



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-17W

Wellbore #1

Design: Wellbore #1

QES Survey Report

09 May, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-17W
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 0994-13-17W	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 0994-13-17W					
Well Position	+N/-S	0.0 usft	Northing:	1,533,102.39 usft	Latitude:	39.273780
	+E/-W	0.0 usft	Easting:	2,339,056.59 usft	Longitude:	-107.834992
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	186.58	

Survey Program	Date	5/8/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
197.0	7,594.0	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 @ 197.0' MD / 197.0' TVD										
197.0	2.10	156.00	197.0	-3.3	1.5	3.1	1.07	1.07	0.00	
470.0	4.00	174.90	469.6	-17.4	4.3	16.7	0.78	0.70	6.92	
562.0	3.70	190.40	561.4	-23.5	4.1	22.8	1.17	-0.33	16.85	
653.0	3.90	200.00	652.2	-29.3	2.5	28.8	0.73	0.22	10.55	
744.0	5.60	197.40	742.8	-36.4	0.1	36.2	1.88	1.87	-2.86	
835.0	6.50	197.30	833.3	-45.6	-2.7	45.6	0.99	0.99	-0.11	
926.0	6.60	194.50	923.7	-55.5	-5.6	55.8	0.37	0.11	-3.08	
1,017.0	6.80	197.40	1,014.1	-65.7	-8.5	66.3	0.43	0.22	3.19	
1,112.0	7.30	192.30	1,108.4	-77.0	-11.5	77.8	0.84	0.53	-5.37	



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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)
1,206.0	7.50	191.80	1,201.6	-88.9	-14.0	89.9	0.22	0.21	-0.53
1,300.0	8.20	183.80	1,294.7	-101.5	-15.7	102.7	1.38	0.74	-8.51
1,394.0	8.30	184.30	1,387.8	-115.0	-16.6	116.2	0.13	0.11	0.53
1,488.0	7.60	185.80	1,480.9	-128.0	-17.8	129.1	0.78	-0.74	1.60
1,583.0	8.20	183.60	1,575.0	-141.0	-18.8	142.2	0.71	0.63	-2.32
1,677.0	8.00	180.00	1,668.0	-154.2	-19.3	155.4	0.58	-0.21	-3.83
1,772.0	8.00	182.60	1,762.1	-167.4	-19.6	168.5	0.38	0.00	2.74
1,866.0	7.70	180.70	1,855.2	-180.2	-19.9	181.3	0.42	-0.32	-2.02
1,960.0	7.30	183.80	1,948.4	-192.5	-20.4	193.6	0.61	-0.43	3.30
2,054.0	6.90	183.40	2,041.7	-204.1	-21.1	205.2	0.43	-0.43	-0.43
2,149.0	6.90	184.90	2,136.0	-215.5	-22.0	216.6	0.19	0.00	1.58
2,243.0	6.30	182.90	2,229.4	-226.3	-22.7	227.4	0.68	-0.64	-2.13
2,337.0	6.40	182.20	2,322.8	-236.6	-23.2	237.7	0.13	0.11	-0.74
2,431.0	6.00	185.60	2,416.3	-246.8	-23.9	247.9	0.58	-0.43	3.62
2,525.0	5.80	183.80	2,509.8	-256.4	-24.6	257.5	0.29	-0.21	-1.91
2,619.0	5.80	181.90	2,603.3	-265.9	-25.1	267.0	0.20	0.00	-2.02
2,713.0	6.00	179.40	2,696.8	-275.5	-25.2	276.6	0.35	0.21	-2.66
2,808.0	5.80	179.10	2,791.3	-285.3	-25.1	286.3	0.21	-0.21	-0.32
2,902.0	5.60	176.10	2,884.8	-294.6	-24.7	295.5	0.38	-0.21	-3.19
2,996.0	5.50	175.80	2,978.4	-303.7	-24.1	304.5	0.11	-0.11	-0.32
3,090.0	5.10	177.60	3,072.0	-312.4	-23.6	313.0	0.46	-0.43	1.91
3,184.0	5.10	180.20	3,165.6	-320.7	-23.4	321.3	0.25	0.00	2.77
3,279.0	4.90	178.70	3,260.2	-329.0	-23.3	329.5	0.25	-0.21	-1.58
3,373.0	2.60	180.00	3,354.0	-335.1	-23.2	335.6	2.45	-2.45	1.38
3,467.0	0.90	214.80	3,448.0	-337.9	-23.7	338.4	2.05	-1.81	37.02
3,562.0	1.00	215.40	3,543.0	-339.2	-24.6	339.7	0.11	0.11	0.63
3,656.0	0.90	194.60	3,637.0	-340.6	-25.2	341.2	0.38	-0.11	-22.13
3,750.0	0.80	200.90	3,730.9	-341.9	-25.6	342.6	0.15	-0.11	6.70
3,844.0	0.70	186.00	3,824.9	-343.1	-25.9	343.8	0.23	-0.11	-15.85
3,938.0	0.80	177.80	3,918.9	-344.3	-26.0	345.0	0.16	0.11	-8.72
4,033.0	0.70	190.10	4,013.9	-345.5	-26.0	346.2	0.20	-0.11	12.95
4,127.0	0.70	203.90	4,107.9	-346.6	-26.4	347.4	0.18	0.00	14.68
4,221.0	0.80	208.30	4,201.9	-347.7	-26.9	348.5	0.12	0.11	4.68
4,315.0	0.40	196.20	4,295.9	-348.6	-27.3	349.4	0.44	-0.43	-12.87
4,410.0	0.40	172.40	4,390.9	-349.3	-27.4	350.1	0.17	0.00	-25.05
4,504.0	0.50	195.10	4,484.9	-350.0	-27.4	350.8	0.22	0.11	24.15
4,598.0	0.50	195.90	4,578.9	-350.8	-27.7	351.6	0.01	0.00	0.85
4,692.0	0.50	250.40	4,672.9	-351.3	-28.2	352.2	0.49	0.00	57.98
4,787.0	0.70	202.20	4,767.9	-352.0	-28.8	353.0	0.55	0.21	-50.74
4,881.0	0.80	240.10	4,861.9	-352.8	-29.6	353.9	0.53	0.11	40.32
4,975.0	0.80	241.20	4,955.9	-353.5	-30.7	354.7	0.02	0.00	1.17
5,069.0	0.80	253.30	5,049.9	-354.0	-31.9	355.3	0.18	0.00	12.87
5,164.0	0.70	245.40	5,144.9	-354.4	-33.1	355.9	0.15	-0.11	-8.32



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Survey										
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5,258.0	0.90	224.00	5,238.8	-355.2	-34.1	356.8	0.38	0.21	-22.77	
5,352.0	1.10	211.60	5,332.8	-356.5	-35.1	358.2	0.31	0.21	-13.19	
5,446.0	1.00	211.10	5,426.8	-358.0	-36.0	359.7	0.11	-0.11	-0.53	
5,540.0	1.20	223.50	5,520.8	-359.4	-37.1	361.3	0.33	0.21	13.19	
5,634.0	0.70	123.90	5,614.8	-360.4	-37.3	362.3	1.58	-0.53	-105.96	
5,729.0	0.50	125.80	5,709.8	-361.0	-36.5	362.8	0.21	-0.21	2.00	
5,823.0	0.30	179.20	5,803.8	-361.5	-36.1	363.2	0.43	-0.21	56.81	
5,917.0	0.80	223.40	5,897.8	-362.2	-36.6	364.0	0.66	0.53	47.02	
6,011.0	0.90	205.50	5,991.8	-363.3	-37.3	365.2	0.30	0.11	-19.04	
6,105.0	1.10	215.20	6,085.8	-364.7	-38.2	366.7	0.28	0.21	10.32	
6,199.0	0.90	242.50	6,179.7	-365.8	-39.4	367.9	0.54	-0.21	29.04	
6,293.0	0.70	227.00	6,273.7	-366.5	-40.4	368.8	0.31	-0.21	-16.49	
6,388.0	1.00	202.00	6,368.7	-367.7	-41.2	370.0	0.50	0.32	-26.32	
6,482.0	0.90	205.50	6,462.7	-369.1	-41.8	371.5	0.12	-0.11	3.72	
6,576.0	1.40	231.00	6,556.7	-370.5	-43.0	373.0	0.75	0.53	27.13	
6,670.0	1.50	243.80	6,650.7	-371.8	-45.0	374.5	0.36	0.11	13.62	
6,765.0	1.20	226.40	6,745.6	-373.0	-46.8	375.9	0.53	-0.32	-18.32	
6,859.0	1.70	240.10	6,839.6	-374.4	-48.8	377.5	0.64	0.53	14.57	
6,953.0	2.20	239.00	6,933.5	-376.0	-51.5	379.4	0.53	0.53	-1.17	
7,047.0	2.20	247.20	7,027.5	-377.6	-54.7	381.4	0.33	0.00	8.72	
7,141.0	2.80	264.10	7,121.4	-378.6	-58.7	382.8	1.00	0.64	17.98	
7,236.0	3.80	249.20	7,216.2	-379.9	-63.9	384.8	1.38	1.05	-15.68	
7,330.0	3.80	253.40	7,310.0	-381.9	-69.8	387.4	0.30	0.00	4.47	
7,424.0	3.60	254.80	7,403.8	-383.6	-75.6	389.7	0.23	-0.21	1.49	
7,518.0	3.30	255.60	7,497.7	-385.0	-81.1	391.8	0.32	-0.32	0.85	
7,534.0	3.30	254.80	7,513.6	-385.3	-82.0	392.1	0.29	0.00	-5.00	
Projection to TD @ 7594.0' MD / 7573.5' TVD										
7,594.0	3.30	254.80	7,573.5	-386.2	-85.3	393.4	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
197.0	197.0	-3.3	1.5	First MWD Survey @ 197.0' MD / 197.0' TVD	
7,594.0	7,573.5	-386.2	-85.3	Projection to TD @ 7594.0' MD / 7573.5' TVD	