

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

September 27, 2022

Former LH Miller Unit 1 Tank Battery  
NWNW Section 25 T4N R66W  
Remediation # 16033

This groundwater monitoring summary has been prepared by Tasman, Inc. for the former LH Miller Unit 1 Tank Battery.

### **Site History and Background**

On January 6, 2021, a historic hydrocarbon release was discovered beneath a buried produced water vessel during ACM abatement activities. Following the discovery, mitigation activities were initiated and between January 6 and January 13, 2021, approximately 360 cubic yards of impacted material were removed from the former excavation. During excavation activities, groundwater was encountered at approximately 6 feet below ground surface (bgs). On April 9, 2021, five monitoring wells (BH01-BH05) were installed within and adjacent to the former excavation extent to confirm the absence of dissolved phase hydrocarbon impacts. Per the approved Supplemental Form 27 (Document No. 403014370), organic compounds were removed from the sampling and analysis plan following the first quarter 2022 groundwater monitoring event.

### **Groundwater Monitoring Activities**

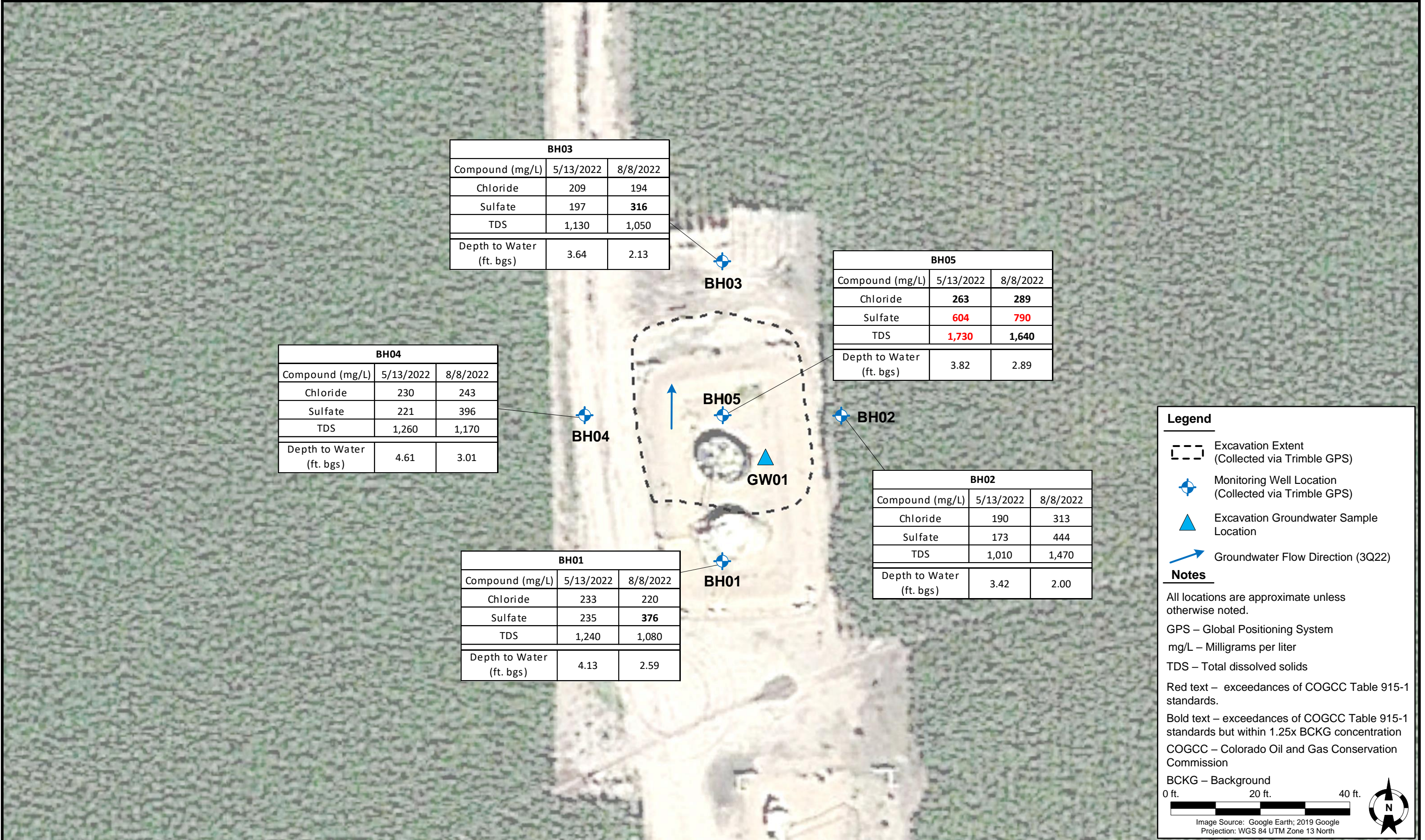
On August 8, 2022, groundwater monitoring was conducted at all five monitoring wells (BH01 – BH05). Five groundwater samples were submitted to Summit Scientific Laboratories for analysis of chloride and sulfate anions by EPA Method 300.0, and total dissolved solids (TDS) by Method SM 2540C.

Third quarter 2022 analytical results indicated that sulfate anion concentrations were in exceedance of the applicable COGCC Table 915-1 groundwater standards and above 1.25x the background concentrations of the cross-gradient monitoring wells (BH02 and BH04) in monitoring well BH05. TDS and chloride anion concentrations were in compliance with the applicable regulatory standards or within 1.25x the background concentrations in all five monitoring well locations. Sample locations and corresponding analytical results are illustrated on Figure 1. Groundwater elevation data is illustrated on Figure 2. Groundwater analytical results are summarized in Table 1. 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 2021 and will remain the selected remediation strategy through the fourth quarter 2022.

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



DATE:	September 27, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	S. Anderson



Tasman, Inc.  
6855 W. 119<sup>th</sup> Ave.  
Broomfield, CO 80020


PDC Energy, Inc. – DJ Basin  
Former LH Miller Unit 1 Tank Battery  
NWNW, Section 25, Township 4 North, Range 66 West  
Weld County, Colorado

GROUNDWATER  
ANALYTICAL RESULTS  
MAP  
(INORGANIC PARAMETERS)

FIGURE  
1



DATE:	September 27, 2022
DESIGNED BY:	C. Hamlin
DRAWN BY:	J. Clonts



**Tasman, Inc.**  
6855 W. 119<sup>th</sup> Ave.  
Broomfield, CO 80020

**PDC Energy, Inc. – DJ Basin**  
**Former LH Miller Unit 1 Tank Battery**  
NWNW, Section 25, Township 4 North, Range 66 West  
Weld County, Colorado

**GROUNDWATER  
ELEVATION CONTOUR  
MAP (08/08/2022)**

**FIGURE  
2**

**TABLE 1**  
**FORMER LH MILLER UNIT 1 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) <sup>(1)</sup></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>	<b>-</b>	<b>-</b>
BH01	5/27/2021	1,020	120	122	4.17	4742.29
BH01	8/26/2021	1,020	159	286	1.51	4744.95
BH01	11/17/2021	1,140	228	340	3.26	4743.20
BH01	2/28/2022	1,060	197	191	3.91	4742.55
BH01	5/13/2022	1,240	233	235	4.13	4742.33
BH01	8/8/2022	1,080	220	<b>376</b>	2.59	4743.87
BH02	8/26/2021	1,020	163	241	1.00	4744.51
BH02	11/17/2021	974	217	242	2.61	4742.90
BH02	2/28/2022	938	175	189	3.29	4742.22
BH02	5/13/2022	1,010	190	173	3.42	4742.09
BH02	8/8/2022	1,470	313	444	2.00	4743.51
BH03	5/27/2021	957	112	118	3.72	4741.58
BH03	8/26/2021	933	155	246	1.03	4744.27
BH03	11/17/2021	1070	239	<b>332</b>	2.79	4742.51
BH03	2/28/2022	984	158	146	3.49	4741.81
BH03	5/13/2022	1,130	209	197	3.64	4741.66
BH03	8/8/2022	1,050	194	<b>316</b>	2.13	4743.17
BH04	5/27/2021	1,090	134	147	4.69	4741.90
BH04	8/26/2021	1,060	182	<b>316</b>	1.84	4744.75
BH04	11/17/2021	1,170	<b>293</b>	<b>392</b>	3.74	4742.85
BH04	2/28/2022	1,100	208	231	4.49	4742.10
BH04	5/13/2022	1,260	230	221	4.61	4741.98
BH04	8/8/2022	1,170	243	396	3.01	4743.58
BH05	5/27/2021	<b>1,310</b>	<b>251</b>	<b>1,090</b>	4.14	4741.74
BH05	8/26/2021	<b>1,970</b>	<b>299</b>	<b>1,240</b>	1.98	4743.90
BH05	11/17/2021	<b>1,990</b>	<b>413</b>	<b>1,370</b>	3.00	4742.88
BH05	2/28/2022	<b>1,400</b>	233	<b>590</b>	3.70	4742.18
BH05	5/13/2022	<b>1,730</b>	<b>263</b>	<b>604</b>	3.82	4742.06
BH05	8/8/2022	<b>1,640</b>	<b>289</b>	<b>790</b>	2.89	4742.99

**TABLE 1**  
**FORMER LH MILLER UNIT 1 TANK BATTERY**  
**GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE**  
**INORGANIC PARAMETERS**

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<b>COGCC Table 915-1 Groundwater Standard (mg/L) <sup>(1)</sup></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>	-	-

**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

  = Cross-gradient well locations used for background concentration.

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

**BOLD** = Analytical result is in exceedance of applicable standard.

## Attachment A

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

August 15, 2022

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: LH Miller Unit 1

Work Order #2208110

Enclosed are the results of analyses for samples received by Summit Scientific on 08/08/22 17:43. 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: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

#### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2208110-01	Water	08/08/22 12:12	08/08/22 17:43
BH02	2208110-02	Water	08/08/22 12:05	08/08/22 17:43
BH03	2208110-03	Water	08/08/22 12:24	08/08/22 17:43
BH04	2208110-04	Water	08/08/22 12:32	08/08/22 17:43
BH05	2208110-05	Water	08/08/22 12:36	08/08/22 17:43

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

2208110

4653 Table Mountain Drive ♦ Golden, Colorado 80403

303-277-9310

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: LH Miller Unit 2  
 Sampler Name: David Vigil, Aaron Otillar 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	TPH - (C6 - C36)	pH, EC, SAR	Boron - HWS	TMBs (1,2,4)&(1,3,5)	PAH - 915	Metals - 915	
1	BH01	8/8/22	1212	1			X		X											pH, EC, SAR by saturated paste
2	BH02		1205	1			X		X											
3	BH03		1224	1			X		X											
4	BH04		1253	1			X		X											
5	BH05		1236	1			X		X											
6																				
7																				
8																				
9																				
10																				

Relinquished by: <u>David Vigil</u>	Date/Time: <u>8/8/22 1500</u>	Received by: <u>Tasman's Lock Box</u>	Date/Time: <u>8/8/22 1500</u>	Turn Around Time (Check) Same Day <input type="checkbox"/> 72 hours 24 hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 hours <input type="checkbox"/>	Notes:
Relinquished by: <u>Tasman's Lock Box</u>	Date/Time: <u>8/8/22 1743</u>	Received by: <u>[Signature]</u>	Date/Time: <u>8/8/22 1743</u>	Sample Integrity: Temperature Upon Receipt: <u>5.8</u> Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Relinquished by:	Date/Time:	Received by:	Date/Time:		

S<sub>2</sub>

2208110

## Sample Receipt Checklist

S2 Work Order#

Client: pac fushman Client Project ID: LH miller unit 1

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

	-			
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Matrix (Check all that apply) Air ☐ Soil/Solid ☐ Water ☒ Other ☐Temp (°C) 5.8Thermometer # 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.	-			on ice
Were all samples received intact <sup>(1)</sup> ?	-			
Was adequate sample volume provided <sup>(1)</sup> ?	-			
If custody seals are present, are they intact <sup>(1)</sup> ?	-			
Are samples due within 48 hours present?		-		
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			-	
Is a chain-of-custody (COC) form present and filled out completely <sup>(1)</sup> ?	-			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	-			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	-			
Is the COC properly relinquished by the client w/ date and time recorded <sup>(1)</sup> ?	-			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		-		
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.			-	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? Record the pH in Comments.			-	
If dissolved metals are requested, were samples field filtered?			-	
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

8822  
 Date/Time



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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**BH01**  
**2208110-01 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

Date Sampled: **08/08/22 12:12**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Chloride	<b>220</b>	12.0	mg/L	200	BFH0274	08/12/22	08/12/22	EPA 300.0	
Sulfate	<b>376</b>	60.0	"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **08/08/22 12:12**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Total Dissolved Solids	<b>1080</b>	10.0	mg/L	1	BFH0197	08/09/22	08/09/22	SM2540C	

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**BH02**  
**2208110-02 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

Date Sampled: **08/08/22 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	<b>313</b>	12.0		mg/L	200	BFH0274	08/12/22	08/12/22	EPA 300.0	
Sulfate	<b>444</b>	60.0		"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **08/08/22 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	<b>1470</b>	10.0		mg/L	1	BFH0197	08/09/22	08/09/22	SM2540C	

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**BH03**  
**2208110-03 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

Date Sampled: **08/08/22 12:24**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	<b>194</b>	12.0		mg/L	200	BFH0274	08/12/22	08/12/22	EPA 300.0	
Sulfate	<b>316</b>	60.0		"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **08/08/22 12:24**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	<b>1050</b>	10.0		mg/L	1	BFH0197	08/09/22	08/09/22	SM2540C	

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**BH04**  
**2208110-04 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

Date Sampled: **08/08/22 12:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	<b>243</b>	12.0		mg/L	200	BFH0274	08/12/22	08/12/22	EPA 300.0	
Sulfate	<b>396</b>	60.0		"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **08/08/22 12:32**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	<b>1170</b>	10.0		mg/L	1	BFH0197	08/09/22	08/09/22	SM2540C	

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**BH05**  
**2208110-05 (Water)**

**Summit Scientific**

**Anions by EPA Method 300.0**

Date Sampled: **08/08/22 12:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	<b>289</b>	12.0		mg/L	200	BFH0274	08/12/22	08/12/22	EPA 300.0	
Sulfate	<b>790</b>	60.0		"	"	"	"	"	"	

**Total Dissolved Solids by SM2540C**

Date Sampled: **08/08/22 12:36**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	<b>1640</b>	10.0		mg/L	1	BFH0197	08/09/22	08/09/22	SM2540C	

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

### 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 BFH0274 - General Preparation

##### Blank (BFH0274-BLK1)

Prepared & Analyzed: 08/12/22

Chloride	ND	0.0600	mg/L
Sulfate	ND	0.300	"

##### LCS (BFH0274-BS1)

Prepared & Analyzed: 08/12/22

Chloride	3.10	0.0600	mg/L	3.00	103	90-110
Sulfate	16.3	0.300	"	15.0	108	90-110

##### Duplicate (BFH0274-DUP1)

Source: 2208109-01

Prepared & Analyzed: 08/12/22

Chloride	199	12.0	mg/L	194	2.65	20
Sulfate	288	60.0	"	282	2.17	20

##### Matrix Spike (BFH0274-MS1)

Source: 2208109-01

Prepared & Analyzed: 08/12/22

Chloride	847	12.0	mg/L	600	194	109	80-120
Sulfate	3700	60.0	"	3000	282	114	80-120

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

**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 BFH0197 - General Preparation**

**Blank (BFH0197-BLK1)**

Prepared & Analyzed: 08/09/22

Total Dissolved Solids ND 10.0 mg/L

**Duplicate (BFH0197-DUP1)**

Source: 2208021-01

Prepared & Analyzed: 08/09/22

Total Dissolved Solids 1370 10.0 mg/L 1270 7.35 20

Summit Scientific

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

Project: LH Miller Unit 1  
Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
08/15/22 14:03

### 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