



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-14-16E

Wellbore #1

Design: Wellbore #1

QES Survey Report

29 April, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-14-16E
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 0994-14-16E	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 0994-14-16E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,120.15 usft	Latitude:	39.273829
	+E/-W	0.0 usft	Easting:	2,339,060.16 usft	Longitude:	-107.834981
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	4/20/2018	9.44	65.41	51,307.60000000

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	264.89	

Survey Program	Date	4/29/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
382.0	8,800.0	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 @ 382.0' MD / 380.6' TVD									
382.0	8.50	271.20	380.6	0.6	-28.3	28.1	2.23	2.23	0.00
473.0	10.60	270.20	470.3	0.8	-43.4	43.1	2.31	2.31	-1.10
564.0	12.50	272.10	559.5	1.2	-61.6	61.2	2.13	2.09	2.09
655.0	14.50	267.40	648.0	1.0	-82.8	82.4	2.51	2.20	-5.16
746.0	16.30	265.20	735.7	-0.6	-106.9	106.5	2.08	1.98	-2.42
837.0	18.70	261.70	822.5	-3.8	-134.1	133.9	2.88	2.64	-3.85
929.0	21.50	259.00	908.9	-9.1	-165.2	165.4	3.21	3.04	-2.93
1,020.0	23.90	260.00	992.8	-15.5	-199.8	200.3	2.67	2.64	1.10
1,114.0	27.20	263.70	1,077.6	-21.2	-239.9	240.8	3.90	3.51	3.94



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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)
1,208.0	31.00	264.90	1,159.7	-25.7	-285.4	286.5	4.09	4.04	1.28
1,302.0	33.50	265.40	1,239.2	-29.9	-335.3	336.7	2.67	2.66	0.53
1,397.0	34.10	265.60	1,318.2	-34.1	-388.0	389.5	0.64	0.63	0.21
1,491.0	35.10	265.10	1,395.6	-38.4	-441.2	442.9	1.11	1.06	-0.53
1,511.0	35.20	264.70	1,411.9	-39.4	-452.7	454.4	1.26	0.50	-2.00
1,604.0	33.80	262.80	1,488.5	-45.1	-505.1	507.1	1.90	-1.51	-2.04
1,698.0	34.40	265.20	1,566.4	-50.6	-557.5	559.7	1.57	0.64	2.55
1,792.0	33.40	265.50	1,644.4	-54.9	-609.7	612.2	1.08	-1.06	0.32
1,886.0	35.10	267.40	1,722.1	-58.1	-662.5	665.0	2.14	1.81	2.02
1,981.0	34.10	268.00	1,800.3	-60.3	-716.4	718.9	1.11	-1.05	0.63
2,075.0	34.60	265.90	1,877.9	-63.1	-769.4	771.9	1.37	0.53	-2.23
2,169.0	33.60	266.60	1,955.8	-66.6	-821.9	824.6	1.14	-1.06	0.74
2,263.0	34.90	265.00	2,033.5	-70.5	-874.7	877.5	1.68	1.38	-1.70
2,357.0	33.40	266.00	2,111.2	-74.6	-927.3	930.3	1.70	-1.60	1.06
2,451.0	33.90	263.90	2,189.5	-79.2	-979.2	982.3	1.35	0.53	-2.23
2,546.0	32.30	262.30	2,269.1	-85.4	-1,030.7	1,034.2	1.92	-1.68	-1.68
2,640.0	33.00	264.30	2,348.2	-91.3	-1,081.0	1,084.9	1.37	0.74	2.13
2,734.0	33.30	264.20	2,426.9	-96.5	-1,132.2	1,136.3	0.32	0.32	-0.11
2,829.0	31.60	265.80	2,507.1	-100.9	-1,183.0	1,187.2	2.00	-1.79	1.68
2,923.0	33.00	265.50	2,586.5	-104.7	-1,233.0	1,237.5	1.50	1.49	-0.32
3,017.0	35.20	266.00	2,664.4	-108.6	-1,285.6	1,290.2	2.36	2.34	0.53
3,112.0	34.80	265.70	2,742.2	-112.6	-1,339.9	1,344.6	0.46	-0.42	-0.32
3,206.0	35.30	264.60	2,819.1	-117.2	-1,393.7	1,398.6	0.86	0.53	-1.17
3,300.0	34.30	265.20	2,896.3	-121.9	-1,447.2	1,452.3	1.12	-1.06	0.64
3,394.0	35.20	263.50	2,973.6	-127.2	-1,500.5	1,505.8	1.41	0.96	-1.81
3,488.0	33.90	264.20	3,051.0	-132.9	-1,553.5	1,559.1	1.45	-1.38	0.74
3,583.0	35.40	263.70	3,129.1	-138.6	-1,607.2	1,613.1	1.61	1.58	-0.53
3,677.0	34.00	262.70	3,206.4	-145.0	-1,660.3	1,666.6	1.61	-1.49	-1.06
3,771.0	34.90	264.10	3,283.9	-151.1	-1,713.1	1,719.8	1.28	0.96	1.49
3,865.0	33.90	264.30	3,361.5	-156.4	-1,766.0	1,772.9	1.07	-1.06	0.21
3,959.0	35.40	264.70	3,438.8	-161.5	-1,819.2	1,826.3	1.61	1.60	0.43
4,054.0	34.40	264.30	3,516.7	-166.8	-1,873.3	1,880.7	1.08	-1.05	-0.42
4,148.0	35.30	264.60	3,593.9	-171.9	-1,926.7	1,934.4	0.97	0.96	0.32
4,242.0	35.00	265.10	3,670.7	-176.8	-1,980.6	1,988.5	0.44	-0.32	0.53
4,337.0	34.00	264.40	3,749.0	-181.7	-2,034.2	2,042.3	1.13	-1.05	-0.74
4,431.0	34.00	264.90	3,827.0	-186.6	-2,086.6	2,094.9	0.30	0.00	0.53
4,525.0	32.90	266.30	3,905.4	-190.6	-2,138.2	2,146.7	1.43	-1.17	1.49
4,619.0	33.80	264.90	3,983.9	-194.6	-2,189.7	2,198.4	1.26	0.96	-1.49
4,713.0	33.00	263.40	4,062.4	-199.8	-2,241.2	2,250.1	1.22	-0.85	-1.60
4,808.0	33.80	265.60	4,141.7	-204.8	-2,293.2	2,302.4	1.53	0.84	2.32
4,901.0	33.10	266.10	4,219.3	-208.6	-2,344.4	2,353.6	0.81	-0.75	0.54
4,996.0	32.00	264.90	4,299.4	-212.6	-2,395.3	2,404.7	1.34	-1.16	-1.26
5,090.0	30.90	264.70	4,379.6	-217.0	-2,444.2	2,453.8	1.18	-1.17	-0.21



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Survey										
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5,184.0	30.30	264.30	4,460.5	-221.6	-2,491.8	2,501.6	0.67	-0.64	-0.43	
5,278.0	29.80	263.40	4,541.8	-226.6	-2,538.6	2,548.7	0.72	-0.53	-0.96	
5,372.0	26.10	264.10	4,624.9	-231.4	-2,582.4	2,592.7	3.95	-3.94	0.74	
5,467.0	23.10	266.20	4,711.2	-234.8	-2,621.8	2,632.3	3.29	-3.16	2.21	
5,561.0	21.40	266.20	4,798.2	-237.2	-2,657.3	2,667.9	1.81	-1.81	0.00	
5,655.0	18.20	267.00	4,886.7	-239.1	-2,689.1	2,699.7	3.42	-3.40	0.85	
5,749.0	15.40	268.10	4,976.6	-240.3	-2,716.2	2,726.8	3.00	-2.98	1.17	
5,843.0	14.50	268.60	5,067.5	-241.0	-2,740.4	2,751.0	0.97	-0.96	0.53	
5,937.0	13.10	266.70	5,158.7	-241.9	-2,762.8	2,773.4	1.57	-1.49	-2.02	
6,031.0	11.00	262.90	5,250.7	-243.6	-2,782.4	2,793.0	2.39	-2.23	-4.04	
6,126.0	8.30	260.10	5,344.3	-245.9	-2,798.1	2,808.9	2.88	-2.84	-2.95	
6,220.0	7.30	248.70	5,437.4	-249.2	-2,810.4	2,821.4	1.95	-1.06	-12.13	
6,314.0	4.70	248.20	5,530.9	-252.8	-2,819.5	2,830.8	2.77	-2.77	-0.53	
6,409.0	1.50	246.10	5,625.8	-254.8	-2,824.3	2,835.7	3.37	-3.37	-2.21	
6,503.0	1.10	265.30	5,719.7	-255.4	-2,826.3	2,837.8	0.62	-0.43	20.43	
6,597.0	1.40	272.10	5,813.7	-255.4	-2,828.3	2,839.9	0.36	0.32	7.23	
6,691.0	1.80	259.50	5,907.7	-255.6	-2,830.9	2,842.5	0.56	0.43	-13.40	
6,785.0	1.00	225.70	6,001.7	-256.5	-2,833.0	2,844.6	1.19	-0.85	-35.96	
6,879.0	1.70	222.40	6,095.6	-258.1	-2,834.5	2,846.2	0.75	0.74	-3.51	
6,974.0	0.40	216.90	6,190.6	-259.4	-2,835.7	2,847.5	1.37	-1.37	-5.79	
7,068.0	0.80	359.40	6,284.6	-259.0	-2,835.9	2,847.7	1.22	0.43	151.60	
7,162.0	0.80	327.70	6,378.6	-257.8	-2,836.2	2,847.9	0.46	0.00	-33.72	
7,256.0	1.00	269.50	6,472.6	-257.2	-2,837.4	2,849.0	0.95	0.21	-61.91	
7,351.0	1.00	268.40	6,567.6	-257.2	-2,839.1	2,850.7	0.02	0.00	-1.16	
7,445.0	1.50	269.40	6,661.6	-257.3	-2,841.1	2,852.7	0.53	0.53	1.06	
7,539.0	0.60	209.50	6,755.5	-257.7	-2,842.6	2,854.2	1.39	-0.96	-63.72	
7,633.0	0.60	200.30	6,849.5	-258.6	-2,843.0	2,854.7	0.10	0.00	-9.79	
7,727.0	0.70	234.40	6,943.5	-259.4	-2,843.6	2,855.4	0.42	0.11	36.28	
7,821.0	1.40	234.40	7,037.5	-260.4	-2,845.0	2,856.9	0.74	0.74	0.00	
7,915.0	2.20	240.90	7,131.5	-262.0	-2,847.5	2,859.6	0.88	0.85	6.91	
8,009.0	2.20	242.50	7,225.4	-263.7	-2,850.7	2,862.9	0.07	0.00	1.70	
8,103.0	2.30	248.00	7,319.3	-265.2	-2,854.1	2,866.3	0.25	0.11	5.85	
8,198.0	2.10	240.30	7,414.3	-266.8	-2,857.3	2,869.7	0.38	-0.21	-8.11	
8,292.0	2.30	246.10	7,508.2	-268.4	-2,860.6	2,873.1	0.32	0.21	6.17	
8,386.0	2.40	246.20	7,602.1	-270.0	-2,864.1	2,876.8	0.11	0.11	0.11	
8,480.0	2.30	243.40	7,696.0	-271.6	-2,867.6	2,880.4	0.16	-0.11	-2.98	
8,574.0	2.30	243.00	7,790.0	-273.3	-2,870.9	2,883.9	0.02	0.00	-0.43	
8,668.0	2.70	242.20	7,883.9	-275.2	-2,874.6	2,887.7	0.43	0.43	-0.85	
8,740.0	2.80	246.50	7,955.8	-276.7	-2,877.7	2,890.9	0.32	0.14	5.97	
Projection to TD @ 8800.0' MD / 8015.7' TVD										
8,800.0	2.80	246.50	8,015.7	-277.8	-2,880.4	2,893.7	0.00	0.00	0.00	



Survey Report



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Site:	Gunderson 13-11 Pad	MD Reference:	well @ 7302.0usft (H&P #522)
Well:	Gunderson 0994-14-16E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
382.0	380.6	0.6	-28.3	First MWD Survey @ 382.0' MD / 380.6' TVD
8,800.0	8,015.7	-277.8	-2,880.4	Projection to TD @ 8800.0' MD / 8015.7' TVD