



Laramie Energy, LLC

Mesa County, CO

Gunderson 13-11 Pad

Gunderson 0994-13-06W

Wellbore #1

Design: Wellbore #1

QES Survey Report

06 March, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson 0994-13-06W
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 0994-13-06W	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 0994-13-06W					
Well Position	+N/-S	0.0 usft	Northing:	1,533,157.09 usft	Latitude:	39.273933
	+E/-W	0.0 usft	Easting:	2,339,097.36 usft	Longitude:	-107.834853
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	356.60	

Survey Program	Date	3/6/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
293.0	8,642.0	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 @ 293.0' MD / 292.7' TVD									
293.0	4.70	348.50	292.7	11.8	-2.4	11.9	1.60	1.60	0.00
384.0	6.70	2.30	383.2	20.7	-2.9	20.9	2.65	2.20	15.16
475.0	8.90	5.70	473.4	33.0	-2.0	33.1	2.47	2.42	3.74
567.0	11.30	358.20	563.9	49.1	-1.6	49.1	2.97	2.61	-8.15
657.0	13.40	359.10	651.9	68.4	-2.0	68.4	2.34	2.33	1.00
748.0	15.70	358.70	739.9	91.2	-2.5	91.2	2.53	2.53	-0.44
840.0	18.60	355.70	827.8	118.3	-3.9	118.3	3.29	3.15	-3.26
931.0	22.20	353.60	913.1	149.9	-6.9	150.0	4.04	3.96	-2.31
961.0	22.60	352.70	940.9	161.2	-8.2	161.4	1.76	1.33	-3.00



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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)
1,053.0	24.50	357.20	1,025.2	197.8	-11.4	198.2	2.84	2.07	4.89
1,148.0	24.10	357.60	1,111.8	236.9	-13.2	237.2	0.46	-0.42	0.42
1,242.0	25.80	358.80	1,197.0	276.5	-14.4	276.9	1.89	1.81	1.28
1,336.0	25.70	358.30	1,281.7	317.3	-15.4	317.7	0.25	-0.11	-0.53
1,430.0	26.50	358.60	1,366.1	358.7	-16.6	359.0	0.86	0.85	0.32
1,495.0	26.50	359.00	1,424.3	387.7	-17.2	388.0	0.27	0.00	0.62
1,602.0	25.80	359.30	1,520.3	434.8	-17.9	435.1	0.67	-0.65	0.28
1,696.0	26.50	356.50	1,604.7	476.2	-19.4	476.5	1.51	0.74	-2.98
1,790.0	26.10	355.70	1,688.9	517.8	-22.2	518.2	0.57	-0.43	-0.85
1,884.0	27.00	354.80	1,773.0	559.6	-25.7	560.2	1.05	0.96	-0.96
1,978.0	26.10	353.90	1,857.1	601.4	-29.8	602.1	1.05	-0.96	-0.96
2,072.0	25.30	353.60	1,941.8	642.0	-34.3	642.9	0.86	-0.85	-0.32
2,166.0	25.40	355.90	2,026.8	682.0	-38.0	683.1	1.05	0.11	2.45
2,261.0	26.80	355.80	2,112.1	723.7	-41.0	724.9	1.47	1.47	-0.11
2,355.0	26.10	355.80	2,196.2	765.5	-44.1	766.7	0.74	-0.74	0.00
2,449.0	24.80	355.00	2,281.1	805.7	-47.3	807.1	1.43	-1.38	-0.85
2,543.0	26.10	355.40	2,366.0	846.0	-50.7	847.5	1.40	1.38	0.43
2,638.0	25.30	354.40	2,451.6	887.0	-54.3	888.7	0.96	-0.84	-1.05
2,732.0	24.30	353.60	2,536.9	926.2	-58.4	928.1	1.12	-1.06	-0.85
2,826.0	25.80	357.10	2,622.1	965.9	-61.6	967.8	2.24	1.60	3.72
2,921.0	25.40	356.70	2,707.8	1,006.9	-63.8	1,008.9	0.46	-0.42	-0.42
3,015.0	24.40	356.20	2,793.0	1,046.4	-66.3	1,048.5	1.09	-1.06	-0.53
3,109.0	26.40	356.30	2,877.9	1,086.6	-68.9	1,088.8	2.13	2.13	0.11
3,203.0	26.10	355.80	2,962.2	1,128.1	-71.8	1,130.4	0.40	-0.32	-0.53
3,297.0	25.40	355.70	3,046.9	1,168.8	-74.8	1,171.2	0.75	-0.74	-0.11
3,392.0	27.10	356.50	3,132.1	1,210.7	-77.7	1,213.2	1.83	1.79	0.84
3,486.0	26.50	356.40	3,216.0	1,253.0	-80.3	1,255.6	0.64	-0.64	-0.11
3,580.0	25.80	355.20	3,300.4	1,294.3	-83.3	1,297.0	0.93	-0.74	-1.28
3,674.0	28.00	355.40	3,384.2	1,336.7	-86.8	1,339.5	2.34	2.34	0.21
3,769.0	27.30	355.00	3,468.4	1,380.7	-90.5	1,383.6	0.76	-0.74	-0.42
3,863.0	26.50	353.80	3,552.2	1,423.0	-94.6	1,426.1	1.03	-0.85	-1.28
3,957.0	27.60	358.50	3,635.9	1,465.6	-97.5	1,468.8	2.56	1.17	5.00
4,051.0	26.90	358.20	3,719.5	1,508.6	-98.7	1,511.8	0.76	-0.74	-0.32
4,146.0	25.90	358.00	3,804.6	1,550.8	-100.1	1,554.0	1.06	-1.05	-0.21
4,240.0	27.20	0.20	3,888.7	1,592.8	-100.7	1,596.0	1.73	1.38	2.34
4,334.0	26.50	0.80	3,972.5	1,635.3	-100.4	1,638.4	0.80	-0.74	0.64
4,428.0	26.00	0.10	4,056.8	1,676.9	-100.1	1,679.9	0.63	-0.53	-0.74
4,522.0	24.60	359.40	4,141.8	1,717.0	-100.2	1,720.0	1.52	-1.49	-0.74
4,617.0	26.50	358.40	4,227.5	1,758.0	-101.0	1,760.9	2.05	2.00	-1.05
4,711.0	26.00	356.70	4,311.8	1,799.5	-102.8	1,802.5	0.96	-0.53	-1.81
4,805.0	25.40	355.20	4,396.5	1,840.2	-105.7	1,843.2	0.94	-0.64	-1.60
4,899.0	27.20	358.10	4,480.8	1,881.8	-108.1	1,884.9	2.35	1.91	3.09
4,993.0	27.00	358.70	4,564.5	1,924.6	-109.3	1,927.7	0.36	-0.21	0.64



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Survey										
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5,087.0	26.10	358.60	4,648.6	1,966.6	-110.2	1,969.6	0.96	-0.96	-0.11	
5,182.0	24.50	357.80	4,734.5	2,007.1	-111.5	2,010.2	1.72	-1.68	-0.84	
5,276.0	23.00	356.40	4,820.5	2,045.0	-113.4	2,048.1	1.70	-1.60	-1.49	
5,370.0	22.00	355.30	4,907.3	2,080.8	-116.0	2,084.0	1.15	-1.06	-1.17	
5,464.0	20.30	353.60	4,995.0	2,114.6	-119.3	2,117.9	1.92	-1.81	-1.81	
5,558.0	18.60	352.70	5,083.6	2,145.7	-123.0	2,149.2	1.84	-1.81	-0.96	
5,652.0	17.20	350.80	5,173.1	2,174.2	-127.1	2,178.0	1.61	-1.49	-2.02	
5,747.0	15.20	356.80	5,264.3	2,200.6	-130.1	2,204.4	2.74	-2.11	6.32	
5,841.0	12.70	10.50	5,355.6	2,223.0	-128.9	2,226.8	4.39	-2.66	14.57	
5,935.0	10.50	14.10	5,447.6	2,241.5	-124.9	2,245.0	2.46	-2.34	3.83	
6,029.0	7.00	14.60	5,540.5	2,255.4	-121.4	2,258.6	3.72	-3.72	0.53	
6,123.0	4.10	8.80	5,634.1	2,264.2	-119.4	2,267.3	3.14	-3.09	-6.17	
6,218.0	2.40	34.20	5,728.9	2,269.2	-117.8	2,272.2	2.30	-1.79	26.74	
6,312.0	1.80	35.80	5,822.9	2,272.0	-115.8	2,274.9	0.64	-0.64	1.70	
6,406.0	1.10	14.90	5,916.8	2,274.1	-114.7	2,276.9	0.92	-0.74	-22.23	
6,500.0	1.10	359.10	6,010.8	2,275.9	-114.5	2,278.7	0.32	0.00	-16.81	
6,594.0	0.80	349.80	6,104.8	2,277.4	-114.6	2,280.2	0.36	-0.32	-9.89	
6,689.0	0.80	282.90	6,199.8	2,278.2	-115.4	2,281.1	0.93	0.00	-70.42	
6,783.0	1.10	291.90	6,293.8	2,278.7	-116.9	2,281.6	0.36	0.32	9.57	
6,877.0	1.50	282.00	6,387.8	2,279.3	-118.9	2,282.4	0.49	0.43	-10.53	
6,971.0	0.90	279.50	6,481.7	2,279.7	-120.8	2,282.8	0.64	-0.64	-2.66	
7,065.0	1.20	354.30	6,575.7	2,280.8	-121.7	2,284.0	1.38	0.32	79.57	
7,160.0	0.40	327.60	6,670.7	2,282.1	-121.9	2,285.3	0.91	-0.84	-28.11	
7,254.0	0.90	307.70	6,764.7	2,282.8	-122.7	2,286.0	0.58	0.53	-21.17	
7,348.0	0.80	316.30	6,858.7	2,283.7	-123.7	2,287.0	0.17	-0.11	9.15	
7,442.0	0.90	275.90	6,952.7	2,284.3	-124.9	2,287.7	0.63	0.11	-42.98	
7,537.0	1.00	295.20	7,047.7	2,284.7	-126.4	2,288.2	0.35	0.11	20.32	
7,631.0	1.50	303.60	7,141.6	2,285.7	-128.2	2,289.3	0.57	0.53	8.94	
7,725.0	1.20	313.70	7,235.6	2,287.1	-129.9	2,290.8	0.41	-0.32	10.74	
7,818.0	1.10	293.10	7,328.6	2,288.1	-131.4	2,291.9	0.45	-0.11	-22.15	
7,914.0	1.50	293.50	7,424.6	2,289.0	-133.4	2,292.9	0.42	0.42	0.42	
8,008.0	1.20	298.90	7,518.6	2,289.9	-135.4	2,293.9	0.35	-0.32	5.74	
8,102.0	1.10	270.80	7,612.5	2,290.4	-137.2	2,294.5	0.60	-0.11	-29.89	
8,196.0	1.10	273.50	7,706.5	2,290.5	-139.0	2,294.7	0.06	0.00	2.87	
8,291.0	1.50	255.20	7,801.5	2,290.2	-141.1	2,294.6	0.60	0.42	-19.26	
8,385.0	1.20	268.70	7,895.5	2,289.9	-143.3	2,294.4	0.46	-0.32	14.36	
8,479.0	1.40	252.00	7,989.4	2,289.5	-145.4	2,294.1	0.45	0.21	-17.77	
8,582.0	1.40	250.50	8,092.4	2,288.7	-147.7	2,293.4	0.04	0.00	-1.46	
Projection to TD @ 8642.0' MD / 8152.4' TVD										
8,642.0	1.40	250.50	8,152.4	2,288.2	-149.1	2,293.0	0.00	0.00	0.00	



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Design Annotations

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		+N/-S (usft)	+E/-W (usft)	
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8,642.0	8,152.4	2,288.2	-149.1	Projection to TD @ 8642.0' MD / 8152.4' TVD

Checked By: _____ Approved By: _____ Date: _____