



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC 0697-04-08E

Wellbore #1

Design: Wellbore #1

QES Survey Report

18 May, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-04-08E
Project:	Garfield County, CO	TVD Reference:	Well @ 8639.0usft (H&P #522)
Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (H&P #522)
Well:	CC 0697-04-08E	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 0697-04-08E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,406.07 usft	Latitude:	39.557467
	+E/-W	0.0 usft	Easting:	2,233,526.84 usft	Longitude:	-108.218839
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	5/14/2019	9.58	65.80	51,438.90000000

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	276.93	

Survey Program	Date	5/18/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
202.0	9,953.0	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 @ 202.0'MD / 202.0' TVD									
202.0	1.20	278.40	202.0	0.3	-2.1	2.1	0.59	0.59	0.00
294.0	1.80	280.30	294.0	0.7	-4.5	4.5	0.65	0.65	2.07
386.0	2.40	279.40	385.9	1.3	-7.8	7.9	0.65	0.65	-0.98
477.0	3.00	277.10	476.8	1.9	-12.0	12.2	0.67	0.66	-2.53
569.0	4.00	276.20	568.6	2.5	-17.6	17.8	1.09	1.09	-0.98
660.0	4.60	271.80	659.4	3.0	-24.4	24.6	0.75	0.66	-4.84
752.0	4.60	272.40	751.1	3.3	-31.8	31.9	0.05	0.00	0.65
843.0	4.50	278.10	841.8	3.9	-39.0	39.2	0.51	-0.11	6.26
935.0	4.70	278.70	933.5	5.0	-46.3	46.5	0.22	0.22	0.65



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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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)
1,027.0	4.80	275.60	1,025.2	5.9	-53.8	54.1	0.30	0.11	-3.37
1,121.0	4.80	277.20	1,118.8	6.8	-61.6	62.0	0.14	0.00	1.70
1,216.0	3.70	274.10	1,213.6	7.5	-68.6	69.0	1.18	-1.16	-3.26
1,310.0	4.00	266.20	1,307.4	7.5	-74.9	75.3	0.65	0.32	-8.40
1,405.0	3.60	277.20	1,402.2	7.7	-81.2	81.5	0.87	-0.42	11.58
1,500.0	4.10	277.60	1,496.9	8.5	-87.5	87.9	0.53	0.53	0.42
1,594.0	4.40	273.80	1,590.7	9.2	-94.5	94.9	0.44	0.32	-4.04
1,689.0	4.40	277.10	1,685.4	9.9	-101.7	102.2	0.27	0.00	3.47
1,784.0	4.60	275.00	1,780.1	10.7	-109.1	109.6	0.27	0.21	-2.21
1,878.0	3.10	285.00	1,873.9	11.7	-115.3	115.9	1.74	-1.60	10.64
1,973.0	2.70	284.60	1,968.8	12.9	-120.0	120.7	0.42	-0.42	-0.42
2,068.0	2.70	283.90	2,063.7	14.0	-124.3	125.1	0.03	0.00	-0.74
2,162.0	2.30	278.90	2,157.6	14.8	-128.3	129.2	0.48	-0.43	-5.32
2,257.0	2.90	272.50	2,252.5	15.2	-132.6	133.5	0.70	0.63	-6.74
2,352.0	2.80	279.60	2,347.4	15.7	-137.3	138.2	0.39	-0.11	7.47
2,446.0	3.80	278.90	2,441.2	16.6	-142.6	143.6	1.06	1.06	-0.74
2,518.0	3.50	275.40	2,513.1	17.1	-147.2	148.2	0.52	-0.42	-4.86
2,636.0	3.00	273.20	2,630.9	17.7	-153.9	154.9	0.44	-0.42	-1.86
2,731.0	2.20	303.70	2,725.8	18.8	-157.9	159.0	1.65	-0.84	32.11
2,826.0	2.10	312.40	2,820.7	21.0	-160.7	162.0	0.36	-0.11	9.16
2,920.0	2.90	299.40	2,914.6	23.3	-164.0	165.6	1.04	0.85	-13.83
3,015.0	2.30	296.50	3,009.5	25.3	-167.8	169.6	0.65	-0.63	-3.05
3,110.0	3.60	297.20	3,104.4	27.6	-172.2	174.2	1.37	1.37	0.74
3,204.0	3.00	288.70	3,198.2	29.7	-177.1	179.4	0.82	-0.64	-9.04
3,299.0	4.40	282.70	3,293.0	31.3	-183.0	185.5	1.53	1.47	-6.32
3,394.0	3.90	281.50	3,387.8	32.7	-189.7	192.3	0.53	-0.53	-1.26
3,488.0	3.90	274.70	3,481.6	33.6	-196.1	198.7	0.49	0.00	-7.23
3,583.0	3.90	275.80	3,576.4	34.2	-202.5	205.1	0.08	0.00	1.16
3,678.0	3.60	286.90	3,671.1	35.4	-208.6	211.3	0.83	-0.32	11.68
3,772.0	3.20	289.20	3,765.0	37.1	-213.9	216.8	0.45	-0.43	2.45
3,867.0	2.70	291.70	3,859.9	38.8	-218.4	221.5	0.54	-0.53	2.63
3,962.0	2.50	280.50	3,954.8	40.1	-222.6	225.8	0.57	-0.21	-11.79
4,056.0	3.60	285.50	4,048.6	41.2	-227.4	230.7	1.20	1.17	5.32
4,151.0	3.70	284.10	4,143.4	42.8	-233.3	236.7	0.14	0.11	-1.47
4,246.0	3.60	283.70	4,238.2	44.2	-239.1	242.7	0.11	-0.11	-0.42
4,341.0	3.20	281.90	4,333.1	45.5	-244.6	248.3	0.44	-0.42	-1.89
4,435.0	3.80	300.40	4,426.9	47.6	-249.9	253.8	1.35	0.64	19.68
4,530.0	3.20	297.80	4,521.7	50.4	-255.0	259.2	0.65	-0.63	-2.74
4,625.0	2.90	297.90	4,616.6	52.8	-259.4	263.9	0.32	-0.32	0.11
4,719.0	3.00	294.30	4,710.5	54.9	-263.8	268.5	0.22	0.11	-3.83
4,814.0	2.90	299.60	4,805.3	57.1	-268.1	273.0	0.31	-0.11	5.58
4,909.0	2.90	295.80	4,900.2	59.3	-272.4	277.5	0.20	0.00	-4.00
5,003.0	3.10	285.40	4,994.1	61.0	-277.0	282.3	0.62	0.21	-11.06



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Survey									
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5,098.0	3.60	294.10	5,088.9	62.9	-282.2	287.7	0.75	0.53	9.16
5,192.0	3.90	285.00	5,182.7	65.0	-287.9	293.7	0.71	0.32	-9.68
5,287.0	2.60	294.80	5,277.6	66.7	-293.0	298.9	1.48	-1.37	10.32
5,382.0	1.70	345.20	5,372.5	69.0	-295.3	301.5	2.11	-0.95	53.05
5,476.0	1.40	349.90	5,466.5	71.5	-295.9	302.4	0.35	-0.32	5.00
5,571.0	1.10	339.80	5,561.5	73.5	-296.4	303.1	0.39	-0.32	-10.63
5,665.0	1.00	337.10	5,655.4	75.1	-297.0	303.9	0.12	-0.11	-2.87
5,760.0	1.00	350.90	5,750.4	76.6	-297.5	304.6	0.25	0.00	14.53
5,855.0	0.90	356.10	5,845.4	78.2	-297.7	304.9	0.14	-0.11	5.47
5,949.0	0.70	350.70	5,939.4	79.5	-297.8	305.2	0.23	-0.21	-5.74
6,044.0	0.80	328.40	6,034.4	80.7	-298.3	305.8	0.32	0.11	-23.47
6,139.0	0.30	157.90	6,129.4	81.0	-298.5	306.1	1.15	-0.53	-179.47
6,234.0	0.70	152.60	6,224.4	80.2	-298.2	305.7	0.42	0.42	-5.58
6,328.0	0.80	177.30	6,318.4	79.1	-297.9	305.2	0.36	0.11	26.28
6,423.0	1.10	185.20	6,413.4	77.5	-297.9	305.1	0.34	0.32	8.32
6,518.0	1.30	201.00	6,508.3	75.6	-298.4	305.3	0.41	0.21	16.63
6,612.0	0.70	234.80	6,602.3	74.3	-299.2	306.0	0.87	-0.64	35.96
6,707.0	1.00	254.40	6,697.3	73.7	-300.5	307.2	0.44	0.32	20.63
6,802.0	1.70	235.70	6,792.3	72.7	-302.5	309.0	0.86	0.74	-19.68
6,896.0	0.90	234.90	6,886.3	71.5	-304.2	310.6	0.85	-0.85	-0.85
6,991.0	0.10	279.60	6,981.3	71.1	-304.9	311.3	0.88	-0.84	47.05
7,086.0	0.80	58.20	7,076.3	71.4	-304.4	310.8	0.92	0.74	145.89
7,180.0	0.60	53.30	7,170.3	72.1	-303.5	310.0	0.22	-0.21	-5.21
7,275.0	0.20	108.20	7,265.3	72.3	-302.9	309.4	0.54	-0.42	57.79
7,370.0	0.40	211.30	7,360.3	72.0	-302.9	309.4	0.51	0.21	108.53
7,464.0	0.70	43.20	7,454.3	72.1	-302.7	309.2	1.16	0.32	-178.83
7,559.0	1.40	51.20	7,549.2	73.3	-301.4	308.1	0.75	0.74	8.42
7,654.0	0.90	77.40	7,644.2	74.2	-299.8	306.5	0.75	-0.53	27.58
7,748.0	0.60	169.30	7,738.2	73.8	-299.0	305.7	1.17	-0.32	97.77
7,843.0	1.90	216.40	7,833.2	72.1	-299.8	306.3	1.64	1.37	49.58
7,938.0	1.60	223.40	7,928.1	69.8	-301.7	307.9	0.39	-0.32	7.37
8,033.0	2.20	236.70	8,023.1	67.9	-304.1	310.1	0.78	0.63	14.00
8,127.0	3.10	238.20	8,117.0	65.6	-307.8	313.4	0.96	0.96	1.60
8,222.0	2.80	236.30	8,211.9	62.9	-311.9	317.2	0.33	-0.32	-2.00
8,317.0	2.50	250.60	8,306.8	60.9	-315.8	320.8	0.76	-0.32	15.05
8,412.0	2.90	239.80	8,401.7	59.0	-319.8	324.6	0.68	0.42	-11.37
8,506.0	2.80	236.60	8,495.5	56.6	-323.8	328.2	0.20	-0.11	-3.40
8,601.0	3.60	233.20	8,590.4	53.5	-328.1	332.2	0.87	0.84	-3.58
8,696.0	3.50	234.00	8,685.2	50.0	-332.8	336.4	0.12	-0.11	0.84
8,790.0	3.90	236.10	8,779.0	46.6	-337.8	340.9	0.45	0.43	2.23
8,885.0	3.90	235.70	8,873.8	42.9	-343.1	345.8	0.03	0.00	-0.42
8,980.0	4.80	233.40	8,968.5	38.7	-349.0	351.1	0.96	0.95	-2.42
9,074.0	5.70	236.00	9,062.1	33.8	-356.0	357.5	0.99	0.96	2.77



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Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (H&P #522)
Well:	CC 0697-04-08E	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)	
9,169.0	4.70	240.00	9,156.7	29.2	-363.3	364.2	1.12	-1.05	4.21	
9,264.0	5.20	247.10	9,251.4	25.6	-370.7	371.0	0.83	0.53	7.47	
9,358.0	6.00	249.60	9,344.9	22.2	-379.2	379.1	0.89	0.85	2.66	
9,453.0	7.00	251.70	9,439.3	18.7	-389.3	388.7	1.08	1.05	2.21	
9,548.0	6.20	253.80	9,533.7	15.4	-399.8	398.7	0.88	-0.84	2.21	
9,642.0	5.30	254.60	9,627.2	12.8	-408.8	407.4	0.96	-0.96	0.85	
9,737.0	4.90	255.80	9,721.8	10.7	-417.0	415.2	0.44	-0.42	1.26	
9,832.0	5.00	251.50	9,816.5	8.4	-424.8	422.7	0.40	0.11	-4.53	
9,893.0	5.00	253.80	9,877.3	6.8	-429.9	427.6	0.33	0.00	3.77	
TD @ 9953.0' MD / 9937.0' TVD										
9,953.0	5.00	253.80	9,937.0	5.3	-434.9	432.4	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	0.3	-2.1	First MWD Survey @ 202.0'MD / 202.0' TVD	
9,953.0	9,937.0	5.3	-434.9	TD @ 9953.0' MD / 9937.0' TVD	