

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

May 18, 2021

Karen Olson

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: DWR Permit #137465

Work Order #2105179

Enclosed are the results of analyses for samples received by Summit Scientific on 05/13/21 18:14. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Muri Premer", is displayed on a light purple rectangular background.

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:
05/18/21 14:49

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EFF-051321-1255	2105179-01	Water	05/13/21 12:55	05/13/21 18:14
INF-051321-1355	2105179-02	Water	05/13/21 13:55	05/13/21 18:14

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

Page 1 of 1

Project Manager:	MD Mark Longhurst Karen Olson
E-Mail:	MD Mark.Longhurst@pdcc.com Karen.Olson@Pdcc.com
Project Name:	DWR Permit # 137465
Project Number:	AFE # EX-000335

				Preservative				Matrix				Analyze For:										
Sample Description	Date Sampled	Time Sampled	Number of Containers	HCl	HNO ₃	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	BK-175 (Dissolved Gases)	DIG Gas Concentration	DIG Methan Carbon	DIG Methane Hydrogen	Special Instructions						
EFF-051321-1255	5/13/21	1255	3			X		X				X					4th Container for INF-051321 sample is Iso Flask (FOAGY)					
INF-051321-1355	5/13/21	1355	4			X		X				X	x	x	x							
Relinquished by: [Signature] Date/Time: 5/13/21 1502				Received by: Tasman Lock Box Date/Time: 5/13/21 1502				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"/>														
Relinquished by: Tasman Lock Box 5/13/21 1750				Received by: [Signature] Date/Time: 5/13/21 1750				Sample Integrity: Temperature Upon Receipt: 6 Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>														
Relinquished by:				Received in Lab by:																		

Sample Receipt Checklist

S2 Work Order 2105179

Client: POL / Tasman Client Project ID DWR Permit #137465

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

☐ ☒ ☐ ☐ ☐

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

Temp (°C)	6
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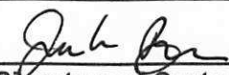
Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	On ice
NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.				
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"/>	24 hours
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⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect				
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Record the pH in Comments.				
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.

JB
Custodian Printed Name or Initials


Signature of Custodian

5/13/21
Date/Time



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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:
05/18/21 14:49

EFF-051321-1255
2105179-01 (Water)

Summit Scientific

Dissolved Gases by RSK-175

Date Sampled: **05/13/21 12:55**

Analyte	Result	Reporting		Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit	Units						
Methane	3.4	1.0	mg/L	100	BEE0242	05/13/21	05/14/21	RSK-175 mod	
Ethane	2.6	0.10	"	10	"	"	"	"	
Propane	1.5	0.10	"	"	"	"	"	"	

Date Sampled: **05/13/21 12:55**

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

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Project: DWR Permit #137465
Project Number: AFE #EX-000335
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Reported:
05/18/21 14:49

INF-051321-1355
2105179-02 (Water)

Summit Scientific

Dissolved Gases by RSK-175

Date Sampled: **05/13/21 13:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Methane	12	1.0		mg/L	100	BEE0242	05/13/21	05/14/21	RSK-175 mod	
Ethane	4.9	1.0		"	"	"	"	"	"	
Propane	2.6	1.0		"	"	"	"	"	"	

Date Sampled: **05/13/21 13:55**

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:
05/18/21 14:49

Dissolved Gases by RSK-175 - Quality Control
Summit Scientific

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

Batch BEE0242 - GC

Blank (BEE0242-BLK1)

Prepared: 05/13/21 Analyzed: 05/14/21

Methane	ND	0.010	mg/L							
Ethane	ND	0.010	"							
Propane	ND	0.010	"							
Surrogate: Ethene	0.0435		"	0.0364		120	70-130			

LCS (BEE0242-BS1)

Prepared: 05/13/21 Analyzed: 05/14/21

Methane	0.030	0.010	mg/L	0.0428		70.4	70-130			
Ethane	0.083	0.010	"	0.0798		104	70-130			
Propane	0.12	0.010	"	0.139		86.1	70-130			
Surrogate: Ethene	0.0847		"	0.0728		116	70-130			

Duplicate (BEE0242-DUP1)

Source: 2105179-01

Prepared: 05/13/21 Analyzed: 05/14/21

Methane	5.0	1.0	mg/L		3.4			39.2	30	QR-03
Ethane	4.0	1.0	"		2.6			43.2	30	QR-03
Propane	3.4	1.0	"		1.5			75.2	30	QR-03
Surrogate: Ethene	0.0700		"	0.0364		192	70-130			S-06

Matrix Spike (BEE0242-MS1)

Source: 2105179-01

Prepared: 05/13/21 Analyzed: 05/14/21

Methane	3.9	1.0	mg/L	0.0428	3.4	NR	70-130			QM-05
Ethane	2.0	1.0	"	0.0798	2.6	NR	70-130			QM-05
Propane	1.4	0.10	"	0.139	1.5	NR	70-130			QM-05
Surrogate: Ethene	0.0800		"	0.0728		110	70-130			

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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 #: 21055734
Lab #: DIG-025360
Client: Summit Scientific
Sample Name(s): INF-051321-1355

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 #: 21055734
Lab #: DIG-025360
Client: Summit Scientific
Sample Name: INF-051321-1355
Date Sampled: 05/13/21
Time Sampled: 13:55
Sample Description: Isoflask
Sampling Notes:
Date Received: 05/14/21
Date Analyzed: Gas Composition: 05/14/21 $\delta^{13}\text{C}$: 05/17/21 δD : 05/14/21
Date Reported: 05/18/21
Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N_2)	361657	35.50	-	-	-	
Oxygen + Argon (O_2+Ar)	78416	7.70	-	-	-	
Carbon Dioxide (CO_2)	1277	0.13	-	-	-	
Helium (He) ^b	232	0.02	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	489071	48.01	84.74	-54.0	-271	
Ethane (C_2H_6)	57764	5.67	10.01		-	
Ethene (C_2H_4)	nd	nd	nd		-	
Propane (C_3H_8)	23077	2.27	4.00		-	
iso-Butane (C_4H_{10})	2224	0.22	0.39		-	
n-Butane (C_4H_{10})	3808	0.37	0.66		-	
iso-Pentane (C_5H_{12})	547	0.05	0.09		-	
n-Pentane (C_5H_{12})	421	0.04	0.07		-	
Hexanes + (C_6H_{14})	209	0.02	0.04		-	

Calculated Values:	
Total HCs (ppm)	577121
Gas Wetness (mol % C_2+C_1+)	15.26
$\text{C}_1/(\text{C}_2+\text{C}_3)$ (mol/mol)	6

^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

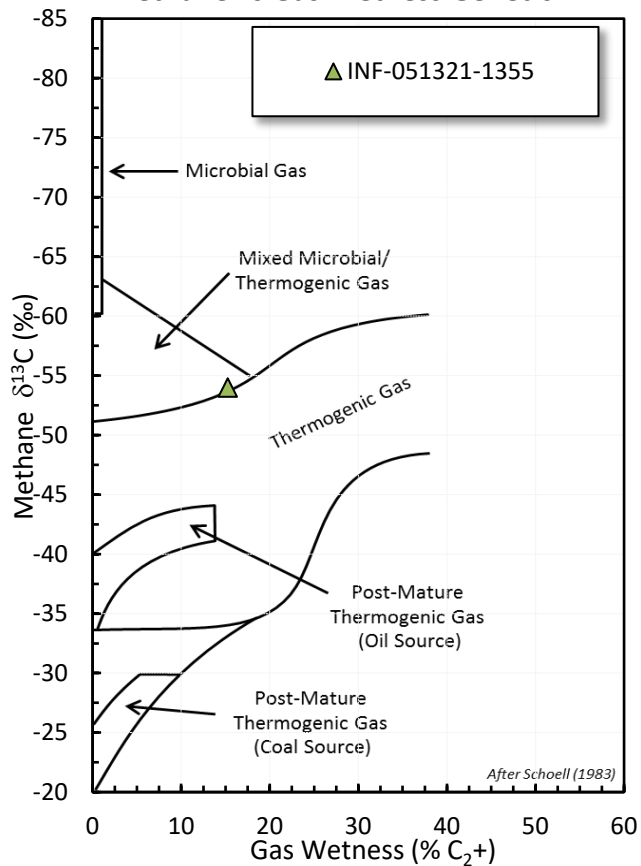
Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

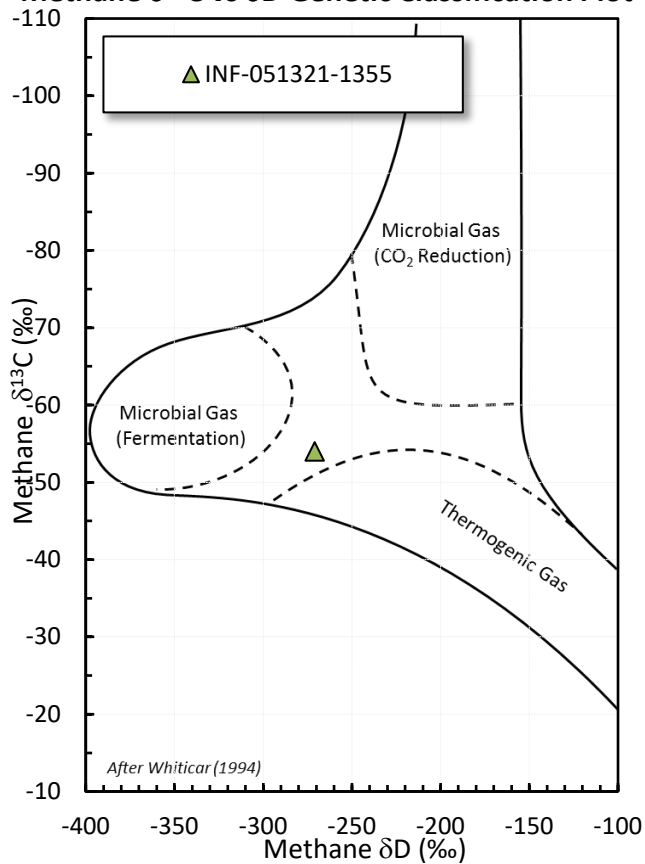
Error δD < 5.0 ‰

Stable Isotope Interpretive Plots

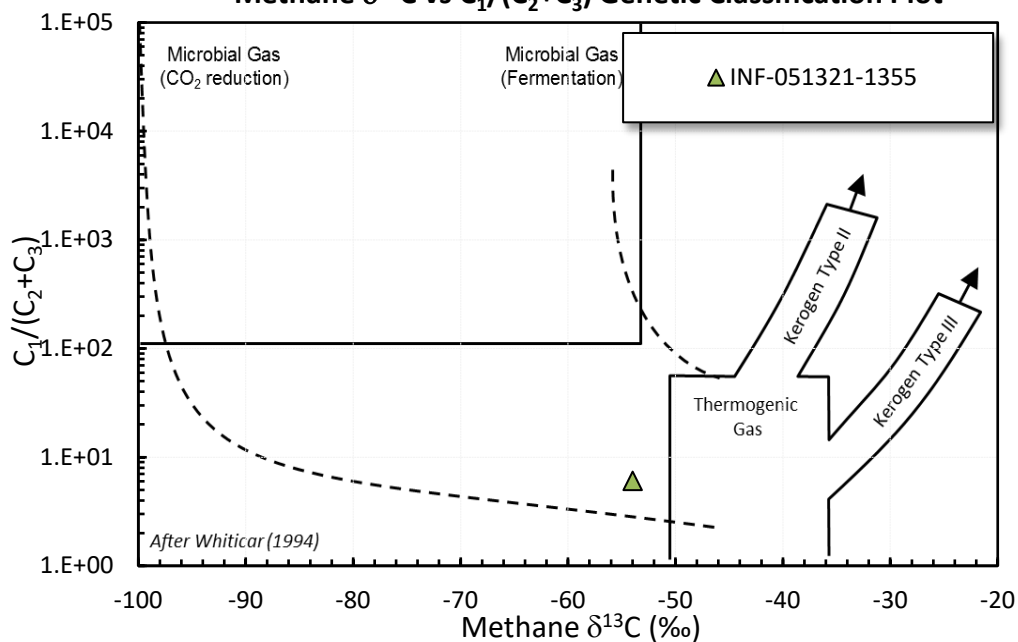
Methane vs Gas Wetness Genetic



Methane $\delta^{13}\text{C}$ vs δD Genetic Classification Plot



Methane $\delta^{13}\text{C}$ vs $\text{C}_1/(\text{C}_2+\text{C}_3)$ Genetic Classification Plot



Geochemistry
for Energymain 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021JOB 21055734
DIG - 025360

Send Data to:		Send Invoice to (if different):		Additional Information:	
Name: Muri Premer / Paul Shrewsbury		Name: Ben Shrewsbury		AFE #:	
Company: Summit Scientific		Company: Summit Scientific		Project: 2105179	
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**:	<input type="radio"/> Standard (≤ 10 Business days)	<input type="radio"/> Rush (≤ 5 Business days)	<input checked="" type="radio"/> Expedited Rush (≤ 3 Business days)
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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-051321-1355	5/13/21	13:55	Water	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input 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"/>
				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
<i>Paul Ben</i>	Summit Scientific	5/14/21	1240	<i>audenich naye</i>	DSB	5/14/21	1243

*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:
05/18/21 14:49

Notes and Definitions

S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.
QR-03	The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
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.
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