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December 16, 2016

Jim Hughes
Colorado Oil & Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, CO 80203

**RE: McCulloch #4 Gas Sampling Results
La Plata County, Colorado**

Dear Mr. Hughes:

Cottonwood Consulting LLC (Cottonwood) is pleased to provide you with the results of gas sampling at the McCulloch #4 temporarily-abandoned natural gas well in La Plata County, Colorado (Figure 1). The gas sampling methodology and associated results are summarized below.

Background

The McCulloch #4 (API# 05-067-05620) temporarily-abandoned natural gas well was drilled in 1956 in the northeast quarter of the northwest quarter of Section 35, Township 34 North, Range 10 West, in La Plata County, Colorado. According to Colorado Oil and Gas Conservation Commission (COGCC) records, the total depth of the well is 5,561 feet below ground surface and the deepest formation targeted was the Mancos Shale. Due to mechanical difficulties and various disputes over operatorship, the well has never been produced or plugged and is now considered an orphan well by the COGCC. Cottonwood was retained by COGCC in October 2016 to conduct a soil gas survey and determine the presence or absence of methane seepage in the vicinity of the McCulloch #4. The soil gas survey was conducted on October 6, 2016 and indicated that methane was not seeping from the ground surface in the vicinity of the well. These results were submitted to COGCC in a summary letter dated October 14, 2016.

Cottonwood also anticipated collecting a gas sample from the well on October 6, 2016, but due to wellhead conditions and plumbing, Cottonwood was unable to collect a gas sample at the time of the soil gas survey. Cottonwood found the tubing master valve open and one of two production casing master valves missing. Methane was recorded venting from the production casing port that was missing a master valve. Methane was not found to be venting from the tubing or the other production casing valve. Cottonwood closed the available production casing master valve and attempted to close the tubing valve, but it was unclear whether the valve was operating properly during the site visit. Cottonwood recorded wellhead conditions and made a plan to return to the site with necessary equipment to shut-in the well with the appropriate plugs and valves and collect a gas sample.

Methodology

Cottonwood shut the well in on October 19, 2016. Plugs were installed on the tubing valve port and on the production casing master valve that was present. On the production casing port from which venting methane had been recorded, a new valve and plug were installed to stop the venting gas and allow for collection of a gas sample at a later date. Photographs of the wellhead conditions before and after shut-in are included as Attachment 1.

Cottonwood returned to the site on November 3, 2016 to collect a gas sample from the production casing. Prior to sampling, a pressure reading was taken using a Crystal XP2® Digital Test Gauge. The gas sample was collected in a 300 milliliter (ml) stainless steel gas cylinder provided by the laboratory. The cylinder was purged with sample gas 10 times prior to sample collection. The sample was submitted to Isotech Laboratories, Inc. of Champaign, Illinois for analysis of gas and isotopic composition. Additionally, Cottonwood dug around the wellhead and found an intermediate and surface casing present on the well; however, no functioning valves were present on the either casing to allow for sample collection. A roustabout crew and proper equipment would be required to safely access these casings should pressure testing and gas sampling of the intermediate and surface casings be desired.

Results

Results of the gas sampling activities indicate that 4.2 pounds per square inch (psi) of pressure were recorded on the production casing after being shut-in for the 16 day period between October 19th and November 3rd. Laboratory analytical results indicate that the production casing gas contained 84.65 percent (%) methane; 9.22% ethane; 3.21% propane; and lower concentrations of various other gasses. The stable carbon and deuterium isotopes in the production casing gas were -43.85 and -217.8 per mil, respectively. A cross-plot of deuterium and stable carbon isotopes of methane is included as Figure 2 and indicates that the gas plots in the thermogenic region of the chart. The laboratory analytical report is included as Attachment 2.

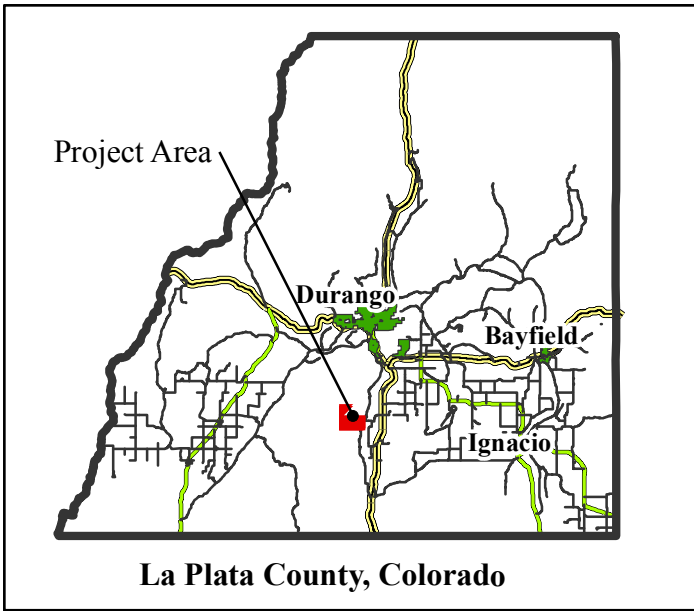
Should you have any questions, please do not hesitate to contact me at 970-764-7356 or ksiesser@cottonwoodconsulting.com. We appreciate the opportunity to provide services to the COGCC.

Sincerely,



Kyle Siesser, P.G.
Cottonwood Consulting, LLC

Attachments: Figure 1 – Project Vicinity Map
Figure 2 – Stable Carbon and Deuterium isotope Ratios
Attachment 1 – Photographic Documentation
Attachment 2 – Laboratory Analytical Report




<p>Legend</p> <p>★ McCulloch #4 Well Head</p>	<p>Cottonwood CONSULTING</p> 	<p>FIGURE 1 PROJECT VICINITY MAP McCULLOCH #4 COGCC</p>
<p>Project Area: NENW, Sec. 35, T34N, R10W NMPM, La Plata County, CO</p>	<p>Mapping: J. Harter, 12/15/16 Coordinate System: NAD 1983 UTM Z13</p>	

FIGURE 2
STABLE CARBON AND DEUTERIUM ISOTOPE RATIOS

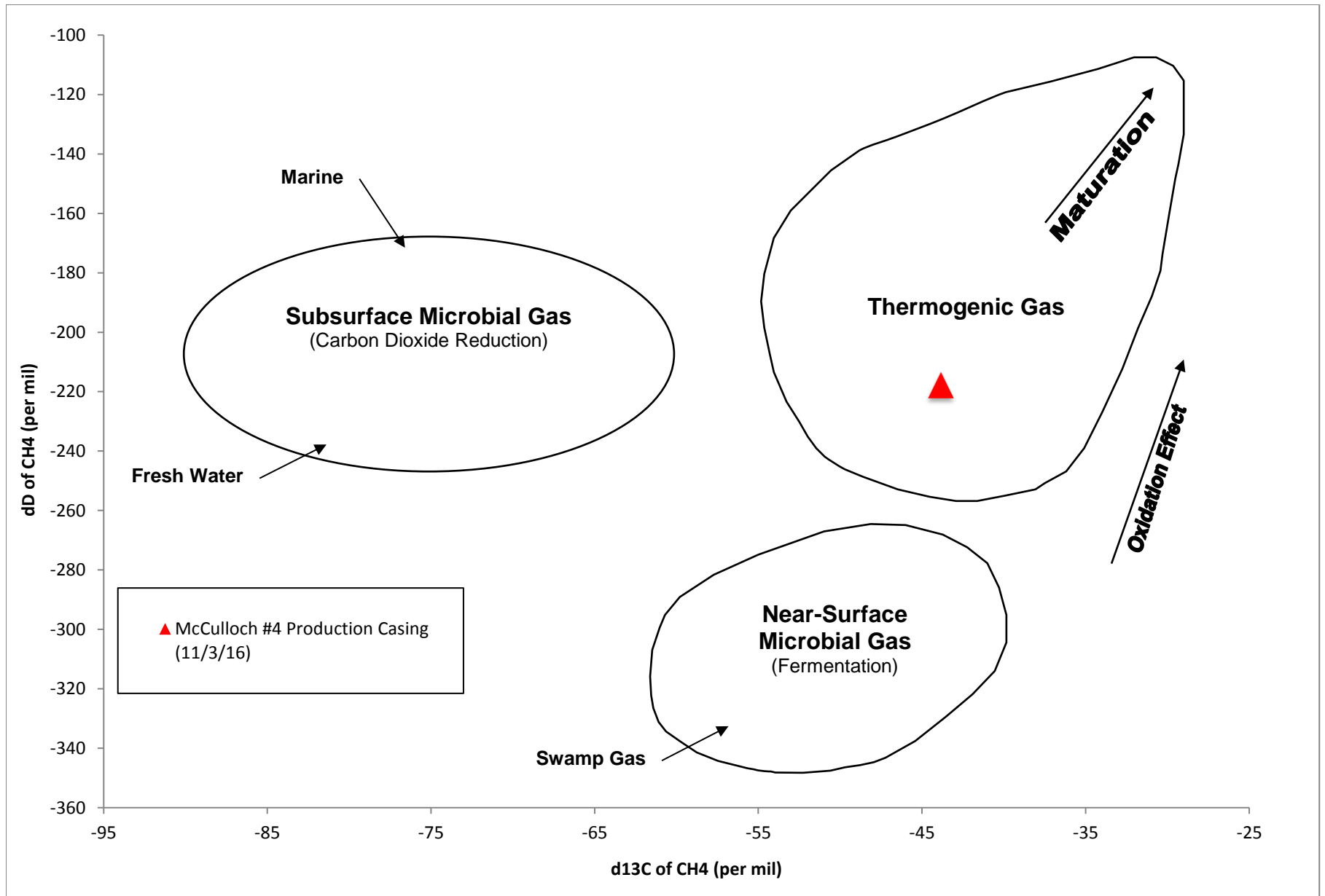




Photo 1: McCulloch #4 Well Head – As found (before shut-in)

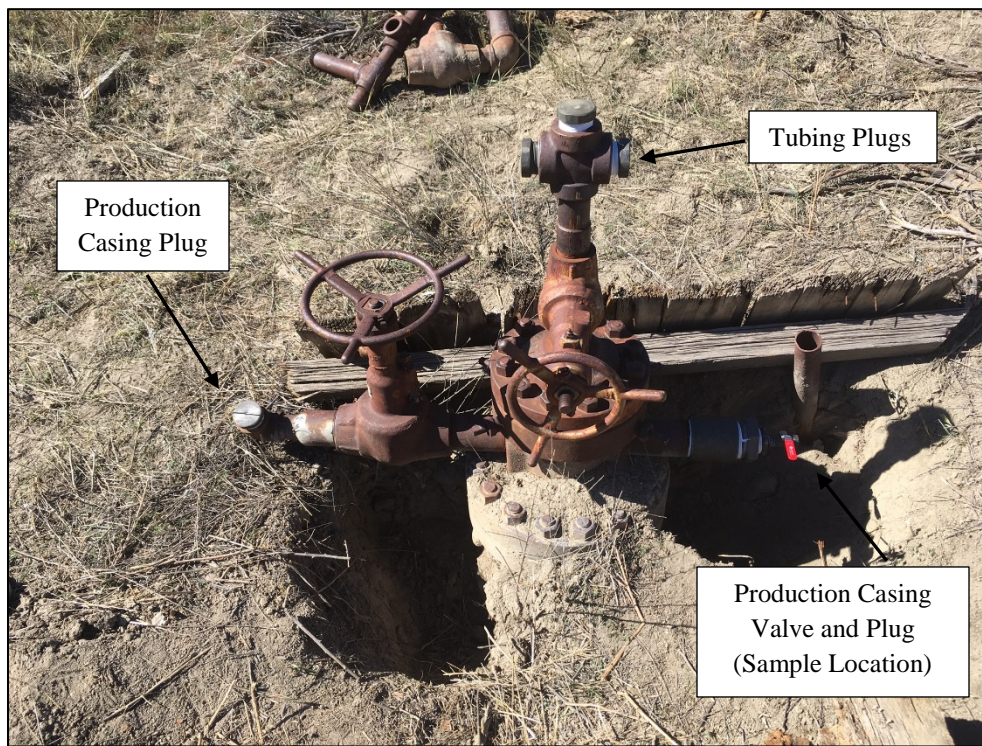


Photo 2: McCulloch #4 Well Head – As left on 10/19/16 (following shut-in)

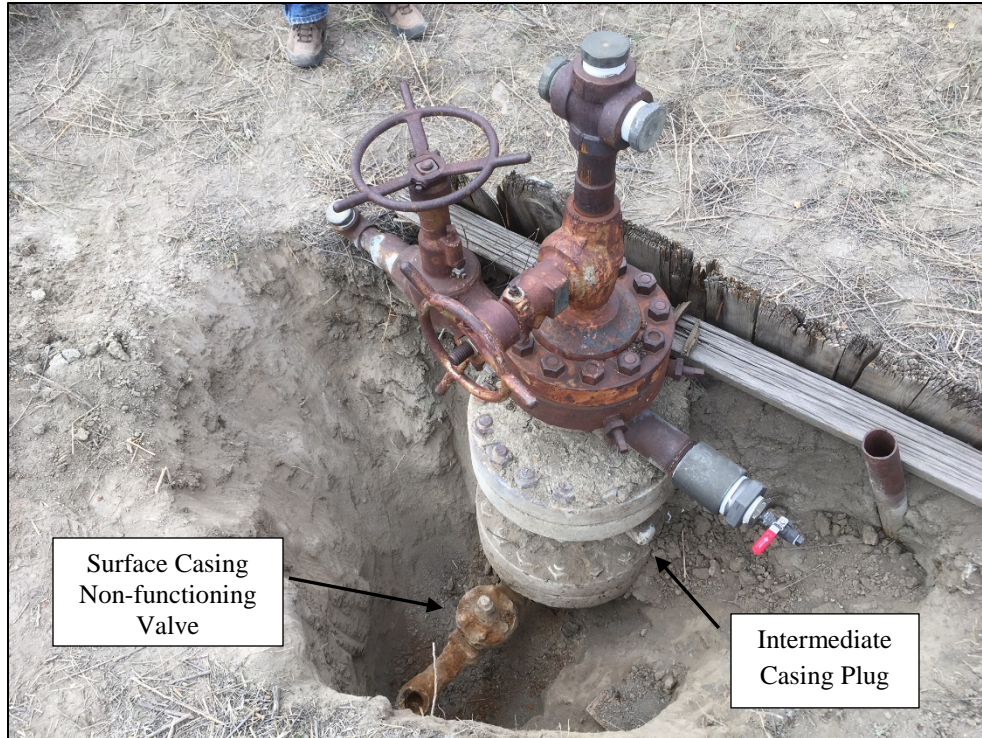


Photo 3: McCulloch #4 Well Head – As left on 11/3/16. Note surface casing and intermediate casing

Lab #: 586193 Job #: 33368 IS-93530 Co. Job#:
 Sample Name: McCulloch # 4 Production Casing Co. Lab#:
 Company: Cottonwood Consulting, LLC Cylinder: 2775
 API/Well:
 Container: Cylinder
 Field/Site Name: McCulloch #4
 Location: La Plata County, CO
 Formation:
 Sampling Point:
 Date Sampled: 11/03/2016 10:25 Date Received: 11/04/2016 Date Reported: 12/09/2016

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	nd			
Hydrogen -----	nd			
Argon -----	0.0075			
Oxygen -----	0.15			
Nitrogen -----	0.65			
Carbon Dioxide -----	0.039			
Methane -----	84.65	-43.85	-217.8	
Ethane -----	9.22	-30.81		
Ethylene -----	nd			
Propane -----	3.21	-26.79		
Propylene -----	nd			
Iso-butane -----	0.617			
N-butane -----	0.651			
Iso-pentane -----	0.255			
N-pentane -----	0.159			
Hexanes + -----	0.388			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1181

Specific gravity, calculated: 0.669

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

SEND DATA TO:

 Name: Kyle Siesser
 Company: Cottonwood Consulting
 Address: PO Box 1653 Durango, CO 81302
 Phone: 970 764 7356
 Email: Ksiesser@cottonwoodconsulting.com
 Project: McCulloch #4
SEND INVOICE TO (if different from SEND DATA TO):

 Name: _____
 Company: _____
 Address: _____
 Phone: _____
 Email: _____

Purchase Order #: _____

 Location: La Plata County, CO

 Sampled By: Kyle Siesser

 Circle one: Standard Priority Rush

Analysis Requested		
NG-2D		

Sample Description

Container Number	Sample Identification	Date Sampled	Time	Analysis Requested			Comments
2775	McCulloch #4 Production Casing	11/3/16	1025	X			4.2 psi

Chain-of-Custody Record

Signature	Company	Date	Time
Relinquished by <u>Kyle Siesser</u>	<u>Cottonwood</u>	<u>11/3/16</u>	<u>1300</u>
Received by <u>Abby L. Skube / Isotech Laboratories</u>		<u>11/4/16</u>	<u>8:40</u>
Relinquished by			
Received by			
Relinquished by			
Received by			