



Laramie Energy, LLC

Mesa County, CO

Gunderson 0993 21-05 Pad

BCU 0993-21-06W

Wellbore #1

Design: Wellbore #1

QES Survey Report

28 September, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well BCU 0993-21-06W
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 0993-21-06W	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 0993-21-06W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,658.03 usft	Latitude:	39.265403
	+E/-W	0.0 usft	Easting:	2,354,498.33 usft	Longitude:	-107.780157
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	9/18/2018	9.47	65.43	51,381.90000000

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	55.91	

Survey Program	Date	9/28/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
301.0	7,704.0	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 @ 301.0' MD / 301.0' TVD									
301.0	0.90	265.80	301.0	-0.2	-2.4	-2.0	0.30	0.30	0.00
393.0	0.90	256.40	393.0	-0.4	-3.8	-3.4	0.16	0.00	-10.22
486.0	0.60	33.00	486.0	-0.2	-4.2	-3.6	1.50	-0.32	146.88
579.0	2.70	50.70	578.9	1.6	-2.3	-1.0	2.30	2.26	19.03
671.0	5.80	57.70	670.7	5.5	3.3	5.8	3.41	3.37	7.61
764.0	7.10	62.10	763.1	10.7	12.4	16.3	1.49	1.40	4.73
856.0	7.30	55.50	854.4	16.7	22.2	27.8	0.92	0.22	-7.17
949.0	6.90	54.60	946.6	23.2	31.7	39.2	0.45	-0.43	-0.97
1,043.0	8.30	55.90	1,039.8	30.3	41.9	51.7	1.50	1.49	1.38



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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)
1,138.0	8.00	58.40	1,133.9	37.6	53.2	65.1	0.49	-0.32	2.63
1,232.0	7.90	61.10	1,226.9	44.2	64.4	78.1	0.41	-0.11	2.87
1,327.0	8.60	50.40	1,321.0	51.9	75.6	91.7	1.77	0.74	-11.26
1,421.0	8.50	50.90	1,413.9	60.7	86.4	105.6	0.13	-0.11	0.53
1,494.0	7.70	52.00	1,486.2	67.1	94.5	115.9	1.12	-1.10	1.51
1,605.0	8.00	48.10	1,596.2	76.9	106.1	130.9	0.55	0.27	-3.51
1,699.0	8.30	50.60	1,689.2	85.6	116.2	144.2	0.49	0.32	2.66
1,794.0	7.40	57.60	1,783.3	93.2	126.6	157.1	1.38	-0.95	7.37
1,888.0	8.10	60.40	1,876.5	99.7	137.5	169.8	0.85	0.74	2.98
1,982.0	8.60	57.20	1,969.5	106.8	149.2	183.4	0.73	0.53	-3.40
2,077.0	7.90	55.30	2,063.5	114.3	160.5	197.0	0.79	-0.74	-2.00
2,171.0	8.00	60.20	2,156.6	121.3	171.5	210.0	0.73	0.11	5.21
2,266.0	7.50	60.20	2,250.7	127.6	182.6	222.8	0.53	-0.53	0.00
2,360.0	7.60	57.20	2,343.9	134.1	193.2	235.1	0.43	0.11	-3.19
2,454.0	6.60	54.70	2,437.2	140.5	202.8	246.7	1.11	-1.06	-2.66
2,549.0	6.80	51.00	2,531.5	147.2	211.6	257.8	0.50	0.21	-3.89
2,643.0	6.10	56.90	2,624.9	153.5	220.1	268.3	1.02	-0.74	6.28
2,737.0	4.80	49.60	2,718.5	158.7	227.3	277.2	1.56	-1.38	-7.77
2,832.0	4.10	52.20	2,813.2	163.4	233.0	284.6	0.77	-0.74	2.74
2,926.0	4.00	54.80	2,907.0	167.3	238.4	291.2	0.22	-0.11	2.77
3,021.0	3.90	53.90	3,001.8	171.2	243.7	297.7	0.12	-0.11	-0.95
3,115.0	3.70	52.60	3,095.6	174.9	248.7	304.0	0.23	-0.21	-1.38
3,209.0	3.70	54.70	3,189.4	178.5	253.6	310.0	0.14	0.00	2.23
3,304.0	3.90	54.90	3,284.1	182.1	258.7	316.3	0.21	0.21	0.21
3,399.0	3.20	77.10	3,379.0	184.6	263.9	322.0	1.61	-0.74	23.37
3,493.0	1.10	88.70	3,472.9	185.2	267.4	325.2	2.27	-2.23	12.34
3,588.0	0.60	67.70	3,567.9	185.4	268.8	326.5	0.61	-0.53	-22.11
3,682.0	0.20	74.50	3,661.9	185.6	269.4	327.1	0.43	-0.43	7.23
3,776.0	0.40	63.40	3,755.9	185.8	269.8	327.6	0.22	0.21	-11.81
3,871.0	0.40	43.60	3,850.9	186.2	270.3	328.2	0.14	0.00	-20.84
3,966.0	0.30	13.10	3,945.9	186.7	270.6	328.8	0.22	-0.11	-32.11
4,060.0	0.20	159.20	4,039.9	186.8	270.7	328.9	0.51	-0.11	155.43
4,154.0	0.20	99.50	4,133.9	186.6	271.0	329.0	0.21	0.00	-63.51
4,249.0	0.40	50.20	4,228.9	186.8	271.4	329.4	0.33	0.21	-51.89
4,344.0	0.70	38.00	4,323.9	187.4	272.0	330.3	0.34	0.32	-12.84
4,438.0	0.60	34.00	4,417.9	188.3	272.6	331.3	0.12	-0.11	-4.26
4,533.0	0.60	5.40	4,512.9	189.2	273.0	332.1	0.31	0.00	-30.11
4,628.0	0.20	5.20	4,607.9	189.9	273.0	332.5	0.42	-0.42	-0.21
4,722.0	0.20	60.00	4,701.9	190.1	273.2	332.8	0.20	0.00	58.30
4,817.0	0.20	329.50	4,796.9	190.3	273.2	333.0	0.30	0.00	-95.26
4,911.0	0.20	341.40	4,890.9	190.6	273.1	333.0	0.04	0.00	12.66
5,005.0	0.20	184.20	4,984.9	190.6	273.0	333.0	0.42	0.00	-167.23
5,100.0	0.10	244.10	5,079.9	190.4	272.9	332.8	0.18	-0.11	63.05



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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)	
5,194.0	0.30	3.90	5,173.9	190.6	272.9	332.8	0.38	0.21	127.45	
5,288.0	0.60	310.60	5,267.9	191.2	272.5	332.9	0.52	0.32	-56.70	
5,383.0	0.40	304.80	5,362.8	191.7	271.9	332.6	0.22	-0.21	-6.11	
5,477.0	0.60	313.80	5,456.8	192.2	271.3	332.4	0.23	0.21	9.57	
5,571.0	0.70	353.30	5,550.8	193.1	270.8	332.5	0.48	0.11	42.02	
5,666.0	0.60	349.60	5,645.8	194.2	270.7	333.0	0.11	-0.11	-3.89	
5,760.0	0.80	326.50	5,739.8	195.2	270.2	333.2	0.36	0.21	-24.57	
5,854.0	0.80	328.50	5,833.8	196.3	269.5	333.3	0.03	0.00	2.13	
5,949.0	1.00	331.70	5,928.8	197.6	268.8	333.4	0.22	0.21	3.37	
6,043.0	0.90	327.20	6,022.8	199.0	268.0	333.5	0.13	-0.11	-4.79	
6,138.0	0.80	279.50	6,117.8	199.7	266.9	333.0	0.73	-0.11	-50.21	
6,232.0	0.30	155.00	6,211.8	199.6	266.4	332.5	1.06	-0.53	-132.45	
6,326.0	0.10	311.10	6,305.8	199.4	266.4	332.4	0.42	-0.21	166.06	
6,420.0	0.80	13.70	6,399.8	200.1	266.5	332.9	0.81	0.74	66.60	
6,515.0	0.90	345.50	6,494.8	201.5	266.5	333.6	0.45	0.11	-29.68	
6,609.0	1.00	340.80	6,588.8	203.0	266.0	334.1	0.13	0.11	-5.00	
6,703.0	1.40	351.20	6,682.7	204.9	265.6	334.8	0.48	0.43	11.06	
6,797.0	0.70	289.60	6,776.7	206.2	264.9	334.9	1.31	-0.74	-65.53	
6,891.0	0.40	106.70	6,870.7	206.3	264.7	334.8	1.17	-0.32	188.40	
6,985.0	0.50	56.80	6,964.7	206.5	265.3	335.4	0.42	0.11	-53.09	
7,079.0	0.30	27.80	7,058.7	206.9	265.8	336.1	0.30	-0.21	-30.85	
7,174.0	0.40	38.30	7,153.7	207.4	266.1	336.6	0.12	0.11	11.05	
7,268.0	0.10	14.40	7,247.7	207.7	266.3	337.0	0.33	-0.32	-25.43	
7,362.0	1.30	49.60	7,341.7	208.5	267.1	338.1	1.30	1.28	37.45	
7,456.0	1.00	25.70	7,435.7	209.9	268.3	339.9	0.60	-0.32	-25.43	
7,550.0	1.30	9.20	7,529.7	211.7	268.8	341.3	0.47	0.32	-17.55	
7,644.0	0.90	0.80	7,623.6	213.5	269.0	342.4	0.46	-0.43	-8.94	
Projection to TD @ 7704.0' MD / 7683.6' TVD										
7,704.0	0.90	0.80	7,683.6	214.4	269.0	343.0	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
301.0	301.0	-0.2	-2.4	First QES Survey @ 301.0' MD / 301.0' TVD	
7,704.0	7,683.6	214.4	269.0	Projection to TD @ 7704.0' MD / 7683.6' TVD	

Checked By: _____	Approved By: _____	Date: _____
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