



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-07W

Wellbore #1

Design: Wellbore #1

QES Survey Report

02 March, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-07W
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 0994-13-07W	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 0994-13-07W					
Well Position	+N/-S	0.0 usft	Northing:	1,533,149.98 usft	Latitude:	39.273914
	+E/-W	0.0 usft	Easting:	2,339,104.54 usft	Longitude:	-107.834827
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	2/15/2018	9.46	65.41	51,327.90000000

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	356.46	

Survey Program	Date	3/2/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
111.0	7,972.0	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 @ 111.0' MD / 111.0' TVD									
111.0	0.20	44.60	111.0	0.1	0.1	0.1	0.18	0.18	0.00
202.0	0.40	15.10	202.0	0.6	0.3	0.5	0.27	0.22	-32.42
293.0	0.50	359.00	293.0	1.3	0.4	1.2	0.18	0.11	-17.69
384.0	2.10	24.00	384.0	3.2	1.1	3.1	1.82	1.76	27.47
475.0	4.30	19.20	474.8	7.9	2.9	7.7	2.43	2.42	-5.27
567.0	7.20	11.30	566.4	16.8	5.1	16.5	3.26	3.15	-8.59
657.0	9.20	7.90	655.4	29.5	7.2	29.0	2.29	2.22	-3.78
748.0	12.70	0.50	744.8	46.7	8.3	46.1	4.14	3.85	-8.13
840.0	15.50	355.90	834.0	69.1	7.5	68.5	3.28	3.04	-5.00



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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)
931.0	18.30	354.40	921.0	95.4	5.3	94.9	3.11	3.08	-1.65
1,022.0	20.70	356.80	1,006.8	125.7	3.0	125.3	2.78	2.64	2.64
1,116.0	24.00	357.50	1,093.7	161.4	1.2	161.0	3.52	3.51	0.74
1,210.0	24.50	357.20	1,179.5	200.0	-0.6	199.6	0.55	0.53	-0.32
1,304.0	24.50	356.60	1,265.0	238.9	-2.7	238.6	0.26	0.00	-0.64
1,399.0	24.60	356.20	1,351.4	278.3	-5.2	278.1	0.20	0.11	-0.42
1,493.0	24.20	356.10	1,437.0	317.0	-7.8	316.9	0.43	-0.43	-0.11
1,605.0	23.60	356.50	1,539.4	362.3	-10.7	362.3	0.55	-0.54	0.36
1,699.0	23.20	356.60	1,625.7	399.6	-12.9	399.6	0.43	-0.43	0.11
1,793.0	24.70	356.90	1,711.6	437.7	-15.1	437.8	1.60	1.60	0.32
1,887.0	24.40	357.20	1,797.1	476.7	-17.1	476.8	0.35	-0.32	0.32
1,981.0	23.90	356.60	1,882.8	515.1	-19.2	515.3	0.59	-0.53	-0.64
2,075.0	22.80	356.20	1,969.1	552.3	-21.5	552.6	1.18	-1.17	-0.43
2,170.0	24.00	357.20	2,056.3	589.9	-23.7	590.3	1.33	1.26	1.05
2,264.0	24.90	356.30	2,141.9	628.8	-25.9	629.2	1.04	0.96	-0.96
2,358.0	23.50	356.50	2,227.6	667.2	-28.3	667.7	1.49	-1.49	0.21
2,455.0	24.30	355.80	2,316.3	706.4	-31.0	707.0	0.88	0.82	-0.72
2,549.0	23.30	355.90	2,402.3	744.3	-33.7	744.9	1.06	-1.06	0.11
2,644.0	24.00	354.80	2,489.3	782.3	-36.8	783.0	0.87	0.74	-1.16
2,738.0	23.40	354.10	2,575.4	819.9	-40.5	820.8	0.70	-0.64	-0.74
2,832.0	24.50	356.30	2,661.3	857.9	-43.6	858.9	1.51	1.17	2.34
2,927.0	24.10	355.70	2,747.9	896.9	-46.4	898.0	0.49	-0.42	-0.63
3,021.0	23.00	354.60	2,834.1	934.3	-49.5	935.6	1.26	-1.17	-1.17
3,115.0	24.90	355.70	2,920.0	972.3	-52.7	973.7	2.08	2.02	1.17
3,209.0	24.60	355.10	3,005.4	1,011.6	-55.9	1,013.1	0.42	-0.32	-0.64
3,303.0	23.80	353.50	3,091.1	1,049.9	-59.7	1,051.6	1.10	-0.85	-1.70
3,398.0	22.90	352.10	3,178.3	1,087.2	-64.4	1,089.2	1.11	-0.95	-1.47
3,492.0	25.00	354.00	3,264.2	1,125.1	-69.0	1,127.2	2.38	2.23	2.02
3,586.0	24.70	352.70	3,349.5	1,164.4	-73.6	1,166.7	0.66	-0.32	-1.38
3,680.0	23.60	351.90	3,435.3	1,202.5	-78.7	1,205.0	1.22	-1.17	-0.85
3,775.0	25.30	355.20	3,521.8	1,241.5	-83.1	1,244.3	2.29	1.79	3.47
3,869.0	26.30	353.80	3,606.4	1,282.2	-87.0	1,285.2	1.25	1.06	-1.49
3,963.0	25.70	353.10	3,690.9	1,323.2	-91.7	1,326.3	0.72	-0.64	-0.74
4,057.0	24.20	352.90	3,776.1	1,362.5	-96.6	1,365.9	1.60	-1.60	-0.21
4,152.0	23.90	356.50	3,862.9	1,401.1	-100.1	1,404.6	1.58	-0.32	3.79
4,246.0	23.30	356.20	3,949.0	1,438.6	-102.5	1,442.2	0.65	-0.64	-0.32
4,340.0	23.00	355.60	4,035.4	1,475.5	-105.2	1,479.2	0.41	-0.32	-0.64
4,434.0	24.30	356.20	4,121.5	1,513.1	-107.9	1,516.9	1.41	1.38	0.64
4,540.0	24.00	355.30	4,218.3	1,556.3	-111.1	1,560.2	0.45	-0.28	-0.85
4,623.0	22.90	354.40	4,294.4	1,589.2	-114.0	1,593.2	1.39	-1.33	-1.08
4,717.0	23.00	354.40	4,381.0	1,625.7	-117.6	1,629.9	0.11	0.11	0.00
4,811.0	24.20	358.00	4,467.1	1,663.3	-120.1	1,667.5	1.99	1.28	3.83
4,905.0	23.20	357.00	4,553.2	1,701.0	-121.7	1,705.3	1.15	-1.06	-1.06



Survey Report



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Survey									
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4,999.0	22.50	356.00	4,639.8	1,737.4	-124.0	1,741.8	0.85	-0.74	-1.06
5,093.0	20.60	354.60	4,727.2	1,771.8	-126.8	1,776.3	2.09	-2.02	-1.49
5,188.0	19.20	357.70	4,816.5	1,804.1	-129.0	1,808.6	1.84	-1.47	3.26
5,282.0	17.60	356.00	4,905.7	1,833.7	-130.6	1,838.3	1.80	-1.70	-1.81
5,376.0	16.60	353.80	4,995.6	1,861.2	-133.0	1,865.9	1.27	-1.06	-2.34
5,470.0	14.70	354.10	5,086.1	1,886.5	-135.7	1,891.2	2.02	-2.02	0.32
5,564.0	13.60	355.00	5,177.2	1,909.3	-137.9	1,914.2	1.19	-1.17	0.96
5,658.0	13.20	356.40	5,268.7	1,931.0	-139.5	1,936.0	0.55	-0.43	1.49
5,753.0	11.70	356.50	5,361.4	1,951.5	-140.8	1,956.5	1.58	-1.58	0.11
5,847.0	10.50	3.90	5,453.7	1,969.6	-140.8	1,974.5	1.98	-1.28	7.87
5,941.0	9.10	7.60	5,546.3	1,985.5	-139.2	1,990.3	1.63	-1.49	3.94
6,035.0	7.10	14.20	5,639.4	1,998.5	-136.8	2,003.1	2.34	-2.13	7.02
6,130.0	4.80	24.50	5,733.9	2,007.8	-133.7	2,012.2	2.66	-2.42	10.84
6,224.0	4.20	21.10	5,827.6	2,014.6	-130.9	2,018.8	0.70	-0.64	-3.62
6,318.0	3.40	16.10	5,921.4	2,020.5	-128.8	2,024.6	0.92	-0.85	-5.32
6,412.0	2.80	13.10	6,015.2	2,025.4	-127.5	2,029.4	0.66	-0.64	-3.19
6,506.0	2.30	11.30	6,109.1	2,029.5	-126.7	2,033.4	0.54	-0.53	-1.91
6,600.0	1.10	28.50	6,203.1	2,032.1	-125.9	2,036.0	1.37	-1.28	18.30
6,694.0	0.70	90.80	6,297.1	2,032.9	-124.9	2,036.7	1.06	-0.43	66.28
6,789.0	1.00	87.40	6,392.1	2,032.9	-123.4	2,036.7	0.32	0.32	-3.58
6,883.0	0.90	111.40	6,486.1	2,032.7	-121.9	2,036.3	0.43	-0.11	25.53
6,977.0	1.00	153.40	6,580.0	2,031.7	-120.9	2,035.3	0.73	0.11	44.68
7,071.0	1.10	190.00	6,674.0	2,030.1	-120.7	2,033.6	0.71	0.11	38.94
7,166.0	0.90	221.30	6,769.0	2,028.6	-121.3	2,032.2	0.60	-0.21	32.95
7,260.0	1.10	238.80	6,863.0	2,027.6	-122.6	2,031.3	0.39	0.21	18.62
7,354.0	0.90	251.90	6,957.0	2,026.9	-124.1	2,030.7	0.32	-0.21	13.94
7,448.0	0.70	240.40	7,051.0	2,026.4	-125.3	2,030.2	0.27	-0.21	-12.23
7,543.0	0.90	205.20	7,146.0	2,025.4	-126.1	2,029.3	0.55	0.21	-37.05
7,637.0	1.80	164.90	7,239.9	2,023.3	-126.0	2,027.2	1.34	0.96	-42.87
7,731.0	1.80	167.80	7,333.9	2,020.4	-125.3	2,024.3	0.10	0.00	3.09
7,825.0	1.60	173.20	7,427.9	2,017.7	-124.8	2,021.6	0.27	-0.21	5.74
7,912.0	1.10	175.30	7,514.8	2,015.7	-124.6	2,019.5	0.58	-0.57	2.41
Projection to TD @ 7972.0' MD / 7574.8' TVD									
7,972.0	1.10	175.30	7,574.8	2,014.5	-124.5	2,018.4	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
111.0	111.0	0.1	0.1	First MWD Survey @ 111.0' MD / 111.0' TVD
7,972.0	7,574.8	2,014.5	-124.5	Projection to TD @ 7972.0' MD / 7574.8' TVD



Survey Report



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Checked By: _____ Approved By: _____ Date: _____