



Laramie Energy, LLC

Garfield County, CO

CC 604-41-32 Pad

CC 0697-03-10W

Wellbore #1

Design: Wellbore #1

QES Survey Report

23 August, 2019





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well CC 0697-03-10W
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 0697-03-10W	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 0697-03-10W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,402.51 usft	Latitude:	39.557458
	+E/-W	0.0 usft	Easting:	2,233,536.04 usft	Longitude:	-108.218806
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	8/17/2019	9.55	65.78	51,411.30000000

Design	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	85.02

Survey Program	Date	8/23/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
386.0	10,547.0	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 @ 386.0' MD / 385.9' TVD									
386.0	2.20	122.60	385.9	-4.0	6.2	5.9	0.57	0.57	0.00
477.0	4.10	106.60	476.8	-5.9	10.8	10.3	2.28	2.09	-17.58
569.0	5.40	101.90	568.4	-7.7	18.2	17.5	1.47	1.41	-5.11
660.0	8.30	92.60	658.8	-8.9	29.0	28.1	3.40	3.19	-10.22
752.0	10.30	93.00	749.6	-9.6	43.8	42.8	2.18	2.17	0.43
843.0	12.60	84.60	838.8	-9.1	61.8	60.8	3.12	2.53	-9.23
935.0	14.70	80.20	928.2	-6.2	83.3	82.5	2.54	2.28	-4.78
1,027.0	16.40	80.60	1,016.8	-2.1	107.6	107.1	1.85	1.85	0.43
1,121.0	16.50	83.40	1,106.9	1.6	134.0	133.6	0.85	0.11	2.98



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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)
1,216.0	18.20	81.10	1,197.6	5.5	162.1	161.9	1.93	1.79	-2.42
1,311.0	20.10	83.70	1,287.4	9.6	192.9	193.0	2.19	2.00	2.74
1,405.0	22.10	84.00	1,375.1	13.2	226.6	226.9	2.13	2.13	0.32
1,500.0	22.40	82.10	1,463.0	17.6	262.3	262.8	0.82	0.32	-2.00
1,594.0	22.90	79.10	1,549.7	23.5	298.0	298.9	1.34	0.53	-3.19
1,689.0	22.00	81.60	1,637.5	29.6	333.7	335.1	1.38	-0.95	2.63
1,784.0	21.60	83.10	1,725.7	34.3	368.7	370.3	0.72	-0.42	1.58
1,879.0	21.50	87.90	1,814.1	37.0	403.5	405.2	1.86	-0.11	5.05
1,973.0	20.40	87.20	1,901.9	38.4	437.0	438.7	1.20	-1.17	-0.74
2,068.0	19.00	85.00	1,991.3	40.6	469.0	470.7	1.67	-1.47	-2.32
2,162.0	18.40	86.70	2,080.4	42.8	499.0	500.9	0.86	-0.64	1.81
2,257.0	17.60	85.60	2,170.7	44.7	528.3	530.2	0.91	-0.84	-1.16
2,352.0	18.10	87.50	2,261.2	46.5	557.4	559.3	0.81	0.53	2.00
2,446.0	18.80	87.60	2,350.3	47.8	587.1	589.1	0.75	0.74	0.11
2,541.0	17.30	86.60	2,440.6	49.2	616.5	618.5	1.61	-1.58	-1.05
2,673.0	18.80	82.60	2,566.1	53.1	657.2	659.3	1.47	1.14	-3.03
2,768.0	18.60	83.60	2,656.1	56.8	687.4	689.8	0.40	-0.21	1.05
2,862.0	20.20	84.70	2,744.8	60.0	718.5	721.0	1.75	1.70	1.17
2,957.0	20.10	84.20	2,834.0	63.1	751.1	753.7	0.21	-0.11	-0.53
3,051.0	19.60	84.60	2,922.4	66.3	782.8	785.6	0.55	-0.53	0.43
3,146.0	19.10	83.40	3,012.0	69.5	814.1	817.1	0.67	-0.53	-1.26
3,241.0	19.10	83.60	3,101.8	73.1	845.0	848.2	0.07	0.00	0.21
3,336.0	18.50	84.30	3,191.7	76.3	875.5	878.8	0.67	-0.63	0.74
3,431.0	17.60	84.30	3,282.1	79.2	904.8	908.2	0.95	-0.95	0.00
3,525.0	17.40	87.20	3,371.7	81.3	932.9	936.5	0.95	-0.21	3.09
3,620.0	18.40	86.20	3,462.1	83.0	962.1	965.7	1.10	1.05	-1.05
3,715.0	20.10	86.60	3,551.8	85.0	993.3	997.0	1.79	1.79	0.42
3,809.0	18.90	85.40	3,640.4	87.1	1,024.6	1,028.3	1.35	-1.28	-1.28
3,904.0	19.90	86.90	3,730.0	89.3	1,056.1	1,059.9	1.18	1.05	1.58
3,999.0	20.30	84.30	3,819.2	91.8	1,088.7	1,092.5	1.03	0.42	-2.74
4,093.0	18.10	82.90	3,908.0	95.2	1,119.4	1,123.4	2.39	-2.34	-1.49
4,188.0	18.90	83.30	3,998.1	98.8	1,149.3	1,153.6	0.85	0.84	0.42
4,282.0	19.70	82.70	4,086.8	102.6	1,180.2	1,184.6	0.88	0.85	-0.64
4,377.0	19.40	82.10	4,176.3	106.8	1,211.7	1,216.4	0.38	-0.32	-0.63
4,472.0	20.10	82.50	4,265.7	111.1	1,243.5	1,248.4	0.75	0.74	0.42
4,566.0	19.60	82.10	4,354.1	115.4	1,275.1	1,280.3	0.55	-0.53	-0.43
4,661.0	18.60	82.40	4,443.9	119.6	1,305.9	1,311.4	1.06	-1.05	0.32
4,755.0	19.50	87.10	4,532.8	122.3	1,336.4	1,342.0	1.89	0.96	5.00
4,850.0	18.60	87.70	4,622.6	123.8	1,367.4	1,373.0	0.97	-0.95	0.63
4,945.0	19.60	83.90	4,712.3	126.1	1,398.4	1,404.1	1.68	1.05	-4.00
5,039.0	19.30	82.30	4,801.0	129.8	1,429.5	1,435.3	0.65	-0.32	-1.70
5,134.0	19.30	85.20	4,890.6	133.2	1,460.7	1,466.7	1.01	0.00	3.05
5,229.0	21.00	86.30	4,979.8	135.6	1,493.3	1,499.4	1.83	1.79	1.16



Survey Report



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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)	
5,323.0	21.20	85.00	5,067.5	138.2	1,527.0	1,533.3	0.54	0.21	-1.38	
5,418.0	19.20	81.90	5,156.7	141.9	1,559.6	1,566.1	2.39	-2.11	-3.26	
5,513.0	18.30	82.60	5,246.6	146.0	1,589.9	1,596.6	0.98	-0.95	0.74	
5,608.0	21.00	82.10	5,336.1	150.3	1,621.5	1,628.5	2.85	2.84	-0.53	
5,702.0	20.00	79.00	5,424.1	155.7	1,654.0	1,661.3	1.57	-1.06	-3.30	
5,797.0	20.20	83.00	5,513.4	160.8	1,686.2	1,693.8	1.46	0.21	4.21	
5,892.0	21.30	85.10	5,602.2	164.2	1,719.7	1,727.5	1.40	1.16	2.21	
5,986.0	20.20	83.80	5,690.1	167.5	1,752.9	1,760.8	1.27	-1.17	-1.38	
6,081.0	21.00	85.80	5,779.0	170.5	1,786.1	1,794.2	1.12	0.84	2.11	
6,176.0	20.30	85.50	5,867.9	173.0	1,819.5	1,827.7	0.75	-0.74	-0.32	
6,270.0	20.10	85.90	5,956.1	175.4	1,851.9	1,860.1	0.26	-0.21	0.43	
6,365.0	18.50	85.60	6,045.8	177.8	1,883.2	1,891.5	1.69	-1.68	-0.32	
6,460.0	19.80	86.40	6,135.5	179.9	1,914.3	1,922.7	1.40	1.37	0.84	
6,554.0	18.80	88.00	6,224.2	181.5	1,945.3	1,953.7	1.20	-1.06	1.70	
6,649.0	19.20	85.10	6,314.1	183.3	1,976.2	1,984.7	1.08	0.42	-3.05	
6,744.0	20.00	83.70	6,403.6	186.5	2,007.9	2,016.5	0.98	0.84	-1.47	
6,838.0	19.50	82.60	6,492.0	190.2	2,039.4	2,048.3	0.66	-0.53	-1.17	
6,933.0	17.80	84.20	6,582.0	193.7	2,069.6	2,078.6	1.87	-1.79	1.68	
7,028.0	17.40	83.80	6,672.6	196.7	2,098.2	2,107.3	0.44	-0.42	-0.42	
7,122.0	17.10	83.60	6,762.4	199.8	2,125.9	2,135.2	0.33	-0.32	-0.21	
7,217.0	15.90	82.70	6,853.5	203.0	2,152.7	2,162.2	1.29	-1.26	-0.95	
7,312.0	13.90	82.30	6,945.3	206.2	2,176.9	2,186.6	2.11	-2.11	-0.42	
7,407.0	12.00	84.00	7,037.8	208.8	2,198.0	2,207.9	2.04	-2.00	1.79	
7,502.0	11.50	82.10	7,130.8	211.1	2,217.2	2,227.2	0.67	-0.53	-2.00	
7,596.0	10.20	83.60	7,223.2	213.3	2,234.8	2,244.9	1.42	-1.38	1.60	
7,691.0	9.80	83.30	7,316.7	215.2	2,251.2	2,261.4	0.42	-0.42	-0.32	
7,785.0	8.30	83.50	7,409.6	216.9	2,265.9	2,276.1	1.60	-1.60	0.21	
7,880.0	7.60	75.90	7,503.6	219.2	2,278.8	2,289.2	1.33	-0.74	-8.00	
7,975.0	7.50	74.90	7,597.8	222.3	2,290.8	2,301.5	0.17	-0.11	-1.05	
8,070.0	5.80	78.90	7,692.2	224.9	2,301.5	2,312.4	1.85	-1.79	4.21	
8,164.0	3.90	82.90	7,785.8	226.2	2,309.4	2,320.3	2.05	-2.02	4.26	
8,258.0	2.80	93.70	7,879.7	226.4	2,314.8	2,325.8	1.34	-1.17	11.49	
8,351.0	1.60	118.70	7,972.6	225.7	2,318.2	2,329.1	1.62	-1.29	26.88	
8,445.0	1.40	171.30	8,066.6	223.9	2,319.6	2,330.3	1.43	-0.21	55.96	
8,539.0	0.50	290.10	8,160.6	222.9	2,319.4	2,330.0	1.81	-0.96	126.38	
8,633.0	1.00	324.40	8,254.6	223.7	2,318.5	2,329.2	0.69	0.53	36.49	
8,727.0	1.60	292.10	8,348.5	224.9	2,316.8	2,327.6	0.98	0.64	-34.36	
8,822.0	2.00	267.50	8,443.5	225.3	2,313.9	2,324.7	0.91	0.42	-25.89	
8,916.0	2.50	256.60	8,537.4	224.8	2,310.3	2,321.1	0.70	0.53	-11.60	
9,011.0	2.50	254.60	8,632.3	223.7	2,306.3	2,317.0	0.09	0.00	-2.11	
9,106.0	3.10	250.10	8,727.2	222.3	2,301.9	2,312.5	0.67	0.63	-4.74	
9,200.0	3.40	246.30	8,821.1	220.3	2,296.9	2,307.4	0.39	0.32	-4.04	
9,295.0	4.00	242.30	8,915.9	217.6	2,291.4	2,301.6	0.69	0.63	-4.21	



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9,389.0	4.90	238.60	9,009.6	214.0	2,285.1	2,295.0	1.00	0.96	-3.94	
9,484.0	6.00	240.40	9,104.1	209.5	2,277.3	2,286.9	1.17	1.16	1.89	
9,579.0	5.60	242.10	9,198.7	204.8	2,268.9	2,278.1	0.46	-0.42	1.79	
9,673.0	5.60	235.90	9,292.2	200.1	2,261.0	2,269.9	0.64	0.00	-6.60	
9,768.0	4.80	237.60	9,386.8	195.4	2,253.8	2,262.3	0.86	-0.84	1.79	
9,862.0	5.40	237.00	9,480.5	190.9	2,246.8	2,254.9	0.64	0.64	-0.64	
9,957.0	6.50	237.30	9,574.9	185.5	2,238.5	2,246.2	1.16	1.16	0.32	
10,052.0	6.70	237.50	9,669.3	179.7	2,229.3	2,236.5	0.21	0.21	0.21	
10,146.0	6.40	235.20	9,762.7	173.7	2,220.4	2,227.1	0.42	-0.32	-2.45	
10,241.0	6.50	234.50	9,857.1	167.6	2,211.7	2,217.9	0.13	0.11	-0.74	
10,336.0	6.70	233.70	9,951.5	161.2	2,202.8	2,208.5	0.23	0.21	-0.84	
10,430.0	7.20	234.00	10,044.8	154.5	2,193.7	2,198.8	0.53	0.53	0.32	
10,487.0	7.60	235.70	10,101.3	150.2	2,187.6	2,192.4	0.80	0.70	2.98	
Projection to TD @ 10547.0' MD / 10160.8' TVD										
10,547.0	7.60	235.70	10,160.8	145.8	2,181.1	2,185.5	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
386.0	385.9	-4.0	6.2	First MWD Survey @ 386.0' MD / 385.9' TVD	
10,547.0	10,160.8	145.8	2,181.1	Projection to TD @ 10547.0' MD / 10160.8' TVD	