



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 #: 240712151
Lab #: DIG-036343
Client: Olsson
Well Name: SCMW072524
API #:

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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	
240712151	DIG-036343	SCMW072524 Gas	Gas	07/25/24	10:10	7/29/2024	501875	138279	1176	275205	43821	18808	2546	4746	1050	780	93				79.3	12.63	5.42	0.73	1.37	0.30	0.22	0.03	440	

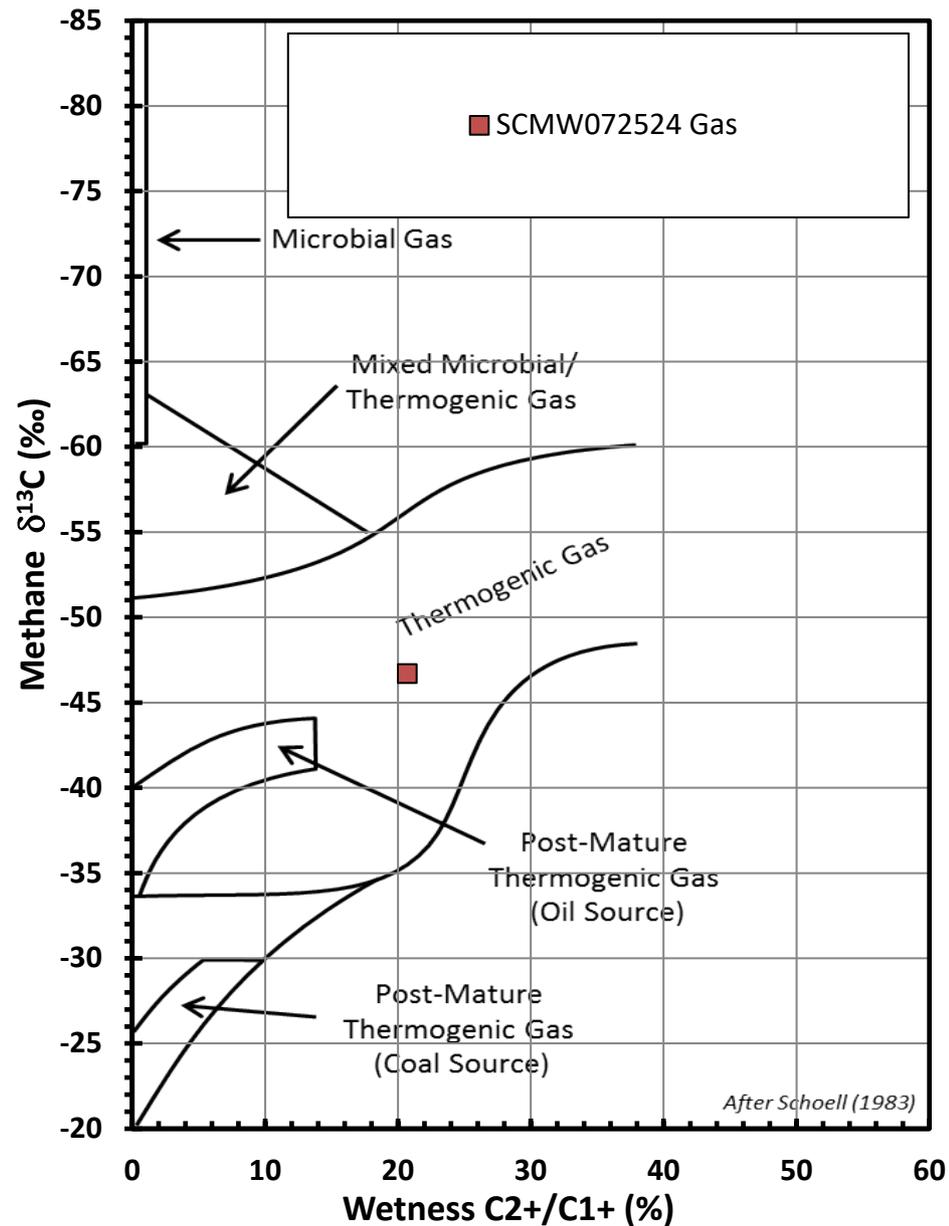
SAMPLE INFORMATION						HYDROCARBON RATIOS				STABLE ISOTOPE ANALYSIS										Comments
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Total HC ppm	Wetness % C ₂ to C ₆	C ₁ /C ₂ +C ₃ mol/mol	Balance Ratio C ₁ +C ₂ /C ₁ -C ₂	Mass Spec Date	δ ¹³ C ₁ ‰ VPDB	δ ¹³ C ₂ ‰ VPDB	δ ¹³ C ₃ ‰ 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	
240712151	DIG-036343	SCMW072524 Gas	Gas	07/25/24	10:10	347049	20.7	4.4	11.4	8/3/2024	-46.7	-31.8	-28.1	-27.0						-257

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 ‰

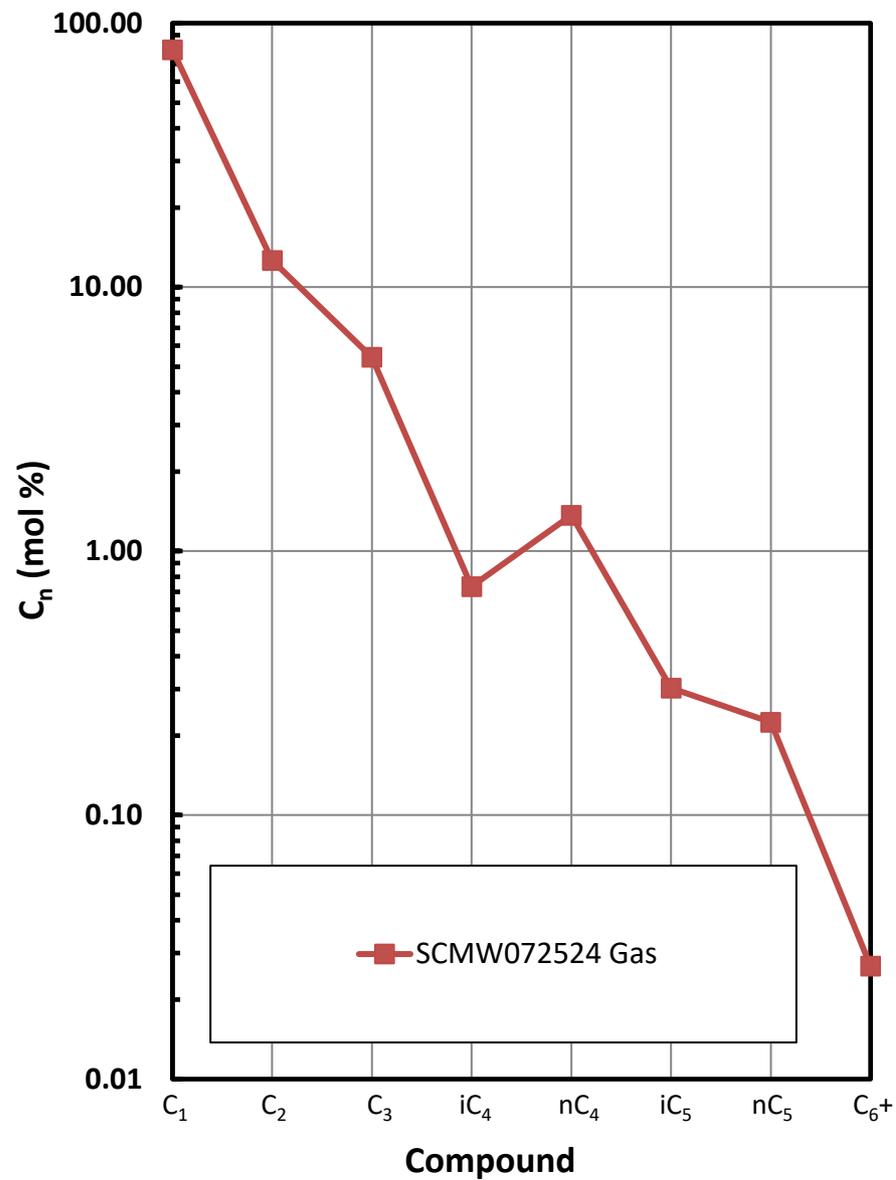
SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
0.896	0.709

* As ideal gas, with gas concentrations normalized to 100%; calculations based on GPA 2145-09 physical constants.

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

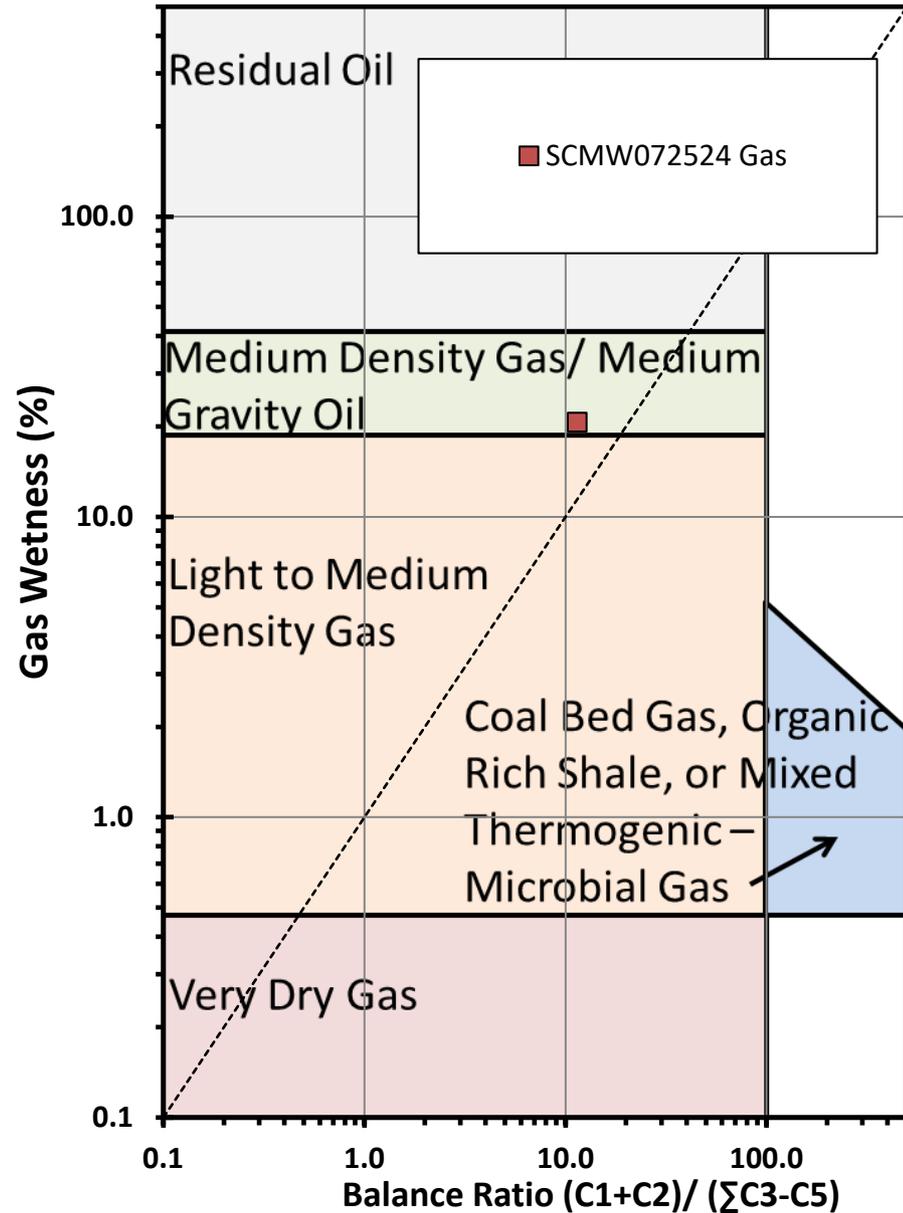


Hydrocarbon Composition Plot

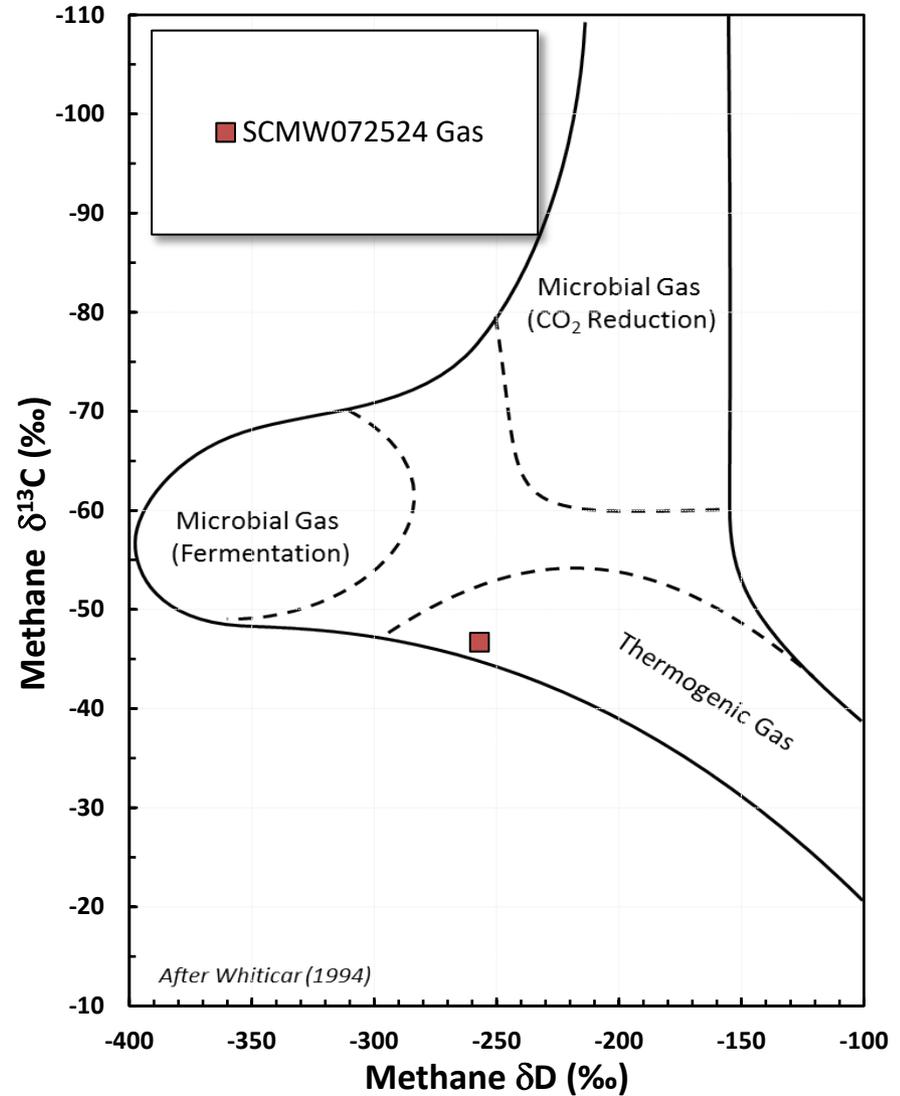


INTERPRETIVE PLOTS

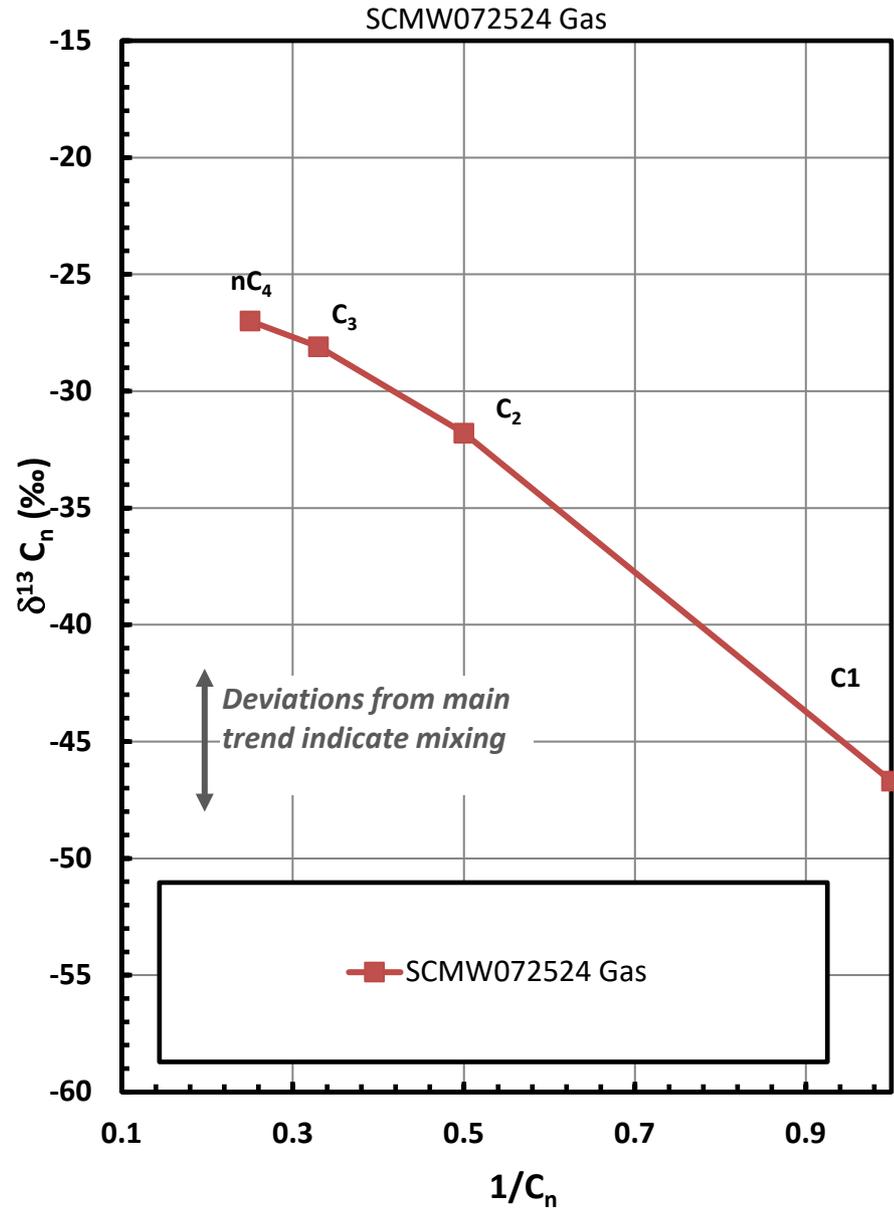
Haworth Ratio Plot - Characterization of Hydrocarbon Type



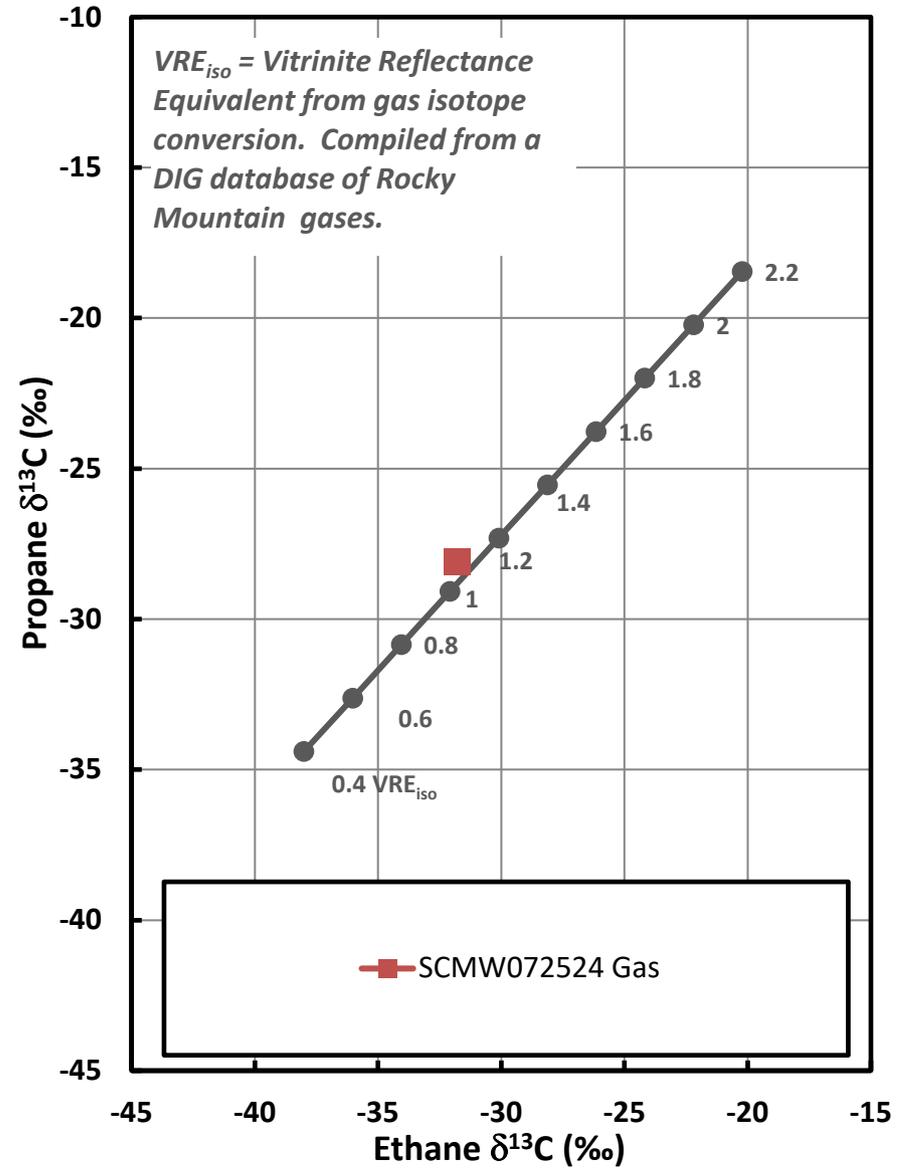
Methane $\delta^{13}C$ vs δD Genetic Classification Plot



Mixing Plot

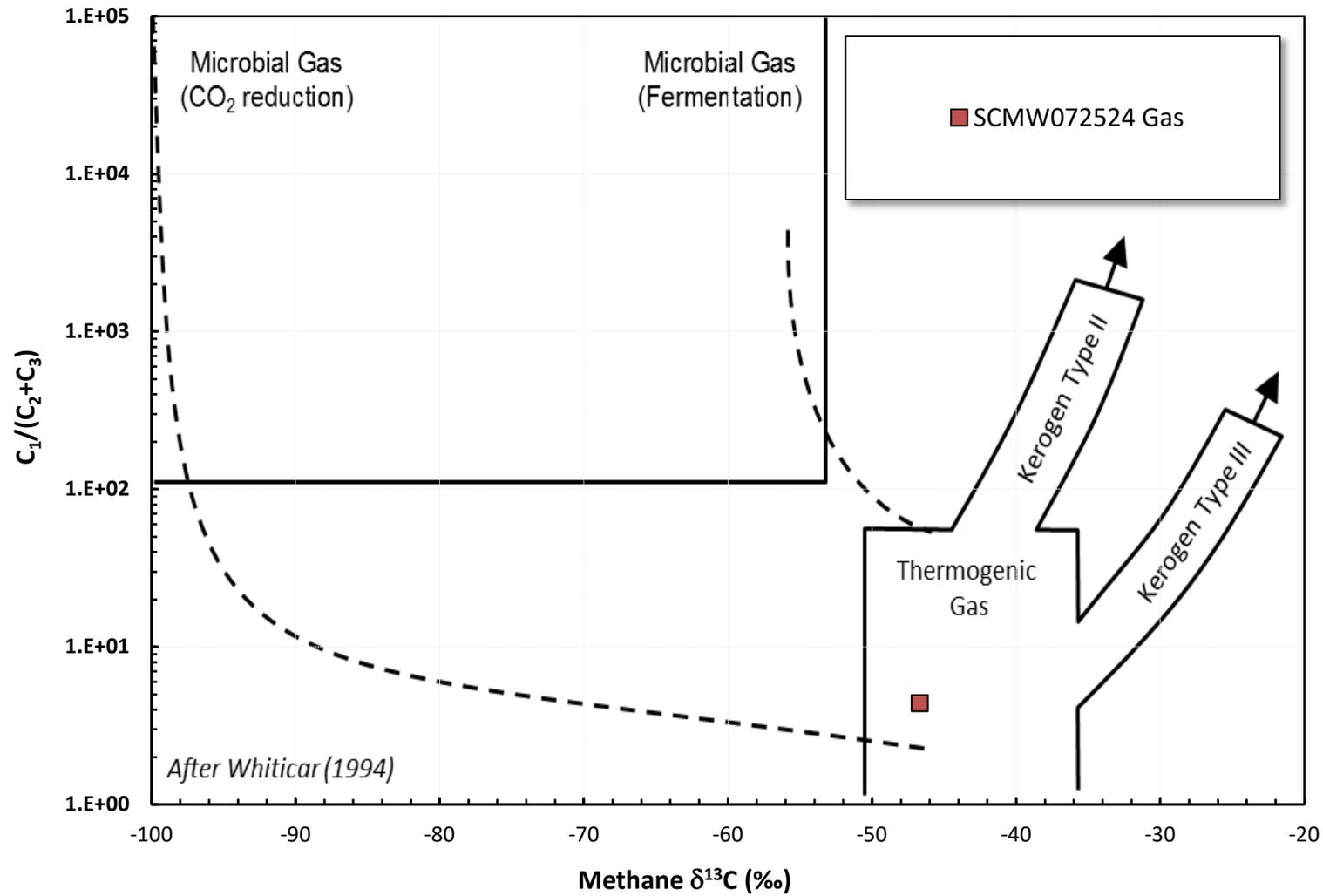


Ethane - Propane Maturity Plot



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	COGCC Facility No.	Dolan Integration Group		Olsson																	
Sample	7/25/24 10:10	Sample Date and Time	API #	LAB Sample ID	Sample Type	Matrix	Comments	Project Number	Chain of Custody ID	Date Received by Lab											
Batch	10206	Lab Batch Identifier	Leach Date	DIG-036343	GAS				SCMW072524	7/25/2024											
Result	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 #					
	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 %	13.991									0.005	0.005	0.005		240712151		
	124-38-9	CARBON DIOXIDE	SOP		MOL %	0.119									0.005	0.005	0.005		240712151		
	7727-37-9	NITROGEN (N2)	SOP		MOL %	50.778									0.005	0.005	0.005		240712151		
	7440-59-7	Helium	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240712151		
	1333-74-0	HYDROGEN	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240712151		
	74-82-8	METHANE	SOP		MOL %	27.844									0.005	0.005	0.005		240712151		
	74-84-0	ETHANE	SOP		MOL %	4.434									0.005	0.005	0.005		240712151		
	74-85-1	ETHENE	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240712151		
	74-98-6	PROPANE	SOP		MOL %	1.903									0.005	0.005	0.005		240712151		
	75-28-5	ISOBUTANE	SOP		MOL %	0.258									0.005	0.005	0.005		240712151		
	106-97-8	N-BUTANE	SOP		MOL %	0.480									0.005	0.005	0.005		240712151		
	ICS	ISOPENTANE	SOP		MOL %	0.106									0.005	0.005	0.005		240712151		
	109-66-0	N-PENTANE	SOP		MOL %	0.079									0.005	0.005	0.005		240712151		
	92112-69-1+	C6+ (hexanes +)	SOP		MOL %	0.009									0.005	0.005	0.005		240712151		
	delta13C_C1	DELTA 13C C1	SOP		per mil	-46.7													240712151		
	deltaD_C1	DELTA D C1	SOP		per mil	-257													240712151		
	delta13C_C2	DELTA 13C C2	SOP		per mil	-31.8													240712151		
	delta13C_C3	DELTA 13C C3	SOP		per mil	-28.1													240712151		
	delta13C_nC4	DELTA 13C nC4	SOP		per mil	-27.0													240712151		
	BTU	BRITISH THERMAL UNITS	SOP		BTU/cuft	440				Low Signal									240712151		
	SpGrav	SPECIFIC GRAVITY	SOP		No Unit	0.896													240712151		



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Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:		Send Invoice to (if different):		Additional Information:	
Name: Trent Watne	Name:	Company: Olsson	Company:	AFE #: RSK R20521336	Project: S/MW
Address: 1525 Raleigh St, Suite 400	Address:	City, State: Denver, CO	City, State:	PO #:	Location: Greeley, CO
Phone: 303-503-5140	Phone:	Email: twatne@olsson.com	Email:	API #:	Sampled By: Brook H.

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 (with ASTM D1250)	ASTM D1250 (API Gravim)	d18O and dD Isotopes of Water	RSK 175 Dissolved Gas Quantification	d13C of Dissolved Inorganic Carbon (DIC)	Other (specify):
	S/MW072524	7/25/10	10:10	Other	<input checked="" 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"/>							
				Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
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				Other	<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>[Signature]</i>	Olsson	7/25	15:05	<i>[Signature]</i>	DIG	7/25/10	15:05

*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.