



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-04W

Wellbore #1

Design: Wellbore #1

QES Survey Report

24 February, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-04W
Project:	Mesa County, CO	TVD Reference:	well @ 7302.0usft (H&P #522)
Site:	Gunderson 13-11 Pad	MD Reference:	well @ 7302.0usft (H&P #522)
Well:	Gunderson 0994-13-04W	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 13-11 Pad			
Site Position:		Northing:	1,533,162.26 usft	Latitude: 39.273948
From:	Lat/Long	Easting:	2,339,102.68 usft	Longitude: -107.834835
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.47 °

Well	Gunderson 0994-13-04W			
Well Position	+N/-S	0.0 usft	Northing:	1,533,162.42 usft
	+E/-W	0.0 usft	Easting:	2,339,102.59 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft
			Ground Level:	7,272.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	2/15/2018	9.46	65.41	51,327.90000000

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	356.89

Survey Program	Date	2/24/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
111.0	8,311.0	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 @ 111.0' MD / 111.0' TVD									
111.0	1.00	36.60	111.0	0.8	0.6	0.7	0.90	0.90	0.00
202.0	2.30	19.80	202.0	3.1	1.7	3.0	1.51	1.43	-18.46
325.0	6.70	6.40	324.5	12.6	3.3	12.4	3.65	3.58	-10.89
384.0	7.80	4.30	383.1	20.0	4.0	19.8	1.92	1.86	-3.56
475.0	10.20	8.40	472.9	34.1	5.6	33.8	2.73	2.64	4.51
567.0	11.60	7.10	563.3	51.4	8.0	50.9	1.54	1.52	-1.41
657.0	13.00	1.10	651.2	70.5	9.3	69.9	2.10	1.56	-6.67
748.0	15.10	357.40	739.5	92.6	8.9	91.9	2.51	2.31	-4.07
840.0	18.60	355.60	827.5	119.2	7.3	118.6	3.85	3.80	-1.96



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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)
931.0	22.40	355.20	912.8	150.9	4.7	150.4	4.18	4.18	-0.44
1,022.0	25.10	356.10	996.0	187.5	1.9	187.1	2.99	2.97	0.99
1,116.0	28.30	357.40	1,080.0	229.6	-0.4	229.3	3.46	3.40	1.38
1,210.0	31.10	357.50	1,161.7	276.1	-2.5	275.9	2.98	2.98	0.11
1,304.0	31.00	356.00	1,242.2	324.5	-5.2	324.4	0.83	-0.11	-1.60
1,399.0	34.20	356.20	1,322.2	375.6	-8.7	375.5	3.37	3.37	0.21
1,510.0	35.00	355.60	1,413.6	438.5	-13.2	438.5	0.78	0.72	-0.54
1,611.0	35.00	354.70	1,496.3	496.2	-18.1	496.4	0.51	0.00	-0.89
1,705.0	34.40	356.00	1,573.6	549.5	-22.5	549.9	1.01	-0.64	1.38
1,799.0	33.70	355.70	1,651.5	602.0	-26.3	602.6	0.77	-0.74	-0.32
1,893.0	33.00	357.80	1,730.0	653.6	-29.2	654.2	1.44	-0.74	2.23
1,988.0	32.00	357.20	1,810.1	704.6	-31.4	705.3	1.11	-1.05	-0.63
2,082.0	31.10	356.90	1,890.2	753.7	-34.0	754.5	0.97	-0.96	-0.32
2,176.0	31.70	357.70	1,970.5	802.6	-36.3	803.4	0.78	0.64	0.85
2,270.0	30.80	357.90	2,050.8	851.4	-38.2	852.2	0.96	-0.96	0.21
2,365.0	32.20	357.20	2,131.8	901.0	-40.3	901.8	1.52	1.47	-0.74
2,459.0	31.20	357.20	2,211.8	950.3	-42.7	951.2	1.06	-1.06	0.00
2,553.0	31.70	357.60	2,292.0	999.3	-44.9	1,000.3	0.58	0.53	0.43
2,647.0	30.20	357.60	2,372.6	1,047.6	-46.9	1,048.6	1.60	-1.60	0.00
2,742.0	30.20	357.60	2,454.7	1,095.3	-48.9	1,096.4	0.00	0.00	0.00
2,836.0	31.40	356.50	2,535.4	1,143.4	-51.4	1,144.5	1.41	1.28	-1.17
2,930.0	32.90	356.10	2,615.0	1,193.3	-54.7	1,194.5	1.61	1.60	-0.43
3,024.0	32.20	355.60	2,694.3	1,243.8	-58.3	1,245.1	0.80	-0.74	-0.53
3,119.0	33.50	357.00	2,774.1	1,295.2	-61.6	1,296.6	1.58	1.37	1.47
3,213.0	32.60	357.00	2,852.9	1,346.4	-64.3	1,347.9	0.96	-0.96	0.00
3,307.0	31.60	355.80	2,932.5	1,396.2	-67.4	1,397.8	1.26	-1.06	-1.28
3,401.0	32.30	357.30	3,012.3	1,445.9	-70.4	1,447.6	1.13	0.74	1.60
3,495.0	31.40	356.50	3,092.1	1,495.4	-73.1	1,497.2	1.06	-0.96	-0.85
3,590.0	32.10	358.20	3,172.9	1,545.3	-75.4	1,547.1	1.20	0.74	1.79
3,684.0	30.90	357.70	3,253.0	1,594.4	-77.2	1,596.3	1.31	-1.28	-0.53
3,778.0	32.50	357.60	3,333.0	1,643.8	-79.2	1,645.6	1.70	1.70	-0.11
3,873.0	31.60	356.50	3,413.5	1,694.1	-81.8	1,696.0	1.13	-0.95	-1.16
3,967.0	30.40	355.70	3,494.1	1,742.4	-85.1	1,744.5	1.35	-1.28	-0.85
4,061.0	31.90	356.30	3,574.5	1,790.9	-88.5	1,793.1	1.63	1.60	0.64
4,155.0	34.10	356.80	3,653.4	1,842.0	-91.5	1,844.3	2.36	2.34	0.53
4,249.0	33.80	355.90	3,731.3	1,894.4	-94.9	1,896.8	0.62	-0.32	-0.96
4,343.0	33.10	355.90	3,809.8	1,946.1	-98.6	1,948.6	0.74	-0.74	0.00
4,438.0	32.10	354.10	3,889.8	1,997.1	-103.0	1,999.7	1.47	-1.05	-1.89
4,532.0	30.60	353.60	3,970.1	2,045.7	-108.3	2,048.5	1.62	-1.60	-0.53
4,626.0	31.90	354.80	4,050.4	2,094.2	-113.2	2,097.3	1.53	1.38	1.28
4,720.0	32.10	356.30	4,130.2	2,143.9	-117.0	2,147.1	0.87	0.21	1.60
4,814.0	32.10	357.70	4,209.8	2,193.7	-119.6	2,197.0	0.79	0.00	1.49
4,909.0	30.90	357.80	4,290.8	2,243.3	-121.6	2,246.6	1.26	-1.26	0.11



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Survey										
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5,003.0	30.40	0.20	4,371.7	2,291.2	-122.4	2,294.5	1.41	-0.53	2.55	
5,097.0	28.70	359.30	4,453.4	2,337.6	-122.6	2,340.8	1.87	-1.81	-0.96	
5,191.0	28.30	358.60	4,536.0	2,382.4	-123.5	2,385.6	0.55	-0.43	-0.74	
5,285.0	27.30	359.40	4,619.2	2,426.3	-124.2	2,429.4	1.14	-1.06	0.85	
5,379.0	25.60	1.50	4,703.4	2,468.1	-123.9	2,471.2	2.06	-1.81	2.23	
5,473.0	23.00	4.50	4,789.0	2,506.8	-121.9	2,509.7	3.06	-2.77	3.19	
5,568.0	22.90	6.00	4,876.5	2,543.6	-118.6	2,546.3	0.62	-0.11	1.58	
5,662.0	21.40	8.10	4,963.6	2,578.8	-114.2	2,581.2	1.80	-1.60	2.23	
5,756.0	20.30	6.40	5,051.4	2,612.0	-110.0	2,614.1	1.34	-1.17	-1.81	
5,850.0	19.20	0.80	5,139.9	2,643.7	-108.0	2,645.6	2.33	-1.17	-5.96	
5,944.0	18.20	2.00	5,228.9	2,673.8	-107.2	2,675.7	1.14	-1.06	1.28	
6,039.0	14.60	358.30	5,320.0	2,700.6	-107.1	2,702.4	3.94	-3.79	-3.89	
6,133.0	12.30	353.70	5,411.5	2,722.4	-108.5	2,724.3	2.70	-2.45	-4.89	
6,227.0	9.90	354.40	5,503.7	2,740.4	-110.4	2,742.3	2.56	-2.55	0.74	
6,321.0	7.80	351.40	5,596.6	2,754.7	-112.2	2,756.8	2.29	-2.23	-3.19	
6,416.0	4.60	353.50	5,691.0	2,764.9	-113.5	2,767.0	3.38	-3.37	2.21	
6,510.0	3.00	348.90	5,784.8	2,771.0	-114.4	2,773.2	1.73	-1.70	-4.89	
6,604.0	2.90	339.70	5,878.7	2,775.7	-115.7	2,777.9	0.51	-0.11	-9.79	
6,698.0	2.30	332.50	5,972.6	2,779.6	-117.4	2,781.9	0.73	-0.64	-7.66	
6,792.0	2.50	328.90	6,066.5	2,783.0	-119.4	2,785.4	0.27	0.21	-3.83	
6,887.0	2.20	314.90	6,161.4	2,786.1	-121.7	2,788.6	0.68	-0.32	-14.74	
6,981.0	1.80	313.00	6,255.4	2,788.4	-124.1	2,791.0	0.43	-0.43	-2.02	
7,075.0	0.70	301.60	6,349.3	2,789.7	-125.7	2,792.4	1.19	-1.17	-12.13	
7,169.0	1.10	279.50	6,443.3	2,790.1	-127.0	2,792.9	0.56	0.43	-23.51	
7,264.0	1.00	275.70	6,538.3	2,790.4	-128.8	2,793.2	0.13	-0.11	-4.00	
7,358.0	1.30	230.50	6,632.3	2,789.8	-130.4	2,792.7	0.99	0.32	-48.09	
7,452.0	2.30	230.90	6,726.2	2,787.9	-132.7	2,791.0	1.06	1.06	0.43	
7,546.0	2.20	236.70	6,820.2	2,785.7	-135.7	2,789.0	0.26	-0.11	6.17	
7,640.0	2.60	253.00	6,914.1	2,784.1	-139.2	2,787.6	0.84	0.43	17.34	
7,735.0	2.90	255.00	7,009.0	2,782.8	-143.6	2,786.5	0.33	0.32	2.11	
7,829.0	2.60	267.50	7,102.9	2,782.1	-148.0	2,786.1	0.71	-0.32	13.30	
7,923.0	2.80	267.20	7,196.8	2,781.9	-152.4	2,786.1	0.21	0.21	-0.32	
8,018.0	3.40	266.80	7,291.6	2,781.7	-157.6	2,786.1	0.63	0.63	-0.42	
8,112.0	3.60	266.50	7,385.4	2,781.3	-163.3	2,786.1	0.21	0.21	-0.32	
8,206.0	3.60	265.30	7,479.3	2,780.9	-169.2	2,786.0	0.08	0.00	-1.28	
8,251.0	3.40	270.80	7,524.2	2,780.8	-171.9	2,786.0	0.87	-0.44	12.22	
Projection to TD @ 8311.0' MD / 7584.1' TVD										
8,311.0	3.40	270.80	7,584.1	2,780.9	-175.5	2,786.3	0.00	0.00	0.00	



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Design Annotations					
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		+N/-S (usft)	+E/-W (usft)	Comment	
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8,311.0	7,584.1	2,780.9	-175.5	Projection to TD @ 8311.0' MD / 7584.1' TVD	