



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson 20-06W

Wellbore #1

Design: Wellbore #1

QES Survey Report

08 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 20-06W
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 20-06W	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

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 20-06W					
Well Position	+N/-S	0.0 usft	Northing:	1,530,308.99 usft	Latitude:	39.266894
	+E/-W	0.0 usft	Easting:	2,350,221.24 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	6/26/2017	9.58	65.43	51,419

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	241.63	

Survey Program	Date	7/8/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
111.0	7,601.0	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 / TVD										
111.0	1.50	246.40	111.0	-0.6	-1.3	1.4	1.35	1.35	0.00	
201.0	1.80	230.50	201.0	-2.0	-3.5	4.0	0.61	0.33	-17.67	
292.0	3.70	249.30	291.8	-3.9	-7.4	8.3	2.28	2.09	20.66	
383.0	6.60	243.50	382.5	-7.3	-14.8	16.5	3.23	3.19	-6.37	
474.0	7.40	241.90	472.8	-12.4	-24.6	27.5	0.90	0.88	-1.76	
565.0	7.70	242.30	563.0	-18.0	-35.2	39.5	0.33	0.33	0.44	
658.0	8.10	242.40	655.1	-23.9	-46.5	52.3	0.43	0.43	0.11	
749.0	8.10	241.70	745.2	-29.9	-57.8	65.1	0.11	0.00	-0.77	
841.0	8.30	239.40	836.3	-36.4	-69.3	78.2	0.42	0.22	-2.50	



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Design:	Wellbore #1	Database:	EDM5002

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)
932.0	8.40	244.50	926.3	-42.6	-80.9	91.4	0.82	0.11	5.60
1,024.0	10.10	243.20	1,017.1	-49.1	-94.2	106.2	1.86	1.85	-1.41
1,118.0	9.70	240.80	1,109.7	-56.7	-108.5	122.4	0.61	-0.43	-2.55
1,212.0	9.80	242.30	1,202.3	-64.3	-122.5	138.3	0.29	0.11	1.60
1,307.0	9.90	243.20	1,295.9	-71.7	-136.9	154.5	0.19	0.11	0.95
1,401.0	9.40	236.50	1,388.6	-79.6	-150.5	170.2	1.31	-0.53	-7.13
1,495.0	9.40	235.50	1,481.4	-88.2	-163.2	185.5	0.17	0.00	-1.06
1,590.0	9.40	237.20	1,575.1	-96.8	-176.2	201.0	0.29	0.00	1.79
1,685.0	9.10	235.80	1,668.8	-105.2	-188.9	216.2	0.39	-0.32	-1.47
1,779.0	8.90	235.80	1,761.7	-113.4	-201.1	230.8	0.21	-0.21	0.00
1,873.0	8.70	235.90	1,854.6	-121.5	-213.0	245.1	0.21	-0.21	0.11
1,967.0	8.70	236.50	1,947.5	-129.4	-224.8	259.3	0.10	0.00	0.64
2,061.0	8.50	235.70	2,040.4	-137.3	-236.4	273.3	0.25	-0.21	-0.85
2,156.0	9.10	238.30	2,134.3	-145.2	-248.6	287.7	0.76	0.63	2.74
2,250.0	8.70	239.20	2,227.2	-152.7	-261.1	302.3	0.45	-0.43	0.96
2,344.0	8.50	238.00	2,320.1	-160.0	-273.1	316.3	0.29	-0.21	-1.28
2,438.0	9.40	243.20	2,413.0	-167.2	-285.8	330.9	1.29	0.96	5.53
2,532.0	9.10	241.60	2,505.8	-174.2	-299.2	346.0	0.42	-0.32	-1.70
2,626.0	8.80	241.90	2,598.6	-181.1	-312.1	360.6	0.32	-0.32	0.32
2,721.0	8.80	240.80	2,692.5	-188.1	-324.8	375.2	0.18	0.00	-1.16
2,815.0	8.80	239.60	2,785.4	-195.2	-337.3	389.6	0.20	0.00	-1.28
2,909.0	8.70	238.80	2,878.3	-202.5	-349.6	403.8	0.17	-0.11	-0.85
3,003.0	8.60	238.30	2,971.2	-209.9	-361.6	418.0	0.13	-0.11	-0.53
3,098.0	9.40	239.70	3,065.1	-217.6	-374.4	432.8	0.87	0.84	1.47
3,192.0	9.40	239.60	3,157.8	-225.3	-387.6	448.1	0.02	0.00	-0.11
3,286.0	9.10	240.30	3,250.6	-232.9	-400.7	463.2	0.34	-0.32	0.74
3,380.0	9.00	239.00	3,343.4	-240.4	-413.5	478.0	0.24	-0.11	-1.38
3,474.0	8.80	239.80	3,436.3	-247.8	-426.0	492.6	0.25	-0.21	0.85
3,569.0	9.00	238.40	3,530.1	-255.3	-438.6	507.2	0.31	0.21	-1.47
3,663.0	8.90	237.50	3,623.0	-263.1	-451.0	521.8	0.18	-0.11	-0.96
3,757.0	9.00	238.00	3,715.8	-270.9	-463.4	536.4	0.13	0.11	0.53
3,851.0	8.70	238.00	3,808.7	-278.5	-475.6	550.9	0.32	-0.32	0.00
3,945.0	8.50	238.10	3,901.7	-286.0	-487.6	564.9	0.21	-0.21	0.11
4,040.0	8.40	238.20	3,995.6	-293.3	-499.4	578.8	0.11	-0.11	0.11
4,134.0	8.40	236.40	4,088.6	-300.8	-511.0	592.5	0.28	0.00	-1.91
4,228.0	8.80	242.10	4,181.6	-307.9	-523.0	606.5	1.00	0.43	6.06
4,322.0	8.50	241.20	4,274.5	-314.6	-535.5	620.7	0.35	-0.32	-0.96
4,417.0	8.20	241.00	4,368.5	-321.3	-547.6	634.5	0.32	-0.32	-0.21
4,511.0	8.30	240.00	4,461.5	-327.9	-559.3	648.0	0.19	0.11	-1.06
4,605.0	8.20	238.40	4,554.6	-334.8	-570.9	661.4	0.27	-0.11	-1.70
4,699.0	7.90	238.60	4,647.6	-341.7	-582.1	674.6	0.32	-0.32	0.21
4,793.0	7.60	238.60	4,740.8	-348.3	-592.9	687.2	0.32	-0.32	0.00
4,888.0	7.30	236.10	4,835.0	-355.0	-603.3	699.5	0.46	-0.32	-2.63



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Survey									
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4,982.0	6.80	234.80	4,928.3	-361.5	-612.8	711.0	0.56	-0.53	-1.38
5,076.0	6.50	235.70	5,021.6	-367.7	-621.7	721.8	0.34	-0.32	0.96
5,170.0	6.20	235.10	5,115.0	-373.6	-630.3	732.1	0.33	-0.32	-0.64
5,265.0	5.80	235.40	5,209.5	-379.3	-638.5	742.0	0.42	-0.42	0.32
5,359.0	5.50	232.20	5,303.1	-384.7	-645.9	751.2	0.46	-0.32	-3.40
5,453.0	5.20	232.10	5,396.7	-390.1	-652.9	759.8	0.32	-0.32	-0.11
5,548.0	4.90	232.20	5,491.3	-395.2	-659.5	768.1	0.32	-0.32	0.11
5,642.0	4.40	233.60	5,585.0	-399.8	-665.5	775.6	0.55	-0.53	1.49
5,736.0	3.30	243.00	5,678.8	-403.2	-670.8	781.9	1.35	-1.17	10.00
5,830.0	2.90	243.20	5,772.6	-405.5	-675.4	786.9	0.43	-0.43	0.21
5,925.0	2.80	237.90	5,867.5	-407.8	-679.5	791.7	0.30	-0.11	-5.58
6,019.0	2.60	231.20	5,961.4	-410.4	-683.1	796.1	0.40	-0.21	-7.13
6,113.0	2.20	229.40	6,055.3	-412.9	-686.1	799.9	0.43	-0.43	-1.91
6,207.0	1.50	233.00	6,149.3	-414.8	-688.5	802.9	0.75	-0.74	3.83
6,302.0	0.80	275.50	6,244.3	-415.5	-690.1	804.7	1.11	-0.74	44.74
6,396.0	0.90	281.90	6,338.3	-415.3	-691.5	805.8	0.15	0.11	6.81
6,490.0	1.00	281.60	6,432.2	-415.0	-693.0	807.0	0.11	0.11	-0.32
6,584.0	1.20	279.60	6,526.2	-414.6	-694.8	808.4	0.22	0.21	-2.13
6,678.0	1.30	288.50	6,620.2	-414.1	-696.8	809.9	0.23	0.11	9.47
6,772.0	1.50	286.70	6,714.2	-413.4	-699.0	811.5	0.22	0.21	-1.91
6,867.0	1.10	315.90	6,809.1	-412.4	-700.8	812.6	0.80	-0.42	30.74
6,961.0	1.10	343.60	6,903.1	-410.9	-701.7	812.7	0.56	0.00	29.47
7,056.0	2.00	355.70	6,998.1	-408.4	-702.1	811.8	1.00	0.95	12.74
7,150.0	1.90	352.70	7,092.0	-405.2	-702.4	810.6	0.15	-0.11	-3.19
7,245.0	1.50	21.30	7,187.0	-402.5	-702.1	809.1	0.97	-0.42	30.11
7,339.0	1.00	35.50	7,281.0	-400.7	-701.2	807.4	0.62	-0.53	15.11
7,433.0	1.00	39.70	7,375.0	-399.4	-700.2	805.9	0.08	0.00	4.47
7,527.0	0.90	37.90	7,469.0	-398.2	-699.2	804.4	0.11	-0.11	-1.91
Projection to TD @ 7601.0' MD / 7542.9' TVD									
7,601.0	0.90	37.90	7,542.9	-397.2	-698.5	803.4	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
111.0	111.0	-0.6	-1.3	First MWD Survey @ 111.0' MD / TVD
7,601.0	7,542.9	-397.2	-698.5	Projection to TD @ 7601.0' MD / 7542.9' TVD