

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

October 18, 2022

Karen Olson

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: DWR Permit #137465

Work Order #2208440

Enclosed are the results of analyses for samples received by Summit Scientific on 08/30/22 17:37. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



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:
10/18/22 09:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EFF-083022-1211	2208440-01	Water	08/30/22 12:11	08/30/22 17:37
INF-083022-1239	2208440-02	Water	08/30/22 12:39	08/30/22 17:37

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.

2208440

Summit Scientific

S₂

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: Byce 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)	DIG (Gas Composition)	DIG Methane (Carbon)		DIG Methane (Hydrogen)	
1	EFF-083022-1211	8/30/22	1211	3			X		X				X					
2	INF-083022-1239		1239	3			X		X				X					
3	INF-083022-1239		1239	1				X	X					X	X	X		Lot 120 s/n FOGUR-L3
4																		* Please analyze
5																		DIG analysis on
6																		Standard turn
7																		
8																		
9																		
10																		

Relinquished by: <u>Byce Goldade</u> Date/Time: <u>8/30/22 1431</u>	Received by: <u>Tasman Lockbox</u> Date/Time: <u>8/30/22 1431</u>	Turn Around Time (Check) 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"/> Sample Integrity: Temperature Upon Receipt: <u>111</u> Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Notes: Please provide data in PDF and COGCC EDD formats. COGCC Facility No.: 765500
Relinquished by: <u>Tasman Lockbox</u> Date/Time: <u>8/30/22 1737</u>	Received by: <u>[Signature]</u> Date/Time: <u>8/30/22 1737</u>		
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____		

S₂

Sample Receipt Checklist

S2 Work Order# 2208440

Client: Bob Trisman Client Project ID: DWR Permit # 137405

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

-

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

Temp (°C) 11.1 Thermometer # 1

	Yes	No	N/A	Comments (if any)
If samples require cooling, is the temperature < 6 °C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met if there is evidence that cooling has begun.	-			on ICE
If custody seals are present, are they intact ⁽¹⁾ ?	-			
Are samples due within 48 hours present?	-			24 hrs
Are water samples with short hold times present? Note the short hold analysis in the comments column - pH, Nitrate/Nitrite, Ferrous Iron (Fe ²⁺), Hexavalent Chromium (Cr ⁶⁺ , Cr VI), COD/BOD, Total Coliform, E. Coli, Total Residual Chlorine (TRC), Dissolved Oxygen			-	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	-			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	-			
Were all samples received intact ⁽¹⁾ ?	-			
Was adequate sample volume provided ⁽¹⁾ ?	-			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	-	✓		
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	-			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		-		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the comments column – HCl, H ₂ SO ₄ , NaOH, HNO ₃ , etc.			-	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			-	
If dissolved metals are requested, were samples field filtered?			-	

Additional Comments (if any):

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

[Signature]
Custodian Printed Name

8/30/22 20:00
Date/Time



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

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

Reported:
 10/18/22 09:42

EFF-083022-1211
2208440-01 (Water)

Summit Scientific

Dissolved Gases by RSK-175

Date Sampled: **08/30/22 12:11**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Methane	5.4	1.0	mg/L	100	BFH0653	08/30/22	08/31/22	RSK-175 mod	
Ethane	ND	0.010	"	1	"	"	"	"	
Propane	5.8	1.0	"	100	"	"	"	"	

Date Sampled: **08/30/22 12:11**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: Ethene</i>	ND	192 %	70-130		"	"	"	"	S-01

Summit Scientific

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 Denver CO, 80203

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

Reported:
 10/18/22 09:42

INF-083022-1239
2208440-02 (Water)

Summit Scientific

Dissolved Gases by RSK-175

S-01

Date Sampled: **08/30/22 12:39**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Methane	6.0	1.0		mg/L	100	BFH0653	08/30/22	08/31/22	RSK-175 mod	
Ethane	ND	0.010		"	1	"	"	"	"	
Propane	1.1	1.0		"	100	"	"	"	"	

Date Sampled: **08/30/22 12:39**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: Ethene</i>	ND	165 %		70-130		"	"	"	"	

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Denver CO, 80203

Project: DWR Permit #137465

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

Reported:
10/18/22 09:42

Dissolved Gases by RSK-175 - Quality Control

Summit Scientific

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

Batch BFH0653 - GC

Blank (BFH0653-BLK1)

Prepared: 08/30/22 Analyzed: 08/31/22

Methane	ND	0.010	mg/L								
Ethane	ND	0.010	"								
Propane	ND	0.010	"								
<i>Surrogate: Ethene</i>	<i>0.0453</i>		<i>"</i>	<i>0.0364</i>		<i>124</i>	<i>70-130</i>				

LCS (BFH0653-BS1)

Prepared: 08/30/22 Analyzed: 08/31/22

Methane	0.031	0.010	mg/L	0.0428		72.2	70-130				
Ethane	0.080	0.010	"	0.0798		101	70-130				
Propane	0.12	0.010	"	0.139		83.9	70-130				
<i>Surrogate: Ethene</i>	<i>0.0777</i>		<i>"</i>	<i>0.0728</i>		<i>107</i>	<i>70-130</i>				

Duplicate (BFH0653-DUP1)

Source: 2208407-01

Prepared: 08/30/22 Analyzed: 08/31/22

Methane	ND	0.010	mg/L		ND					30	
Ethane	ND	0.010	"		ND					30	
Propane	ND	0.010	"		ND					30	
<i>Surrogate: Ethene</i>	<i>0.0364</i>		<i>"</i>	<i>0.0364</i>		<i>100</i>	<i>70-130</i>				

Matrix Spike (BFH0653-MS1)

Source: 2208407-01

Prepared: 08/30/22 Analyzed: 08/31/22

Methane	0.031	0.010	mg/L	0.0428	ND	72.2	70-130				
Ethane	0.080	0.010	"	0.0798	ND	99.9	70-130				
Propane	0.12	0.010	"	0.139	ND	83.3	70-130				
<i>Surrogate: Ethene</i>	<i>0.0631</i>		<i>"</i>	<i>0.0728</i>		<i>86.7</i>	<i>70-130</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 #: 22088147
Lab #: DIG-029019
Client: Summit Scientific
Sample Name(s): INF-083022-1239

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

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Analytical Report



Job #: 22088147
 Lab #: DIG-029019
 Client: Summit Scientific
 Sample Name: INF-083022-1239
 Date Sampled: 08/30/22
 Time Sampled: 12:39
 Sample Description: Isoflask
 Sampling Notes:
 Date Received: 08/31/22
 Date Analyzed: Gas Composition: 09/13/22 $\delta^{13}\text{C}$: 09/11/22 δD : 09/08/22
 Date Reported: 09/14/22
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	458152	46.31	-	-	-	
Oxygen + Argon (O ₂ +Ar)	67731	6.85	-	-	-	
Carbon Dioxide (CO ₂)	3111	0.31	-	-	-	
Helium (He) ^b	147	0.01	-	-	-	
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	414010	41.85	89.97	-61.4	-256	
Ethane (C ₂ H ₆)	28480	2.88	6.19		-	
Ethene (C ₂ H ₄)	nd	nd	nd		-	
Propane (C ₃ H ₈)	12775	1.29	2.78		-	
iso-Butane (C ₄ H ₁₀)	1540	0.16	0.33		-	
n-Butane (C ₄ H ₁₀)	2185	0.22	0.47		-	
iso-Pentane (C ₅ H ₁₂)	373	0.04	0.08		-	
n-Pentane (C ₅ H ₁₂)	288	0.03	0.06		-	
Hexanes + (C ₆ H ₁₄)	528	0.05	0.11		-	

Calculated Values:	
Total HCs (ppm)	460179
Gas Wetness (mol % C ₂ +C ₁ +))	10.03
C ₁ /(C ₂ +C ₃) (mol/mol)	10

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

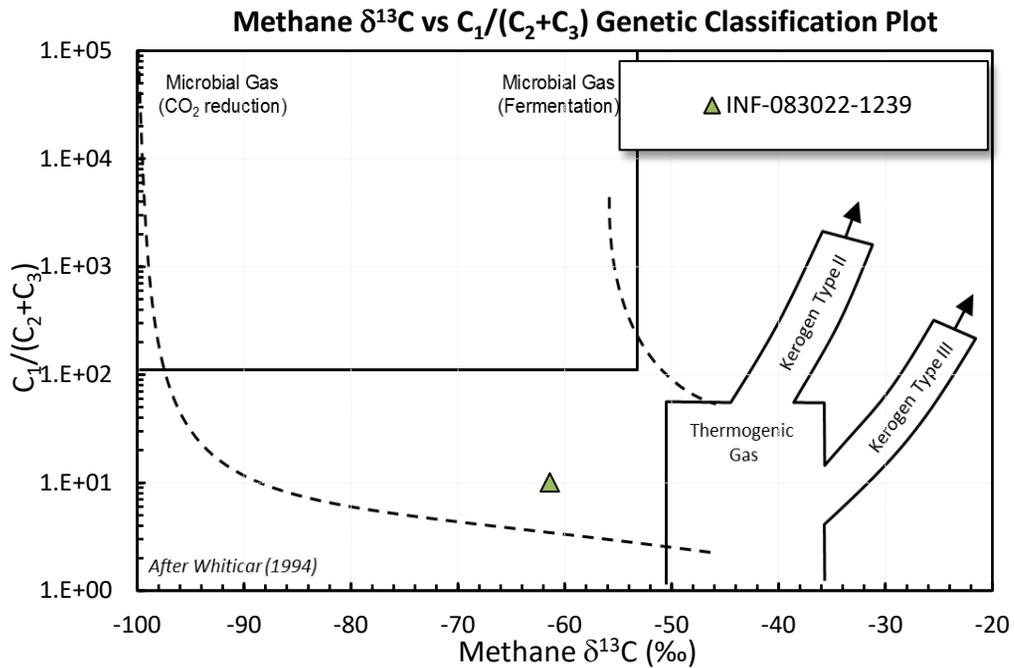
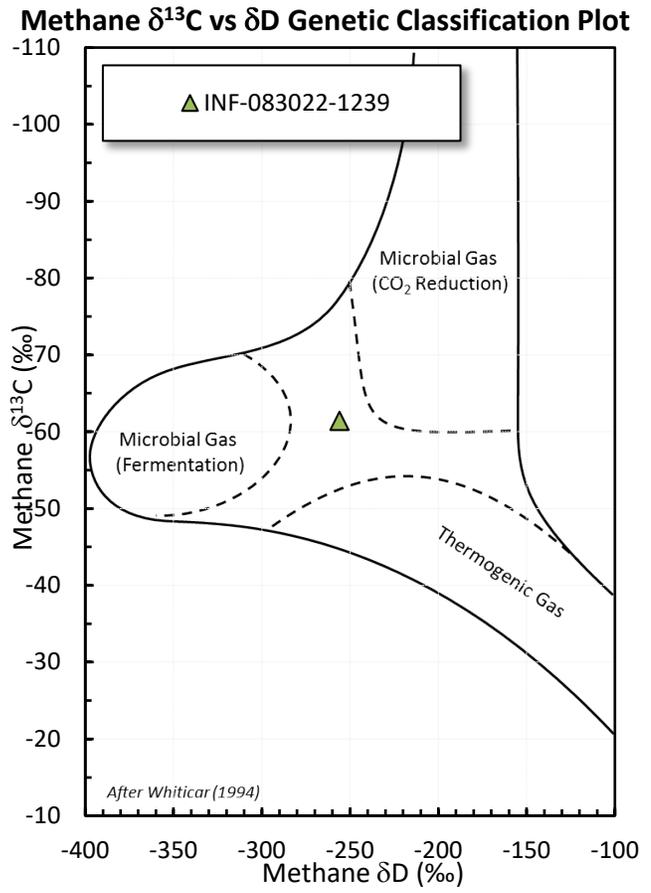
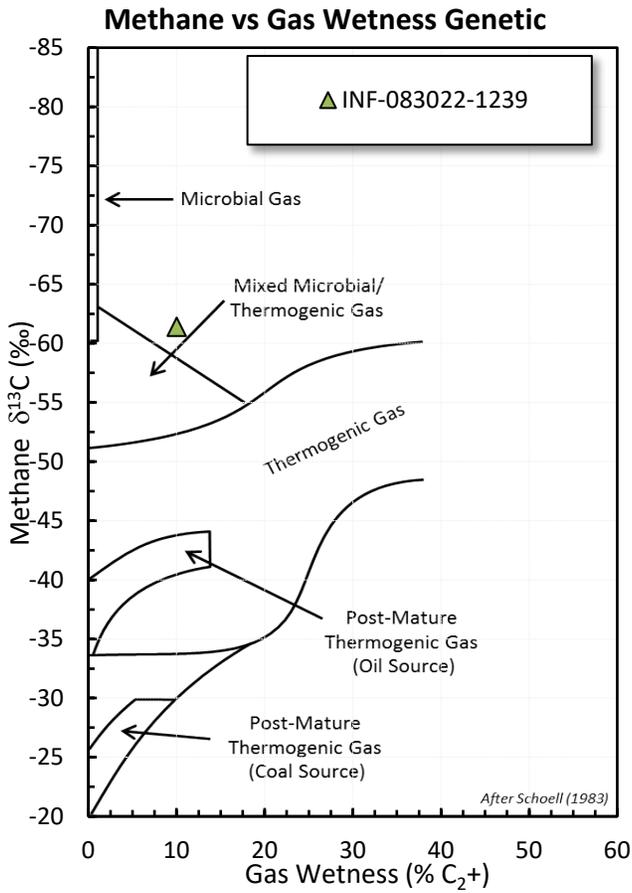
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



Job 22088147
DIG-029019



main 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:		Send Invoice to (if different):		Additional:
Name: Muri Premer / Paul Shrewsbury		Name: Ben Shrewsbury		AFE #:
Company: Summit Scientific		Company: Summit Scientific		Project: 2208440
Address: 4653 Table Mountain Drive		Address: 4653 Table Mountain Drive		PO #:
City, State: Golden, CO 80403		City, State: Golden, CO 80403		Location:
Phone: 303-277-9310		Phone: 303-277-9310		Sampled By:
Email: mpremer@s2scientific.com / pshrewsbury@s2scientific.com		Email: bshrewsbury@s2scientific.com		API #:

Turnaround Time**:

Standard (≤ 10 Business days)
 Rush (≤ 5 Business days)
 Expedited Rush ()

Container Number	Sample Identification	Date Sampled	Time	Sample Type*	Gas Composition	d13C of Methane (C1)	d13C of Ethane (C2)	d13C of Propane+ (C3+)	d13C of Carbon Dioxide (CO2)	d13C of Methane (C1)
	INF-083022-1239	8/30/22	12:39	Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>

Chain of Custody Record

Comments:

Relinquished by Signature	Company	Date	Time	Received by Signature	Company
	Summit Scientific	8/31/22	9:53		DIG

*Gas composition vs RSK-175 - Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., of exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

** Rush and Expedited Rush turnaround time analysis will incur additional costs at 2x and 3x the standard turnaround time pricing.



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

Project: DWR Permit #137465

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

Reported:
10/18/22 09:42

Notes and Definitions

- S-01 The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference's.
- 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