



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson 20-08W

Wellbore #1

Design: Wellbore #1

QES Survey Report

22 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 20-08W
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson 20-08W	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 20-03 Pad			
Site Position:		Northing:	1,530,258.75 usft	Latitude:	39.266756
From:	Lat/Long	Easting:	2,350,219.97 usft	Longitude:	-107.795317
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.45 °

Well	Gunderson 20-08W					
Well Position	+N/-S	0.0 usft	Northing:	1,530,288.96 usft	Latitude:	39.266839
	+E/-W	0.0 usft	Easting:	2,350,220.73 usft	Longitude:	-107.795317
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,146.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/19/2016	9.65	65.45	51,494.81858496

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	218.11	

Survey Program	Date	7/22/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
110.0	7,672.0	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 @ 110.0' MD / TVD									
110.0	1.80	234.20	110.0	-1.0	-1.4	1.7	1.64	1.64	0.00
200.0	2.40	234.00	199.9	-2.9	-4.1	4.8	0.67	0.67	-0.22
291.0	2.30	225.00	290.8	-5.4	-6.9	8.5	0.42	-0.11	-9.89
382.0	2.60	229.20	381.8	-8.0	-9.8	12.3	0.38	0.33	4.62
474.0	2.80	234.10	473.7	-10.7	-13.2	16.5	0.33	0.22	5.33
566.0	4.60	219.70	565.5	-14.8	-17.3	22.4	2.19	1.96	-15.65
658.0	5.40	213.50	657.1	-21.3	-22.1	30.4	1.05	0.87	-6.74
749.0	7.60	218.40	747.5	-29.6	-28.2	40.7	2.49	2.42	5.38
841.0	10.20	215.10	838.4	-41.0	-36.6	54.9	2.88	2.83	-3.59



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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)
933.0	14.80	217.50	928.2	-57.0	-48.5	74.8	5.03	5.00	2.61
1,024.0	14.70	216.00	1,016.2	-75.6	-62.4	97.9	0.43	-0.11	-1.65
1,118.0	14.90	215.60	1,107.1	-95.0	-76.4	121.9	0.24	0.21	-0.43
1,213.0	14.80	215.50	1,198.9	-114.8	-90.6	146.3	0.11	-0.11	-0.11
1,307.0	15.70	218.00	1,289.6	-134.6	-105.4	171.0	1.19	0.96	2.66
1,401.0	16.00	218.00	1,380.0	-154.9	-121.2	196.6	0.32	0.32	0.00
1,495.0	16.30	219.30	1,470.3	-175.3	-137.5	222.8	0.50	0.32	1.38
1,584.0	16.10	219.00	1,555.8	-194.5	-153.2	247.6	0.24	-0.22	-0.34
1,679.0	15.50	218.70	1,647.2	-214.7	-169.4	273.5	0.64	-0.63	-0.32
1,773.0	15.30	217.20	1,737.8	-234.4	-184.7	298.4	0.47	-0.21	-1.60
1,867.0	15.00	215.70	1,828.6	-254.1	-199.3	323.0	0.53	-0.32	-1.60
1,961.0	14.60	214.30	1,919.4	-273.8	-213.1	347.0	0.57	-0.43	-1.49
2,055.0	14.10	214.30	2,010.5	-293.0	-226.2	370.2	0.53	-0.53	0.00
2,150.0	12.90	219.90	2,102.9	-310.7	-239.6	392.4	1.87	-1.26	5.89
2,244.0	12.60	218.80	2,194.6	-326.8	-252.7	413.1	0.41	-0.32	-1.17
2,338.0	12.20	220.30	2,286.4	-342.3	-265.6	433.3	0.55	-0.43	1.60
2,432.0	11.70	219.20	2,378.3	-357.3	-278.0	452.7	0.58	-0.53	-1.17
2,526.0	11.20	217.70	2,470.5	-371.9	-289.6	471.4	0.62	-0.53	-1.60
2,621.0	12.10	221.40	2,563.5	-386.7	-301.9	490.6	1.23	0.95	3.89
2,715.0	12.20	220.80	2,655.4	-401.6	-314.9	510.3	0.17	0.11	-0.64
2,809.0	11.90	220.10	2,747.3	-416.5	-327.6	529.9	0.35	-0.32	-0.74
2,903.0	11.30	221.30	2,839.4	-430.9	-339.9	548.8	0.69	-0.64	1.28
2,998.0	13.20	219.40	2,932.2	-446.2	-352.9	568.9	2.04	2.00	-2.00
3,092.0	12.90	219.80	3,023.8	-462.6	-366.5	590.2	0.33	-0.32	0.43
3,186.0	12.70	218.00	3,115.5	-478.8	-379.6	611.0	0.47	-0.21	-1.91
3,280.0	12.20	217.70	3,207.3	-494.8	-392.0	631.2	0.54	-0.53	-0.32
3,374.0	11.50	216.00	3,299.3	-510.2	-403.6	650.5	0.83	-0.74	-1.81
3,468.0	10.90	214.30	3,391.5	-525.2	-414.1	668.8	0.73	-0.64	-1.81
3,563.0	13.40	222.60	3,484.3	-540.7	-426.6	688.7	3.20	2.63	8.74
3,657.0	13.10	220.90	3,575.8	-556.7	-441.0	710.2	0.52	-0.32	-1.81
3,751.0	13.00	221.10	3,667.4	-572.8	-454.9	731.4	0.12	-0.11	0.21
3,845.0	12.60	218.60	3,759.1	-588.7	-468.2	752.2	0.73	-0.43	-2.66
3,940.0	13.60	219.70	3,851.6	-605.4	-481.8	773.7	1.08	1.05	1.16
4,034.0	13.10	218.40	3,943.1	-622.3	-495.5	795.4	0.62	-0.53	-1.38
4,128.0	12.80	220.70	4,034.7	-638.5	-508.9	816.5	0.63	-0.32	2.45
4,222.0	12.70	219.70	4,126.4	-654.4	-522.3	837.2	0.26	-0.11	-1.06
4,316.0	12.20	219.10	4,218.2	-670.0	-535.2	857.5	0.55	-0.53	-0.64
4,411.0	13.10	220.80	4,310.8	-686.0	-548.5	878.3	1.03	0.95	1.79
4,505.0	12.80	218.20	4,402.5	-702.2	-561.9	899.3	0.70	-0.32	-2.77
4,599.0	11.90	218.70	4,494.3	-718.0	-574.4	919.4	0.96	-0.96	0.53
4,693.0	13.40	219.10	4,586.0	-734.0	-587.4	940.0	1.60	1.60	0.43
4,788.0	12.40	216.50	4,678.6	-750.7	-600.4	961.2	1.22	-1.05	-2.74
4,882.0	12.90	216.50	4,770.3	-767.3	-612.6	981.8	0.53	0.53	0.00



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Survey										
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4,976.0	11.60	213.10	4,862.2	-783.6	-624.0	1,001.7	1.58	-1.38	-3.62	
5,070.0	10.50	210.10	4,954.4	-799.0	-633.5	1,019.6	1.32	-1.17	-3.19	
5,165.0	9.70	207.80	5,048.0	-813.5	-641.5	1,036.0	0.94	-0.84	-2.42	
5,259.0	7.40	219.50	5,140.9	-825.2	-649.1	1,049.9	3.06	-2.45	12.45	
5,353.0	6.60	216.70	5,234.2	-834.2	-656.2	1,061.3	0.93	-0.85	-2.98	
5,448.0	6.80	217.80	5,328.6	-843.0	-662.9	1,072.4	0.25	0.21	1.16	
5,542.0	4.50	231.60	5,422.1	-849.7	-669.2	1,081.6	2.82	-2.45	14.68	
5,639.0	3.50	234.40	5,518.9	-853.8	-674.6	1,088.1	1.05	-1.03	2.89	
5,730.0	3.20	232.50	5,609.7	-857.0	-678.8	1,093.2	0.35	-0.33	-2.09	
5,824.0	3.30	232.30	5,703.6	-860.2	-683.1	1,098.4	0.11	0.11	-0.21	
5,919.0	3.20	231.60	5,798.4	-863.5	-687.3	1,103.6	0.11	-0.11	-0.74	
6,013.0	0.50	223.80	5,892.3	-865.5	-689.6	1,106.6	2.88	-2.87	-8.30	
6,107.0	0.40	249.20	5,986.3	-865.9	-690.2	1,107.3	0.23	-0.11	27.02	
6,201.0	0.50	252.80	6,080.3	-866.1	-690.9	1,107.9	0.11	0.11	3.83	
6,296.0	0.70	236.70	6,175.3	-866.6	-691.8	1,108.8	0.27	0.21	-16.95	
6,390.0	0.60	228.30	6,269.3	-867.2	-692.7	1,109.8	0.15	-0.11	-8.94	
6,484.0	1.00	221.10	6,363.3	-868.1	-693.6	1,111.1	0.44	0.43	-7.66	
6,578.0	0.80	238.10	6,457.3	-869.1	-694.7	1,112.6	0.35	-0.21	18.09	
6,672.0	0.40	250.00	6,551.3	-869.6	-695.5	1,113.5	0.44	-0.43	12.66	
6,766.0	0.50	211.20	6,645.3	-870.0	-696.1	1,114.2	0.33	0.11	-41.28	
6,861.0	0.70	200.30	6,740.3	-870.9	-696.5	1,115.1	0.24	0.21	-11.47	
6,955.0	0.70	221.20	6,834.3	-871.9	-697.0	1,116.2	0.27	0.00	22.23	
7,050.0	1.10	245.90	6,929.3	-872.7	-698.3	1,117.6	0.58	0.42	26.00	
7,144.0	0.90	210.00	7,023.3	-873.7	-699.5	1,119.1	0.69	-0.21	-38.19	
7,239.0	1.00	209.43	7,118.3	-875.1	-700.2	1,120.7	0.11	0.11	-0.60	
7,333.0	0.70	202.00	7,212.2	-876.3	-700.9	1,122.1	0.34	-0.32	-7.90	
7,427.0	0.70	201.25	7,306.2	-877.4	-701.3	1,123.2	0.01	0.00	-0.80	
7,521.0	1.00	205.90	7,400.2	-878.7	-701.8	1,124.5	0.33	0.32	4.95	
7,612.0	1.00	197.00	7,491.2	-880.1	-702.4	1,126.0	0.17	0.00	-9.78	
Projection to TD @ 7672.0' MD / 7551.2' TVD										
7,672.0	1.00	197.00	7,551.2	-881.1	-702.7	1,127.0	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
110.0	110.0	-1.0	-1.4	First MWD Survey @ 110.0' MD / TVD	
7,672.0	7,551.2	-881.1	-702.7	Projection to TD @ 7672.0' MD / 7551.2' TVD	