



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-03-02W

Wellbore #1

Design: Wellbore #1

QES Survey Report

11 July, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-03-02W
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 0697-03-02W	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 0697-03-02W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,477.85 usft	Latitude:	39.557667
	+E/-W	0.0 usft	Easting:	2,233,563.40 usft	Longitude:	-108.218717
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	7/5/2019	9.57	65.80	51,422.50000000

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	46.50	

Survey Program	Date	7/11/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
296.0	10,884.0	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	3.80	40.80	295.8	7.4	6.4	9.8	1.28	1.28	0.00
388.0	5.70	38.50	387.5	13.3	11.2	17.3	2.08	2.07	-2.50
479.0	8.10	38.60	477.8	21.9	18.1	28.1	2.64	2.64	0.11
571.0	10.90	44.30	568.5	33.2	28.2	43.3	3.21	3.04	6.20
662.0	14.70	45.50	657.3	47.4	42.4	63.4	4.19	4.18	1.32
754.0	17.60	44.70	745.6	65.5	60.5	89.0	3.16	3.15	-0.87
845.0	21.20	43.30	831.4	87.2	81.5	119.2	3.99	3.96	-1.54
937.0	23.50	42.60	916.5	112.9	105.3	154.1	2.52	2.50	-0.76
1,029.0	27.20	44.50	999.6	141.4	132.5	193.4	4.12	4.02	2.07



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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)
1,123.0	29.50	43.90	1,082.4	173.4	163.6	238.0	2.47	2.45	-0.64
1,218.0	31.90	44.50	1,164.0	208.1	197.4	286.5	2.55	2.53	0.63
1,313.0	32.60	46.50	1,244.4	243.6	233.6	337.2	1.34	0.74	2.11
1,407.0	32.00	47.60	1,323.8	277.9	270.4	387.4	0.89	-0.64	1.17
1,502.0	32.00	48.30	1,404.4	311.6	307.7	437.7	0.39	0.00	0.74
1,596.0	30.30	47.20	1,484.9	344.3	343.7	486.3	1.91	-1.81	-1.17
1,691.0	30.20	47.20	1,566.9	376.8	378.8	534.2	0.11	-0.11	0.00
1,786.0	29.80	47.10	1,649.2	409.1	413.7	581.7	0.42	-0.42	-0.11
1,880.0	29.10	45.50	1,731.0	441.0	447.1	627.9	1.12	-0.74	-1.70
1,975.0	28.80	44.10	1,814.2	473.6	479.5	673.8	0.78	-0.32	-1.47
2,070.0	28.50	42.40	1,897.5	506.8	510.7	719.3	0.91	-0.32	-1.79
2,164.0	26.50	44.60	1,980.9	538.3	540.5	762.6	2.39	-2.13	2.34
2,259.0	25.90	45.00	2,066.2	568.1	570.1	804.6	0.66	-0.63	0.42
2,354.0	24.50	47.50	2,152.1	596.1	599.3	845.0	1.85	-1.47	2.63
2,448.0	24.60	49.90	2,237.6	621.8	628.6	884.0	1.07	0.11	2.55
2,532.0	22.80	48.90	2,314.5	643.8	654.3	917.7	2.20	-2.14	-1.19
2,676.0	19.70	46.40	2,448.7	678.9	692.9	969.9	2.24	-2.15	-1.74
2,770.0	18.60	45.30	2,537.5	700.3	715.0	1,000.7	1.23	-1.17	-1.17
2,865.0	19.50	46.00	2,627.3	722.0	737.2	1,031.7	0.98	0.95	0.74
2,960.0	21.70	47.60	2,716.2	744.9	761.6	1,065.2	2.39	2.32	1.68
3,054.0	23.80	48.10	2,802.9	769.3	788.5	1,101.5	2.24	2.23	0.53
3,149.0	24.70	48.00	2,889.5	795.4	817.5	1,140.5	0.95	0.95	-0.11
3,244.0	23.60	47.30	2,976.2	821.5	846.3	1,179.4	1.20	-1.16	-0.74
3,339.0	24.90	47.70	3,062.8	847.9	875.0	1,218.4	1.38	1.37	0.42
3,433.0	22.70	47.10	3,148.8	873.6	903.0	1,256.3	2.35	-2.34	-0.64
3,528.0	20.80	46.90	3,237.1	897.6	928.7	1,291.5	2.00	-2.00	-0.21
3,623.0	21.00	47.50	3,325.8	920.6	953.6	1,325.4	0.31	0.21	0.63
3,718.0	19.90	47.60	3,414.8	943.0	978.1	1,358.6	1.16	-1.16	0.11
3,812.0	21.80	48.50	3,502.7	965.3	1,003.0	1,392.0	2.05	2.02	0.96
3,907.0	25.40	47.60	3,589.7	990.8	1,031.2	1,430.0	3.81	3.79	-0.95
4,001.0	23.60	46.70	3,675.3	1,017.3	1,059.8	1,469.0	1.96	-1.91	-0.96
4,096.0	25.20	45.80	3,761.8	1,044.4	1,088.1	1,508.2	1.73	1.68	-0.95
4,190.0	24.80	45.40	3,847.0	1,072.2	1,116.5	1,548.0	0.46	-0.43	-0.43
4,285.0	24.00	46.20	3,933.5	1,099.6	1,144.7	1,587.2	0.91	-0.84	0.84
4,380.0	23.90	46.30	4,020.3	1,126.2	1,172.5	1,625.8	0.11	-0.11	0.11
4,474.0	25.40	47.90	4,105.7	1,152.9	1,201.2	1,665.0	1.75	1.60	1.70
4,569.0	23.80	49.20	4,192.1	1,179.1	1,230.9	1,704.5	1.78	-1.68	1.37
4,664.0	23.70	49.60	4,279.1	1,204.0	1,259.9	1,742.7	0.20	-0.11	0.42
4,758.0	24.70	49.70	4,364.8	1,229.0	1,289.3	1,781.2	1.06	1.06	0.11
4,853.0	25.90	49.60	4,450.7	1,255.2	1,320.2	1,821.7	1.26	1.26	-0.11
4,947.0	26.30	48.90	4,535.1	1,282.2	1,351.6	1,863.0	0.54	0.43	-0.74
5,042.0	25.10	48.40	4,620.7	1,309.4	1,382.5	1,904.2	1.28	-1.26	-0.53
5,137.0	25.40	48.40	4,706.6	1,336.4	1,412.8	1,944.7	0.32	0.32	0.00



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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)	
5,231.0	26.10	47.30	4,791.3	1,363.8	1,443.1	1,985.5	0.90	0.74	-1.17	
5,326.0	24.40	46.60	4,877.2	1,391.4	1,472.7	2,026.0	1.82	-1.79	-0.74	
5,421.0	25.00	46.40	4,963.5	1,418.7	1,501.5	2,065.7	0.64	0.63	-0.21	
5,516.0	26.70	47.50	5,049.0	1,447.0	1,531.7	2,107.1	1.86	1.79	1.16	
5,610.0	24.50	45.90	5,133.8	1,474.8	1,561.3	2,147.8	2.45	-2.34	-1.70	
5,705.0	24.30	46.00	5,220.3	1,502.1	1,589.5	2,187.0	0.21	-0.21	0.11	
5,800.0	25.10	47.10	5,306.6	1,529.4	1,618.3	2,226.7	0.97	0.84	1.16	
5,894.0	24.70	46.50	5,391.9	1,556.5	1,647.2	2,266.3	0.50	-0.43	-0.64	
5,989.0	24.60	46.70	5,478.2	1,583.7	1,676.0	2,305.9	0.14	-0.11	0.21	
6,084.0	26.20	47.90	5,564.0	1,611.4	1,705.9	2,346.6	1.77	1.68	1.26	
6,178.0	25.40	47.30	5,648.6	1,638.9	1,736.2	2,387.5	0.90	-0.85	-0.64	
6,273.0	27.10	47.10	5,733.8	1,667.5	1,767.0	2,429.5	1.79	1.79	-0.21	
6,368.0	26.10	46.60	5,818.8	1,696.6	1,798.0	2,472.1	1.08	-1.05	-0.53	
6,462.0	26.60	46.60	5,903.0	1,725.3	1,828.3	2,513.8	0.53	0.53	0.00	
6,557.0	25.50	45.90	5,988.4	1,754.1	1,858.5	2,555.5	1.20	-1.16	-0.74	
6,652.0	26.90	48.50	6,073.6	1,782.6	1,889.2	2,597.5	1.91	1.47	2.74	
6,746.0	25.20	48.00	6,158.1	1,810.1	1,920.0	2,638.7	1.82	-1.81	-0.53	
6,841.0	25.90	47.50	6,243.8	1,837.6	1,950.4	2,679.7	0.77	0.74	-0.53	
6,936.0	24.20	47.00	6,329.8	1,864.9	1,979.9	2,719.9	1.80	-1.79	-0.53	
7,030.0	25.00	47.40	6,415.3	1,891.5	2,008.6	2,759.0	0.87	0.85	0.43	
7,125.0	23.50	46.80	6,501.9	1,918.0	2,037.2	2,798.0	1.60	-1.58	-0.63	
7,220.0	24.60	47.50	6,588.7	1,944.4	2,065.6	2,836.7	1.20	1.16	0.74	
7,315.0	24.00	47.30	6,675.2	1,970.8	2,094.4	2,875.8	0.64	-0.63	-0.21	
7,410.0	23.90	47.20	6,762.1	1,997.0	2,122.7	2,914.4	0.11	-0.11	-0.11	
7,504.0	21.80	48.40	6,848.7	2,021.5	2,149.7	2,950.9	2.29	-2.23	1.28	
7,599.0	20.20	49.40	6,937.4	2,043.9	2,175.4	2,984.9	1.73	-1.68	1.05	
7,694.0	17.40	47.90	7,027.3	2,064.1	2,198.4	3,015.5	2.99	-2.95	-1.58	
7,788.0	17.60	49.10	7,116.9	2,082.8	2,219.5	3,043.7	0.44	0.21	1.28	
7,883.0	15.80	48.50	7,207.9	2,100.8	2,240.1	3,071.0	1.90	-1.89	-0.63	
7,978.0	14.20	49.60	7,299.7	2,116.9	2,258.6	3,095.6	1.71	-1.68	1.16	
8,072.0	10.80	45.50	7,391.5	2,130.6	2,273.7	3,115.9	3.74	-3.62	-4.36	
8,167.0	8.50	46.60	7,485.1	2,141.7	2,285.2	3,131.8	2.43	-2.42	1.16	
8,260.0	6.00	40.00	7,577.4	2,150.1	2,293.3	3,143.5	2.83	-2.69	-7.10	
8,354.0	3.80	40.20	7,671.0	2,156.3	2,298.4	3,151.5	2.34	-2.34	0.21	
8,448.0	2.70	37.50	7,764.9	2,160.4	2,301.8	3,156.8	1.18	-1.17	-2.87	
8,542.0	2.30	28.90	7,858.8	2,163.8	2,304.1	3,160.8	0.58	-0.43	-9.15	
8,636.0	1.50	30.00	7,952.7	2,166.5	2,305.6	3,163.7	0.85	-0.85	1.17	
8,730.0	1.10	19.10	8,046.7	2,168.4	2,306.5	3,165.7	0.50	-0.43	-11.60	
8,825.0	0.50	334.90	8,141.7	2,169.7	2,306.6	3,166.7	0.86	-0.63	-46.53	
8,919.0	0.90	282.30	8,235.7	2,170.2	2,305.7	3,166.4	0.76	0.43	-55.96	
9,014.0	1.50	286.40	8,330.7	2,170.7	2,303.8	3,165.3	0.64	0.63	4.32	
9,108.0	2.20	268.80	8,424.6	2,171.0	2,300.8	3,163.4	0.95	0.74	-18.72	
9,203.0	3.30	254.50	8,519.5	2,170.2	2,296.4	3,159.6	1.36	1.16	-15.05	



Survey Report



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Site:	CC 604-41-32 Pad	MD Reference:	Well @ 8639.0usft (H&P #522)
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9,298.0	3.70	242.60	8,614.3	2,168.1	2,291.0	3,154.3	0.87	0.42	-12.53
9,392.0	4.10	237.40	8,708.1	2,164.9	2,285.5	3,148.1	0.57	0.43	-5.53
9,487.0	4.40	235.80	8,802.8	2,161.0	2,279.6	3,141.1	0.34	0.32	-1.68
9,582.0	4.10	235.10	8,897.6	2,157.0	2,273.8	3,134.2	0.32	-0.32	-0.74
9,676.0	4.40	236.90	8,991.3	2,153.1	2,268.0	3,127.3	0.35	0.32	1.91
9,771.0	4.40	243.50	9,086.0	2,149.5	2,261.7	3,120.2	0.53	0.00	6.95
9,865.0	2.90	263.00	9,179.8	2,147.6	2,256.1	3,114.9	2.05	-1.60	20.74
9,960.0	1.80	261.60	9,274.8	2,147.1	2,252.3	3,111.7	1.16	-1.16	-1.47
10,054.0	2.40	257.20	9,368.7	2,146.5	2,248.9	3,108.8	0.66	0.64	-4.68
10,149.0	3.50	248.50	9,463.6	2,145.0	2,244.3	3,104.4	1.25	1.16	-9.16
10,244.0	2.90	225.10	9,558.4	2,142.2	2,239.9	3,099.3	1.50	-0.63	-24.63
10,339.0	3.10	220.40	9,653.3	2,138.5	2,236.5	3,094.4	0.33	0.21	-4.95
10,433.0	3.90	224.60	9,747.1	2,134.3	2,232.6	3,088.6	0.89	0.85	4.47
10,528.0	4.00	222.30	9,841.9	2,129.6	2,228.1	3,082.1	0.20	0.11	-2.42
10,623.0	3.70	224.00	9,936.7	2,124.9	2,223.7	3,075.7	0.34	-0.32	1.79
10,717.0	4.00	228.90	10,030.5	2,120.6	2,219.2	3,069.4	0.47	0.32	5.21
10,812.0	4.20	228.50	10,125.2	2,116.1	2,214.1	3,062.7	0.21	0.21	-0.42
10,824.0	4.40	231.00	10,137.2	2,115.5	2,213.4	3,061.8	2.28	1.67	20.83
Projection to TD @ 10884.0' MD / 10197.0' TVD									
10,884.0	4.40	231.00	10,197.0	2,112.6	2,209.8	3,057.2	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	7.4	6.4	First MWD Survey @ 296.0' MD / 295.8' TVD
10,884.0	10,197.0	2,112.6	2,209.8	Projection to TD @ 10884.0' MD / 10197.0' TVD