

Lab #: 722066      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Williams 43-18 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W32524   
 Formation:   
 Sampling Point: 282888   
 Date Sampled: 5/23/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0101			
Hydrogen -----	0.185			
Argon -----	0.0168			
Oxygen -----	0.35			
Nitrogen -----	1.59			
Carbon Dioxide -----	1.73	0.5		
Methane -----	74.49	-48.0	-241	
Ethane -----	12.69	-32.7		
Ethylene -----	nd			
Propane -----	5.43	-29.1		
Propylene -----	nd			
Iso-butane -----	0.777	-31.4		
N-butane -----	1.90	-28.1		
Iso-pentane -----	0.403	-28.7		
N-pentane -----	0.380	-27.6		
Hexanes + -----	0.0497			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1242

Specific gravity, calculated: 0.748

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722067      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Rasmussen H1 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W768362   
 Formation:   
 Sampling Point: 244563   
 Date Sampled: 5/24/2019 11:20      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0246			
Hydrogen -----	nd			
Argon -----	0.0073			
Oxygen -----	0.11			
Nitrogen -----	1.12			
Carbon Dioxide -----	0.71	-8.7		
Methane -----	80.45	-51.2	-248	
Ethane -----	9.41	-35.4		
Ethylene -----	nd			
Propane -----	5.28	-30.5		
Propylene -----	nd			
Iso-butane -----	0.642	-32.1		
N-butane -----	1.47	-29.1		
Iso-pentane -----	0.307	-28.9		
N-pentane -----	0.284	-28.2		
Hexanes + -----	0.183			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1220

Specific gravity, calculated: 0.709

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722068      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Rasmussen H1 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W768362   
 Formation:   
 Sampling Point: 244563   
 Date Sampled: 5/24/2019 11:20      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0114			
Hydrogen -----	0.0803			
Argon -----	0.0058			
Oxygen -----	0.088			
Nitrogen -----	0.60			
Carbon Dioxide -----	0.72	-2.4		
Methane -----	79.65	-48.0	-239	
Ethane -----	12.50	-32.5		
Ethylene -----	nd			
Propane -----	4.80	-28.9		
Propylene -----	nd			
Iso-butane -----	0.538	-31.1		
N-butane -----	0.772	-27.4		
Iso-pentane -----	0.0839	-28.1		
N-pentane -----	0.0540	-26.6		
Hexanes + -----	0.101			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1206

Specific gravity, calculated: 0.695

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722069      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Ross 12-19 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W68762   
 Formation:   
 Sampling Point: 422591   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0780			
Hydrogen -----	0.0257			
Argon -----	0.0250			
Oxygen -----	0.44			
Nitrogen -----	4.60			
Carbon Dioxide -----	0.006			
Methane -----	84.60	-56.4	-224	
Ethane -----	3.37	-34.7		
Ethylene -----	nd			
Propane -----	3.79	-32.9		
Propylene -----	nd			
Iso-butane -----	1.07	-32.4		
N-butane -----	1.07	-31.9		
Iso-pentane -----	0.367	-29.6		
N-pentane -----	0.258	-29.9		
Hexanes + -----	0.297			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1124

Specific gravity, calculated: 0.679

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722070      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Ross 12-19 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W68762   
 Formation:   
 Sampling Point: 422591   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0146			
Hydrogen -----	0.240			
Argon -----	0.0219			
Oxygen -----	0.48			
Nitrogen -----	2.25			
Carbon Dioxide -----	1.50	1.70		
Methane -----	70.40	-48.98	-240.7	
Ethane -----	12.45	-33.06		
Ethylene -----	nd			
Propane -----	6.57	-29.36		
Propylene -----	nd			
Iso-butane -----	1.11	-31.67		
N-butane -----	2.89	-28.39		
Iso-pentane -----	0.892	-28.51		
N-pentane -----	1.03	-27.75		
Hexanes + -----	0.152			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1320

Specific gravity, calculated: 0.802

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

# ANALYSIS REPORT

Lab #: 722071      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Costigan 6-8-20 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W64863   
 Formation:   
 Sampling Point: 301900   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0132			
Hydrogen -----	nd			
Argon -----	0.0234			
Oxygen -----	0.49			
Nitrogen -----	2.36			
Carbon Dioxide -----	0.006			
Methane -----	78.55	-48.5	-241	
Ethane -----	10.57	-32.6		
Ethylene -----	nd			
Propane -----	4.99	-28.7		
Propylene -----	0.0001			
Iso-butane -----	0.701	-31.5		
N-butane -----	1.45	-28.1		
Iso-pentane -----	0.351	-28.8		
N-pentane -----	0.305	-27.6		
Hexanes + -----	0.195			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1218

Specific gravity, calculated: 0.715

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722072      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Costigan 6-8-20 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W64863   
 Formation:   
 Sampling Point: 301900   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0087			
Hydrogen -----	0.0270			
Argon -----	0.0066			
Oxygen -----	0.12			
Nitrogen -----	0.68			
Carbon Dioxide -----	1.43	2.3		
Methane -----	76.95	-47.3	-239	
Ethane -----	12.62	-31.7		
Ethylene -----	0.0007			
Propane -----	5.53	-28.5		
Propylene -----	nd			
Iso-butane -----	0.764	-31.0		
N-butane -----	1.47	-27.4		
Iso-pentane -----	0.211	-28.3		
N-pentane -----	0.173	-26.7		
Hexanes + -----	0.0140			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1235

Specific gravity, calculated: 0.726

Remarks: Sample analyzed offline for QC comparison to online Values.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722073      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Costigan 34-20 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W64889   
 Formation:   
 Sampling Point: 301573   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0138			
Hydrogen -----	0.0186			
Argon -----	0.0065			
Oxygen -----	0.095			
Nitrogen -----	0.71			
Carbon Dioxide -----	1.50	1.4		
Methane -----	79.93	-46.9	-238	
Ethane -----	10.62	-31.4		
Ethylene -----	0.0005			
Propane -----	4.29	-28.7		
Propylene -----	nd			
Iso-butane -----	0.647	-31.0		
N-butane -----	1.37	-27.7		
Iso-pentane -----	0.325	-28.7		
N-pentane -----	0.321	-27.4		
Hexanes + -----	0.150			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1208

Specific gravity, calculated: 0.710

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 722074      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Costigan 34-20 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W64889   
 Formation:   
 Sampling Point: 301573   
 Date Sampled: 5/24/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0156			
Hydrogen -----	nd			
Argon -----	0.0261			
Oxygen -----	0.57			
Nitrogen -----	2.83			
Carbon Dioxide -----	0.019			
Methane -----	79.72	-49.4	-245	
Ethane -----	9.85	-34.1		
Ethylene -----	nd			
Propane -----	4.77	-29.7		
Propylene -----	nd			
Iso-butane -----	0.619	-31.8		
N-butane -----	1.10	-28.5		
Iso-pentane -----	0.222	-28.9		
N-pentane -----	0.168	-28.2		
Hexanes + -----	0.0935			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1182

Specific gravity, calculated: 0.698

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722075      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Echerveria 2I-2H-D267 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: 16191925   
 Formation:   
 Sampling Point: 459171   
 Date Sampled: 5/28/2019 12:20      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	nd			
Hydrogen -----	nd			
Argon -----	0.917			
Oxygen -----	20.94			
Nitrogen -----	78.07			
Carbon Dioxide -----	0.062	-11.6		
Methane -----	0.0051			
Ethane -----	0.0006			
Ethylene -----	nd			
Propane -----	0.0004			
Propylene -----	nd			
Iso-butane -----	nd			
N-butane -----	0.0002			
Iso-pentane -----	nd			
N-pentane -----	nd			
Hexanes + -----	0.0002			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 0

Specific gravity, calculated: 1.000

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722076      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Echerveria 2I-2H-D267 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: 16191925   
 Formation:   
 Sampling Point: 459171   
 Date Sampled: 5/28/2019 12:20      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0236			
Hydrogen -----	nd			
Argon -----	0.0162			
Oxygen -----	0.12			
Nitrogen -----	1.82			
Carbon Dioxide -----	nd			
Methane -----	91.28	-50.8	-250	
Ethane -----	5.97	-35.1		
Ethylene -----	nd			
Propane -----	0.766	-28.1		
Propylene -----	nd			
Iso-butane -----	0.0040			
N-butane -----	0.0006			
Iso-pentane -----	0.0004			
N-pentane -----	0.0007			
Hexanes + -----	0.0016			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1052

Specific gravity, calculated: 0.599

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 722077      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Haley 41-20 / Production Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W73340   
 Formation:   
 Sampling Point: 430587   
 Date Sampled: 5/29/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0302			
Hydrogen -----	0.320			
Argon -----	0.0054			
Oxygen -----	0.090			
Nitrogen -----	0.84			
Carbon Dioxide -----	1.96	0.7		
Methane -----	80.21	-49.7	-236	
Ethane -----	10.27	-32.3		
Ethylene -----	0.0002			
Propane -----	3.63	-27.6		
Propylene -----	nd			
Iso-butane -----	0.542	-29.6		
N-butane -----	1.06	-26.9		
Iso-pentane -----	0.386	-28.4		
N-pentane -----	0.362	-27.0		
Hexanes + -----	0.298			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1187

Specific gravity, calculated: 0.705

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

# ANALYSIS REPORT

Lab #: 722078      Job #: 41790      IS-94649      Co. Job#:   
 Sample Name: Haley 41-20 / Surface Casing      Co. Lab#:   
 Company: Crestone Peak Resources   
 API/Well:   
 Container: IsoTube®   
 Field/Site Name: Bradenhead Testing   
 Location: W73340   
 Formation:   
 Sampling Point: 430587   
 Date Sampled: 5/29/2019      Date Received: 6/06/2019      Date Reported: 7/08/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	$\delta\text{D}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0584			
Hydrogen -----	0.0206			
Argon -----	0.0150			
Oxygen -----	0.22			
Nitrogen -----	3.25			
Carbon Dioxide -----	0.006			
Methane -----	84.22	-54.9	-227	
Ethane -----	5.65	-34.3		
Ethylene -----	nd			
Propane -----	4.46	-30.0		
Propylene -----	nd			
Iso-butane -----	0.558	-31.2		
N-butane -----	1.01	-28.1		
Iso-pentane -----	0.216	-28.8		
N-pentane -----	0.184	-27.6		
Hexanes + -----	0.132			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1142

Specific gravity, calculated: 0.673

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.