



**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 #:** 230810239  
**Lab #:** DIG-032742  
**Client:** Olsson  
**Well Name:** SCMW 082923  
**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 <sub>2</sub> ppm	O <sub>2</sub> + Ar ppm	CO <sub>2</sub> ppm	C <sub>1</sub> ppm	C <sub>2</sub> ppm	C <sub>3</sub> ppm	iC <sub>4</sub> ppm	nC <sub>4</sub> ppm	iC <sub>5</sub> ppm	nC <sub>5</sub> ppm	C <sub>6</sub> + ppm	C <sub>2</sub> H <sub>4</sub> ppm	He ppm	H <sub>2</sub> ppm	C <sub>1</sub> mol%	C <sub>2</sub> mol%	C <sub>3</sub> mol%	iC <sub>4</sub> mol%	nC <sub>4</sub> mol%	iC <sub>5</sub> mol%	nC <sub>5</sub> mol%	C <sub>6</sub> + mol%	Total Gas BTU/R <sup>3</sup>			
230810239	DIG-032742	SCMW 082923 Gas	Gas	08/29/23	10:30	8/29/2023	736982	207443	377	30760	4828	2023	267	546	154	191	235				78.9	12.38	5.19	0.68	1.40	0.39	0.49	0.60	52			

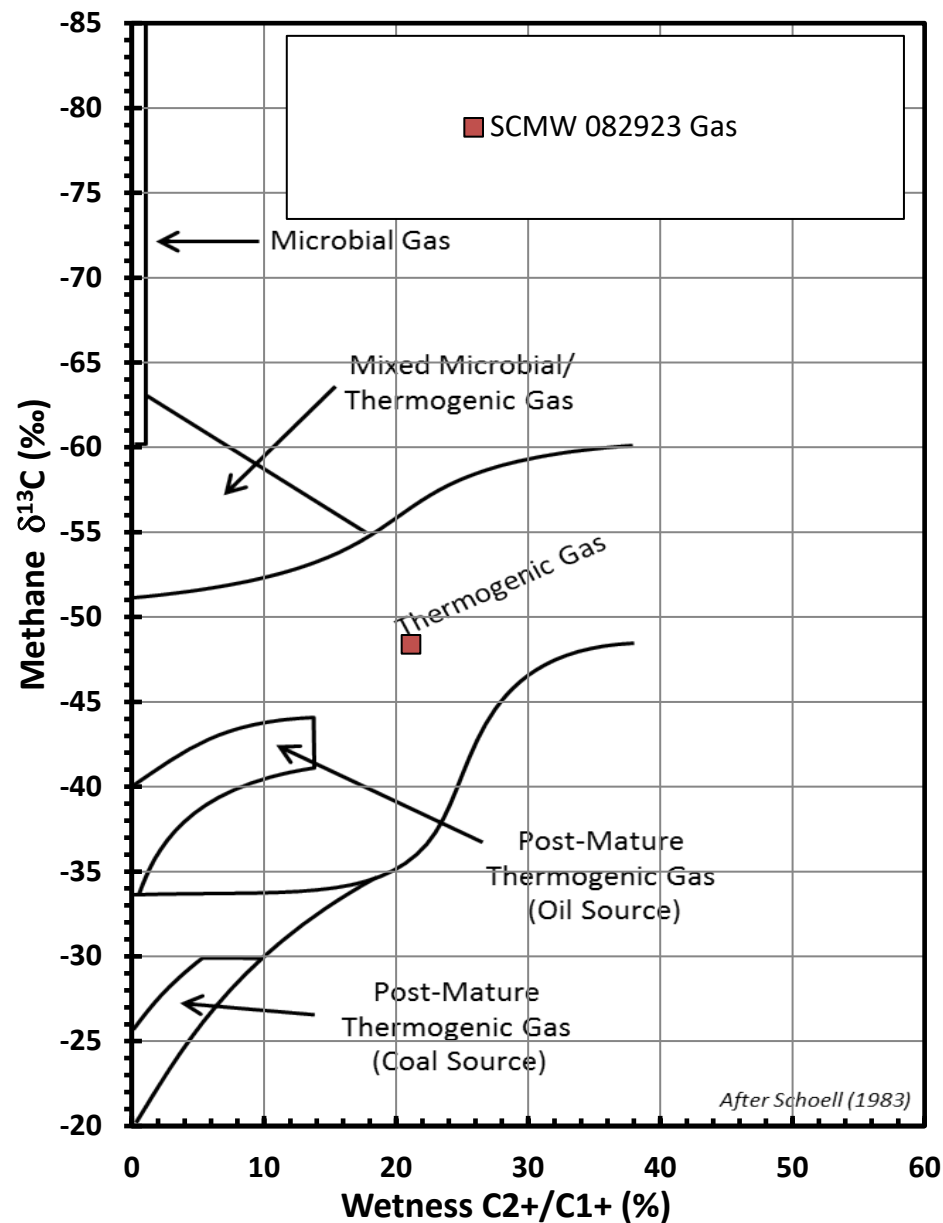
SAMPLE INFORMATION						HYDROCARBON RATIOS				STABLE ISOTOPE ANALYSIS											Comments
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Total HC ppm	Wetness % C <sub>1</sub> to C <sub>5</sub>	C <sub>1</sub> /C <sub>2</sub> +C <sub>3</sub> mol/mol	Balance Ratio C <sub>1</sub> +C <sub>2</sub> /C <sub>3</sub> -C <sub>5</sub>	Mass Spec Date	δ <sup>13</sup> C <sub>1</sub> ‰ VPDB	δ <sup>13</sup> C <sub>2</sub> ‰ VPDB	δ <sup>13</sup> C <sub>3</sub> ‰ VPDB	δ <sup>13</sup> iC <sub>4</sub> ‰ VPDB	δ <sup>13</sup> nC <sub>4</sub> ‰ VPDB	δ <sup>13</sup> iC <sub>5</sub> ‰ VPDB	δ <sup>13</sup> nC <sub>5</sub> ‰ VPDB	δ <sup>13</sup> CO <sub>2</sub> ‰ VPDB	δD ‰ VSMOW		
230810239	DIG-032742	SCMW 082923 Gas	Gas	08/29/23	10:30	39003	21.1	4.5	11.2	9/1/2023	-48.4	-32.6	-28.4						-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 ‰  
\* As ideal gas, with gas concentrations normalized to 100%;  
calculations based on GPA 2145-09 physical constants.

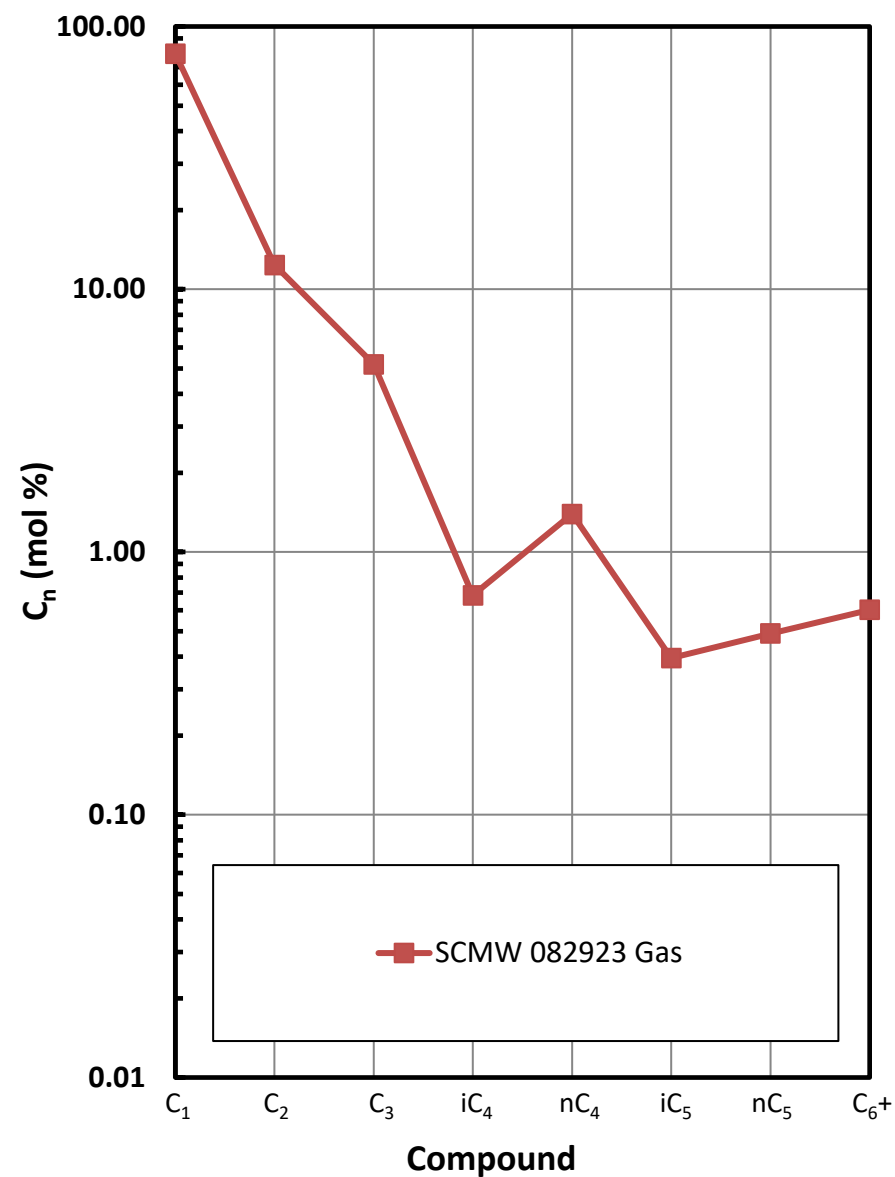
SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
0.987	0.726

## INTERPRETIVE PLOTS

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

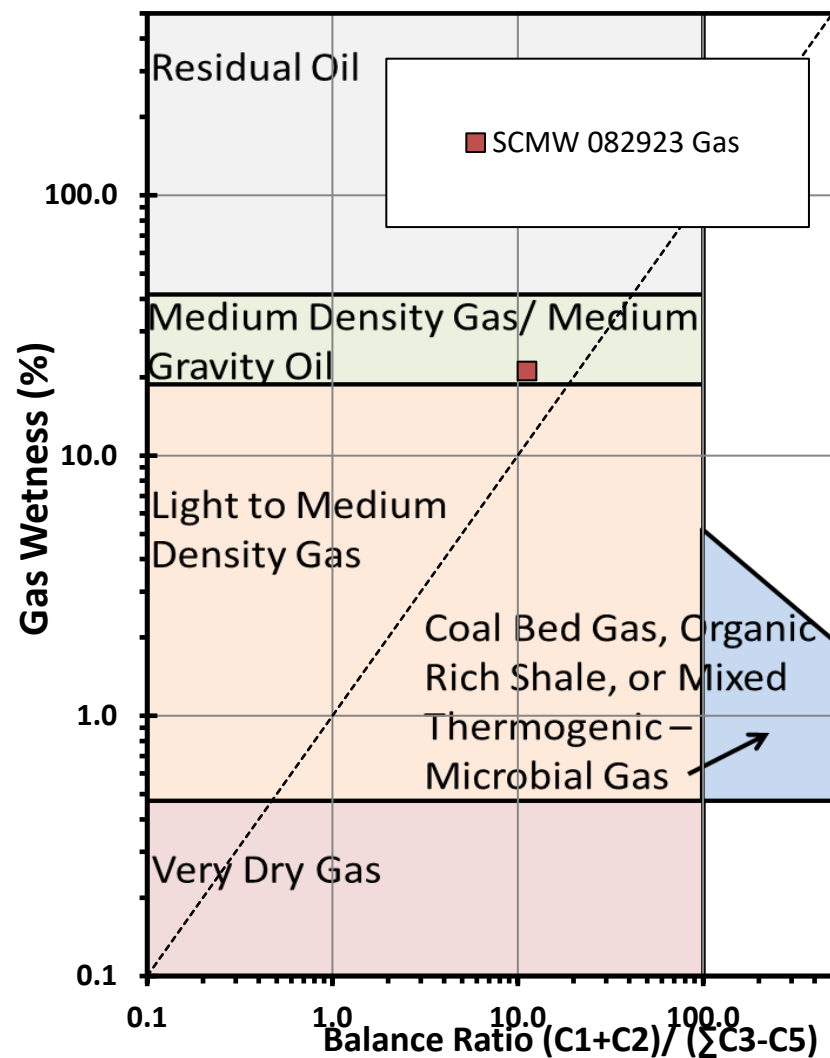


### Hydrocarbon Composition Plot

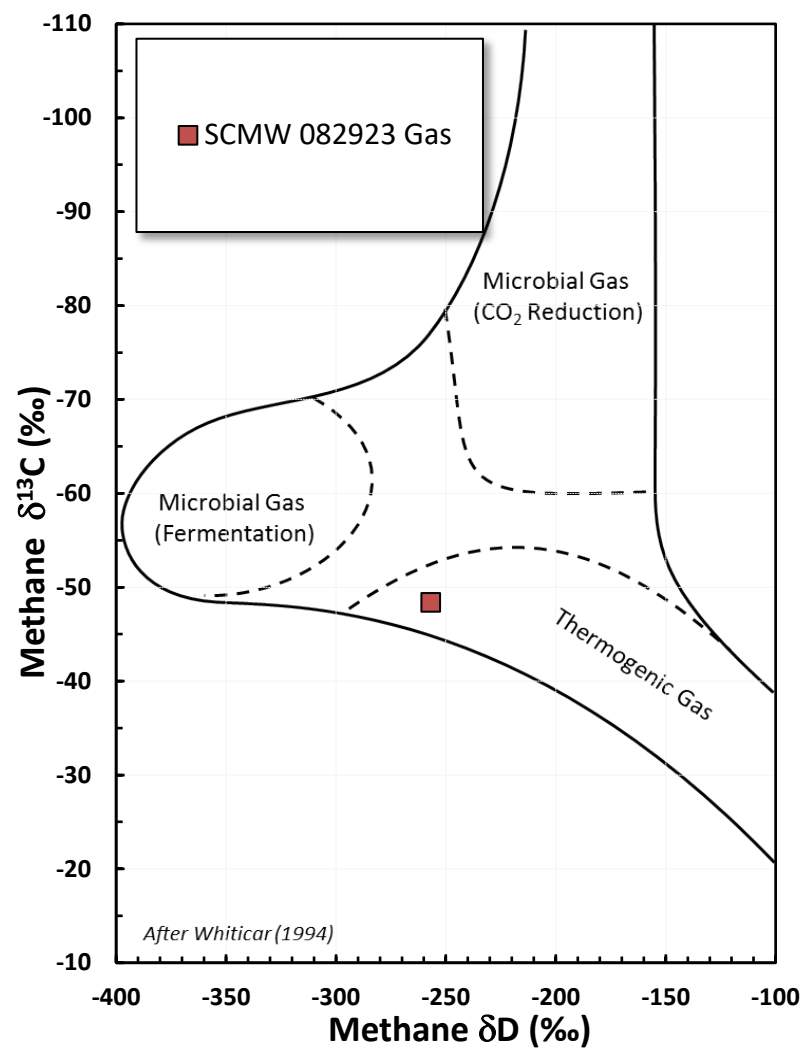


## INTERPRETIVE PLOTS

Haworth Ratio Plot - Characterization of Hydrocarbon Type

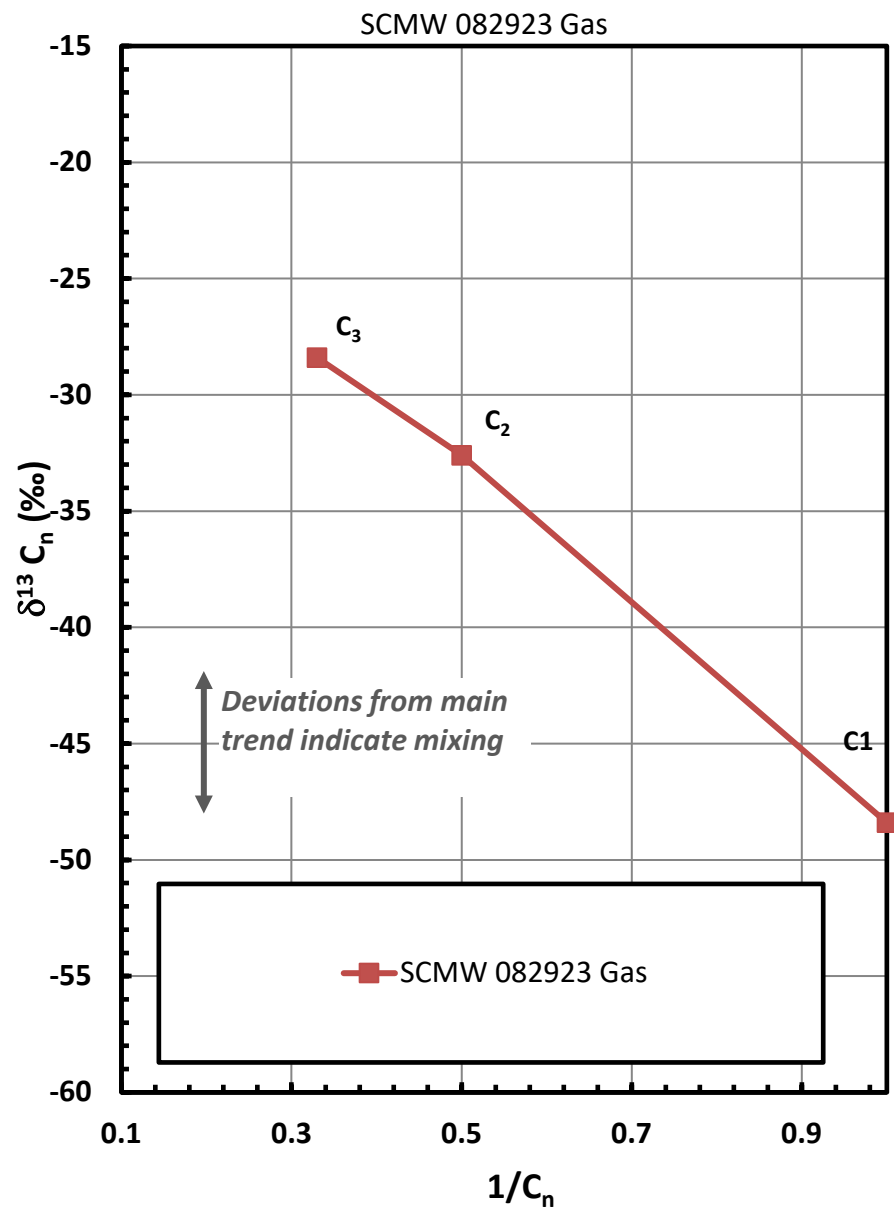


Methane  $\delta^{13}C$  vs  $\delta D$  Genetic Classification Plot

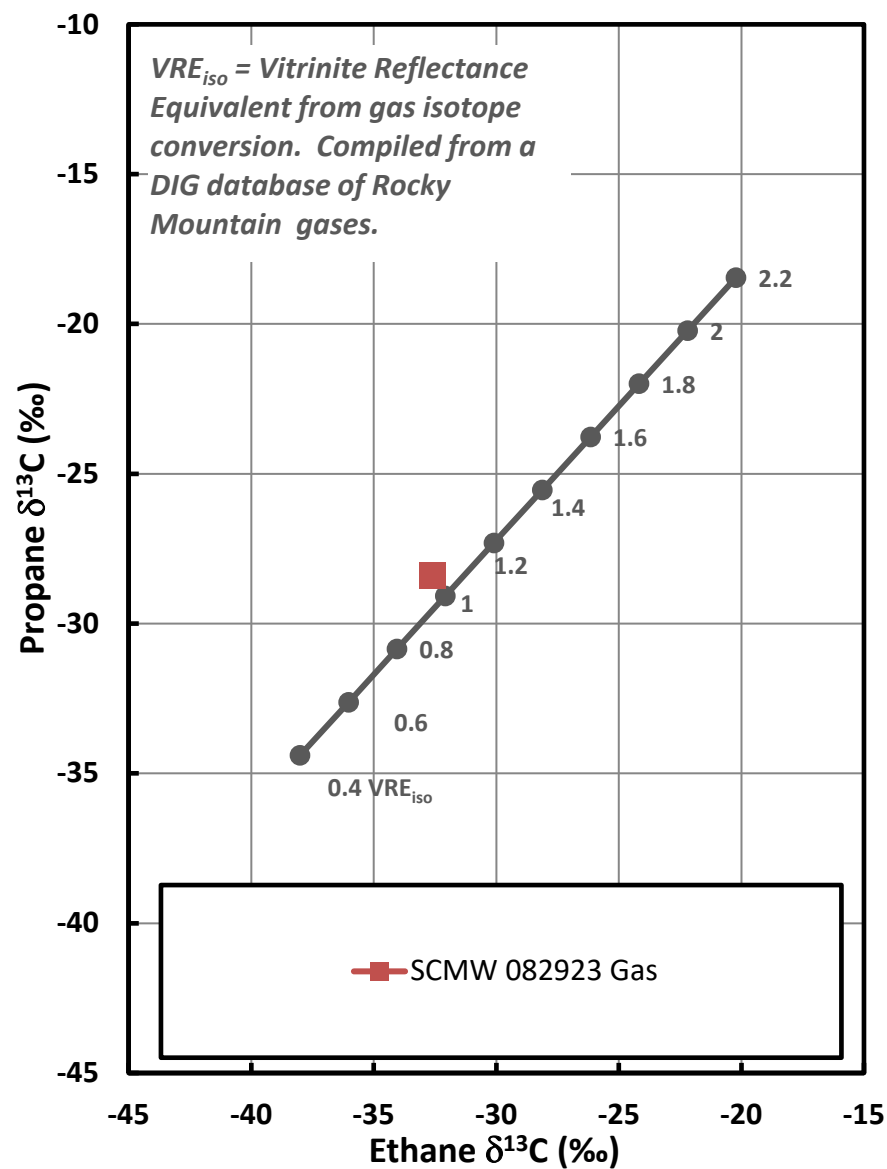


## INTERPRETIVE PLOTS

### Mixing Plot

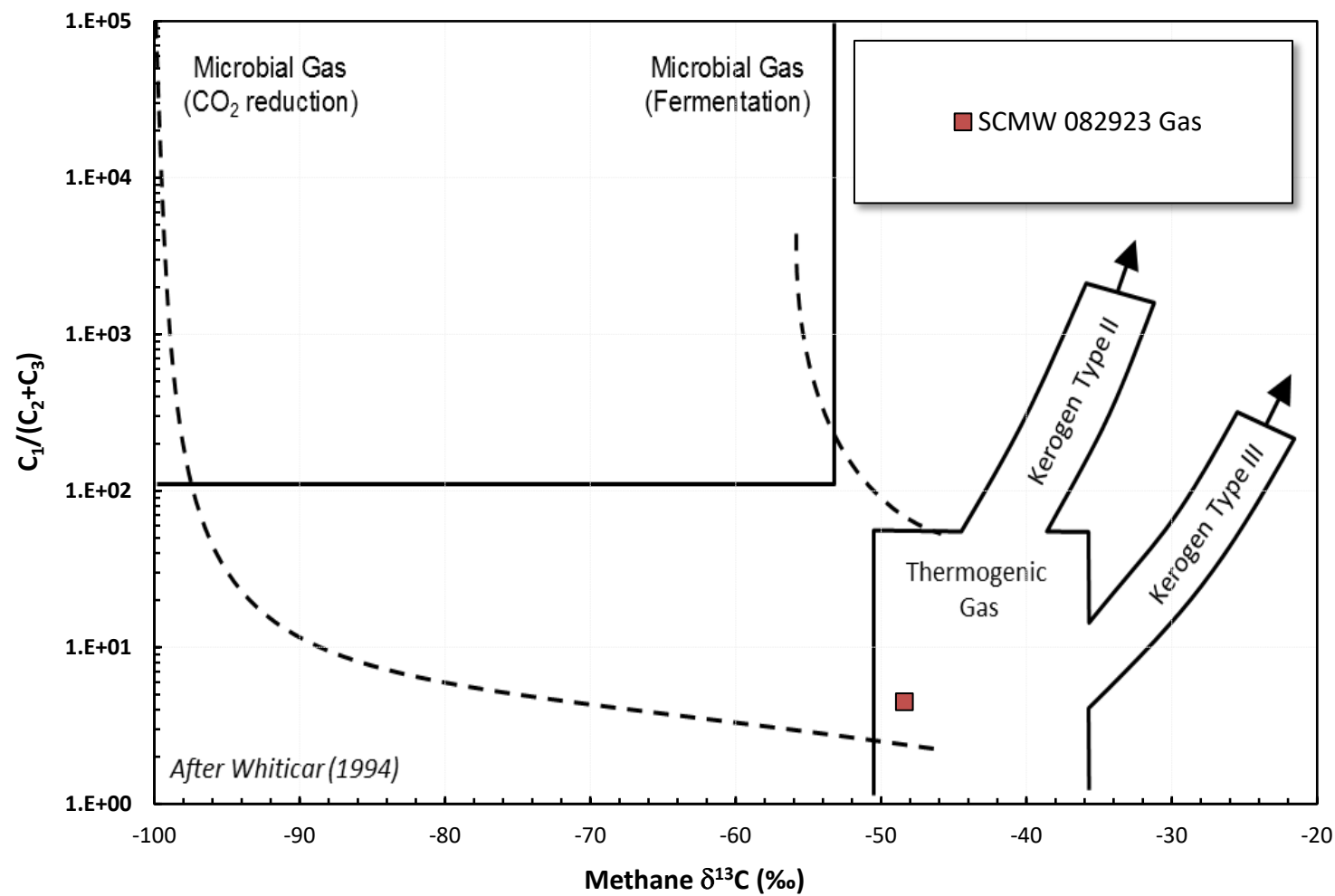


### Ethane - Propane Maturity Plot



## INTERPRETIVE PLOTS

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



[illegible]



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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)	δD of Methane (C1)	Whole Oil Gas Chromatography	δ18O and δD Isotopes of Water	RSK 175 Dissolved Gas Quantification
	<u>SCMW 082923</u>	<u>8/29</u>	<u>10:30</u>	<u>Other</u>	<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"/>
				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:
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Relinquished by Signature	Company	Date	Time	Received by Signature	Company	Date	Time
<u>Trent Watne</u>	<u>Olsson</u>	<u>8/29</u>	<u>3:00</u>	<u>[Signature]</u>	<u>DIG</u>	<u>8/29</u>	<u>3:00pm</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.