



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 #: 21106442
Lab #: DIG-026319 - DIG-026320
Client: WSP
Well Name: McGlothlin Farms 4X-314
API #: 05-123-44007

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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	Sample Date	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 ₇ + ppm	C ₈ + 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%	C ₇ + mol%	Total Gas BTU/R ³
21106442	DIG-026319	McGlothlin Farms 4X-314 Bradenhead gas	Bradenhead gas	10/05/21	14:50	10/6/2021	23557	5363		414292	174307	189904	37603	94320	19752	22395	18963					3016	42.9	18.03	19.65	3.89	9.76	2.04	2.32	1.44	1878	
21106442	DIG-026320	McGlothlin Farms 4X-314 Production gas	Production gas	10/05/21	14:40	10/6/2021	22132	4998	24979	682963	137148	66957	9807	24434	6571	7705	7492						72.4	14.54	7.10	1.04	2.59	0.70	0.82	0.79	1313	

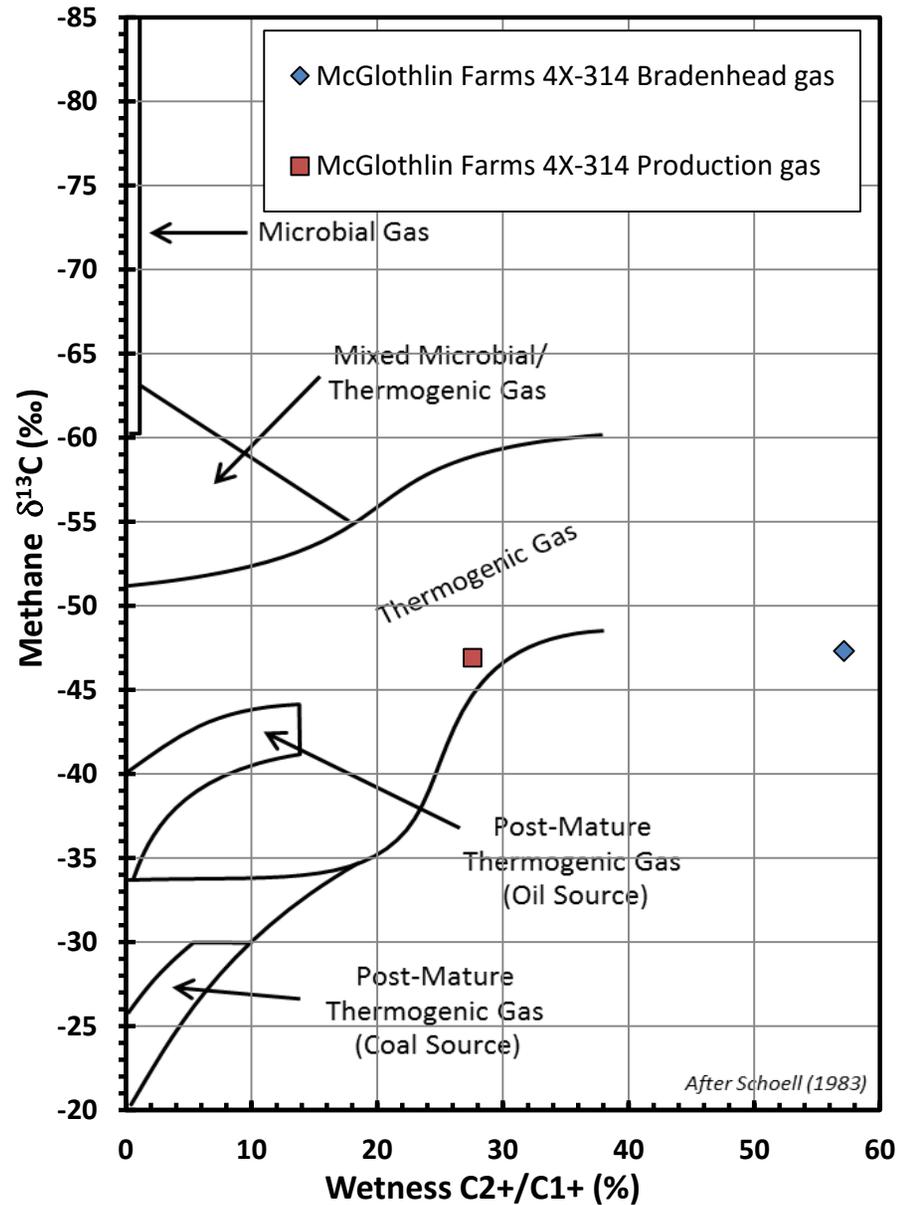
SAMPLE INFORMATION							HYDROCARBON RATIOS				STABLE ISOTOPE ANALYSIS										Comments
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Sample Date	Total HC ppm	Wetness % C ₂ to C ₆	C ₂ /C ₁ +C ₂ mol/mol	Balance Ratio C ₂ +C ₃ /C ₄ +C ₅	Mass Spec Date	δ ¹³ C ₁ % VPDB	δ ¹³ C ₂ % VPDB	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	
21106442	DIG-026319	McGlothlin Farms 4X-314 Bradenhead gas	Bradenhead gas	10/05/21	14:50	96644	97.1	1.1	1.4	1.4	10/22/2021	-47.3	-31.7	-28.3	-30.0	-22.2	-26.4	-27.1			-256
21106442	DIG-026320	McGlothlin Farms 4X-314 Production gas	Production gas	10/05/21	14:40	943067	27.6	3.3	7.1	7.1	10/12/2021	-46.9	-31.0	-28.0	-30.3	-22.2	-22.2	-27.1	4.0		-252

Stable isotope results based on multi-point laboratory calibration
 low signal, interpret with caution

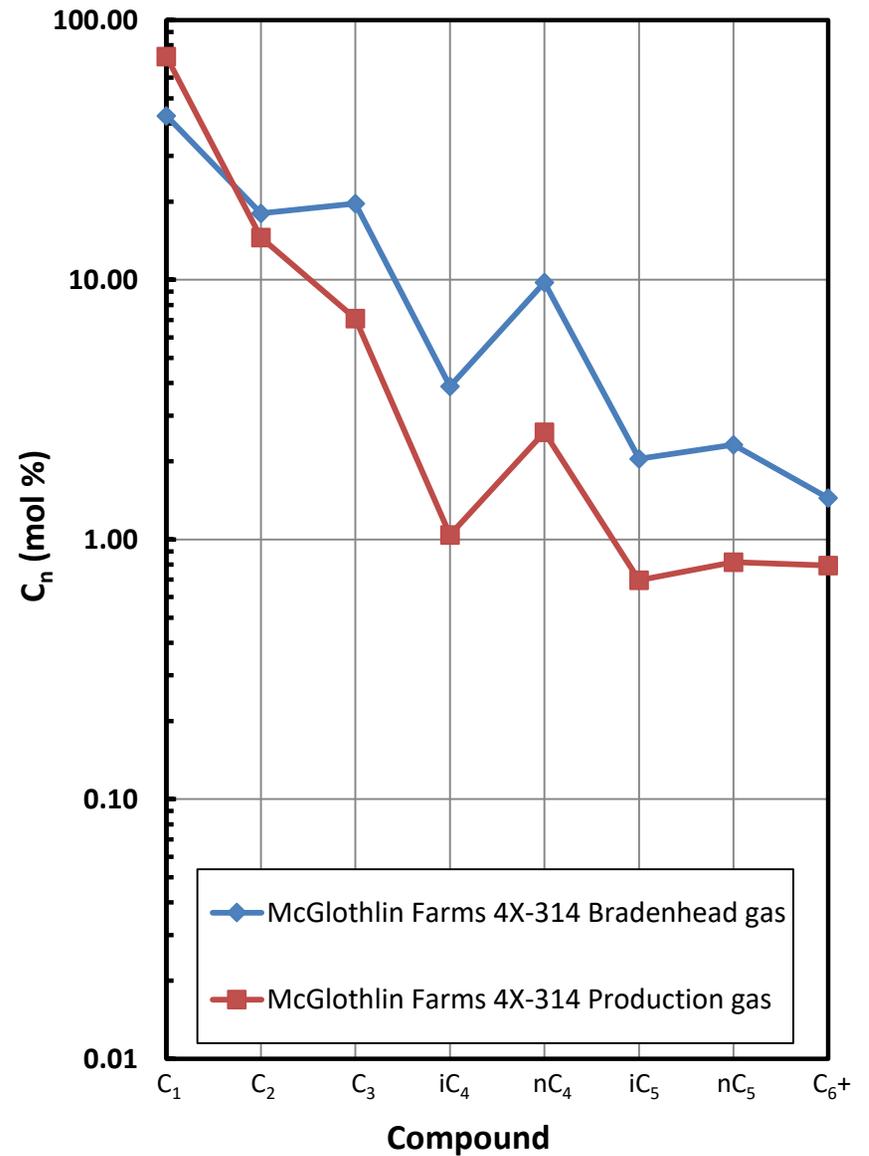
Precision δ¹³C: <0.5 ‰
 Precision δD: <5 ‰
 * As ideal gas, with gas concentrations normalized to 100%, calculations based on GPA 2145-09 physical constants.

SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
1.141	1.149
0.818	0.794

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

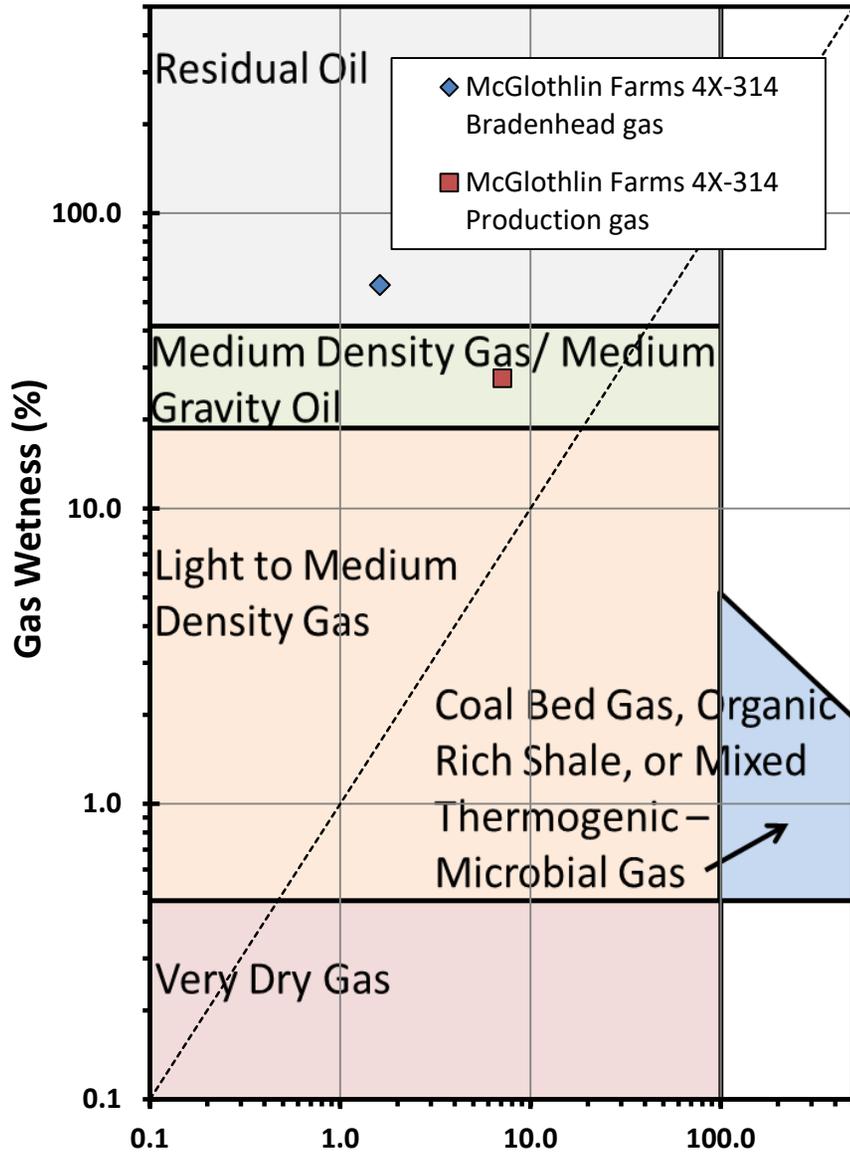


Hydrocarbon Composition Plot

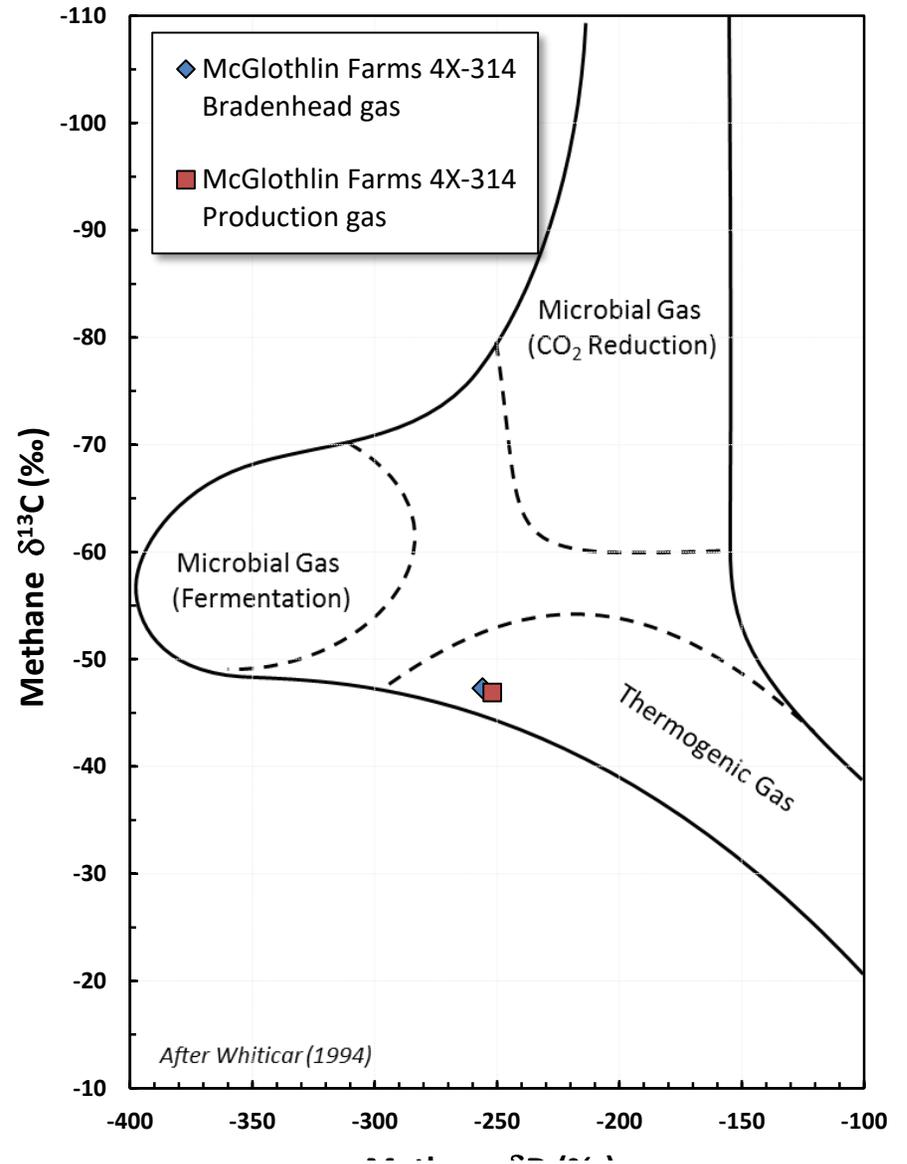


INTERPRETIVE PLOTS

Haworth Ratio Plot - Characterization of Hydrocarbon Type



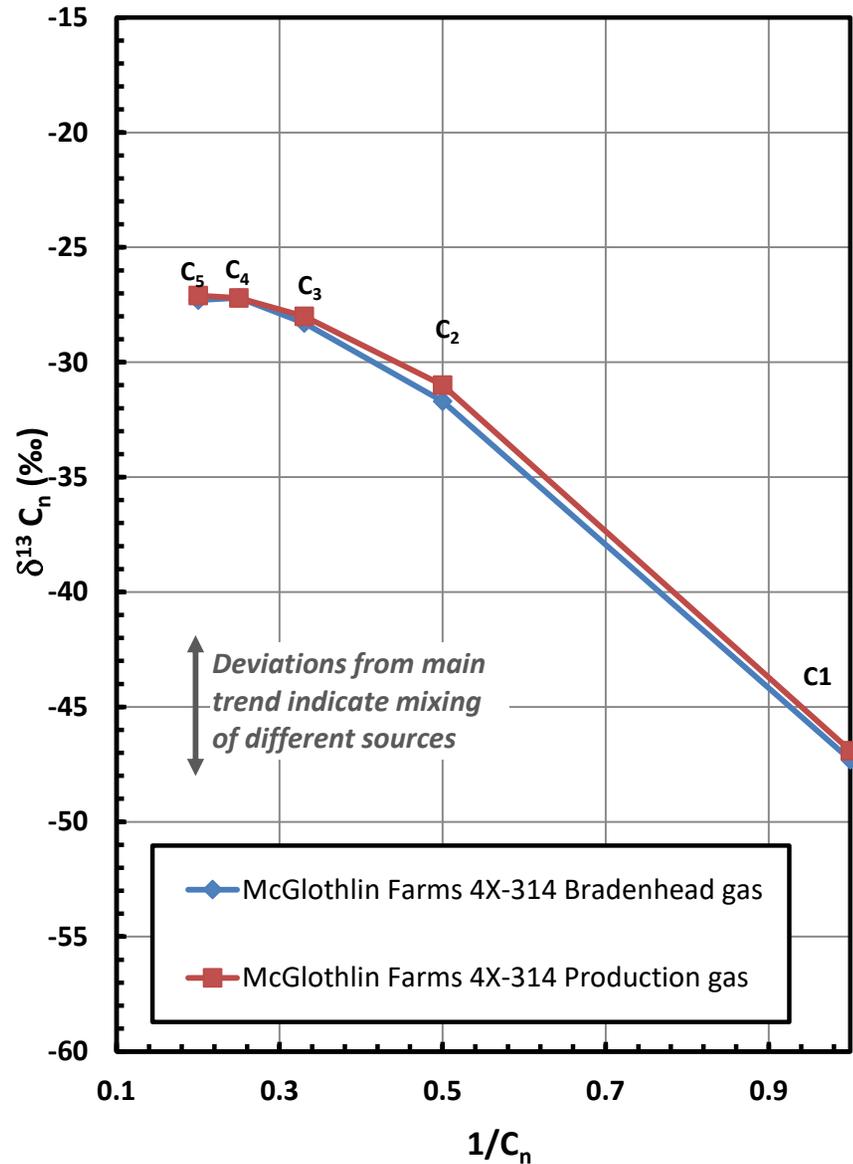
Methane $\delta^{13}\text{C}$ vs δD Genetic Classification Plot



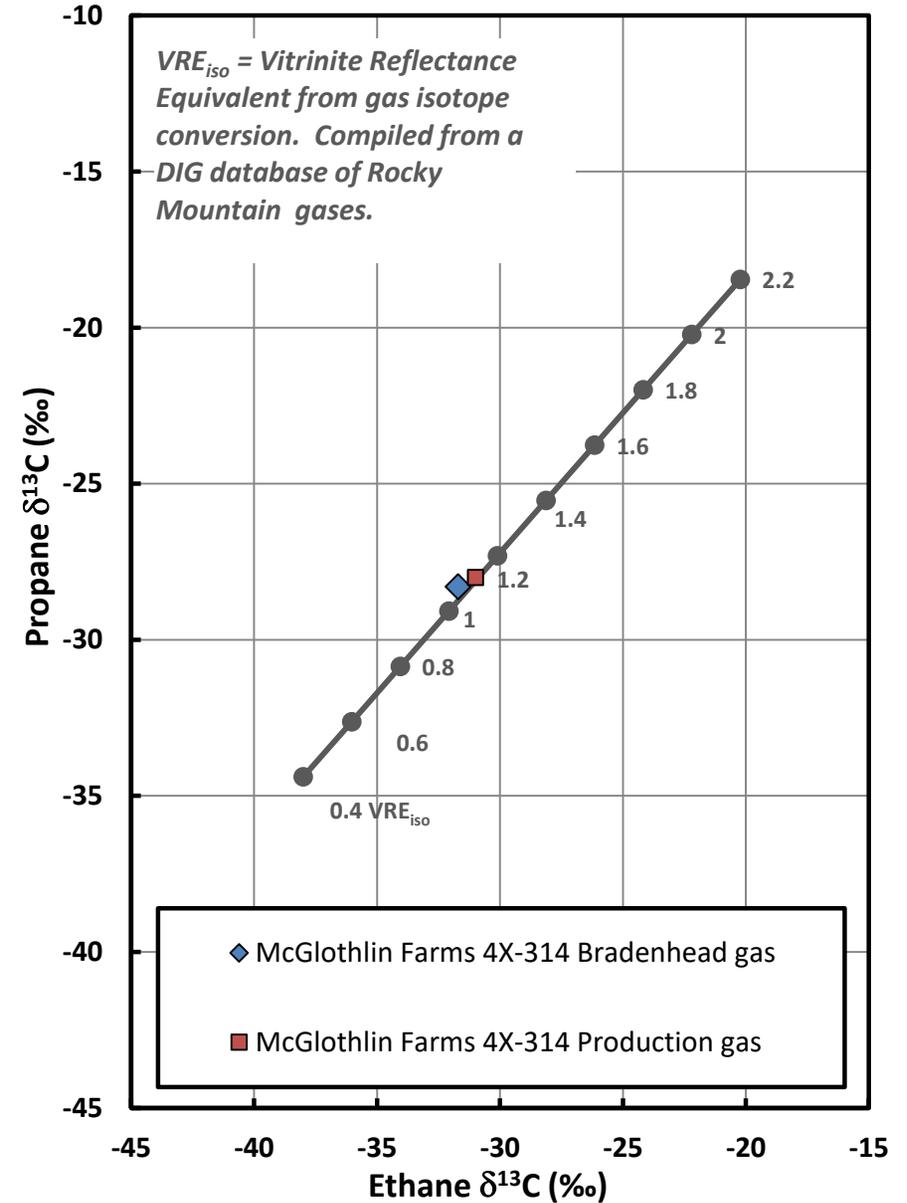
Balance Ratio (C1+C2)/ (ΣC3-C5)

Methane δD (‰)

Mixing Plot

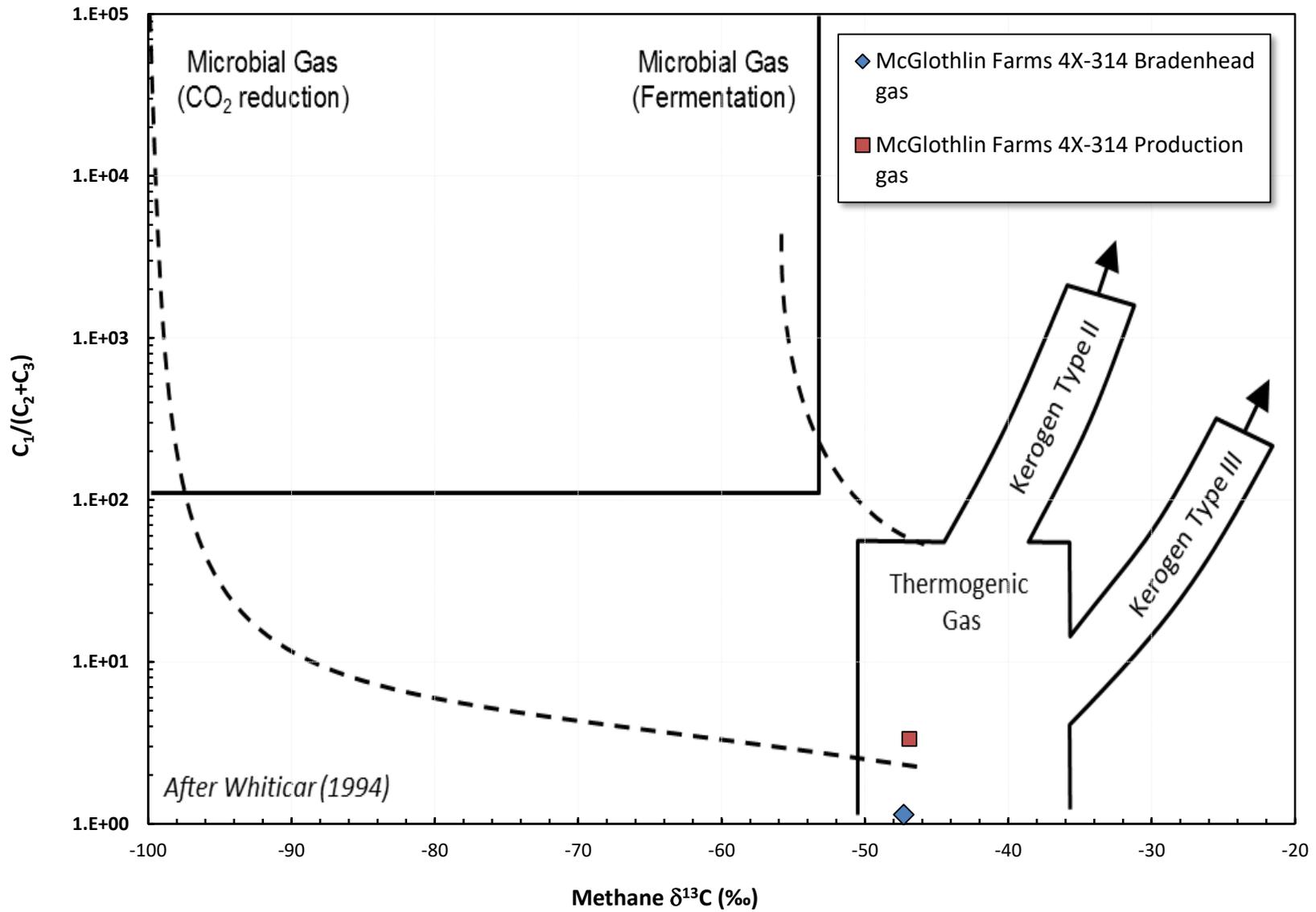


Ethane - Propane Maturity Plot



INTERPRETIVE PLOTS

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





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Turnaround Time**:

Standard (≤ 10 Business days) Rush (≤ 5 Business days)

Container Number	Sample Identification	Date Sampled	Time	Sample Type*	Gas Composition	d13C of Methane (C1)
FOEP6	McGlothlin Farms 4X-314 prod	10/5/21	1440	Production Gas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOEP9	McGlothlin Farms 4X-314 bh	10/5/21	1450	Bradenhead gas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
				Production gas	<input type="checkbox"/>	<input type="checkbox"/>
				Bradenhead gas	<input type="checkbox"/>	<input type="checkbox"/>
				Production gas	<input type="checkbox"/>	<input type="checkbox"/>
				Bradenhead gas	<input type="checkbox"/>	<input type="checkbox"/>
				Production gas	<input type="checkbox"/>	<input type="checkbox"/>
				Bradenhead gas	<input type="checkbox"/>	<input type="checkbox"/>
				Production gas	<input type="checkbox"/>	<input type="checkbox"/>
				Bradenhead gas	<input type="checkbox"/>	<input type="checkbox"/>

Chain of Custody Record Comments:

Relinquished by Signature	Company	Date	Time	Received by Signa
Jeffrey D. Braden <small>Digitally signed by Jeffrey D. Braden Date: 2021.10.05 16:18:04 -0600</small>	WSP USA	10/5/21	1620	Luke Arnsberger <small>Digitally signed Date: 2021.10.0</small>

*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 by 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 the 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.

