

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

November 06, 2020

Karen Olson

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: DWR Permit #137465

Work Order #2011057

Enclosed are the results of analyses for samples received by Summit Scientific on 11/05/20 18:03. 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:
11/06/20 16:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EFF-110520-1026	2011057-01	Water	11/05/20 10:26	11/05/20 18:03
INF-110520-1107	2011057-02	Water	11/05/20 11:07	11/05/20 18:03

Summit Scientific

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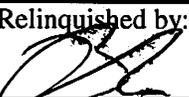
S₂

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

2011057

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: 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)	D20 - Gas (Compressor)	D20 - Methane (Injection)	D20 - Methane (Hydrogen)			
1	EFF-110520-1026	11/5/20	1026	3			X		X					X					4th container for Inf-110520 sample is for IsoFlesh (SN F098T)
2	IHF-110520-1107	11/5/20	1107	4			X		X					X	X	X			D20 analysis for IsoFlesh
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished by:  Date/Time: 11/5/20 1450	Received by: Tasman Lock box Date/Time: 11/5/20 1450	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: 2.6 Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Notes: Please provide data in PDF and COGCC EDD formats. COGCC Facility No.: 754070
Relinquished by: Tasman Lock Box Date/Time: 11/05/20 1450	Received by:  Date/Time: 11/05/20 1450		
Relinquished by: Date/Time:	Received by: Date/Time:		

Sample Receipt Checklist

S2 Work Order 2011057

Client: POC TABMAN

Client Project ID: DNR PERMIT # B746E

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

Matrix (check all that apply): Air Soil/Solid Water Other: _____ (Describe)

Temp (°C)	<u>2.6</u>
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Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Additional Comments (if any):				

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

BS
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

11/05/2000
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:
 11/06/20 16:08

EFF-110520-1026
2011057-01 (Water)

Summit Scientific

Dissolved Gases by RSK-175

Date Sampled: **11/05/20 10:26**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Methane	4.4	1.0	mg/L	100	BDK0076	11/05/20	11/06/20	RSK-175 mod	
Ethane	2.7	1.0	"	"	"	"	"	"	
Propane	1.9	1.0	"	"	"	"	"	"	

Date Sampled: **11/05/20 10:26**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: Ethene</i>		120 %	70-130		"	"	"	"	

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

Project: DWR Permit #137465

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

Reported:
 11/06/20 16:08

INF-110520-1107
2011057-02 (Water)

Summit Scientific

Dissolved Gases by RSK-175

Date Sampled: **11/05/20 11:07**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Methane	11	1.0		mg/L	100	BDK0076	11/05/20	11/06/20	RSK-175 mod	
Ethane	3.5	1.0		"	"	"	"	"	"	
Propane	2.4	0.10		"	10	"	"	"	"	

Date Sampled: **11/05/20 11:07**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: Ethene</i>		107 %		70-130		"	"	"	"	

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

Project: DWR Permit #137465

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

Reported:
11/06/20 16:08

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 BDK0076 - GC

Blank (BDK0076-BLK1)

Prepared: 11/05/20 Analyzed: 11/06/20

Methane	ND	0.010	mg/L								
Ethane	ND	0.010	"								
Propane	ND	0.010	"								
<i>Surrogate: Ethene</i>	<i>0.0418</i>		<i>"</i>	<i>0.0364</i>		<i>115</i>	<i>70-130</i>				

LCS (BDK0076-BS1)

Prepared: 11/05/20 Analyzed: 11/06/20

Methane	0.034	0.010	mg/L	0.0428		78.8	70-130				
Ethane	0.092	0.010	"	0.0798		115	70-130				
Propane	0.13	0.010	"	0.139		97.2	70-130				
<i>Surrogate: Ethene</i>	<i>0.0880</i>		<i>"</i>	<i>0.0728</i>		<i>121</i>	<i>70-130</i>				

Duplicate (BDK0076-DUP1)

Source: 2011057-01

Prepared: 11/05/20 Analyzed: 11/06/20

Methane	3.6	1.0	mg/L		4.4			19.3	30		
Ethane	2.9	1.0	"		2.7			7.22	30		
Propane	2.0	1.0	"		1.9			5.33	30		
<i>Surrogate: Ethene</i>	<i>0.0430</i>		<i>"</i>	<i>0.0364</i>		<i>118</i>	<i>70-130</i>				

Matrix Spike (BDK0076-MS1)

Source: 2011057-01

Prepared: 11/05/20 Analyzed: 11/06/20

Methane	3.3	1.0	mg/L	0.0428	4.4	NR	70-130				QM-02
Ethane	1.9	1.0	"	0.0798	2.7	NR	70-130				QM-02
Propane	1.4	1.0	"	0.139	1.9	NR	70-130				QM-02
<i>Surrogate: Ethene</i>	<i>0.0700</i>		<i>"</i>	<i>0.0728</i>		<i>96.1</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 #: 20114803
Lab #: DIG-024054
Client: Summit Scientific
Sample Name(s): INF-110520-1107; DWR Permit #137465

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.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall

Analytical Report



Job #: 20114803
 Lab #: DIG-024054
 Client: Summit Scientific
 Sample Name: INF-110520-1107; DWR Permit #137465
 Date Sampled: 11/05/20
 Time Sampled: 11:07
 Sample Description: Isoflask
 Sampling Notes:
 Date Received: 11/06/20
 Date Analyzed: Gas Composition: 11/7/20 $\delta^{13}\text{C}$: 11/9/20 δD : 11/11/20
 Date Reported: 11/12/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	114377	20.97	-	-	-	
Oxygen + Argon (O ₂ +Ar)	8012	1.47	-	-	-	
Carbon Dioxide (CO ₂)	1377	0.25	-	-	-	
Helium (He) ^b	na	nd	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	371640	68.14	88.14	-57.8	-269	
Ethane (C ₂ H ₆)	33369	6.12	7.91	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	13081	2.40	3.10	-	-	
iso-Butane (C ₄ H ₁₀)	1102	0.20	0.26	-	-	
n-Butane (C ₄ H ₁₀)	1962	0.36	0.47	-	-	
iso-Pentane (C ₅ H ₁₂)	240	0.04	0.06	-	-	
n-Pentane (C ₅ H ₁₂)	190	0.03	0.05	-	-	
Hexanes + (C ₆ H ₁₄)	73	0.01	0.02	-	-	

Calculated Values:	
Total HCs (ppm)	421656
Gas Wetness (mol % C ₂ +C ₁ +))	11.86
C ₁ /(C ₂ +C ₃) (mol/mol)	8

^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

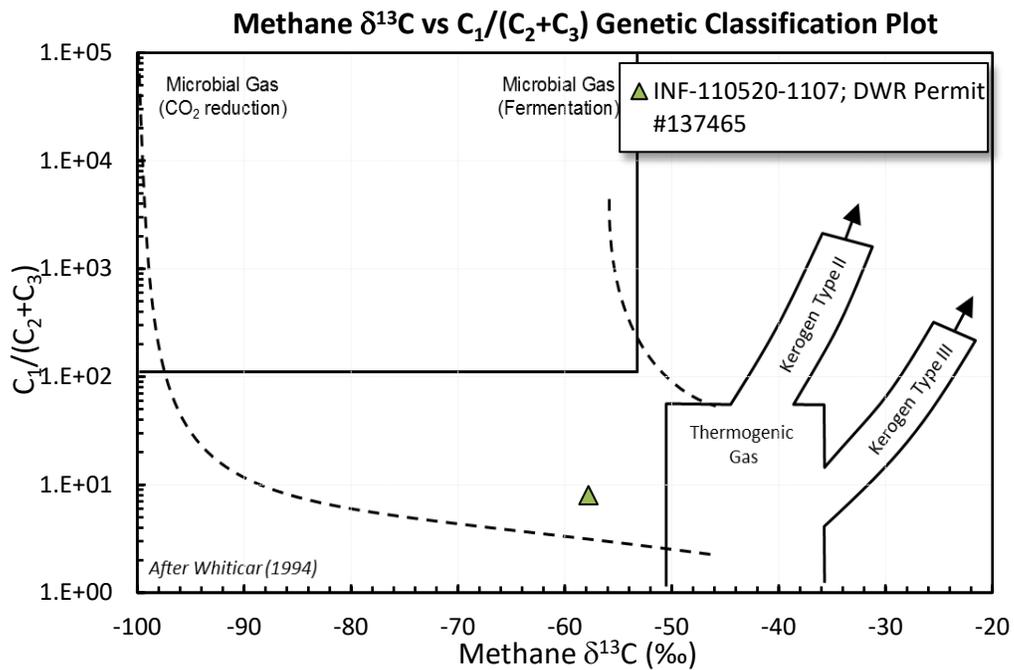
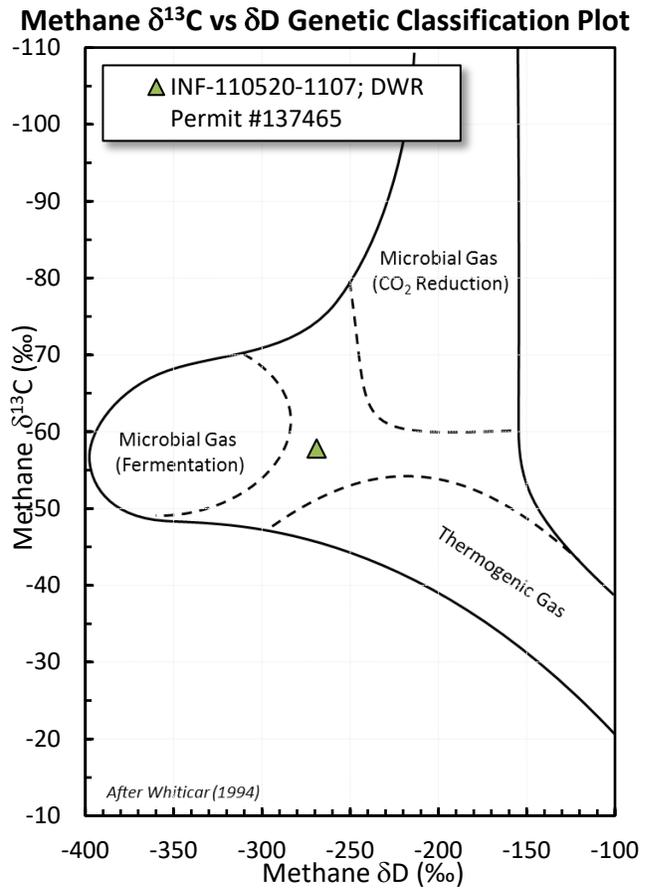
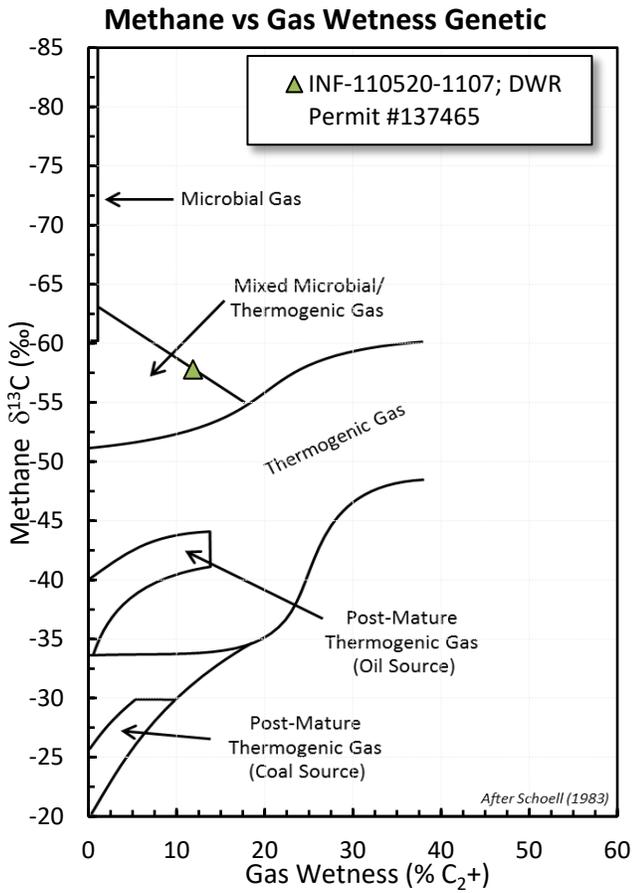
na = not analyzed

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 20114803 DIG-024054



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 Information:
Name: Muri Premer / Paul Shrewsbury	Name: Ben Shrewsbury	AFE #: EX-000335
Company: Summit Scientific	Company: Summit Scientific	Project: 2011057
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 (≤ 3 Business days)

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)	dD of Methane (C1)	Whole Oil Gas Chromatography	d18O and dD Isotopes of Water	RSK 175 Dissolved Gas Quantification
	INF-110520-1107	11/5/20	11:07	Water	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Chain of Custody Record

Comments:

Relinquished By Signature	Company	Date	Time	Received by Signature	Company	Date	Time
	Summit Scientific	11/04/2020			DIG	11/16/20	1236

*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 technique combined with 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., gas wetness). RSK-175 gives us an 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:
11/06/20 16:08

Notes and Definitions

- QM-02 The RPD and/or percent recovery for this QC spike 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