



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-14-15E

Wellbore #1

Design: Wellbore #1

QES Survey Report

14 April, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-14-15E
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 0994-14-15E	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 0994-14-15E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,125.12 usft	Latitude:	39.273843
	+E/-W	0.0 usft	Easting:	2,339,065.39 usft	Longitude:	-107.834963
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	4/5/2018	9.45	65.41	51,312.40000000

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	270.04	

Survey Program	Date	4/14/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
472.0	8,252.0	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 / 470.1' TVD									
472.0	8.80	270.70	470.1	0.4	-36.2	36.2	1.86	1.86	0.00
563.0	12.00	266.80	559.6	0.0	-52.6	52.6	3.60	3.52	-4.29
654.0	15.30	266.80	648.1	-1.2	-74.0	74.0	3.63	3.63	0.00
745.0	18.20	268.30	735.2	-2.3	-100.2	100.2	3.22	3.19	1.65
836.0	21.10	268.80	820.9	-3.1	-130.8	130.8	3.19	3.19	0.55
927.0	24.20	269.70	904.9	-3.5	-165.8	165.8	3.43	3.41	0.99
1,018.0	26.90	271.20	986.9	-3.2	-205.1	205.1	3.05	2.97	1.65
1,113.0	30.40	271.50	1,070.3	-2.1	-250.6	250.6	3.69	3.68	0.32
1,207.0	34.20	271.50	1,149.7	-0.8	-300.8	300.8	4.04	4.04	0.00



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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)
1,301.0	34.30	271.70	1,227.4	0.7	-353.7	353.7	0.16	0.11	0.21
1,395.0	34.30	271.60	1,305.1	2.2	-406.6	406.6	0.06	0.00	-0.11
1,489.0	33.80	270.70	1,383.0	3.3	-459.3	459.3	0.76	-0.53	-0.96
1,510.0	33.90	270.60	1,400.4	3.4	-471.0	471.0	0.55	0.48	-0.48
1,607.0	33.80	269.50	1,481.0	3.5	-525.0	525.0	0.64	-0.10	-1.13
1,702.0	33.60	269.00	1,560.0	2.8	-577.7	577.7	0.36	-0.21	-0.53
1,796.0	34.70	268.50	1,637.8	1.6	-630.5	630.5	1.21	1.17	-0.53
1,890.0	34.80	268.10	1,715.0	0.0	-684.0	684.0	0.26	0.11	-0.43
1,984.0	34.70	267.80	1,792.3	-1.9	-737.6	737.6	0.21	-0.11	-0.32
2,078.0	34.60	267.10	1,869.6	-4.3	-790.9	790.9	0.44	-0.11	-0.74
2,172.0	34.30	268.90	1,947.1	-6.1	-844.1	844.1	1.13	-0.32	1.91
2,266.0	34.80	271.30	2,024.5	-6.0	-897.4	897.4	1.54	0.53	2.55
2,361.0	34.50	271.00	2,102.7	-4.9	-951.4	951.4	0.36	-0.32	-0.32
2,455.0	33.80	270.20	2,180.5	-4.4	-1,004.1	1,004.1	0.88	-0.74	-0.85
2,549.0	33.30	269.80	2,258.8	-4.4	-1,056.1	1,056.1	0.58	-0.53	-0.43
2,643.0	34.10	270.80	2,337.0	-4.1	-1,108.3	1,108.2	1.04	0.85	1.06
2,738.0	34.00	270.30	2,415.7	-3.6	-1,161.4	1,161.4	0.31	-0.11	-0.53
2,832.0	33.20	269.90	2,494.0	-3.5	-1,213.5	1,213.5	0.88	-0.85	-0.43
2,926.0	34.00	270.80	2,572.3	-3.2	-1,265.5	1,265.5	1.00	0.85	0.96
3,021.0	33.80	271.40	2,651.2	-2.2	-1,318.4	1,318.4	0.41	-0.21	0.63
3,115.0	33.60	271.30	2,729.4	-0.9	-1,370.6	1,370.6	0.22	-0.21	-0.11
3,209.0	33.20	271.20	2,807.9	0.2	-1,422.3	1,422.3	0.43	-0.43	-0.11
3,303.0	33.00	270.70	2,886.6	1.1	-1,473.6	1,473.6	0.36	-0.21	-0.53
3,397.0	32.70	269.80	2,965.6	1.3	-1,524.6	1,524.6	0.61	-0.32	-0.96
3,491.0	32.30	269.40	3,044.9	0.9	-1,575.1	1,575.1	0.48	-0.43	-0.43
3,586.0	34.20	270.30	3,124.3	0.8	-1,627.2	1,627.2	2.07	2.00	0.95
3,680.0	35.20	270.60	3,201.6	1.2	-1,680.7	1,680.7	1.08	1.06	0.32
3,774.0	35.20	270.50	3,278.4	1.7	-1,734.9	1,734.9	0.06	0.00	-0.11
3,868.0	34.80	270.80	3,355.4	2.4	-1,788.8	1,788.8	0.46	-0.43	0.32
3,963.0	34.30	270.30	3,433.6	2.9	-1,842.7	1,842.7	0.61	-0.53	-0.53
4,057.0	33.90	270.50	3,511.5	3.2	-1,895.4	1,895.4	0.44	-0.43	0.21
4,151.0	34.90	271.60	3,589.0	4.2	-1,948.5	1,948.5	1.25	1.06	1.17
4,246.0	34.20	271.90	3,667.3	5.9	-2,002.3	2,002.4	0.76	-0.74	0.32
4,340.0	34.10	271.40	3,745.1	7.4	-2,055.1	2,055.1	0.32	-0.11	-0.53
4,434.0	33.70	272.00	3,823.1	8.9	-2,107.5	2,107.5	0.55	-0.43	0.64
4,528.0	35.10	270.90	3,900.7	10.3	-2,160.6	2,160.6	1.63	1.49	-1.17
4,622.0	35.10	270.90	3,977.6	11.1	-2,214.6	2,214.6	0.00	0.00	0.00
4,716.0	34.90	271.10	4,054.6	12.1	-2,268.5	2,268.5	0.25	-0.21	0.21
4,811.0	34.90	270.70	4,132.5	12.9	-2,322.9	2,322.9	0.24	0.00	-0.42
4,905.0	34.50	270.00	4,209.8	13.2	-2,376.4	2,376.4	0.60	-0.43	-0.74
4,999.0	34.10	267.70	4,287.4	12.2	-2,429.3	2,429.4	1.44	-0.43	-2.45
5,093.0	34.10	268.10	4,365.2	10.3	-2,482.0	2,482.0	0.24	0.00	0.43
5,187.0	32.10	268.40	4,444.0	8.7	-2,533.3	2,533.3	2.13	-2.13	0.32



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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)	
5,281.0	28.70	267.40	4,525.1	7.0	-2,580.8	2,580.9	3.66	-3.62	-1.06	
5,376.0	25.50	267.70	4,609.6	5.1	-2,624.1	2,624.1	3.37	-3.37	0.32	
5,470.0	22.00	270.20	4,695.6	4.4	-2,661.9	2,661.9	3.87	-3.72	2.66	
5,564.0	19.60	271.90	4,783.5	4.9	-2,695.3	2,695.3	2.63	-2.55	1.81	
5,658.0	15.90	269.10	4,873.0	5.3	-2,723.9	2,723.9	4.04	-3.94	-2.98	
5,752.0	14.90	266.60	4,963.6	4.3	-2,748.9	2,748.9	1.28	-1.06	-2.66	
5,846.0	13.80	269.90	5,054.7	3.6	-2,772.1	2,772.1	1.46	-1.17	3.51	
5,941.0	11.80	274.40	5,147.3	4.3	-2,793.2	2,793.2	2.35	-2.11	4.74	
6,035.0	10.00	275.30	5,239.7	5.8	-2,810.9	2,810.9	1.92	-1.91	0.96	
6,129.0	8.00	274.80	5,332.5	7.1	-2,825.5	2,825.5	2.13	-2.13	-0.53	
6,223.0	5.10	277.40	5,425.9	8.2	-2,836.2	2,836.2	3.10	-3.09	2.77	
6,318.0	2.80	280.70	5,520.6	9.2	-2,842.6	2,842.7	2.43	-2.42	3.47	
6,412.0	1.10	285.90	5,614.6	9.9	-2,845.8	2,845.8	1.82	-1.81	5.53	
6,506.0	0.60	140.00	5,708.6	9.7	-2,846.3	2,846.3	1.74	-0.53	-155.21	
6,600.0	0.40	134.50	5,802.6	9.1	-2,845.8	2,845.8	0.22	-0.21	-5.85	
6,694.0	0.60	173.00	5,896.6	8.4	-2,845.5	2,845.5	0.40	0.21	40.96	
6,788.0	0.80	214.80	5,990.6	7.4	-2,845.8	2,845.8	0.57	0.21	44.47	
6,883.0	1.10	219.80	6,085.5	6.1	-2,846.8	2,846.8	0.33	0.32	5.26	
6,977.0	1.50	229.60	6,179.5	4.6	-2,848.3	2,848.3	0.49	0.43	10.43	
7,071.0	1.30	210.10	6,273.5	2.9	-2,849.7	2,849.7	0.55	-0.21	-20.74	
7,165.0	1.50	220.80	6,367.5	1.1	-2,851.1	2,851.1	0.35	0.21	11.38	
7,260.0	1.80	236.10	6,462.4	-0.7	-2,853.1	2,853.1	0.56	0.32	16.11	
7,354.0	1.90	244.00	6,556.4	-2.2	-2,855.8	2,855.8	0.29	0.11	8.40	
7,448.0	2.10	253.30	6,650.3	-3.4	-2,858.8	2,858.8	0.40	0.21	9.89	
7,542.0	3.10	258.60	6,744.2	-4.4	-2,862.9	2,862.9	1.09	1.06	5.64	
7,636.0	3.60	258.80	6,838.1	-5.5	-2,868.3	2,868.3	0.53	0.53	0.21	
7,731.0	4.10	266.50	6,932.8	-6.2	-2,874.7	2,874.6	0.76	0.53	8.11	
7,825.0	4.80	262.80	7,026.6	-6.9	-2,881.9	2,881.9	0.80	0.74	-3.94	
7,919.0	5.10	268.00	7,120.2	-7.6	-2,890.0	2,890.0	0.57	0.32	5.53	
8,013.0	5.00	265.50	7,213.8	-8.1	-2,898.2	2,898.2	0.26	-0.11	-2.66	
8,108.0	5.30	266.20	7,308.5	-8.7	-2,906.7	2,906.7	0.32	0.32	0.74	
8,197.0	5.40	262.90	7,397.1	-9.5	-2,915.0	2,915.0	0.36	0.11	-3.71	
Projection to TD @ 8252.0' MD / 7451.8' TVD										
8,252.0	5.40	262.90	7,451.8	-10.1	-2,920.1	2,920.1	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	470.1	0.4	-36.2	First MWD Survey @ 472.0' MD / 470.1' TVD	
8,252.0	7,451.8	-10.1	-2,920.1	Projection to TD @ 8252.0' MD / 7451.8' TVD	



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Checked By: _____ Approved By: _____ Date: _____