



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-04-04E

Wellbore #1

Design: Wellbore #1

QES Survey Report

12 June, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-04-04E
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 0697-04-04E	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 0697-04-04E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,443.57 usft	Latitude:	39.557571
	+E/-W	0.0 usft	Easting:	2,233,540.37 usft	Longitude:	-108.218795
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	6/8/2019	9.57	65.80	51,430.30000000

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	339.57	

Survey Program	Date	6/12/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
245.0	10,198.0	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 @ 245.0'MD / 245.0' TVD									
245.0	1.10	117.70	245.0	-1.1	2.1	-1.8	0.45	0.45	0.00
293.0	1.40	130.60	293.0	-1.7	2.9	-2.6	0.85	0.63	26.88
506.0	0.80	40.10	505.9	-2.2	5.9	-4.2	0.76	-0.28	-42.49
567.0	1.10	2.60	566.9	-1.3	6.2	-3.4	1.10	0.49	-61.48
659.0	2.20	319.30	658.9	0.9	5.1	-0.9	1.73	1.20	-47.07
750.0	3.80	329.90	749.8	4.8	2.4	3.7	1.85	1.76	11.65
842.0	6.20	324.30	841.4	11.5	-2.0	11.5	2.66	2.61	-6.09
933.0	7.20	334.00	931.8	20.6	-7.4	21.9	1.66	1.10	10.66
1,025.0	8.10	338.50	1,023.0	31.8	-12.3	34.1	1.17	0.98	4.89



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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)
1,120.0	7.70	334.00	1,117.1	43.8	-17.5	47.1	0.78	-0.42	-4.74
1,214.0	8.00	334.30	1,210.2	55.3	-23.1	59.9	0.32	0.32	0.32
1,309.0	8.70	340.00	1,304.2	68.0	-28.5	73.7	1.14	0.74	6.00
1,404.0	9.40	343.30	1,398.0	82.2	-33.1	88.6	0.92	0.74	3.47
1,498.0	8.10	336.10	1,490.9	95.6	-38.0	102.9	1.81	-1.38	-7.66
1,593.0	7.00	339.10	1,585.1	107.2	-42.8	115.4	1.23	-1.16	3.16
1,688.0	7.40	338.50	1,679.3	118.3	-47.1	127.3	0.43	0.42	-0.63
1,782.0	7.10	341.70	1,772.6	129.4	-51.2	139.1	0.54	-0.32	3.40
1,877.0	7.40	342.30	1,866.8	140.8	-54.9	151.1	0.33	0.32	0.63
1,972.0	6.70	340.60	1,961.1	151.9	-58.6	162.7	0.77	-0.74	-1.79
2,066.0	6.10	340.90	2,054.5	161.7	-62.0	173.2	0.64	-0.64	0.32
2,161.0	5.40	340.10	2,149.0	170.7	-65.2	182.7	0.74	-0.74	-0.84
2,256.0	5.60	340.00	2,243.6	179.3	-68.3	191.8	0.21	0.21	-0.11
2,350.0	5.70	343.90	2,337.2	188.1	-71.2	201.1	0.42	0.11	4.15
2,445.0	6.20	350.10	2,431.6	197.7	-73.4	210.8	0.86	0.53	6.53
2,524.0	5.40	346.50	2,510.2	205.5	-75.0	218.7	1.11	-1.01	-4.56
2,639.0	4.60	325.80	2,624.8	214.6	-78.8	228.6	1.70	-0.70	-18.00
2,733.0	5.40	332.00	2,718.5	221.6	-83.0	236.6	1.03	0.85	6.60
2,828.0	6.60	343.00	2,812.9	230.7	-86.7	246.5	1.74	1.26	11.58
2,923.0	8.10	347.50	2,907.1	242.5	-89.7	258.6	1.69	1.58	4.74
3,018.0	10.10	346.80	3,000.9	257.1	-93.1	273.5	2.11	2.11	-0.74
3,112.0	10.80	343.80	3,093.4	273.6	-97.4	290.4	0.94	0.74	-3.19
3,207.0	11.10	340.10	3,186.7	290.8	-103.0	308.5	0.80	0.32	-3.89
3,301.0	11.60	342.20	3,278.8	308.3	-109.0	326.9	0.69	0.53	2.23
3,396.0	11.50	341.80	3,371.9	326.4	-114.9	345.9	0.13	-0.11	-0.42
3,491.0	12.20	343.70	3,464.9	345.0	-120.7	365.4	0.84	0.74	2.00
3,585.0	11.80	342.80	3,556.8	363.7	-126.3	384.9	0.47	-0.43	-0.96
3,680.0	12.00	344.40	3,649.8	382.5	-131.8	404.5	0.41	0.21	1.68
3,775.0	10.70	342.60	3,742.9	400.4	-137.1	423.1	1.42	-1.37	-1.89
3,870.0	12.20	345.10	3,836.0	418.6	-142.3	441.9	1.66	1.58	2.63
3,964.0	10.80	344.70	3,928.1	436.6	-147.2	460.6	1.49	-1.49	-0.43
4,059.0	12.50	345.60	4,021.2	455.2	-152.1	479.7	1.80	1.79	0.95
4,154.0	10.80	343.50	4,114.2	473.7	-157.2	498.8	1.84	-1.79	-2.21
4,248.0	11.80	341.70	4,206.4	491.3	-162.7	517.2	1.13	1.06	-1.91
4,343.0	10.90	342.10	4,299.5	509.0	-168.5	535.8	0.95	-0.95	0.42
4,438.0	12.60	344.50	4,392.5	527.6	-174.1	555.1	1.86	1.79	2.53
4,533.0	11.70	343.60	4,485.4	546.8	-179.5	575.1	0.97	-0.95	-0.95
4,627.0	12.70	344.00	4,577.3	565.9	-185.1	594.9	1.07	1.06	0.43
4,722.0	11.40	344.80	4,670.2	585.0	-190.4	614.6	1.38	-1.37	0.84
4,817.0	12.30	345.70	4,763.2	603.8	-195.4	634.0	0.97	0.95	0.95
4,911.0	11.30	344.60	4,855.2	622.4	-200.3	653.2	1.09	-1.06	-1.17
5,006.0	12.90	347.50	4,948.1	641.7	-205.1	673.0	1.80	1.68	3.05
5,100.0	11.30	346.80	5,040.0	660.9	-209.4	692.5	1.71	-1.70	-0.74



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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)	
5,195.0	10.50	342.80	5,133.3	678.3	-214.1	710.4	1.16	-0.84	-4.21	
5,290.0	10.80	339.50	5,226.6	694.9	-219.8	727.9	0.72	0.32	-3.47	
5,384.0	11.60	333.80	5,318.8	711.6	-227.1	746.1	1.45	0.85	-6.06	
5,479.0	9.80	328.80	5,412.2	727.1	-235.5	763.6	2.13	-1.89	-5.26	
5,573.0	10.40	337.10	5,504.7	741.8	-242.9	779.9	1.67	0.64	8.83	
5,668.0	11.90	341.20	5,597.9	758.9	-249.4	798.3	1.78	1.58	4.32	
5,762.0	10.70	340.20	5,690.1	776.3	-255.5	816.7	1.29	-1.28	-1.06	
5,857.0	12.10	344.70	5,783.2	794.2	-261.1	835.4	1.74	1.47	4.74	
5,952.0	11.40	345.20	5,876.2	812.9	-266.1	854.7	0.74	-0.74	0.53	
6,047.0	10.50	345.20	5,969.5	830.4	-270.7	872.6	0.95	-0.95	0.00	
6,141.0	12.30	345.90	6,061.7	848.3	-275.4	891.1	1.92	1.91	0.74	
6,236.0	11.60	345.40	6,154.6	867.4	-280.2	910.7	0.74	-0.74	-0.53	
6,331.0	10.80	343.90	6,247.8	885.2	-285.1	929.0	0.90	-0.84	-1.58	
6,425.0	9.80	341.50	6,340.3	901.2	-290.1	945.8	1.16	-1.06	-2.55	
6,520.0	8.90	343.10	6,434.0	915.9	-294.8	961.2	0.99	-0.95	1.68	
6,615.0	8.20	342.30	6,528.0	929.4	-299.0	975.3	0.75	-0.74	-0.84	
6,710.0	8.20	345.50	6,622.0	942.4	-302.7	988.8	0.48	0.00	3.37	
6,804.0	8.40	353.10	6,715.0	955.7	-305.3	1,002.2	1.19	0.21	8.09	
6,899.0	7.40	352.40	6,809.1	968.7	-306.9	1,014.9	1.06	-1.05	-0.74	
6,994.0	6.00	342.20	6,903.5	979.5	-309.2	1,025.8	1.93	-1.47	-10.74	
7,088.0	6.50	347.20	6,996.9	989.4	-311.9	1,036.0	0.79	0.53	5.32	
7,183.0	7.90	350.70	7,091.1	1,001.0	-314.1	1,047.7	1.54	1.47	3.68	
7,278.0	7.60	349.30	7,185.3	1,013.7	-316.4	1,060.3	0.37	-0.32	-1.47	
7,372.0	6.80	350.10	7,278.5	1,025.3	-318.5	1,071.9	0.86	-0.85	0.85	
7,467.0	5.40	352.20	7,373.0	1,035.2	-320.1	1,081.8	1.49	-1.47	2.21	
7,561.0	3.60	320	7,466.7	1,042.6	-320.5	1,088.8	2.12	-1.91	11.70	
7,656.0	0.40	18.90	7,561.6	1,045.8	-320.2	1,091.8	3.39	-3.37	16.53	
7,751.0	0.70	175.60	7,656.6	1,045.6	-320.1	1,091.5	1.14	0.32	164.95	
7,846.0	1.20	204.20	7,751.6	1,044.1	-320.4	1,090.3	0.71	0.53	30.11	
7,940.0	1.40	212.20	7,845.6	1,042.2	-321.4	1,088.9	0.29	0.21	8.51	
8,035.0	1.50	218.00	7,940.6	1,040.3	-322.8	1,087.5	0.19	0.11	6.11	
8,130.0	2.40	224.60	8,035.5	1,037.9	-325.0	1,086.0	0.97	0.95	6.95	
8,225.0	0.90	233.10	8,130.5	1,036.0	-327.0	1,085.0	1.60	-1.58	8.95	
8,319.0	1.00	311.30	8,224.5	1,036.1	-328.2	1,085.5	1.28	0.11	83.19	
8,414.0	1.20	275.70	8,319.4	1,036.7	-329.8	1,086.7	0.74	0.21	-37.47	
8,509.0	2.00	255.70	8,414.4	1,036.4	-332.4	1,087.3	1.01	0.84	-21.05	
8,603.0	0.90	194.20	8,508.4	1,035.3	-334.2	1,086.8	1.87	-1.17	-65.43	
8,698.0	1.50	184.90	8,603.4	1,033.4	-334.5	1,085.1	0.66	0.63	-9.79	
8,793.0	1.90	199.90	8,698.3	1,030.6	-335.1	1,082.8	0.63	0.42	15.79	
8,887.0	2.90	211.70	8,792.2	1,027.1	-336.9	1,080.1	1.18	1.06	12.55	
8,982.0	2.20	200.50	8,887.1	1,023.4	-338.8	1,077.3	0.90	-0.74	-11.79	
9,077.0	1.70	206.60	8,982.1	1,020.4	-340.1	1,074.9	0.57	-0.53	6.42	
9,171.0	2.30	215.60	9,076.0	1,017.6	-341.8	1,072.9	0.72	0.64	9.57	



Survey Report



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9,266.0	2.90	227.80	9,170.9	1,014.5	-344.7	1,071.0	0.86	0.63	12.84	
9,361.0	3.20	233.30	9,265.8	1,011.3	-348.6	1,069.3	0.44	0.32	5.79	
9,455.0	3.60	235.60	9,359.6	1,008.0	-353.1	1,067.9	0.45	0.43	2.45	
9,550.0	4.00	237.40	9,454.4	1,004.6	-358.4	1,066.5	0.44	0.42	1.89	
9,645.0	4.20	241.00	9,549.2	1,001.1	-364.2	1,065.3	0.34	0.21	3.79	
9,739.0	4.00	241.40	9,642.9	997.9	-370.1	1,064.3	0.21	-0.21	0.43	
9,834.0	4.40	241.80	9,737.7	994.6	-376.2	1,063.3	0.42	0.42	0.42	
9,929.0	4.80	242.10	9,832.4	991.0	-382.9	1,062.3	0.42	0.42	0.32	
10,023.0	5.10	246.60	9,926.0	987.5	-390.2	1,061.6	0.52	0.32	4.79	
10,118.0	5.20	245.60	10,020.6	984.0	-398.0	1,061.1	0.14	0.11	-1.05	
10,138.0	4.90	245.10	10,040.6	983.3	-399.6	1,060.9	1.52	-1.50	-2.50	
Projection to TD @ 10198.0' MD / 10100.3' TVD										
10,198.0	4.90	245.10	10,100.3	981.1	-404.3	1,060.5	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
245.0	245.0	-1.1	2.1	First MWD Survey @ 245.0'MD / 245.0' TVD	
10,198.0	10,100.3	981.1	-404.3	Projection to TD @ 10198.0' MD / 10100.3' TVD	

Checked By: _____	Approved By: _____	Date: _____
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