

A N A L Y S I S R E P O R T

Lab #: 376499 Job #: 22695 IS-64384
 Sample Name/Number: 750011 Bean 2
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/26/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.37			
Oxygen -----	22.00			
Nitrogen -----	72.00			
Carbon Dioxide -----	4.29	-17.00		
Methane -----	0.337			
Ethane -----	nd			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-82.8	-10.96
Dissolved Inorganic Carbon -		-9.4		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.74

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376500 Job #: 22695 IS-64384
 Sample Name/Number: 750010 Bean
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/26/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	nd			
Hydrogen -----	nd			
Argon -----	0.186			
Oxygen -----	2.26			
Nitrogen -----	8.06			
Carbon Dioxide -----	0.23	-7.7		
Methane -----	89.06	-55.87	-255.8	
Ethane -----	0.177	-30.4		
Ethylene -----	nd			
Propane -----	0.0133			
Propylene -----	nd			
Iso-butane -----	0.0053			
N-butane -----	0.0021			
Iso-pentane -----	0.0021			
N-pentane -----	0.0004			
Hexanes + -----	0.0027			
Water -----			-79.4	-10.59
Dissolved Inorganic Carbon -		0.3		

Remarks:

** Ethane and carbon dioxide isotopes obtained online via GC-C-IRMS

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376501 Job #: 22695 IS-64384
 Sample Name/Number: 707184 Dutton
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/26/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.46			
Oxygen -----	10.92			
Nitrogen -----	80.42			
Carbon Dioxide -----	7.11	-20.64		
Methane -----	0.0884			
Ethane -----	nd			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-82.3	-10.65
Dissolved Inorganic Carbon -		-12.2		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.75

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376502 Job #: 22695 IS-64384
 Sample Name/Number: 701420 Bieber
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/27/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.42			
Oxygen -----	2.23			
Nitrogen -----	77.65			
Carbon Dioxide -----	4.85	-16.53		
Methane -----	13.84	-53.94	-181.3	
Ethane -----	0.0079			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-89.1	-11.54
Dissolved Inorganic Carbon -		-9.1		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.75

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376503 Job #: 22695 IS-64384
 Sample Name/Number: 752778 Nelson
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/27/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	0.776			
Oxygen -----	15.58			
Nitrogen -----	39.88			
Carbon Dioxide -----	0.10			
Methane -----	43.65	-52.98	-260.5	
Ethane -----	0.0158			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-80.8	-10.85
Dissolved Inorganic Carbon -		18.1		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.68

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376504 Job #: 22695 IS-64384
 Sample Name/Number: 704235 Damelio
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/27/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.33			
Oxygen -----	6.68			
Nitrogen -----	88.32			
Carbon Dioxide -----	3.20	-19.23		
Methane -----	0.471			
Ethane -----	0.0004			
Ethylene -----	nd			
Propane -----	0.0011			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-90.2	-12.17
Dissolved Inorganic Carbon -		-12.3		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.72

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376505 Job #: 22695 IS-64384
 Sample Name/Number: McDonald 1 ← 752788
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/28/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.38			
Oxygen -----	14.41			
Nitrogen -----	75.89			
Carbon Dioxide -----	8.24	-9.52		
Methane -----	0.0831			
Ethane -----	nd			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-77.3	-9.83
Dissolved Inorganic Carbon -		-2.4		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.75

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376506 Job #: 22695 IS-64384
 Sample Name/Number: McDonald 2 ← 752793
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/28/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.31			
Oxygen -----	25.87			
Nitrogen -----	69.41			
Carbon Dioxide -----	3.40	-19.85		
Methane -----	0.0077			
Ethane -----	nd			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-86.4	-11.46
Dissolved Inorganic Carbon -		-12.7		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.74

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376507 Job #: 22695 IS-64384
 Sample Name/Number: 752787 Earls
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/28/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.34			
Oxygen -----	23.93			
Nitrogen -----	70.41			
Carbon Dioxide -----	4.32	-20.04		
Methane -----	0.0036			
Ethane -----	nd			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-85.0	-11.05
Dissolved Inorganic Carbon -		-12.1		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.75

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376508 Job #: 22695 IS-64384
 Sample Name/Number: 704681 Dolores WW
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/29/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.22			
Oxygen -----	5.52			
Nitrogen -----	72.09			
Carbon Dioxide -----	0.21	-24.6		
Methane -----	20.95	-56.20	-191.3	
Ethane -----	0.0051			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-74.9	-10.19
Dissolved Inorganic Carbon -		-16.7		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.71

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

** Carbon dioxide isotopes obtained online via GC-C-IRMS

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.

Lab #: 376509 Job #: 22695 IS-64384
 Sample Name/Number: 705737 Dolores MW
 Company: Colorado Oil & Gas Conservation
 Date Sampled: 8/29/2013
 Container: Dissolved Gas Bottle
 Field/Site Name: TBAL
 Location: Las Animas County, CO
 Formation/Depth:
 Sampling Point:
 Date Received: 8/30/2013 Date Reported: 9/18/2013

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰
Carbon Monoxide -----	nd			
Helium -----	na			
Hydrogen -----	nd			
Argon -----	1.26			
Oxygen -----	12.99			
Nitrogen -----	68.94			
Carbon Dioxide -----	0.058			
Methane -----	16.75	-60.47	-204.8	
Ethane -----	0.0035			
Ethylene -----	nd			
Propane -----	nd			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	nd			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	nd			
Water -----			-69.0	-9.55
Dissolved Inorganic Carbon -		-17.7		

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.74

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which 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. %.