



Laramie Energy, LLC

Garfield County, CO

CC 0697-03-07 Pad

CC 0697-03-13E

Wellbore #1

Design: Wellbore #1

QES Survey Report

12 June, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-13E
Project:	Garfield County, CO	TVD Reference:	well @ 8458.0usft (30' RKB)
Site:	CC 0697-03-07 Pad	MD Reference:	well @ 8458.0usft (30' RKB)
Well:	CC 0697-03-13E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Garfield 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		CC 0697-03-07 Pad						
Site Position:		Northing:	1,638,132.66	usft	Latitude:	39.554247		
From:	Lat/Long	Easting:	2,236,874.96	usft	Longitude:	-108.206835		
Position Uncertainty:	0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	-1.71	°

Well	CC 0697-03-13E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,602.36 usft	Latitude:	39.558324
	+E/-W	0.0 usft	Easting:	2,237,406.56 usft	Longitude:	-108.205106
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,428.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	User Defined	5/16/2018	9.63	65.59	51,411.00000000

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	127.89	

Survey Program	Date	6/12/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
202.0	9,807.0	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 @ 202.0' MD / 202.0' TVD									
202.0	2.20	163.00	202.0	-3.7	1.1	3.2	1.09	1.09	0.00
295.0	4.00	153.30	294.8	-8.3	3.1	7.6	2.01	1.94	-10.43
387.0	5.70	133.90	386.5	-14.3	7.8	15.0	2.54	1.85	-21.09
478.0	7.40	130.20	476.9	-21.3	15.6	25.4	1.92	1.87	-4.07
568.0	8.40	127.90	566.0	-29.0	25.2	37.7	1.17	1.11	-2.56
659.0	10.20	124.20	655.8	-37.7	37.1	52.4	2.08	1.98	-4.07
749.0	11.40	121.40	744.2	-46.8	51.3	69.2	1.45	1.33	-3.11
840.0	12.40	117.60	833.3	-56.0	67.6	87.8	1.40	1.10	-4.18
931.0	12.70	122.70	922.1	-65.9	84.7	107.3	1.26	0.33	5.60



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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)
1,022.0	11.50	128.10	1,011.1	-76.9	100.3	126.4	1.81	-1.32	5.93
1,116.0	11.60	128.40	1,103.2	-88.6	115.0	145.2	0.12	0.11	0.32
1,211.0	12.40	125.70	1,196.1	-100.5	130.8	164.9	1.03	0.84	-2.84
1,306.0	12.80	122.00	1,288.8	-112.0	148.0	185.6	0.95	0.42	-3.89
1,400.0	12.90	117.60	1,380.5	-122.4	166.1	206.3	1.05	0.11	-4.68
1,494.0	11.30	122.20	1,472.4	-132.1	183.2	225.8	1.99	-1.70	4.89
1,524.0	10.70	121.50	1,501.8	-135.2	188.1	231.5	2.05	-2.00	-2.33
1,618.0	10.10	124.40	1,594.3	-144.4	202.3	248.3	0.85	-0.64	3.09
1,713.0	10.30	130.90	1,687.8	-154.6	215.6	265.1	1.23	0.21	6.84
1,808.0	10.20	135.70	1,781.3	-166.2	227.9	282.0	0.90	-0.11	5.05
1,903.0	11.00	136.50	1,874.7	-178.8	240.0	299.3	0.86	0.84	0.84
1,998.0	10.90	134.20	1,967.9	-191.6	252.7	317.1	0.47	-0.11	-2.42
2,092.0	11.30	133.40	2,060.2	-204.2	265.8	335.1	0.46	0.43	-0.85
2,186.0	10.10	128.50	2,152.5	-215.6	278.9	352.6	1.60	-1.28	-5.21
2,281.0	9.50	130.30	2,246.1	-225.9	291.4	368.7	0.71	-0.63	1.89
2,375.0	10.20	133.80	2,338.8	-236.7	303.3	384.7	0.98	0.74	3.72
2,470.0	10.60	132.90	2,432.2	-248.4	315.8	401.8	0.45	0.42	-0.95
2,515.0	9.80	131.50	2,476.5	-253.8	321.7	409.8	1.86	-1.78	-3.11
2,667.0	10.20	128.00	2,626.2	-270.6	342.0	436.1	0.48	0.26	-2.30
2,762.0	9.90	127.60	2,719.7	-280.8	355.1	452.7	0.32	-0.32	-0.42
2,856.0	10.10	131.30	2,812.3	-291.2	367.7	469.0	0.72	0.21	3.94
2,950.0	9.90	130.00	2,904.9	-301.8	380.1	485.3	0.32	-0.21	-1.38
3,046.0	9.60	136.60	2,999.5	-312.9	391.9	501.5	1.20	-0.31	6.88
3,141.0	9.00	144.00	3,093.2	-324.7	401.7	516.5	1.41	-0.63	7.79
3,235.0	9.20	148.80	3,186.1	-337.1	409.9	530.5	0.83	0.21	5.11
3,329.0	9.50	149.80	3,278.8	-350.2	417.7	544.8	0.36	0.32	1.06
3,423.0	10.90	148.80	3,371.3	-364.5	426.2	560.3	1.50	1.49	-1.06
3,519.0	11.20	145.90	3,465.5	-380.0	436.2	577.6	0.66	0.31	-3.02
3,613.0	10.70	142.70	3,557.8	-394.5	446.6	594.7	0.84	-0.53	-3.40
3,708.0	10.30	137.50	3,651.2	-407.8	457.7	611.6	1.08	-0.42	-5.47
3,802.0	11.50	134.30	3,743.5	-420.5	470.0	629.2	1.43	1.28	-3.40
3,897.0	11.60	126.60	3,836.6	-432.8	484.5	648.2	1.63	0.11	-8.11
3,991.0	12.10	121.10	3,928.6	-443.6	500.5	667.4	1.31	0.53	-5.85
4,085.0	11.00	119.50	4,020.7	-453.1	516.8	686.1	1.22	-1.17	-1.70
4,179.0	11.10	120.90	4,113.0	-462.1	532.3	703.9	0.30	0.11	1.49
4,273.0	11.00	122.40	4,205.2	-471.6	547.7	721.8	0.32	-0.11	1.60
4,368.0	10.70	123.80	4,298.5	-481.3	562.6	739.6	0.42	-0.32	1.47
4,462.0	11.30	127.00	4,390.8	-491.7	577.2	757.6	0.91	0.64	3.40
4,556.0	11.30	130.20	4,483.0	-503.2	591.6	776.0	0.67	0.00	3.40
4,651.0	10.30	128.70	4,576.3	-514.5	605.4	793.8	1.09	-1.05	-1.58
4,745.0	10.80	126.20	4,668.7	-525.0	619.0	811.0	0.72	0.53	-2.66
4,839.0	11.20	128.20	4,761.0	-535.8	633.3	828.9	0.59	0.43	2.13
4,933.0	11.60	127.90	4,853.1	-547.3	648.0	847.5	0.43	0.43	-0.32



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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)	
5,027.0	11.10	131.20	4,945.3	-559.1	662.2	866.0	0.87	-0.53	3.51	
5,121.0	11.40	128.60	5,037.5	-570.8	676.3	884.3	0.63	0.32	-2.77	
5,216.0	11.00	122.30	5,130.7	-581.5	691.3	902.7	1.35	-0.42	-6.63	
5,311.0	9.80	122.50	5,224.1	-590.7	705.8	919.8	1.26	-1.26	0.21	
5,407.0	10.40	125.60	5,318.6	-600.1	719.7	936.6	0.84	0.63	3.23	
5,502.0	11.40	127.70	5,411.9	-610.9	734.1	954.5	1.13	1.05	2.21	
5,596.0	12.30	128.20	5,503.9	-622.7	749.3	973.8	0.96	0.96	0.53	
5,691.0	12.40	128.20	5,596.7	-635.3	765.3	994.1	0.11	0.11	0.00	
5,785.0	12.00	128.30	5,688.6	-647.6	780.9	1,014.0	0.43	-0.43	0.11	
5,879.0	12.40	126.50	5,780.5	-659.7	796.7	1,033.9	0.59	0.43	-1.91	
5,973.0	12.00	126.40	5,872.3	-671.5	812.6	1,053.7	0.43	-0.43	-0.11	
6,067.0	12.30	125.90	5,964.2	-683.1	828.6	1,073.5	0.34	0.32	-0.53	
6,162.0	12.40	126.70	6,057.0	-695.2	845.0	1,093.8	0.21	0.11	0.84	
6,256.0	12.00	126.40	6,148.9	-707.0	861.0	1,113.7	0.43	-0.43	-0.32	
6,351.0	12.30	126.10	6,241.8	-718.8	877.1	1,133.6	0.32	0.32	-0.32	
6,445.0	11.50	127.00	6,333.8	-730.4	892.7	1,153.0	0.87	-0.85	0.96	
6,540.0	11.60	129.30	6,426.8	-742.1	907.6	1,172.0	0.50	0.11	2.42	
6,634.0	11.80	129.70	6,518.9	-754.2	922.3	1,191.1	0.23	0.21	0.43	
6,729.0	11.90	130.00	6,611.9	-766.7	937.3	1,210.6	0.12	0.11	0.32	
6,824.0	11.60	131.90	6,704.9	-779.4	951.9	1,229.9	0.52	-0.32	2.00	
6,918.0	11.00	131.50	6,797.1	-791.7	965.7	1,248.3	0.64	-0.64	-0.43	
7,013.0	9.80	132.80	6,890.5	-803.2	978.4	1,265.4	1.29	-1.26	1.37	
7,108.0	9.50	138.50	6,984.2	-814.5	989.5	1,281.2	1.05	-0.32	6.00	
7,202.0	9.10	143.80	7,076.9	-826.3	999.0	1,295.9	1.01	-0.43	5.64	
7,297.0	8.50	149.40	7,170.8	-838.4	1,007.0	1,309.7	1.10	-0.63	5.89	
7,391.0	8.30	151.00	7,263.8	-850.4	1,013.9	1,322.4	0.33	-0.21	1.70	
7,486.0	8.20	150.40	7,357.8	-862.2	1,020.5	1,335.0	0.14	-0.11	-0.63	
7,580.0	7.90	147.40	7,450.9	-873.5	1,027.3	1,347.2	0.55	-0.32	-3.19	
7,675.0	6.80	142.40	7,545.1	-883.5	1,034.3	1,358.8	1.34	-1.16	-5.26	
7,767.0	3.70	125.20	7,636.7	-889.5	1,040.0	1,367.1	3.74	-3.37	-18.70	
7,864.0	2.50	83.80	7,733.6	-891.1	1,044.7	1,371.7	2.54	-1.24	-42.68	
7,958.0	1.90	57.40	7,827.5	-890.0	1,048.0	1,373.7	1.24	-0.64	-28.09	
8,053.0	1.30	80.60	7,922.5	-889.0	1,050.4	1,375.0	0.92	-0.63	24.42	
8,148.0	0.80	136.50	8,017.5	-889.3	1,052.0	1,376.4	1.14	-0.53	58.84	
8,242.0	1.00	349.80	8,111.5	-889.0	1,052.3	1,376.4	1.84	0.21	-156.06	
8,337.0	1.50	0.20	8,206.4	-886.9	1,052.1	1,375.0	0.58	0.53	10.95	
8,431.0	1.90	9.60	8,300.4	-884.1	1,052.4	1,373.5	0.52	0.43	10.00	
8,525.0	1.20	343.40	8,394.4	-881.7	1,052.4	1,372.0	1.04	-0.74	-27.87	
8,619.0	1.00	303.70	8,488.3	-880.3	1,051.4	1,370.4	0.82	-0.21	-42.23	
8,714.0	0.90	351.00	8,583.3	-879.1	1,050.6	1,369.0	0.81	-0.11	49.79	
8,808.0	1.00	358.50	8,677.3	-877.5	1,050.5	1,367.9	0.17	0.11	7.98	
8,902.0	0.90	315.50	8,771.3	-876.2	1,049.9	1,366.7	0.75	-0.11	-45.74	
8,997.0	1.30	303.40	8,866.3	-875.0	1,048.5	1,364.9	0.48	0.42	-12.74	



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9,091.0	2.00	289.50	8,960.3	-873.9	1,046.1	1,362.3	0.85	0.74	-14.79	
9,186.0	2.50	265.20	9,055.2	-873.5	1,042.4	1,359.2	1.12	0.53	-25.58	
9,280.0	3.20	251.80	9,149.1	-874.5	1,037.9	1,356.2	1.02	0.74	-14.26	
9,375.0	3.90	237.80	9,243.9	-877.1	1,032.6	1,353.6	1.17	0.74	-14.74	
9,469.0	3.90	234.20	9,337.7	-880.6	1,027.3	1,351.6	0.26	0.00	-3.83	
9,563.0	3.80	236.60	9,431.5	-884.2	1,022.2	1,349.7	0.20	-0.11	2.55	
9,658.0	4.10	238.10	9,526.2	-887.8	1,016.6	1,347.5	0.33	0.32	1.58	
9,747.0	4.90	232.10	9,615.0	-891.8	1,010.9	1,345.5	1.04	0.90	-6.74	
Projection to TD @ 9807.0' MD / 9674.7' TVD										
9,807.0	4.90	232.10	9,674.7	-894.9	1,006.9	1,344.2	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
202.0	202.0	-3.7	1.1	First MWD Survey @ 202.0' MD / 202.0' TVD	
9,807.0	9,674.7	-894.9	1,006.9	Projection to TD @ 9807.0' MD / 9674.7' TVD	