

# Summit Scientific

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4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

June 03, 2022

Karen Olson

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: DWR Permit #137465

Work Order #2205410

Enclosed are the results of analyses for samples received by Summit Scientific on 05/26/22 14:09. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Paul Shrewsbury  
President



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

Project: DWR Permit #137465

Project Number: AFE #EX-000335  
Project Manager: Karen Olson

**Reported:**  
06/03/22 12:26

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EFF-052622-1158	2205410-01	Water	05/26/22 11:58	05/26/22 14:09
INF-052622-1252	2205410-02	Water	05/26/22 12:52	05/26/22 14:09

Summit Scientific

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

# Summit Scientific

S<sub>2</sub>

4653 Table Mountain Drive ♦ Golden, Colorado 80403  
303-277-9310

Client: PDC Energy / Tasman Geosciences Project Manager: Karen Olson  
Address: 6855 W. 119th Ave. E-Mail: Karen.Olson@pdce.com; chamlin@tasman-geo.com  
City/State/Zip: Broomfield / CO / 80020  
Phone: 303-487-1228 Project Name: DWR Permit # 137465  
Sampler Name: Bryce Goldade Project Number: AFE # EX-000335

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested				Special Instructions	
					HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	RSK-175 (Dissolved Gases)	D16 Gas Composition	D16 Methane (Carbon)	D16 Methane (Hydrogen)		
1	BFF-052622-1158	05/26/22	1158	3			X		X				X					
2	INF-052622-1252	I	1252	3			X		X				X					
3	INF-052622-1252	I	1252	1				X	X					X	X	X		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Relinquished by: <u>Bryce J Goldade</u> Date/Time: <u>5/26/22 1409</u>	Received by: <u>Tasman Dropbox</u> Date/Time: <u>05/26/22 1409</u>	<b>Turn Around Time (Check)</b> Same Day <input type="checkbox"/> 72 hours <input type="checkbox"/> 24 hours <input checked="" type="checkbox"/> Standard <input type="checkbox"/> 48 hours <input type="checkbox"/> <b>Sample Integrity:</b> Temperature Upon Receipt: _____ Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>Notes:</b> Please provide data in PDF and COGCC EDD formats. COGCC Facility No.: 765500
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: <u>5/26/22 1845</u>		
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____		

S<sub>2</sub>

Sample Receipt Checklist

S2 Work Order# 2205410

Client: PDC Energy Client Project ID: DWR permit 13746

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

Grid with 'X' in the second cell

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

Temp (°C) 17.8° Thermometer # 02

Table with 5 columns: Yes, No, N/A, Comments (if any). Rows include questions about cooling, sample integrity, volume, custody seals, 48-hour rule, short hold times, COC form, pH, and field filtering.

Additional Comments (if any):

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

Custodian Printed Name

Date/Time 5/26/22 1845



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

Project: DWR Permit #137465

Project Number: AFE #EX-000335  
 Project Manager: Karen Olson

**Reported:**  
 06/03/22 12:26

**EFF-052622-1158**  
**2205410-01 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Date Sampled: **05/26/22 11:58**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
<b>Methane</b>	<b>0.79</b>	0.10	mg/L	10	BFE0676	05/28/22	05/31/22	RSK-175 mod	
<b>Ethane</b>	<b>0.22</b>	0.10	"	"	"	"	"	"	
<b>Propane</b>	<b>0.37</b>	0.10	"	"	"	"	"	"	

Date Sampled: **05/26/22 11:58**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
<i>Surrogate: Ethene</i>		110 %		70-130	"	"	"	"	

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 1775 Sherman St. STE. 3000  
 Denver CO, 80203

Project: DWR Permit #137465  
 Project Number: AFE #EX-000335  
 Project Manager: Karen Olson

**Reported:**  
 06/03/22 12:26

**INF-052622-1252**  
**2205410-02 (Water)**

**Summit Scientific**

**Dissolved Gases by RSK-175**

Date Sampled: **05/26/22 12:52**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Methane</b>	<b>7.5</b>	1.0		mg/L	100	BFE0676	05/28/22	05/31/22	RSK-175 mod	
<b>Ethane</b>	<b>1.7</b>	1.0		"	"	"	"	"	"	
<b>Propane</b>	<b>1.1</b>	1.0		"	"	"	"	"	"	

Date Sampled: **05/26/22 12:52**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: Ethene</i>		110 %		70-130		"	"	"	"	

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Project: DWR Permit #137465

Project Number: AFE #EX-000335  
Project Manager: Karen Olson

**Reported:**  
06/03/22 12:26

### Dissolved Gases by RSK-175 - Quality Control

#### Summit Scientific

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

#### Batch BFE0676 - GC

##### Blank (BFE0676-BLK1)

Prepared: 05/28/22 Analyzed: 05/30/22

Methane	ND	0.010	mg/L								
Ethane	ND	0.010	"								
Propane	ND	0.010	"								
<i>Surrogate: Ethene</i>	<i>0.0431</i>		<i>"</i>	<i>0.0364</i>		<i>118</i>	<i>70-130</i>				

##### LCS (BFE0676-BS1)

Prepared: 05/28/22 Analyzed: 05/30/22

Methane	0.034	0.010	mg/L	0.0428		79.5	70-130				
Ethane	0.097	0.010	"	0.0798		122	70-130				
Propane	0.14	0.010	"	0.139		101	70-130				
<i>Surrogate: Ethene</i>	<i>0.0927</i>		<i>"</i>	<i>0.0728</i>		<i>127</i>	<i>70-130</i>				

##### Duplicate (BFE0676-DUP1)

Source: 2205410-01

Prepared: 05/28/22 Analyzed: 05/31/22

Methane	0.87	0.10	mg/L		0.79			10.1	30		
Ethane	0.25	0.10	"		0.22			12.4	30		
Propane	0.46	0.10	"		0.37			21.3	30		
<i>Surrogate: Ethene</i>	<i>0.0300</i>		<i>"</i>	<i>0.0364</i>		<i>82.4</i>	<i>70-130</i>				

##### Matrix Spike (BFE0676-MS1)

Source: 2205410-01

Prepared: 05/28/22 Analyzed: 05/31/22

Methane	1.8	1.0	mg/L	0.0428	0.79	NR	70-130				QM-07
Ethane	0.60	1.0	"	0.0798	0.22	476	70-130				QM-07
Propane	0.53	1.0	"	0.139	0.37	115	70-130				
<i>Surrogate: Ethene</i>	<i>0.100</i>		<i>"</i>	<i>0.0728</i>		<i>137</i>	<i>70-130</i>				<i>QM-07</i>

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**dig**  
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800  
Westminster, CO 80021  
p: 303.531.2030

**Hydrocarbon Gas Composition and Stable Isotopes  
Data and Interpretation**

**Job #:** 22057558  
**Lab #:** DIG-028077  
**Client:** Summit Scientific  
**Sample Name(s):** INF-052622-1252

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# Analytical Report



Job #: 22057558  
 Lab #: DIG-028077  
 Client: Summit Scientific  
 Sample Name: INF-052622-1252  
 Date Sampled: 05/26/22  
 Time Sampled: 12:52  
 Sample Description: Isoflask  
 Sampling Notes:  
 Date Received: 05/27/22  
 Date Analyzed: Gas Composition: 05/27/22  $\delta^{13}\text{C}$ : 05/31/22  $\delta\text{D}$ : 05/31/22  
 Date Reported: 06/02/22  
 Comments:

Measured Values:	Measured ppm	Analyte mol % <sup>a</sup>	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	$\delta\text{D}$ ‰ VSMOW	Comments
Nitrogen (N <sub>2</sub> )	275646	43.79	-	-	-	
Oxygen + Argon (O <sub>2</sub> +Ar)	31024	4.93	-	-	-	
Carbon Dioxide (CO <sub>2</sub> )	1047	0.17	-	-	-	
Helium (He) <sup>b</sup>	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H <sub>2</sub> )	na	na	-	-	-	
Methane (CH <sub>4</sub> )	292066	46.40	90.78	-62.6	-269	
Ethane (C <sub>2</sub> H <sub>6</sub> )	18520	2.94	5.76		-	
Ethene (C <sub>2</sub> H <sub>4</sub> )	nd	nd	nd		-	
Propane (C <sub>3</sub> H <sub>8</sub> )	8180	1.30	2.54		-	
iso-Butane (C <sub>4</sub> H <sub>10</sub> )	1037	0.16	0.32		-	
n-Butane (C <sub>4</sub> H <sub>10</sub> )	1467	0.23	0.46		-	
iso-Pentane (C <sub>5</sub> H <sub>12</sub> )	257	0.04	0.08		-	
n-Pentane (C <sub>5</sub> H <sub>12</sub> )	196	0.03	0.06		-	
Hexanes + (C <sub>6</sub> H <sub>14</sub> )	nd	nd	nd		-	

Calculated Values:	
Total HCs (ppm)	321724
Gas Wetness (mol % C <sub>2</sub> +C <sub>1</sub> +) )	9.22
C <sub>1</sub> /(C <sub>2</sub> +C <sub>3</sub> ) (mol/mol)	11

<sup>a</sup> Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. % )

<sup>b</sup> Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

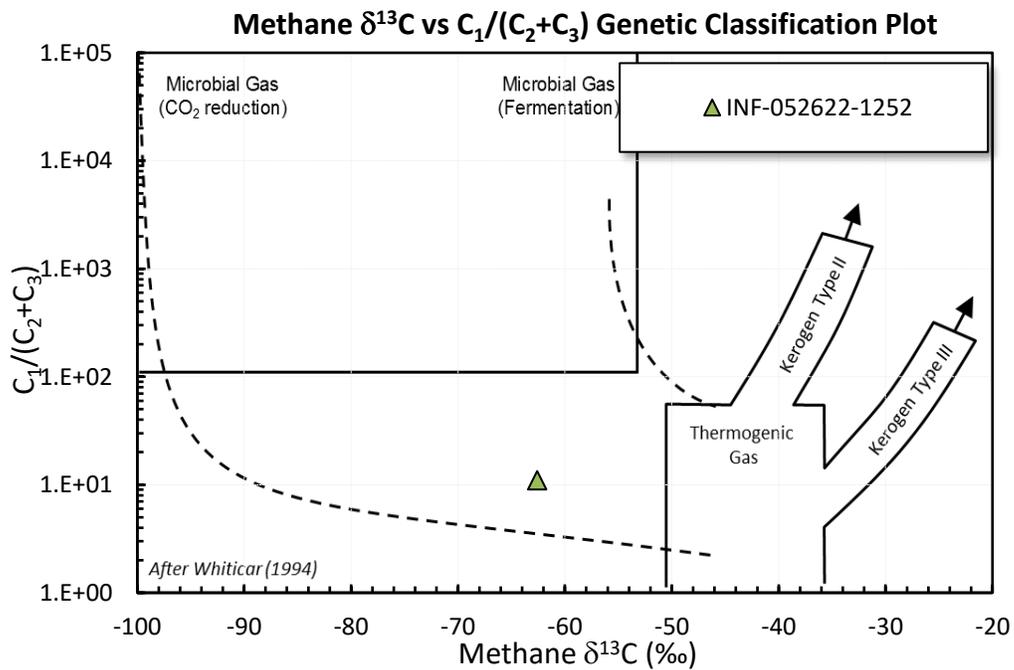
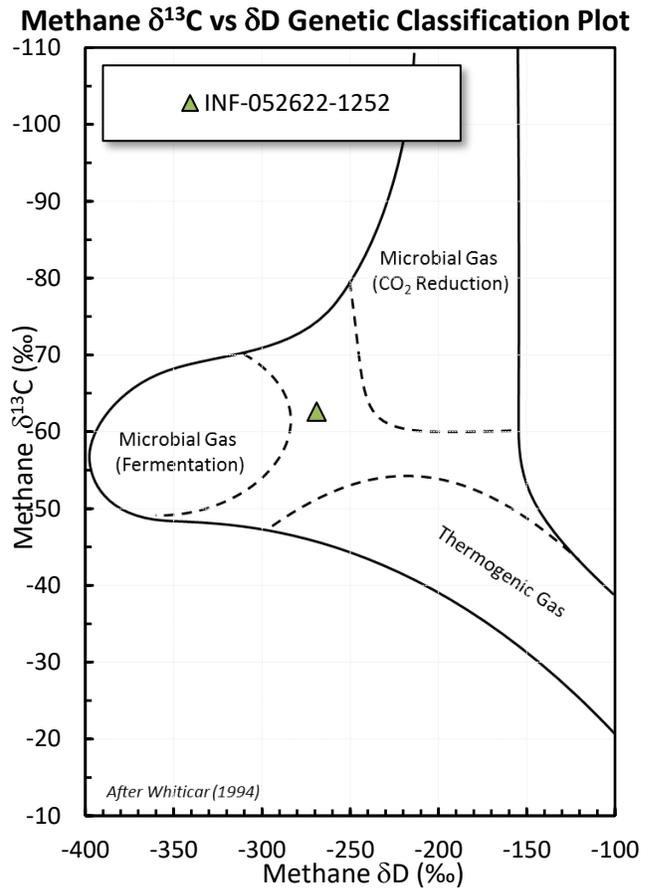
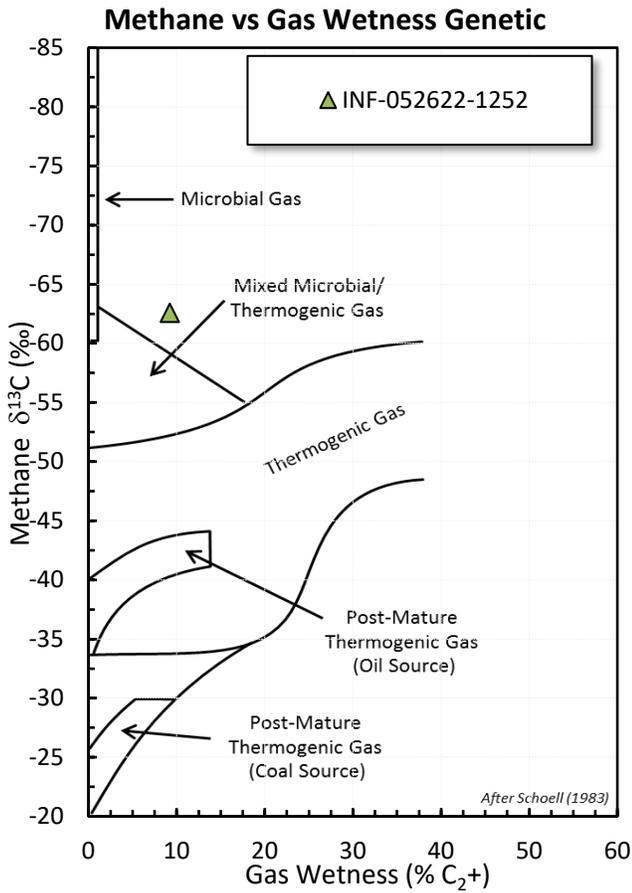
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error  $\delta^{13}\text{C}$  < 0.5 ‰

Error  $\delta\text{D}$  < 5.0 ‰

# Stable Isotope Interpretive Plots





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

Project: DWR Permit #137465

Project Number: AFE #EX-000335  
Project Manager: Karen Olson

**Reported:**  
06/03/22 12:26

### Notes and Definitions

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS/LCSD recovery.

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