



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson 20-07W

Wellbore #1

Design: Wellbore #1

QES Survey Report

11 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 20-07W
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 20-07W	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 20-07W					
Well Position	+N/-S	0.0 usft	Northing:	1,530,299.16 usft	Latitude:	39.266867
	+E/-W	0.0 usft	Easting:	2,350,220.99 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	227.14	

Survey Program	Date	7/11/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
201.0	7,605.0	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 @ 201.0' MD / TVD									
201.0	1.90	241.60	201.0	-1.6	-2.9	3.2	0.95	0.95	0.00
292.0	2.00	227.00	291.9	-3.4	-5.4	6.3	0.56	0.11	-16.04
382.0	2.20	229.30	381.9	-5.6	-7.9	9.6	0.24	0.22	2.56
474.0	2.50	239.10	473.8	-7.8	-10.9	13.3	0.54	0.33	10.65
565.0	4.10	232.30	564.6	-10.8	-15.2	18.5	1.81	1.76	-7.47
657.0	4.80	235.60	656.3	-15.0	-21.0	25.6	0.81	0.76	3.59
749.0	5.40	219.80	748.0	-20.5	-26.9	33.7	1.65	0.65	-17.17
840.0	5.40	218.40	838.6	-27.1	-32.3	42.1	0.14	0.00	-1.54
932.0	6.90	226.80	930.0	-34.3	-39.1	52.0	1.90	1.63	9.13



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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)
1,024.0	9.40	227.20	1,021.1	-43.2	-48.6	65.0	2.72	2.72	0.43
1,118.0	10.30	226.40	1,113.7	-54.2	-60.3	81.1	0.97	0.96	-0.85
1,212.0	10.70	225.70	1,206.2	-66.1	-72.7	98.2	0.45	0.43	-0.74
1,307.0	11.60	226.00	1,299.4	-78.9	-85.8	116.6	0.95	0.95	0.32
1,401.0	11.60	223.40	1,391.4	-92.3	-99.1	135.4	0.56	0.00	-2.77
1,495.0	12.20	223.70	1,483.4	-106.3	-112.5	154.8	0.64	0.64	0.32
1,583.0	12.20	224.10	1,569.4	-119.7	-125.4	173.4	0.10	0.00	0.45
1,678.0	11.80	223.90	1,662.4	-134.0	-139.1	193.1	0.42	-0.42	-0.21
1,772.0	11.60	223.70	1,754.4	-147.7	-152.3	212.1	0.22	-0.21	-0.21
1,866.0	11.20	223.60	1,846.5	-161.2	-165.1	230.7	0.43	-0.43	-0.11
1,960.0	10.70	222.20	1,938.8	-174.2	-177.3	248.5	0.60	-0.53	-1.49
2,054.0	10.30	222.90	2,031.3	-186.9	-188.9	265.5	0.45	-0.43	0.74
2,149.0	10.50	224.50	2,124.7	-199.2	-200.7	282.6	0.37	0.21	1.68
2,243.0	10.90	226.50	2,217.1	-211.5	-213.2	300.1	0.58	0.43	2.13
2,337.0	11.10	226.10	2,309.3	-223.9	-226.1	318.0	0.23	0.21	-0.43
2,431.0	11.30	228.30	2,401.5	-236.3	-239.5	336.3	0.50	0.21	2.34
2,525.0	11.70	230.00	2,493.7	-248.5	-253.7	355.0	0.56	0.43	1.81
2,619.0	11.50	230.50	2,585.7	-260.6	-268.2	373.9	0.24	-0.21	0.53
2,714.0	11.30	230.20	2,678.9	-272.6	-282.7	392.6	0.22	-0.21	-0.32
2,808.0	11.10	231.20	2,771.1	-284.2	-296.8	410.9	0.30	-0.21	1.06
2,902.0	10.90	230.70	2,863.3	-295.5	-310.7	428.7	0.24	-0.21	-0.53
2,996.0	10.90	230.80	2,955.7	-306.7	-324.5	446.5	0.02	0.00	0.11
3,091.0	11.00	230.50	3,048.9	-318.1	-338.5	464.5	0.12	0.11	-0.32
3,185.0	10.90	230.90	3,141.2	-329.4	-352.3	482.3	0.13	-0.11	0.43
3,279.0	10.80	230.10	3,233.5	-340.7	-365.9	500.0	0.19	-0.11	-0.85
3,373.0	10.50	229.20	3,325.9	-351.9	-379.2	517.3	0.36	-0.32	-0.96
3,467.0	10.70	229.80	3,418.3	-363.2	-392.3	534.6	0.24	0.21	0.64
3,561.0	11.30	230.30	3,510.6	-374.7	-406.1	552.5	0.65	0.64	0.53
3,656.0	11.00	231.50	3,603.8	-386.3	-420.3	570.9	0.40	-0.32	1.26
3,750.0	11.90	230.80	3,695.9	-398.0	-434.9	589.5	0.97	0.96	-0.74
3,844.0	11.90	230.20	3,787.9	-410.3	-449.8	608.8	0.13	0.00	-0.64
3,938.0	11.70	230.40	3,879.9	-422.6	-464.6	628.0	0.22	-0.21	0.21
4,033.0	11.50	229.00	3,973.0	-435.0	-479.2	647.1	0.36	-0.21	-1.47
4,127.0	11.30	228.70	4,065.1	-447.2	-493.2	665.7	0.22	-0.21	-0.32
4,221.0	11.50	225.90	4,157.3	-459.8	-506.8	684.2	0.63	0.21	-2.98
4,315.0	11.00	226.70	4,249.5	-472.4	-520.1	702.6	0.56	-0.53	0.85
4,410.0	9.30	223.80	4,343.0	-484.2	-532.0	719.3	1.87	-1.79	-3.05
4,504.0	9.60	225.40	4,435.7	-495.2	-542.8	734.7	0.42	0.32	1.70
4,598.0	10.30	224.70	4,528.3	-506.7	-554.3	751.0	0.76	0.74	-0.74
4,692.0	11.40	220.60	4,620.6	-519.7	-566.3	768.6	1.43	1.17	-4.36
4,786.0	10.70	221.20	4,712.9	-533.3	-578.1	786.5	0.75	-0.74	0.64
4,881.0	10.50	219.46	4,806.2	-546.6	-589.4	803.8	0.40	-0.21	-1.83
4,975.0	10.00	215.00	4,898.7	-559.9	-599.5	820.3	1.00	-0.53	-4.74



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Survey										
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5,069.0	9.50	214.10	4,991.4	-573.0	-608.5	835.8	0.56	-0.53	-0.96	
5,163.0	8.30	220.60	5,084.2	-584.6	-617.3	850.1	1.66	-1.28	6.91	
5,258.0	7.80	219.80	5,178.3	-594.8	-625.9	863.3	0.54	-0.53	-0.84	
5,352.0	7.00	219.50	5,271.5	-604.1	-633.6	875.4	0.85	-0.85	-0.32	
5,446.0	6.60	216.20	5,364.9	-612.9	-640.4	886.3	0.59	-0.43	-3.51	
5,541.0	5.90	225.60	5,459.3	-620.7	-647.1	896.6	1.30	-0.74	9.89	
5,635.0	5.40	230.30	5,552.8	-626.9	-654.0	905.8	0.72	-0.53	5.00	
5,729.0	5.10	229.50	5,646.4	-632.4	-660.6	914.4	0.33	-0.32	-0.85	
5,823.0	4.40	233.30	5,740.1	-637.3	-666.7	922.2	0.82	-0.74	4.04	
5,918.0	3.30	242.60	5,834.9	-640.7	-672.0	928.4	1.33	-1.16	9.79	
6,012.0	2.60	249.20	5,928.8	-642.7	-676.4	933.0	0.83	-0.74	7.02	
6,106.0	2.60	243.90	6,022.7	-644.4	-680.3	937.0	0.26	0.00	-5.64	
6,200.0	1.60	239.90	6,116.6	-646.0	-683.4	940.4	1.07	-1.06	-4.26	
6,295.0	0.70	255.10	6,211.6	-646.9	-685.1	942.2	0.99	-0.95	16.00	
6,389.0	0.70	267.60	6,305.6	-647.0	-686.2	943.1	0.16	0.00	13.30	
6,483.0	0.80	272.00	6,399.6	-647.0	-687.4	944.0	0.12	0.11	4.68	
6,577.0	0.60	293.90	6,493.6	-646.8	-688.5	944.7	0.35	-0.21	23.30	
6,671.0	0.70	268.00	6,587.6	-646.6	-689.6	945.3	0.33	0.11	-27.55	
6,765.0	0.80	272.40	6,681.6	-646.6	-690.8	946.2	0.12	0.11	4.68	
6,860.0	0.70	317.90	6,776.6	-646.2	-691.8	946.6	0.62	-0.11	47.89	
6,954.0	0.80	303.50	6,870.6	-645.4	-692.8	946.8	0.23	0.11	-15.32	
7,049.0	0.60	305.40	6,965.5	-644.7	-693.7	947.1	0.21	-0.21	2.00	
7,143.0	0.70	263.70	7,059.5	-644.5	-694.7	947.6	0.50	0.11	-44.36	
7,238.0	0.40	307.90	7,154.5	-644.4	-695.5	948.1	0.52	-0.32	46.53	
7,332.0	0.40	269.20	7,248.5	-644.2	-696.1	948.4	0.28	0.00	-41.17	
7,426.0	0.50	247.80	7,342.5	-644.3	-696.8	949.1	0.21	0.11	-22.77	
7,545.0	0.60	261.40	7,461.5	-644.6	-697.9	950.1	0.14	0.08	11.43	
Projection to Bit @ 7605.0' MD / 7521.5' TVD										
7,605.0	0.60	261.40	7,521.5	-644.7	-698.5	950.6	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
201.0	201.0	-1.6	-2.9	First MWD Survey @ 201.0' MD / TVD	
7,605.0	7,521.5	-644.7	-698.5	Projection to Bit @ 7605.0' MD / 7521.5' TVD	