



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-06E

Wellbore #1

Design: Wellbore #1

QES Survey Report

05 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-06E
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 20-06E	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 20-06E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,308.00 usft	Latitude:	39.266892
	+E/-W	0.0 usft	Easting:	2,350,231.41 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	6/26/2017	9.58	65.43	51,419

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	101.67	

Survey Program	Date	7/5/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
110.0	7,950.0	MWD Survey (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 TVD										
110.0	0.70	83.10	110.0	0.1	0.7	0.6	0.64	0.64	0.00	
202.0	1.00	82.40	202.0	0.3	2.0	1.9	0.33	0.33	-0.76	
293.0	1.10	83.80	293.0	0.5	3.7	3.5	0.11	0.11	1.54	
384.0	3.90	112.90	383.9	-0.7	7.4	7.4	3.28	3.08	31.98	
475.0	7.50	113.40	474.4	-4.2	15.7	16.2	3.96	3.96	0.55	
567.0	10.60	109.90	565.3	-9.5	29.2	30.5	3.42	3.37	-3.80	
659.0	13.50	104.90	655.2	-15.1	47.5	49.6	3.35	3.15	-5.43	
751.0	14.40	99.60	744.5	-19.8	69.2	71.7	1.70	0.98	-5.76	
842.0	17.20	99.20	832.1	-23.8	93.6	96.5	3.08	3.08	-0.44	



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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)
934.0	20.10	101.30	919.2	-29.1	122.5	125.9	3.24	3.15	2.28
1,026.0	20.30	99.60	1,005.6	-34.9	153.8	157.7	0.67	0.22	-1.85
1,120.0	22.10	102.40	1,093.2	-41.4	187.1	191.6	2.20	1.91	2.98
1,214.0	24.30	103.30	1,179.6	-49.6	223.2	228.7	2.37	2.34	0.96
1,308.0	25.00	102.20	1,265.0	-58.3	261.5	267.9	0.89	0.74	-1.17
1,402.0	25.10	99.80	1,350.2	-65.9	300.5	307.6	1.09	0.11	-2.55
1,496.0	25.10	98.50	1,435.3	-72.2	339.9	347.5	0.59	0.00	-1.38
1,591.0	25.30	96.30	1,521.3	-77.4	380.0	387.8	1.01	0.21	-2.32
1,686.0	24.80	95.90	1,607.3	-81.7	420.0	427.8	0.56	-0.53	-0.42
1,780.0	24.70	99.30	1,692.7	-86.9	459.0	467.1	1.52	-0.11	3.62
1,874.0	25.30	102.00	1,777.9	-94.2	498.0	506.8	1.37	0.64	2.87
1,968.0	24.90	100.70	1,863.0	-102.1	537.1	546.7	0.72	-0.43	-1.38
2,062.0	24.10	101.70	1,948.6	-109.7	575.4	585.6	0.96	-0.85	1.06
2,156.0	23.20	100.90	2,034.7	-117.1	612.3	623.3	1.02	-0.96	-0.85
2,251.0	23.40	101.80	2,121.9	-124.5	649.2	660.9	0.43	0.21	0.95
2,345.0	24.70	103.40	2,207.8	-132.8	686.5	699.2	1.55	1.38	1.70
2,439.0	23.60	102.00	2,293.5	-141.3	724.1	737.7	1.32	-1.17	-1.49
2,533.0	23.90	101.40	2,379.6	-149.0	761.1	775.5	0.41	0.32	-0.64
2,627.0	23.90	103.20	2,465.5	-157.1	798.3	813.6	0.78	0.00	1.91
2,722.0	23.00	101.70	2,552.7	-165.2	835.2	851.4	1.14	-0.95	-1.58
2,816.0	24.10	103.70	2,638.8	-173.5	871.9	888.9	1.45	1.17	2.13
2,910.0	23.60	102.80	2,724.8	-182.2	908.9	926.9	0.66	-0.53	-0.96
3,004.0	23.10	102.70	2,811.1	-190.4	945.2	964.2	0.53	-0.53	-0.11
3,099.0	23.80	103.60	2,898.3	-199.0	982.0	1,002.0	0.83	0.74	0.95
3,193.0	23.10	102.50	2,984.5	-207.5	1,018.5	1,039.4	0.88	-0.74	-1.17
3,287.0	24.10	104.30	3,070.6	-216.2	1,055.1	1,077.0	1.31	1.06	1.91
3,381.0	23.30	103.70	3,156.7	-225.4	1,091.7	1,114.7	0.89	-0.85	-0.64
3,475.0	23.60	104.90	3,243.0	-234.6	1,128.0	1,152.1	0.60	0.32	1.28
3,569.0	22.90	104.80	3,329.3	-244.1	1,163.8	1,189.2	0.75	-0.74	-0.11
3,664.0	23.20	104.10	3,416.7	-253.4	1,199.8	1,226.3	0.43	0.32	-0.74
3,758.0	23.40	103.10	3,503.1	-262.1	1,236.0	1,263.5	0.47	0.21	-1.06
3,852.0	24.00	103.30	3,589.1	-270.8	1,272.8	1,301.2	0.64	0.64	0.21
3,946.0	24.80	102.70	3,674.7	-279.5	1,310.6	1,340.1	0.89	0.85	-0.64
4,041.0	23.90	103.80	3,761.3	-288.5	1,348.7	1,379.2	1.06	-0.95	1.16
4,135.0	24.00	100.00	3,847.2	-296.3	1,386.1	1,417.3	1.64	0.11	-4.04
4,229.0	23.10	99.70	3,933.4	-302.8	1,423.1	1,454.9	0.97	-0.96	-0.32
4,323.0	23.50	99.80	4,019.7	-309.1	1,459.7	1,492.0	0.43	0.43	0.11
4,418.0	23.60	101.70	4,106.8	-316.1	1,497.0	1,530.0	0.81	0.11	2.00
4,512.0	22.60	99.80	4,193.3	-323.0	1,533.2	1,566.9	1.33	-1.06	-2.02
4,606.0	22.50	98.60	4,280.1	-328.8	1,568.8	1,602.9	0.50	-0.11	-1.28
4,700.0	22.70	99.00	4,366.9	-334.3	1,604.5	1,639.0	0.27	0.21	0.43
4,794.0	22.60	99.10	4,453.6	-340.0	1,640.2	1,675.1	0.11	-0.11	0.11
4,889.0	20.90	99.80	4,541.8	-345.8	1,675.0	1,710.3	1.81	-1.79	0.74



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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)	
4,983.0	19.70	100.50	4,630.0	-351.5	1,707.1	1,742.9	1.30	-1.28	0.74	
5,077.0	18.60	100.50	4,718.8	-357.1	1,737.4	1,773.7	1.17	-1.17	0.00	
5,171.0	17.30	101.10	4,808.2	-362.6	1,765.8	1,802.7	1.40	-1.38	0.64	
5,266.0	15.50	101.10	4,899.4	-367.7	1,792.2	1,829.5	1.89	-1.89	0.00	
5,360.0	13.80	101.40	4,990.3	-372.4	1,815.5	1,853.3	1.81	-1.81	0.32	
5,454.0	12.70	100.50	5,081.8	-376.5	1,836.6	1,874.8	1.19	-1.17	-0.96	
5,549.0	11.30	99.90	5,174.7	-380.0	1,856.1	1,894.6	1.48	-1.47	-0.63	
5,643.0	10.40	99.60	5,267.0	-383.0	1,873.5	1,912.2	0.96	-0.96	-0.32	
5,737.0	9.90	99.30	5,359.6	-385.7	1,889.8	1,928.8	0.53	-0.53	-0.32	
5,831.0	7.10	94.80	5,452.5	-387.5	1,903.6	1,942.6	3.06	-2.98	-4.79	
5,926.0	6.30	95.20	5,546.9	-388.4	1,914.7	1,953.6	0.84	-0.84	0.42	
6,020.0	5.40	94.90	5,640.4	-389.3	1,924.2	1,963.2	0.96	-0.96	-0.32	
6,114.0	5.00	95.40	5,734.0	-390.1	1,932.7	1,971.6	0.43	-0.43	0.53	
6,208.0	4.70	98.10	5,827.7	-391.0	1,940.6	1,979.5	0.40	-0.32	2.87	
6,302.0	4.20	99.60	5,921.4	-392.1	1,947.8	1,986.8	0.55	-0.53	1.60	
6,397.0	2.50	101.10	6,016.2	-393.1	1,953.2	1,992.4	1.79	-1.79	1.58	
6,491.0	1.60	125.90	6,110.1	-394.2	1,956.3	1,995.6	1.32	-0.96	26.38	
6,585.0	1.50	127.50	6,204.1	-395.8	1,958.4	1,997.9	0.12	-0.11	1.70	
6,679.0	1.10	125.60	6,298.1	-397.0	1,960.1	1,999.9	0.43	-0.43	-2.02	
6,773.0	0.90	119.70	6,392.1	-397.9	1,961.4	2,001.4	0.24	-0.21	-6.28	
6,868.0	0.80	109.90	6,487.1	-398.5	1,962.7	2,002.8	0.19	-0.11	-10.32	
6,962.0	0.60	93.20	6,581.1	-398.8	1,963.8	2,003.9	0.30	-0.21	-17.77	
7,057.0	0.60	74.00	6,676.0	-398.7	1,964.8	2,004.8	0.21	0.00	-20.21	
7,151.0	0.80	75.20	6,770.0	-398.4	1,965.9	2,005.8	0.21	0.21	1.28	
7,246.0	0.70	93.80	6,865.0	-398.2	1,967.1	2,007.0	0.28	-0.11	19.58	
7,340.0	1.10	80.90	6,959.0	-398.1	1,968.6	2,008.4	0.47	0.43	-13.72	
7,434.0	0.70	82.30	7,053.0	-397.9	1,970.1	2,009.8	0.43	-0.43	1.49	
7,528.0	0.30	28.70	7,147.0	-397.6	1,970.7	2,010.4	0.61	-0.43	-57.02	
7,622.0	1.00	336.40	7,241.0	-396.6	1,970.5	2,010.0	0.90	0.74	-55.64	
7,717.0	0.90	325.40	7,336.0	-395.3	1,969.8	2,009.0	0.22	-0.11	-11.58	
7,811.0	0.80	318.30	7,430.0	-394.2	1,968.9	2,007.9	0.15	-0.11	-7.55	
7,892.0	0.70	313.30	7,511.0	-393.4	1,968.2	2,007.1	0.15	-0.12	-6.17	
Projection to TD @ 7950.0'MD / 7569.0'TVD										
7,950.0	0.70	313.30	7,569.0	-392.9	1,967.7	2,006.5	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
110.0	110.0	0.1	0.7	First MWD Survey @ 110.0' MD TVD	
7,950.0	7,569.0	-392.9	1,967.7	Projection to TD @ 7950.0'MD / 7569.0'TVD	



Survey Report



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Checked By: _____	Approved By: _____	Date: _____
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