



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-10E

Wellbore #1

Design: Wellbore #1

QES Survey Report

18 March, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-10E
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 0994-13-10E	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 0994-13-10E					
Well Position	+N/-S	0.0 usft	Northing:	1,533,139.30 usft	Latitude:	39.273884
	+E/-W	0.0 usft	Easting:	2,339,093.79 usft	Longitude:	-107.834864
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	3/6/2018	9.45	65.41	51,321.90000000

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	60.07	

Survey Program	Date	3/18/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
477.0	8,447.0	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 @ 477.0' MD / 476.8' TVD									
477.0	3.00	58.70	476.8	6.5	10.7	12.5	0.63	0.63	0.00
569.0	5.50	54.60	568.5	10.3	16.3	19.3	2.74	2.72	-4.46
659.0	8.10	55.50	657.9	16.4	25.1	29.9	2.89	2.89	1.00
750.0	11.30	58.00	747.6	24.7	37.9	45.2	3.55	3.52	2.75
842.0	15.20	57.70	837.1	36.0	55.8	66.3	4.24	4.24	-0.33
933.0	19.40	56.30	924.0	50.7	78.4	93.3	4.64	4.62	-1.54
1,024.0	21.40	58.60	1,009.3	67.8	105.2	125.0	2.37	2.20	2.53
1,118.0	24.20	59.90	1,095.9	86.4	136.5	161.4	3.03	2.98	1.38
1,212.0	27.10	60.60	1,180.6	106.5	171.8	202.1	3.10	3.09	0.74



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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)
1,306.0	30.20	60.40	1,263.1	128.7	211.0	247.1	3.30	3.30	-0.21
1,398.0	32.70	60.60	1,341.6	152.4	252.8	295.1	2.72	2.72	0.22
1,493.0	33.80	61.20	1,421.0	177.7	298.3	347.2	1.21	1.16	0.63
1,515.0	34.00	61.20	1,439.3	183.6	309.1	359.5	0.91	0.91	0.00
1,606.0	34.30	61.90	1,514.6	207.9	354.0	410.5	0.54	0.33	0.77
1,700.0	34.00	61.20	1,592.4	233.1	400.4	463.3	0.53	-0.32	-0.74
1,794.0	35.10	60.10	1,669.8	259.2	446.8	516.6	1.35	1.17	-1.17
1,888.0	34.70	60.10	1,746.9	286.0	493.5	570.4	0.43	-0.43	0.00
1,982.0	34.30	60.60	1,824.4	312.4	539.7	623.6	0.52	-0.43	0.53
2,076.0	34.10	59.80	1,902.1	338.6	585.6	676.4	0.52	-0.21	-0.85
2,170.0	33.60	59.50	1,980.2	365.1	630.8	728.8	0.56	-0.53	-0.32
2,265.0	34.70	61.00	2,058.8	391.5	677.1	782.1	1.46	1.16	1.58
2,359.0	33.70	60.40	2,136.6	417.4	723.1	835.0	1.12	-1.06	-0.64
2,455.0	34.20	61.10	2,216.2	443.6	769.9	888.6	0.66	0.52	0.73
2,547.0	34.30	60.90	2,292.2	468.7	815.2	940.3	0.16	0.11	-0.22
2,642.0	33.00	60.80	2,371.3	494.3	861.2	993.0	1.37	-1.37	-0.11
2,736.0	33.60	61.00	2,449.9	519.4	906.3	1,044.6	0.65	0.64	0.21
2,830.0	34.80	59.30	2,527.6	545.7	952.1	1,097.4	1.63	1.28	-1.81
2,925.0	34.20	58.60	2,605.9	573.5	998.2	1,151.2	0.76	-0.63	-0.74
3,019.0	34.20	58.50	2,683.7	601.0	1,043.3	1,204.0	0.06	0.00	-0.11
3,113.0	33.70	58.10	2,761.6	628.6	1,087.9	1,256.5	0.58	-0.53	-0.43
3,207.0	34.60	60.00	2,839.4	655.8	1,133.2	1,309.2	1.48	0.96	2.02
3,301.0	34.10	60.30	2,917.0	682.2	1,179.2	1,362.3	0.56	-0.53	0.32
3,396.0	33.30	60.00	2,996.1	708.4	1,224.9	1,415.0	0.86	-0.84	-0.32
3,490.0	34.40	60.80	3,074.1	734.2	1,270.4	1,467.3	1.26	1.17	0.85
3,584.0	33.80	59.90	3,152.0	760.3	1,316.2	1,520.0	0.83	-0.64	-0.96
3,678.0	33.00	59.60	3,230.5	786.4	1,360.9	1,571.8	0.87	-0.85	-0.32
3,773.0	34.80	59.50	3,309.3	813.2	1,406.6	1,624.8	1.90	1.89	-0.11
3,867.0	34.60	58.60	3,386.6	840.8	1,452.5	1,678.3	0.59	-0.21	-0.96
3,961.0	33.40	58.30	3,464.5	868.3	1,497.3	1,730.8	1.29	-1.28	-0.32
4,055.0	33.90	61.00	3,542.8	894.6	1,542.2	1,782.9	1.68	0.53	2.87
4,150.0	35.20	60.80	3,621.0	920.8	1,589.3	1,836.8	1.37	1.37	-0.21
4,244.0	35.10	60.30	3,697.9	947.4	1,636.4	1,890.9	0.32	-0.11	-0.53
4,338.0	34.50	60.30	3,775.1	973.9	1,683.0	1,944.5	0.64	-0.64	0.00
4,432.0	33.50	59.10	3,853.0	1,000.5	1,728.4	1,997.1	1.28	-1.06	-1.28
4,526.0	34.70	59.40	3,930.8	1,027.4	1,773.7	2,049.8	1.29	1.28	0.32
4,620.0	33.30	58.90	4,008.1	1,053.5	1,818.2	2,102.2	1.13	-1.11	-0.40
4,715.0	32.70	58.70	4,088.1	1,081.3	1,863.6	2,154.5	0.97	-0.95	-0.32
4,809.0	34.60	61.60	4,166.4	1,107.2	1,908.7	2,206.6	2.65	2.02	3.09
4,903.0	35.00	61.20	4,243.6	1,132.9	1,955.8	2,260.2	0.49	0.43	-0.43
5,028.0	34.30	60.30	4,346.4	1,167.6	2,017.8	2,331.3	0.69	-0.56	-0.72
5,112.0	33.30	60.20	4,416.2	1,190.8	2,058.4	2,378.0	1.19	-1.19	-0.12
5,186.0	33.20	58.80	4,478.1	1,211.4	2,093.4	2,418.6	1.05	-0.14	-1.89



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Survey										
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5,280.0	32.90	58.00	4,556.9	1,238.2	2,137.0	2,469.8	0.56	-0.32	-0.85	
5,374.0	32.30	57.70	4,636.1	1,265.2	2,179.9	2,520.4	0.66	-0.64	-0.32	
5,468.0	29.40	59.50	4,716.7	1,290.3	2,221.0	2,568.6	3.24	-3.09	1.91	
5,562.0	28.30	58.10	4,799.1	1,313.8	2,259.8	2,614.0	1.37	-1.17	-1.49	
5,656.0	27.00	58.10	4,882.3	1,336.9	2,296.9	2,657.6	1.38	-1.38	0.00	
5,751.0	24.30	57.80	4,968.0	1,358.7	2,331.7	2,698.6	2.85	-2.84	-0.32	
5,845.0	20.60	58.70	5,054.8	1,377.6	2,362.2	2,734.5	3.95	-3.94	0.96	
5,939.0	18.80	58.80	5,143.3	1,394.0	2,389.3	2,766.2	1.92	-1.91	0.11	
6,033.0	17.80	57.20	5,232.6	1,409.6	2,414.3	2,795.7	1.19	-1.06	-1.70	
6,127.0	16.90	56.60	5,322.3	1,424.9	2,437.8	2,823.7	0.98	-0.96	-0.64	
6,222.0	15.30	54.00	5,413.6	1,439.9	2,459.5	2,849.9	1.85	-1.68	-2.74	
6,316.0	13.80	52.90	5,504.6	1,454.0	2,478.5	2,873.4	1.62	-1.60	-1.17	
6,410.0	11.60	49.40	5,596.2	1,466.9	2,494.6	2,893.8	2.48	-2.34	-3.72	
6,504.0	8.60	49.40	5,688.8	1,477.6	2,507.1	2,910.0	3.19	-3.19	0.00	
6,598.0	6.00	52.70	5,782.0	1,485.2	2,516.4	2,921.8	2.80	-2.77	3.51	
6,693.0	3.30	54.40	5,876.7	1,489.8	2,522.5	2,929.4	2.85	-2.84	1.79	
6,787.0	1.50	69.20	5,970.6	1,491.8	2,525.9	2,933.3	2.01	-1.91	15.74	
6,881.0	0.80	53.60	6,064.6	1,492.6	2,527.6	2,935.2	0.81	-0.74	-16.60	
6,975.0	0.60	85.40	6,158.6	1,493.0	2,528.6	2,936.3	0.46	-0.21	33.83	
7,069.0	0.30	126.70	6,252.6	1,492.9	2,529.3	2,936.8	0.45	-0.32	43.94	
7,164.0	0.50	173.70	6,347.6	1,492.4	2,529.5	2,936.8	0.39	0.21	49.47	
7,258.0	0.60	165.70	6,441.6	1,491.5	2,529.7	2,936.5	0.13	0.11	-8.51	
7,352.0	0.80	164.50	6,535.6	1,490.4	2,530.0	2,936.2	0.21	0.21	-1.28	
7,446.0	0.90	189.20	6,629.6	1,489.0	2,530.0	2,935.5	0.40	0.11	26.28	
7,541.0	1.00	184.60	6,724.5	1,487.4	2,529.8	2,934.6	0.13	0.11	-4.84	
7,635.0	1.20	186.50	6,818.5	1,485.6	2,529.7	2,933.6	0.22	0.21	2.02	
7,729.0	1.70	202.40	6,912.5	1,483.4	2,529.0	2,931.9	0.68	0.53	16.91	
7,823.0	1.70	198.50	7,006.5	1,480.8	2,528.1	2,929.7	0.12	0.00	-4.15	
7,918.0	2.30	214.50	7,101.4	1,477.9	2,526.5	2,926.9	0.86	0.63	16.84	
8,012.0	2.80	225.00	7,195.3	1,474.7	2,523.8	2,923.0	0.73	0.53	11.17	
8,106.0	3.30	235.70	7,289.2	1,471.5	2,520.0	2,918.1	0.80	0.53	11.38	
8,200.0	3.60	247.50	7,383.0	1,468.9	2,515.0	2,912.5	0.82	0.32	12.55	
8,295.0	3.60	253.40	7,477.8	1,466.9	2,509.4	2,906.6	0.39	0.00	6.21	
8,387.0	3.60	259.60	7,569.6	1,465.5	2,503.8	2,901.1	0.42	0.00	6.74	
Projection to TD @ 8447.0' MD / 7629.5' TVD										
8,447.0	3.60	259.60	7,629.5	1,464.9	2,500.1	2,897.5	0.00	0.00	0.00	



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Design Annotations

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		+N/-S (usft)	+E/-W (usft)	
477.0	476.8	6.5	10.7	First MWD Survey @ 477.0' MD / 476.8' TVD
8,447.0	7,629.5	1,464.9	2,500.1	Projection to TD @ 8447.0' MD / 7629.5' TVD

Checked By: _____ Approved By: _____ Date: _____