



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC Federal 0697-03-05W

Wellbore #1

Design: Wellbore #1

QES Survey Report

28 July, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC Federal 0697-03-05W
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 0697-03-05W	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 0697-03-05W			
Well Position	+N/-S	0.0 usft	Northing:	1,639,449.37 usft
	+E/-W	0.0 usft	Easting:	2,233,553.24 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	7/22/2019	9.57	65.78	51,417.50000000

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	58.04

Survey Program	Date	7/28/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
232.0	10,177.0	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 @ 232.0' MD / 232.0' TVD									
232.0	1.30	73.70	232.0	0.7	2.5	2.5	0.56	0.56	0.00
386.0	2.70	59.30	385.9	3.1	7.3	7.8	0.96	0.91	-9.35
478.0	3.00	57.90	477.8	5.5	11.2	12.4	0.33	0.33	-1.52
600.0	4.30	61.90	599.5	9.3	18.0	20.2	1.09	1.07	3.28
661.0	5.20	55.50	660.3	12.0	22.3	25.2	1.71	1.48	-10.49
752.0	7.60	63.40	750.7	17.0	31.0	35.3	2.80	2.64	8.68
844.0	10.70	59.80	841.6	24.0	43.9	49.9	3.42	3.37	-3.91
935.0	14.10	58.30	930.4	34.1	60.6	69.5	3.75	3.74	-1.65
1,027.0	16.90	56.20	1,019.1	47.4	81.3	94.0	3.10	3.04	-2.28



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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	20.00	56.00	1,109.2	64.2	106.2	124.1	3.26	3.26	-0.21
1,216.0	21.80	54.60	1,197.0	83.3	133.8	157.6	1.99	1.91	-1.49
1,311.0	24.00	54.50	1,284.5	104.7	163.9	194.5	2.32	2.32	-0.11
1,406.0	25.80	56.20	1,370.7	127.5	196.8	234.4	2.04	1.89	1.79
1,500.0	26.60	59.40	1,455.0	149.5	231.9	275.9	1.73	0.85	3.40
1,595.0	27.50	58.60	1,539.6	171.8	268.9	319.1	1.02	0.95	-0.84
1,690.0	26.20	60.40	1,624.4	193.6	305.9	362.0	1.61	-1.37	1.89
1,784.0	25.60	59.30	1,708.9	214.2	341.4	403.0	0.82	-0.64	-1.17
1,879.0	26.00	58.30	1,794.5	235.6	376.8	444.4	0.62	0.42	-1.05
1,974.0	26.50	58.30	1,879.7	257.7	412.5	486.4	0.53	0.53	0.00
2,068.0	25.00	57.70	1,964.3	279.3	447.1	527.2	1.62	-1.60	-0.64
2,163.0	22.80	56.30	2,051.2	300.3	479.4	565.7	2.39	-2.32	-1.47
2,258.0	21.80	58.10	2,139.1	319.8	509.7	601.7	1.27	-1.05	1.89
2,352.0	21.00	58.70	2,226.6	337.8	538.9	636.0	0.88	-0.85	0.64
2,447.0	21.10	61.80	2,315.3	354.7	568.5	670.1	1.18	0.11	3.26
2,549.0	20.00	61.40	2,410.8	371.7	600.0	705.9	1.09	-1.08	-0.39
2,676.0	18.90	65.20	2,530.5	390.8	637.8	747.9	1.32	-0.87	2.99
2,770.0	18.90	64.50	2,619.4	403.7	665.3	778.2	0.24	0.00	-0.74
2,865.0	20.70	64.60	2,708.8	417.5	694.4	810.2	1.90	1.89	0.11
2,960.0	22.50	64.20	2,797.2	432.7	725.9	844.9	1.90	1.89	-0.42
3,054.0	23.90	60.30	2,883.6	449.9	758.7	881.8	2.21	1.49	-4.15
3,149.0	24.10	56.90	2,970.3	470.0	791.6	920.4	1.47	0.21	-3.58
3,244.0	23.80	56.50	3,057.2	491.2	823.9	959.0	0.36	-0.32	-0.42
3,339.0	21.00	55.90	3,145.0	511.3	854.0	995.2	2.96	-2.95	-0.63
3,433.0	20.70	56.60	3,232.8	529.9	881.8	1,028.6	0.41	-0.32	0.74
3,528.0	21.30	58.30	3,321.5	548.2	910.5	1,062.7	0.90	0.63	1.79
3,623.0	21.90	58.60	3,409.9	566.5	940.3	1,097.6	0.64	0.63	0.32
3,718.0	23.70	56.90	3,497.4	586.2	971.4	1,134.4	2.02	1.89	-1.79
3,812.0	22.60	56.20	3,583.9	606.6	1,002.2	1,171.4	1.21	-1.17	-0.74
3,907.0	22.90	56.00	3,671.5	627.1	1,032.7	1,208.1	0.33	0.32	-0.21
4,001.0	23.50	56.20	3,757.9	647.7	1,063.5	1,245.1	0.64	0.64	0.21
4,096.0	22.00	56.00	3,845.5	668.2	1,093.9	1,281.8	1.58	-1.58	-0.21
4,190.0	21.10	56.20	3,932.9	687.5	1,122.6	1,316.3	0.96	-0.96	0.21
4,285.0	22.40	57.40	4,021.1	706.7	1,152.1	1,351.5	1.45	1.37	1.26
4,380.0	22.90	57.40	4,108.8	726.4	1,182.9	1,388.1	0.53	0.53	0.00
4,474.0	21.90	58.30	4,195.7	745.5	1,213.2	1,423.9	1.12	-1.06	0.96
4,569.0	23.10	58.90	4,283.5	764.4	1,244.2	1,460.3	1.29	1.26	0.63
4,664.0	22.00	59.20	4,371.2	783.2	1,275.5	1,496.7	1.16	-1.16	0.32
4,758.0	23.20	57.60	4,458.0	802.1	1,306.2	1,532.8	1.43	1.28	-1.70
4,853.0	22.60	56.30	4,545.5	822.3	1,337.2	1,569.8	0.83	-0.63	-1.37
4,947.0	23.60	56.10	4,632.0	842.8	1,367.9	1,606.6	1.07	1.06	-0.21
5,042.0	22.20	55.10	4,719.5	863.7	1,398.4	1,643.6	1.53	-1.47	-1.05
5,137.0	22.40	58.10	4,807.4	883.5	1,428.5	1,679.6	1.22	0.21	3.16



Survey Report



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Survey									
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5,231.0	21.80	58.60	4,894.5	902.0	1,458.6	1,715.0	0.67	-0.64	0.53
5,326.0	22.80	58.70	4,982.4	920.8	1,489.4	1,751.0	1.05	1.05	0.11
5,421.0	21.50	59.80	5,070.4	939.1	1,520.1	1,786.8	1.44	-1.37	1.16
5,516.0	22.30	59.70	5,158.5	957.0	1,550.7	1,822.2	0.84	0.84	-0.11
5,610.0	21.20	58.60	5,245.8	974.8	1,580.6	1,857.0	1.25	-1.17	-1.17
5,705.0	19.70	55.80	5,334.8	992.8	1,608.6	1,890.2	1.88	-1.58	-2.95
5,800.0	20.60	54.70	5,424.0	1,011.4	1,635.4	1,922.9	1.03	0.95	-1.16
5,894.0	21.90	55.60	5,511.6	1,030.9	1,663.4	1,956.9	1.43	1.38	0.96
5,989.0	22.30	60.70	5,599.6	1,049.7	1,693.7	1,992.6	2.06	0.42	5.37
6,084.0	24.80	62.10	5,686.7	1,067.9	1,727.1	2,030.5	2.70	2.63	1.47
6,178.0	24.30	62.70	5,772.2	1,086.0	1,761.7	2,069.5	0.59	-0.53	0.64
6,273.0	23.10	62.40	5,859.2	1,103.6	1,795.6	2,107.5	1.27	-1.26	-0.32
6,368.0	23.30	60.80	5,946.5	1,121.4	1,828.5	2,144.9	0.70	0.21	-1.68
6,462.0	23.20	61.20	6,032.9	1,139.4	1,860.9	2,181.9	0.20	-0.11	0.43
6,557.0	22.20	61.90	6,120.5	1,156.8	1,893.2	2,218.5	1.09	-1.05	0.74
6,652.0	21.70	57.30	6,208.7	1,174.8	1,923.8	2,254.0	1.88	-0.53	-4.84
6,746.0	20.50	56.20	6,296.3	1,193.3	1,952.1	2,287.8	1.34	-1.28	-1.17
6,841.0	21.80	58.40	6,385.0	1,211.8	1,980.9	2,322.1	1.60	1.37	2.32
6,936.0	22.00	57.60	6,473.1	1,230.6	2,011.0	2,357.5	0.38	0.21	-0.84
7,030.0	23.60	56.90	6,559.7	1,250.3	2,041.6	2,394.0	1.73	1.70	-0.74
7,125.0	22.50	56.50	6,647.2	1,270.7	2,072.7	2,431.1	1.17	-1.16	-0.42
7,220.0	21.50	56.90	6,735.2	1,290.3	2,102.4	2,466.7	1.06	-1.05	0.42
7,315.0	20.00	56.60	6,824.1	1,308.7	2,130.6	2,500.4	1.58	-1.58	-0.32
7,410.0	17.80	54.70	6,914.0	1,326.1	2,156.0	2,531.1	2.40	-2.32	-2.00
7,504.0	15.90	54.20	7,003.9	1,341.9	2,178.2	2,558.3	2.03	-2.02	-0.53
7,599.0	14.00	54.10	7,095.7	1,356.2	2,198.0	2,582.8	2.00	-2.00	-0.11
7,694.0	12.70	54.00	7,188.1	1,369.1	2,215.8	2,604.6	1.37	-1.37	-0.11
7,788.0	11.00	53.00	7,280.1	1,380.6	2,231.3	2,623.9	1.82	-1.81	-1.06
7,883.0	10.70	55.30	7,373.4	1,391.1	2,245.8	2,641.7	0.55	-0.32	2.42
7,978.0	9.10	53.40	7,467.0	1,400.6	2,259.1	2,658.0	1.72	-1.68	-2.00
8,072.0	8.00	55.20	7,560.0	1,408.7	2,270.4	2,672.0	1.20	-1.17	1.91
8,167.0	6.60	55.50	7,654.2	1,415.6	2,280.4	2,684.0	1.47	-1.47	0.32
8,260.0	4.90	50.70	7,746.7	1,421.1	2,287.8	2,693.3	1.90	-1.83	-5.16
8,354.0	4.10	53.50	7,840.4	1,425.7	2,293.6	2,700.6	0.88	-0.85	2.98
8,448.0	3.30	52.60	7,934.2	1,429.3	2,298.5	2,706.7	0.85	-0.85	-0.96
8,542.0	2.90	53.20	8,028.1	1,432.4	2,302.6	2,711.7	0.43	-0.43	0.64
8,636.0	2.40	53.20	8,122.0	1,435.0	2,306.0	2,716.1	0.53	-0.53	0.00
8,730.0	2.40	41.10	8,215.9	1,437.7	2,308.9	2,719.9	0.54	0.00	-12.87
8,825.0	2.20	56.60	8,310.8	1,440.2	2,311.7	2,723.6	0.69	-0.21	16.32
8,919.0	1.50	64.90	8,404.8	1,441.7	2,314.4	2,726.7	0.80	-0.74	8.83
9,014.0	0.50	68.00	8,499.8	1,442.4	2,315.9	2,728.3	1.05	-1.05	3.26
9,108.0	0.90	270.30	8,593.8	1,442.5	2,315.5	2,728.1	1.46	0.43	-167.77
9,203.0	1.60	273.90	8,688.7	1,442.6	2,313.4	2,726.4	0.74	0.74	3.79



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

Survey										
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9,298.0	2.10	268.80	8,783.7	1,442.7	2,310.4	2,723.8	0.55	0.53	-5.37	
9,392.0	2.50	259.60	8,877.6	1,442.3	2,306.6	2,720.4	0.58	0.43	-9.79	
9,487.0	3.40	259.10	8,972.5	1,441.3	2,301.8	2,715.9	0.95	0.95	-0.53	
9,582.0	4.90	257.10	9,067.2	1,439.9	2,295.1	2,709.4	1.59	1.58	-2.11	
9,771.0	6.90	251.50	9,255.2	1,434.5	2,276.5	2,690.7	1.10	1.06	-2.96	
9,865.0	6.50	251.80	9,348.6	1,431.0	2,266.1	2,680.1	0.43	-0.43	0.32	
9,960.0	6.60	246.50	9,443.0	1,427.2	2,255.9	2,669.4	0.64	0.11	-5.58	
10,054.0	6.70	240.00	9,536.3	1,422.3	2,246.2	2,658.6	0.81	0.11	-6.91	
10,117.0	6.80	242.30	9,598.9	1,418.7	2,239.8	2,651.2	0.46	0.16	3.65	
Projection to TD @ 10177.0' MD / 9658.5' TVD										
10,177.0	6.80	242.30	9,658.5	1,415.4	2,233.5	2,644.1	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
232.0	232.0	0.7	2.5	First MWD Survey @ 232.0' MD / 232.0' TVD	
10,177.0	9,658.5	1,415.4	2,233.5	Projection to TD @ 10177.0' MD / 9658.5' TVD	