



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-11W

Wellbore #1

Design: Wellbore #1

QES Survey Report

16 March, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-11W
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 0994-13-11W	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 0994-13-11W					
Well Position	+N/-S	0.0 usft	Northing:	1,533,144.66 usft	Latitude:	39.273899
	+E/-W	0.0 usft	Easting:	2,339,099.02 usft	Longitude:	-107.834846
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	3/6/2018	9.45	65.41	51,321.90000000

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	354.25	

Survey Program	Date	3/16/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,467.0	Gyro (Wellbore #1)	OWSG GYRO-NS	OWSG Gyrocompass Gyro	
1,509.0	7,694.0	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	
100.0	0.34	257.56	100.0	-0.1	-0.3	0.0	0.34	0.34	0.00	
111.0	0.33	257.12	111.0	-0.1	-0.4	0.0	0.09	-0.09	-4.00	
204.0	2.23	326.25	204.0	1.4	-1.6	1.5	2.30	2.04	74.33	
295.0	3.64	340.39	294.9	5.6	-3.6	5.9	1.73	1.55	15.54	
386.0	5.41	355.33	385.6	12.6	-4.9	13.0	2.32	1.95	16.42	
477.0	8.26	0.10	475.9	23.4	-5.2	23.8	3.19	3.13	5.24	
569.0	11.33	0.95	566.6	39.0	-5.1	39.3	3.34	3.34	0.92	
659.0	14.24	0.91	654.3	58.9	-4.7	59.1	3.23	3.23	-0.04	
750.0	15.11	0.14	742.4	82.0	-4.5	82.0	0.98	0.96	-0.85	



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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)
842.0	13.89	354.70	831.4	105.0	-5.5	105.0	1.99	-1.33	-5.91
933.0	12.14	349.66	920.1	125.3	-8.3	125.5	2.29	-1.92	-5.54
1,024.0	11.49	352.74	1,009.2	143.7	-11.1	144.1	0.99	-0.71	3.38
1,118.0	11.43	351.65	1,101.3	162.2	-13.7	162.7	0.24	-0.06	-1.16
1,212.0	11.40	352.10	1,193.4	180.6	-16.3	181.3	0.10	-0.03	0.48
1,306.0	11.77	356.36	1,285.5	199.4	-18.2	200.2	0.99	0.39	4.53
1,401.0	13.34	357.67	1,378.2	220.0	-19.2	220.8	1.68	1.65	1.38
Gyro Tie-In @ 1467.0' MD / 1442.4' TVD									
1,467.0	13.96	356.82	1,442.4	235.5	-20.0	236.4	0.99	0.94	-1.29
1,509.0	13.40	356.50	1,483.2	245.5	-20.6	246.3	1.35	-1.33	-0.76
1,585.0	13.70	357.40	1,557.1	263.2	-21.5	264.1	0.48	0.39	1.18
1,679.0	13.20	357.20	1,648.5	285.1	-22.5	285.9	0.53	-0.53	-0.21
1,773.0	13.00	356.40	1,740.0	306.3	-23.7	307.2	0.29	-0.21	-0.85
1,868.0	12.60	356.00	1,832.7	327.3	-25.1	328.2	0.43	-0.42	-0.42
1,962.0	13.70	356.50	1,924.2	348.7	-26.5	349.6	1.18	1.17	0.53
2,056.0	13.20	355.80	2,015.6	370.5	-28.0	371.4	0.56	-0.53	-0.74
2,150.0	12.70	354.50	2,107.2	391.5	-29.8	392.5	0.62	-0.53	-1.38
2,244.0	13.90	356.40	2,198.7	413.0	-31.5	414.1	1.36	1.28	2.02
2,338.0	13.00	356.30	2,290.1	434.9	-32.8	436.0	0.96	-0.96	-0.11
2,433.0	14.50	355.30	2,382.4	457.4	-34.5	458.5	1.60	1.58	-1.05
2,527.0	13.90	352.70	2,473.5	480.3	-36.9	481.6	0.93	-0.64	-2.77
2,621.0	13.20	351.40	2,564.9	502.1	-39.9	503.6	0.81	-0.74	-1.38
2,715.0	14.10	353.70	2,656.3	524.1	-42.8	525.8	1.12	0.96	2.45
2,809.0	13.60	352.60	2,747.5	546.5	-45.5	548.3	0.60	-0.53	-1.17
2,904.0	13.20	351.30	2,840.0	568.3	-48.6	570.3	0.53	-0.42	-1.37
2,998.0	14.10	357.50	2,931.3	590.3	-50.7	592.4	1.83	0.96	6.60
3,093.0	13.80	355.70	3,023.5	613.2	-52.0	615.3	0.56	-0.32	-1.89
3,187.0	13.00	355.20	3,114.9	634.9	-53.8	637.1	0.86	-0.85	-0.53
3,281.0	14.30	356.10	3,206.3	657.0	-55.4	659.2	1.40	1.38	0.96
3,376.0	14.10	354.90	3,298.4	680.2	-57.3	682.5	0.37	-0.21	-1.26
3,470.0	13.60	354.60	3,389.7	702.6	-59.3	705.0	0.54	-0.53	-0.32
3,564.0	13.10	352.60	3,481.1	724.2	-61.7	726.7	0.72	-0.53	-2.13
3,658.0	14.60	359.00	3,572.4	746.6	-63.3	749.2	2.28	1.60	6.81
3,753.0	14.50	358.60	3,664.3	770.5	-63.8	773.0	0.15	-0.11	-0.42
3,847.0	14.20	357.20	3,755.4	793.8	-64.7	796.2	0.49	-0.32	-1.49
3,941.0	12.90	356.10	3,846.8	815.7	-65.9	818.2	1.41	-1.38	-1.17
4,035.0	14.20	357.20	3,938.2	837.7	-67.2	840.2	1.41	1.38	1.17
4,129.0	14.10	356.60	4,029.3	860.7	-68.5	863.2	0.19	-0.11	-0.64
4,224.0	13.40	355.70	4,121.6	883.2	-70.0	885.8	0.77	-0.74	-0.95
4,318.0	13.10	354.50	4,213.1	904.7	-71.8	907.3	0.43	-0.32	-1.28
4,412.0	12.90	358.50	4,304.7	925.8	-73.1	928.4	0.98	-0.21	4.26
4,506.0	12.00	355.90	4,396.5	946.0	-74.1	948.7	1.13	-0.96	-2.77
4,601.0	13.30	2.30	4,489.2	966.8	-74.4	969.3	2.01	1.37	6.74



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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)
	4,695.0	12.80	2.80	4,580.7	988.0	-73.4	990.4	0.55	-0.53	0.53
	4,789.0	13.00	359.30	4,672.4	1,008.9	-73.0	1,011.2	0.86	0.21	-3.72
	4,884.0	11.30	357.60	4,765.2	1,028.9	-73.6	1,031.1	1.83	-1.79	-1.79
	4,978.0	11.50	357.60	4,857.4	1,047.5	-74.3	1,049.7	0.21	0.21	0.00
	5,072.0	11.50	356.60	4,949.5	1,066.2	-75.3	1,068.4	0.21	0.00	-1.06
	5,166.0	11.20	355.10	5,041.7	1,084.7	-76.6	1,086.9	0.45	-0.32	-1.60
	5,260.0	11.80	355.10	5,133.8	1,103.3	-78.2	1,105.6	0.64	0.64	0.00
	5,355.0	12.10	358.40	5,226.7	1,123.0	-79.3	1,125.3	0.79	0.32	3.47
	5,448.0	10.50	358.30	5,317.9	1,141.2	-79.8	1,143.4	1.72	-1.72	-0.11
	5,543.0	9.30	356.20	5,411.5	1,157.5	-80.6	1,159.7	1.32	-1.26	-2.21
	5,637.0	8.40	356.90	5,504.4	1,171.9	-81.5	1,174.2	0.96	-0.96	0.74
	5,731.0	5.80	353.30	5,597.6	1,183.5	-82.4	1,185.8	2.80	-2.77	-3.83
	5,825.0	2.80	352.50	5,691.4	1,190.5	-83.3	1,192.8	3.19	-3.19	-0.85
	5,919.0	2.40	345.20	5,785.3	1,194.7	-84.1	1,197.1	0.55	-0.43	-7.77
	6,013.0	2.20	332.20	5,879.2	1,198.2	-85.4	1,200.7	0.59	-0.21	-13.83
	6,107.0	1.40	314.20	5,973.1	1,200.6	-87.1	1,203.2	1.03	-0.85	-19.15
	6,202.0	1.40	298.60	6,068.1	1,201.9	-88.9	1,204.8	0.40	0.00	-16.42
	6,296.0	1.70	279.50	6,162.1	1,202.7	-91.3	1,205.8	0.63	0.32	-20.32
	6,390.0	1.70	273.70	6,256.0	1,203.0	-94.1	1,206.4	0.18	0.00	-6.17
	6,484.0	1.60	280.90	6,350.0	1,203.4	-96.8	1,207.0	0.24	-0.11	7.66
	6,578.0	1.90	273.10	6,444.0	1,203.7	-99.6	1,207.6	0.41	0.32	-8.30
	6,673.0	1.90	264.50	6,538.9	1,203.6	-102.7	1,207.9	0.30	0.00	-9.05
	6,767.0	1.70	251.60	6,632.9	1,203.0	-105.6	1,207.6	0.48	-0.21	-13.72
	6,861.0	1.70	249.90	6,726.8	1,202.1	-108.2	1,206.9	0.05	0.00	-1.81
	6,955.0	1.70	239.60	6,820.8	1,200.9	-110.8	1,206.0	0.32	0.00	-10.96
	7,050.0	2.20	243.20	6,915.7	1,199.4	-113.6	1,204.8	0.54	0.53	3.79
	7,144.0	2.20	247.80	7,009.7	1,197.9	-116.9	1,203.6	0.19	0.00	4.89
	7,238.0	1.70	248.00	7,103.6	1,196.7	-119.8	1,202.7	0.53	-0.53	0.21
	7,332.0	1.90	235.70	7,197.6	1,195.3	-122.4	1,201.6	0.46	0.21	-13.09
	7,426.0	2.10	233.50	7,291.5	1,193.4	-125.1	1,199.9	0.23	0.21	-2.34
	7,521.0	2.10	246.10	7,386.4	1,191.7	-128.1	1,198.5	0.49	0.00	13.26
	7,615.0	2.00	250.20	7,480.4	1,190.4	-131.2	1,197.6	0.19	-0.11	4.36
	7,634.0	2.00	247.30	7,499.4	1,190.2	-131.8	1,197.4	0.53	0.00	-15.26
Projection to TD @ 7694.0' MD / 7559.3' TVD										
	7,694.0	2.00	247.30	7,559.3	1,189.4	-133.8	1,196.8	0.00	0.00	0.00

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,467.0	1,442.4	235.5	-20.0	Gyro Tie-In @ 1467.0' MD / 1442.4' TVD	
7,694.0	7,559.3	1,189.4	-133.8	Projection to TD @ 7694.0' MD / 7559.3' TVD	



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