



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-08E

Wellbore #1

Design: Wellbore #1

QES Survey Report

19 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson BCU 20-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

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 20-03 Pad						
Site Position:		Northing:	1,530,258.75	usft	Latitude:	39.266756		
From:	Lat/Long	Easting:	2,350,219.97	usft	Longitude:	-107.795317		
Position Uncertainty:	0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	-1.45	°

Well	Gunderson BCU 20-08E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,287.61 usft	Latitude:	39.266836
	+E/-W	0.0 usft	Easting:	2,350,230.89 usft	Longitude:	-107.795281
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,146.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/19/2016	9.65	65.45	51,495

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	114.19	

Survey Program	Date	7/19/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
200.0	8,030.0	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 @ 200.0' MD / TVD										
200.0	1.20	114.30	200.0	-0.9	1.9	2.1	0.60	0.60	0.00	
291.0	1.30	95.30	291.0	-1.3	3.8	4.0	0.47	0.11	-20.88	
382.0	2.60	119.90	381.9	-2.5	6.6	7.1	1.67	1.43	27.03	
474.0	3.00	123.70	473.8	-4.8	10.4	11.5	0.48	0.43	4.13	
566.0	3.20	115.80	565.7	-7.3	14.7	16.4	0.51	0.22	-8.59	
658.0	5.90	111.40	657.4	-10.1	21.5	23.7	2.96	2.93	-4.78	
749.0	9.10	113.60	747.6	-14.7	32.4	35.6	3.53	3.52	2.42	
841.0	12.50	110.90	837.9	-21.2	48.4	52.8	3.74	3.70	-2.93	
933.0	15.00	114.40	927.3	-29.7	68.5	74.7	2.86	2.72	3.80	



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson BCU 20-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

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)
1,027.0	17.10	116.50	1,017.6	-40.9	92.0	100.7	2.32	2.23	2.23
1,121.0	17.50	114.80	1,107.4	-53.0	117.2	128.6	0.69	0.43	-1.81
1,215.0	20.10	114.50	1,196.4	-65.6	144.7	158.9	2.77	2.77	-0.32
1,309.0	23.40	112.90	1,283.6	-79.6	176.6	193.7	3.57	3.51	-1.70
1,404.0	25.80	114.50	1,370.0	-95.5	212.8	233.2	2.62	2.53	1.68
1,498.0	28.20	114.20	1,453.8	-113.1	251.7	275.9	2.56	2.55	-0.32
1,582.0	29.10	113.50	1,527.5	-129.3	288.5	316.2	1.14	1.07	-0.83
1,677.0	29.70	113.20	1,610.2	-147.8	331.3	362.8	0.65	0.63	-0.32
1,771.0	29.80	112.40	1,691.9	-165.9	374.3	409.5	0.44	0.11	-0.85
1,865.0	30.10	112.70	1,773.3	-183.9	417.7	456.4	0.36	0.32	0.32
1,959.0	30.20	112.60	1,854.6	-202.1	461.3	503.6	0.12	0.11	-0.11
2,053.0	29.40	112.80	1,936.2	-220.1	504.4	550.3	0.86	-0.85	0.21
2,147.0	28.60	114.50	2,018.4	-238.4	546.1	595.8	1.22	-0.85	1.81
2,242.0	28.00	113.80	2,102.0	-256.8	587.2	640.9	0.72	-0.63	-0.74
2,336.0	27.40	112.90	2,185.2	-274.1	627.3	684.5	0.78	-0.64	-0.96
2,430.0	26.90	111.60	2,268.9	-290.4	667.0	727.4	0.83	-0.53	-1.38
2,524.0	26.50	112.80	2,352.9	-306.3	706.1	769.6	0.71	-0.43	1.28
2,618.0	27.10	114.30	2,436.8	-323.3	745.0	812.0	0.96	0.64	1.60
2,713.0	27.10	113.70	2,521.3	-340.9	784.5	855.3	0.29	0.00	-0.63
2,807.0	27.20	116.20	2,605.0	-359.0	823.4	898.2	1.22	0.11	2.66
2,901.0	27.60	115.60	2,688.4	-377.9	862.3	941.4	0.52	0.43	-0.64
2,995.0	27.60	114.50	2,771.7	-396.3	901.7	984.9	0.54	0.00	-1.17
3,090.0	27.50	113.20	2,856.0	-414.1	941.9	1,028.9	0.64	-0.11	-1.37
3,184.0	27.50	114.90	2,939.4	-431.7	981.6	1,072.3	0.84	0.00	1.81
3,278.0	27.60	113.80	3,022.7	-449.7	1,021.2	1,115.8	0.55	0.11	-1.17
3,372.0	26.90	115.80	3,106.3	-467.7	1,060.2	1,158.8	1.23	-0.74	2.13
3,466.0	27.00	115.10	3,190.1	-486.0	1,098.7	1,201.4	0.35	0.11	-0.74
3,560.0	27.00	114.60	3,273.8	-504.0	1,137.4	1,244.0	0.24	0.00	-0.53
3,655.0	27.20	113.70	3,358.4	-521.7	1,176.9	1,287.3	0.48	0.21	-0.95
3,749.0	26.90	112.90	3,442.1	-538.6	1,216.2	1,330.1	0.50	-0.32	-0.85
3,843.0	25.90	114.50	3,526.3	-555.4	1,254.4	1,371.9	1.31	-1.06	1.70
3,937.0	26.30	114.80	3,610.7	-572.6	1,292.0	1,413.2	0.45	0.43	0.32
4,032.0	26.80	115.00	3,695.7	-590.5	1,330.5	1,455.7	0.53	0.53	0.21
4,126.0	27.40	114.30	3,779.4	-608.3	1,369.5	1,498.5	0.72	0.64	-0.74
4,220.0	25.90	115.70	3,863.4	-626.1	1,407.7	1,540.6	1.73	-1.60	1.49
4,314.0	24.70	114.50	3,948.4	-643.2	1,444.0	1,580.8	1.39	-1.28	-1.28
4,409.0	24.40	113.90	4,034.8	-659.4	1,480.0	1,620.3	0.41	-0.32	-0.63
4,503.0	24.30	113.30	4,120.4	-674.9	1,515.6	1,659.0	0.28	-0.11	-0.64
4,597.0	24.70	114.10	4,206.0	-690.6	1,551.3	1,698.0	0.55	0.43	0.85
4,691.0	24.70	113.90	4,291.4	-706.5	1,587.1	1,737.3	0.09	0.00	-0.21
4,785.0	24.40	113.60	4,376.9	-722.3	1,622.9	1,776.3	0.35	-0.32	-0.32
4,880.0	25.50	113.50	4,463.0	-738.3	1,659.6	1,816.4	1.16	1.16	-0.11
4,974.0	24.70	112.90	4,548.1	-754.0	1,696.3	1,856.3	0.89	-0.85	-0.64



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson BCU 20-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

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)	
5,068.0	22.90	113.30	4,634.1	-768.9	1,731.2	1,894.2	1.92	-1.91	0.43	
5,162.0	19.60	113.20	4,721.7	-782.3	1,762.5	1,928.3	3.51	-3.51	-0.11	
5,257.0	18.80	113.70	4,811.4	-794.7	1,791.1	1,959.5	0.86	-0.84	0.53	
5,351.0	17.80	112.20	4,900.7	-806.3	1,818.3	1,989.0	1.18	-1.06	-1.60	
5,445.0	15.90	113.40	4,990.6	-816.8	1,843.4	2,016.2	2.05	-2.02	1.28	
5,540.0	15.40	112.00	5,082.1	-826.7	1,867.1	2,041.9	0.66	-0.53	-1.47	
5,634.0	13.20	113.20	5,173.2	-835.6	1,888.5	2,065.1	2.36	-2.34	1.28	
5,728.0	9.90	113.40	5,265.3	-843.0	1,905.8	2,083.9	3.51	-3.51	0.21	
5,822.0	7.90	115.70	5,358.1	-849.1	1,919.0	2,098.4	2.16	-2.13	2.45	
5,917.0	5.60	116.70	5,452.5	-854.0	1,929.0	2,109.6	2.42	-2.42	1.05	
6,011.0	3.30	118.10	5,546.2	-857.3	1,935.5	2,116.9	2.45	-2.45	1.49	
6,105.0	2.80	127.60	5,640.1	-860.0	1,939.7	2,121.8	0.75	-0.53	10.11	
6,199.0	1.90	125.90	5,734.0	-862.3	1,942.8	2,125.6	0.96	-0.96	-1.81	
6,293.0	1.10	128.90	5,827.9	-863.8	1,944.8	2,128.0	0.85	-0.85	3.19	
6,388.0	1.50	131.70	5,922.9	-865.2	1,946.4	2,130.0	0.43	0.42	2.95	
6,482.0	1.20	125.70	6,016.9	-866.6	1,948.1	2,132.2	0.35	-0.32	-6.38	
6,576.0	1.10	117.40	6,110.9	-867.6	1,949.7	2,134.0	0.21	-0.11	-8.83	
6,670.0	0.70	108.50	6,204.9	-868.2	1,951.1	2,135.5	0.45	-0.43	-9.47	
6,764.0	0.50	150.30	6,298.9	-868.7	1,951.8	2,136.4	0.50	-0.21	44.47	
6,859.0	0.40	99.60	6,393.8	-869.1	1,952.4	2,137.1	0.42	-0.11	-53.37	
6,953.0	0.40	77.60	6,487.8	-869.1	1,953.0	2,137.6	0.16	0.00	-23.40	
7,048.0	0.60	355.30	6,582.8	-868.5	1,953.3	2,137.7	0.71	0.21	-86.63	
7,142.0	1.00	9.90	6,676.8	-867.2	1,953.4	2,137.2	0.47	0.43	15.53	
7,237.0	0.80	354.90	6,771.8	-865.7	1,953.5	2,136.7	0.32	-0.21	-15.79	
7,331.0	0.40	14.90	6,865.8	-864.8	1,953.5	2,136.3	0.47	-0.43	21.28	
7,425.0	0.50	230.70	6,959.8	-864.7	1,953.3	2,136.1	0.91	0.11	-153.40	
7,519.0	0.50	275.30	7,053.8	-864.9	1,952.5	2,135.5	0.40	0.00	47.45	
7,613.0	0.80	314.20	7,147.8	-864.4	1,951.7	2,134.5	0.55	0.32	41.38	
7,708.0	1.00	299.70	7,242.8	-863.6	1,950.5	2,133.1	0.32	0.21	-15.26	
7,802.0	1.40	297.20	7,336.8	-862.6	1,948.7	2,131.1	0.43	0.43	-2.66	
7,896.0	1.30	308.10	7,430.8	-861.5	1,946.9	2,128.9	0.29	-0.11	11.60	
7,970.0	1.10	307.40	7,504.7	-860.5	1,945.6	2,127.4	0.27	-0.27	-0.95	
Projecton to TD @ 8030.0' MD / 7564.7' TVD										
8,030.0	1.10	307.40	7,564.7	-859.8	1,944.7	2,126.3	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
200.0	200.0	-0.9	1.9	First MWD Survey @ 200.0' MD / TVD	
8,030.0	7,564.7	-859.8	1,944.7	Projecton to TD @ 8030.0' MD / 7564.7' TVD	



Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-08E
Project:	Mesa County, CO	TVD Reference:	well @ 7176.0usft (H&P #522)
Site:	Gunderson 20-03 Pad	MD Reference:	well @ 7176.0usft (H&P #522)
Well:	Gunderson BCU 20-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002