



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-15E

Wellbore #1

Design: Wellbore #1

QES Survey Report

06 April, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-15E
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 0994-13-15E	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 0994-13-15E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,123.34 usft	Latitude:	39.273839
	+E/-W	0.0 usft	Easting:	2,339,077.80 usft	Longitude:	-107.834919
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	86.53	

Survey Program	Date	4/6/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,291.0	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 / 470.6' TVD									
472.0	7.70	86.60	470.6	1.9	31.6	31.7	1.63	1.63	0.00
563.0	10.00	85.10	560.5	2.9	45.6	45.7	2.54	2.53	-1.65
654.0	12.70	89.30	649.7	3.7	63.5	63.6	3.10	2.97	4.62
745.0	15.60	87.20	737.9	4.4	85.7	85.8	3.24	3.19	-2.31
837.0	18.70	86.10	825.8	6.0	112.8	112.9	3.39	3.37	-1.20
928.0	22.20	86.90	911.1	8.0	144.5	144.7	3.86	3.85	0.88
1,019.0	25.00	87.20	994.5	9.8	180.9	181.1	3.08	3.08	0.33
1,113.0	29.30	85.30	1,078.1	12.7	223.6	224.0	4.67	4.57	-2.02
1,207.0	29.60	84.50	1,159.9	16.8	269.7	270.2	0.53	0.32	-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)
1,301.0	29.40	85.80	1,241.8	20.7	315.8	316.5	0.71	-0.21	1.38
1,395.0	29.10	85.80	1,323.8	24.1	361.6	362.4	0.32	-0.32	0.00
1,485.0	29.70	86.70	1,402.2	27.0	405.7	406.6	0.83	0.67	1.00
1,603.0	29.40	86.80	1,504.8	30.3	463.8	464.8	0.26	-0.25	0.08
1,698.0	28.40	86.40	1,588.0	33.0	509.6	510.7	1.07	-1.05	-0.42
1,792.0	29.50	89.10	1,670.3	34.8	555.1	556.2	1.82	1.17	2.87
1,886.0	28.60	89.50	1,752.4	35.3	600.7	601.8	0.98	-0.96	0.43
1,980.0	30.10	88.00	1,834.4	36.3	646.8	647.8	1.78	1.60	-1.60
2,074.0	28.90	88.90	1,916.2	37.6	693.0	694.1	1.36	-1.28	0.96
2,168.0	30.30	86.60	1,997.9	39.4	739.4	740.5	1.92	1.49	-2.45
2,262.0	29.00	86.90	2,079.6	42.1	785.9	787.0	1.39	-1.38	0.32
2,357.0	30.10	87.20	2,162.2	44.5	832.6	833.8	1.17	1.16	0.32
2,451.0	28.60	86.00	2,244.2	47.2	878.6	879.9	1.71	-1.60	-1.28
2,545.0	30.50	88.10	2,325.9	49.6	924.9	926.2	2.30	2.02	2.23
2,639.0	28.80	87.80	2,407.6	51.2	971.4	972.7	1.82	-1.81	-0.32
2,734.0	29.40	86.80	2,490.6	53.4	1,017.5	1,018.9	0.81	0.63	-1.05
2,828.0	31.00	87.50	2,571.9	55.7	1,064.8	1,066.2	1.74	1.70	0.74
2,922.0	30.20	86.50	2,652.8	58.2	1,112.6	1,114.0	1.01	-0.85	-1.06
3,017.0	29.10	87.30	2,735.4	60.8	1,159.5	1,161.0	1.23	-1.16	0.84
3,111.0	31.20	87.20	2,816.6	63.1	1,206.6	1,208.2	2.23	2.23	-0.11
3,205.0	30.50	87.20	2,897.3	65.4	1,254.8	1,256.4	0.74	-0.74	0.00
3,299.0	29.70	86.40	2,978.7	68.0	1,301.8	1,303.6	0.95	-0.85	-0.85
3,393.0	28.80	86.00	3,060.7	71.1	1,347.7	1,349.5	0.98	-0.96	-0.43
3,487.0	29.00	85.70	3,143.0	74.4	1,393.0	1,394.9	0.26	0.21	-0.32
3,582.0	30.50	85.10	3,225.4	78.2	1,440.0	1,442.1	1.61	1.58	-0.63
3,676.0	29.80	86.40	3,306.7	81.7	1,487.1	1,489.3	1.02	-0.74	1.38
3,770.0	28.80	87.60	3,388.7	84.1	1,533.0	1,535.3	1.23	-1.06	1.28
3,864.0	29.60	84.30	3,470.8	87.3	1,578.7	1,581.1	1.91	0.85	-3.51
3,959.0	28.70	84.20	3,553.7	92.0	1,624.8	1,627.3	0.95	-0.95	-0.11
4,053.0	30.20	84.50	3,635.6	96.5	1,670.7	1,673.5	1.60	1.60	0.32
4,147.0	29.90	84.80	3,716.9	100.9	1,717.6	1,720.6	0.36	-0.32	0.32
4,242.0	29.00	86.40	3,799.7	104.5	1,764.2	1,767.3	1.26	-0.95	1.68
4,336.0	30.30	83.60	3,881.4	108.6	1,810.5	1,813.7	2.02	1.38	-2.98
4,430.0	29.40	83.00	3,962.9	114.0	1,857.0	1,860.4	1.01	-0.96	-0.64
4,524.0	28.10	83.50	4,045.3	119.3	1,901.9	1,905.6	1.41	-1.38	0.53
4,618.0	29.00	84.80	4,127.9	123.9	1,946.5	1,950.5	1.16	0.96	1.38
4,712.0	28.60	84.80	4,210.2	128.0	1,991.6	1,995.7	0.43	-0.43	0.00
4,807.0	28.00	85.60	4,293.9	131.8	2,036.5	2,040.8	0.75	-0.63	0.84
4,901.0	28.90	88.90	4,376.5	133.9	2,081.2	2,085.5	1.93	0.96	3.51
4,995.0	29.80	88.40	4,458.5	135.0	2,127.3	2,131.6	0.99	0.96	-0.53
5,089.0	30.50	89.40	4,539.8	135.9	2,174.5	2,178.7	0.92	0.74	1.06
5,183.0	30.50	88.80	4,620.7	136.7	2,222.2	2,226.4	0.32	0.00	-0.64
5,277.0	28.80	88.00	4,702.4	137.9	2,268.7	2,272.9	1.86	-1.81	-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)	
5,372.0	26.10	89.00	4,786.7	139.1	2,312.4	2,316.6	2.88	-2.84	1.05	
5,466.0	24.00	88.70	4,871.9	139.9	2,352.2	2,356.4	2.24	-2.23	-0.32	
5,560.0	21.70	86.10	4,958.5	141.5	2,388.7	2,392.9	2.67	-2.45	-2.77	
5,654.0	19.50	85.00	5,046.5	144.1	2,421.7	2,425.9	2.38	-2.34	-1.17	
5,748.0	17.80	84.70	5,135.6	146.8	2,451.6	2,456.0	1.81	-1.81	-0.32	
5,842.0	16.90	82.20	5,225.3	149.9	2,479.4	2,484.0	1.24	-0.96	-2.66	
5,937.0	15.90	83.80	5,316.4	153.2	2,506.1	2,510.7	1.15	-1.05	1.68	
6,031.0	13.80	82.00	5,407.3	156.2	2,530.0	2,534.8	2.29	-2.23	-1.91	
6,125.0	11.20	83.60	5,499.0	158.8	2,550.1	2,555.1	2.79	-2.77	1.70	
6,219.0	7.50	90.80	5,591.8	159.7	2,565.4	2,570.3	4.12	-3.94	7.66	
6,314.0	4.60	86.70	5,686.2	159.8	2,575.4	2,580.3	3.08	-3.05	-4.32	
6,408.0	3.80	63.40	5,780.0	161.4	2,581.9	2,587.0	1.99	-0.85	-24.79	
6,502.0	3.20	51.90	5,873.8	164.4	2,586.8	2,592.0	0.98	-0.64	-12.23	
6,596.0	2.40	48.00	5,967.7	167.4	2,590.3	2,595.7	0.87	-0.85	-4.15	
6,690.0	1.70	44.20	6,061.6	169.7	2,592.7	2,598.2	0.76	-0.74	-4.04	
6,784.0	1.10	40.70	6,155.6	171.4	2,594.3	2,599.9	0.64	-0.64	-3.72	
6,879.0	0.70	31.90	6,250.6	172.6	2,595.2	2,600.9	0.44	-0.42	-9.26	
6,973.0	0.10	326.10	6,344.6	173.1	2,595.4	2,601.2	0.71	-0.64	-70.00	
7,067.0	0.30	279.50	6,438.6	173.2	2,595.2	2,600.9	0.26	0.21	-49.57	
7,161.0	0.50	296.60	6,532.6	173.5	2,594.5	2,600.3	0.25	0.21	18.19	
7,256.0	0.80	281.40	6,627.6	173.8	2,593.5	2,599.3	0.36	0.32	-16.00	
7,350.0	1.30	267.30	6,721.6	173.8	2,591.8	2,597.6	0.59	0.53	-15.00	
7,444.0	1.70	268.60	6,815.5	173.8	2,589.4	2,595.1	0.43	0.43	1.38	
7,538.0	2.40	269.10	6,909.5	173.7	2,586.0	2,591.8	0.74	0.74	0.53	
7,633.0	2.60	266.40	7,004.4	173.5	2,581.9	2,587.6	0.24	0.21	-2.84	
7,727.0	2.90	266.90	7,098.3	173.3	2,577.4	2,583.1	0.32	0.32	0.53	
7,821.0	3.00	262.80	7,192.2	172.8	2,572.5	2,578.3	0.25	0.11	-4.36	
7,915.0	2.20	268.80	7,286.1	172.5	2,568.3	2,574.0	0.90	-0.85	6.38	
8,009.0	1.90	264.90	7,380.0	172.3	2,564.9	2,570.7	0.35	-0.32	-4.15	
8,104.0	2.00	265.00	7,474.9	172.0	2,561.7	2,567.4	0.11	0.11	0.11	
8,198.0	2.20	259.10	7,568.9	171.5	2,558.3	2,564.0	0.31	0.21	-6.28	
8,236.0	2.10	256.20	7,606.8	171.2	2,556.9	2,562.6	0.39	-0.26	-7.63	
Projection to TD @ 8291.0' MD / 7661.8' TVD										
8,291.0	2.10	256.20	7,661.8	170.8	2,555.0	2,560.6	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	470.6	1.9	31.6	First MWD Survey @ 472.0' MD / 470.6' TVD	
8,291.0	7,661.8	170.8	2,555.0	Projection to TD @ 8291.0' MD / 7661.8' TVD	



Survey Report



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Checked By: _____	Approved By: _____	Date: _____
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