



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-07W

Wellbore #1

Design: Wellbore #1

QES Survey Report

15 September, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-07W
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 0993-21-07W	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 0993-21-07W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,650.37 usft	Latitude:	39.265382
	+E/-W	0.0 usft	Easting:	2,354,498.42 usft	Longitude:	-107.780156
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	9/3/2018	9.48	65.43	51,386.50000000

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	104.42	

Survey Program	Date	9/15/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
243.0	7,710.0	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 QES Survey @ 243.0' MD / 243.0' TVD									
243.0	0.40	217.60	243.0	-0.7	-0.5	-0.3	0.16	0.16	0.00
301.0	0.80	154.40	301.0	-1.2	-0.5	-0.2	1.23	0.69	-108.97
393.0	2.10	131.30	393.0	-2.9	1.1	1.8	1.52	1.41	-25.11
486.0	3.20	109.80	485.9	-4.9	4.8	5.9	1.57	1.18	-23.12
579.0	4.50	100.20	578.7	-6.4	10.8	12.1	1.56	1.40	-10.32
671.0	6.50	99.50	670.2	-7.9	19.5	20.9	2.18	2.17	-0.76
764.0	8.20	101.90	762.5	-10.2	31.2	32.8	1.86	1.83	2.58
856.0	8.70	101.60	853.5	-12.9	44.4	46.3	0.55	0.54	-0.33
949.0	9.10	100.40	945.3	-15.6	58.6	60.6	0.47	0.43	-1.29



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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	10.10	99.00	1,038.0	-18.3	74.0	76.2	1.09	1.06	-1.49
1,138.0	9.10	103.80	1,131.7	-21.4	89.5	92.0	1.35	-1.05	5.05
1,232.0	9.10	103.30	1,224.5	-24.9	104.0	106.9	0.08	0.00	-0.53
1,327.0	9.40	102.90	1,318.3	-28.3	118.9	122.2	0.32	0.32	-0.42
1,421.0	9.20	104.90	1,411.0	-32.0	133.6	137.4	0.40	-0.21	2.13
1,516.0	9.20	104.20	1,504.8	-35.8	148.3	152.6	0.12	0.00	-0.74
1,538.0	9.30	104.10	1,526.5	-36.6	151.7	156.1	0.46	0.45	-0.45
1,610.0	9.50	104.20	1,597.6	-39.5	163.1	167.8	0.28	0.28	0.14
1,704.0	9.20	105.40	1,690.3	-43.4	177.9	183.1	0.38	-0.32	1.28
1,798.0	8.60	104.60	1,783.2	-47.2	192.0	197.7	0.65	-0.64	-0.85
1,893.0	8.40	103.20	1,877.1	-50.6	205.6	211.7	0.30	-0.21	-1.47
1,987.0	8.00	100.20	1,970.2	-53.3	218.7	225.1	0.62	-0.43	-3.19
2,082.0	5.80	98.90	2,064.5	-55.2	230.0	236.5	2.32	-2.32	-1.37
2,176.0	3.40	106.30	2,158.2	-56.7	237.3	244.0	2.62	-2.55	7.87
2,270.0	0.90	217.50	2,252.1	-58.1	239.6	246.5	4.06	-2.66	118.30
2,364.0	1.30	253.20	2,346.1	-59.0	238.1	245.3	0.82	0.43	37.98
2,459.0	1.50	269.50	2,441.1	-59.3	235.8	243.1	0.47	0.21	17.16
2,553.0	1.60	139.30	2,535.1	-60.3	235.4	243.0	2.99	0.11	-138.51
2,648.0	2.10	138.60	2,630.0	-62.6	237.4	245.6	0.53	0.53	-0.74
2,742.0	1.90	126.40	2,724.0	-64.8	239.8	248.4	0.50	-0.21	-12.98
2,837.0	1.80	137.10	2,818.9	-66.9	242.1	251.1	0.38	-0.11	11.26
2,931.0	1.70	127.30	2,912.9	-68.8	244.2	253.7	0.34	-0.11	-10.43
3,025.0	1.60	131.90	3,006.8	-70.5	246.3	256.1	0.18	-0.11	4.89
3,120.0	1.30	141.90	3,101.8	-72.2	248.0	258.2	0.41	-0.32	10.53
3,214.0	1.50	134.30	3,195.8	-73.9	249.5	260.1	0.29	0.21	-8.09
3,309.0	1.50	136.30	3,290.7	-75.7	251.3	262.2	0.06	0.00	2.11
3,403.0	1.10	130.90	3,384.7	-77.2	252.8	264.1	0.44	-0.43	-5.74
3,498.0	1.50	125.50	3,479.7	-78.5	254.5	266.0	0.44	0.42	-5.68
3,592.0	1.70	112.00	3,573.6	-79.7	256.8	268.6	0.45	0.21	-14.36
3,687.0	1.50	120.70	3,668.6	-80.9	259.2	271.2	0.33	-0.21	9.16
3,781.0	1.30	115.90	3,762.6	-82.0	261.2	273.4	0.25	-0.21	-5.11
3,876.0	1.30	116.10	3,857.6	-82.9	263.1	275.5	0.00	0.00	0.21
3,970.0	1.30	121.60	3,951.5	-84.0	265.0	277.6	0.13	0.00	5.85
4,065.0	1.30	112.20	4,046.5	-84.9	266.9	279.6	0.22	0.00	-9.89
4,159.0	1.40	114.70	4,140.5	-85.8	268.9	281.8	0.12	0.11	2.66
4,254.0	1.50	118.10	4,235.5	-86.9	271.1	284.2	0.14	0.11	3.58
4,348.0	1.10	114.90	4,329.4	-87.9	273.0	286.3	0.43	-0.43	-3.40
4,443.0	1.00	117.60	4,424.4	-88.6	274.6	288.0	0.12	-0.11	2.84
4,538.0	0.80	104.00	4,519.4	-89.2	275.9	289.4	0.31	-0.21	-14.32
4,632.0	0.70	96.10	4,613.4	-89.4	277.1	290.7	0.15	-0.11	-8.40
4,727.0	0.80	113.50	4,708.4	-89.7	278.3	291.9	0.26	0.11	18.32
4,821.0	0.60	99.50	4,802.4	-90.1	279.4	293.0	0.28	-0.21	-14.89
4,916.0	0.30	57.30	4,897.4	-90.0	280.1	293.7	0.45	-0.32	-44.42



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Survey										
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5,010.0	0.20	3.90	4,991.4	-89.7	280.3	293.8	0.26	-0.11	-56.81	
5,104.0	0.10	304.00	5,085.4	-89.5	280.3	293.7	0.18	-0.11	-63.72	
5,199.0	0.30	305.10	5,180.4	-89.3	280.0	293.4	0.21	0.21	1.16	
5,293.0	0.40	279.50	5,274.4	-89.1	279.5	292.9	0.19	0.11	-27.23	
5,387.0	0.30	202.10	5,368.4	-89.3	279.1	292.5	0.47	-0.11	-82.34	
5,482.0	0.10	210.80	5,463.4	-89.6	278.9	292.4	0.21	-0.21	9.16	
5,576.0	0.10	78.00	5,557.4	-89.6	279.0	292.5	0.19	0.00	-141.28	
5,671.0	0.20	199.40	5,652.4	-89.8	279.0	292.6	0.28	0.11	127.79	
5,765.0	0.30	188.20	5,746.4	-90.2	278.9	292.6	0.12	0.11	-11.91	
5,859.0	0.10	99.50	5,840.4	-90.4	278.9	292.7	0.33	-0.21	-94.36	
5,954.0	0.10	217.80	5,935.4	-90.5	279.0	292.7	0.18	0.00	124.53	
6,048.0	0.20	241.40	6,029.4	-90.7	278.8	292.6	0.12	0.11	25.11	
6,142.0	0.40	256.90	6,123.4	-90.8	278.3	292.2	0.23	0.21	16.49	
6,236.0	0.50	269.10	6,217.4	-90.9	277.6	291.5	0.15	0.11	12.98	
6,331.0	0.70	275.20	6,312.4	-90.9	276.6	290.5	0.22	0.21	6.42	
6,425.0	0.80	251.00	6,406.4	-91.0	275.4	289.4	0.35	0.11	-25.74	
6,519.0	1.00	246.90	6,500.3	-91.5	274.0	288.2	0.22	0.21	-4.36	
6,613.0	0.40	287.20	6,594.3	-91.8	273.0	287.2	0.79	-0.64	42.87	
6,707.0	0.40	13.70	6,688.3	-91.4	272.7	286.9	0.58	0.00	92.02	
6,801.0	1.00	354.40	6,782.3	-90.2	272.7	286.6	0.68	0.64	-20.53	
6,895.0	0.60	326.90	6,876.3	-89.0	272.4	286.0	0.58	-0.43	-29.26	
6,990.0	0.20	319.50	6,971.3	-88.5	272.0	285.4	0.42	-0.42	-7.79	
7,084.0	0.30	216.30	7,065.3	-88.5	271.7	285.2	0.42	0.11	-109.79	
7,178.0	0.30	233.10	7,159.3	-88.9	271.4	285.0	0.09	0.00	17.87	
7,272.0	0.40	279.50	7,253.3	-89.0	270.9	284.5	0.31	0.11	49.36	
7,366.0	0.70	355.60	7,347.3	-88.3	270.5	284.0	0.76	0.32	80.96	
7,461.0	1.30	3.00	7,442.3	-86.7	270.5	283.6	0.64	0.63	7.79	
7,555.0	1.30	355.90	7,536.3	-84.6	270.5	283.0	0.17	0.00	-7.55	
7,650.0	1.50	1.20	7,631.2	-82.2	270.4	282.4	0.25	0.21	5.58	
Projection to TD @ 7710.0' MD / 7691.2' TVD										
7,710.0	1.50	1.20	7,691.2	-80.7	270.5	282.0	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
243.0	243.0	-0.7	-0.5	First QES Survey @ 243.0' MD / 243.0' TVD	
7,710.0	7,691.2	-80.7	270.5	Projection to TD @ 7710.0' MD / 7691.2' TVD	

Checked By: _____ Approved By: _____ Date: _____