



dig
Dolan Integration Group

Geochemistry for Energy

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p: 303.531.2030

**Hydrocarbon Gas Composition and Stable Isotopes
Data and Interpretation**

Job #: 240611994
Lab #: DIG-036090
Client: Olsson
Well Name: SCMW062724
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/R ³			
240611994	DIG-036090	SCMW062724 Gas	Gas	06/27/24	10:11	6/28/2024	559869	155584	1150	196600	31546	13557	1835	3493	801	615	142				79.1	12.69	5.45	0.74	1.41	0.32	0.25	0.06	324			

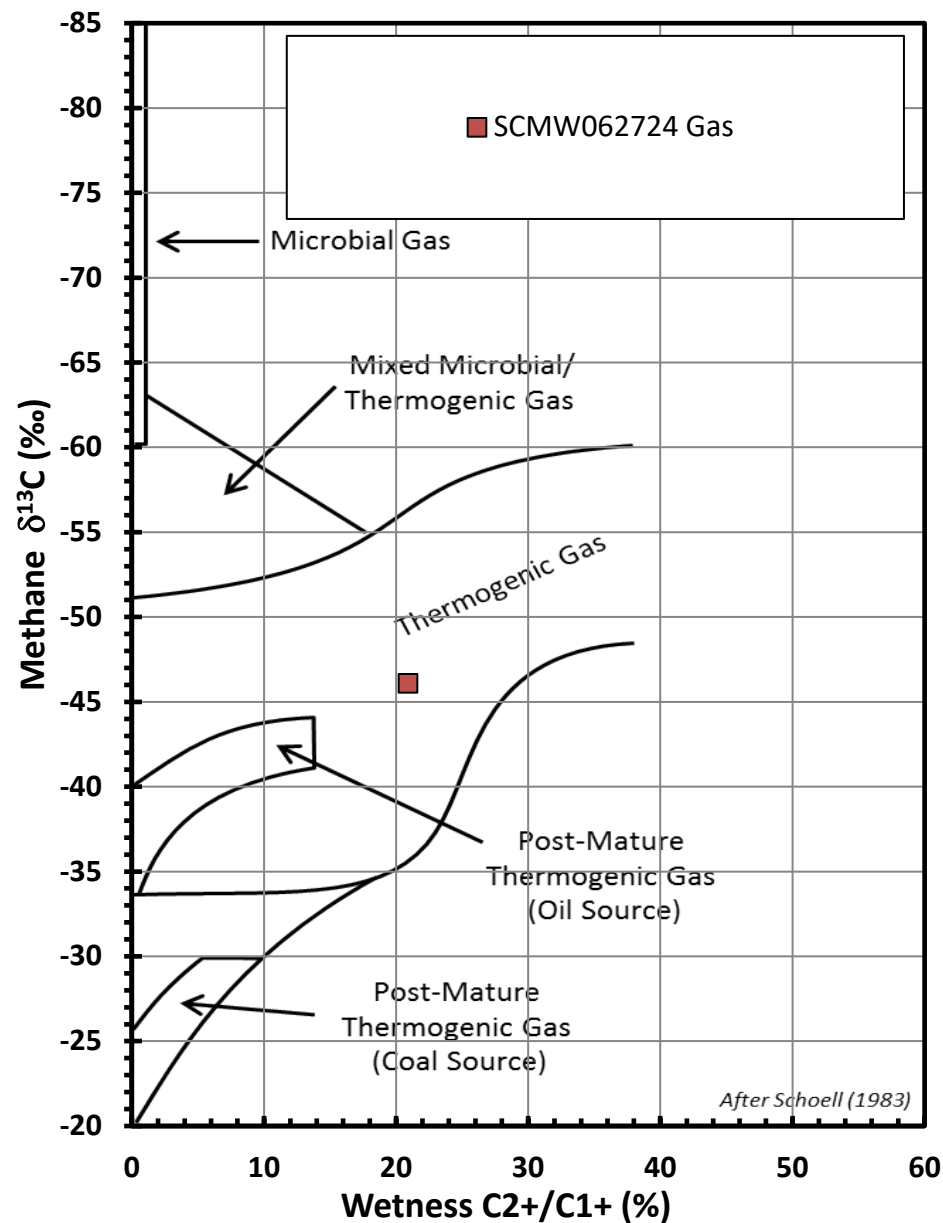
SAMPLE INFORMATION						HYDROCARBON RATIOS				STABLE ISOTOPE ANALYSIS											Comments
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Total HC ppm	Wetness % C ₂ to C ₅	C ₁ /C ₂ +C ₃ mol/mol	Balance Ratio C ₁ +C ₂ /C ₃ -C ₅	Mass Spec Date	δ ¹³ C ₁ ‰ VPDB	δ ¹³ C ₂ ‰ VPDB	δ ¹³ C ₃ ‰ 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		
240611994	DIG-036090	SCMW062724 Gas	Gas	06/27/24	10:11	248589	20.9	4.4	11.2	7/10/2024	-46.1	-31.2	-27.8	-31.4	-27.4				-256		

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.

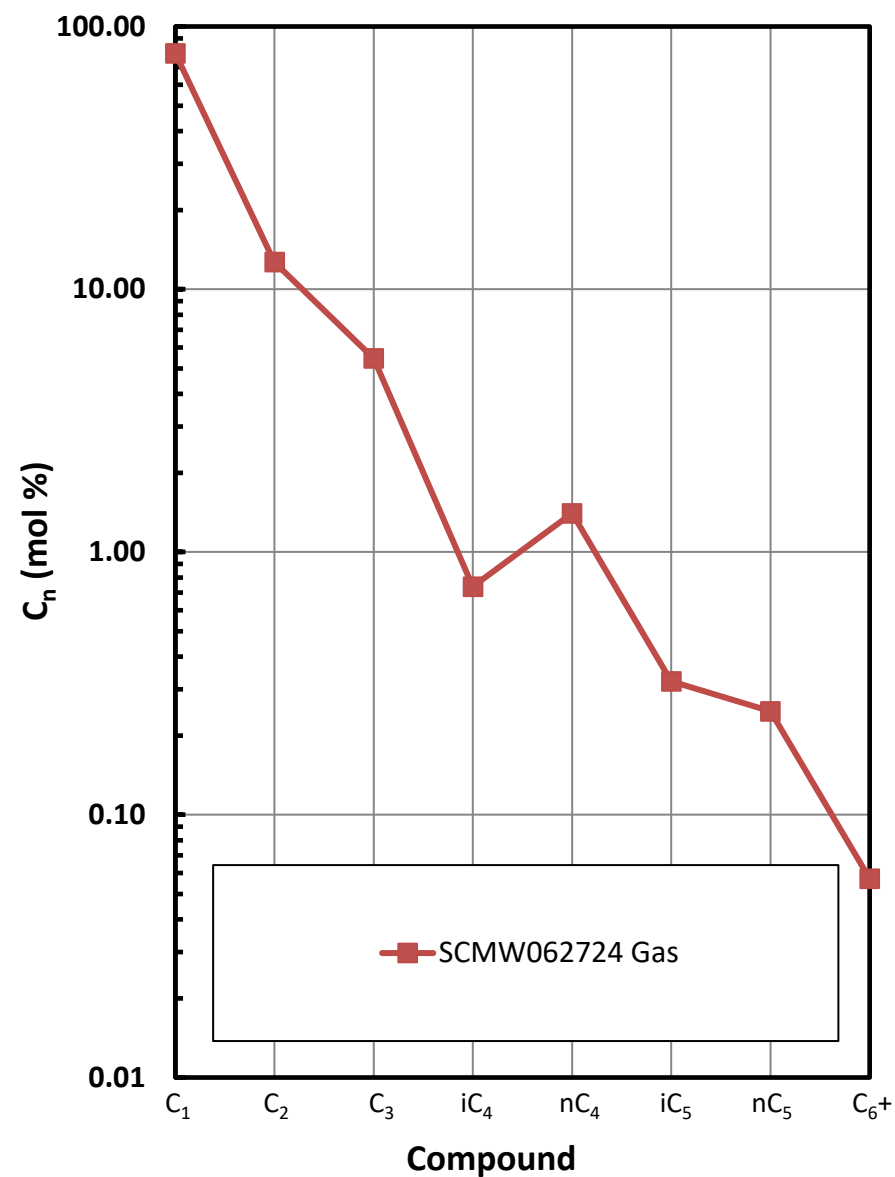
SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
0.924	0.712

INTERPRETIVE PLOTS

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

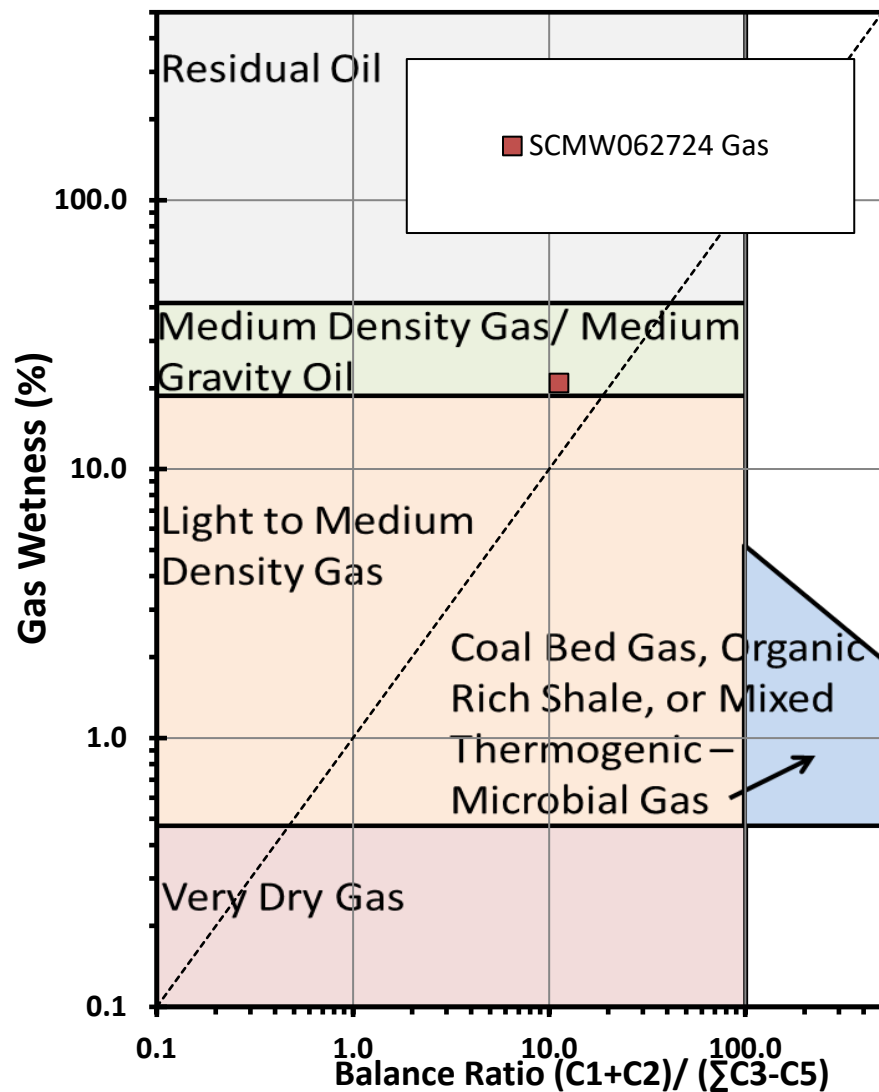


Hydrocarbon Composition Plot

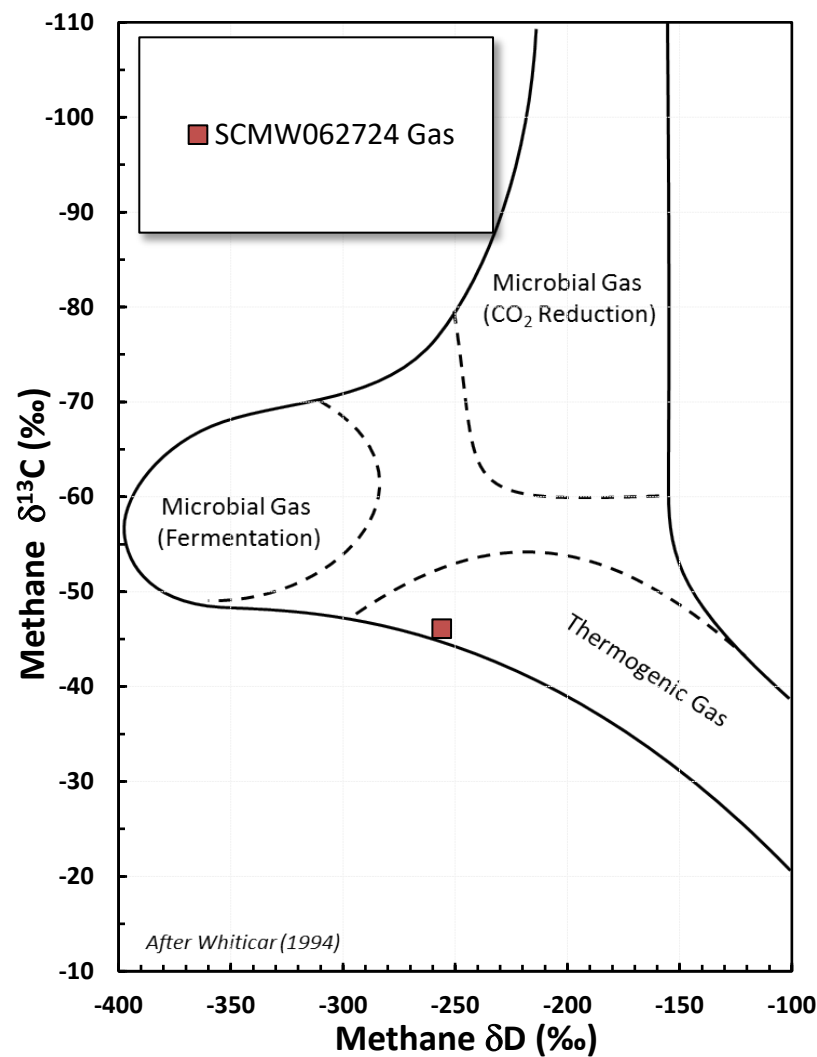


INTERPRETIVE PLOTS

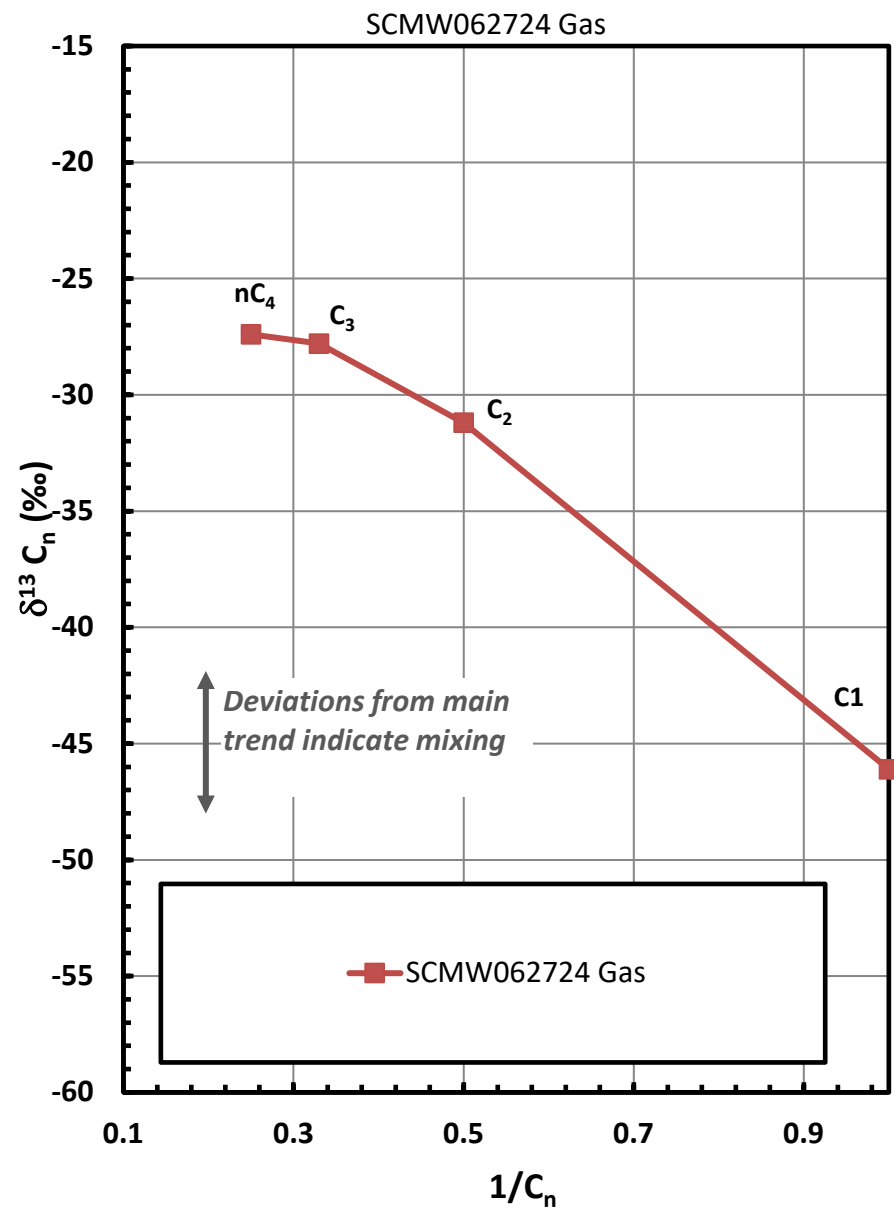
Haworth Ratio Plot - Characterization of Hydrocarbon Type



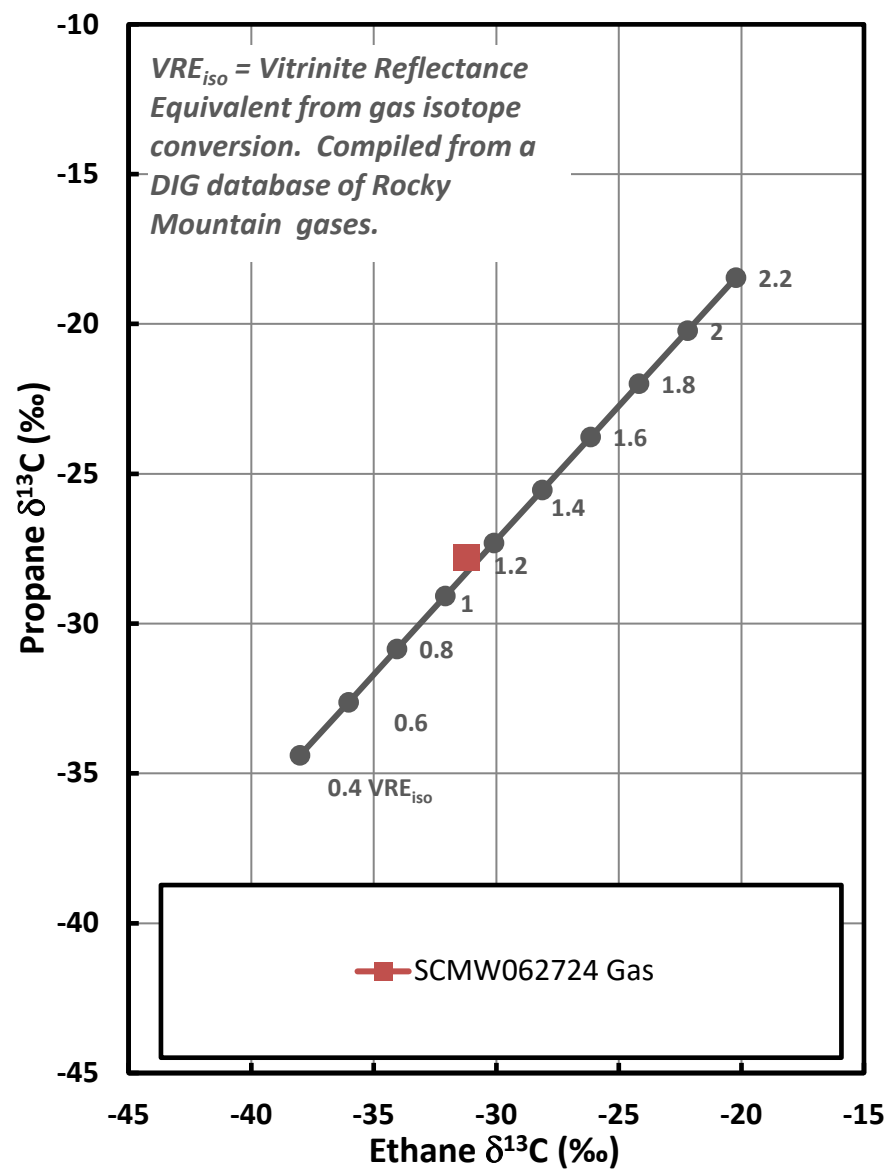
Methane $\delta^{13}C$ vs δD Genetic Classification Plot



Mixing Plot

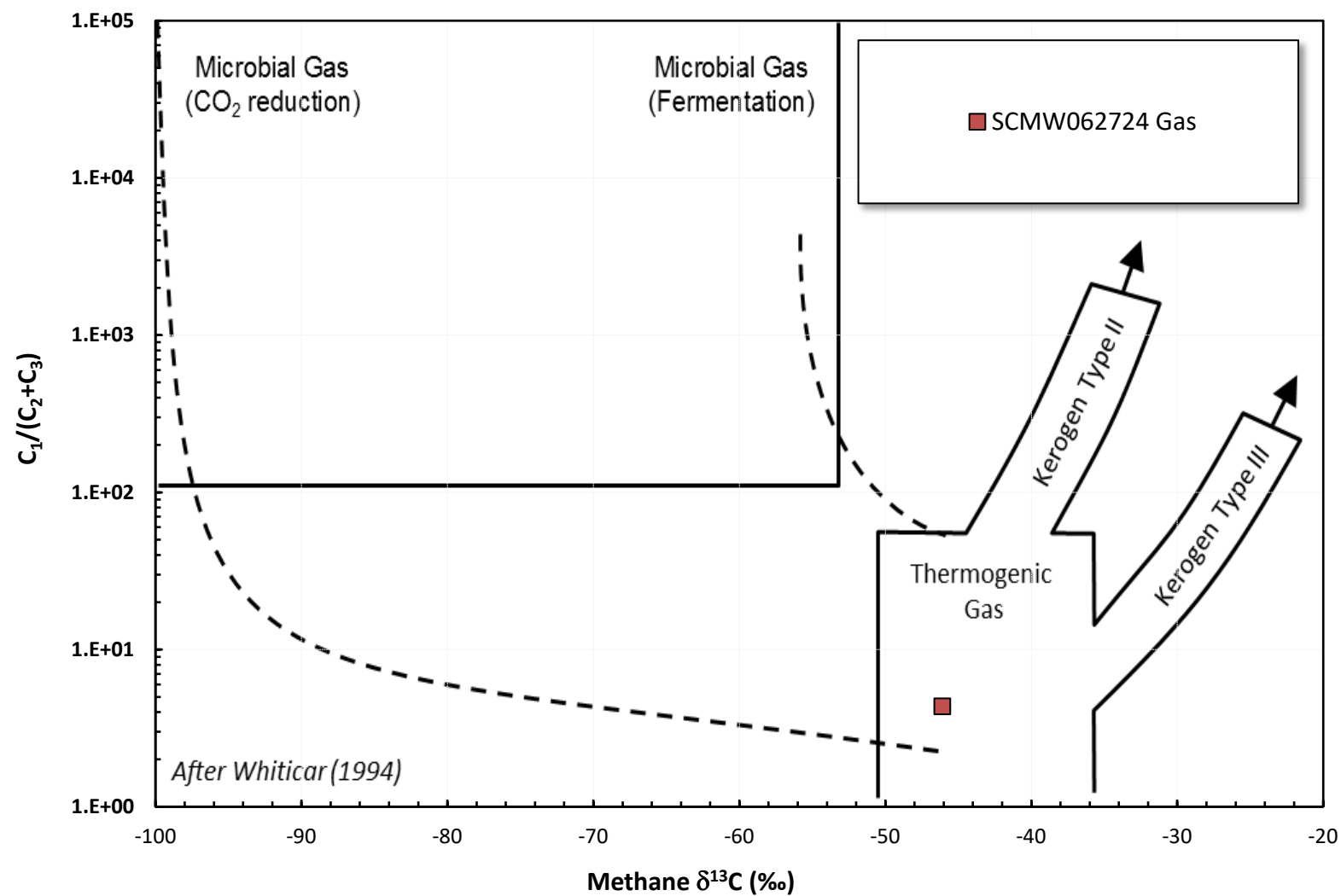


Ethane - Propane Maturity Plot



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														
Sample	10206	Dolan Integration Group		Olsson																
	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										
Batch		6/27/24 10:11		DIG-036090		GAS				6/27/2024										
	LabID	Lab Batch Identifier	Leach Date	Extract Date and Time	Extract Method	Start Date and Time	Conc Method	Init Vol	Final Vol	SCMW062724	Init Vol Units	Final Vol Units	Analysis Date and Time	Report Basis	Comments	File Name	Column #			
Result	10206	240611994																		
	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 %	16.120									0.005	0.005	0.005		240611994	
	124-38-9	CARBON DIOXIDE	SOP		MOL %	0.119									0.005	0.005	0.005		240611994	
	7727-37-9	NITROGEN (N2)	SOP		MOL %	58.006									0.005	0.005	0.005		240611994	
	7440-59-7	Helium	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240611994	
	1333-74-0	HYDROGEN	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240611994	
	74-82-8	METHANE	SOP		MOL %	20.369									0.005	0.005	0.005		240611994	
	74-84-0	ETHANE	SOP		MOL %	3.268									0.005	0.005	0.005		240611994	
	74-85-1	ETHENE	SOP		MOL %	0.005	ND								0.005	0.005	0.005		240611994	
	74-98-6	PROPANE	SOP		MOL %	1.405									0.005	0.005	0.005		240611994	
	75-28-5	ISOBUTANE	SOP		MOL %	0.190									0.005	0.005	0.005		240611994	
	106-97-8	N-BUTANE	SOP		MOL %	0.362									0.005	0.005	0.005		240611994	
	iC5	ISOPENTANE	SOP		MOL %	0.083									0.005	0.005	0.005		240611994	
	109-66-0	N-PENTANE	SOP		MOL %	0.064									0.005	0.005	0.005		240611994	
	92112-69-1+	C6+ (hexanes +)	SOP		MOL %	0.015									0.005	0.005	0.005		240611994	
	delta13C_C1	DELTA 13C C1	SOP		per mil	-46.1													240611994	
	deltaD_C1	DELTA D C1	SOP		per mil	-256													240611994	
	delta13C_C2	DELTA 13C C2	SOP		per mil	-31.2													240611994	
	delta13C_C3	DELTA 13C C3	SOP		per mil	-27.8													240611994	
	delta13C_iC4	DELTA 13C iC4	SOP		per mil	-31.4													240611994	
	delta13C_nC4	DELTA 13C nC4	SOP		per mil	-27.4									Low Signal				240611994	
	BTU	BRITISH THERMAL UNITS	SOP		BTU/cuft	324													240611994	
	SpGrav	SPECIFIC GRAVITY	SOP		No Unit	0.924									Low Signal				240611994	



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City, State: <u>Denver, CO</u>	City, State:	Location: <u>Greeley, CO</u>
Phone: <u>303-503-5140</u>	Phone:	Sampled By: <u>Brook H.</u>
Email: <u>twatne@olsson.com</u>	Email:	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)	d13C of Methane (C1)	Whole Oil Gas Chromatography (with ASTM D1250)	ASTM D1250 (API Gravity)	d18O and dD Isotopes of Water	Gas Quantification	RSK 175 Dissolved Inorganic Carbon (DIC)	d13C of Dissolved Inorganic Carbon (DIC)	Other (Specify):
	<u>SCMW062724</u>	<u>6/27</u>	<u>10:41</u>	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"/>	<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"/>	<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"/>	<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"/>	<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"/>	<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"/>	<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"/>	<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"/>	<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
<u>B. 104</u>	<u>Olsson</u>	<u>6/27</u>	<u>15:30</u>	<u>[Signature]</u>	<u>Olsson</u>	<u>6/27/24</u>	<u>16:30</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.