



PDC Energy, Inc.
First Quarter 2023 Groundwater Monitoring Summary

February 15, 2023

Former Von Feldt 13-12 Wellhead
SWSW Section 12 T6N R65W
Remediation # 19634

This groundwater monitoring summary has been prepared by Tasman, Inc. for the former Von Feldt 13-12 Wellhead.

Site History and Background

On September 2, 2021, a historic hydrocarbon release was discovered at the former wellhead during wellhead decommissioning activities. Following the discovery, mitigation activities were initiated and approximately 8 cubic yards of impacted material were removed from the former excavation. During excavation activities, groundwater was encountered within the excavation at approximately 6 feet below ground surface (bgs). On January 21, 2022, five monitoring wells (BH01 – BH05) were installed to confirm the absence of dissolved-phase hydrocarbon impacts within and adjacent to the former excavation extent. Per the approved Supplemental Form 27 (Document No. 403210939), benzene, toluene, ethylbenzene, total xylenes (BTEX), naphthalene, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB were removed from the quarterly sampling and analysis plan following the fourth quarter 2022.

Groundwater Monitoring Activities

On January 9, 2023, groundwater monitoring was conducted at all five monitoring wells (BH01 – BH05). Five (5) 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.

First quarter 2023 analytical results indicated that inorganic parameters were in compliance with the applicable COGCC Table 915-1 regulatory standards or within 1.25x the background concentrations of the up- and cross-gradient monitoring wells (BH02 and BH04) in all monitoring well locations.

In addition, sulfate and chloride anion concentration trends were examined over time and compared to historic background data and groundwater flow direction. Based on the results, historic anion concentrations in all monitoring wells were below the 125% threshold of the historic maximum background concentration recorded during the third quarter of 2022. Furthermore, a correlation could not be made between groundwater elevation and inorganic concentrations and the inorganic concentrations were highly variable over time. The graphs illustrating the data are included as Attachment A. Sample locations and corresponding analytical results are illustrated on Figure 1. Groundwater

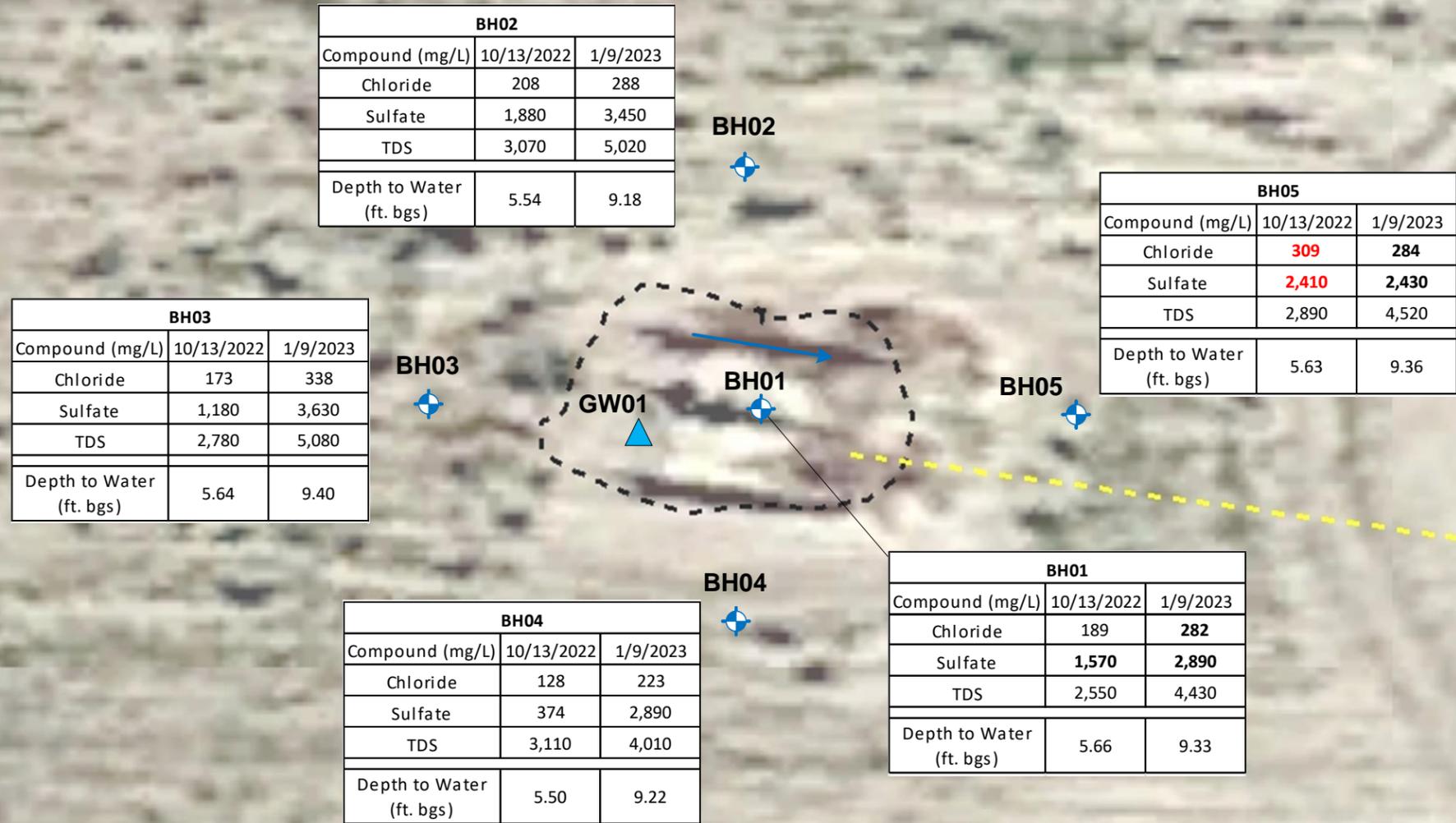


elevation data is illustrated on Figure 2. Groundwater analytical results are summarized in Table 1. The laboratory analytical report is included as Attachment B.

Current Remediation Activities and Path Forward

Monitored natural attenuation (MNA) was selected as the remediation strategy for this site during the first quarter 2022 and will remain the selected remediation strategy through the second quarter 2023.

Second quarter 2023 groundwater sampling will be conducted in April 2023.



Legend

- Underground Flowline Location (Collected via Trimble GPS)
- - - Excavation Extent (Collected via Trimble GPS)
- ▲ Groundwater Sample Location
- ⊕ Monitoring Well Location (Collected via Trimble GPS)
- Groundwater Flow Direction (1Q23)

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

Black bold text denotes an exceedance of COGCC regulatory standards, but within 1.25x background concentration

Red text denotes an exceedance of COGCC regulatory standards

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

DATE: February 15, 2023

DESIGNED BY: C. Hamlin

DRAWN BY: S. Anderson

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

PDC Energy, Inc. – DJ Basin
Former Von Feldt 13-12 Wellhead
SWSW, Section 12, Township 6 North, Range 65 West
Weld County, Colorado

GROUNDWATER ANALYTICAL RESULTS MAP (INORGANIC PARAMETERS)

FIGURE 1



DATE: February 14, 2023

DESIGNED BY: C. Hamlin

DRAWN BY: M. Kaczmarek



TASMAN

Tasman, Inc.
6855 West 119th Avenue
Broomfield, CO 80020

PDC Energy, Inc. – DJ Basin
Former Von Feldt #13-12 Wellhead
SWSW, Section 12, Township 6 North, Range 65 West
Weld County, Colorado

**GROUNDWATER
ELEVATION CONTOUR
MAP (01/09/2023)**

**FIGURE
2**

TABLE 1
FORMER VON FELDT 13-12 WELLHEAD
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	1/28/2022	3,410	173	1,750	9.77	4708.82
BH01	4/8/2022	Not Sampled - Dry			DRY	DRY
BH01	7/5/2022	1,740	176	1,080	3.04	4715.72
BH01	10/13/2022	2,550	189	1,570	5.66	4713.10
BH01	1/9/2023	4,430	282	2,890	9.33	4709.43
BH02	1/28/2022	4,530	244	2,300	9.51	4708.70
BH02	4/8/2022	Not Sampled - Insufficient Water Column			10.26	4707.95
BH02	7/5/2022	4,160	277	3,730	2.93	4715.70
BH02	10/13/2022	3,070	208	1,880	5.54	4713.09
BH02	1/9/2023	5,020	288	3,450	9.18	4709.45
BH03	1/28/2022	3,740	188	1,830	9.69	4708.87
BH03	4/8/2022	3,660	266	3,060	NA	NA
BH03	7/5/2022	3,160	215	2,850	3.03	4715.77
BH03	10/13/2022	2,780	173	1,180	5.64	4713.16
BH03	1/9/2023	5,080	338	3,630	9.40	4709.40
BH04	1/28/2022	3,030	113	1,450	9.56	4708.79
BH04	4/8/2022	2,960	155	2,450	10.52	4707.83
BH04	7/5/2022	4,480	368	4,070	2.90	4715.73
BH04	10/13/2022	3,110	128	374	5.50	4713.13
BH04	1/9/2023	4,010	223	2,890	9.22	4709.41
BH05	1/28/2022	2,910	126	1,280	9.74	4708.70
BH05	4/8/2022	Not Sampled - Insufficient Water Column			10.53	4707.91
BH05	7/5/2022	3,320	264	3,010	3.04	4715.62
BH05	10/13/2022	2,890	309	2,410	5.63	4713.03
BH05	1/9/2023	4,520	284	2,430	9.36	4709.30

TABLE 1
FORMER VON FELDT 13-12 WELLHEAD
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	-	-

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

ft. = Feet

AMSL = Above Mean Sea Level

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

 = Historic up- / cross-gradient monitoring well location used for background concentration.

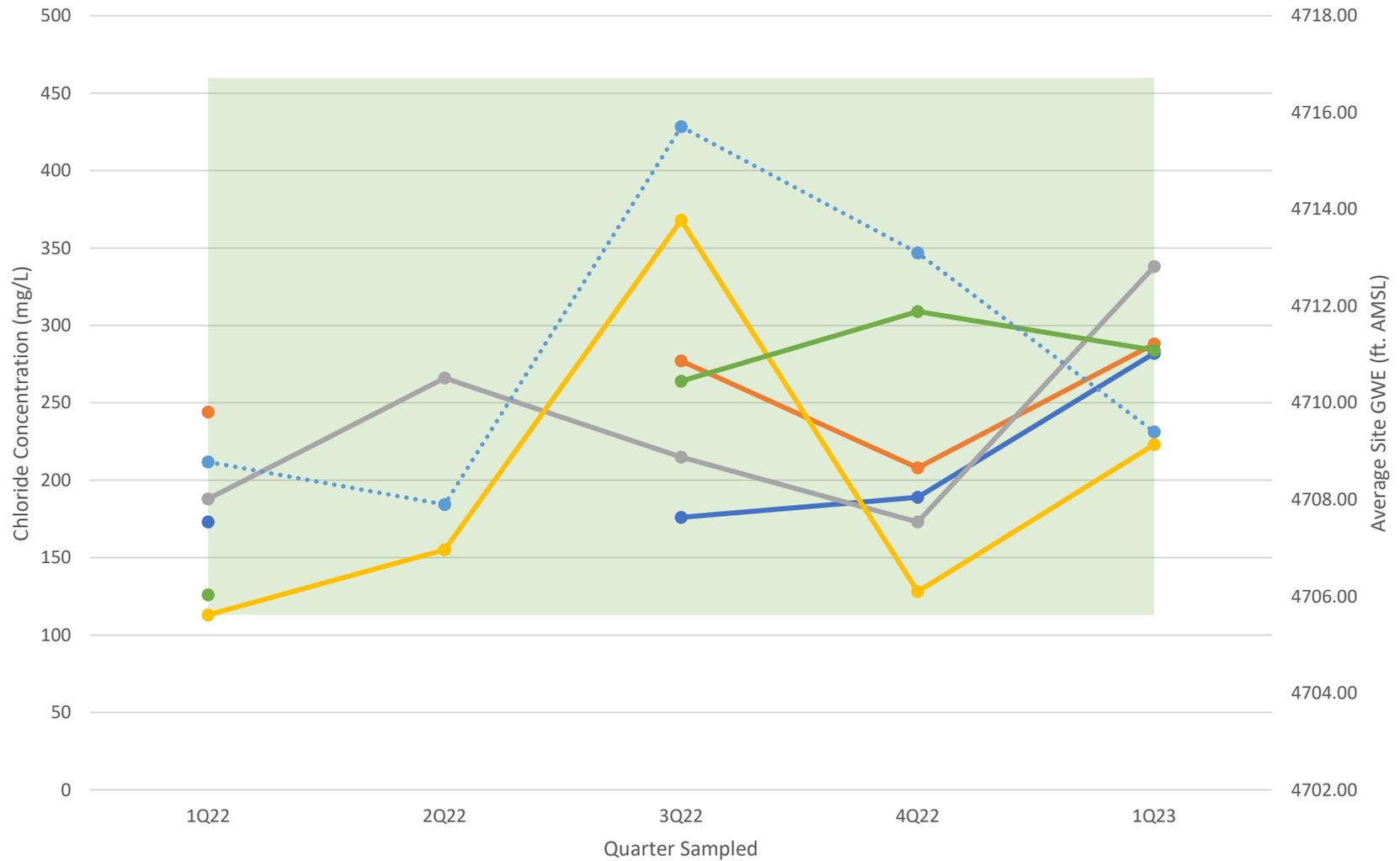
 = Up- / cross-gradient well location used for background concentration.

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

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

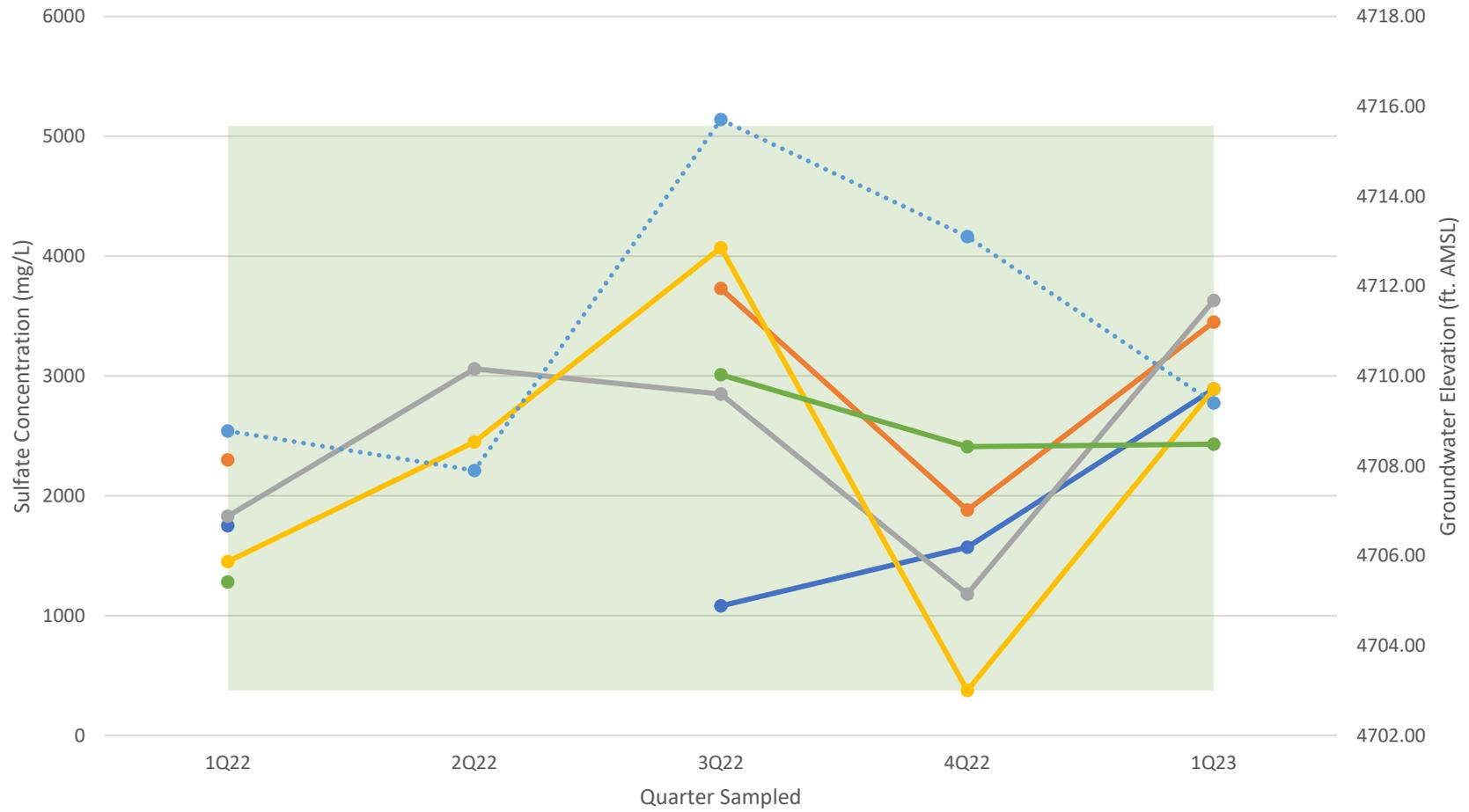
Attachment A

Former Von Feldt 13-12 Wellhead Chloride Concentration vs Historic Background



Historic 1.25x Max and Min BCKG Concentration
 BH01
 BH02
 BH03
 BH04
 BH05
 Average Site GWE

Former Von Feldt 13-12 Wellhead Sulfate Concentration vs Historic Background



Historic 1.25x Max and Min BCKG Concentration BH01 BH02 BH03 BH04 BH05 Average Site GWE

Attachment B

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

January 16, 2023

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Von Feldt 13-12 Wellhead

Work Order #2301144

Enclosed are the results of analyses for samples received by Summit Scientific on 01/09/23 18:24. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Scott Sheely For Paul Shrewsbury
President



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

Project: Von Feldt 13-12 Wellhead

Project Number: [none]

Project Manager: Mark Longhurst

Reported:
01/16/23 11:16

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	2301144-01	Water	01/09/23 13:06	01/09/23 18:24
BH02	2301144-02	Water	01/09/23 12:40	01/09/23 18:24
BH03	2301144-03	Water	01/09/23 12:48	01/09/23 18:24
BH04	2301144-04	Water	01/09/23 12:07	01/09/23 18:24
BH05	2301144-05	Water	01/09/23 12:57	01/09/23 18:24

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.

S₂

S2 Work Order# 2301144

Sample Receipt Checklist

Client: ADC/rosmann Client Project ID: Von fecht 13-12 wellhead

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

Matrix (Check all that apply) Air Soil/Solid Water Other

Temp (°C) 6.2 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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>on ICE</u>
If custody seals are present, are they intact? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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 ²⁺), Hexavalent Chromium (Cr ⁶⁺ , 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? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC? ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2? ⁽¹⁾ 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):

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

[Signature]
Custodian Printed Name

1-9-23 1824
Date/Time



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

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

BH01
2301144-01 (Water)

Summit Scientific

Anions by EPA Method 300.0

Date Sampled: **01/09/23 13:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chloride	282	12.0	mg/L	200	BGA0317	01/13/23	01/13/23	EPA 300.0	
Sulfate	2890	60.0	"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **01/09/23 13:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Total Dissolved Solids	4430	10.0	mg/L	1	BGA0191	01/10/23	01/10/23	SM2540C	

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Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

BH02
2301144-02 (Water)

Summit Scientific

Anions by EPA Method 300.0

Date Sampled: **01/09/23 12:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chloride	288	12.0	mg/L	200	BGA0317	01/13/23	01/13/23	EPA 300.0	
Sulfate	3450	60.0	"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **01/09/23 12:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Total Dissolved Solids	5020	10.0	mg/L	1	BGA0191	01/10/23	01/10/23	SM2540C	

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

BH03
2301144-03 (Water)

Summit Scientific

Anions by EPA Method 300.0

Date Sampled: **01/09/23 12:48**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	338	12.0		mg/L	200	BGA0317	01/13/23	01/13/23	EPA 300.0	
Sulfate	3630	60.0		"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **01/09/23 12:48**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	5080	10.0		mg/L	1	BGA0191	01/10/23	01/10/23	SM2540C	

Summit Scientific

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

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

BH04
2301144-04 (Water)

Summit Scientific

Anions by EPA Method 300.0

Date Sampled: **01/09/23 12:07**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	223	12.0		mg/L	200	BGA0317	01/13/23	01/13/23	EPA 300.0	
Sulfate	2890	60.0		"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **01/09/23 12:07**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	4010	10.0		mg/L	1	BGA0191	01/10/23	01/10/23	SM2540C	

Summit Scientific

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 1775 Sherman St. STE. 3000
 Denver CO, 80203

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

BH05
2301144-05 (Water)

Summit Scientific

Anions by EPA Method 300.0

Date Sampled: **01/09/23 12:57**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Chloride	284	12.0		mg/L	200	BGA0317	01/13/23	01/13/23	EPA 300.0	
Sulfate	2430	60.0		"	"	"	"	"	"	

Total Dissolved Solids by SM2540C

Date Sampled: **01/09/23 12:57**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Total Dissolved Solids	4520	10.0		mg/L	1	BGA0191	01/10/23	01/10/23	SM2540C	

Summit Scientific

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

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

Anions by EPA Method 300.0 - Quality Control

Summit Scientific

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

Batch BGA0317 - General Preparation

Blank (BGA0317-BLK1)

Prepared & Analyzed: 01/13/23

Chloride	ND	0.0600	mg/L						
Sulfate	ND	0.300	"						

LCS (BGA0317-BS1)

Prepared & Analyzed: 01/13/23

Chloride	2.86	0.0600	mg/L	3.00	95.4	90-110		
Sulfate	14.6	0.300	"	15.0	97.3	90-110		

Duplicate (BGA0317-DUP1)

Source: 2301144-01

Prepared & Analyzed: 01/13/23

Chloride	298	12.0	mg/L	282			5.38	20
Sulfate	2980	60.0	"	2890			3.09	20

Matrix Spike (BGA0317-MS1)

Source: 2301144-01

Prepared & Analyzed: 01/13/23

Chloride	866	12.0	mg/L	600	282	97.2	80-120	
Sulfate	6140	60.0	"	3000	2890	108	80-120	

Summit Scientific

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Project: Von Feldt 13-12 Wellhead

Project Number: [none]
 Project Manager: Mark Longhurst

Reported:
 01/16/23 11:16

Total Dissolved Solids by SM2540C - Quality Control

Summit Scientific

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

Batch BGA0191 - General Preparation

Blank (BGA0191-BLK1)

Prepared & Analyzed: 01/10/23

Total Dissolved Solids ND 10.0 mg/L

Duplicate (BGA0191-DUP1)

Source: 2301138-01

Prepared & Analyzed: 01/10/23

Total Dissolved Solids 1630 10.0 mg/L 1620 0.492 20

Summit Scientific

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

Project: Von Feldt 13-12 Wellhead

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
01/16/23 11:16

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