



Produced Gas Isotope and Compositional Analyses

**Crestone Peak Resources Produced Gases
Colorado**

Crestone Peak Resources

March 27, 2019

GEOMARK PRODUCED GAS ISOTOPE ANALYSIS

Crestone Peak Resources Crestone Peak Resources Produced Gases, Colorado

Sample ID	Cylinder ID Number	COGCC ID	Sampling Date	Sampling Time	Tubing Pressure (psia)	Casing Pressure (psia)	Stable Carbon Isotopes									
							$\delta^{13}\text{C}$ Methane (‰)	$\delta^{13}\text{C}$ Ethane (‰)	$\delta^{13}\text{C}$ Propane (‰)	$\delta^{13}\text{C}$ i-Butane (‰)	$\delta^{13}\text{C}$ n-Butane (‰)	$\delta^{13}\text{C}$ i-Pentane (‰)	$\delta^{13}\text{C}$ n-Pentane (‰)	δD Methane (‰)	$\delta^{13}\text{C}$ CO ₂ (‰)	
Herren 31-33 - Surface CSG		265302	1/22/2019	-			-52.3	-33.8	-29.2	-32.1	-29.4				-263	-17.0



PRODUCED GAS ISOTOPE ANALYSIS

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Sample ID	Cylinder ID Number	COGCC ID	Sampling Date	Sampling Time	Tubing Pressure (psia)	Casing Pressure (psia)	Isotope Gas Composition														Specific Gravity (Air = 1.0)			
							He Conc. (mole %)	H2 Conc. (mole %)	O2+Ar Conc. (mole %)	N2 Conc. (mole %)	CO2 Conc. (mole %)	H2S Conc. (mole %)	CO Conc. (mole %)	C1 Conc. (mole %)	C2 Conc. (mole %)	C2H4 Conc. (mole %)	C3 Conc. (mole %)	C3H6 Conc. (mole %)	iC4 Conc. (mole %)	nC4 Conc. (mole %)		iC5 Conc. (mole %)	nC5 Conc. (mole %)	C6+ Conc. (mole %)
Herren 31-33 - Surface CSG		265302	1/22/2019	-			0.00	0.01	1.41	7.73	0.03	0.00	0.00	74.22	10.28	0.00	4.16	0.00	0.42	1.07	0.26	0.21	0.20	0.720



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Sample ID	Cylinder ID Number	COGCC ID	Sampling Date	Sampling Time	Tubing Pressure (psia)	Casing Pressure (psia)	Hydrocarbon Gas Composition							
							C1 Conc. (mole %)	C2 Conc. (mole %)	C3 Conc. (mole %)	iC4 Conc. (mole %)	nC4 Conc. (mole %)	iC5 Conc. (mole %)	nC5 Conc. (mole %)	C6+ Conc. (mole %)
Herren 31-33 - Surface CSG		265302	1/22/2019	-			81.72	11.32	4.58	0.46	1.18	0.29	0.23	0.22

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Sample ID	Cylinder ID Number	COGCC ID	Sampling Date	Sampling Time	Tubing Pressure (psia)	Casing Pressure (psia)	BTU Content		Calculated Ratios			
							Total Gas (BTU/ft3)	Hydrocar. Gas (BTU/ft3)	Total HC Gas (ppm by mole)	Wetness (C2 - nC5) / (C1 - nC5)	C1/C2 Ratio (mole/mole)	IC4/nC4 Ratio (mole/mole)
Herren 31-33 - Surface CSG		265302	1/22/2019	-			1,113	1,226	908,261	18.10	7	0.39