



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-03-04W

Wellbore #1

Design: Wellbore #1

QES Survey Report

22 July, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-03-04W
Project:	Garfield County, CO	TVD Reference:	RKB @ 8639.0usft (H&P #522)
Site:	CC 604-41-32 Pad	MD Reference:	RKB @ 8639.0usft (H&P #522)
Well:	CC Federal 0697-03-04W	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 0697-03-04W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,458.74 usft	Latitude:	39.557614
	+E/-W	0.0 usft	Easting:	2,233,556.62 usft	Longitude:	-108.218739
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	7/17/2019	9.57	65.80	51,419.00000000

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	53.74	

Survey Program	Date	7/22/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
247.0	10,768.0	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 @ 247.0'MD / 247.0' TVD									
247.0	1.60	55.50	247.0	2.0	2.8	3.4	0.65	0.65	0.00
340.0	2.80	62.10	339.9	3.8	5.9	7.0	1.32	1.29	7.10
386.0	3.30	62.40	385.8	4.9	8.1	9.4	1.09	1.09	0.65
478.0	4.60	55.40	477.6	8.2	13.5	15.7	1.50	1.41	-7.61
569.0	6.60	56.80	568.2	13.1	20.8	24.6	2.20	2.20	1.54
661.0	8.80	54.20	659.3	20.2	31.0	36.9	2.42	2.39	-2.83
752.0	11.90	51.80	748.8	30.0	44.0	53.2	3.44	3.41	-2.64
844.0	14.30	51.10	838.4	43.0	60.3	74.1	2.61	2.61	-0.76
935.0	17.70	52.10	925.9	58.6	80.0	99.1	3.75	3.74	1.10



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Well:	CC Federal 0697-03-04W	North Reference:	True
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	19.40	54.40	1,013.1	76.1	103.4	128.4	2.01	1.85	2.50
1,122.0	20.90	53.70	1,102.3	95.3	129.9	161.1	1.60	1.58	-0.74
1,216.0	22.10	53.70	1,189.8	115.7	157.7	195.6	1.28	1.28	0.00
1,311.0	23.40	53.50	1,277.4	137.5	187.3	232.3	1.37	1.37	-0.21
1,406.0	24.10	53.90	1,364.3	160.2	218.1	270.6	0.76	0.74	0.42
1,500.0	24.80	53.60	1,449.9	183.2	249.5	309.5	0.76	0.74	-0.32
1,595.0	24.70	52.40	1,536.2	207.1	281.2	349.2	0.54	-0.11	-1.26
1,690.0	25.90	53.50	1,622.1	231.5	313.6	389.8	1.36	1.26	1.16
1,784.0	25.20	52.10	1,706.9	256.0	345.9	430.4	0.98	-0.74	-1.49
1,879.0	25.50	55.20	1,792.7	280.1	378.7	471.0	1.43	0.32	3.26
1,974.0	25.00	55.10	1,878.6	303.3	411.9	511.5	0.53	-0.53	-0.11
2,068.0	24.60	53.80	1,964.0	326.2	444.0	551.0	0.72	-0.43	-1.38
2,163.0	25.00	52.50	2,050.2	350.1	475.9	590.8	0.71	0.42	-1.37
2,258.0	25.40	52.10	2,136.2	374.9	507.9	631.3	0.46	0.42	-0.42
2,352.0	25.00	53.90	2,221.2	398.9	539.9	671.3	0.92	-0.43	1.91
2,447.0	25.60	54.60	2,307.1	422.7	572.8	711.9	0.71	0.63	0.74
2,503.0	25.70	54.70	2,357.6	436.7	592.6	736.1	0.19	0.18	0.18
2,591.0	23.60	53.00	2,437.6	458.3	622.2	772.8	2.52	-2.39	-1.93
2,675.0	23.00	51.30	2,514.7	478.7	648.5	806.0	1.07	-0.71	-2.02
2,770.0	22.90	54.00	2,602.2	501.2	677.9	843.0	1.11	-0.11	2.84
2,865.0	23.30	53.60	2,689.6	523.2	708.0	880.3	0.45	0.42	-0.42
2,959.0	25.50	53.30	2,775.2	546.3	739.2	919.1	2.34	2.34	-0.32
3,054.0	23.90	53.00	2,861.5	570.1	770.9	958.8	1.69	-1.68	-0.32
3,149.0	25.20	55.40	2,947.9	593.2	803.0	998.3	1.72	1.37	2.53
3,244.0	24.20	57.50	3,034.2	615.1	836.0	1,037.9	1.40	-1.05	2.21
3,338.0	23.70	55.50	3,120.1	636.2	867.8	1,076.0	1.01	-0.53	-2.13
3,433.0	22.50	54.90	3,207.5	657.4	898.5	1,113.3	1.29	-1.26	-0.63
3,528.0	22.30	53.80	3,295.3	678.5	927.9	1,149.5	0.49	-0.21	-1.16
3,622.0	22.10	52.80	3,382.4	699.8	956.3	1,185.0	0.45	-0.21	-1.06
3,717.0	23.60	56.50	3,469.9	721.1	986.4	1,221.9	2.19	1.58	3.89
3,812.0	22.90	56.80	3,557.2	741.7	1,017.8	1,259.3	0.75	-0.74	0.32
3,906.0	22.80	56.90	3,643.8	761.6	1,048.3	1,295.8	0.11	-0.11	0.11
4,001.0	23.80	55.20	3,731.1	782.6	1,079.5	1,333.3	1.27	1.05	-1.79
4,096.0	22.90	54.40	3,818.3	804.3	1,110.3	1,371.0	1.00	-0.95	-0.84
4,190.0	22.40	54.00	3,905.0	825.5	1,139.6	1,407.2	0.56	-0.53	-0.43
4,285.0	22.80	53.40	3,992.8	847.1	1,169.0	1,443.7	0.49	0.42	-0.63
4,380.0	23.40	53.00	4,080.1	869.5	1,198.9	1,480.9	0.65	0.63	-0.42
4,474.0	23.90	52.10	4,166.2	892.4	1,228.8	1,518.6	0.66	0.53	-0.96
4,569.0	22.40	51.00	4,253.6	915.6	1,258.1	1,556.0	1.64	-1.58	-1.16
4,663.0	24.30	52.90	4,339.9	938.5	1,287.4	1,593.2	2.17	2.02	2.02
4,758.0	23.40	52.50	4,426.8	961.8	1,318.0	1,631.6	0.96	-0.95	-0.42
4,852.0	24.30	53.30	4,512.7	984.7	1,348.3	1,669.6	1.02	0.96	0.85
4,947.0	22.90	53.00	4,599.8	1,007.5	1,378.7	1,707.6	1.48	-1.47	-0.32



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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)	
5,042.0	24.90	54.10	4,686.7	1,030.4	1,409.7	1,746.1	2.16	2.11	1.16	
5,137.0	22.80	53.40	4,773.5	1,053.1	1,440.7	1,784.5	2.23	-2.21	-0.74	
5,231.0	23.70	54.60	4,859.9	1,074.9	1,470.7	1,821.6	1.08	0.96	1.28	
5,326.0	22.90	55.20	4,947.2	1,096.5	1,501.4	1,859.2	0.88	-0.84	0.63	
5,421.0	23.70	55.40	5,034.4	1,117.9	1,532.3	1,896.8	0.85	0.84	0.21	
5,515.0	22.70	54.70	5,120.8	1,139.1	1,562.7	1,933.8	1.10	-1.06	-0.74	
5,610.0	19.90	57.90	5,209.3	1,158.3	1,591.3	1,968.2	3.19	-2.95	3.37	
5,705.0	19.20	59.20	5,298.8	1,174.9	1,618.5	1,999.9	0.87	-0.74	1.37	
5,800.0	19.70	61.20	5,388.4	1,190.6	1,645.9	2,031.3	0.88	0.53	2.11	
5,894.0	20.20	58.90	5,476.8	1,206.6	1,673.7	2,063.2	0.99	0.53	-2.45	
5,989.0	22.80	56.20	5,565.2	1,225.3	1,703.0	2,098.0	2.93	2.74	-2.84	
6,083.0	25.60	53.40	5,650.9	1,247.6	1,734.5	2,136.5	3.22	2.98	-2.98	
6,178.0	25.10	53.40	5,736.7	1,271.8	1,767.1	2,177.1	0.53	-0.53	0.00	
6,273.0	23.20	52.10	5,823.4	1,295.3	1,798.1	2,216.0	2.08	-2.00	-1.37	
6,367.0	24.60	54.20	5,909.4	1,318.2	1,828.6	2,254.1	1.74	1.49	2.23	
6,462.0	23.60	55.00	5,996.1	1,340.6	1,860.2	2,292.9	1.11	-1.05	0.84	
6,557.0	22.50	53.50	6,083.5	1,362.4	1,890.4	2,330.0	1.31	-1.16	-1.58	
6,651.0	24.70	54.70	6,169.6	1,384.4	1,920.9	2,367.7	2.40	2.34	1.28	
6,746.0	23.20	54.80	6,256.4	1,406.7	1,952.4	2,406.2	1.58	-1.58	0.11	
6,841.0	23.70	58.20	6,343.6	1,427.5	1,983.9	2,444.0	1.52	0.53	3.58	
6,935.0	22.70	59.00	6,430.0	1,446.8	2,015.5	2,480.9	1.12	-1.06	0.85	
7,030.0	20.90	58.70	6,518.2	1,465.1	2,045.7	2,516.0	1.90	-1.89	-0.32	
7,125.0	19.20	57.60	6,607.4	1,482.2	2,073.3	2,548.5	1.83	-1.79	-1.16	
7,220.0	20.80	55.70	6,696.7	1,500.1	2,100.5	2,580.9	1.82	1.68	-2.00	
7,315.0	20.60	55.00	6,785.6	1,519.2	2,128.1	2,614.5	0.33	-0.21	-0.74	
7,409.0	18.80	54.60	6,874.1	1,537.5	2,154.0	2,646.2	1.92	-1.91	-0.43	
7,504.0	15.80	53.90	6,964.8	1,554.0	2,176.9	2,674.4	3.17	-3.16	-0.74	
7,599.0	15.30	53.90	7,056.3	1,569.0	2,197.5	2,699.9	0.53	-0.53	0.00	
7,693.0	13.90	54.60	7,147.2	1,582.8	2,216.7	2,723.6	1.50	-1.49	0.74	
7,788.0	12.10	55.30	7,239.8	1,595.1	2,234.2	2,744.9	1.90	-1.89	0.74	
7,883.0	10.50	47.60	7,333.0	1,606.6	2,248.8	2,763.5	2.31	-1.68	-8.11	
7,977.0	8.80	42.00	7,425.6	1,617.7	2,259.9	2,779.1	2.06	-1.81	-5.96	
8,072.0	8.40	42.20	7,519.6	1,628.3	2,269.4	2,793.0	0.42	-0.42	0.21	
8,166.0	7.40	40.90	7,612.7	1,637.9	2,278.0	2,805.6	1.08	-1.06	-1.38	
8,260.0	5.60	38.50	7,706.1	1,646.1	2,284.8	2,815.9	1.94	-1.91	-2.55	
8,354.0	5.80	32.40	7,799.6	1,653.7	2,290.2	2,824.8	0.68	0.21	-6.49	
8,448.0	5.10	31.00	7,893.2	1,661.3	2,294.9	2,833.1	0.76	-0.74	-1.49	
8,542.0	4.10	28.50	7,986.9	1,667.8	2,298.7	2,840.0	1.08	-1.06	-2.66	
8,636.0	3.00	25.90	8,080.7	1,673.0	2,301.4	2,845.2	1.18	-1.17	-2.77	
8,730.0	1.90	8.50	8,174.6	1,676.7	2,302.7	2,848.4	1.40	-1.17	-18.51	
8,824.0	0.90	344.90	8,268.6	1,679.0	2,302.7	2,849.8	1.21	-1.06	-25.11	
8,919.0	1.00	289.90	8,363.6	1,680.0	2,301.7	2,849.6	0.93	0.11	-57.89	
9,013.0	1.40	259.20	8,457.5	1,680.0	2,299.8	2,848.1	0.79	0.43	-32.66	



Survey Report



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Site:	CC 604-41-32 Pad	MD Reference:	RKB @ 8639.0usft (H&P #522)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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9,108.0	2.70	241.90	8,552.5	1,678.8	2,296.7	2,844.9	1.50	1.37	-18.21	
9,203.0	3.70	241.80	8,647.3	1,676.3	2,292.1	2,839.6	1.05	1.05	-0.11	
9,297.0	2.90	259.20	8,741.2	1,674.4	2,287.0	2,834.5	1.35	-0.85	18.51	
9,392.0	2.30	245.60	8,836.1	1,673.2	2,282.9	2,830.4	0.90	-0.63	-14.32	
9,487.0	3.10	248.20	8,931.0	1,671.4	2,278.8	2,826.1	0.85	0.84	2.74	
9,581.0	3.90	259.00	9,024.8	1,669.9	2,273.3	2,820.7	1.10	0.85	11.49	
9,676.0	4.60	254.20	9,119.5	1,668.2	2,266.5	2,814.2	0.83	0.74	-5.05	
9,770.0	5.10	262.90	9,213.2	1,666.7	2,258.7	2,807.0	0.94	0.53	9.26	
9,865.0	5.50	263.10	9,307.8	1,665.6	2,250.0	2,799.4	0.42	0.42	0.21	
9,959.0	5.60	265.60	9,401.4	1,664.7	2,241.0	2,791.6	0.28	0.11	2.66	
10,054.0	5.20	251.10	9,495.9	1,663.0	2,232.3	2,783.5	1.49	-0.42	-15.26	
10,149.0	5.80	250.40	9,590.5	1,659.9	2,223.7	2,774.8	0.64	0.63	-0.74	
10,244.0	5.10	250.50	9,685.1	1,656.9	2,215.2	2,766.2	0.74	-0.74	0.11	
10,338.0	4.60	236.10	9,778.7	1,653.4	2,208.1	2,758.4	1.40	-0.53	-15.32	
10,433.0	4.80	233.70	9,873.4	1,649.0	2,201.7	2,750.6	0.30	0.21	-2.53	
10,528.0	4.40	234.70	9,968.1	1,644.5	2,195.6	2,743.0	0.43	-0.42	1.05	
10,622.0	4.50	233.30	10,061.8	1,640.2	2,189.7	2,735.7	0.16	0.11	-1.49	
10,708.0	5.00	236.80	10,147.5	1,636.1	2,183.8	2,728.6	0.67	0.58	4.07	
Projection to TD @ 10768.0' MD / 10207.3' TVD										
10,768.0	5.00	236.80	10,207.3	1,633.3	2,179.4	2,723.4	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
247.0	247.0	2.0	2.8	First MWD Survey @ 247.0'MD / 247.0' TVD	
10,768.0	10,207.3	1,633.3	2,179.4	Projection to TD @ 10768.0' MD / 10207.3' TVD	

Checked By: _____	Approved By: _____	Date: _____
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