



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-17E

Wellbore #1

Design: Wellbore #1

QES Survey Report

22 April, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-17E
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 0994-13-17E	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 0994-13-17E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,113.05 usft	Latitude:	39.273810
	+E/-W	0.0 usft	Easting:	2,339,067.06 usft	Longitude:	-107.834956
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	4/5/2018	9.45	65.41	51,312.40000000

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	96.96	

Survey Program	Date	4/22/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,285.0	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 @ 472.0' MD / 469.7' TVD									
472.0	9.90	99.30	469.7	-6.6	40.1	40.6	2.10	2.10	0.00
563.0	11.60	96.90	559.1	-8.9	56.9	57.6	1.93	1.87	-2.64
654.0	13.70	95.10	647.8	-11.0	76.8	77.5	2.35	2.31	-1.98
745.0	15.70	96.60	735.9	-13.4	99.7	100.6	2.24	2.20	1.65
836.0	17.30	99.60	823.1	-17.0	125.3	126.4	1.99	1.76	3.30
927.0	19.60	99.00	909.4	-21.7	153.7	155.2	2.54	2.53	-0.66
1,018.0	22.20	96.80	994.4	-26.1	185.9	187.7	2.98	2.86	-2.42
1,113.0	26.60	94.30	1,080.9	-29.8	224.9	226.9	4.76	4.63	-2.63
1,207.0	29.00	95.70	1,164.1	-33.7	268.6	270.7	2.65	2.55	1.49



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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)
1,301.0	30.30	97.00	1,245.8	-38.8	314.8	317.2	1.54	1.38	1.38
1,395.0	29.80	95.90	1,327.1	-44.1	361.6	364.3	0.79	-0.53	-1.17
1,489.0	30.20	97.60	1,408.5	-49.6	408.2	411.3	1.00	0.43	1.81
1,604.0	29.60	95.20	1,508.2	-56.0	465.2	468.6	1.16	-0.52	-2.09
1,698.0	29.30	97.70	1,590.1	-61.2	511.1	514.8	1.35	-0.32	2.66
1,792.0	31.00	97.40	1,671.4	-67.4	557.9	562.0	1.82	1.81	-0.32
1,886.0	30.10	97.10	1,752.3	-73.5	605.3	609.8	0.97	-0.96	-0.32
1,980.0	31.30	99.80	1,833.2	-80.5	652.8	657.7	1.94	1.28	2.87
2,074.0	30.30	99.70	1,913.9	-88.7	700.2	705.8	1.07	-1.06	-0.11
2,169.0	31.20	98.70	1,995.5	-96.4	748.2	754.3	1.09	0.95	-1.05
2,263.0	30.10	97.50	2,076.4	-103.2	795.6	802.2	1.34	-1.17	-1.28
2,357.0	31.00	98.90	2,157.4	-110.0	842.9	850.0	1.22	0.96	1.49
2,451.0	29.80	98.40	2,238.4	-117.2	889.9	897.5	1.30	-1.28	-0.53
2,546.0	30.80	98.30	2,320.5	-124.1	937.3	945.5	1.05	1.05	-0.11
2,640.0	29.40	98.00	2,401.8	-130.8	984.0	992.6	1.50	-1.49	-0.32
2,734.0	27.20	97.80	2,484.5	-137.0	1,028.1	1,037.1	2.34	-2.34	-0.21
2,828.0	29.40	97.60	2,567.3	-142.9	1,072.3	1,081.7	2.34	2.34	-0.21
2,923.0	30.30	98.30	2,649.7	-149.5	1,119.1	1,129.0	1.02	0.95	0.74
3,017.0	28.80	97.20	2,731.5	-155.7	1,165.0	1,175.3	1.70	-1.60	-1.17
3,111.0	29.90	98.40	2,813.4	-162.0	1,210.7	1,221.4	1.33	1.17	1.28
3,205.0	31.20	97.50	2,894.3	-168.6	1,258.0	1,269.2	1.47	1.38	-0.96
3,300.0	29.70	97.10	2,976.2	-174.7	1,305.8	1,317.3	1.59	-1.58	-0.42
3,394.0	30.90	96.60	3,057.4	-180.4	1,352.8	1,364.7	1.30	1.28	-0.53
3,488.0	29.50	97.10	3,138.6	-186.0	1,399.8	1,412.0	1.51	-1.49	0.53
3,582.0	30.40	97.50	3,220.1	-192.0	1,446.3	1,458.9	0.98	0.96	0.43
3,676.0	29.20	96.90	3,301.7	-197.8	1,492.7	1,505.7	1.32	-1.28	-0.64
3,771.0	30.00	97.10	3,384.3	-203.5	1,539.3	1,552.6	0.85	0.84	0.21
3,865.0	28.70	97.10	3,466.2	-209.2	1,585.0	1,598.7	1.38	-1.38	0.00
3,959.0	30.30	95.70	3,548.0	-214.4	1,631.0	1,644.9	1.85	1.70	-1.49
4,053.0	29.00	96.50	3,629.7	-219.3	1,677.2	1,691.4	1.45	-1.38	0.85
4,148.0	31.30	94.20	3,711.8	-223.7	1,724.7	1,739.1	2.71	2.42	-2.42
4,242.0	29.80	93.30	3,792.8	-226.9	1,772.4	1,786.8	1.67	-1.60	-0.96
4,336.0	30.60	98.00	3,874.0	-231.5	1,819.4	1,834.1	2.65	0.85	5.00
4,430.0	29.00	97.00	3,955.6	-237.6	1,865.7	1,880.8	1.78	-1.70	-1.06
4,524.0	28.00	98.10	4,038.2	-243.5	1,910.2	1,925.6	1.20	-1.06	1.17
4,619.0	29.70	98.30	4,121.4	-250.1	1,955.5	1,971.4	1.79	1.79	0.21
4,713.0	28.90	98.60	4,203.4	-256.8	2,001.0	2,017.4	0.87	-0.85	0.32
4,807.0	29.90	99.50	4,285.3	-264.1	2,046.6	2,063.5	1.16	1.06	0.96
4,901.0	30.60	95.80	4,366.5	-270.4	2,093.5	2,110.9	2.12	0.74	-3.94
4,995.0	29.40	95.40	4,447.9	-275.0	2,140.3	2,157.9	1.29	-1.28	-0.43
5,089.0	29.00	95.10	4,530.0	-279.2	2,186.0	2,203.7	0.45	-0.43	-0.32
5,184.0	28.70	94.50	4,613.2	-283.0	2,231.7	2,249.5	0.44	-0.32	-0.63
5,278.0	27.50	94.30	4,696.1	-286.4	2,275.8	2,293.7	1.28	-1.28	-0.21



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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)	
5,372.0	26.10	93.30	4,780.0	-289.2	2,318.1	2,336.0	1.56	-1.49	-1.06	
5,466.0	25.20	93.20	4,864.7	-291.5	2,358.7	2,376.6	0.96	-0.96	-0.11	
5,560.0	23.90	92.60	4,950.2	-293.5	2,397.7	2,415.6	1.41	-1.38	-0.64	
5,654.0	21.90	91.00	5,036.8	-294.7	2,434.3	2,452.0	2.23	-2.13	-1.70	
5,749.0	19.70	90.70	5,125.6	-295.2	2,468.0	2,485.6	2.32	-2.32	-0.32	
5,843.0	17.60	95.60	5,214.7	-296.8	2,498.0	2,515.5	2.79	-2.23	5.21	
5,937.0	14.80	94.50	5,304.9	-299.1	2,524.1	2,541.7	3.00	-2.98	-1.17	
6,031.0	12.00	94.30	5,396.4	-300.8	2,545.8	2,563.5	2.98	-2.98	-0.21	
6,125.0	9.30	103.10	5,488.7	-303.2	2,563.0	2,580.8	3.35	-2.87	9.36	
6,220.0	7.70	111.50	5,582.7	-307.3	2,576.4	2,594.6	2.13	-1.68	8.84	
6,314.0	6.40	106.40	5,676.0	-311.1	2,587.2	2,605.9	1.53	-1.38	-5.43	
6,408.0	5.30	103.20	5,769.5	-313.6	2,596.5	2,615.4	1.22	-1.17	-3.40	
6,502.0	4.60	99.40	5,863.1	-315.2	2,604.4	2,623.4	0.82	-0.74	-4.04	
6,596.0	3.80	100.30	5,956.9	-316.3	2,611.2	2,630.3	0.85	-0.85	0.96	
6,691.0	3.30	100.70	6,051.7	-317.4	2,617.0	2,636.2	0.53	-0.53	0.42	
6,785.0	1.10	47.00	6,145.6	-317.3	2,620.3	2,639.5	2.97	-2.34	-57.13	
6,879.0	1.00	10.50	6,239.6	-315.9	2,621.1	2,640.1	0.71	-0.11	-38.83	
6,973.0	1.00	346.50	6,333.6	-314.3	2,621.1	2,639.9	0.44	0.00	-25.53	
7,067.0	1.00	341.60	6,427.6	-312.7	2,620.7	2,639.2	0.09	0.00	-5.21	
7,162.0	0.80	326.20	6,522.6	-311.3	2,620.0	2,638.4	0.33	-0.21	-16.21	
7,256.0	0.70	328.50	6,616.6	-310.3	2,619.4	2,637.7	0.11	-0.11	2.45	
7,350.0	0.50	331.60	6,710.6	-309.5	2,618.9	2,637.1	0.22	-0.21	3.30	
7,444.0	0.60	326.60	6,804.6	-308.7	2,618.4	2,636.5	0.12	0.11	-5.32	
7,539.0	1.30	290.90	6,899.6	-307.9	2,617.1	2,635.1	0.93	0.74	-37.58	
7,633.0	2.30	276.00	6,993.5	-307.3	2,614.2	2,632.2	1.17	1.06	-15.85	
7,727.0	2.40	270.40	7,087.4	-307.1	2,610.4	2,628.4	0.27	0.11	-5.96	
7,821.0	3.10	272.10	7,181.3	-307.0	2,605.9	2,623.9	0.75	0.74	1.81	
7,916.0	3.60	270.40	7,276.2	-306.9	2,600.3	2,618.4	0.54	0.53	-1.79	
8,010.0	3.00	267.90	7,370.0	-307.0	2,594.9	2,613.0	0.66	-0.64	-2.66	
8,104.0	2.80	263.70	7,463.9	-307.3	2,590.2	2,608.3	0.31	-0.21	-4.47	
8,198.0	3.00	262.70	7,557.8	-307.9	2,585.5	2,603.7	0.22	0.21	-1.06	
8,225.0	2.90	259.80	7,584.7	-308.1	2,584.1	2,602.4	0.67	-0.37	-10.74	
Projection to TD @ 8285.0' MD / 7644.7' TVD										
8,285.0	2.90	259.80	7,644.7	-308.6	2,581.1	2,599.5	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
472.0	469.7	-6.6	40.1	First MWD Survey @ 472.0' MD / 469.7' TVD	
8,285.0	7,644.7	-308.6	2,581.1	Projection to TD @ 8285.0' MD / 7644.7' TVD	



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