



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-14-11E

Wellbore #1

Design: Wellbore #1

QES Survey Report

30 March, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-14-11E
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 0994-14-11E	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 0994-14-11E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,135.77 usft	Latitude:	39.273873
	+E/-W	0.0 usft	Easting:	2,339,076.14 usft	Longitude:	-107.834926
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	292.04	

Survey Program	Date	3/30/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,322.0	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 @ 472.0' MD / 470.3' TVD									
472.0	8.50	293.30	470.3	13.8	-32.1	34.9	1.80	1.80	0.00
563.0	12.00	291.20	559.8	19.9	-47.1	51.1	3.87	3.85	-2.31
654.0	15.40	289.20	648.2	27.3	-67.3	72.7	3.77	3.74	-2.20
745.0	18.00	290.80	735.4	36.3	-91.9	98.8	2.90	2.86	1.76
836.0	20.10	292.40	821.4	47.2	-119.5	128.5	2.38	2.31	1.76
927.0	22.30	291.90	906.2	59.6	-150.0	161.4	2.43	2.42	-0.55
1,018.0	24.50	292.30	989.7	73.2	-183.5	197.5	2.42	2.42	0.44
1,113.0	27.90	293.30	1,074.9	89.5	-222.1	239.5	3.61	3.58	1.05
1,207.0	30.70	295.20	1,156.9	108.4	-264.0	285.4	3.14	2.98	2.02



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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)
1,301.0	33.10	292.50	1,236.7	128.5	-309.5	335.1	2.97	2.55	-2.87
1,395.0	34.50	291.80	1,314.8	148.2	-357.9	387.3	1.55	1.49	-0.74
1,489.0	33.20	290.40	1,392.9	167.0	-406.7	439.7	1.61	-1.38	-1.49
1,511.0	32.80	290.30	1,411.3	171.2	-418.0	451.7	1.83	-1.82	-0.45
1,605.0	33.70	291.10	1,490.0	189.4	-466.2	503.2	1.07	0.96	0.85
1,700.0	35.60	289.50	1,568.1	208.1	-516.8	557.2	2.22	2.00	-1.68
1,793.0	35.20	289.10	1,643.9	225.9	-567.7	611.0	0.50	-0.43	-0.43
1,888.0	35.90	292.80	1,721.2	245.7	-619.2	666.2	2.38	0.74	3.89
1,982.0	34.80	292.50	1,797.9	266.6	-669.4	720.6	1.18	-1.17	-0.32
2,076.0	36.10	291.40	1,874.5	287.0	-720.0	775.1	1.54	1.38	-1.17
2,170.0	34.60	290.10	1,951.1	306.3	-770.8	829.5	1.79	-1.60	-1.38
2,264.0	35.50	292.60	2,028.1	326.0	-821.1	883.4	1.80	0.96	2.66
2,358.0	34.40	291.50	2,105.1	346.2	-871.0	937.3	1.35	-1.17	-1.17
2,453.0	35.40	293.30	2,183.0	366.9	-921.3	991.6	1.51	1.05	1.89
2,547.0	35.90	292.90	2,259.4	388.4	-971.7	1,046.4	0.59	0.53	-0.43
2,641.0	33.90	291.50	2,336.5	408.7	-1,021.4	1,100.2	2.29	-2.13	-1.49
2,735.0	34.60	292.70	2,414.2	428.6	-1,070.4	1,153.1	1.03	0.74	1.28
2,830.0	36.10	291.60	2,491.7	449.3	-1,121.4	1,208.0	1.72	1.58	-1.16
2,924.0	34.60	291.10	2,568.4	469.1	-1,172.0	1,262.4	1.63	-1.60	-0.53
3,018.0	36.90	289.90	2,644.6	488.4	-1,223.4	1,317.3	2.56	2.45	-1.28
3,113.0	37.20	293.60	2,720.5	509.6	-1,276.6	1,374.5	2.37	0.32	3.89
3,207.0	36.10	293.20	2,795.9	531.9	-1,328.1	1,430.6	1.20	-1.17	-0.43
3,301.0	37.50	293.70	2,871.2	554.3	-1,379.7	1,486.9	1.52	1.49	0.53
3,395.0	36.60	293.20	2,946.2	576.8	-1,431.7	1,543.5	1.01	-0.96	-0.53
3,489.0	35.30	293.60	3,022.3	598.7	-1,482.3	1,598.7	1.41	-1.38	0.43
3,584.0	33.70	292.60	3,100.6	619.8	-1,531.8	1,652.5	1.79	-1.68	-1.05
3,678.0	35.80	295.60	3,177.8	641.7	-1,580.7	1,706.0	2.88	2.23	3.19
3,772.0	34.70	295.70	3,254.6	665.2	-1,629.6	1,760.2	1.17	-1.17	0.11
3,866.0	33.60	294.80	3,332.4	687.7	-1,677.3	1,812.8	1.29	-1.17	-0.96
3,961.0	33.80	296.10	3,411.4	710.4	-1,724.9	1,865.4	0.79	0.21	1.37
4,055.0	33.20	296.60	3,489.8	733.4	-1,771.4	1,917.2	0.70	-0.64	0.53
4,149.0	33.90	294.90	3,568.1	756.0	-1,818.2	1,969.0	1.25	0.74	-1.81
4,243.0	34.90	294.90	3,645.7	778.3	-1,866.4	2,022.1	1.06	1.06	0.00
4,338.0	34.70	294.00	3,723.7	800.8	-1,915.7	2,076.2	0.58	-0.21	-0.95
4,432.0	33.90	293.70	3,801.3	822.2	-1,964.2	2,129.2	0.87	-0.85	-0.32
4,526.0	35.10	294.60	3,878.8	844.0	-2,012.8	2,182.4	1.39	1.28	0.96
4,620.0	34.70	294.00	3,955.9	866.1	-2,061.8	2,236.1	0.56	-0.43	-0.64
4,714.0	34.40	294.00	4,033.3	887.8	-2,110.5	2,289.4	0.32	-0.32	0.00
4,809.0	33.60	293.40	4,112.1	909.2	-2,159.1	2,342.5	0.91	-0.84	-0.63
4,903.0	33.00	292.70	4,190.6	929.4	-2,206.6	2,394.1	0.76	-0.64	-0.74
4,997.0	31.40	289.40	4,270.2	947.4	-2,253.3	2,444.2	2.53	-1.70	-3.51
5,091.0	31.10	293.90	4,350.6	965.4	-2,298.6	2,492.9	2.50	-0.32	4.79
5,185.0	30.60	294.00	4,431.3	984.9	-2,342.7	2,541.1	0.53	-0.53	0.11



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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)	
5,279.0	29.60	293.00	4,512.6	1,003.7	-2,385.9	2,588.2	1.19	-1.06	-1.06	
5,373.0	28.30	292.20	4,594.8	1,021.2	-2,427.9	2,633.7	1.44	-1.38	-0.85	
5,468.0	25.40	291.50	4,679.6	1,037.2	-2,467.7	2,676.6	3.07	-3.05	-0.74	
5,562.0	22.00	289.70	4,765.7	1,050.5	-2,503.1	2,714.4	3.70	-3.62	-1.91	
5,656.0	19.90	291.50	4,853.4	1,062.3	-2,534.5	2,747.9	2.34	-2.23	1.91	
5,750.0	17.90	290.20	4,942.4	1,073.2	-2,563.0	2,778.4	2.17	-2.13	-1.38	
5,844.0	16.60	292.50	5,032.1	1,083.3	-2,588.9	2,806.2	1.56	-1.38	2.45	
5,939.0	15.30	292.70	5,123.5	1,093.3	-2,613.0	2,832.4	1.37	-1.37	0.21	
6,033.0	13.60	295.40	5,214.5	1,102.9	-2,634.5	2,855.8	1.94	-1.81	2.87	
6,127.0	10.70	295.70	5,306.4	1,111.4	-2,652.3	2,875.5	3.09	-3.09	0.32	
6,221.0	8.80	294.70	5,399.0	1,118.2	-2,666.7	2,891.4	2.03	-2.02	-1.06	
6,316.0	8.00	293.70	5,493.0	1,123.9	-2,679.4	2,905.3	0.86	-0.84	-1.05	
6,410.0	7.50	288.90	5,586.1	1,128.5	-2,691.2	2,918.0	0.87	-0.53	-5.11	
6,504.0	7.60	287.20	5,679.3	1,132.3	-2,702.9	2,930.3	0.26	0.11	-1.81	
6,598.0	5.70	293.30	5,772.7	1,136.0	-2,713.1	2,941.1	2.15	-2.02	6.49	
6,692.0	3.10	283.20	5,866.4	1,138.4	-2,719.9	2,948.3	2.88	-2.77	-10.74	
6,786.0	0.80	279.50	5,960.3	1,139.1	-2,723.0	2,951.5	2.45	-2.45	-3.94	
6,880.0	0.50	254.60	6,054.3	1,139.1	-2,724.1	2,952.4	0.43	-0.32	-26.49	
6,975.0	0.70	240.90	6,149.3	1,138.7	-2,725.0	2,953.1	0.26	0.21	-14.42	
7,069.0	0.90	255.70	6,243.3	1,138.3	-2,726.2	2,954.1	0.30	0.21	15.74	
7,158.0	0.90	250.20	6,332.3	1,137.8	-2,727.5	2,955.2	0.10	0.00	-6.18	
7,257.0	1.20	247.10	6,431.3	1,137.2	-2,729.2	2,956.5	0.31	0.30	-3.13	
7,352.0	2.00	251.40	6,526.3	1,136.3	-2,731.7	2,958.4	0.85	0.84	4.53	
7,446.0	2.20	252.00	6,620.2	1,135.2	-2,735.0	2,961.1	0.21	0.21	0.64	
7,540.0	2.20	252.00	6,714.1	1,134.1	-2,738.4	2,963.8	0.00	0.00	0.00	
7,634.0	2.40	255.10	6,808.1	1,133.0	-2,742.0	2,966.8	0.25	0.21	3.30	
7,729.0	2.90	253.80	6,903.0	1,131.8	-2,746.2	2,970.3	0.53	0.53	-1.37	
7,823.0	2.70	248.90	6,996.8	1,130.4	-2,750.6	2,973.7	0.33	-0.21	-5.21	
7,917.0	2.90	248.00	7,090.7	1,128.7	-2,754.9	2,977.1	0.22	0.21	-0.96	
8,011.0	3.20	239.20	7,184.6	1,126.4	-2,759.3	2,980.4	0.59	0.32	-9.36	
8,106.0	3.00	239.60	7,279.5	1,123.8	-2,763.7	2,983.5	0.21	-0.21	0.42	
8,200.0	3.40	238.80	7,373.3	1,121.1	-2,768.2	2,986.7	0.43	0.43	-0.85	
8,267.0	3.40	238.70	7,440.2	1,119.1	-2,771.6	2,989.0	0.01	0.00	-0.15	
Projection to TD @ 8322.0' MD / 7495.1' TVD										
8,322.0	3.40	238.70	7,495.1	1,117.4	-2,774.4	2,991.0	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
472.0	470.3	13.8	-32.1	First MWD Survey @ 472.0' MD / 470.3' TVD	
8,322.0	7,495.1	1,117.4	-2,774.4	Projection to TD @ 8322.0' MD / 7495.1' TVD	



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