



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 #: 240411591
Lab #: DIG-035313
Client: Olsson
Well Name: SCMW042524
API #:

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



Client/Well Name: Olsson / SCMW042524
Job #: 240411591
Lab #: DIG-035313

SAMPLE INFORMATION						COMPLETE GAS ANALYSIS																HYDROCARBON GAS ANALYSIS (normalized to total HC content)										BTU CONTENT*	
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	GC Date	N ₂ ppm	O ₂ + Ar ppm	CO ₂ ppm	C ₁ ppm	C ₂ ppm	C ₃ ppm	iC ₄ ppm	nC ₄ ppm	iC ₅ ppm	nC ₅ ppm	C ₆ + ppm	C ₂ H ₄ ppm	He ppm	H ₂ ppm	C ₁ mol%	C ₂ mol%	C ₃ mol%	iC ₄ mol%	nC ₄ mol%	iC ₅ mol%	nC ₅ mol%	C ₆ + mol%	Total Gas BTU/ft ³				
240411591	DIG-035313	SCMW042524 Gas	Gas	04/25/24	10:30	4/26/24	447015	116034		345176	56834	23560	3143	6071	1336	1004	308				78.9	12.99	5.39	0.72	1.39	0.31	0.23		0.07	550			

SAMPLE INFORMATION						HYDROCARBON RATIOS						STABLE ISOTOPE ANALYSIS											
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Total HC ppm	Wetness % C ₁ to C ₅	C ₁ /C ₂ +C ₃ mol/mol	Balance Ratio C ₁ +C ₂ /C ₃ -C ₅	Mass Spec Date	δ ¹³ C ₁ ‰ VPDB	δ ¹³ C ₂ ‰ VPDB	δ ¹³ C ₃ ‰ VPDB	δ ¹³ iC ₄ ‰ VPDB	δ ¹³ nC ₄ ‰ VPDB	δ ¹³ iC ₅ ‰ VPDB	δ ¹³ nC ₅ ‰ VPDB	δ ¹³ CO ₂ ‰ VPDB	δD ‰ VSMOW	Comments			
240411591	DIG-035313	SCMW042524 Gas	Gas	04/25/24	10:30	437432	21.1	4.3	11.4	5/1/2024	-45.4	-31.4	-28.1	-30.6	-27.1	-27.8				-256			

Stable isotope results based on multi-point laboratory calibration

Values in red represent low signal; interpret with caution

precision δ13C < 0.5 ‰

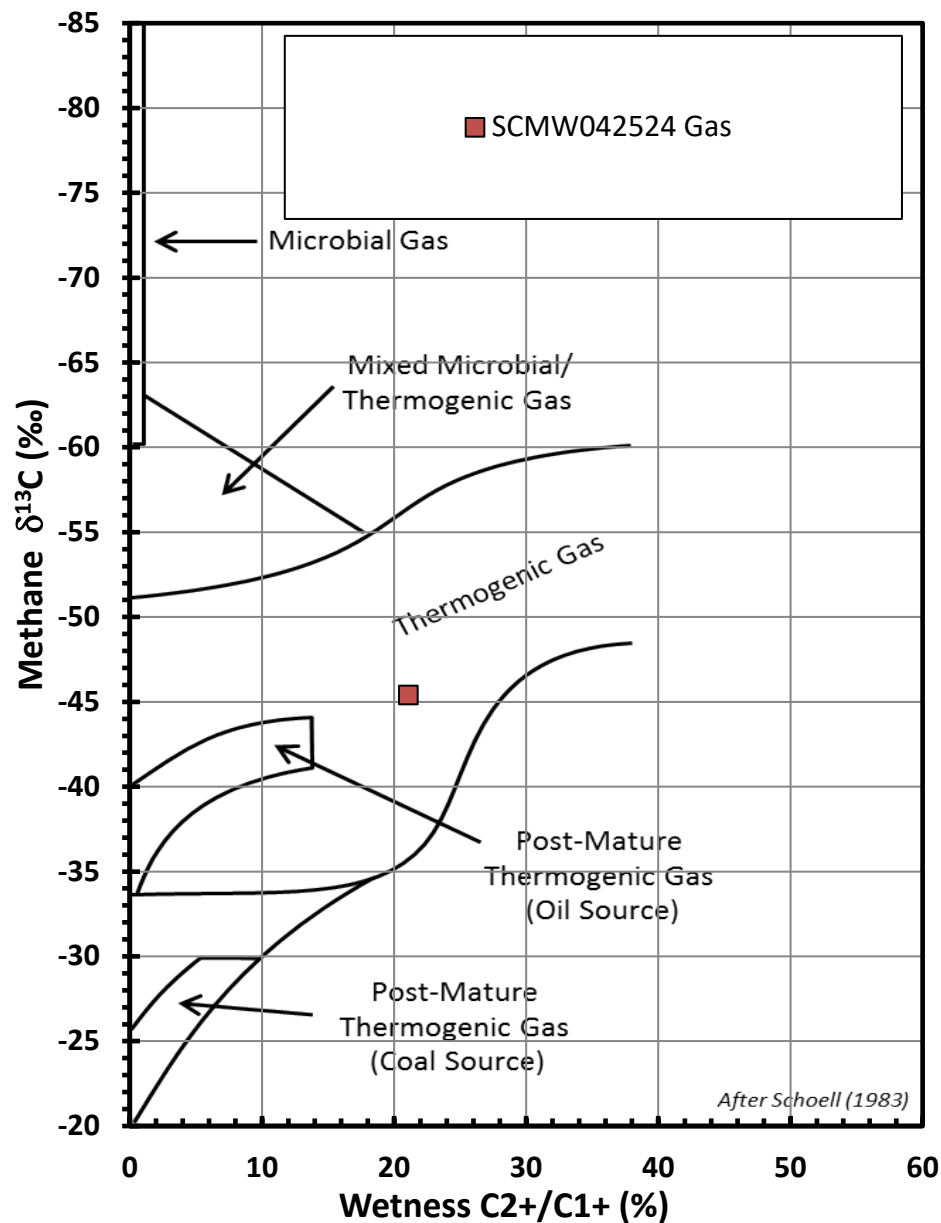
SPECIFIC GRAVITY*		
Total Gas Spec Grav	HCs only Spec Grav	
0.871	0.712	

Stable isotope results based on multi-point laboratory calibration
Values in red represent low signal; interpret with caution
Precision δ13C < 0.5 ‰
Precision δD < 5 ‰
* As ideal gas, with gas concentrations normalized to 100%;
calculations based on GPA 2145-09 physical constants.

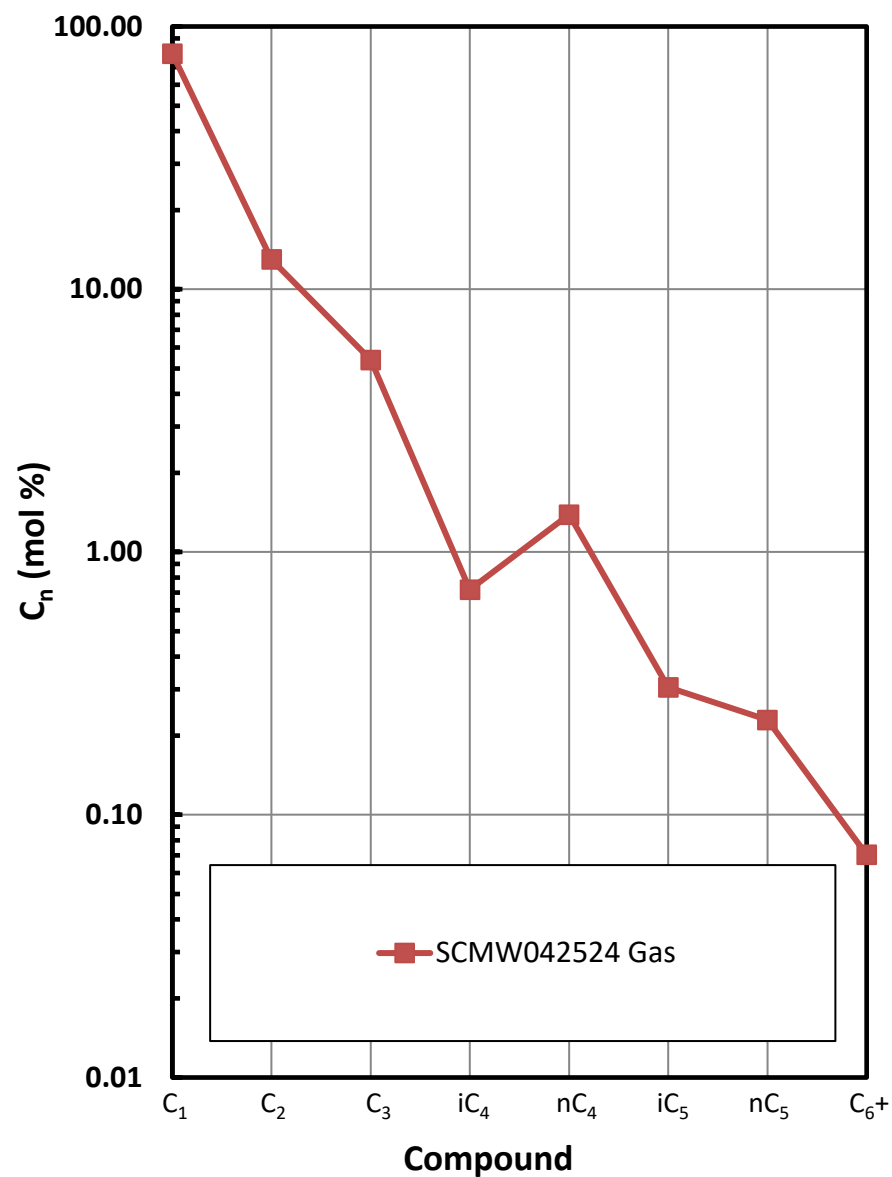
SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
0.871	0.712

INTERPRETIVE PLOTS

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

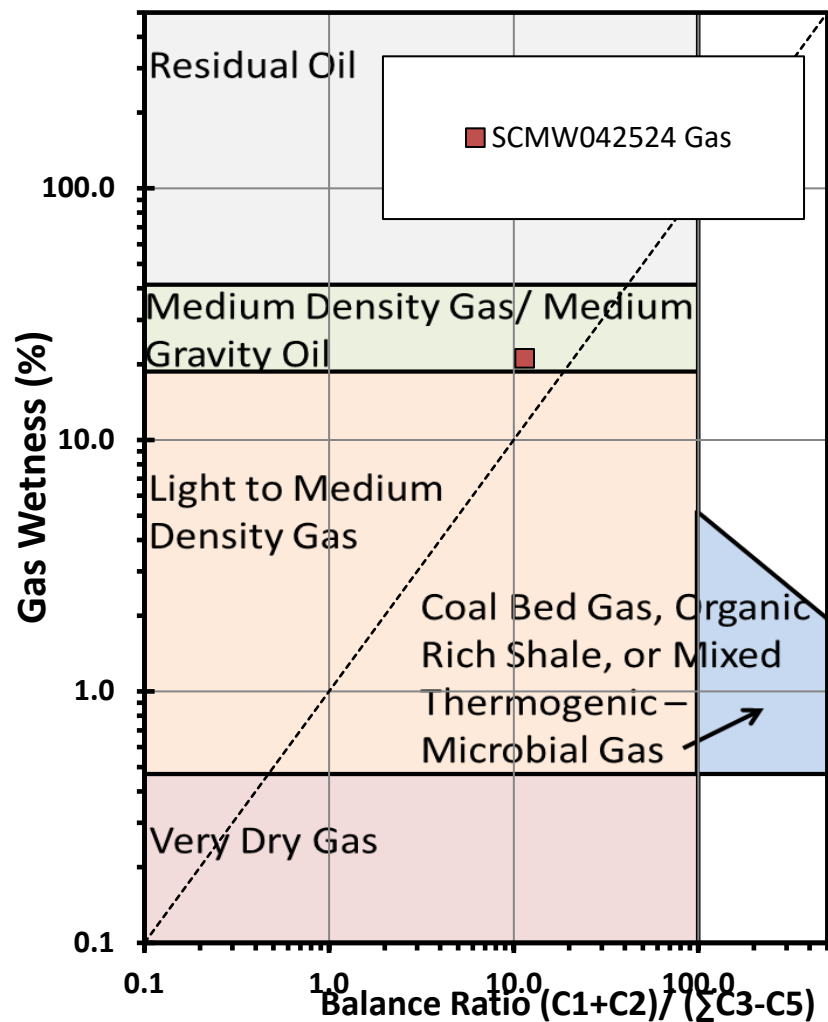


Hydrocarbon Composition Plot

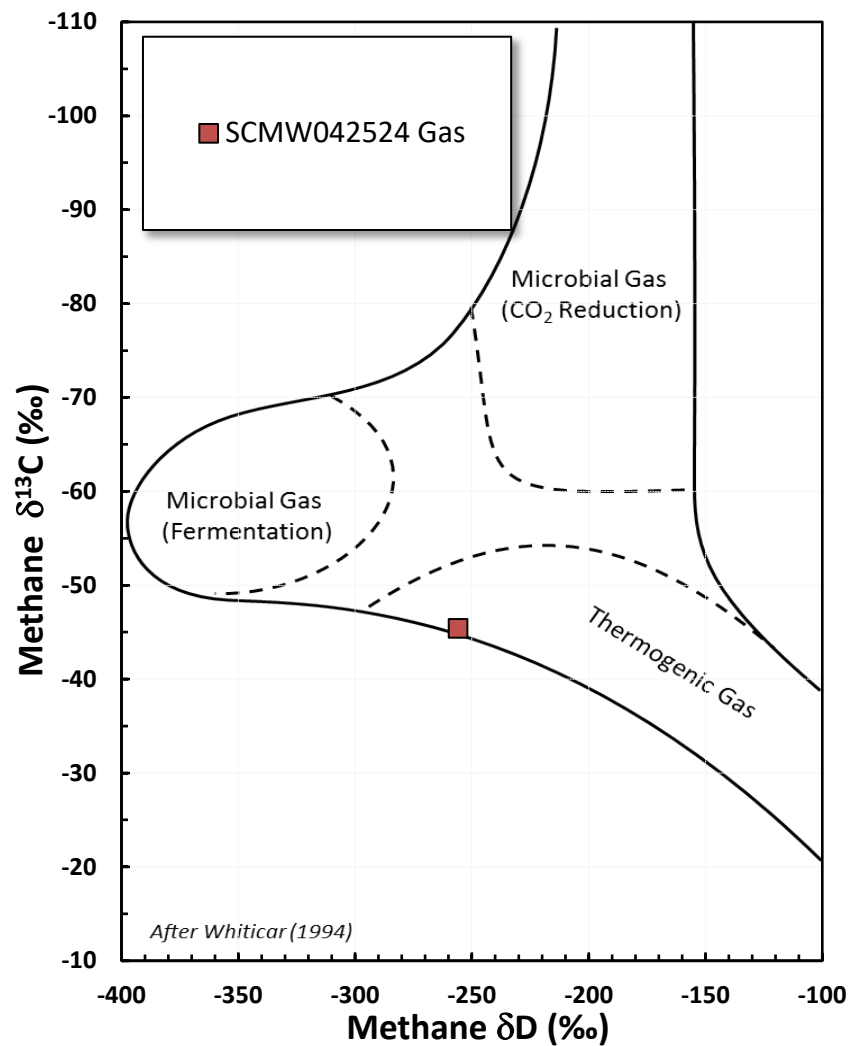


INTERPRETIVE PLOTS

Haworth Ratio Plot - Characterization of Hydrocarbon Type

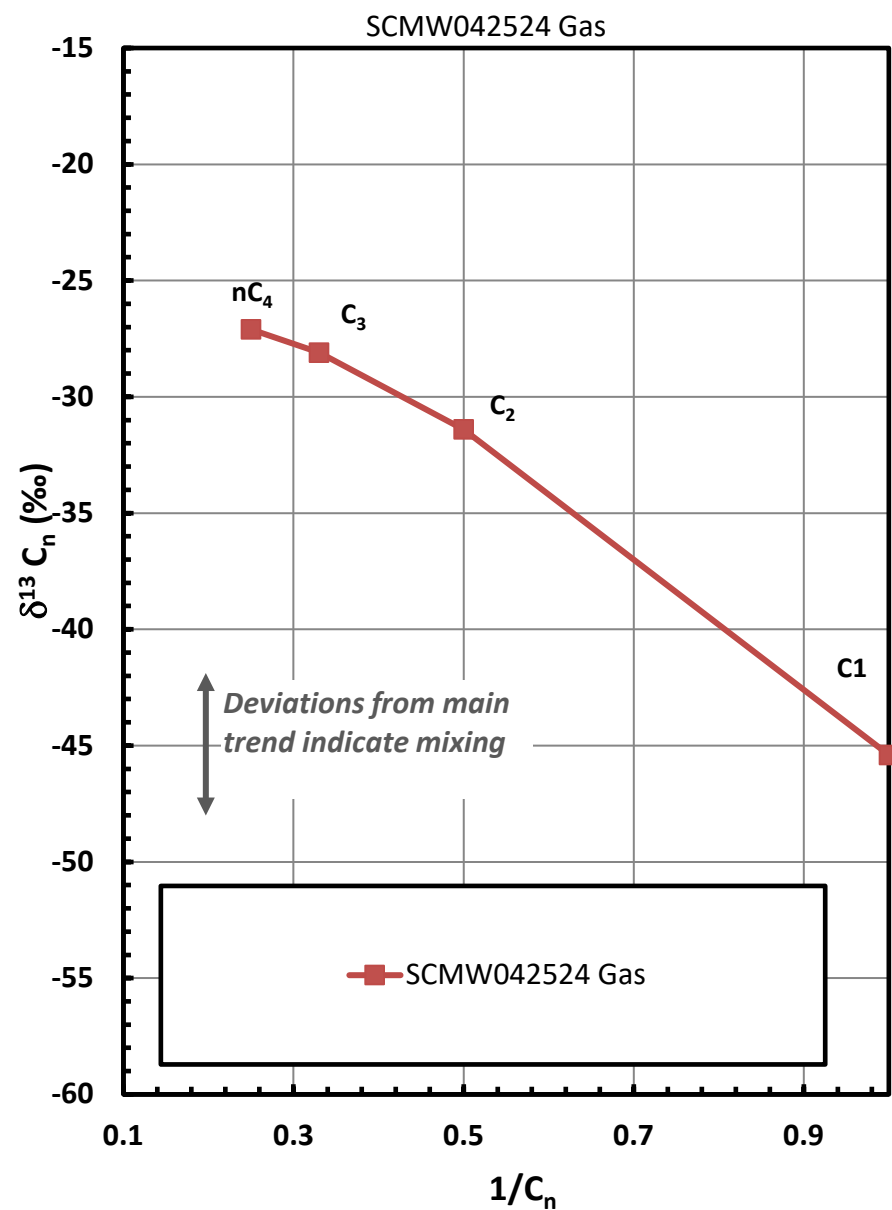


Methane $\delta^{13}C$ vs δD Genetic Classification Plot

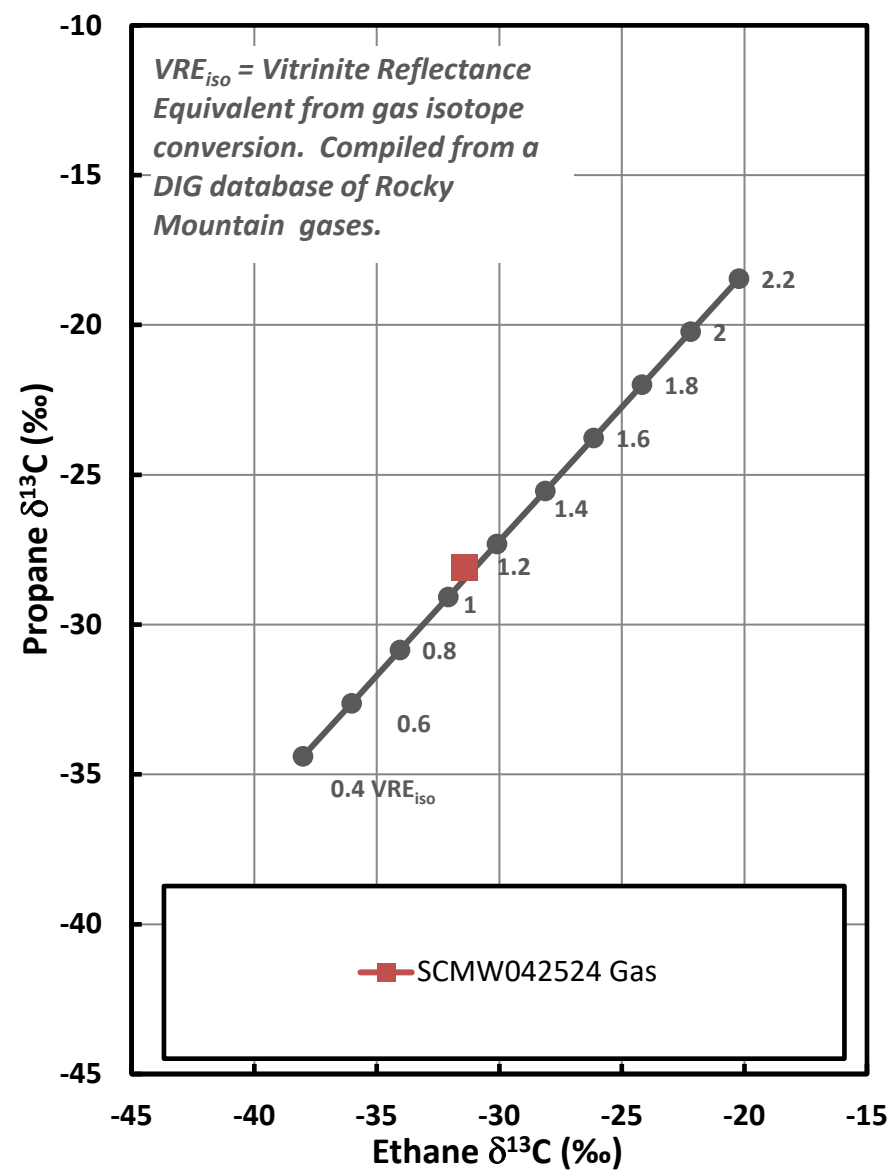


INTERPRETIVE PLOTS

Mixing Plot

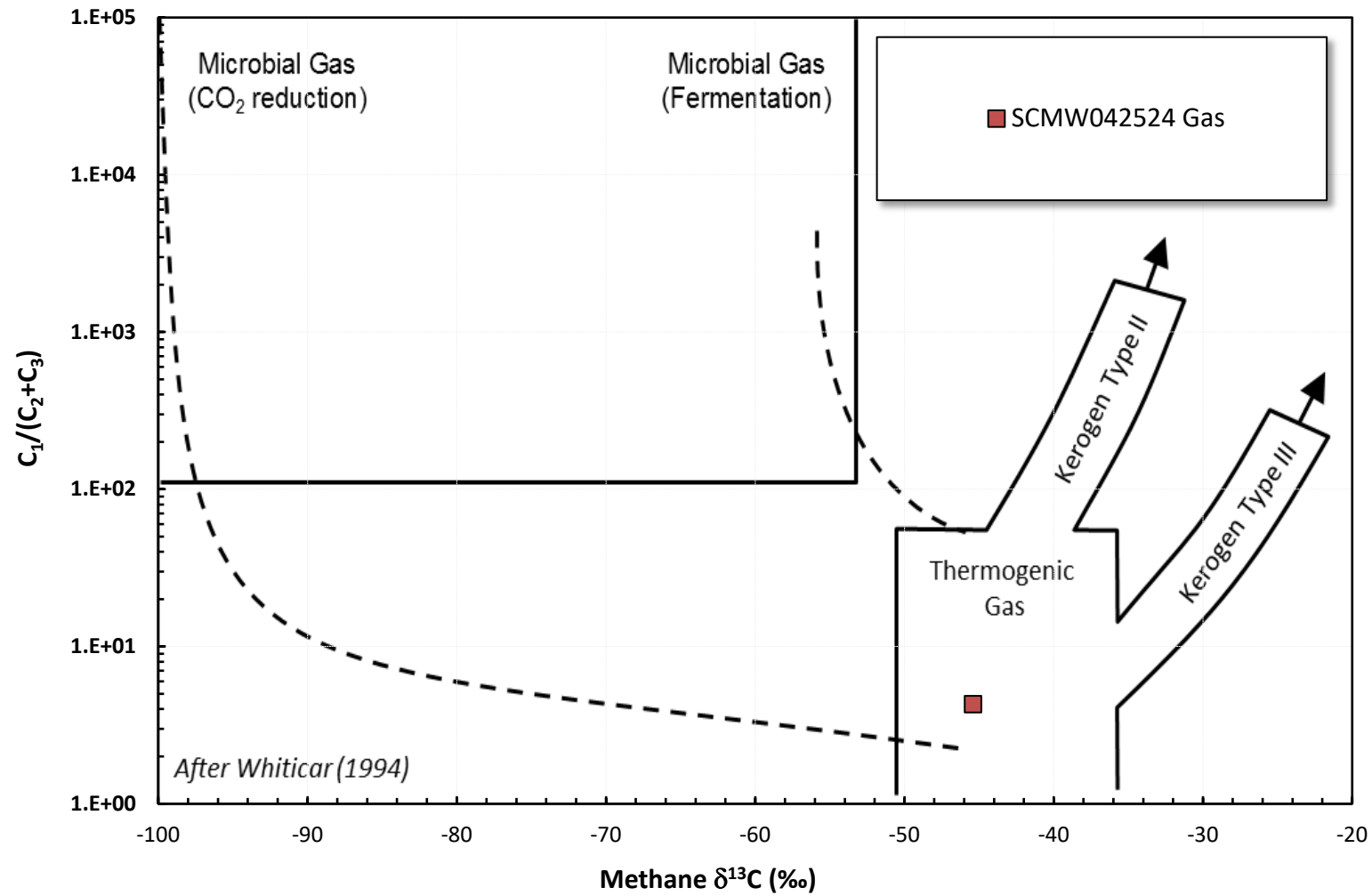


Ethane - Propane Maturity Plot



INTERPRETIVE PLOTS

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



Organization	Reporting Organization	Reporting Organization Name	Order Number	Entity Requesting Analysis	Purpose	Project															
	10206	Dolan Integration Group		Olsson																	
Sample	COGCC Facility No.	Sample Date and Time	API #	LAB Sample ID	Sample Type	Matrix	Comments	Project Number	Chain of Custody ID	Date Received by Lab											
		4/25/24 10:30		DIG-035313		GAS			SCMW042524	4/25/2024											
Batch	LabID	Lab Batch Identifier	Leach Date	Extract Date and Time	Extract Method	Start Date and Time	Conc Method	Init Vol	Final Vol	Init Vol Units	Final Vol Units	Analysis Date and Time	Report Basis	Comments	File Name	Column #					
	10206	240411591																			
Result	CAS Number	Analysis Name	Analysis Method	Analytical Method Modifier	Unit	Result Value	Qualifier	Test Type	Result Text	Data Flag	Dilution	Fraction Type	MDC	Requested MDC	Detection Limit	Instrument Detection Limit	Method Detection Limit	Comments	AnalyticalBatchID		
	O2+AR	OXYGEN + ARGON	SOP		MOL %	11.598									0.005	0.005	0.005		240411591		
	124-38-9	CARBON DIOXIDE	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240411591		
	7727-37-9	NITROGEN (N2)	SOP		MOL %	44.680									0.005	0.005	0.005		240411591		
	7440-59-7	Helium	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240411591		
	1333-74-0	HYDROGEN	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240411591		
	74-82-8	METHANE	SOP		MOL %	34.501									0.005	0.005	0.005		240411591		
	74-84-0	ETHANE	SOP		MOL %	5.681									0.005	0.005	0.005		240411591		
	74-85-1	ETHENE	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240411591		
	74-98-6	PROPANE	SOP		MOL %	2.355									0.005	0.005	0.005		240411591		
	75-28-5	ISOBUTANE	SOP		MOL %	0.314									0.005	0.005	0.005		240411591		
	106-97-8	N-BUTANE	SOP		MOL %	0.607									0.005	0.005	0.005		240411591		
	ICS	ISOPENTANE	SOP		MOL %	0.134									0.005	0.005	0.005		240411591		
	109-66-0	N-PENTANE	SOP		MOL %	0.100									0.005	0.005	0.005		240411591		
	92112-69-1+	C6+ (hexanes +)	SOP		MOL %	0.031									0.005	0.005	0.005		240411591		
	delta13C_C1	DELTA 13C C1	SOP		per mil	-45.4													240411591		
	deltaD_C1	DELTA D C1	SOP		per mil	-256													240411591		
	delta13C_C2	DELTA 13C C2	SOP		per mil	-31.4													240411591		
	delta13C_C3	DELTA 13C C3	SOP		per mil	-28.1													240411591		
	delta13C_iC4	DELTA 13C iC4	SOP		per mil	-30.6													240411591		
	delta13C_nC4	DELTA 13C nC4	SOP		per mil	-27.1				Low Signal									240411591		
	delta13C_iC5	DELTA 13C iC5	SOP		per mil	-27.8				Low Signal									240411591		
	BTU	BRITISH THERMAL UNITS	SOP		BTU/cuft	550				Low Signal									240411591		
	SpGrav	SPECIFIC GRAVITY	SOP		No Unit	0.871													240411591		



dig Geochemistry
for Energy
Dolan Integration Group

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: <u>Trent Wathe</u>	Name:	AFE #:
Company: <u>Olsson</u>	Company:	Project:
Address: <u>1525 Raleigh St, Suite 400</u>	Address:	PO #:
City, State: <u>Denver, CO</u>	City, State:	Location:
Phone: <u>303-237-2072</u>	Phone:	Sampled By:
Email: <u>twathe@olsson.com</u>	Email:	API #:

Turnaround Time**:	<input checked="" type="radio"/> Standard (≤ 10 Business days)	<input type="radio"/> Rush (≤ 5 Business days)	<input type="radio"/> 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)	d13C of Methane (C1)	Whole Oil Gas Chromatography	Isotopes of Water	RSK 175 Dissolved Gas Quantification
	SCMN042524	4/25	1030	Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
				Other	<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"/>			
				Other	<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"/>			
				Other	<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"/>			
				Other	<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"/>			
				Other	<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
<u>[Signature]</u>	<u>Olsson</u>	<u>4/25</u>	<u>14:05</u>	<u>[Signature]</u>	<u>DIG</u>	<u>4/25/24</u>	<u>14:05</u>

*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.