



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-04-03E

Wellbore #1

Design: Wellbore #1

QES Survey Report

18 June, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-04-03E
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 Federal 0697-04-03E	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 0697-04-03E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,452.93 usft	Latitude:	39.557597
	+E/-W	0.0 usft	Easting:	2,233,543.76 usft	Longitude:	-108.218784
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	6/13/2019	9.57	65.80	51,428.80000000

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	343.13	

Survey Program	Date	6/18/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
330.0	9,685.0	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 @ 330.0' MD / 329.8' TVD									
330.0	3.50	344.40	329.8	9.7	-2.7	10.1	1.06	1.06	0.00
386.0	4.80	346.00	385.6	13.6	-3.7	14.1	2.33	2.32	2.86
478.0	6.20	346.30	477.2	22.2	-5.8	22.9	1.52	1.52	0.33
569.0	7.60	341.80	567.6	32.7	-8.9	33.9	1.65	1.54	-4.95
661.0	9.40	340.70	658.5	45.5	-13.3	47.4	1.96	1.96	-1.20
752.0	11.30	344.70	748.1	61.2	-18.1	63.8	2.23	2.09	4.40
844.0	10.90	341.80	838.3	78.1	-23.2	81.5	0.75	-0.43	-3.15
934.0	11.00	342.00	926.7	94.4	-28.5	98.6	0.12	0.11	0.22
1,027.0	11.30	345.20	1,017.9	111.6	-33.6	116.6	0.74	0.32	3.44



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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)
1,122.0	12.30	343.70	1,110.9	130.3	-38.8	136.0	1.10	1.05	-1.58
1,216.0	12.30	340.00	1,202.8	149.3	-45.0	156.0	0.84	0.00	-3.94
1,311.0	12.40	341.80	1,295.6	168.5	-51.7	176.3	0.42	0.11	1.89
1,406.0	14.00	341.70	1,388.1	189.1	-58.4	198.0	1.68	1.68	-0.11
1,500.0	12.80	337.90	1,479.5	209.6	-65.9	219.7	1.58	-1.28	-4.04
1,595.0	10.50	335.80	1,572.6	227.2	-73.4	238.8	2.46	-2.42	-2.21
1,690.0	9.80	335.20	1,666.1	242.5	-80.4	255.4	0.75	-0.74	-0.63
1,784.0	8.60	339.20	1,758.9	256.3	-86.2	270.3	1.45	-1.28	4.26
1,879.0	8.70	344.10	1,852.8	269.9	-90.7	284.6	0.78	0.11	5.16
1,974.0	8.20	347.90	1,946.7	283.4	-94.1	298.5	0.79	-0.53	4.00
2,068.0	7.70	351.40	2,039.8	296.2	-96.5	311.4	0.74	-0.53	3.72
2,163.0	7.20	349.90	2,134.0	308.3	-98.5	323.6	0.56	-0.53	-1.58
2,258.0	7.10	349.10	2,228.3	320.0	-100.6	335.4	0.15	-0.11	-0.84
2,352.0	7.70	355.90	2,321.5	331.9	-102.2	347.3	1.13	0.64	7.23
2,447.0	7.20	353.90	2,415.7	344.2	-103.3	359.4	0.59	-0.53	-2.11
2,541.0	6.20	344.60	2,509.1	355.0	-105.2	370.2	1.57	-1.06	-9.89
2,641.0	4.60	329.80	2,608.6	363.6	-108.7	379.5	2.11	-1.60	-14.80
2,735.0	4.90	324.70	2,702.3	370.2	-112.9	387.0	0.55	0.32	-5.43
2,830.0	8.60	339.30	2,796.6	380.1	-117.7	397.9	4.26	3.89	15.37
2,925.0	10.70	342.90	2,890.3	395.2	-122.9	413.8	2.30	2.21	3.79
3,020.0	12.00	343.20	2,983.4	413.1	-128.3	432.5	1.37	1.37	0.32
3,114.0	11.80	341.40	3,075.4	431.6	-134.2	451.9	0.45	-0.21	-1.91
3,209.0	10.80	342.50	3,168.6	449.2	-140.0	470.5	1.08	-1.05	1.16
3,304.0	10.50	344.30	3,261.9	466.1	-145.0	488.1	0.47	-0.32	1.89
3,398.0	11.60	343.60	3,354.2	483.4	-150.0	506.1	1.18	1.17	-0.74
3,493.0	12.10	344.40	3,447.2	502.1	-155.3	525.6	0.55	0.53	0.84
3,588.0	13.50	345.30	3,539.8	522.5	-160.8	546.6	1.49	1.47	0.95
3,682.0	11.70	344.40	3,631.5	542.2	-166.2	567.1	1.93	-1.91	-0.96
3,777.0	12.30	346.00	3,724.5	561.3	-171.2	586.9	0.72	0.63	1.68
3,872.0	12.70	343.70	3,817.2	581.2	-176.6	607.4	0.67	0.42	-2.42
3,966.0	10.80	342.00	3,909.2	599.5	-182.2	626.6	2.05	-2.02	-1.81
4,061.0	11.80	344.80	4,002.4	617.3	-187.5	645.2	1.20	1.05	2.95
4,156.0	12.60	343.20	4,095.2	636.6	-193.1	665.2	0.91	0.84	-1.68
4,251.0	11.00	339.60	4,188.2	655.0	-199.2	684.7	1.85	-1.68	-3.79
4,345.0	12.30	342.30	4,280.3	673.0	-205.4	703.6	1.50	1.38	2.87
4,440.0	11.60	344.10	4,373.2	691.8	-211.1	723.3	0.83	-0.74	1.89
4,535.0	13.00	345.40	4,466.1	711.3	-216.4	743.5	1.50	1.47	1.37
4,629.0	12.30	346.50	4,557.8	731.3	-221.4	764.1	0.79	-0.74	1.17
4,724.0	11.60	345.80	4,650.7	750.4	-226.1	783.7	0.75	-0.74	-0.74
4,819.0	12.90	348.10	4,743.6	770.0	-230.6	803.8	1.46	1.37	2.42
4,913.0	11.40	348.00	4,835.4	789.4	-234.7	823.5	1.60	-1.60	-0.11
5,008.0	12.00	344.70	4,928.5	808.1	-239.3	842.8	0.95	0.63	-3.47
5,102.0	12.80	347.80	5,020.3	827.7	-244.1	862.9	1.11	0.85	3.30



Survey Report



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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)	
5,197.0	11.50	343.40	5,113.1	847.1	-249.0	882.9	1.68	-1.37	-4.63	
5,292.0	11.60	339.10	5,206.2	865.1	-255.1	901.9	0.91	0.11	-4.53	
5,386.0	12.00	333.00	5,298.2	882.6	-262.9	920.9	1.39	0.43	-6.49	
5,481.0	11.20	340.00	5,391.3	900.1	-270.6	939.8	1.70	-0.84	7.37	
5,575.0	11.80	347.10	5,483.4	918.0	-275.8	958.6	1.63	0.64	7.55	
5,670.0	11.20	350.60	5,576.5	936.6	-279.5	977.4	0.97	-0.63	3.68	
5,765.0	12.60	354.90	5,669.5	956.0	-281.9	996.7	1.74	1.47	4.53	
5,859.0	12.00	355.90	5,761.3	976.0	-283.5	1,016.2	0.68	-0.64	1.06	
5,954.0	11.60	354.50	5,854.3	995.3	-285.2	1,035.2	0.52	-0.42	-1.47	
6,049.0	10.90	352.70	5,947.5	1,013.7	-287.2	1,053.5	0.82	-0.74	-1.89	
6,143.0	12.00	353.20	6,039.6	1,032.3	-289.5	1,071.9	1.17	1.17	0.53	
6,238.0	11.30	353.20	6,132.7	1,051.3	-291.8	1,090.7	0.74	-0.74	0.00	
6,333.0	11.70	355.20	6,225.7	1,070.2	-293.7	1,109.3	0.59	0.42	2.11	
6,427.0	11.60	355.10	6,317.8	1,089.1	-295.3	1,127.9	0.11	-0.11	-0.11	
6,522.0	10.30	355.60	6,411.1	1,107.0	-296.8	1,145.5	1.37	-1.37	0.53	
6,617.0	11.20	354.60	6,504.4	1,124.7	-298.3	1,162.9	0.97	0.95	-1.05	
6,712.0	12.60	350.30	6,597.4	1,144.1	-300.9	1,182.2	1.74	1.47	-4.53	
6,806.0	13.10	347.60	6,689.0	1,164.6	-304.9	1,203.0	0.83	0.53	-2.87	
6,901.0	11.20	348.80	6,781.9	1,184.2	-309.0	1,222.9	2.02	-2.00	1.26	
6,996.0	9.60	346.00	6,875.3	1,200.9	-312.7	1,240.0	1.77	-1.68	-2.95	
7,090.0	9.10	349.70	6,968.1	1,215.8	-315.9	1,255.2	0.83	-0.53	3.94	
7,185.0	8.10	348.80	7,062.0	1,229.8	-318.6	1,269.3	1.06	-1.05	-0.95	
7,280.0	7.60	0.80	7,156.1	1,242.6	-319.8	1,282.0	1.80	-0.53	12.63	
7,374.0	6.70	359.70	7,249.4	1,254.3	-319.7	1,293.2	0.97	-0.96	-1.17	
7,469.0	6.20	357.00	7,343.8	1,265.0	-320.0	1,303.4	0.62	-0.53	-2.84	
7,563.0	4.60	357.30	7,437.4	1,273.8	-320.5	1,312.0	1.70	-1.70	0.32	
7,658.0	2.70	8.80	7,532.2	1,279.9	-320.3	1,317.7	2.13	-2.00	12.11	
7,753.0	2.10	22.60	7,627.1	1,283.7	-319.3	1,321.1	0.87	-0.63	14.53	
7,848.0	1.20	5.00	7,722.0	1,286.3	-318.5	1,323.4	1.08	-0.95	-18.53	
7,942.0	1.00	322.80	7,816.0	1,287.9	-319.0	1,325.0	0.87	-0.21	-44.89	
8,037.0	1.20	267.70	7,911.0	1,288.5	-320.5	1,326.1	1.09	0.21	-58.00	
8,132.0	2.00	266.90	8,006.0	1,288.4	-323.1	1,326.7	0.84	0.84	-0.84	
8,227.0	2.50	232.40	8,100.9	1,287.0	-326.4	1,326.4	1.49	0.53	-36.32	
8,321.0	3.50	226.90	8,194.8	1,283.8	-330.1	1,324.4	1.11	1.06	-5.85	
8,416.0	4.20	236.30	8,289.6	1,279.9	-335.1	1,322.1	0.99	0.74	9.89	
8,511.0	4.70	241.70	8,384.3	1,276.1	-341.5	1,320.3	0.69	0.53	5.68	
8,605.0	5.50	240.70	8,477.9	1,272.1	-348.8	1,318.6	0.86	0.85	-1.06	
8,700.0	5.20	238.30	8,572.5	1,267.6	-356.4	1,316.5	0.39	-0.32	-2.53	
8,795.0	4.30	227.50	8,667.2	1,263.0	-362.7	1,313.9	1.33	-0.95	-11.37	
8,889.0	4.10	224.40	8,760.9	1,258.2	-367.6	1,310.7	0.32	-0.21	-3.30	
8,984.0	4.70	230.80	8,855.6	1,253.3	-373.0	1,307.6	0.82	0.63	6.74	
9,079.0	5.50	232.50	8,950.3	1,248.1	-379.7	1,304.5	0.86	0.84	1.79	
9,173.0	5.60	233.50	9,043.8	1,242.6	-386.9	1,301.4	0.15	0.11	1.06	



Survey Report



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9,268.0	5.50	242.70	9,138.4	1,237.7	-394.7	1,299.0	0.94	-0.11	9.68	
9,363.0	6.30	243.20	9,232.9	1,233.3	-403.4	1,297.3	0.84	0.84	0.53	
9,458.0	7.30	247.00	9,327.2	1,228.6	-413.6	1,295.8	1.15	1.05	4.00	
9,552.0	7.60	248.20	9,420.4	1,224.0	-424.9	1,294.6	0.36	0.32	1.28	
9,625.0	8.00	250.20	9,492.7	1,220.4	-434.1	1,293.9	0.66	0.55	2.74	
Projection to TD @ 9685.0' MD / 9552.1' TVD										
9,685.0	8.00	250.20	9,552.1	1,217.6	-442.0	1,293.5	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
330.0	329.8	9.7	-2.7	First MWD Survey @ 330.0' MD / 329.8' TVD	
9,685.0	9,552.1	1,217.6	-442.0	Projection to TD @ 9685.0' MD / 9552.1' TVD	