



Laramie Energy, LLC

Mesa County, CO

Gunderson 20-03 Pad

Gunderson BCU 20-07E

Wellbore #1

Design: Wellbore #1

QES Survey Report

15 July, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Gunderson BCU 20-07E
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 20-07E	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 20-07E					
Well Position	+N/-S	0.0 usft	Northing:	1,530,297.81 usft	Latitude:	39.266864
	+E/-W	0.0 usft	Easting:	2,350,231.15 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	108.11	

Survey Program	Date	7/15/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
111.0	8,009.0	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 @ 111.0' MD / TVD									
111.0	1.50	103.60	111.0	-0.3	1.4	1.4	1.35	1.35	0.00
201.0	1.80	121.30	201.0	-1.4	3.8	4.0	0.65	0.33	19.67
292.0	1.70	101.20	291.9	-2.4	6.3	6.7	0.68	-0.11	-22.09
382.0	1.80	122.60	381.9	-3.4	8.8	9.4	0.73	0.11	23.78
474.0	2.00	104.30	473.8	-4.6	11.6	12.4	0.69	0.22	-19.89
565.0	2.10	124.40	564.8	-5.9	14.5	15.6	0.79	0.11	22.09
657.0	2.40	117.80	656.7	-7.7	17.6	19.1	0.43	0.33	-7.17
749.0	2.50	113.20	748.6	-9.4	21.1	23.0	0.24	0.11	-5.00
840.0	4.40	111.40	839.4	-11.5	26.2	28.5	2.09	2.09	-1.98



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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)
932.0	6.50	116.30	931.0	-15.1	34.2	37.2	2.34	2.28	5.33
1,024.0	9.70	111.40	1,022.1	-20.2	46.1	50.1	3.56	3.48	-5.33
1,118.0	13.60	108.10	1,114.1	-26.5	63.9	69.0	4.21	4.15	-3.51
1,212.0	15.10	105.00	1,205.2	-33.1	86.3	92.3	1.79	1.60	-3.30
1,307.0	17.90	104.90	1,296.3	-40.1	112.3	119.2	2.95	2.95	-0.11
1,401.0	22.30	107.70	1,384.5	-49.2	143.3	151.5	4.79	4.68	2.98
1,501.0	26.60	107.10	1,475.5	-61.6	182.8	192.9	4.31	4.30	-0.60
1,581.0	27.70	107.90	1,546.7	-72.6	217.6	229.4	1.45	1.38	1.00
1,676.0	28.10	108.20	1,630.7	-86.4	259.9	273.8	0.45	0.42	0.32
1,770.0	27.70	107.40	1,713.8	-99.8	301.8	317.8	0.58	-0.43	-0.85
1,864.0	26.80	107.00	1,797.3	-112.5	342.9	360.9	0.98	-0.96	-0.43
1,958.0	27.50	107.60	1,881.0	-125.3	383.8	403.8	0.80	0.74	0.64
2,053.0	26.40	107.10	1,965.7	-138.1	424.9	446.8	1.18	-1.16	-0.53
2,147.0	25.60	106.30	2,050.1	-150.0	464.4	488.0	0.93	-0.85	-0.85
2,241.0	25.50	109.20	2,135.0	-162.3	503.0	528.5	1.33	-0.11	3.09
2,335.0	26.10	109.40	2,219.6	-175.9	541.6	569.4	0.64	0.64	0.21
2,429.0	26.10	107.80	2,304.0	-189.0	580.8	610.8	0.75	0.00	-1.70
2,523.0	26.70	107.10	2,388.2	-201.6	620.7	652.6	0.72	0.64	-0.74
2,618.0	28.50	108.40	2,472.4	-215.0	662.6	696.6	2.00	1.89	1.37
2,712.0	27.90	107.80	2,555.2	-228.8	704.8	741.0	0.71	-0.64	-0.64
2,806.0	27.70	107.80	2,638.4	-242.2	746.5	784.8	0.21	-0.21	0.00
2,900.0	26.90	107.30	2,721.9	-255.2	787.6	827.9	0.89	-0.85	-0.53
2,995.0	27.80	106.60	2,806.3	-267.9	829.4	871.6	1.01	0.95	-0.74
3,089.0	27.50	106.30	2,889.5	-280.3	871.2	915.2	0.35	-0.32	-0.32
3,183.0	26.50	106.40	2,973.3	-292.3	912.2	957.8	1.06	-1.06	0.11
3,277.0	27.80	108.30	3,056.9	-305.1	953.1	1,000.7	1.66	1.38	2.02
3,371.0	27.10	108.50	3,140.4	-318.8	994.2	1,044.1	0.75	-0.74	0.21
3,465.0	26.50	108.60	3,224.3	-332.3	1,034.4	1,086.4	0.64	-0.64	0.11
3,560.0	28.00	109.80	3,308.7	-346.6	1,075.5	1,129.9	1.68	1.58	1.26
3,654.0	27.40	109.90	3,391.9	-361.4	1,116.6	1,173.6	0.64	-0.64	0.11
3,748.0	26.70	110.20	3,475.7	-376.1	1,156.7	1,216.3	0.76	-0.74	0.32
3,842.0	28.10	109.10	3,559.1	-390.6	1,197.5	1,259.6	1.58	1.49	-1.17
3,937.0	27.50	109.50	3,643.1	-405.2	1,239.3	1,303.9	0.66	-0.63	0.42
4,031.0	27.00	109.50	3,726.7	-419.6	1,279.9	1,346.9	0.53	-0.53	0.00
4,125.0	26.40	109.50	3,810.7	-433.7	1,319.7	1,389.1	0.64	-0.64	0.00
4,219.0	26.30	108.50	3,894.9	-447.3	1,359.1	1,430.8	0.48	-0.11	-1.06
4,313.0	27.20	108.10	3,978.9	-460.6	1,399.3	1,473.1	0.98	0.96	-0.43
4,408.0	27.00	107.60	4,063.4	-473.8	1,440.5	1,516.4	0.32	-0.21	-0.53
4,502.0	26.20	106.50	4,147.5	-486.2	1,480.7	1,558.5	1.00	-0.85	-1.17
4,596.0	25.20	106.70	4,232.2	-497.8	1,519.8	1,599.2	1.07	-1.06	0.21
4,690.0	23.30	106.00	4,317.9	-508.7	1,556.8	1,637.8	2.04	-2.02	-0.74
4,785.0	21.50	105.90	4,405.7	-518.7	1,591.6	1,674.0	1.90	-1.89	-0.11
4,879.0	21.10	105.80	4,493.3	-528.0	1,624.5	1,708.1	0.43	-0.43	-0.11



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4,973.0	20.10	105.60	4,581.3	-536.9	1,656.3	1,741.2	1.07	-1.06	-0.21
5,067.0	18.70	104.30	4,669.9	-545.0	1,686.5	1,772.3	1.56	-1.49	-1.38
5,162.0	17.20	104.00	4,760.3	-552.2	1,714.9	1,801.5	1.58	-1.58	-0.32
5,256.0	18.40	105.80	4,849.8	-559.6	1,742.6	1,830.2	1.40	1.28	1.91
5,350.0	17.50	106.20	4,939.2	-567.5	1,770.5	1,859.2	0.97	-0.96	0.43
5,445.0	15.90	105.20	5,030.2	-574.9	1,796.7	1,886.5	1.71	-1.68	-1.05
5,539.0	14.30	104.70	5,121.0	-581.3	1,820.4	1,910.9	1.71	-1.70	-0.53
5,633.0	13.40	104.50	5,212.2	-586.9	1,842.2	1,933.4	0.96	-0.96	-0.21
5,727.0	13.10	107.00	5,303.7	-592.8	1,862.9	1,954.9	0.69	-0.32	2.66
5,821.0	12.20	106.40	5,395.5	-598.7	1,882.6	1,975.5	0.97	-0.96	-0.64
5,916.0	10.50	108.70	5,488.6	-604.3	1,900.5	1,994.2	1.85	-1.79	2.42
6,010.0	7.70	110.70	5,581.4	-609.3	1,914.5	2,009.0	3.00	-2.98	2.13
6,104.0	5.40	106.50	5,674.8	-612.8	1,924.6	2,019.7	2.50	-2.45	-4.47
6,198.0	3.20	101.50	5,768.5	-614.5	1,931.4	2,026.8	2.37	-2.34	-5.32
6,293.0	2.60	95.80	5,863.4	-615.3	1,936.2	2,031.5	0.70	-0.63	-6.00
6,387.0	2.50	104.60	5,957.3	-616.0	1,940.3	2,035.6	0.43	-0.11	9.36
6,481.0	2.20	109.60	6,051.2	-617.1	1,943.9	2,039.5	0.39	-0.32	5.32
6,575.0	2.40	112.00	6,145.2	-618.5	1,947.5	2,043.2	0.24	0.21	2.55
6,670.0	1.90	116.30	6,240.1	-619.9	1,950.7	2,046.8	0.55	-0.53	4.53
6,764.0	1.60	101.00	6,334.0	-620.9	1,953.4	2,049.6	0.59	-0.32	-16.28
6,858.0	1.40	96.90	6,428.0	-621.3	1,955.8	2,052.1	0.24	-0.21	-4.36
6,952.0	1.40	86.40	6,522.0	-621.3	1,958.1	2,054.3	0.27	0.00	-11.17
7,047.0	1.00	81.90	6,617.0	-621.1	1,960.1	2,056.1	0.43	-0.42	-4.74
7,141.0	0.80	91.40	6,710.9	-621.0	1,961.6	2,057.4	0.26	-0.21	10.11
7,236.0	1.10	94.00	6,805.9	-621.1	1,963.1	2,059.0	0.32	0.32	2.74
7,330.0	0.60	61.30	6,899.9	-620.9	1,964.5	2,060.2	0.72	-0.53	-34.79
7,424.0	0.50	48.50	6,993.9	-620.4	1,965.2	2,060.7	0.17	-0.11	-13.62
7,519.0	0.20	359.80	7,088.9	-620.0	1,965.5	2,060.9	0.42	-0.32	-51.26
7,613.0	1.00	319.70	7,182.9	-619.2	1,965.0	2,060.1	0.91	0.85	-42.66
7,707.0	1.30	322.40	7,276.9	-617.7	1,963.8	2,058.5	0.32	0.32	2.87
7,801.0	1.30	308.40	7,370.9	-616.2	1,962.3	2,056.7	0.34	0.00	-14.89
7,895.0	1.10	309.60	7,464.8	-615.0	1,960.8	2,054.8	0.21	-0.21	1.28
7,949.0	1.10	302.60	7,518.8	-614.4	1,960.0	2,053.8	0.25	0.00	-12.96
Projection to TD @ 8009.0' MD / 7578.8' TVD									
8,009.0	1.10	302.60	7,578.8	-613.8	1,959.0	2,052.7	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	-0.3	1.4	First MWD Survey @ 111.0' MD / TVD
8,009.0	7,578.8	-613.8	1,959.0	Projection to TD @ 8009.0' MD / 7578.8' TVD



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