



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-10E

Wellbore #1

Design: Wellbore #1

QES Survey Report

05 August, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-10E
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 20-10E	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 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 20-10E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,268.32 usft	Latitude:	39.266783
	+E/-W	0.0 usft	Easting:	2,350,230.40 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	7/26/2017	9.57	65.43	51,409.62294163

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	124.56	

Survey Program	Date	8/5/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
110.0	8,113.0	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 @ 110.0' MD / 110.0' TVD									
110.0	1.70	138.30	110.0	-1.2	1.1	1.6	1.55	1.55	0.00
201.0	2.20	154.80	200.9	-3.8	2.7	4.4	0.82	0.55	18.13
292.0	2.90	148.70	291.8	-7.4	4.7	8.0	0.82	0.77	-6.70
383.0	3.90	116.50	382.7	-10.7	8.6	13.2	2.32	1.10	-35.38
474.0	4.70	108.70	473.4	-13.3	14.9	19.8	1.09	0.88	-8.57
566.0	6.50	122.10	565.0	-17.3	22.9	28.7	2.41	1.96	14.57
658.0	7.50	123.90	656.3	-23.4	32.3	39.9	1.11	1.09	1.96
750.0	11.20	123.20	747.1	-31.6	44.8	54.8	4.02	4.02	-0.76
841.0	13.30	124.40	836.0	-42.4	60.8	74.1	2.32	2.31	1.32



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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)
933.0	17.30	129.70	924.7	-57.1	80.1	98.3	4.60	4.35	5.76
1,025.0	19.80	133.20	1,011.9	-76.5	102.0	127.4	2.97	2.72	3.80
1,119.0	22.50	128.60	1,099.6	-98.6	127.6	161.1	3.37	2.87	-4.89
1,213.0	26.10	125.70	1,185.3	-121.9	158.5	199.7	4.03	3.83	-3.09
1,307.0	29.30	125.80	1,268.5	-147.4	193.9	243.4	3.40	3.40	0.11
1,402.0	30.10	124.90	1,351.0	-174.7	232.3	290.4	0.96	0.84	-0.95
1,496.0	31.10	122.10	1,431.9	-201.1	272.2	338.3	1.85	1.06	-2.98
1,587.0	32.00	122.10	1,509.5	-226.4	312.6	385.8	0.99	0.99	0.00
1,681.0	31.70	121.40	1,589.3	-252.5	354.8	435.4	0.51	-0.32	-0.74
1,775.0	31.70	119.70	1,669.3	-277.6	397.3	484.6	0.95	0.00	-1.81
1,869.0	31.00	122.20	1,749.6	-302.7	439.2	533.4	1.57	-0.74	2.66
1,964.0	30.50	120.60	1,831.2	-328.0	480.7	581.9	1.01	-0.53	-1.68
2,058.0	29.70	123.80	1,912.5	-353.1	520.6	629.0	1.91	-0.85	3.40
2,152.0	29.10	126.00	1,994.4	-379.5	558.4	675.2	1.31	-0.64	2.34
2,246.0	28.30	124.80	2,076.9	-405.7	595.2	720.3	1.05	-0.85	-1.28
2,340.0	27.30	123.70	2,160.0	-430.3	631.4	764.1	1.20	-1.06	-1.17
2,434.0	28.80	125.00	2,243.0	-455.3	667.9	808.3	1.72	1.60	1.38
2,528.0	27.10	123.60	2,326.0	-480.1	704.3	852.4	1.94	-1.81	-1.49
2,623.0	28.70	124.80	2,410.0	-505.1	741.1	896.8	1.78	1.68	1.26
2,717.0	29.00	127.00	2,492.3	-531.7	777.8	942.2	1.17	0.32	2.34
2,811.0	29.80	126.70	2,574.2	-559.4	814.7	988.3	0.87	0.85	-0.32
2,906.0	29.60	126.20	2,656.7	-587.4	852.6	1,035.3	0.34	-0.21	-0.53
3,000.0	29.40	125.30	2,738.5	-614.4	890.1	1,081.6	0.52	-0.21	-0.96
3,094.0	29.30	125.00	2,820.5	-640.9	927.8	1,127.7	0.19	-0.11	-0.32
3,188.0	28.70	124.40	2,902.7	-666.9	965.3	1,173.2	0.71	-0.64	-0.64
3,282.0	28.90	126.70	2,985.1	-693.2	1,002.1	1,218.5	1.20	0.21	2.45
3,376.0	30.60	127.10	3,066.7	-721.2	1,039.4	1,265.1	1.82	1.81	0.43
3,471.0	30.00	127.00	3,148.7	-750.1	1,077.7	1,313.0	0.63	-0.63	-0.11
3,565.0	29.40	126.50	3,230.3	-778.0	1,115.0	1,359.5	0.69	-0.64	-0.53
3,659.0	28.90	126.40	3,312.4	-805.2	1,151.8	1,405.3	0.53	-0.53	-0.11
3,753.0	28.20	125.90	3,395.0	-831.7	1,188.1	1,450.2	0.79	-0.74	-0.53
3,848.0	28.70	124.50	3,478.5	-857.7	1,225.1	1,495.4	0.88	0.53	-1.47
3,942.0	30.20	124.60	3,560.4	-883.9	1,263.1	1,541.7	1.60	1.60	0.11
4,036.0	29.90	124.80	3,641.8	-910.7	1,301.8	1,588.7	0.34	-0.32	0.21
4,131.0	29.60	124.30	3,724.2	-937.5	1,340.7	1,635.9	0.41	-0.32	-0.53
4,225.0	29.10	123.60	3,806.2	-963.2	1,378.9	1,681.9	0.65	-0.53	-0.74
4,319.0	27.80	123.00	3,888.8	-987.8	1,416.3	1,726.7	1.42	-1.38	-0.64
4,413.0	28.70	123.90	3,971.6	-1,012.3	1,453.4	1,771.2	1.06	0.96	0.96
4,507.0	30.10	125.60	4,053.5	-1,038.6	1,491.3	1,817.3	1.73	1.49	1.81
4,601.0	29.70	125.10	4,135.0	-1,065.8	1,529.5	1,864.2	0.50	-0.43	-0.53
4,696.0	29.60	125.90	4,217.6	-1,093.0	1,567.8	1,911.2	0.43	-0.11	0.84
4,790.0	28.10	126.20	4,299.9	-1,119.7	1,604.5	1,956.5	1.60	-1.60	0.32
4,884.0	27.20	125.80	4,383.2	-1,145.4	1,639.8	2,000.1	0.98	-0.96	-0.43



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Survey									
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4,978.0	26.80	125.30	4,466.9	-1,170.2	1,674.5	2,042.8	0.49	-0.43	-0.53
5,073.0	25.00	125.80	4,552.4	-1,194.3	1,708.2	2,084.3	1.91	-1.89	0.53
5,167.0	22.80	125.60	4,638.3	-1,216.5	1,739.2	2,122.4	2.34	-2.34	-0.21
5,261.0	20.50	125.50	4,725.7	-1,236.7	1,767.4	2,157.0	2.45	-2.45	-0.11
5,355.0	19.30	125.60	4,814.0	-1,255.3	1,793.4	2,189.0	1.28	-1.28	0.11
5,450.0	17.20	123.20	4,904.3	-1,272.1	1,817.9	2,218.8	2.35	-2.21	-2.53
5,544.0	15.00	122.20	4,994.6	-1,286.2	1,839.9	2,244.8	2.36	-2.34	-1.06
5,638.0	13.60	121.80	5,085.7	-1,298.5	1,859.5	2,268.0	1.49	-1.49	-0.43
5,732.0	12.10	120.50	5,177.3	-1,309.4	1,877.4	2,288.9	1.63	-1.60	-1.38
5,826.0	11.30	119.10	5,269.3	-1,318.8	1,894.0	2,307.9	0.90	-0.85	-1.49
5,921.0	9.00	121.00	5,362.9	-1,327.2	1,908.5	2,324.6	2.45	-2.42	2.00
6,015.0	5.90	122.20	5,456.1	-1,333.5	1,918.9	2,336.7	3.30	-3.30	1.28
6,110.0	2.70	110.30	5,550.8	-1,336.9	1,925.1	2,343.8	3.48	-3.37	-12.53
6,204.0	2.00	103.50	5,644.7	-1,338.1	1,928.8	2,347.4	0.80	-0.74	-7.23
6,298.0	1.80	98.00	5,738.6	-1,338.7	1,931.8	2,350.3	0.29	-0.21	-5.85
6,392.0	1.50	89.50	5,832.6	-1,338.9	1,934.5	2,352.6	0.41	-0.32	-9.04
6,486.0	1.10	88.00	5,926.6	-1,338.8	1,936.6	2,354.4	0.43	-0.43	-1.60
6,581.0	0.60	90.70	6,021.6	-1,338.8	1,938.0	2,355.5	0.53	-0.53	2.84
6,675.0	0.20	64.40	6,115.6	-1,338.7	1,938.7	2,356.0	0.46	-0.43	-27.98
6,769.0	0.20	63.90	6,209.6	-1,338.6	1,939.0	2,356.2	0.00	0.00	-0.53
6,863.0	0.40	337.80	6,303.6	-1,338.2	1,939.0	2,356.0	0.46	0.21	-91.60
6,958.0	0.40	270.60	6,398.6	-1,337.9	1,938.5	2,355.4	0.47	0.00	-70.74
7,052.0	0.50	230.60	6,492.6	-1,338.2	1,937.9	2,355.0	0.34	0.11	-42.55
7,147.0	0.40	245.50	6,587.6	-1,338.6	1,937.3	2,354.7	0.16	-0.11	15.68
7,241.0	0.50	266.50	6,681.6	-1,338.7	1,936.6	2,354.2	0.20	0.11	22.34
7,335.0	0.80	279.70	6,775.5	-1,338.6	1,935.5	2,353.3	0.35	0.32	14.04
7,429.0	0.50	271.90	6,869.5	-1,338.5	1,934.5	2,352.4	0.33	-0.32	-8.30
7,524.0	1.00	279.70	6,964.5	-1,338.4	1,933.2	2,351.3	0.54	0.53	8.21
7,618.0	1.40	285.00	7,058.5	-1,337.9	1,931.3	2,349.5	0.44	0.43	5.64
7,712.0	1.70	279.70	7,152.5	-1,337.4	1,928.8	2,347.1	0.35	0.32	-5.64
7,806.0	2.10	280.70	7,246.4	-1,336.8	1,925.8	2,344.3	0.43	0.43	1.06
7,900.0	2.10	274.80	7,340.4	-1,336.4	1,922.4	2,341.2	0.23	0.00	-6.28
7,995.0	1.90	276.90	7,435.3	-1,336.0	1,919.1	2,338.3	0.22	-0.21	2.21
8,055.0	2.00	275.80	7,495.3	-1,335.8	1,917.0	2,336.5	0.18	0.17	-1.83
Projection to TD @ 8113.0' MD / 7553.2' TVD									
8,113.0	2.00	275.80	7,553.2	-1,335.6	1,915.0	2,334.7	0.00	0.00	0.00



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Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
110.0	110.0	-1.2	1.1	First MWD Survey @ 110.0' MD / 110.0' TVD
8,113.0	7,553.2	-1,335.6	1,915.0	Projection to TD @ 8113.0' MD / 7553.2' TVD