



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-15W

Wellbore #1

Design: Wellbore #1

QES Survey Report

07 May, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-15W
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 0994-13-15W	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 0994-13-15W					
Well Position	+N/-S	0.0 usft	Northing:	1,533,107.70 usft	Latitude:	39.273795
	+E/-W	0.0 usft	Easting:	2,339,061.83 usft	Longitude:	-107.834974
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	4/24/2018	9.44	65.41	51,306.40000000

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	159.03	

Survey Program	Date	5/7/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
382.0	7,558.0	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 @ 382.0' MD / 381.7' TVD									
382.0	3.70	163.50	381.7	-11.8	3.5	12.3	0.97	0.97	0.00
473.0	3.90	162.30	472.5	-17.6	5.3	18.3	0.24	0.22	-1.32
564.0	2.70	154.80	563.4	-22.5	7.1	23.5	1.40	-1.32	-8.24
655.0	0.90	133.70	654.3	-24.9	8.6	26.3	2.08	-1.98	-23.19
746.0	1.20	19.20	745.3	-24.5	9.4	26.2	1.95	0.33	-125.82
837.0	1.50	11.30	836.3	-22.4	9.9	24.5	0.39	0.33	-8.68
929.0	1.50	20.70	928.3	-20.1	10.6	22.6	0.27	0.00	10.22
1,020.0	2.00	2.40	1,019.2	-17.4	11.1	20.2	0.82	0.55	-20.11
1,114.0	2.40	356.10	1,113.2	-13.8	11.0	16.9	0.50	0.43	-6.70



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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)
1,208.0	2.30	356.20	1,207.1	-10.0	10.8	13.2	0.11	-0.11	0.11
1,302.0	2.40	351.70	1,301.0	-6.1	10.4	9.4	0.22	0.11	-4.79
1,428.0	2.60	346.20	1,426.9	-0.8	9.3	4.0	0.25	0.16	-4.37
1,489.0	3.20	349.60	1,487.8	2.3	8.7	1.0	1.02	0.98	5.57
1,501.0	2.80	353.40	1,499.8	2.9	8.6	0.4	3.72	-3.33	31.67
1,581.0	2.90	351.20	1,579.7	6.8	8.0	-3.5	0.19	0.13	-2.75
1,675.0	2.60	351.30	1,673.6	11.3	7.3	-7.9	0.32	-0.32	0.11
1,769.0	2.90	345.70	1,767.5	15.7	6.4	-12.3	0.43	0.32	-5.96
1,864.0	2.60	341.80	1,862.4	20.1	5.2	-16.9	0.37	-0.32	-4.11
1,958.0	2.70	343.30	1,956.3	24.2	3.9	-21.2	0.13	0.11	1.60
2,052.0	2.30	337.20	2,050.2	28.1	2.5	-25.3	0.51	-0.43	-6.49
2,146.0	2.20	346.60	2,144.1	31.6	1.3	-29.0	0.41	-0.11	10.00
2,240.0	2.20	346.20	2,238.0	35.1	0.5	-32.6	0.02	0.00	-0.43
2,334.0	2.30	347.00	2,332.0	38.7	-0.4	-36.2	0.11	0.11	0.85
2,429.0	2.10	351.50	2,426.9	42.2	-1.0	-39.8	0.28	-0.21	4.74
2,523.0	1.90	357.10	2,520.8	45.5	-1.4	-43.0	0.30	-0.21	5.96
2,617.0	1.90	350.40	2,614.8	48.6	-1.7	-46.0	0.24	0.00	-7.13
2,711.0	1.60	355.20	2,708.7	51.4	-2.1	-48.8	0.35	-0.32	5.11
2,805.0	1.50	344.60	2,802.7	53.9	-2.5	-51.3	0.32	-0.11	-11.28
2,899.0	1.30	354.60	2,896.7	56.2	-3.0	-53.5	0.34	-0.21	10.64
2,993.0	1.50	358.10	2,990.6	58.5	-3.1	-55.7	0.23	0.21	3.72
3,088.0	1.60	355.60	3,085.6	61.0	-3.2	-58.1	0.13	0.11	-2.63
3,182.0	1.50	5.40	3,179.6	63.6	-3.2	-60.5	0.30	-0.11	10.43
3,276.0	1.50	359.40	3,273.5	66.0	-3.1	-62.8	0.17	0.00	-6.38
3,371.0	1.70	16.10	3,368.5	68.6	-2.7	-65.1	0.53	0.21	17.58
3,465.0	1.40	13.20	3,462.5	71.1	-2.1	-67.1	0.33	-0.32	-3.09
3,559.0	1.10	356.10	3,556.4	73.1	-1.9	-68.9	0.51	-0.32	-18.19
3,654.0	1.20	9.70	3,651.4	75.0	-1.8	-70.7	0.31	0.11	14.32
3,748.0	1.20	351.40	3,745.4	76.9	-1.8	-72.5	0.41	0.00	-19.47
3,842.0	1.20	353.30	3,839.4	78.9	-2.0	-74.4	0.04	0.00	2.02
3,936.0	0.80	346.80	3,933.4	80.5	-2.3	-76.0	0.44	-0.43	-6.91
4,030.0	1.10	335.40	4,027.4	82.0	-2.8	-77.5	0.38	0.32	-12.13
4,125.0	1.20	328.80	4,122.3	83.6	-3.7	-79.4	0.17	0.11	-6.95
4,219.0	0.90	333.90	4,216.3	85.1	-4.5	-81.1	0.33	-0.32	5.43
4,313.0	1.00	334.10	4,310.3	86.5	-5.2	-82.7	0.11	0.11	0.21
4,407.0	0.90	330.30	4,404.3	87.9	-6.0	-84.2	0.13	-0.11	-4.04
4,501.0	0.50	304.40	4,498.3	88.8	-6.7	-85.3	0.53	-0.43	-27.55
4,596.0	0.40	302.80	4,593.3	89.2	-7.3	-85.9	0.11	-0.11	-1.68
4,690.0	0.50	270.70	4,687.3	89.4	-8.0	-86.3	0.28	0.11	-34.15
4,784.0	0.90	251.20	4,781.3	89.2	-9.1	-86.5	0.49	0.43	-20.74
4,879.0	1.00	249.20	4,876.3	88.6	-10.6	-86.5	0.11	0.11	-2.11
4,973.0	1.60	254.10	4,970.2	88.0	-12.6	-86.6	0.65	0.64	5.21
5,067.0	1.60	243.50	5,064.2	87.0	-15.0	-86.6	0.31	0.00	-11.28



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Survey										
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5,161.0	1.70	235.10	5,158.2	85.6	-17.3	-86.2	0.28	0.11	-8.94	
5,255.0	1.50	234.70	5,252.1	84.1	-19.5	-85.5	0.21	-0.21	-0.43	
5,350.0	1.90	234.40	5,347.1	82.5	-21.8	-84.8	0.42	0.42	-0.32	
5,444.0	2.00	238.90	5,441.0	80.7	-24.5	-84.1	0.19	0.11	4.79	
5,538.0	1.00	237.30	5,535.0	79.5	-26.5	-83.7	1.06	-1.06	-1.70	
5,632.0	0.50	269.20	5,629.0	79.0	-27.6	-83.7	0.67	-0.53	33.94	
5,726.0	0.70	254.70	5,723.0	78.8	-28.6	-83.9	0.27	0.21	-15.43	
5,820.0	0.80	214.50	5,817.0	78.2	-29.5	-83.6	0.56	0.11	-42.77	
5,914.0	1.10	212.20	5,911.0	76.9	-30.4	-82.6	0.32	0.32	-2.45	
6,009.0	1.40	215.80	6,005.9	75.1	-31.6	-81.5	0.33	0.32	3.79	
6,103.0	1.70	210.70	6,099.9	73.0	-32.9	-80.0	0.35	0.32	-5.43	
6,197.0	1.40	200.90	6,193.9	70.7	-34.1	-78.2	0.42	-0.32	-10.43	
6,291.0	1.20	215.20	6,287.9	68.9	-35.0	-76.8	0.40	-0.21	15.21	
6,385.0	0.90	229.20	6,381.8	67.6	-36.2	-76.0	0.42	-0.32	14.89	
6,479.0	0.80	211.30	6,475.8	66.5	-37.1	-75.4	0.30	-0.11	-19.04	
6,573.0	0.80	233.30	6,569.8	65.6	-37.9	-74.8	0.32	0.00	23.40	
6,668.0	1.00	263.80	6,664.8	65.1	-39.3	-74.8	0.54	0.21	32.11	
6,762.0	0.50	295.90	6,758.8	65.2	-40.5	-75.3	0.68	-0.53	34.15	
6,856.0	0.80	271.10	6,852.8	65.4	-41.5	-75.9	0.43	0.32	-26.38	
6,951.0	0.90	267.70	6,947.8	65.4	-42.9	-76.4	0.12	0.11	-3.58	
7,045.0	1.40	287.90	7,041.8	65.7	-44.7	-77.3	0.68	0.53	21.49	
7,139.0	1.90	264.80	7,135.7	65.9	-47.4	-78.5	0.87	0.53	-24.57	
7,233.0	2.10	261.90	7,229.7	65.5	-50.6	-79.3	0.24	0.21	-3.09	
7,327.0	2.60	268.60	7,323.6	65.2	-54.5	-80.4	0.61	0.53	7.13	
7,421.0	2.50	262.10	7,417.5	64.9	-58.6	-81.6	0.33	-0.11	-6.91	
7,498.0	2.40	257.50	7,494.4	64.3	-61.9	-82.2	0.29	-0.13	-5.97	
Projection to TD @ 7558.0' MD / 7554.4' TVD										
7,558.0	2.40	257.50	7,554.4	63.8	-64.3	-82.6	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
382.0	381.7	-11.8	3.5	First MWD Survey @ 382.0' MD / 381.7' TVD	
7,558.0	7,554.4	63.8	-64.3	Projection to TD @ 7558.0' MD / 7554.4' TVD	