



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-04W

Wellbore #1

Design: Wellbore #1

QES Survey Report

13 October, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-04W
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 0993-21-04W	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 0993-21-04W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,672.97 usft	Latitude:	39.265444
	+E/-W	0.0 usft	Easting:	2,354,497.86 usft	Longitude:	-107.780160
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	10/3/2018	9.37	65.39	51,267.20000000

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	24.50	

Survey Program	Date	10/13/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
295.0	7,727.0	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 @ 295.0' MD / 295.0' TVD									
295.0	1.30	237.60	295.0	-1.8	-2.8	-2.8	0.44	0.44	0.00
388.0	1.50	238.90	387.9	-3.0	-4.8	-4.7	0.22	0.22	1.40
480.0	0.30	334.30	479.9	-3.4	-5.9	-5.5	1.69	-1.30	103.70
573.0	2.50	54.00	572.9	-2.0	-4.4	-3.6	2.65	2.37	85.70
666.0	5.40	57.60	665.7	1.6	1.0	1.8	3.13	3.12	3.87
758.0	7.10	45.30	757.1	7.9	8.7	10.8	2.34	1.85	-13.37
851.0	8.50	32.30	849.3	17.7	16.4	22.9	2.41	1.51	-13.98
943.0	9.20	23.20	940.2	30.2	23.0	37.0	1.70	0.76	-9.89
1,038.0	8.80	20.10	1,034.0	44.0	28.5	51.9	0.66	-0.42	-3.26



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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)
1,132.0	8.90	18.10	1,126.9	57.7	33.2	66.3	0.34	0.11	-2.13
1,227.0	8.80	16.60	1,220.8	71.7	37.5	80.8	0.26	-0.11	-1.58
1,321.0	8.50	27.00	1,313.7	84.7	42.8	94.8	1.69	-0.32	11.06
1,416.0	8.50	22.40	1,407.7	97.5	48.6	108.9	0.72	0.00	-4.84
1,510.0	9.20	21.40	1,500.5	110.9	54.0	123.3	0.76	0.74	-1.06
1,534.0	9.40	22.50	1,524.2	114.5	55.5	127.2	1.11	0.83	4.58
1,597.0	9.30	22.80	1,586.4	123.9	59.4	137.4	0.18	-0.16	0.48
1,691.0	9.10	21.80	1,679.2	137.9	65.1	152.4	0.27	-0.21	-1.06
1,786.0	9.20	19.60	1,773.0	152.0	70.4	167.5	0.38	0.11	-2.32
1,880.0	9.00	29.60	1,865.8	165.5	76.6	182.3	1.69	-0.21	10.64
1,975.0	8.90	26.70	1,959.6	178.5	83.6	197.1	0.49	-0.11	-3.05
2,069.0	8.60	26.90	2,052.5	191.2	90.0	211.3	0.32	-0.32	0.21
2,163.0	8.30	27.40	2,145.5	203.5	96.3	225.1	0.33	-0.32	0.53
2,258.0	8.10	20.60	2,239.5	215.9	101.8	238.7	1.04	-0.21	-7.16
2,352.0	8.50	21.60	2,332.6	228.5	106.7	252.2	0.45	0.43	1.06
2,446.0	8.30	22.60	2,425.6	241.3	111.9	265.9	0.26	-0.21	1.06
2,541.0	8.20	20.00	2,519.6	254.0	116.8	279.5	0.41	-0.11	-2.74
2,635.0	7.60	18.70	2,612.7	266.2	121.1	292.4	0.67	-0.64	-1.38
2,729.0	9.20	29.80	2,705.7	278.6	126.8	306.1	2.42	1.70	11.81
2,824.0	8.80	30.00	2,799.5	291.4	134.2	320.9	0.42	-0.42	0.21
2,919.0	8.70	23.70	2,893.4	304.3	140.8	335.3	1.01	-0.11	-6.63
3,013.0	8.90	24.30	2,986.3	317.5	146.6	349.7	0.23	0.21	0.64
3,107.0	8.70	22.90	3,079.2	330.6	152.4	364.1	0.31	-0.21	-1.49
3,201.0	8.20	23.00	3,172.2	343.4	157.8	377.9	0.53	-0.53	0.11
3,296.0	8.00	22.20	3,266.2	355.7	162.9	391.2	0.24	-0.21	-0.84
3,391.0	8.60	22.70	3,360.2	368.4	168.1	404.9	0.64	0.63	0.53
3,485.0	8.30	22.00	3,453.2	381.2	173.4	418.7	0.34	-0.32	-0.74
3,580.0	8.10	19.80	3,547.2	393.8	178.2	432.3	0.39	-0.21	-2.32
3,674.0	8.90	29.70	3,640.2	406.4	184.1	446.1	1.77	0.85	10.53
3,769.0	8.70	27.80	3,734.1	419.1	191.1	460.6	0.37	-0.21	-2.00
3,863.0	7.90	25.40	3,827.1	431.2	197.2	474.2	0.93	-0.85	-2.55
3,958.0	8.10	26.00	3,921.2	443.1	202.9	487.4	0.23	0.21	0.63
4,052.0	9.60	22.40	4,014.1	456.3	208.8	501.8	1.70	1.60	-3.83
4,146.0	9.50	22.90	4,106.8	470.7	214.8	517.4	0.14	-0.11	0.53
4,241.0	9.40	22.20	4,200.5	485.1	220.8	533.0	0.16	-0.11	-0.74
4,336.0	9.00	21.00	4,294.2	499.3	226.4	548.2	0.47	-0.42	-1.26
4,431.0	8.30	20.50	4,388.2	512.6	231.4	562.4	0.74	-0.74	-0.53
4,525.0	7.70	21.70	4,481.2	524.8	236.1	575.5	0.66	-0.64	1.28
4,620.0	7.70	17.60	4,575.4	536.8	240.4	588.2	0.58	0.00	-4.32
4,714.0	7.20	29.50	4,668.6	547.9	245.2	600.3	1.72	-0.53	12.66
4,809.0	6.80	30.10	4,762.9	558.0	251.0	611.8	0.43	-0.42	0.63
4,903.0	7.40	24.70	4,856.2	568.3	256.3	623.4	0.95	0.64	-5.74
4,998.0	6.60	21.90	4,950.5	578.9	260.9	635.0	0.92	-0.84	-2.95



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Survey										
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5,092.0	7.50	26.20	5,043.8	589.4	265.6	646.5	1.11	0.96	4.57	
5,186.0	7.00	23.50	5,137.0	600.2	270.6	658.4	0.64	-0.53	-2.87	
5,280.0	7.30	27.40	5,230.3	610.7	275.6	670.1	0.61	0.32	4.15	
5,375.0	7.10	26.90	5,324.5	621.3	281.1	682.0	0.22	-0.21	-0.53	
5,469.0	5.30	20.50	5,418.0	630.6	285.2	692.1	2.05	-1.91	-6.81	
5,564.0	4.70	19.30	5,512.6	638.4	288.0	700.3	0.64	-0.63	-1.26	
5,658.0	3.60	15.30	5,606.4	644.9	290.1	707.1	1.21	-1.17	-4.26	
5,752.0	1.90	8.40	5,700.2	649.2	291.1	711.5	1.84	-1.81	-7.34	
5,846.0	1.90	2.20	5,794.2	652.3	291.4	714.4	0.22	0.00	-6.60	
5,941.0	1.50	0.70	5,889.2	655.2	291.5	717.0	0.42	-0.42	-1.58	
6,035.0	1.60	352.00	5,983.1	657.7	291.3	719.3	0.27	0.11	-9.26	
6,130.0	1.80	344.20	6,078.1	660.4	290.7	721.5	0.32	0.21	-8.21	
6,224.0	1.60	340.60	6,172.0	663.1	289.9	723.6	0.24	-0.21	-3.83	
6,318.0	1.40	318.10	6,266.0	665.2	288.7	725.0	0.66	-0.21	-23.94	
6,412.0	1.30	301.50	6,360.0	666.6	287.0	725.6	0.43	-0.11	-17.66	
6,507.0	1.50	291.00	6,455.0	667.6	284.9	725.6	0.34	0.21	-11.05	
6,601.0	1.00	307.90	6,548.9	668.5	283.1	725.8	0.66	-0.53	17.98	
6,695.0	0.90	303.50	6,642.9	669.5	281.8	726.1	0.13	-0.11	-4.68	
6,789.0	1.30	302.40	6,736.9	670.4	280.3	726.3	0.43	0.43	-1.17	
6,883.0	1.30	209.30	6,830.9	670.1	278.9	725.4	2.01	0.00	-99.04	
6,977.0	1.10	182.40	6,924.9	668.2	278.3	723.5	0.63	-0.21	-28.62	
7,071.0	1.00	187.70	7,018.8	666.5	278.2	721.9	0.15	-0.11	5.64	
7,165.0	0.60	212.00	7,112.8	665.3	277.8	720.6	0.55	-0.43	25.85	
7,259.0	1.30	255.00	7,206.8	664.6	276.5	719.5	1.01	0.74	45.74	
7,354.0	1.10	232.30	7,301.8	663.8	274.8	718.0	0.54	-0.21	-23.89	
7,448.0	1.00	249.00	7,395.8	662.9	273.3	716.6	0.34	-0.11	17.77	
7,542.0	0.80	282.60	7,489.8	662.8	271.9	715.9	0.59	-0.21	35.74	
7,636.0	1.00	287.00	7,583.8	663.2	270.5	715.6	0.22	0.21	4.68	
7,667.0	1.00	260.80	7,614.8	663.2	269.9	715.4	1.46	0.00	-84.52	
TD @ 7727.0' MD / 7674.8' TVD										
7,727.0	1.00	260.80	7,674.8	663.0	268.9	714.8	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
295.0	295.0	-1.8	-2.8	First QES Survey @ 295.0' MD / 295.0' TVD	
7,727.0	7,674.8	663.0	268.9	TD @ 7727.0' MD / 7674.8' TVD	

Checked By: _____	Approved By: _____	Date: _____
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