



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-04-01E

Wellbore #1

Design: Wellbore #1

QES Survey Report

29 June, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-04-01E
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (RKB 30')
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (RKB 30')
Well:	CC Federal 0697-04-01E	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 604-41-32 Pad			
Site Position:		Northing:	1,639,464.67 usft	Latitude: 39.557630
From:	Lat/Long	Easting:	2,233,548.14 usft	Longitude: -108.218770
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.71 °

Well	CC Federal 0697-04-01E			
Well Position	+N/-S	0.0 usft	Northing:	1,639,471.68 usft
	+E/-W	0.0 usft	Easting:	2,233,550.80 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft
			Ground Level:	8,609.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	6/24/2019	9.57	65.80	51,425.70000000

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	347.42	

Survey Program	Date	6/29/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
145.0	9,817.0	QES MWD Surveys (Wellbore #1)	MWD	OWSG 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 @ 145.0'MD / 145.0' TVD									
145.0	0.80	64.80	145.0	0.4	0.9	0.2	0.55	0.55	0.00
236.0	0.80	96.60	236.0	0.6	2.1	0.2	0.48	0.00	34.95
267.0	1.10	98.60	267.0	0.6	2.6	0.0	0.97	0.97	6.45
298.0	1.30	96.80	298.0	0.5	3.3	-0.3	0.66	0.65	-5.81
389.0	1.40	89.30	389.0	0.4	5.4	-0.8	0.22	0.11	-8.24
451.0	1.00	108.11	450.9	0.2	6.7	-1.3	0.90	-0.65	30.34
481.0	1.10	89.90	480.9	0.1	7.2	-1.5	1.16	0.33	-60.70
521.0	1.00	95.40	520.9	0.1	8.0	-1.6	0.35	-0.25	13.75
572.0	0.50	151.40	571.9	-0.1	8.5	-2.0	1.63	-0.98	109.80



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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)
612.0	0.40	293.80	611.9	-0.2	8.5	-2.1	2.13	-0.25	356.00
664.0	1.20	329.80	663.9	0.3	8.0	-1.5	1.74	1.54	69.23
755.0	3.60	348.50	754.8	3.9	7.0	2.3	2.74	2.64	20.55
847.0	5.40	349.80	846.5	11.0	5.6	9.5	1.96	1.96	1.41
938.0	8.00	355.00	936.9	21.5	4.3	20.1	2.93	2.86	5.71
1,030.0	10.10	357.40	1,027.8	36.0	3.4	34.4	2.32	2.28	2.61
1,125.0	12.70	357.00	1,120.9	54.7	2.5	52.9	2.74	2.74	-0.42
1,219.0	14.50	354.70	1,212.2	76.8	0.8	74.7	2.00	1.91	-2.45
1,314.0	17.70	354.40	1,303.5	103.0	-1.7	100.9	3.37	3.37	-0.32
1,409.0	18.90	357.40	1,393.7	132.7	-3.8	130.4	1.61	1.26	3.16
1,503.0	17.30	359.40	1,483.0	161.9	-4.6	159.0	1.83	-1.70	2.13
1,598.0	16.30	358.50	1,574.0	189.4	-5.1	185.9	1.09	-1.05	-0.95
1,693.0	15.50	354.60	1,665.4	215.3	-6.7	211.6	1.40	-0.84	-4.11
1,787.0	15.40	350.20	1,756.0	240.1	-10.0	236.6	1.25	-0.11	-4.68
1,882.0	17.00	349.20	1,847.2	266.2	-14.7	263.0	1.71	1.68	-1.05
1,977.0	18.90	349.40	1,937.6	295.0	-20.1	292.3	2.00	2.00	0.21
2,071.0	19.60	350.10	2,026.3	325.5	-25.7	323.3	0.78	0.74	0.74
2,166.0	18.70	349.40	2,116.0	356.1	-31.2	354.4	0.98	-0.95	-0.74
2,261.0	16.60	347.90	2,206.6	384.4	-36.8	383.2	2.26	-2.21	-1.58
2,355.0	15.60	347.80	2,296.9	409.9	-42.3	409.3	1.06	-1.06	-0.11
2,450.0	14.10	348.50	2,388.7	433.7	-47.3	433.6	1.59	-1.58	0.74
2,550.0	11.90	345.00	2,486.1	455.6	-52.4	456.1	2.34	-2.20	-3.50
2,640.0	10.30	340.90	2,574.5	472.2	-57.5	473.3	1.98	-1.78	-4.56
2,735.0	10.70	344.60	2,667.9	488.7	-62.6	490.6	0.83	0.42	3.89
2,829.0	12.70	347.20	2,759.9	507.2	-67.2	509.6	2.20	2.13	2.77
2,924.0	14.00	345.80	2,852.3	528.5	-72.3	531.6	1.41	1.37	-1.47
3,019.0	16.70	349.10	2,943.9	553.1	-77.7	556.7	2.99	2.84	3.47
3,113.0	18.20	348.90	3,033.6	580.7	-83.1	584.9	1.60	1.60	-0.21
3,208.0	15.80	347.60	3,124.5	607.9	-88.7	612.7	2.56	-2.53	-1.37
3,303.0	14.70	346.40	3,216.1	632.3	-94.4	637.6	1.20	-1.16	-1.26
3,397.0	15.00	345.20	3,307.0	655.6	-100.3	661.7	0.46	0.32	-1.28
3,492.0	15.40	344.70	3,398.6	679.7	-106.7	686.6	0.44	0.42	-0.53
3,587.0	17.90	347.60	3,489.7	706.1	-113.2	713.8	2.77	2.63	3.05
3,682.0	16.00	347.90	3,580.5	733.2	-119.1	741.5	2.00	-2.00	0.32
3,776.0	15.60	350.00	3,671.0	758.3	-124.0	767.1	0.74	-0.43	2.23
3,871.0	17.10	348.10	3,762.1	784.5	-129.1	793.8	1.68	1.58	-2.00
3,965.0	14.30	348.50	3,852.6	809.4	-134.3	819.2	2.98	-2.98	0.43
4,060.0	15.50	345.70	3,944.4	833.2	-139.7	843.7	1.47	1.26	-2.95
4,155.0	16.60	346.10	4,035.7	858.7	-146.1	869.9	1.16	1.16	0.42
4,250.0	17.10	341.60	4,126.6	885.1	-153.8	897.4	1.47	0.53	-4.74
4,345.0	16.20	343.00	4,217.7	911.1	-162.1	924.5	1.04	-0.95	1.47
4,439.0	16.80	343.00	4,307.8	936.6	-169.9	951.1	0.64	0.64	0.00
4,534.0	14.90	342.90	4,399.2	961.4	-177.5	977.0	2.00	-2.00	-0.11



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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)	
4,629.0	16.30	344.90	4,490.7	985.9	-184.6	1,002.5	1.58	1.47	2.11	
4,723.0	16.40	345.80	4,580.9	1,011.5	-191.2	1,028.9	0.29	0.11	0.96	
4,818.0	14.90	345.40	4,672.3	1,036.4	-197.6	1,054.5	1.58	-1.58	-0.42	
4,913.0	15.50	346.00	4,764.0	1,060.5	-203.8	1,079.4	0.65	0.63	0.63	
5,007.0	14.90	346.80	4,854.7	1,084.5	-209.6	1,104.1	0.68	-0.64	0.85	
5,102.0	16.70	346.10	4,946.1	1,109.6	-215.6	1,129.9	1.91	1.89	-0.74	
5,196.0	15.40	344.70	5,036.5	1,134.8	-222.2	1,155.9	1.44	-1.38	-1.49	
5,291.0	15.20	344.00	5,128.1	1,158.9	-228.9	1,180.9	0.29	-0.21	-0.74	
5,385.0	16.40	343.60	5,218.6	1,183.5	-236.1	1,206.5	1.28	1.28	-0.43	
5,480.0	17.90	344.60	5,309.3	1,210.4	-243.7	1,234.4	1.61	1.58	1.05	
5,575.0	17.00	343.70	5,400.0	1,237.8	-251.5	1,262.9	0.99	-0.95	-0.95	
5,669.0	17.90	351.40	5,489.6	1,265.3	-257.5	1,291.0	2.63	0.96	8.19	
5,764.0	17.10	354.00	5,580.2	1,293.6	-261.2	1,319.4	1.18	-0.84	2.74	
5,859.0	16.50	354.30	5,671.2	1,320.9	-264.0	1,346.7	0.64	-0.63	0.32	
5,953.0	17.50	352.30	5,761.1	1,348.2	-267.2	1,374.0	1.23	1.06	-2.13	
6,048.0	17.20	352.90	5,851.8	1,376.3	-270.8	1,402.3	0.37	-0.32	0.63	
6,143.0	16.10	352.90	5,942.8	1,403.3	-274.2	1,429.4	1.16	-1.16	0.00	
6,237.0	17.20	354.50	6,032.8	1,430.1	-277.2	1,456.1	1.27	1.17	1.70	
6,332.0	16.60	354.60	6,123.7	1,457.6	-279.8	1,483.5	0.63	-0.63	0.11	
6,427.0	15.00	355.30	6,215.1	1,483.3	-282.1	1,509.2	1.70	-1.68	0.74	
6,521.0	15.40	350.50	6,305.9	1,507.8	-285.1	1,533.7	1.40	0.43	-5.11	
6,616.0	16.10	348.80	6,397.3	1,533.1	-289.8	1,559.5	0.88	0.74	-1.79	
6,711.0	15.00	351.00	6,488.8	1,558.2	-294.2	1,584.9	1.31	-1.16	2.32	
6,806.0	15.30	349.40	6,580.5	1,582.7	-298.5	1,609.7	0.54	0.32	-1.68	
6,900.0	15.70	349.10	6,671.1	1,607.4	-303.2	1,634.8	0.43	0.43	-0.32	
6,995.0	14.20	346.50	6,762.9	1,631.3	-308.3	1,659.3	1.73	-1.58	-2.74	
7,089.0	12.70	345.50	6,854.3	1,652.5	-313.6	1,681.2	1.61	-1.60	-1.06	
7,184.0	10.40	345.70	6,947.4	1,670.9	-318.3	1,700.2	2.42	-2.42	0.21	
7,279.0	10.00	347.50	7,040.9	1,687.3	-322.2	1,717.0	0.54	-0.42	1.89	
7,374.0	9.30	347.30	7,134.5	1,702.8	-325.7	1,732.9	0.74	-0.74	-0.21	
7,468.0	7.40	346.50	7,227.5	1,716.1	-328.8	1,746.6	2.03	-2.02	-0.85	
7,563.0	6.70	346.00	7,321.8	1,727.5	-331.5	1,758.2	0.74	-0.74	-0.53	
7,657.0	6.10	343.60	7,415.2	1,737.6	-334.3	1,768.7	0.70	-0.64	-2.55	
7,752.0	4.40	353.40	7,509.8	1,746.0	-336.1	1,777.3	2.02	-1.79	10.32	
7,847.0	4.30	15.90	7,604.5	1,753.1	-335.6	1,784.1	1.79	-0.11	23.68	
7,942.0	3.40	14.50	7,699.3	1,759.2	-333.9	1,789.7	0.95	-0.95	-1.47	
8,036.0	2.20	24.90	7,793.2	1,763.6	-332.4	1,793.6	1.38	-1.28	11.06	
8,131.0	1.20	19.00	7,888.2	1,766.2	-331.3	1,795.9	1.07	-1.05	-6.21	
8,226.0	0.70	334.50	7,983.2	1,767.6	-331.3	1,797.4	0.90	-0.53	-46.84	
8,321.0	1.00	254.70	8,078.2	1,767.9	-332.3	1,797.9	1.17	0.32	-84.00	
8,415.0	1.50	262.10	8,172.1	1,767.6	-334.3	1,797.9	0.56	0.53	7.87	
8,510.0	1.80	242.90	8,267.1	1,766.7	-336.9	1,797.7	0.66	0.32	-20.21	
8,605.0	2.10	239.70	8,362.0	1,765.2	-339.7	1,796.8	0.34	0.32	-3.37	



Survey Report



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

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8,699.0	3.00	238.60	8,455.9	1,763.0	-343.3	1,795.4	0.96	0.96	-1.17	
8,794.0	3.50	230.90	8,550.8	1,759.9	-347.7	1,793.4	0.70	0.53	-8.11	
8,889.0	3.60	229.00	8,645.6	1,756.1	-352.2	1,790.6	0.16	0.11	-2.00	
8,984.0	3.90	230.40	8,740.4	1,752.1	-356.9	1,787.7	0.33	0.32	1.47	
9,078.0	4.30	236.20	8,834.2	1,748.1	-362.3	1,785.0	0.61	0.43	6.17	
9,172.0	4.70	240.30	8,927.9	1,744.2	-368.6	1,782.6	0.55	0.43	4.36	
9,265.0	4.80	247.60	9,020.6	1,740.8	-375.5	1,780.8	0.66	0.11	7.85	
9,359.0	5.30	247.70	9,114.2	1,737.7	-383.1	1,779.4	0.53	0.53	0.11	
9,453.0	5.50	242.40	9,207.8	1,734.0	-391.2	1,777.5	0.57	0.21	-5.64	
9,547.0	5.80	244.40	9,301.3	1,729.8	-399.4	1,775.3	0.38	0.32	2.13	
9,641.0	6.10	240.10	9,394.8	1,725.3	-408.0	1,772.7	0.57	0.32	-4.57	
9,757.0	6.70	240.50	9,510.1	1,718.9	-419.3	1,768.9	0.52	0.52	0.34	
Projection to TD @ 9817.0' MD / 9569.7' TVD										
9,817.0	6.70	240.50	9,569.7	1,715.4	-425.4	1,766.9	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
145.0	145.0	0.4	0.9	First MWD Survey @ 145.0'MD / 145.0' TVD	
9,817.0	9,569.7	1,715.4	-425.4	Projection to TD @ 9817.0' MD / 9569.7' TVD	

Checked By: _____	Approved By: _____	Date: _____
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