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 #:	**230710090**
Lab #:	**DIG-032518**
Client:	**Olsson**
Well Name:	**SCMW 072623**
API #:	

Client/Well Name: Olsson / SCMW 072623
Job #: 230710090
Lab #: DIG-032518

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_2H_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
230710090	DIG-032518	SCMW 072623 Gas	Gas	07/26/23	12:00	8/3/2023	593220	163204	436	180683	29867	14164	1723	3410	705	534	156	nd	nd	nd	78.1	12.92	6.13	0.75	1.47	0.30	0.23	0.07	298

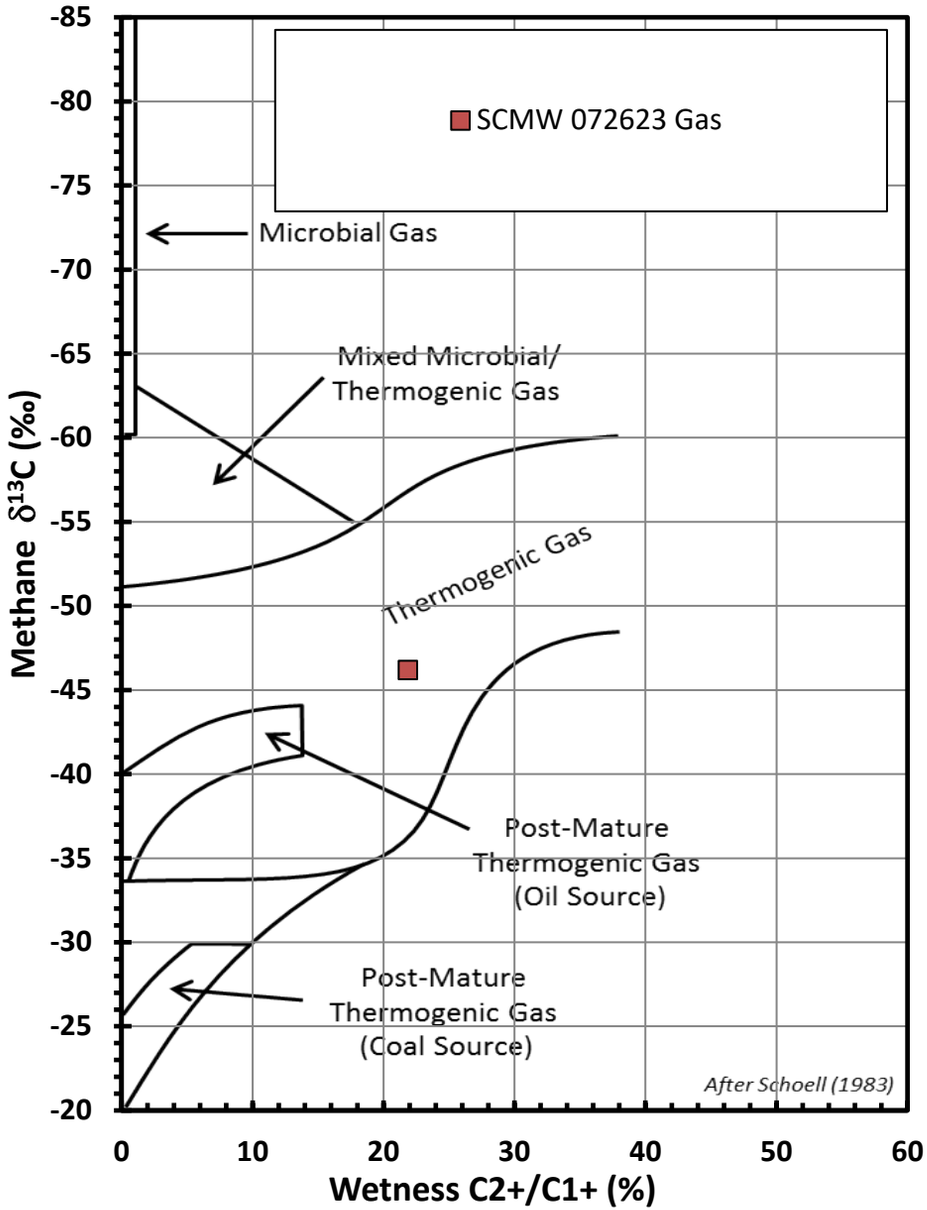
SAMPLE INFORMATION						HYDROCARBON RATIOS				STABLE ISOTOPE ANALYSIS											
Job Number	Lab Number	Well Name	Sample Type	Sample Date	Sample Time	Total HC ppm	Wetness % C_2 to C_6	C_1/C_2+C_3 mol/mol	Balance Ratio C_1+C_2/C_3-C_5	Mass Spec Date	$\delta^{13}C_1$ ‰ VPDB	$\delta^{13}C_2$ ‰ VPDB	$\delta^{13}C_3$ ‰ VPDB	$\delta^{13}iC_4$ ‰ VPDB	$\delta^{13}nC_4$ ‰ VPDB	$\delta^{13}iC_5$ ‰ VPDB	$\delta^{13}nC_5$ ‰ VPDB	$\delta^{13}CO_2$ ‰ VPDB	δD ‰ VSMOW	Comments
230710090	DIG-032518	SCMW 072623 Gas	Gas	07/26/23	12:00	231242	21.9	4.1	10.3	8/8/2023	-46.2	-32.4	-28.6		-27.3				-258	

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%; caculations based on GPA 2145-09 physical constants.

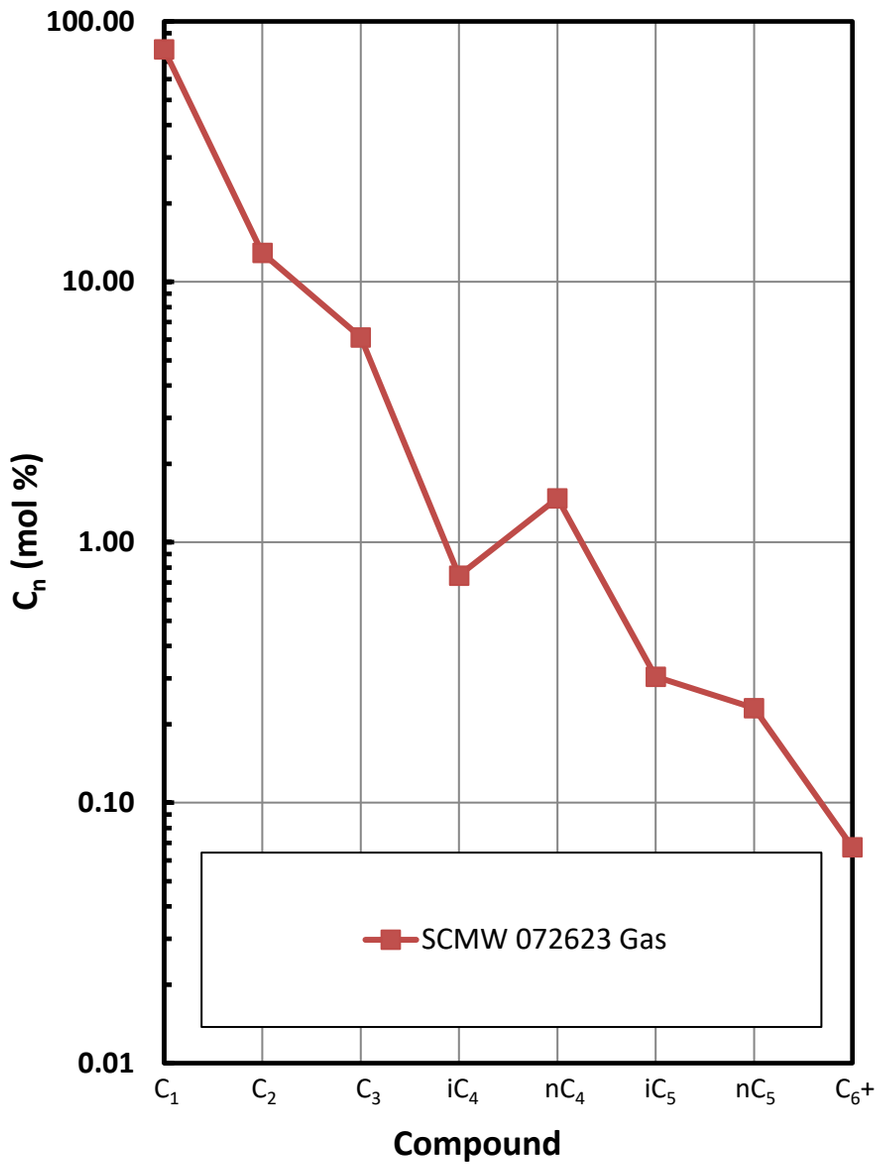
SPECIFIC GRAVITY*	
Total Gas Spec Grav	HCs only Spec Grav
0.932	0.720

INTERPRETIVE PLOTS

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

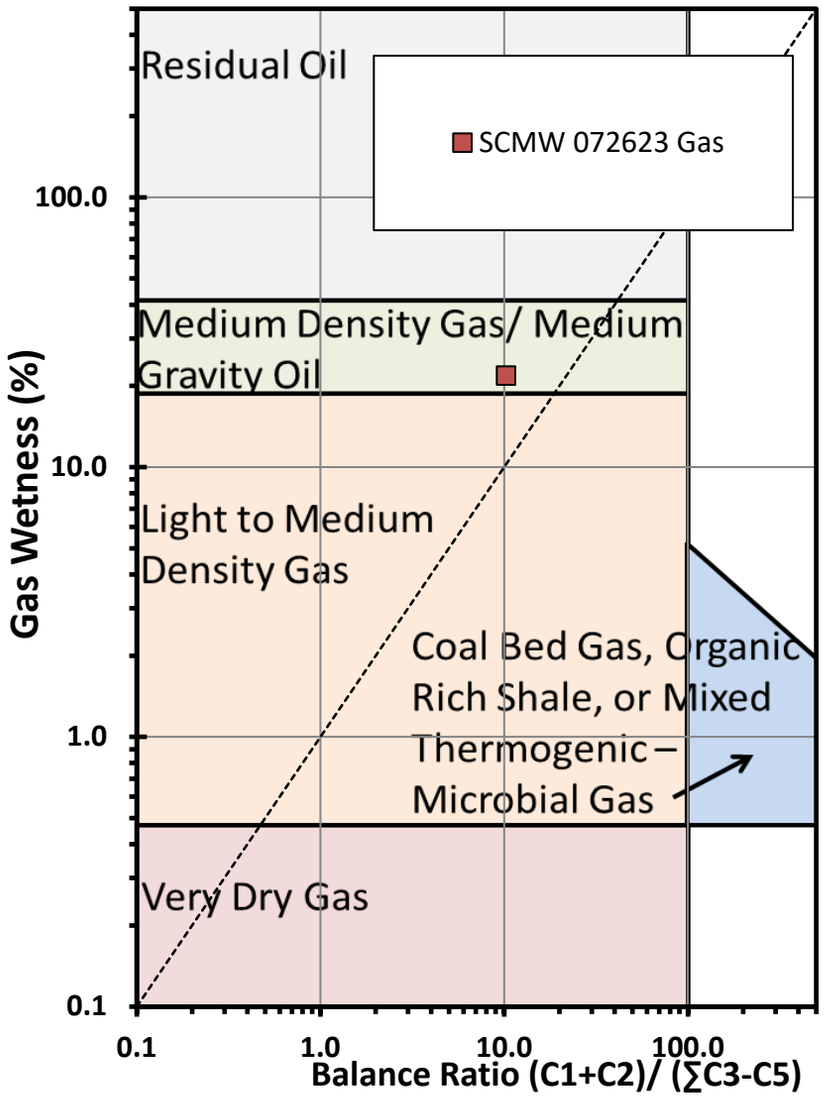


Hydrocarbon Composition Plot

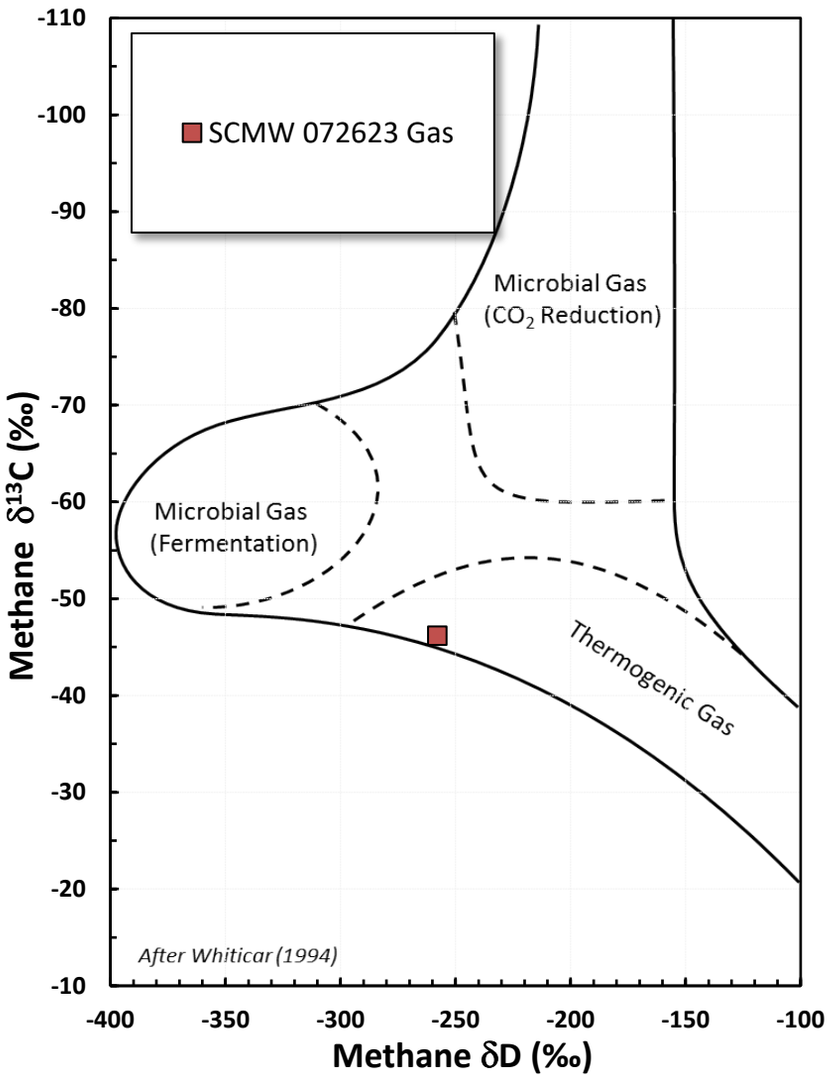


INTERPRETIVE PLOTS

Haworth Ratio Plot - Characterization of Hydrocarbon Type

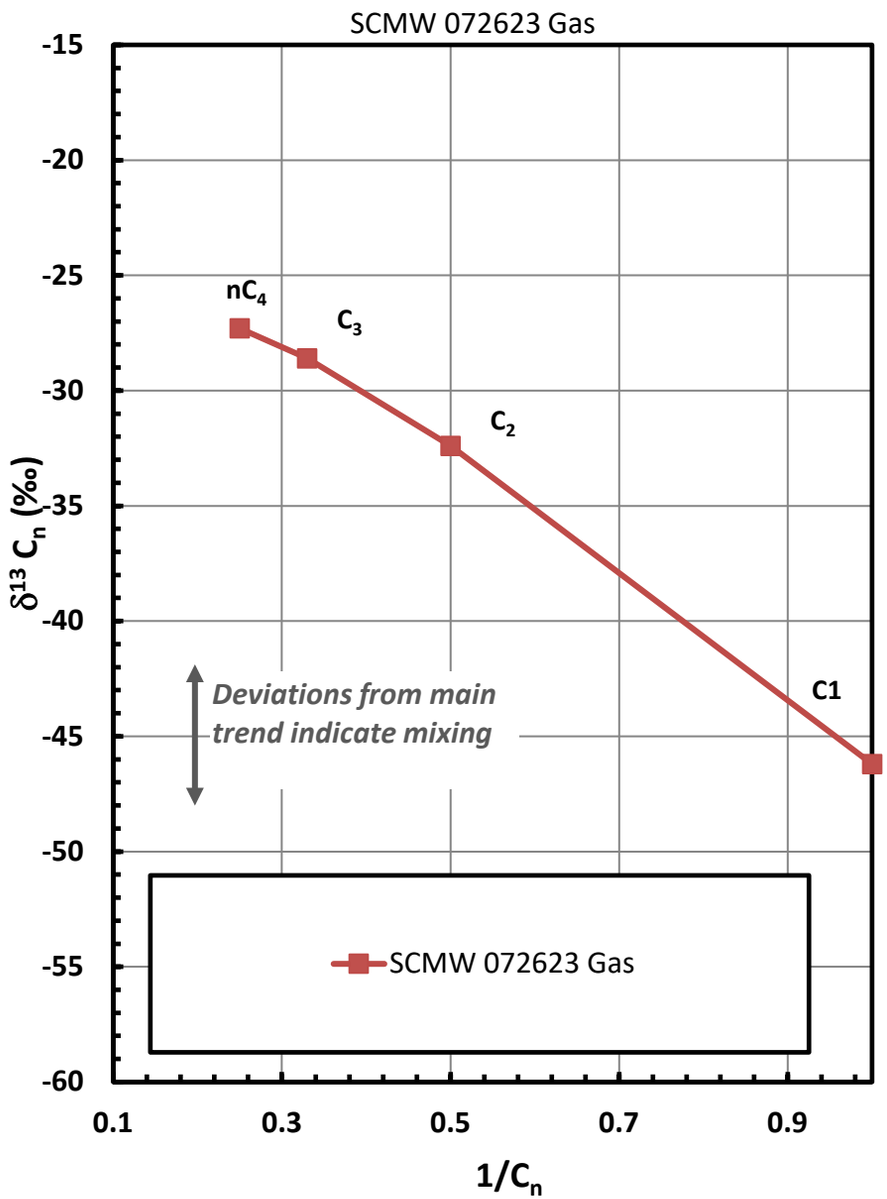


Methane $\delta^{13}C$ vs δD Genetic Classification Plot

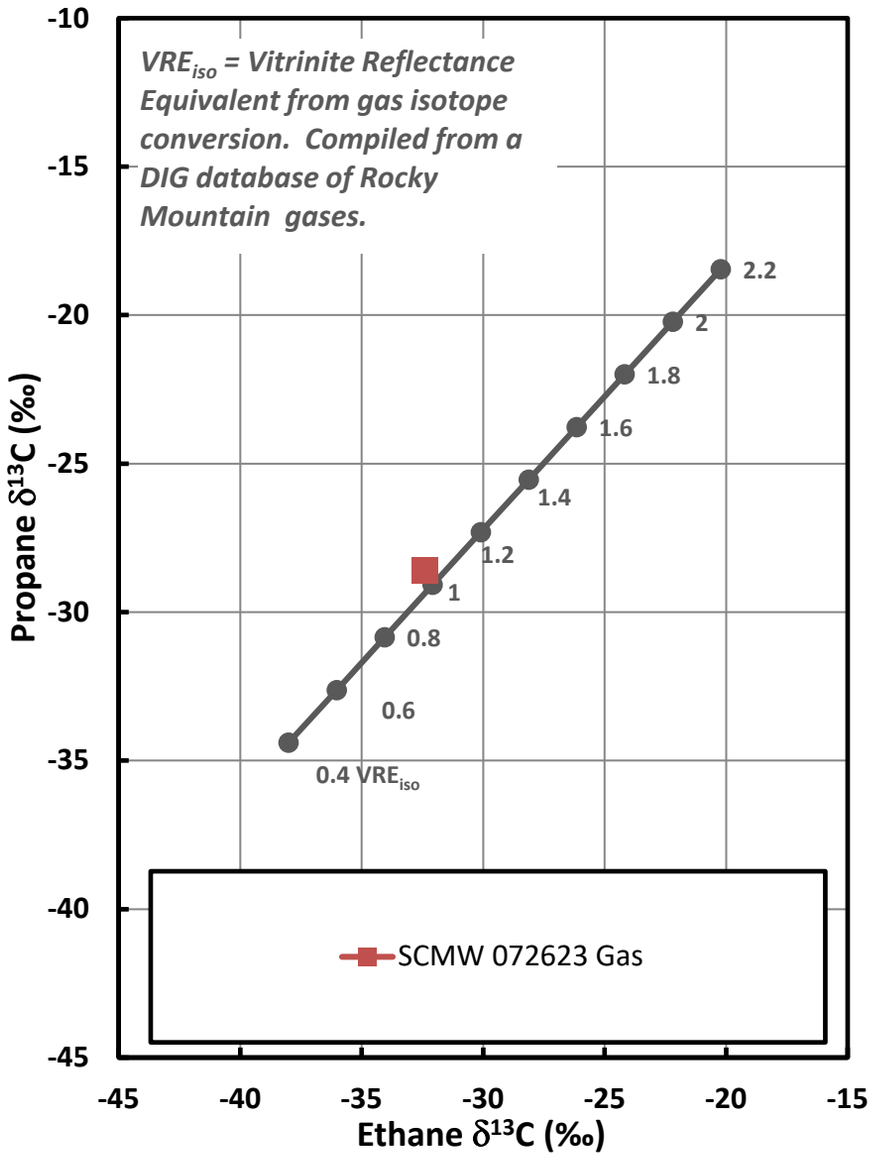


INTERPRETIVE PLOTS

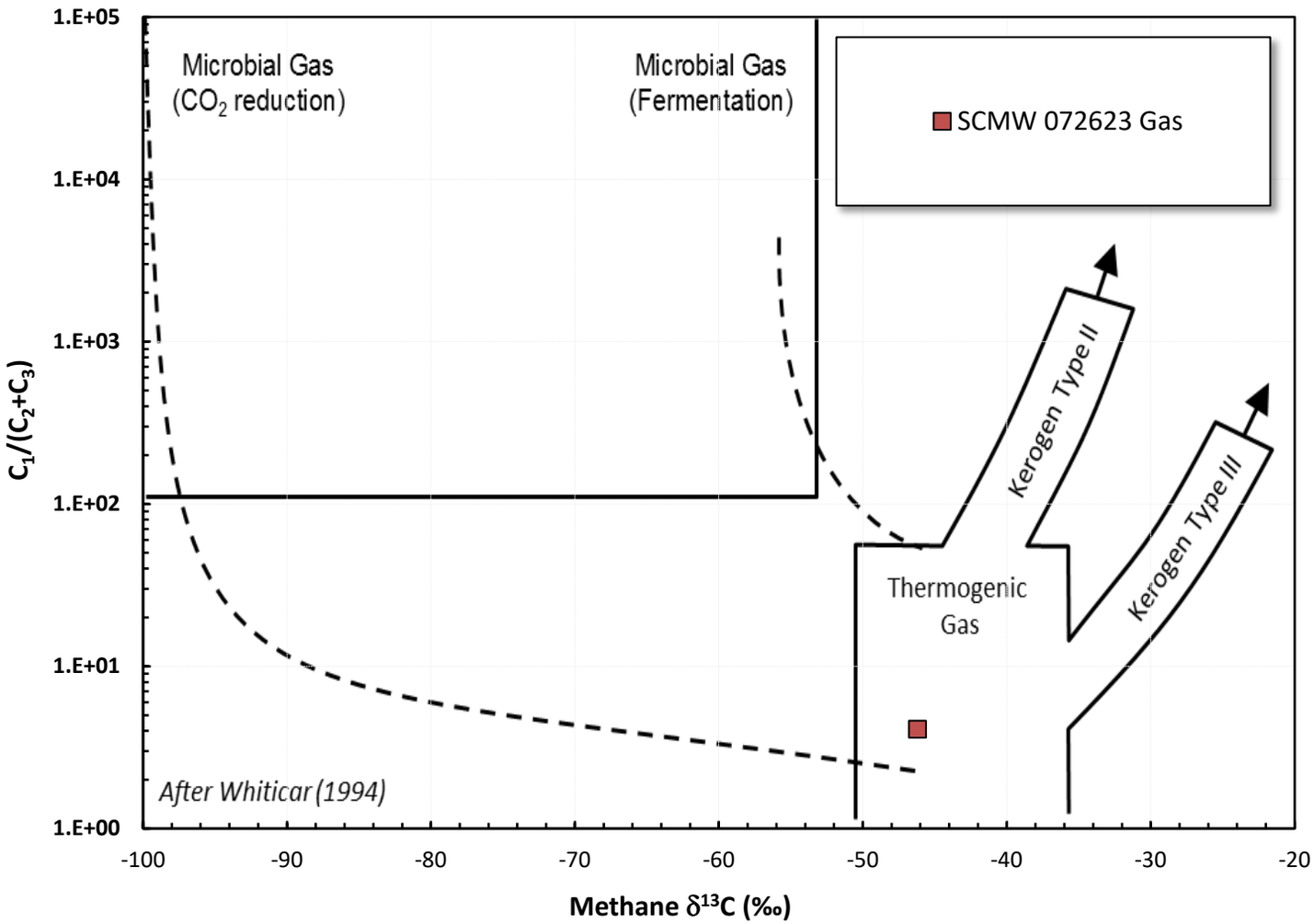
Mixing Plot



Ethane - Propane Maturity Plot



Methane $\delta^{13}C$ vs $C_1/(C_2+C_3)$ 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										
		7/26/23 12:00		DIG-032518		GAS			SCMW 072623	7/27/2023										
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	230710090																		
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 %	16.517									0.005	0.005	0.005		230710090	
	124-38-9	CARBON DIOXIDE	SOP		MOL %	0.044									0.005	0.005	0.005		230710090	
	7727-37-9	NITROGEN (N2)	SOP		MOL %	60.036									0.005	0.005	0.005		230710090	
	7440-59-7	Helium	SOP		MOL %	0.005	ND								0.005	0.005	0.005		230710090	
	1333-74-0	HYDROGEN	SOP		MOL %	0.005	ND								0.005	0.005	0.005		230710090	
	74-82-8	METHANE	SOP		MOL %	18.286									0.005	0.005	0.005		230710090	
	74-84-0	ETHANE	SOP		MOL %	3.023									0.005	0.005	0.005		230710090	
	74-85-1	ETHENE	SOP		MOL %	0.005	ND								0.005	0.005	0.005		230710090	
	74-98-6	PROPANE	SOP		MOL %	1.433									0.005	0.005	0.005		230710090	
	75-28-5	ISOBUTANE	SOP		MOL %	0.174									0.005	0.005	0.005		230710090	
	106-97-8	N-BUTANE	SOP		MOL %	0.345									0.005	0.005	0.005		230710090	
	iC5	ISOPENTANE	SOP		MOL %	0.071									0.005	0.005	0.005		230710090	
	109-66-0	N-PENTANE	SOP		MOL %	0.054									0.005	0.005	0.005		230710090	
	92112-69-1+	C6+ (hexanes +)	SOP		MOL %	0.016									0.005	0.005	0.005		230710090	
	delta13C_C1	DELTA 13C C1	SOP		per mil	-46.2													230710090	
	deltaD_C1	DELTA D C1	SOP		per mil	-258													230710090	
	delta13C_C2	DELTA 13C C2	SOP		per mil	-32.4													230710090	
	delta13C_C3	DELTA 13C C3	SOP		per mil	-28.6													230710090	
	delta13C_nC4	DELTA 13C nC4	SOP		per mil	-27.3				Low Signal									230710090	
	BTU	BRITISH THERMAL UNITS	SOP		BTU/cuft	298													230710090	
	SpGrav	SPECIFIC GRAVITY	SOP		No Unit	0.932													230710090	

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

JOB 230710090
DIG-03258

Send Data to:	Send Invoice to (if different):	Additional Information:
Name: Trent Watne	Name:	AFE #:
Company: Olsson	Company:	Project:
Address: 1525 Raleigh, #400	Address:	PO #:
City, State: Denver, CO	City, State:	Location:
Phone: 303-503-5140	Phone:	Sampled By:
Email: twatne@olsson.com	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)	dD of Methane (C1)	Whole Oil Gas Chromatography	d18O and dD Isotopes of Water	RSK 175 Dissolved Gas Quantification
	SCMW 072623	7/26	12:00	Other	X	X	X	X	X	X	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐
				Other	☐	☐	☐	☐	☐	☐	☐	☐	☐

Chain of Custody Record

Comments:

Relinquished by Signature	Company	Date	Time	Received by Signature	Company	Date	Time
[signature]	Olsson	7/27	1230	[signature]	DIG	7/27/23	1230

*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.