



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-04-05E

Wellbore #1

Design: Wellbore #1

QES Survey Report

07 June, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-04-05E
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 0697-04-05E	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 0697-04-05E			
Well Position	+N/-S	0.0 usft	Northing:	1,639,434.19 usft
	+E/-W	0.0 usft	Easting:	2,233,536.99 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	6/3/2019	9.58	65.80	51,431.70000000

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	334.13

Survey Program	Date	6/7/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
296.0	9,567.0	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 @ 296.0' MD / 295.8' TVD									
296.0	3.40	345.60	295.8	8.5	-2.2	8.6	1.15	1.15	0.00
388.0	5.40	335.20	387.6	15.1	-4.7	15.6	2.33	2.17	-11.30
480.0	7.20	335.20	479.0	24.2	-8.9	25.7	1.96	1.96	0.00
571.0	7.60	336.40	569.2	34.9	-13.7	37.4	0.47	0.44	1.32
662.0	8.60	333.30	659.3	46.5	-19.2	50.2	1.20	1.10	-3.41
754.0	9.10	333.50	750.2	59.2	-25.5	64.4	0.54	0.54	0.22
845.0	9.20	328.10	840.1	71.8	-32.6	78.8	0.95	0.11	-5.93
937.0	7.80	327.50	931.1	83.3	-39.8	92.3	1.52	-1.52	-0.65
1,029.0	7.20	329.90	1,022.3	93.6	-46.1	104.3	0.74	-0.65	2.61



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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)
1,124.0	6.80	324.10	1,116.6	103.3	-52.3	115.8	0.85	-0.42	-6.11
1,218.0	6.40	323.10	1,209.9	112.0	-58.8	126.4	0.44	-0.43	-1.06
1,313.0	6.80	319.90	1,304.3	120.5	-65.6	137.0	0.57	0.42	-3.37
1,407.0	6.50	321.20	1,397.7	128.9	-72.5	147.6	0.36	-0.32	1.38
1,502.0	5.90	325.40	1,492.1	137.1	-78.6	157.7	0.79	-0.63	4.42
1,597.0	5.40	334.00	1,586.7	145.2	-83.3	167.0	1.03	-0.53	9.05
1,691.0	5.80	341.60	1,680.2	153.6	-86.8	176.1	0.90	0.43	8.09
1,786.0	6.00	343.40	1,774.7	162.9	-89.7	185.8	0.29	0.21	1.89
1,881.0	7.30	339.60	1,869.1	173.4	-93.2	196.7	1.44	1.37	-4.00
1,975.0	6.20	333.40	1,962.4	183.5	-97.6	207.7	1.40	-1.17	-6.60
2,070.0	5.80	333.00	2,056.9	192.4	-102.1	217.6	0.42	-0.42	-0.42
2,165.0	6.00	327.50	2,151.4	200.8	-106.9	227.4	0.63	0.21	-5.79
2,259.0	6.20	326.20	2,244.9	209.2	-112.4	237.3	0.26	0.21	-1.38
2,354.0	5.90	336.40	2,339.3	217.9	-117.2	247.2	1.17	-0.32	10.74
2,449.0	6.20	342.20	2,433.8	227.3	-120.7	257.2	0.72	0.32	6.11
2,543.0	5.30	342.50	2,527.3	236.3	-123.6	266.5	0.96	-0.96	0.32
2,610.0	4.40	339.50	2,594.1	241.6	-125.4	272.1	1.40	-1.34	-4.48
2,733.0	4.40	332.70	2,716.7	250.2	-129.2	281.5	0.42	0.00	-5.53
2,828.0	4.90	331.40	2,811.4	257.0	-132.8	289.2	0.54	0.53	-1.37
2,923.0	6.10	337.70	2,906.0	265.3	-136.7	298.3	1.41	1.26	6.63
3,017.0	7.70	339.80	2,999.3	275.8	-140.8	309.6	1.72	1.70	2.23
3,112.0	6.90	334.20	3,093.5	286.9	-145.4	321.6	1.13	-0.84	-5.89
3,207.0	6.30	338.20	3,187.9	296.9	-149.9	332.5	0.80	-0.63	4.21
3,301.0	6.80	341.20	3,281.3	306.9	-153.6	343.2	0.64	0.53	3.19
3,396.0	6.80	339.30	3,375.6	317.5	-157.4	354.4	0.24	0.00	-2.00
3,491.0	8.20	342.30	3,469.8	329.2	-161.4	366.7	1.53	1.47	3.16
3,585.0	7.30	340.60	3,562.9	341.3	-165.4	379.2	0.99	-0.96	-1.81
3,680.0	8.30	339.70	3,657.1	353.4	-169.8	392.1	1.06	1.05	-0.95
3,775.0	7.70	339.30	3,751.1	365.8	-174.5	405.2	0.63	-0.63	-0.42
3,869.0	6.60	337.10	3,844.4	376.6	-178.8	416.9	1.21	-1.17	-2.34
3,964.0	8.30	338.50	3,938.6	388.0	-183.4	429.2	1.80	1.79	1.47
4,059.0	7.60	337.90	4,032.7	400.2	-188.3	442.3	0.74	-0.74	-0.63
4,153.0	8.50	341.30	4,125.8	412.6	-192.9	455.4	1.08	0.96	3.62
4,248.0	8.00	340.00	4,219.8	425.4	-197.4	468.9	0.56	-0.53	-1.37
4,343.0	7.10	337.80	4,314.0	437.1	-201.9	481.4	0.99	-0.95	-2.32
4,438.0	8.50	338.30	4,408.1	449.1	-206.7	494.2	1.48	1.47	0.53
4,532.0	7.70	340.10	4,501.1	461.4	-211.4	507.4	0.89	-0.85	1.91
4,627.0	6.80	345.40	4,595.4	472.9	-215.0	519.3	1.18	-0.95	5.58
4,722.0	8.40	342.30	4,689.5	484.9	-218.5	531.7	1.74	1.68	-3.26
4,816.0	7.80	343.20	4,782.6	497.6	-222.4	544.7	0.65	-0.64	0.96
4,911.0	6.20	340.30	4,876.9	508.6	-226.0	556.2	1.72	-1.68	-3.05
5,005.0	7.80	339.70	4,970.2	519.3	-229.9	567.6	1.70	1.70	-0.64
5,100.0	6.30	331.30	5,064.5	529.9	-234.7	579.2	1.91	-1.58	-8.84



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Survey										
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5,195.0	6.40	333.50	5,158.9	539.3	-239.5	589.7	0.28	0.11	2.32	
5,289.0	7.90	341.70	5,252.2	550.1	-243.9	601.4	1.93	1.60	8.72	
5,384.0	7.00	333.90	5,346.4	561.5	-248.5	613.6	1.42	-0.95	-8.21	
5,479.0	5.50	339.30	5,440.8	570.9	-252.7	624.0	1.69	-1.58	5.68	
5,573.0	6.80	358.10	5,534.3	580.7	-254.4	633.5	2.53	1.38	20.00	
5,668.0	7.00	359.50	5,628.6	592.1	-254.7	643.9	0.28	0.21	1.47	
5,762.0	6.20	356.90	5,721.9	602.9	-255.0	653.8	0.91	-0.85	-2.77	
5,857.0	5.50	354.20	5,816.4	612.6	-255.7	662.8	0.79	-0.74	-2.84	
5,952.0	7.20	350.60	5,910.9	623.0	-257.2	672.8	1.84	1.79	-3.79	
6,046.0	6.90	350.80	6,004.2	634.4	-259.0	683.8	0.32	-0.32	0.21	
6,141.0	6.70	349.60	6,098.5	645.4	-260.9	694.6	0.26	-0.21	-1.26	
6,236.0	5.50	350.90	6,192.9	655.4	-262.7	704.3	1.27	-1.26	1.37	
6,330.0	5.50	356.80	6,286.5	664.3	-263.6	712.8	0.60	0.00	6.28	
6,425.0	6.90	351.90	6,381.0	674.5	-264.7	722.4	1.57	1.47	-5.16	
6,520.0	7.30	348.70	6,475.2	686.1	-266.7	733.7	0.59	0.42	-3.37	
6,615.0	6.40	344.80	6,569.5	697.1	-269.2	744.7	1.07	-0.95	-4.11	
6,709.0	8.10	342.70	6,662.8	708.5	-272.6	756.4	1.83	1.81	-2.23	
6,804.0	8.00	340.10	6,756.9	721.1	-276.8	769.6	0.40	-0.11	-2.74	
6,899.0	7.20	338.20	6,851.0	732.9	-281.3	782.2	0.88	-0.84	-2.00	
6,993.0	7.10	336.70	6,944.3	743.7	-285.8	793.8	0.23	-0.11	-1.60	
7,088.0	6.40	333.60	7,038.6	753.8	-290.5	805.0	0.83	-0.74	-3.26	
7,183.0	5.10	325.90	7,133.2	762.0	-295.2	814.5	1.59	-1.37	-8.11	
7,277.0	5.20	332.60	7,226.8	769.3	-299.5	822.9	0.65	0.11	7.13	
7,372.0	4.90	327.70	7,321.4	776.5	-303.6	831.2	0.55	-0.32	-5.16	
7,467.0	4.40	322.00	7,416.1	782.8	-308.0	838.8	0.72	-0.53	-6.00	
7,561.0	3.70	333.60	7,509.9	788.4	-311.6	845.3	1.14	-0.74	12.34	
7,656.0	2.20	342.20	7,604.7	792.9	-313.5	850.2	1.64	-1.58	9.05	
7,751.0	1.50	345.70	7,699.7	795.8	-314.4	853.2	0.75	-0.74	3.68	
7,845.0	1.30	321.20	7,793.7	797.8	-315.4	855.5	0.67	-0.21	-26.06	
7,940.0	1.20	279.60	7,888.6	798.8	-317.0	857.1	0.94	-0.11	-43.79	
8,035.0	0.20	263.90	7,983.6	799.0	-318.2	857.7	1.06	-1.05	-16.53	
8,129.0	0.80	175.30	8,077.6	798.3	-318.3	857.2	0.87	0.64	-94.26	
8,224.0	1.70	210.20	8,172.6	796.4	-318.9	855.8	1.20	0.95	36.74	
8,319.0	1.80	191.70	8,267.6	793.8	-319.9	853.8	0.60	0.11	-19.47	
8,414.0	2.60	194.50	8,362.5	790.2	-320.8	851.0	0.85	0.84	2.95	
8,508.0	3.40	199.70	8,456.4	785.5	-322.3	847.4	0.90	0.85	5.53	
8,603.0	3.20	183.60	8,551.2	780.2	-323.4	843.1	0.99	-0.21	-16.95	
8,698.0	3.40	199.50	8,646.0	774.9	-324.5	838.8	0.98	0.21	16.74	
8,792.0	4.50	211.70	8,739.8	769.2	-327.4	834.9	1.47	1.17	12.98	
8,887.0	5.60	213.60	8,834.5	762.1	-331.9	830.6	1.17	1.16	2.00	
8,982.0	6.70	215.20	8,928.9	753.7	-337.6	825.5	1.17	1.16	1.68	
9,077.0	6.30	228.20	9,023.3	745.7	-344.7	821.4	1.60	-0.42	13.68	
9,171.0	6.10	234.50	9,116.7	739.4	-352.6	819.2	0.75	-0.21	6.70	



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9,266.0	4.70	243.00	9,211.3	734.7	-360.2	818.2	1.69	-1.47	8.95
9,361.0	4.80	250.20	9,306.0	731.6	-367.4	818.6	0.64	0.11	7.58
9,455.0	5.20	252.60	9,399.6	729.0	-375.2	819.6	0.48	0.43	2.55
9,507.0	5.50	251.20	9,451.4	727.5	-379.8	820.3	0.63	0.58	-2.69
Projection to TD @ 9567.0' MD / 9511.1' TVD									
9,567.0	5.50	251.20	9,511.1	725.6	-385.2	821.0	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
296.0	295.8	8.5	-2.2	First MWD Survey @ 296.0' MD / 295.8' TVD
9,567.0	9,511.1	725.6	-385.2	Projection to TD @ 9567.0' MD / 9511.1' TVD

Checked By: _____ Approved By: _____ Date: _____