



**dig**  
Dolan Integration Group

## Geochemistry for Energy

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received 08/15/2016  
Complaint 200439757

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

**Job #:** 16070661  
**Lab #:** DIG-009455  
**Client:** COGCC  
**Sample Name(s):** 753452

# Analytical Report



Job #: 16070661  
 Lab #: DIG-009455  
 Client: COGCC  
 Sample Name: 753452  
 Date Sampled: 07/20/16  
 Time Sampled: 9:45  
 Sample Description: Water  
 Sampling Notes:  
 Date Received: 07/25/16  
 Date Analyzed: Gas Composition: 8/3/16 ;  $\delta^{13}\text{C}$ : 8/5/16 ;  $\delta\text{D}$ : 8/8/16  
 Date Reported: 08/15/16  
 Comments: Headspace created with UHP Helium

Measured Values:	Measured ppm	Analyte mol % <sup>a</sup>	HC mol %	Total dissolved mg/L	$\delta^{13}\text{C}$ ‰ VPDB	$\delta\text{D}$ ‰ VSMOW	Comments
Nitrogen (N <sub>2</sub> )	141746	31.7	-	8.66	-	-	
Oxygen + Argon (O <sub>2</sub> +Ar)	21402	4.79	-	2.09	-	-	
Carbon Dioxide (CO <sub>2</sub> )	3754	0.84	-	7.45	-17.0	-	
Helium (He) <sup>b</sup>	na	na	-	na	-	-	Added Headspace
Hydrogen (H <sub>2</sub> )	nd	nd	-	nd	-	-	
Methane (CH <sub>4</sub> )	279750	62.57	99.84	14.35	-71.3	-250	
Ethane (C <sub>2</sub> H <sub>6</sub> )	457	0.1	0.16	0.05	nd	-	
Propane (C <sub>3</sub> H <sub>8</sub> )	nd	nd	nd	nd	nd	-	
iso-Butane (C <sub>4</sub> H <sub>10</sub> )	nd	nd	nd	nd	nd	-	
n-Butane (C <sub>4</sub> H <sub>10</sub> )	nd	nd	nd	nd	nd	-	
iso-Pentane (C <sub>5</sub> H <sub>12</sub> )	nd	nd	nd	nd	nd	-	
n-Pentane (C <sub>5</sub> H <sub>12</sub> )	nd	nd	nd	nd	nd	-	
Hexanes + (C <sub>6</sub> H <sub>14</sub> )	nd	nd	nd	nd	nd	-	

Calculated Values:	
Total HCs (ppm)	280207
Gas Wetness (mol % C <sub>2</sub> +C <sub>1</sub> +) )	0.16
C <sub>1</sub> /(C <sub>2</sub> +C <sub>3</sub> ) (mol/mol)	612

<sup>a</sup> Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. % )

<sup>b</sup> Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error  $\delta^{13}\text{C}$  < 0.5 ‰

Error  $\delta\text{D}$  < 5.0 ‰

# Stable Isotope Interpretive Plots

