



Laramie Energy, LLC

**Mesa County, CO
Gunderson 13-11 Pad
Gunderson 0994-13-12E**

Wellbore #1

Survey: MWD

QES Survey Report

31 May, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-12E
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 0994-13-12E	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 0994-13-12E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,128.67 usft	Latitude:	39.273854
	+E/-W	0.0 usft	Easting:	2,339,083.04 usft	Longitude:	-107.834901
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	3/22/2018	9.45	65.41	51,316.80000000

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	70.52	

Survey Program		Date	4/5/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,384.0	MWD (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 @ 472.0' MD / 471.7' TVD									
472.0	3.60	70.90	471.7	4.9	14.0	14.8	0.76	0.76	0.00
563.0	5.70	69.60	562.4	7.4	20.9	22.2	2.31	2.31	-1.43
654.0	8.50	68.90	652.7	11.4	31.5	33.4	3.08	3.08	-0.77
745.0	11.50	71.20	742.3	16.7	46.3	49.2	3.33	3.30	2.53
837.0	14.60	70.90	831.9	23.5	66.0	70.0	3.37	3.37	-0.33
928.0	18.00	68.80	919.2	32.3	89.9	95.5	3.79	3.74	-2.31
1,019.0	20.90	69.70	1,005.0	43.0	118.3	125.8	3.20	3.19	0.99
1,113.0	24.40	70.70	1,091.8	55.3	152.3	162.0	3.75	3.72	1.06
1,207.0	27.30	71.30	1,176.3	68.6	191.1	203.0	3.10	3.09	0.64



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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)
1,301.0	29.80	71.30	1,258.9	83.0	233.6	247.9	2.66	2.66	0.00
1,395.0	31.90	70.00	1,339.6	99.0	279.1	296.1	2.34	2.23	-1.38
1,490.0	32.00	69.50	1,420.2	116.4	326.3	346.4	0.30	0.11	-0.53
1,514.0	32.10	69.30	1,440.6	120.9	338.2	359.1	0.61	0.42	-0.83
1,605.0	31.80	70.30	1,517.8	137.5	383.4	407.3	0.67	-0.33	1.10
1,700.0	33.10	68.30	1,597.9	155.5	431.0	458.2	1.77	1.37	-2.11
1,793.0	33.00	69.40	1,675.9	173.8	478.3	508.9	0.65	-0.11	1.18
1,888.0	32.50	68.80	1,755.8	192.1	526.3	560.3	0.63	-0.53	-0.63
1,982.0	31.80	67.60	1,835.4	210.7	572.8	610.3	1.01	-0.74	-1.28
2,076.0	31.40	68.00	1,915.4	229.3	618.4	659.5	0.48	-0.43	0.43
2,170.0	30.50	67.50	1,996.1	247.6	663.1	707.8	1.00	-0.96	-0.53
2,264.0	31.50	70.80	2,076.6	264.8	708.4	756.1	2.10	1.06	3.51
2,358.0	30.80	70.70	2,157.1	280.9	754.3	804.8	0.75	-0.74	-0.11
2,453.0	31.40	70.50	2,238.4	297.2	800.6	853.8	0.64	0.63	-0.21
2,547.0	32.40	71.40	2,318.2	313.4	847.5	903.5	1.18	1.06	0.96
2,641.0	31.20	71.70	2,398.1	329.0	894.5	953.0	1.29	-1.28	0.32
2,735.0	29.10	70.90	2,479.4	344.2	939.2	1,000.2	2.27	-2.23	-0.85
2,830.0	29.70	74.10	2,562.2	358.2	983.7	1,046.8	1.77	0.63	3.37
2,924.0	31.30	71.70	2,643.2	372.2	1,029.3	1,094.5	2.14	1.70	-2.55
3,018.0	32.60	71.90	2,722.9	387.8	1,076.5	1,144.2	1.39	1.38	0.21
3,113.0	31.60	71.80	2,803.4	403.5	1,124.5	1,194.7	1.05	-1.05	-0.11
3,207.0	31.00	72.90	2,883.7	418.3	1,171.0	1,243.5	0.88	-0.64	1.17
3,301.0	32.20	71.90	2,963.8	433.2	1,218.0	1,292.7	1.39	1.28	-1.06
3,395.0	33.00	69.40	3,043.0	450.0	1,265.7	1,343.3	1.67	0.85	-2.66
3,489.0	32.20	69.30	3,122.2	467.8	1,313.1	1,394.0	0.85	-0.85	-0.11
3,584.0	31.20	69.70	3,203.0	485.3	1,359.9	1,443.9	1.08	-1.05	0.42
3,678.0	32.60	71.70	3,282.8	501.7	1,406.8	1,493.6	1.87	1.49	2.13
3,773.0	32.20	70.30	3,363.0	518.3	1,454.9	1,544.5	0.89	-0.42	-1.47
3,866.0	31.00	70.80	3,442.2	534.5	1,500.8	1,593.2	1.32	-1.29	0.54
3,961.0	32.20	70.30	3,523.1	551.1	1,547.8	1,643.0	1.29	1.26	-0.53
4,055.0	31.50	72.00	3,603.0	567.1	1,594.7	1,692.6	1.21	-0.74	1.81
4,149.0	32.40	71.60	3,682.7	582.7	1,642.0	1,742.3	0.98	0.96	-0.43
4,243.0	33.30	69.30	3,761.7	599.7	1,690.0	1,793.3	1.64	0.96	-2.45
4,338.0	32.20	69.20	3,841.6	618.0	1,738.1	1,844.6	1.16	-1.16	-0.11
4,432.0	31.70	69.50	3,921.4	635.5	1,784.6	1,894.4	0.56	-0.53	0.32
4,526.0	29.50	69.00	4,002.3	652.4	1,829.4	1,942.2	2.36	-2.34	-0.53
4,620.0	29.70	70.40	4,084.0	668.5	1,872.9	1,988.6	0.77	0.21	1.49
4,714.0	30.40	70.60	4,165.4	684.3	1,917.3	2,035.7	0.75	0.74	0.21
4,809.0	31.60	68.30	4,246.8	701.4	1,963.1	2,084.6	1.77	1.26	-2.42
4,903.0	31.30	68.80	4,327.0	719.4	2,008.7	2,133.6	0.42	-0.32	0.53
4,997.0	30.90	70.80	4,407.5	736.2	2,054.3	2,182.2	1.18	-0.43	2.13
5,091.0	32.30	72.00	4,487.5	751.9	2,101.0	2,231.4	1.63	1.49	1.28
5,185.0	31.80	70.50	4,567.2	767.9	2,148.2	2,281.3	1.00	-0.53	-1.60



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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)
5,279.0	31.50	70.50	4,647.2	784.3	2,194.7	2,330.6	0.32	-0.32	0.00
5,373.0	29.70	70.20	4,728.1	800.4	2,239.8	2,378.5	1.92	-1.91	-0.32
5,468.0	27.40	71.50	4,811.6	815.3	2,282.6	2,423.9	2.51	-2.42	1.37
5,562.0	25.90	70.10	4,895.6	829.2	2,322.5	2,466.0	1.73	-1.60	-1.49
5,656.0	23.90	71.30	4,980.9	842.3	2,359.8	2,505.6	2.19	-2.13	1.28
5,750.0	21.20	69.80	5,067.7	854.3	2,393.8	2,541.6	2.94	-2.87	-1.60
5,844.0	19.20	70.30	5,155.9	865.3	2,424.3	2,574.1	2.14	-2.13	0.53
5,939.0	17.50	70.90	5,246.0	875.3	2,452.5	2,604.0	1.80	-1.79	0.63
6,033.0	15.00	70.80	5,336.3	883.9	2,477.3	2,630.3	2.66	-2.66	-0.11
6,127.0	12.00	75.60	5,427.7	890.3	2,498.3	2,652.2	3.40	-3.19	5.11
6,221.0	9.50	82.50	5,520.0	893.8	2,515.5	2,669.5	2.99	-2.66	7.34
6,316.0	7.20	84.90	5,614.0	895.3	2,529.2	2,683.0	2.45	-2.42	2.53
6,410.0	4.50	87.10	5,707.5	896.1	2,538.7	2,692.2	2.88	-2.87	2.34
6,504.0	1.90	66.40	5,801.4	896.9	2,543.8	2,697.3	2.98	-2.77	-22.02
6,598.0	1.30	65.90	5,895.3	897.9	2,546.2	2,699.9	0.64	-0.64	-0.53
6,692.0	1.40	90.10	5,989.3	898.4	2,548.4	2,702.1	0.61	0.11	25.74
6,786.0	1.00	105.20	6,083.3	898.1	2,550.3	2,703.8	0.54	-0.43	16.06
6,880.0	1.00	56.30	6,177.3	898.4	2,551.8	2,705.3	0.88	0.00	-52.02
6,975.0	0.80	24.00	6,272.2	899.4	2,552.7	2,706.6	0.56	-0.21	-34.00
7,069.0	0.30	297.60	6,366.2	900.2	2,552.8	2,706.8	0.89	-0.53	-91.91
7,163.0	1.10	254.80	6,460.2	900.0	2,551.7	2,705.8	0.96	0.85	-45.53
7,257.0	0.80	254.30	6,554.2	899.6	2,550.2	2,704.2	0.32	-0.32	-0.53
7,352.0	0.70	253.20	6,649.2	899.3	2,549.0	2,703.0	0.11	-0.11	-1.16
7,446.0	1.00	283.70	6,743.2	899.3	2,547.6	2,701.7	0.57	0.32	32.45
7,540.0	1.20	279.50	6,837.2	899.7	2,545.9	2,700.2	0.23	0.21	-4.47
7,634.0	1.00	259.10	6,931.2	899.7	2,544.1	2,698.5	0.46	-0.21	-21.70
7,729.0	0.40	127.10	7,026.2	899.3	2,543.6	2,697.9	1.37	-0.63	-138.95
7,823.0	0.80	206.20	7,120.2	898.5	2,543.5	2,697.6	0.88	0.43	84.15
7,917.0	1.00	230.30	7,214.1	897.4	2,542.6	2,696.3	0.45	0.21	25.64
8,011.0	1.00	259.30	7,308.1	896.7	2,541.2	2,694.7	0.53	0.00	30.85
8,106.0	1.30	262.40	7,403.1	896.4	2,539.3	2,692.9	0.32	0.32	3.26
8,200.0	1.30	264.70	7,497.1	896.2	2,537.2	2,690.8	0.06	0.00	2.45
8,294.0	1.60	268.80	7,591.1	896.1	2,534.8	2,688.5	0.34	0.32	4.36
8,329.0	1.60	264.30	7,626.0	896.0	2,533.8	2,687.6	0.36	0.00	-12.86
TD @ 8384.0' MD / 7681.0' TVD									
8,384.0	1.60	264.30	7,681.0	895.9	2,532.3	2,686.1	0.00	0.00	0.00

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
472.0	471.7	4.9	14.0	First MWD Survey @ 472.0' MD / 471.7' TVD
8,384.0	7,681.0	895.9	2,532.3	TD @ 8384.0' MD / 7681.0' TVD



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Checked By: _____ Approved By: _____ Date: _____