<b>67</b>	<b>67</b>	<b>-</b>	<b>-</b>
BH01	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.50	4752.62
BH01	9/22/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	0.35	4755.77
BH02	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.56	4752.45
BH02	9/22/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	0.38	4755.63
BH03	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.61	4753.04
BH03	9/22/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	0.25	4756.40
BH04	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.59	4752.90
BH04	9/22/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	0.42	4756.07
BH05	6/10/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	3.64	4752.26
BH05	9/22/2022	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	0.35	4755.55

**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 <sup>(2)</sup> (ft.)	Groundwater Elevation (ft. AMSL)
<b>COGCC Table 915-1 Groundwater Standard (mg/L) (1)</b>		<b>&lt;1.25 x BCKG</b>	<b>250 or &lt;1.25 x BCKG</b>	<b>250 or &lt;1.25 x BCKG</b>	-	-
BH01	6/10/2022	1,900	<b>311</b>	<b>631</b>	3.50	4752.62
BH01	9/22/2022	1,560	234	<b>441</b>	0.35	4755.77
BH02	6/10/2022	2,010	417	422	3.56	4752.45
BH02	9/22/2022	2,010	359	603	0.38	4755.63
BH03	6/10/2022	1,630	324	309	3.61	4753.04
BH03	9/22/2022	1,580	296	398	0.25	4756.40
BH04	6/10/2022	1,530	<b>325</b>	<b>321</b>	3.59	4752.90
BH04	9/22/2022	1,250	231	<b>291</b>	0.42	4756.07
BH05	6/10/2022	1,440	<b>279</b>	<b>252</b>	3.64	4752.26
BH05	9/22/2022	1,830	<b>340</b>	<b>476</b>	0.35	4755.55

**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.

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

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

## Attachment A



# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

October 03, 2022

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Willman 42-16 Wellhead

Work Order #2209473

Enclosed are the results of analyses for samples received by Summit Scientific on 09/22/22 18:03. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Mikayla Axtell For Paul Shrewsbury  
President



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

Project: Willman 42-16 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/03/22 13:23

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2209473-01	Water	09/22/22 10:52	09/22/22 18:03
BH02	2209473-02	Water	09/22/22 11:04	09/22/22 18:03
BH03	2209473-03	Water	09/22/22 11:14	09/22/22 18:03
BH04	2209473-04	Water	09/22/22 11:24	09/22/22 18:03
BH05	2209473-05	Water	09/22/22 11:36	09/22/22 18:03

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

S<sub>2</sub>

2209473

4653 Table Mountain Drive ♦ Golden, Colorado 80403  
303-277-9310 ♦ 303-374-5933 (f)

Page 1 of 1

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: <i>Willman 42-16 Wellhead</i>
Sampler Name: Chase Jonjak	Project Number:

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested								Special Instructions		
					HCl	HNO <sub>3</sub>	None	Other	Water	Soil	Air-Canister #	Other	BTEXN -8260B	TPH-(C6-C36)	TMB's(1,2,4)&(1,3,5)	Boron - HWS	pH, EC, SAR	PAH - 915	Metals - 915	TD, Cl, SO <sub>4</sub>			
1	BH01	9/22/2022	1052	4	3		1		X					X		X						X	
2	BH02	I	1104	I	I		I		I					I		I					I		
3	BH03		1114																				
4	BH04		1124																				
5	BH05	I	1136	I	I		I		I					I		I					I		
6																							
7																							
8																							
9																							
10																							

Relinquished by: <i>Chase J</i> Date/Time: 9/22/2022 1343	Received by: <i>Tasman Lockbox</i> Date/Time: 9/22/2022 1343	<b>Turn Around Time</b> (Check) Same Day _____ 72 hours 24 hours _____ Standard <input checked="" type="checkbox"/> 48 hours _____ <b>Sample Integrity:</b> Temperature Upon Receipt: <u>4.9</u> Samples Intact: <input checked="" type="checkbox"/> Yes No	<b>Notes:</b>
Relinquished by: <i>Tasman Lockbox</i> Date/Time: 9/22/22 1803	Received by: <i>[Signature]</i> Date/Time: 9/22/22 1803		
Relinquished by:	Received by:		

S<sub>2</sub>

## Sample Receipt Checklist

S2 Work Order# 2209473Client: Per/TasmanClient Project ID: Willman 42-14 wellheadShipped Via: H.D./P.U./FedEx/UPS/USPS/Other ☐Airbill #:                     

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	-------------------------------------	--------------------------	--------------------------	--------------------------

Matrix (Check all that apply)

Air ☐Soil/Solid ☐Water ☒Other ☐

Temp (°C)

4.9

Thermometer #

1

	Yes	No	N/A	Comments (if any)
If samples require cooling, is the temperature < 6°C? <sup>(1)</sup> <b>NOTE:</b> If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>on ice</u>
Are samples due within 48 hours present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are water samples with short hold times present? Note the short hold analysis in the comments column - pH, Nitrate/Nitrite, Ferrous Iron (Fe <sup>2+</sup> ), Hexavalent Chromium (Cr <sup>6+</sup> , Cr VI), COD/BOD, Total Coliform, E. Coli, Total Residual Chlorine (TRC), Dissolved Oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out Completely? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received? <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC? <sup>(1)</sup>	<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)? <sup>(1)</sup> Note the type of preservative in the comments column – HCl, H <sub>2</sub> SO <sub>4</sub> , NaOH, HNO <sub>3</sub> , etc.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>HCl</u>
If samples are acid preserved for metals, is the pH ≤ 2? <sup>(1)</sup> 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):				

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

Custodian Printed Name

Date/Time

8-22-2219:50





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

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

**Reported:**  
10/03/22 13:23

**BH01**  
**2209473-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/22/22 10:52**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Benzene	ND	1.0	ug/l	1	BF10677	09/26/22	09/28/22	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: **09/22/22 10:52**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Surrogate: 1,2-Dichloroethane-d4		86.8 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		137 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		91.4 %	21-167		"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **09/22/22 10:52**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Chloride	234	12.0	mg/L	200	BF10674	09/26/22	09/26/22	EPA 300.0	
Sulfate	441	60.0	"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **09/22/22 10:52**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Total Dissolved Solids	1560	10.0	mg/L	1	BF10682	09/26/22	09/27/22	SM2540C	

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

**BH02**  
**2209473-02 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/22/22 11:04**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	BF10677	09/26/22	09/28/22	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: **09/22/22 11:04**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		87.7 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		114 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		90.2 %	21-167		"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **09/22/22 11:04**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chloride	359	12.0	mg/L	200	BF10674	09/26/22	09/26/22	EPA 300.0	
Sulfate	603	60.0	"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **09/22/22 11:04**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Total Dissolved Solids	2010	10.0	mg/L	1	BF10682	09/26/22	09/27/22	SM2540C	

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

**BH03**  
**2209473-03 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/22/22 11:14**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	BF10677	09/26/22	09/28/22	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: **09/22/22 11:14**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		84.6 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		105 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		91.3 %	21-167		"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **09/22/22 11:14**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chloride	<b>296</b>	12.0	mg/L	200	BF10674	09/26/22	09/27/22	EPA 300.0	
Sulfate	<b>398</b>	60.0	"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **09/22/22 11:14**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Total Dissolved Solids	<b>1580</b>	10.0	mg/L	1	BF10682	09/26/22	09/27/22	SM2540C	

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

**BH04**  
**2209473-04 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/22/22 11:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	BF10677	09/26/22	09/28/22	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: **09/22/22 11:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		70.5 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		120 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		91.7 %	21-167		"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **09/22/22 11:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Chloride	231	12.0	mg/L	200	BF10674	09/26/22	09/27/22	EPA 300.0	
Sulfate	291	60.0	"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **09/22/22 11:24**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Total Dissolved Solids	1250	10.0	mg/L	1	BF10682	09/26/22	09/27/22	SM2540C	

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

**BH05**  
**2209473-05 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **09/22/22 11:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	BF10677	09/26/22	09/28/22	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: **09/22/22 11:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		88.1 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		162 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		86.1 %		21-167		"	"	"	"	

**Anions by EPA Method 300.0**

Date Sampled: **09/22/22 11:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	<b>340</b>	12.0		mg/L	200	BF10674	09/26/22	09/27/22	EPA 300.0	
Sulfate	<b>476</b>	60.0		"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **09/22/22 11:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	<b>1830</b>	10.0		mg/L	1	BF10682	09/26/22	09/27/22	SM2540C	

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

## 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 BFI0677 - EPA 5030 Water MS

##### Blank (BFI0677-BLK1)

Prepared: 09/26/22 Analyzed: 09/28/22

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	11.2		"	13.3		83.9	23-173			
Surrogate: Toluene-d8	15.0		"	13.3		113	20-170			
Surrogate: 4-Bromofluorobenzene	12.1		"	13.3		90.8	21-167			

##### LCS (BFI0677-BS1)

Prepared: 09/26/22 Analyzed: 09/28/22

Benzene	37.0	1.0	ug/l	41.7		88.7	51-132			
Toluene	46.2	1.0	"	41.7		111	51-138			
Ethylbenzene	44.2	1.0	"	41.7		106	58-146			
m,p-Xylene	91.6	2.0	"	83.3		110	57-144			
o-Xylene	43.8	1.0	"	41.7		105	53-146			
Naphthalene	36.5	1.0	"	41.7		87.5	70-130			
1,2,4-Trimethylbenzene	45.8	1.0	"	41.7		110	70-130			
1,3,5-Trimethylbenzene	45.5	1.0	"	41.7		109	70-130			
Surrogate: 1,2-Dichloroethane-d4	11.8		"	13.3		88.4	23-173			
Surrogate: Toluene-d8	15.8		"	13.3		118	20-170			
Surrogate: 4-Bromofluorobenzene	12.3		"	13.3		92.1	21-167			

##### Matrix Spike (BFI0677-MS1)

Source: 2209441-04

Prepared: 09/26/22 Analyzed: 09/28/22

Benzene	36.2	1.0	ug/l	41.7	ND	86.9	34-141			
Toluene	41.0	1.0	"	41.7	ND	98.3	27-151			
Ethylbenzene	45.5	1.0	"	41.7	ND	109	29-160			
m,p-Xylene	94.0	2.0	"	83.3	3.24	109	20-166			
o-Xylene	44.0	1.0	"	41.7	ND	106	33-159			
Naphthalene	43.7	1.0	"	41.7	ND	105	70-130			
1,2,4-Trimethylbenzene	47.0	1.0	"	41.7	ND	113	70-130			
1,3,5-Trimethylbenzene	46.7	1.0	"	41.7	ND	112	70-130			
Surrogate: 1,2-Dichloroethane-d4	8.86		"	13.3		66.5	23-173			
Surrogate: Toluene-d8	13.5		"	13.3		101	20-170			
Surrogate: 4-Bromofluorobenzene	12.3		"	13.3		92.0	21-167			

Summit Scientific

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

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

**Reported:**  
10/03/22 13:23

**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 BFI0677 - EPA 5030 Water MS**

**Matrix Spike Dup (BFI0677-MSD1)**

**Source: 2209441-04**

Prepared: 09/26/22 Analyzed: 09/28/22

Benzene	35.7	1.0	ug/l	41.7	ND	85.7	34-141	1.39	30	
Toluene	44.4	1.0	"	41.7	ND	107	27-151	8.06	30	
Ethylbenzene	44.2	1.0	"	41.7	ND	106	29-160	2.81	30	
m,p-Xylene	91.3	2.0	"	83.3	3.24	106	20-166	2.84	30	
o-Xylene	43.4	1.0	"	41.7	ND	104	33-159	1.44	30	
Naphthalene	46.8	1.0	"	41.7	ND	112	70-130	6.87	30	
1,2,4-Trimethylbenzene	45.8	1.0	"	41.7	ND	110	70-130	2.54	30	
1,3,5-Trimethylbenzene	45.7	1.0	"	41.7	ND	110	70-130	2.10	30	
Surrogate: 1,2-Dichloroethane-d4	12.6		"	13.3		94.8	23-173			
Surrogate: Toluene-d8	14.6		"	13.3		109	20-170			
Surrogate: 4-Bromofluorobenzene	12.1		"	13.3		91.0	21-167			

Summit Scientific

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

Project: Willman 42-16 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/03/22 13:23

**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 BFI0674 - General Preparation**

**Blank (BFI0674-BLK1)**

Prepared & Analyzed: 09/26/22

Chloride	ND	0.0600	mg/L
Sulfate	ND	0.300	"

**LCS (BFI0674-BS1)**

Prepared & Analyzed: 09/26/22

Chloride	3.10	0.0600	mg/L	3.00	103	90-110
Sulfate	16.0	0.300	"	15.0	107	90-110

**Duplicate (BFI0674-DUP1)**

Source: 2209441-01

Prepared & Analyzed: 09/26/22

Chloride	257	12.0	mg/L	249	3.16	20
Sulfate	121	60.0	"	122	0.988	20

**Matrix Spike (BFI0674-MS1)**

Source: 2209441-01

Prepared & Analyzed: 09/26/22

Chloride	841	12.0	mg/L	600	249	98.6	80-120
Sulfate	3250	60.0	"	3000	122	104	80-120

Summit Scientific

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

Project: Willman 42-16 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/03/22 13:23

**Total Dissolved Solids by SM2540C - Quality Control**  
**Summit Scientific**

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

**Batch BFI0682 - General Preparation**

**Blank (BFI0682-BLK1)**

Prepared: 09/26/22 Analyzed: 09/27/22

Total Dissolved Solids ND 10.0 mg/L

**Duplicate (BFI0682-DUP1)**

Source: 2209450-01

Prepared: 09/26/22 Analyzed: 09/27/22

Total Dissolved Solids 13900 10.0 mg/L 15600 11.7 20

Summit Scientific

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

Project: Willman 42-16 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
10/03/22 13:23

### 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