



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-10W

Wellbore #1

Design: Wellbore #1

QES Survey Report

29 August, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-10W
Project:	Mesa County, CO	TVD Reference:	Well @ 7287.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	MD Reference:	Well @ 7287.0usft (H&P #522)
Well:	BCU 0993-21-10W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Mesa County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site	Gunderson 0993 21-05 Pad				
Site Position:		Northing:	1,529,627.90 usft	Latitude:	39.265321
From:	Lat/Long	Easting:	2,354,508.90 usft	Longitude:	-107.780117
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.44 °

Well	BCU 0993-21-10W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,627.77 usft	Latitude:	39.265320
	+E/-W	0.0 usft	Easting:	2,354,498.99 usft	Longitude:	-107.780152
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	7,257.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	8/9/2018	9.48	65.43	51,394.30000000

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	165.56	

Survey Program	Date	8/29/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
208.0	7,743.0	QES MWD Surveys (Wellbore #1)	MWD default	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
First MWD Survey @ 208.0' MD / 208.0' TVD										
208.0	1.90	184.60	208.0	-3.4	-0.3	3.3	0.91	0.91	0.00	
301.0	2.80	164.00	300.9	-7.2	0.2	7.0	1.31	0.97	-22.15	
393.0	3.40	164.10	392.7	-11.9	1.6	12.0	0.65	0.65	0.11	
486.0	3.30	161.20	485.6	-17.1	3.2	17.4	0.21	-0.11	-3.12	
579.0	5.70	172.10	578.3	-24.2	4.7	24.6	2.73	2.58	11.72	
671.0	9.50	174.20	669.5	-36.3	6.1	36.7	4.14	4.13	2.28	
764.0	9.90	175.50	761.1	-51.9	7.5	52.2	0.49	0.43	1.40	
856.0	9.80	177.00	851.8	-67.6	8.5	67.6	0.30	-0.11	1.63	
949.0	10.00	176.30	943.4	-83.6	9.5	83.3	0.25	0.22	-0.75	



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-10W
Project:	Mesa County, CO	TVD Reference:	Well @ 7287.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	MD Reference:	Well @ 7287.0usft (H&P #522)
Well:	BCU 0993-21-10W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,043.0	9.80	156.60	1,036.0	-99.1	13.2	99.2	3.59	-0.21	-20.96
1,138.0	9.80	152.60	1,129.6	-113.7	20.1	115.1	0.72	0.00	-4.21
1,232.0	9.90	153.00	1,222.3	-128.0	27.5	130.8	0.13	0.11	0.43
1,327.0	10.60	162.10	1,315.7	-143.6	33.9	147.5	1.85	0.74	9.58
1,421.0	10.70	161.70	1,408.1	-160.1	39.3	164.8	0.13	0.11	-0.43
1,486.0	10.90	160.60	1,472.0	-171.6	43.2	177.0	0.44	0.31	-1.69
1,608.0	11.20	164.10	1,591.7	-193.9	50.3	200.3	0.60	0.25	2.87
1,702.0	11.40	163.00	1,683.9	-211.6	55.5	218.7	0.31	0.21	-1.17
1,797.0	11.30	161.70	1,777.0	-229.4	61.1	237.4	0.29	-0.11	-1.37
1,891.0	10.90	160.70	1,869.3	-246.5	67.0	255.4	0.47	-0.43	-1.06
1,985.0	10.30	164.30	1,961.7	-263.0	72.2	272.7	0.95	-0.64	3.83
2,080.0	10.00	163.60	2,055.2	-279.1	76.8	289.4	0.34	-0.32	-0.74
2,174.0	10.00	160.90	2,147.8	-294.6	81.8	305.7	0.50	0.00	-2.87
2,268.0	8.70	168.30	2,240.5	-309.3	85.9	320.9	1.88	-1.38	7.87
2,363.0	8.40	167.50	2,334.5	-323.1	88.9	335.0	0.34	-0.32	-0.84
2,457.0	8.00	166.30	2,427.5	-336.2	91.9	348.4	0.46	-0.43	-1.28
2,551.0	7.70	166.20	2,520.6	-348.6	94.9	361.3	0.32	-0.32	-0.11
2,646.0	7.30	164.10	2,614.8	-360.6	98.1	373.7	0.51	-0.42	-2.21
2,740.0	8.00	164.80	2,708.0	-372.7	101.5	386.2	0.75	0.74	0.74
2,835.0	9.50	177.10	2,801.9	-386.9	103.6	400.5	2.52	1.58	12.95
2,929.0	9.40	176.60	2,894.6	-402.3	104.4	415.6	0.14	-0.11	-0.53
3,023.0	10.30	176.00	2,987.2	-418.3	105.5	431.4	0.96	0.96	-0.64
3,118.0	10.20	174.60	3,080.7	-435.2	106.9	448.1	0.28	-0.11	-1.47
3,212.0	9.90	174.70	3,173.2	-451.5	108.4	464.3	0.32	-0.32	0.11
3,307.0	9.40	174.50	3,266.9	-467.4	109.9	480.0	0.53	-0.53	-0.21
3,401.0	10.50	164.10	3,359.5	-483.2	113.0	496.2	2.24	1.17	-11.06
3,496.0	10.30	162.70	3,452.9	-499.7	117.9	513.3	0.34	-0.21	-1.47
3,591.0	9.70	163.80	3,546.5	-515.5	122.6	529.8	0.66	-0.63	1.16
3,685.0	9.40	161.90	3,639.2	-530.4	127.2	545.3	0.46	-0.32	-2.02
3,779.0	10.20	170.80	3,731.8	-545.9	131.0	561.3	1.82	0.85	9.47
3,874.0	10.30	170.80	3,825.3	-562.6	133.7	578.1	0.11	0.11	0.00
3,968.0	9.40	169.70	3,917.9	-578.4	136.4	594.2	0.98	-0.96	-1.17
4,063.0	10.10	169.70	4,011.5	-594.3	139.2	610.2	0.74	0.74	0.00
4,157.0	10.10	168.70	4,104.1	-610.4	142.3	626.7	0.19	0.00	-1.06
4,252.0	10.80	164.50	4,197.5	-627.2	146.3	643.9	1.09	0.74	-4.42
4,347.0	10.70	161.90	4,290.8	-644.1	151.5	661.6	0.52	-0.11	-2.74
4,441.0	10.60	161.70	4,383.2	-660.7	156.9	678.9	0.11	-0.11	-0.21
4,536.0	10.00	161.90	4,476.7	-676.8	162.2	695.9	0.63	-0.63	0.21
4,631.0	10.10	161.20	4,570.2	-692.5	167.4	712.4	0.17	0.11	-0.74
4,725.0	10.10	160.50	4,662.8	-708.1	172.9	728.8	0.13	0.00	-0.74
4,819.0	9.20	162.30	4,755.4	-723.0	177.9	744.5	1.01	-0.96	1.91
4,914.0	7.90	164.30	4,849.4	-736.5	182.0	758.6	1.40	-1.37	2.11
5,008.0	8.40	163.60	4,942.4	-749.3	185.6	772.0	0.54	0.53	-0.74



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-10W
Project:	Mesa County, CO	TVD Reference:	Well @ 7287.0usft (H&P #522)
Site:	Gunderson 0993 21-05 Pad	MD Reference:	Well @ 7287.0usft (H&P #522)
Well:	BCU 0993-21-10W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,103.0	8.80	160.70	5,036.4	-762.9	190.0	786.1	0.62	0.42	-3.05	
5,197.0	8.80	151.30	5,129.3	-775.9	195.8	800.3	1.53	0.00	-10.00	
5,291.0	7.70	140.90	5,222.3	-787.1	203.3	813.0	1.97	-1.17	-11.06	
5,386.0	5.70	133.40	5,316.7	-795.3	210.7	822.7	2.29	-2.11	-7.89	
5,480.0	3.60	120.50	5,410.3	-800.0	216.6	828.8	2.48	-2.23	-13.72	
5,574.0	2.80	121.50	5,504.2	-802.7	221.1	832.5	0.85	-0.85	1.06	
5,669.0	2.60	126.40	5,599.1	-805.2	224.9	835.9	0.32	-0.21	5.16	
5,763.0	2.40	118.80	5,693.0	-807.4	228.3	838.9	0.41	-0.21	-8.09	
5,857.0	2.20	117.00	5,786.9	-809.2	231.6	841.4	0.23	-0.21	-1.91	
5,952.0	1.80	122.70	5,881.9	-810.8	234.5	843.7	0.47	-0.42	6.00	
6,046.0	1.80	112.50	5,975.8	-812.2	237.1	845.7	0.34	0.00	-10.85	
6,140.0	1.30	114.80	6,069.8	-813.2	239.4	847.2	0.54	-0.53	2.45	
6,235.0	1.00	114.90	6,164.8	-814.0	241.2	848.4	0.32	-0.32	0.11	
6,329.0	0.70	77.90	6,258.8	-814.2	242.5	849.0	0.65	-0.32	-39.36	
6,423.0	0.60	67.10	6,352.7	-813.9	243.5	848.9	0.17	-0.11	-11.49	
6,517.0	0.50	42.90	6,446.7	-813.4	244.2	848.6	0.27	-0.11	-25.74	
6,612.0	0.90	17.30	6,541.7	-812.4	244.7	847.8	0.52	0.42	-26.95	
6,706.0	0.70	9.40	6,635.7	-811.1	245.0	846.6	0.24	-0.21	-8.40	
6,800.0	0.90	359.70	6,729.7	-809.8	245.1	845.4	0.26	0.21	-10.32	
6,894.0	0.80	4.20	6,823.7	-808.4	245.2	844.0	0.13	-0.11	4.79	
6,988.0	0.90	355.10	6,917.7	-807.1	245.2	842.7	0.18	0.11	-9.68	
7,082.0	1.40	354.80	7,011.7	-805.2	245.0	840.8	0.53	0.53	-0.32	
7,176.0	1.90	355.40	7,105.6	-802.5	244.8	838.2	0.53	0.53	0.64	
7,270.0	1.80	341.70	7,199.6	-799.5	244.2	835.2	0.48	-0.11	-14.57	
7,365.0	1.40	332.70	7,294.6	-797.1	243.2	832.5	0.50	-0.42	-9.47	
7,459.0	1.00	326.20	7,388.5	-795.4	242.2	830.6	0.45	-0.43	-6.91	
7,553.0	1.00	344.20	7,482.5	-793.9	241.5	829.1	0.33	0.00	19.15	
7,647.0	1.30	343.50	7,576.5	-792.1	241.0	827.2	0.32	0.32	-0.74	
7,683.0	1.20	352.80	7,612.5	-791.3	240.8	826.4	0.63	-0.28	25.83	
TD @ 7743.0' MD / 7672.5' TVD										
7,743.0	1.20	352.80	7,672.5	-790.1	240.7	825.1	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
208.0	208.0	-3.4	-0.3	First MWD Survey @ 208.0' MD / 208.0' TVD	
7,743.0	7,672.5	-790.1	240.7	TD @ 7743.0' MD / 7672.5' TVD	