

**TABLE 1**  
**HOWARD 14-18 WELLHEAD AND TANK BATTERY COMBINED**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**  
**ORGANIC COMPOUNDS**

Sample ID	Date Sampled	Depth	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	1, 2, 4-TMB (mg/kg)	1, 3, 5-TMB (mg/kg)	Naphthalene (mg/kg)	TPH <sup>(4)</sup> (mg/kg)
<b>Residential SSL<sup>(1,2)</sup></b>			<b>1.2</b>	<b>490</b>	<b>5.8</b>	<b>58</b>	<b>30</b>	<b>27</b>	<b>2</b>	<b>500</b>
<b>Protection of Groundwater SSL<sup>(1,2,3)</sup></b>			<b>0.0026</b>	<b>0.69</b>	<b>0.78</b>	<b>9.9</b>	<b>0.0081</b>	<b>0.0087</b>	<b>0.0038</b>	<b>500</b>
WH01-B @ 8'	3/15/2023	8 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
WH01-N @ 4'	3/15/2023	4 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
PWV01-B @ 4'	3/15/2023	4 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
PWV01-N @ 2.5'	3/15/2023	2.5 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
SEP01-FL @ 4'	3/15/2023	4 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
SEP01-DL @ 4'	3/15/2023	4 ft. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50
AST01 @ 0-6"	3/15/2023	0-6 in. bgs	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0038	<50

**Notes:**

1. Compounds referenced from the COGCC 2 CCR 404-1, Table 915-1, effective January 15, 2021.
2. Soil Screening Levels (SSL) referenced from EPA Regional Screening Levels (EPA RSLs) for Chemical Contaminants at Superfund Sites, effective November 2020.
3. SSLs are applicable if a pathway for communication with groundwater is present.
4. Value calculated by adding TVPH-GRO, TEPH-DRO, and TEPH-ORO concentrations.

COGCC = Colorado Oil and Gas Conservation Commission

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

TVPH-GRO = Total volatile petroleum hydrocarbons - gasoline range organics

TEPH-DRO = Total extractable petroleum hydrocarbons - diesel range organics

TEPH-ORO = Total extractable petroleum hydrocarbons - oil range organics

mg/kg = Milligrams per kilogram

TMB = Trimethylbenzene

ft. = Feet

in. = Inches

bgs = Below ground surface

**TABLE 2**  
**HOWARD 14-18 WELLHEAD AND TANK BATTERY COMBINED**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**  
**INORGANIC COMPOUNDS**

Sample ID	Date Sampled	Depth	pH (units)	EC (mmhos/cm)	SAR (units)	Boron (mg/L)
<b>Soil Suitability for Reclamation Standard <sup>(1)</sup></b>			<b>6-8.3</b>	<b>&lt;4</b>	<b>&lt;6</b>	<b>2</b>
WH01-B @ 8'	3/15/2023	8 ft. bgs	8.06	0.314	0.910	0.0789
WH01-N @ 4'	3/15/2023	4 ft. bgs	7.71	0.482	1.12	0.126
WH01-N @ 2.5'	3/15/2023	2.5 ft. bgs	7.71	0.0797	0.362	0.0206
PWV01-B @ 4'	3/15/2023	4 ft. bgs	7.96	0.160	0.285	0.0500
PWV01-N @ 2.5'	3/15/2023	2.5 ft. bgs	7.65	0.154	0.176	0.0321

**Notes:**

1. Compounds referenced from the COGCC 2 CCR 404-1, Table 915-1, effective January 15, 2021.

COGCC = Colorado Oil and Gas Conservation Commission

EC = Electrical conductivity

SAR = Sodium adsorption ratio

mmhos/cm = millimhos per centimeter

mg/L = milligram per liter

ft. = Feet

bgs = Below ground surface

**TABLE 3**  
**HOWARD 14-18 WELLHEAD AND TANK BATTERY COMBINED**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**  
**ORGANIC COMPOUNDS - PAHs**

Sample ID	Date Sampled	Depth	Acenaphthene (mg/kg)	Anthracene (mg/kg)	Benz(a) (mg/kg)	Benzo(a) (mg/kg)	Benzo(b) (mg/kg)	Benzo(k) (mg/kg)	Chrysene (mg/kg)	A,H (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	1,2,3-CD (mg/kg)	Pyrene (mg/kg)	1-M (mg/kg)	2-M (mg/kg)
<b>Residential SSL <sup>(1,2)</sup></b>			<b>360</b>	<b>1,800</b>	<b>1.1</b>	<b>0.11</b>	<b>1.1</b>	<b>11</b>	<b>110</b>	<b>0.11</b>	<b>240</b>	<b>240</b>	<b>1.1</b>	<b>180</b>	<b>18</b>	<b>24</b>
<b>Protection of Groundwater SSL <sup>(1,2,3)</sup></b>			<b>0.55</b>	<b>5.8</b>	<b>0.011</b>	<b>0.24</b>	<b>0.3</b>	<b>2.9</b>	<b>9</b>	<b>0.096</b>	<b>8.9</b>	<b>0.54</b>	<b>0.98</b>	<b>1.3</b>	<b>0.006</b>	<b>0.019</b>
WH01-B @ 8'	3/15/2023	8 ft. bgs	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	0.00783	<0.00500	<0.00500	0.00616	<0.00500	<0.00500
WH01-N @ 4'	3/15/2023	4 ft. bgs	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500

**Notes:**

1. Compounds referenced from the COGCC 2 CCR 404-1, Table 915-1, effective January 15, 2021.
2. Soil Screening Levels (SSL) referenced from EPA Regional Screening Levels (EPA RSLs) for Chemical Contaminants at Superfund Sites, effective November 2020.
3. SSLs are applicable if a pathway for communication with groundwater is present.

COGCC = Colorado Oil and Gas Conservation Commission

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

PAHs = Polycyclic aromatic hydrocarbons

Benzo(a) = Benzoanthracene

Benzo(a) = Benzopyrene

Benzo(b) = Benzofluoranthene

Benzo(k) = Benzofluoranthene

A,H = Dibenzoanthracene

1,2,3-CD = Indenopyrene

M = Methylnaphthalene

mg/kg = Milligrams per kilogram

ft. = Feet

in. = Inches

bgs = Below ground surface

**TABLE 4**  
**HOWARD 14-18 WELLHEAD AND TANK BATTERY COMBINED**  
**SOIL ANALYTICAL RESULTS SUMMARY TABLE**  
**METALS**

Sample ID	Date Sampled	Depth	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (VI) (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
<b>Residential SSL <sup>(1,2)</sup></b>			<b>0.68</b>	<b>15,000</b>	<b>71</b>	<b>0.3</b>	<b>3,100</b>	<b>400</b>	<b>1,500</b>	<b>390</b>	<b>390</b>	<b>23,000</b>
<b>Protection of Groundwater SSL <sup>(1,2,3)</sup></b>			<b>0.29</b>	<b>82</b>	<b>0.38</b>	<b>0.00067</b>	<b>46</b>	<b>14</b>	<b>26</b>	<b>0.26</b>	<b>0.8</b>	<b>370</b>
WH01-B @ 8'	3/15/2023	8 ft. bgs	<b>0.987</b>	22.0	0.0903	<0.30 <sup>(4)</sup>	2.76	3.30	1.84	<0.175	0.0253	9.06
WH01-N @ 4'	3/15/2023	4 ft. bgs	<b>2.64</b>	57.3	0.297	<0.30 <sup>(4)</sup>	7.16	10.9	3.61	<0.175	0.0874	23.4
WH01-S @ 4'	3/15/2023	4 ft. bgs	<b>2.26</b>	NA	NA	NA	NA	NA	NA	NA	NA	NA
BKG01 @ 2.5'	3/15/2023	2.5 ft. bgs	<b>0.600</b>	45.4	0.114	<0.30 <sup>(4)</sup>	1.97	1.75	2.53	<0.175	0.0191	6.39
BKG01 @ 4'	3/15/2023	4 ft. bgs	<b>0.976</b>	44.2	0.0817	<0.30 <sup>(4)</sup>	1.48	1.76	1.46	<0.175	0.00691	5.59
BKG01 @ 8'	3/15/2023	8 ft. bgs	<b>0.709</b>	37.9	0.0682	<0.30 <sup>(4)</sup>	1.48	1.47	1.26	<0.175	0.00694	4.81
<b>Mean Background Concentration <sup>(5)</sup></b>			<b>0.762</b>	<b>42.5</b>	<b>0.0880</b>	<b>0.30</b>	<b>1.64</b>	<b>1.66</b>	<b>1.75</b>	<b>0.175</b>	<b>0.01098</b>	<b>5.60</b>

**Notes:**

1. Compounds referenced from the COGCC 2 CCR 404-1, Table 915-1, effective January 15, 2021.
2. Soil Screening Levels (SSL) referenced from EPA Regional Screening Levels (EPA RSLs) for Chemical Contaminants at Superfund Sites, effective November 2020.
3. SSLs are applicable if a pathway for communication with groundwater is present.
4. Compound falls within COGCC Table 915-1 Footnote 9.
5. Non-detect background results accounted for in the mean background concentration by using the detection limit, where applicable.

COGCC = Colorado Oil and Gas Conservation Commission

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

mg/kg = Milligrams per kilogram

ft. = Feet

in. = Inches

NA = Constituent not analyzed

bgs = Below ground surface

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

Metals evaluation:

Arsenic:

Concentration used to evaluate arsenic Protection of Groundwater SSL exceedances is 1.25 times the average arsenic background concentration (0.762 mg/kg x 1.25 = 0.952 mg/kg).

**TABLE 5**  
**HOWARD 14-18 WELLHEAD AND TANK BATTERY COMBINED**  
**FIELD DATA SUMMARY TABLE**

Sample ID	Date Sampled	Depth	GPS Data <sup>(1)</sup>		PDOP Value	VOC Concentration <sup>(2)</sup> (ppm)
			Latitude	Longitude		
WH01-B @ 8'	3/15/2023	8 ft. bgs	40.393496	-104.600117	NC	8.6
WH01-N @ 4'	3/15/2023	4 ft. bgs	40.393519	-104.600121	1.1	4.2
WH01-W @ 4'	3/15/2023	4 ft. bgs	40.393490	-104.600150	0.9	0.1
WH01-S @ 4'	3/15/2023	4 ft. bgs	40.393478	-104.600119	1.0	0.6
WH01-E @ 4'	3/15/2023	4 ft. bgs	40.393497	-104.600098	1.0	0.1
WH01-N @ 2.5'	3/15/2023	2.5 ft. bgs	40.393519	-104.600121	1.1	1.9
WHS01-N @ 0-6"	3/15/2023	0-6 in. bgs	40.393581	-104.600084	0.9	0.1
WHS01-W @ 0-6"	3/15/2023	0-6 in. bgs	40.393482	-104.600182	0.9	0.4
WHS01-S @ 0-6"	3/15/2023	0-6 in. bgs	40.393448	-104.600171	1.0	0.9
WHS01-E @ 0-6"	3/15/2023	0-6 in. bgs	40.393477	-104.600037	0.9	0.1
AST01 @ 0-6"	3/15/2023	0-6 in. bgs	40.393594	-104.600560	1.0	0.7
MH01 @ 0-6"	3/15/2023	0-6 in. bgs	40.393315	-104.600549	0.9	0.2
PWV01-B @ 4'	3/15/2023	4 ft. bgs	40.393548	-104.600533	1.0	0.4
PWV01-N @ 2.5'	3/15/2023	2.5 ft. bgs	40.393561	-104.600534	1.0	0.3
PWV01-W @ 2.5'	3/15/2023	2.5 ft. bgs	40.393537	-104.600558	1.0	0.3
PWV01-S @ 2.5'	3/15/2023	2.5 ft. bgs	40.393525	-104.600542	1.0	0.1
PWV01-E @ 2.5'	3/15/2023	2.5 ft. bgs	40.393539	-104.600510	1.0	0.2
WDL01 @ 3'	3/15/2023	3 ft. bgs	40.393560	-104.600536	1.0	0.2
SEP01-FL @ 4'	3/15/2023	4 ft. bgs	40.393322	-104.600496	1.0	0.4
SEP01-DL @ 4'	3/15/2023	4 ft. bgs	40.393367	-104.600527	1.0	0.1
BKG01 @ 2.5'	3/15/2023	2.5 ft. bgs	40.393758	-104.600271	0.9	0.0
BKG01 @ 4'	3/15/2023	4 ft. bgs	40.393758	-104.600271	0.9	0.1
BKG01 @ 8'	3/15/2023	8 ft. bgs	40.393758	-104.600271	0.9	0.1

**Notes:**

1. Global Positioning System (GPS) data is provided in decimal degrees using World Geodetic System (WGS) 84 UTM Zone 13 North.

2. Volatile organic compound (VOC) concentrations are measured in the field using a photoionization detector (PID).

PDOP = Position Dilution of Precision

ppm = Parts per million

ft. = Feet

in. = Inches

bgs = Below ground surface

NC = Data not collected

# **ATTACHMENT A**

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

March 24, 2023

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Howard 14-18 Tank Battery

Work Order #2303420

Enclosed are the results of analyses for samples received by Summit Scientific on 03/15/23 18:18. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read "Scott Sheely".

Scott Sheely For Paul Shrewsbury

President



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

Project: Howard 14-18 Tank Battery

Project Number: [none]

Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PWV01-B@4'	2303420-01	Soil	03/15/23 11:00	03/15/23 18:18
PWV01-N@2.5'	2303420-02	Soil	03/15/23 11:02	03/15/23 18:18
SEP01-FL@4'	2303420-06	Soil	03/15/23 13:12	03/15/23 18:18
SEP01-DL@4'	2303420-07	Soil	03/15/23 13:15	03/15/23 18:18
AST01@0-6"	2303420-08	Soil	03/15/23 13:23	03/15/23 18:18

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

4653 Table Mountain Drive  
Golden, CO 80403  
303-277-9310

Lab ID	Page 1 of 1
2303420	

Client: PDC / Tasman		Send Data To: Project Manager: Mark Longhurst		Send Invoice To: Company: PDC Energy	
Address: 6855 W 119th Ave		E-Mail: mark.longhurst@PDCE.com		Project Name/Location:	
City/State/Zip: Broomfield / CO / 80220				AFE#:	
Phone: 303-487-1228		Project Name: Howard 14-18 Tank Battery		PO/Billing Codes:	
Sampler Name: David v. Jordan H.		Project Number:		Contact: Mark Longhurst	

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix		Air-Canister #	Other	Analysis Requested							Special Instructions					
					HCl	HNO3	None	Other	Water	Soil			BTEXN - 8260B	TPH - (C6 - C36)	1,2,4 & 1,3,5-TMB	Boron - HWS	pH, EC, SAR	PAH - 915	Metals - 915						
1	PWV01-B @ 4'	3/15/23	1100	2			X			X			X	X	X	X	X								
2	PWV01-N @ 2.5'		1102				X						X	X	X	X	X								
3	PWV01-W @ 2.5'		1104				X						X	X	X	X	X							X	
4	PWV01-S @ 2.5'		1106				X						X	X	X	X	X							X	
5	PWV01-E @ 2.5'		1108				X						X	X	X	X	X							X	
6	SEP01-FL @ 4'		1312										X	X	X										
7	SEP01-DL @ 4'		1315										X	X	X										
8	AST01 @ 0-6"		1323										X	X	X										
9																									
10																									
11																									
12																									
13																									
14																									
15																									

Relinquished by: <i>[Signature]</i>	Date/Time: 3/15/23 1600	Received by: Tasman Lockbox	Date/Time: 3/15/23 1600	TAT Business Days	Field DO	Notes:
				Same Day	Field EC	
Relinquished by: Tasman Lockbox	Date/Time: 3/15/23 1818	Received by: <i>[Signature]</i>	Date/Time: 3/15/23 1818	1 Day	Field ORP	
				2 Days	Field pH	
Relinquished by:	Date/Time:	Received by:	Date/Time:	3 Days	Field Temp.	
				Standard	Field Turb.	
Temperature Upon Receipt: 89	Corrected Temperature: <i>[Symbol]</i>	IR gun #: 1	HNO3 lot #:			

S<sub>2</sub>

Sample Receipt Checklist

S2 Work Order# 2303420

Client: Draftsman Client Project ID: Howard 14-18 Tank Battery

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

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

Temp (°C)  Thermometer #

	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"/>	<u>on ice</u>
If custody seals are present, are they intact? <sup>(1)</sup>	<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 <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? <b>If yes, contact client and note in narrative.</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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 type="checkbox"/>	

Additional Comments (if any):

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

[Signature]  
Custodian Printed Name

3-15-23  
Date/Time



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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**PWV01-B@4'**  
**2303420-01 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	0.0020		mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050		"	"	"	"	"	"	
Ethylbenzene	ND	0.0050		"	"	"	"	"	"	
Xylenes (total)	ND	0.010		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
Naphthalene	ND	0.0038		"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50		"	"	"	"	"	"	

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4	0.0567	142 %		50-150		"	"	"	"	
Surrogate: Toluene-d8	0.0394	98.6 %		50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	0.0411	103 %		50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
C10-C28 (DRO)	ND	50		mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: o-Terphenyl	9.57	76.6 %		30-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

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: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**PWV01-B@4'**  
**2303420-01 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.0500</b>	0.0100	mg/L	1	BGC0653	03/20/23	03/22/23	EPA 6020B	

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Calcium</b>	<b>14.6</b>	0.0516	mg/L dry	1	BGC0628	03/20/23	03/21/23	EPA 6020B	
<b>Magnesium</b>	<b>6.68</b>	0.0516	"	"	"	"	"	"	
<b>Sodium</b>	<b>5.24</b>	0.0516	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Sodium Adsorption Ratio</b>	<b>0.285</b>	0.00100	units	1	BGC0816	03/24/23	03/24/23	Calculation	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>96.9</b>		%	1	BGC0714	03/21/23	03/23/23	Calculation	

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Specific Conductance (EC)</b>	<b>0.160</b>	0.0100	mmhos/cm	1	BGC0665	03/21/23	03/21/23	EPA 120.1	

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]

Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**PWV01-B@4'**  
**2303420-01 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:00**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
<b>pH</b>	<b>7.96</b>		pH Units	1	BGC0666	03/21/23	03/21/23	EPA 9045D	

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**PWV01-N@2.5'**  
**2303420-02 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0020	mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	0.0541	135 %	50-150		"	"	"	"	
Surrogate: Toluene-d8	0.0380	95.0 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	0.0413	103 %	50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl	9.26	74.1 %	30-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**PWV01-N@2.5'**  
**2303420-02 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.0321</b>	0.0100	mg/L	1	BGC0653	03/20/23	03/22/23	EPA 6020B	

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Calcium</b>	<b>12.3</b>	0.0509	mg/L dry	1	BGC0628	03/20/23	03/21/23	EPA 6020B	
<b>Magnesium</b>	<b>6.05</b>	0.0509	"	"	"	"	"	"	
<b>Sodium</b>	<b>3.01</b>	0.0509	"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Sodium Adsorption Ratio</b>	<b>0.176</b>	0.00100	units	1	BGC0816	03/24/23	03/24/23	Calculation	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>98.2</b>		%	1	BGC0714	03/21/23	03/23/23	Calculation	

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Specific Conductance (EC)</b>	<b>0.154</b>	0.0100	mmhos/cm	1	BGC0665	03/21/23	03/21/23	EPA 120.1	

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**PWV01-N@2.5'**  
**2303420-02 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:02**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
<b>pH</b>	<b>7.65</b>		pH Units	1	BGC0666	03/21/23	03/21/23	EPA 9045D	

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**SEP01-FL@4'**  
**2303420-06 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 13:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0020	mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050	"	"	"	"	"	"	
Naphthalene	ND	0.0038	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **03/15/23 13:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4	0.0540	135 %	50-150		"	"	"	"	
Surrogate: Toluene-d8	0.0386	96.4 %	50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	0.0423	106 %	50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 13:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50	"	"	"	"	"	"	

Date Sampled: **03/15/23 13:12**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl	9.29	74.3 %	30-150		"	"	"	"	

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**SEP01-DL@4'**  
**2303420-07 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	0.0020		mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050		"	"	"	"	"	"	
Ethylbenzene	ND	0.0050		"	"	"	"	"	"	
Xylenes (total)	ND	0.010		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
Naphthalene	ND	0.0038		"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50		"	"	"	"	"	"	

Date Sampled: **03/15/23 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4	0.0565	141 %		50-150		"	"	"	"	
Surrogate: Toluene-d8	0.0380	95.1 %		50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	0.0429	107 %		50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
C10-C28 (DRO)	ND	50		mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **03/15/23 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: o-Terphenyl	9.48	75.9 %		30-150		"	"	"	"	

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**AST01@0-6"**  
**2303420-08 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 13:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	0.0020		mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050		"	"	"	"	"	"	
Ethylbenzene	ND	0.0050		"	"	"	"	"	"	
Xylenes (total)	ND	0.010		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
Naphthalene	ND	0.0038		"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50		"	"	"	"	"	"	

Date Sampled: **03/15/23 13:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4	0.0520	130 %		50-150		"	"	"	"	
Surrogate: Toluene-d8	0.0388	97.0 %		50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene	0.0409	102 %		50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 13:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
C10-C28 (DRO)	ND	50		mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **03/15/23 13:23**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: o-Terphenyl	9.58	76.7 %		30-150		"	"	"	"	

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**

**Summit Scientific**

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

**Batch BGC0571 - EPA 5030 Soil MS**

**Blank (BGC0571-BLK1)**

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	ND	0.0020	mg/kg								
Toluene	ND	0.0050	"								
Ethylbenzene	ND	0.0050	"								
Xylenes (total)	ND	0.010	"								
1,2,4-Trimethylbenzene	ND	0.0050	"								
1,3,5-Trimethylbenzene	ND	0.0050	"								
Naphthalene	ND	0.0038	"								
Gasoline Range Hydrocarbons	ND	0.50	"								
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0492		"	0.0400		123	50-150				
<i>Surrogate: Toluene-d8</i>	0.0385		"	0.0400		96.2	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0400		"	0.0400		100	50-150				

**LCS (BGC0571-BS1)**

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	0.0838	0.0020	mg/kg	0.100		83.8	70-130				
Toluene	0.0724	0.0050	"	0.100		72.4	70-130				
Ethylbenzene	0.0908	0.0050	"	0.100		90.8	70-130				
m,p-Xylene	0.186	0.010	"	0.200		92.8	70-130				
o-Xylene	0.0883	0.0050	"	0.100		88.3	70-130				
1,2,4-Trimethylbenzene	0.0841	0.0050	"	0.100		84.1	70-130				
1,3,5-Trimethylbenzene	0.0876	0.0050	"	0.100		87.6	70-130				
Naphthalene	0.0771	0.0038	"	0.100		77.1	70-130				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0433		"	0.0400		108	50-150				
<i>Surrogate: Toluene-d8</i>	0.0365		"	0.0400		91.2	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0416		"	0.0400		104	50-150				

**Matrix Spike (BGC0571-MS1)**

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	0.0798	0.0020	mg/kg	0.100	ND	79.8	70-130				
Toluene	0.0710	0.0050	"	0.100	ND	71.0	70-130				
Ethylbenzene	0.0861	0.0050	"	0.100	ND	86.1	70-130				
m,p-Xylene	0.178	0.010	"	0.200	ND	89.1	70-130				
o-Xylene	0.0884	0.0050	"	0.100	ND	88.4	70-130				
1,2,4-Trimethylbenzene	0.0850	0.0050	"	0.100	ND	85.0	70-130				
1,3,5-Trimethylbenzene	0.0874	0.0050	"	0.100	ND	87.4	70-130				
Naphthalene	0.0805	0.0038	"	0.100	ND	80.5	70-130				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0434		"	0.0400		109	50-150				
<i>Surrogate: Toluene-d8</i>	0.0386		"	0.0400		96.4	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0425		"	0.0400		106	50-150				

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**

**Summit Scientific**

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

**Batch BGC0571 - EPA 5030 Soil MS**

Matrix Spike Dup (BGC0571-MSD1)	Source: 2303418-01			Prepared: 03/18/23 Analyzed: 03/21/23						
Benzene	0.0849	0.0020	mg/kg	0.100	ND	84.9	70-130	6.27	30	
Toluene	0.0770	0.0050	"	0.100	ND	77.0	70-130	8.19	30	
Ethylbenzene	0.0904	0.0050	"	0.100	ND	90.4	70-130	4.86	30	
m,p-Xylene	0.182	0.010	"	0.200	ND	91.1	70-130	2.28	30	
o-Xylene	0.0867	0.0050	"	0.100	ND	86.7	70-130	1.95	30	
1,2,4-Trimethylbenzene	0.0806	0.0050	"	0.100	ND	80.6	70-130	5.43	30	
1,3,5-Trimethylbenzene	0.0865	0.0050	"	0.100	ND	86.5	70-130	1.14	30	
Naphthalene	0.0793	0.0038	"	0.100	ND	79.3	70-130	1.58	30	
Surrogate: 1,2-Dichloroethane-d4	0.0412		"	0.0400		103	50-150			
Surrogate: Toluene-d8	0.0386		"	0.0400		96.6	50-150			
Surrogate: 4-Bromofluorobenzene	0.0403		"	0.0400		101	50-150			

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

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

**Batch BGC0574 - EPA 3550A**

**Blank (BGC0574-BLK1)**

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	ND	50	mg/kg								
C28-C36 (ORO)	ND	50	"								
Surrogate: <i>o</i> -Terphenyl	13.6		"	12.5		109		30-150			

**LCS (BGC0574-BS1)**

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	356	50	mg/kg	500		71.1		70-130			
Surrogate: <i>o</i> -Terphenyl	13.4		"	12.5		107		30-150			

**Matrix Spike (BGC0574-MS1)**

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	375	50	mg/kg	500	9.70	73.0		70-130			
Surrogate: <i>o</i> -Terphenyl	11.1		"	12.5		88.8		30-150			

**Matrix Spike Dup (BGC0574-MSD1)**

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	386	50	mg/kg	500	9.70	75.3		70-130	3.03	20	
Surrogate: <i>o</i> -Terphenyl	10.6		"	12.5		85.1		30-150			

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Total Metals by EPA 6020B Hot Water Soluble Extraction - Quality Control**  
**Summit Scientific**

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

**Batch BGC0653 - EPA 3050B**

**Blank (BGC0653-BLK1)**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron ND 0.0100 mg/L

**LCS (BGC0653-BS1)**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 4.94 0.0100 mg/L 5.00 98.7 80-120

**Duplicate (BGC0653-DUP1)**

Source: 2303414-01

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 0.162 0.0100 mg/L 0.165 1.71 20

**Matrix Spike (BGC0653-MS1)**

Source: 2303414-01

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 5.29 0.0100 mg/L 5.00 0.165 102 75-125

**Matrix Spike Dup (BGC0653-MSD1)**

Source: 2303414-01

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 5.17 0.0100 mg/L 5.00 0.165 100 75-125 2.30 25

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: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction - Quality Control**

**Summit Scientific**

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

**Batch BGC0628 - General Preparation**

**Blank (BGC0628-BLK1)**

Prepared: 03/20/23 Analyzed: 03/21/23

Calcium	ND	0.0500	mg/L wet							
Magnesium	ND	0.0500	"							
Sodium	ND	0.0500	"							

**LCS (BGC0628-BS1)**

Prepared: 03/20/23 Analyzed: 03/21/23

Calcium	5.44	0.0500	mg/L wet	5.00		109	70-130			
Magnesium	5.24	0.0500	"	5.00		105	70-130			
Sodium	4.87	0.0500	"	5.00		97.4	70-130			

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]

Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control**

**Summit Scientific**

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

**Batch BGC0714 - General Preparation**

**Duplicate (BGC0714-DUP1)**

**Source: 2303420-01**

Prepared: 03/21/23 Analyzed: 03/23/23

% Solids	97.4		%		96.9			0.513		20	
----------	------	--	---	--	------	--	--	-------	--	----	--

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction - Quality Control**

**Summit Scientific**

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

**Batch BGC0665 - General Preparation**

**Blank (BGC0665-BLK1)**

Prepared & Analyzed: 03/21/23

Specific Conductance (EC) ND 0.0100 mmhos/cm

**LCS (BGC0665-BS1)**

Prepared & Analyzed: 03/21/23

Specific Conductance (EC) 0.153 0.0100 mmhos/cm 0.150 102 95-105

**Duplicate (BGC0665-DUP1)**

Source: 2303359-01

Prepared & Analyzed: 03/21/23

Specific Conductance (EC) 1.21 0.0100 mmhos/cm 1.22 0.826 20

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 03/24/23 13:17

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction - Quality Control**

**Summit Scientific**

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

**Batch BGC0666 - General Preparation**

**LCS (BGC0666-BS1)**

Prepared & Analyzed: 03/21/23

pH	9.16	pH Units	9.18	99.8	95-105
----	------	----------	------	------	--------

**Duplicate (BGC0666-DUP1)**

Source: 2303359-01

Prepared & Analyzed: 03/21/23

pH	9.33	pH Units	9.33	0.00	20
----	------	----------	------	------	----

Summit Scientific

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

Project: Howard 14-18 Tank Battery

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
03/24/23 13:17

### 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

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80401

303.277.9310

April 03, 2023

Mark Longhurst

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Howard 14-18 Wellhead

Work Order # 2303422

Enclosed are the results of analyses for samples received by Summit Scientific on 03/15/23 18:18. 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: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WH01-B@8'	2303422-01	Soil	03/15/23 11:30	03/15/23 18:18
WH01-N@4'	2303422-02	Soil	03/15/23 10:40	03/15/23 18:18
WH01-S@4'	2303422-04	Soil	03/15/23 10:44	03/15/23 18:18
WH01-N@2.5'	2303422-06	Soil	03/15/23 10:52	03/15/23 18:18
BKG01@2.5'	2303422-07	Soil	03/15/23 12:00	03/15/23 18:18
BKG01@4'	2303422-08	Soil	03/15/23 12:05	03/15/23 18:18
BKG01@8'	2303422-09	Soil	03/15/23 12:10	03/15/23 18:18

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

4653 Table Mountain Drive  
Golden, CO 80403  
303-277-9310

Lab ID	Page 1 of 1
2303422	

Client: PDC / Tasman		Send Data To: Project Manager: Mark Longhurst		Send Invoice To: Company: PDC Energy	
Address: 6855 W 119th Ave		E-Mail: mark.longhurst@PDCE.com		Project Name/Location:	
City/State/Zip: Broomfield / CO / 80220		Project Name: Howard 14-18 Wellhead		AFE#:	
Phone: 303-487-1228		Project Number:		PO/Billing Codes:	
Sampler Name: David V. Jordan H.		Contact: Mark Longhurst			

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix		Air-Canister #	Analysis Requested							Special Instructions		
					HCl	HNO3	None	Other	Water	Soil		Other	BTEXN - 8260B	TPH - (C6 - C36)	1,2,4 & 1,3,5-TMB	Boron - HWS	pH, EC, SAR	PAH - 915		Metals - 915	
1	Wt61-B @ 8'	3/15/23	1130	2			X					X	X	X	X	X	X	X	X		
2	Wt61-N @ 4'		1040	2								X	X	X	X	X	X	X	X		
3	Wt61-W @ 4'		1042	2																X	
4	Wt61-S @ 4'		1044	2																X	
5	Wt61-E @ 4'		1046	2																X	
6	Wt61-N @ 2.5'		1052	1										X	X						
7	B/K G61 @ 2.5'		1200	1																X	
8	B/K G61 @ 4'		1205	1																X	
9	B/K G61 @ 8'		1210	1																X	
10																					
11																					
12																					
13																					
14																					
15																					

Relinquished by: <i>[Signature]</i>	Date/Time: 3/15/23 1600	Received by: Tasman lockbox	Date/Time: 3/15/23 1600	TAT Business Days	Field DO	Notes:
				Same Day	Field EC	
Relinquished by: Tasman lockbox	Date/Time: 3/15/23 1818	Received by: <i>[Signature]</i>	Date/Time: 3/15/23 1818	1 Day	Field ORP	
				2 Days	Field pH	
Relinquished by:	Date/Time:	Received by:	Date/Time:	3 Days	Field Temp.	
				Standard	Field Turb.	
Temperature Upon Receipt: 89	Corrected Temperature: 0	IR gun #: 1	HNO3 lot #:			

S<sub>2</sub>

Sample Receipt Checklist

S2 Work Order# 2303422

Client: Poc / Trsman Client Project ID: Howard 14-18 wellhead

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

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

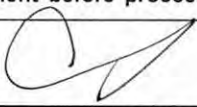
Temp (°C)

Thermometer #

	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"/>	<i>on ICE</i>
If custody seals are present, are they intact? <sup>(1)</sup>	<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 <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? <b>If yes, contact client and note in narrative.</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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

3-15-23  
Date/Time



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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
04/03/23 10:51

**WH01-B@8'**  
**2303422-01 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Benzene	ND	0.0020		mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050		"	"	"	"	"	"	
Ethylbenzene	ND	0.0050		"	"	"	"	"	"	
Xylenes (total)	ND	0.010		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
Naphthalene	ND	0.0038		"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50		"	"	"	"	"	"	

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: 1,2-Dichloroethane-d4		141 %		50-150		"	"	"	"	
Surrogate: Toluene-d8		98.1 %		50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		103 %		50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
C10-C28 (DRO)	ND	50		mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: o-Terphenyl		72.8 %		30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-B@8'**  
**2303422-01 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Acenaphthene	ND	0.00500		mg/kg	1	BGC0771	03/23/23	03/24/23	EPA 8270D SIM	
Anthracene	ND	0.00500		"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.00500		"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.00500		"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.00500		"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.00500		"	"	"	"	"	"	
Chrysene	ND	0.00500		"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.00500		"	"	"	"	"	"	
<b>Fluoranthene</b>	<b>0.00783</b>	0.00500		"	"	"	"	"	"	
Fluorene	ND	0.00500		"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.00500		"	"	"	"	"	"	
<b>Pyrene</b>	<b>0.00616</b>	0.00500		"	"	"	"	"	"	
1-Methylnaphthalene	ND	0.00500		"	"	"	"	"	"	
2-Methylnaphthalene	ND	0.00500		"	"	"	"	"	"	

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: 2-Methylnaphthalene-d10		63.5 %		40-150		"	"	"	"	
Surrogate: Fluoranthene-d10		69.5 %		40-150		"	"	"	"	

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
<b>Boron</b>	<b>0.0789</b>	0.0100		mg/L	1	BGC0653	03/20/23	03/22/23	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-B@8'**  
**2303422-01 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Analyte	Result	Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Arsenic	0.987	0.207	0.175	mg/kg dry	1	BGC0678	03/21/23	03/22/23	EPA 6020B	
Barium	22.0	0.414	0.327	"	"	"	"	"	"	
Cadmium	0.0903	0.207	0.00746	"	"	"	"	"	"	
Copper	2.76	0.414	0.0216	"	"	"	"	"	"	
Lead	3.30	0.207	0.0569	"	"	"	"	"	"	
Nickel	1.84	0.414	0.0632	"	"	"	"	"	"	
Selenium	ND	0.260	0.175	"	"	"	"	"	"	
Silver	0.0253	0.0207	0.00277	"	"	"	"	"	"	
Zinc	9.06	0.414	0.276	"	"	"	"	"	"	

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: 03/15/23 11:30

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30		mg/kg dry	1	BGC0719	03/21/23	03/21/23	EPA 7196A	

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction**

Date Sampled: 03/15/23 11:30

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	23.1	0.0518		mg/L dry	1	BGC0629	03/20/23	03/21/23	EPA 6020B	
Magnesium	7.73	0.0518		"	"	"	"	"	"	
Sodium	19.8	0.0518		"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: 03/15/23 11:30

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.910	0.00100		units	1	BGC0817	03/24/23	03/24/23	Calculation	

**Physical Parameters by APHA/ASTM/EPA Methods**

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**WH01-B@8'**  
**2303422-01 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	96.5			%	1	BGC0714	03/21/23	03/23/23	Calculation	

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Specific Conductance (EC)	0.314	0.0100		mmhos/cm	1	BGC0661	03/21/23	03/21/23	EPA 120.1	

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Date Sampled: **03/15/23 11:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
pH	8.06			pH Units	1	BGC0662	03/21/23	03/21/23	EPA 9045D	

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-N@4'**  
**2303422-02 (Soil)**

**Summit Scientific**

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

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Benzene	ND	0.0020		mg/kg	1	BGC0571	03/18/23	03/22/23	EPA 8260B	
Toluene	ND	0.0050		"	"	"	"	"	"	
Ethylbenzene	ND	0.0050		"	"	"	"	"	"	
Xylenes (total)	ND	0.010		"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	0.0050		"	"	"	"	"	"	
Naphthalene	ND	0.0038		"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50		"	"	"	"	"	"	

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: 1,2-Dichloroethane-d4		146 %		50-150		"	"	"	"	
Surrogate: Toluene-d8		93.8 %		50-150		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		109 %		50-150		"	"	"	"	

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
C10-C28 (DRO)	ND	50		mg/kg	1	BGC0574	03/18/23	03/20/23	EPA 8015M	
C28-C36 (ORO)	ND	50		"	"	"	"	"	"	

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: o-Terphenyl		79.2 %		30-150		"	"	"	"	

**PAH by EPA Method 8270D SIM**

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-N@4'**  
**2303422-02 (Soil)**

**Summit Scientific**

**PAH by EPA Method 8270D SIM**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Acenaphthene	ND	0.00500		mg/kg	1	BGC0771	03/23/23	03/24/23	EPA 8270D SIM	
Anthracene	ND	0.00500		"	"	"	"	"	"	"
Benzo (a) anthracene	ND	0.00500		"	"	"	"	"	"	"
Benzo (a) pyrene	ND	0.00500		"	"	"	"	"	"	"
Benzo (b) fluoranthene	ND	0.00500		"	"	"	"	"	"	"
Benzo (k) fluoranthene	ND	0.00500		"	"	"	"	"	"	"
Chrysene	ND	0.00500		"	"	"	"	"	"	"
Dibenz (a,h) anthracene	ND	0.00500		"	"	"	"	"	"	"
Fluoranthene	ND	0.00500		"	"	"	"	"	"	"
Fluorene	ND	0.00500		"	"	"	"	"	"	"
Indeno (1,2,3-cd) pyrene	ND	0.00500		"	"	"	"	"	"	"
Pyrene	ND	0.00500		"	"	"	"	"	"	"
1-Methylnaphthalene	ND	0.00500		"	"	"	"	"	"	"
2-Methylnaphthalene	ND	0.00500		"	"	"	"	"	"	"

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Surrogate: 2-Methylnaphthalene-d10		74.3 %		40-150		"	"	"	"	"
Surrogate: Fluoranthene-d10		71.0 %		40-150		"	"	"	"	"

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
<b>Boron</b>	<b>0.126</b>	0.0100		mg/L	1	BGC0653	03/20/23	03/22/23	EPA 6020B	

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-N@4'**  
**2303422-02 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Analyte	Result	Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Arsenic	2.64	0.211	0.178	mg/kg dry	1	BGC0678	03/21/23	03/22/23	EPA 6020B	
Barium	57.3	0.422	0.334	"	"	"	"	"	"	
Cadmium	0.297	0.211	0.00760	"	"	"	"	"	"	
Copper	7.16	0.422	0.0221	"	"	"	"	"	"	
Lead	10.9	0.211	0.0580	"	"	"	"	"	"	
Nickel	3.61	0.422	0.0644	"	"	"	"	"	"	
Selenium	ND	0.260	0.175	"	"	"	"	"	"	
Silver	0.0874	0.0211	0.00282	"	"	"	"	"	"	
Zinc	23.4	0.422	0.281	"	"	"	"	"	"	

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: 03/15/23 10:40

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Chromium, Hexavalent	ND	0.30		mg/kg dry	1	BGC0719	03/21/23	03/21/23	EPA 7196A	

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction**

Date Sampled: 03/15/23 10:40

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	32.3	0.0528		mg/L dry	1	BGC0629	03/20/23	03/21/23	EPA 6020B	
Magnesium	13.2	0.0528		"	"	"	"	"	"	
Sodium	30.0	0.0528		"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: 03/15/23 10:40

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	1.12	0.00100		units	1	BGC0817	03/24/23	03/24/23	Calculation	

**Physical Parameters by APHA/ASTM/EPA Methods**

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**WH01-N@4'**  
**2303422-02 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	94.7			%	1	BGC0714	03/21/23	03/23/23	Calculation	

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Specific Conductance (EC)	0.482	0.0100		mmhos/cm	1	BGC0661	03/21/23	03/21/23	EPA 120.1	

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Date Sampled: **03/15/23 10:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
pH	7.71			pH Units	1	BGC0662	03/21/23	03/21/23	EPA 9045D	

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**WH01-S@4'**  
**2303422-04 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 10:44**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Arsenic	2.26	0.200		mg/kg dry	1	BGC0985	03/29/23	03/31/23	EPA 6020B	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 10:44**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	87.5			%	1	BGC1012	03/30/23	03/30/23	Calculation	

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**WH01-N@2.5'**  
**2303422-06 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B Hot Water Soluble Extraction**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Boron</b>	<b>0.0206</b>	0.0100		mg/L	1	BGC0653	03/20/23	03/22/23	EPA 6020B	

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Calcium</b>	<b>23.0</b>	0.0507		mg/L dry	1	BGC0629	03/20/23	03/21/23	EPA 6020B	
<b>Magnesium</b>	<b>6.49</b>	0.0507		"	"	"	"	"	"	
<b>Sodium</b>	<b>7.64</b>	0.0507		"	"	"	"	"	"	

**Calculated Analysis**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Sodium Adsorption Ratio</b>	<b>0.362</b>	0.00100		units	1	BGC0817	03/24/23	03/24/23	Calculation	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>% Solids</b>	<b>98.6</b>			%	1	BGC0714	03/21/23	03/23/23	Calculation	

**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting Limit	MDL	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Specific Conductance (EC)</b>	<b>0.0797</b>	0.0100		mmhos/cm	1	BGC0661	03/21/23	03/21/23	EPA 120.1	

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**WH01-N@2.5'**  
**2303422-06 (Soil)**

**Summit Scientific**

**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction**

Date Sampled: **03/15/23 10:52**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
<b>pH</b>	<b>7.71</b>			pH Units	1	BGC0662	03/21/23	03/21/23	EPA 9045D	

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**BKG01@2.5'**  
**2303422-07 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 12:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Arsenic	<b>0.600</b>	0.203	0.171	mg/kg dry	1	BGC0678	03/21/23	03/22/23	EPA 6020B	
Barium	<b>45.4</b>	0.407	0.322	"	"	"	"	"	"	
Cadmium	<b>0.114</b>	0.203	0.00733	"	"	"	"	"	"	
Copper	<b>1.97</b>	0.407	0.0213	"	"	"	"	"	"	
Lead	<b>1.75</b>	0.203	0.0559	"	"	"	"	"	"	
Nickel	<b>2.53</b>	0.407	0.0621	"	"	"	"	"	"	
Selenium	ND	0.260	0.175	"	"	"	"	"	"	
Silver	<b>0.0191</b>	0.0203	0.00272	"	"	"	"	"	"	
Zinc	<b>6.39</b>	0.407	0.271	"	"	"	"	"	"	

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **03/15/23 12:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Chromium, Hexavalent	ND	0.30		mg/kg dry	1	BGC0719	03/21/23	03/21/23	EPA 7196A	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 12:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	<b>98.3</b>			%	1	BGC0714	03/21/23	03/23/23	Calculation	

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**BKG01@4'**  
**2303422-08 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Arsenic	<b>0.976</b>	0.203	0.171	mg/kg dry	1	BGC0678	03/21/23	03/22/23	EPA 6020B	
Barium	<b>44.2</b>	0.407	0.321	"	"	"	"	"	"	
Cadmium	<b>0.0817</b>	0.203	0.00732	"	"	"	"	"	"	
Copper	<b>1.48</b>	0.407	0.0212	"	"	"	"	"	"	
Lead	<b>1.76</b>	0.203	0.0559	"	"	"	"	"	"	
Nickel	<b>1.46</b>	0.407	0.0620	"	"	"	"	"	"	
Selenium	ND	0.260	0.175	"	"	"	"	"	"	
Silver	<b>0.00691</b>	0.0203	0.00271	"	"	"	"	"	"	
Zinc	<b>5.59</b>	0.407	0.270	"	"	"	"	"	"	

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **03/15/23 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Chromium, Hexavalent	ND	0.30		mg/kg dry	1	BGC0719	03/21/23	03/21/23	EPA 7196A	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 12:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	<b>98.4</b>			%	1	BGC0714	03/21/23	03/23/23	Calculation	

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**BKG01@8'**  
**2303422-09 (Soil)**

**Summit Scientific**

**Total Metals by EPA 6020B**

Date Sampled: **03/15/23 12:10**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Arsenic	<b>0.709</b>	0.204	0.172	mg/kg dry	1	BGC0678	03/21/23	03/22/23	EPA 6020B	
Barium	<b>37.9</b>	0.408	0.323	"	"	"	"	"	"	
Cadmium	<b>0.0682</b>	0.204	0.00735	"	"	"	"	"	"	
Copper	<b>1.48</b>	0.408	0.0213	"	"	"	"	"	"	
Lead	<b>1.47</b>	0.204	0.0561	"	"	"	"	"	"	
Nickel	<b>1.26</b>	0.408	0.0623	"	"	"	"	"	"	
Selenium	ND	0.260	0.175	"	"	"	"	"	"	
Silver	<b>0.00694</b>	0.0204	0.00273	"	"	"	"	"	"	
Zinc	<b>4.81</b>	0.408	0.272	"	"	"	"	"	"	

**Hexavalent Chromium by EPA Method 7196**

Date Sampled: **03/15/23 12:10**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
Chromium, Hexavalent	ND	0.30		mg/kg dry	1	BGC0719	03/21/23	03/21/23	EPA 7196A	

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **03/15/23 12:10**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	MDL							
% Solids	<b>97.9</b>			%	1	BGC0714	03/21/23	03/23/23	Calculation	

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

### Volatile Organic Compounds by EPA Method 8260B - Quality Control

#### Summit Scientific

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

#### Batch BGC0571 - EPA 5030 Soil MS

##### Blank (BGC0571-BLK1)

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	ND	0.0020	mg/kg								
Toluene	ND	0.0050	"								
Ethylbenzene	ND	0.0050	"								
Xylenes (total)	ND	0.010	"								
1,2,4-Trimethylbenzene	ND	0.0050	"								
1,3,5-Trimethylbenzene	ND	0.0050	"								
Naphthalene	ND	0.0038	"								
Gasoline Range Hydrocarbons	ND	0.50	"								
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0492		"	0.0400		123	50-150				
<i>Surrogate: Toluene-d8</i>	0.0385		"	0.0400		96.2	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0400		"	0.0400		100	50-150				

##### LCS (BGC0571-BS1)

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	0.0838	0.0020	mg/kg	0.100		83.8	70-130				
Toluene	0.0724	0.0050	"	0.100		72.4	70-130				
Ethylbenzene	0.0908	0.0050	"	0.100		90.8	70-130				
m,p-Xylene	0.186	0.010	"	0.200		92.8	70-130				
o-Xylene	0.0883	0.0050	"	0.100		88.3	70-130				
1,2,4-Trimethylbenzene	0.0841	0.0050	"	0.100		84.1	70-130				
1,3,5-Trimethylbenzene	0.0876	0.0050	"	0.100		87.6	70-130				
Naphthalene	0.0771	0.0038	"	0.100		77.1	70-130				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0433		"	0.0400		108	50-150				
<i>Surrogate: Toluene-d8</i>	0.0365		"	0.0400		91.2	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0416		"	0.0400		104	50-150				

##### Matrix Spike (BGC0571-MS1)

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/21/23

Benzene	0.0798	0.0020	mg/kg	0.100	ND	79.8	70-130				
Toluene	0.0710	0.0050	"	0.100	ND	71.0	70-130				
Ethylbenzene	0.0861	0.0050	"	0.100	ND	86.1	70-130				
m,p-Xylene	0.178	0.010	"	0.200	ND	89.1	70-130				
o-Xylene	0.0884	0.0050	"	0.100	ND	88.4	70-130				
1,2,4-Trimethylbenzene	0.0850	0.0050	"	0.100	ND	85.0	70-130				
1,3,5-Trimethylbenzene	0.0874	0.0050	"	0.100	ND	87.4	70-130				
Naphthalene	0.0805	0.0038	"	0.100	ND	80.5	70-130				
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.0434		"	0.0400		109	50-150				
<i>Surrogate: Toluene-d8</i>	0.0386		"	0.0400		96.4	50-150				
<i>Surrogate: 4-Bromofluorobenzene</i>	0.0425		"	0.0400		106	50-150				

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**

**Summit Scientific**

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

**Batch BGC0571 - EPA 5030 Soil MS**

Matrix Spike Dup (BGC0571-MSD1)	Source: 2303418-01			Prepared: 03/18/23 Analyzed: 03/21/23					
Benzene	0.0849	0.0020	mg/kg	0.100	ND	84.9	70-130	6.27	30
Toluene	0.0770	0.0050	"	0.100	ND	77.0	70-130	8.19	30
Ethylbenzene	0.0904	0.0050	"	0.100	ND	90.4	70-130	4.86	30
m,p-Xylene	0.182	0.010	"	0.200	ND	91.1	70-130	2.28	30
o-Xylene	0.0867	0.0050	"	0.100	ND	86.7	70-130	1.95	30
1,2,4-Trimethylbenzene	0.0806	0.0050	"	0.100	ND	80.6	70-130	5.43	30
1,3,5-Trimethylbenzene	0.0865	0.0050	"	0.100	ND	86.5	70-130	1.14	30
Naphthalene	0.0793	0.0038	"	0.100	ND	79.3	70-130	1.58	30
Surrogate: 1,2-Dichloroethane-d4	0.0412		"	0.0400		103	50-150		
Surrogate: Toluene-d8	0.0386		"	0.0400		96.6	50-150		
Surrogate: 4-Bromofluorobenzene	0.0403		"	0.0400		101	50-150		

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

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

**Batch BGC0574 - EPA 3550A**

**Blank (BGC0574-BLK1)**

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	ND	50	mg/kg								
C28-C36 (ORO)	ND	50	"								
Surrogate: <i>o</i> -Terphenyl	13.6		"	12.5		109		30-150			

**LCS (BGC0574-BS1)**

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	356	50	mg/kg	500		71.1		70-130			
Surrogate: <i>o</i> -Terphenyl	13.4		"	12.5		107		30-150			

**Matrix Spike (BGC0574-MS1)**

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	375	50	mg/kg	500	9.70	73.0		70-130			
Surrogate: <i>o</i> -Terphenyl	11.1		"	12.5		88.8		30-150			

**Matrix Spike Dup (BGC0574-MSD1)**

Source: 2303418-01

Prepared: 03/18/23 Analyzed: 03/20/23

C10-C28 (DRO)	386	50	mg/kg	500	9.70	75.3		70-130	3.03	20	
Surrogate: <i>o</i> -Terphenyl	10.6		"	12.5		85.1		30-150			

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

Reported:  
 04/03/23 10:51

**PAH by EPA Method 8270D SIM - Quality Control**  
**Summit Scientific**

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

**Batch BGC0771 - EPA 5030 Soil MS**

**Blank (BGC0771-BLK1)**

Prepared & Analyzed: 03/23/23

Acenaphthene	ND	0.00500	mg/kg							
Anthracene	ND	0.00500	"							
Benzo (a) anthracene	ND	0.00500	"							
Benzo (a) pyrene	ND	0.00500	"							
Benzo (b) fluoranthene	ND	0.00500	"							
Benzo (k) fluoranthene	ND	0.00500	"							
Chrysene	ND	0.00500	"							
Dibenz (a,h) anthracene	ND	0.00500	"							
Fluoranthene	ND	0.00500	"							
Fluorene	ND	0.00500	"							
Indeno (1,2,3-cd) pyrene	ND	0.00500	"							
Pyrene	ND	0.00500	"							
1-Methylnaphthalene	ND	0.00500	"							
2-Methylnaphthalene	ND	0.00500	"							
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0280</i>		"	<i>0.0333</i>		<i>84.0</i>		<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0285</i>		"	<i>0.0333</i>		<i>85.5</i>		<i>40-150</i>		

**LCS (BGC0771-BS1)**

Prepared & Analyzed: 03/23/23

Acenaphthene	0.0311	0.00500	mg/kg	0.0333		93.2		31-137		
Anthracene	0.0293	0.00500	"	0.0333		87.8		30-120		
Benzo (a) anthracene	0.0247	0.00500	"	0.0333		74.0		30-120		
Benzo (a) pyrene	0.0317	0.00500	"	0.0333		95.2		30-120		
Benzo (b) fluoranthene	0.0301	0.00500	"	0.0333		90.4		30-120		
Benzo (k) fluoranthene	0.0362	0.00500	"	0.0333		109		30-120		
Chrysene	0.0273	0.00500	"	0.0333		81.9		30-120		
Dibenz (a,h) anthracene	0.0249	0.00500	"	0.0333		74.6		30-120		
Fluoranthene	0.0293	0.00500	"	0.0333		87.9		30-120		
Fluorene	0.0318	0.00500	"	0.0333		95.5		30-120		
Indeno (1,2,3-cd) pyrene	0.0275	0.00500	"	0.0333		82.4		30-120		
Pyrene	0.0327	0.00500	"	0.0333		98.1		35-142		
1-Methylnaphthalene	0.0334	0.00500	"	0.0333		100		35-142		
2-Methylnaphthalene	0.0206	0.00500	"	0.0333		61.7		35-142		
<i>Surrogate: 2-Methylnaphthalene-d10</i>	<i>0.0399</i>		"	<i>0.0333</i>		<i>120</i>		<i>40-150</i>		
<i>Surrogate: Fluoranthene-d10</i>	<i>0.0308</i>		"	<i>0.0333</i>		<i>92.3</i>		<i>40-150</i>		

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
04/03/23 10:51

**PAH by EPA Method 8270D SIM - Quality Control**  
**Summit Scientific**

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

**Batch BGC0771 - EPA 5030 Soil MS**

**Matrix Spike (BGC0771-MS1)**

Source: 2303414-01

Prepared & Analyzed: 03/23/23

Acenaphthene	0.0844	0.00500	mg/kg	0.0333	0.0190	196	31-137			QM-02
Anthracene	0.140	0.00500	"	0.0333	0.0284	335	30-120			QM-02
Benzo (a) anthracene	0.164	0.00500	"	0.0333	0.0331	394	30-120			QM-02
Benzo (a) pyrene	0.0862	0.00500	"	0.0333	0.0154	213	30-120			QM-02
Benzo (b) fluoranthene	0.135	0.00500	"	0.0333	0.0276	322	30-120			QM-02
Benzo (k) fluoranthene	0.0617	0.00500	"	0.0333	0.0106	153	30-120			QM-02
Chrysene	0.133	0.00500	"	0.0333	0.0280	315	30-120			QM-02
Dibenz (a,h) anthracene	0.0419	0.00500	"	0.0333	ND	126	30-120			QM-02
Fluoranthene	0.358	0.00500	"	0.0333	0.0860	816	30-120			QM-02
Fluorene	0.103	0.00500	"	0.0333	0.0213	246	30-120			QM-02
Indeno (1,2,3-cd) pyrene	0.0682	0.00500	"	0.0333	0.0108	172	30-120			QM-02
Pyrene	0.251	0.00500	"	0.0333	0.0621	568	35-142			QM-02
1-Methylnaphthalene	0.0302	0.00500	"	0.0333	ND	90.7	15-130			
2-Methylnaphthalene	0.0230	0.00500	"	0.0333	ND	69.0	15-130			
Surrogate: 2-Methylnaphthalene-d10	0.0299		"	0.0333		89.7	40-150			
Surrogate: Fluoranthene-d10	0.0253		"	0.0333		75.9	40-150			

**Matrix Spike Dup (BGC0771-MSD1)**

Source: 2303414-01

Prepared & Analyzed: 03/23/23

Acenaphthene	0.0544	0.00500	mg/kg	0.0333	0.0190	106	31-137	43.2	30	QM-02
Anthracene	0.0751	0.00500	"	0.0333	0.0284	140	30-120	60.4	30	QM-02
Benzo (a) anthracene	0.0942	0.00500	"	0.0333	0.0331	183	30-120	54.3	30	QM-02
Benzo (a) pyrene	0.0534	0.00500	"	0.0333	0.0154	114	30-120	47.0	30	QM-02
Benzo (b) fluoranthene	0.0831	0.00500	"	0.0333	0.0276	167	30-120	47.6	30	QM-02
Benzo (k) fluoranthene	0.0452	0.00500	"	0.0333	0.0106	104	30-120	30.9	30	QM-02
Chrysene	0.0718	0.00500	"	0.0333	0.0280	131	30-120	59.7	30	QM-02
Dibenz (a,h) anthracene	0.0337	0.00500	"	0.0333	ND	101	30-120	21.7	30	
Fluoranthene	0.199	0.00500	"	0.0333	0.0860	339	30-120	57.1	30	QM-02
Fluorene	0.0641	0.00500	"	0.0333	0.0213	128	30-120	46.8	30	QM-02
Indeno (1,2,3-cd) pyrene	0.0448	0.00500	"	0.0333	0.0108	102	30-120	41.5	30	QM-02
Pyrene	0.146	0.00500	"	0.0333	0.0621	251	35-142	53.3	30	QM-02
1-Methylnaphthalene	0.0305	0.00500	"	0.0333	ND	91.4	15-130	0.736	50	
2-Methylnaphthalene	0.0207	0.00500	"	0.0333	ND	62.2	15-130	10.4	50	
Surrogate: 2-Methylnaphthalene-d10	0.0311		"	0.0333		93.2	40-150			
Surrogate: Fluoranthene-d10	0.0265		"	0.0333		79.6	40-150			

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**Total Metals by EPA 6020B Hot Water Soluble Extraction - Quality Control**  
**Summit Scientific**

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

**Batch BGC0653 - EPA 3050B**

**Blank (BGC0653-BLK1)**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron ND 0.0100 mg/L

**LCS (BGC0653-BS1)**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 4.94 0.0100 mg/L 5.00 98.7 80-120

**Duplicate (BGC0653-DUP1)**

**Source: 2303414-01**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 0.162 0.0100 mg/L 0.165 1.71 20

**Matrix Spike (BGC0653-MS1)**

**Source: 2303414-01**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 5.29 0.0100 mg/L 5.00 0.165 102 75-125

**Matrix Spike Dup (BGC0653-MSD1)**

**Source: 2303414-01**

Prepared: 03/20/23 Analyzed: 03/22/23

Boron 5.17 0.0100 mg/L 5.00 0.165 100 75-125 2.30 25

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

**Total Metals by EPA 6020B - Quality Control**  
**Summit Scientific**

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

**Batch BGC0678 - EPA 3050B**

**Blank (BGC0678-BLK1)**

Prepared: 03/21/23 Analyzed: 03/22/23

Arsenic	ND	0.200	mg/kg wet							
Barium	ND	0.400	"							
Cadmium	ND	0.200	"							
Copper	ND	0.400	"							
Lead	ND	0.200	"							
Nickel	ND	0.400	"							
Selenium	ND	0.260	"							
Silver	ND	0.0200	"							
Zinc	ND	0.400	"							

**LCS (BGC0678-BS1)**

Prepared: 03/21/23 Analyzed: 03/22/23

Arsenic	40.2	0.200	mg/kg wet	40.0		101	80-120			
Barium	40.8	0.400	"	40.0		102	80-120			
Cadmium	2.03	0.200	"	2.00		101	80-120			
Copper	39.0	0.400	"	40.0		97.4	80-120			
Lead	20.1	0.200	"	20.0		101	80-120			
Nickel	38.7	0.400	"	40.0		96.7	80-120			
Selenium	4.11	0.260	"	4.00		103	80-120			
Silver	2.38	0.0200	"	2.00		119	80-120			
Zinc	38.5	0.400	"	40.0		96.3	80-120			

**Duplicate (BGC0678-DUP1)**

Source: 2303422-01

Prepared: 03/21/23 Analyzed: 03/22/23

Arsenic	1.04	0.207	mg/kg dry	0.987		4.79	20			
Barium	25.3	0.414	"	22.0		14.0	20			
Cadmium	0.105	0.207	"	0.0903		14.9	20			
Copper	3.16	0.414	"	2.76		13.6	20			
Lead	4.59	0.207	"	3.30		32.6	20			RPD-1
Nickel	1.92	0.414	"	1.84		4.25	20			
Selenium	ND	0.260	"	ND			20			
Silver	0.0269	0.0207	"	0.0253		6.35	20			
Zinc	11.0	0.414	"	9.06		18.8	20			

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

Reported:  
04/03/23 10:51

**Total Metals by EPA 6020B - Quality Control**  
**Summit Scientific**

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

**Batch BGC0678 - EPA 3050B**

<b>Matrix Spike (BGC0678-MS1)</b>		<b>Source: 2303422-01</b>			Prepared: 03/21/23		Analyzed: 03/22/23	
Arsenic	44.4	0.207	mg/kg dry	41.4	0.987	105	75-125	
Barium	67.2	0.414	"	41.4	22.0	109	75-125	
Cadmium	2.26	0.207	"	2.07	0.0903	105	75-125	
Copper	37.5	0.414	"	41.4	2.76	83.8	75-125	
Lead	25.1	0.207	"	20.7	3.30	105	75-125	
Nickel	36.8	0.414	"	41.4	1.84	84.4	75-125	
Selenium	4.16	0.260	"	4.14	ND	100	75-125	
Silver	2.68	0.0207	"	2.07	0.0253	128	75-125	QM-05
Zinc	45.6	0.414	"	41.4	9.06	88.3	75-125	

<b>Matrix Spike Dup (BGC0678-MSD1)</b>		<b>Source: 2303422-01</b>			Prepared: 03/21/23		Analyzed: 03/22/23	
Arsenic	45.2	0.207	mg/kg dry	41.4	0.987	107	75-125	1.89 25
Barium	67.8	0.414	"	41.4	22.0	110	75-125	0.925 25
Cadmium	2.29	0.207	"	2.07	0.0903	106	75-125	0.947 25
Copper	38.1	0.414	"	41.4	2.76	85.3	75-125	1.59 25
Lead	25.4	0.207	"	20.7	3.30	107	75-125	1.42 25
Nickel	37.4	0.414	"	41.4	1.84	85.9	75-125	1.69 25
Selenium	4.25	0.260	"	4.14	ND	103	75-125	2.14 25
Silver	2.70	0.0207	"	2.07	0.0253	129	75-125	0.770 25
Zinc	46.1	0.414	"	41.4	9.06	89.5	75-125	1.08 25

**Batch BGC0985 - EPA 3050B**

<b>Blank (BGC0985-BLK1)</b>					Prepared: 03/29/23		Analyzed: 03/31/23	
Arsenic	ND	0.200	mg/kg wet					

<b>LCS (BGC0985-BS1)</b>					Prepared: 03/29/23		Analyzed: 03/31/23	
Arsenic	36.5	0.200	mg/kg wet	40.0		91.2	80-120	

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**Total Metals by EPA 6020B - Quality Control**

**Summit Scientific**

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

**Batch BGC0985 - EPA 3050B**

<b>Duplicate (BGC0985-DUP1)</b>		<b>Source: 2303414-03</b>			Prepared: 03/29/23 Analyzed: 03/31/23	
Arsenic	1.27	0.200	mg/kg dry	1.23		2.89 20
<b>Matrix Spike (BGC0985-MS1)</b>		<b>Source: 2303414-03</b>			Prepared: 03/29/23 Analyzed: 03/31/23	
Arsenic	39.5	0.200	mg/kg dry	43.1	1.23	88.8 75-125
<b>Matrix Spike Dup (BGC0985-MSD1)</b>		<b>Source: 2303414-03</b>			Prepared: 03/29/23 Analyzed: 03/31/23	
Arsenic	40.0	0.200	mg/kg dry	43.1	1.23	89.9 75-125 1.23 25

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**Hexavalent Chromium by EPA Method 7196 - Quality Control**  
**Summit Scientific**

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

**Batch BGC0719 - 3060A Mod**

**Blank (BGC0719-BLK1)**

Prepared & Analyzed: 03/21/23

Chromium, Hexavalent      ND      0.30    mg/kg wet

**LCS (BGC0719-BS1)**

Prepared & Analyzed: 03/21/23

Chromium, Hexavalent      24.6      0.30    mg/kg wet      25.0      98.2      80-120

**Duplicate (BGC0719-DUP1)**

**Source: 2303422-01**

Prepared & Analyzed: 03/21/23

Chromium, Hexavalent      ND      0.30    mg/kg dry      ND      20

**Matrix Spike (BGC0719-MS1)**

**Source: 2303422-01**

Prepared & Analyzed: 03/21/23

Chromium, Hexavalent      24.6      0.30    mg/kg dry      25.9      ND      95.0      75-125

**Matrix Spike Dup (BGC0719-MSD1)**

**Source: 2303422-01**

Prepared & Analyzed: 03/21/23

Chromium, Hexavalent      24.8      0.30    mg/kg dry      25.9      ND      95.6      75-125      0.630      20

Summit Scientific

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

Project: Howard 14-18 Wellhead

Project Number: [none]  
 Project Manager: Mark Longhurst

**Reported:**  
 04/03/23 10:51

**Soluble Nutrients by EPA 6020/USDA60 6(2) - Saturated Paste Extraction - Quality Control**

**Summit Scientific**

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

**Batch BGC0629 - General Preparation**

**Blank (BGC0629-BLK1)**

Prepared: 03/20/23 Analyzed: 03/21/23

Calcium	ND	0.0500	mg/L wet							
Magnesium	ND	0.0500	"							
Sodium	ND	0.0500	"							

**LCS (BGC0629-BS1)**

Prepared: 03/20/23 Analyzed: 03/21/23

Calcium	5.31	0.0500	mg/L wet	5.00		106	70-130			
Magnesium	5.02	0.0500	"	5.00		100	70-130			
Sodium	5.04	0.0500	"	5.00		101	70-130			

Summit Scientific

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PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Howard 14-18 Wellhead Project Number: [none] Project Manager: Mark Longhurst	<b>Reported:</b> 04/03/23 10:51
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**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control**  
**Summit Scientific**

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

**Batch BGC0714 - General Preparation**

<b>Duplicate (BGC0714-DUP1)</b>	<b>Source: 2303420-01</b>	Prepared: 03/21/23 Analyzed: 03/23/23								
% Solids	97.4		%		96.9			0.513	20	

**Batch BGC1012 - General Preparation**

<b>Duplicate (BGC1012-DUP1)</b>	<b>Source: 2303422-04</b>	Prepared & Analyzed: 03/30/23								
% Solids	87.2		%		87.5			0.321	20	

Summit Scientific

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PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Howard 14-18 Wellhead Project Number: [none] Project Manager: Mark Longhurst	Reported: 04/03/23 10:51
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**Specific Conductance by EPA Method 120.1, Saturated Paste Extraction - Quality Control**  
**Summit Scientific**

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

**Batch BGC0661 - General Preparation**

<b>Blank (BGC0661-BLK1)</b>		Prepared & Analyzed: 03/21/23								
Specific Conductance (EC)	ND	0.0100	mmhos/cm							
<b>LCS (BGC0661-BS1)</b>		Prepared & Analyzed: 03/21/23								
Specific Conductance (EC)	0.153	0.0100	mmhos/cm	0.150	102	95-105				
<b>Duplicate (BGC0661-DUP1)</b>		<b>Source: 2303372-01</b>		Prepared & Analyzed: 03/21/23						
Specific Conductance (EC)	5.15	0.0100	mmhos/cm		5.16			0.213	20	

Summit Scientific

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PDC Energy 1775 Sherman St. STE. 3000 Denver CO, 80203	Project: Howard 14-18 Wellhead Project Number: [none] Project Manager: Mark Longhurst	<b>Reported:</b> 04/03/23 10:51
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**Physical Parameters by APHA/ASTM/EPA Methods, Saturated Paste Extraction - Quality Control**  
**Summit Scientific**

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

**Batch BGC0662 - General Preparation**

<b>LCS (BGC0662-BS1)</b>			Prepared & Analyzed: 03/21/23							
pH	9.16		pH Units	9.18		99.8	95-105			
<b>Duplicate (BGC0662-DUP1)</b>			<b>Source: 2303372-01</b>		Prepared & Analyzed: 03/21/23					
pH	7.76		pH Units	7.75				0.129	20	

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*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: Howard 14-18 Wellhead

Project Number: [none]  
Project Manager: Mark Longhurst

**Reported:**  
04/03/23 10:51

### Notes and Definitions

- RPD-1 The RPD failure for the sample duplicate analysis is most likely due to a non-homogeneous sample matrix.
- QM-05 The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The associated LCS and/or LCSD were within acceptance limits, therefore the data are considered valid.
- QM-02 The RPD and/or percent recovery for this QC sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
- 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