



# **Laramie Energy, LLC**

**Garfield County, CO**

**CC 604-41-32 Pad**

**CC Federal 0697-03-03W**

**Wellbore #1**

**Design: Wellbore #1**

## **QES Survey Report**

**17 July, 2019**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well CC Federal 0697-03-03W
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	Well @ 8639.0usft (H&P #522)
<b>Site:</b>	CC 604-41-32 Pad	<b>MD Reference:</b>	Well @ 8639.0usft (H&P #522)
<b>Well:</b>	CC Federal 0697-03-03W	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 5000.1 Single User Db

<b>Project</b>	Garfield County, CO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	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 0697-03-03W					
Well Position	+N/-S	0.0 usft	Northing:	1,639,468.12 usft	Latitude:	39.557640
	+E/-W	0.0 usft	Easting:	2,233,560.01 usft	Longitude:	-108.218728
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	8,609.0 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	7/11/2019	9.57	65.80	51,420.70000000

<b>Design</b>	Wellbore #1				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	49.95	

<b>Survey Program</b>	<b>Date</b>	7/17/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
341.0	10,260.0	QES MWD Surveys (Wellbore #1)	MWD	OWSG MWD - Standard	

<b>Survey</b>									
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>First MWD Survey @ 341.0'MD / 340.8' TVD</b>									
341.0	3.60	43.70	340.8	7.7	7.4	10.6	1.06	1.06	0.00
388.0	4.00	42.40	387.7	10.0	9.5	13.7	0.87	0.85	-2.77
479.0	5.50	46.60	478.4	15.4	14.8	21.2	1.69	1.65	4.62
571.0	8.10	50.00	569.7	22.6	23.0	32.1	2.86	2.83	3.70
662.0	11.40	50.30	659.4	32.4	34.8	47.5	3.63	3.63	0.33
754.0	14.60	49.80	749.0	45.7	50.7	68.2	3.48	3.48	-0.54
845.0	18.70	50.30	836.2	62.4	70.7	94.3	4.51	4.51	0.55
937.0	20.30	50.70	922.9	82.0	94.4	125.0	1.75	1.74	0.43
1,029.0	23.20	49.50	1,008.3	103.9	120.5	159.1	3.19	3.15	-1.30



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<b>Site:</b>	CC 604-41-32 Pad	<b>MD Reference:</b>	Well @ 8639.0usft (H&P #522)
<b>Well:</b>	CC Federal 0697-03-03W	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	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	25.20	48.00	1,094.1	129.3	149.5	197.6	2.23	2.13	-1.60
1,218.0	26.90	47.30	1,179.4	157.4	180.3	239.3	1.82	1.79	-0.74
1,313.0	27.90	48.60	1,263.8	186.7	212.8	283.0	1.23	1.05	1.37
1,407.0	29.10	49.00	1,346.4	216.2	246.5	327.8	1.29	1.28	0.43
1,502.0	29.80	49.90	1,429.1	246.6	282.0	374.5	0.87	0.74	0.95
1,596.0	29.90	49.90	1,510.6	276.7	317.8	421.3	0.11	0.11	0.00
1,691.0	30.00	50.40	1,592.9	307.1	354.2	468.7	0.28	0.11	0.53
1,786.0	29.80	49.30	1,675.3	337.6	390.4	516.1	0.61	-0.21	-1.16
1,880.0	29.20	47.50	1,757.1	368.3	425.0	562.4	1.14	-0.64	-1.91
1,975.0	28.50	49.50	1,840.3	398.7	459.3	608.2	1.25	-0.74	2.11
2,070.0	27.80	47.50	1,924.1	428.4	492.9	653.0	1.24	-0.74	-2.11
2,164.0	26.50	50.90	2,007.7	456.4	525.3	695.9	2.15	-1.38	3.62
2,259.0	25.40	49.00	2,093.1	483.2	557.2	737.4	1.45	-1.16	-2.00
2,354.0	23.70	47.40	2,179.6	509.5	586.6	776.9	1.92	-1.79	-1.68
2,448.0	22.10	51.90	2,266.2	533.2	614.4	813.4	2.52	-1.70	4.79
2,545.0	20.50	51.40	2,356.5	555.0	642.1	848.6	1.66	-1.65	-0.52
2,673.0	15.30	46.50	2,478.3	580.7	671.9	887.9	4.23	-4.06	-3.83
2,768.0	17.00	51.70	2,569.5	597.9	691.8	914.3	2.35	1.79	5.47
2,862.0	17.20	52.20	2,659.4	614.9	713.6	941.9	0.26	0.21	0.53
2,957.0	20.20	52.90	2,749.4	633.4	737.8	972.4	3.17	3.16	0.74
3,052.0	21.90	53.30	2,838.0	653.9	765.1	1,006.4	1.80	1.79	0.42
3,146.0	23.60	52.10	2,924.7	676.0	794.0	1,042.7	1.87	1.81	-1.28
3,241.0	24.30	51.00	3,011.5	699.9	824.2	1,081.3	0.87	0.74	-1.16
3,336.0	24.90	50.90	3,097.9	724.9	854.9	1,120.8	0.63	0.63	-0.11
3,431.0	23.80	50.20	3,184.5	749.7	885.2	1,160.0	1.20	-1.16	-0.74
3,525.0	21.90	49.60	3,271.1	773.2	913.1	1,196.5	2.04	-2.02	-0.64
3,620.0	22.10	48.40	3,359.2	796.6	939.9	1,232.1	0.52	0.21	-1.26
3,715.0	23.50	48.90	3,446.7	820.9	967.6	1,268.9	1.49	1.47	0.53
3,810.0	26.30	51.60	3,532.9	846.4	998.3	1,308.9	3.18	2.95	2.84
3,904.0	26.20	47.30	3,617.2	873.5	1,029.9	1,350.4	2.03	-0.11	-4.57
3,999.0	26.70	47.30	3,702.3	902.1	1,061.0	1,392.7	0.53	0.53	0.00
4,093.0	25.20	46.30	3,786.8	930.3	1,091.0	1,433.7	1.66	-1.60	-1.06
4,188.0	25.30	47.70	3,872.7	957.9	1,120.6	1,474.2	0.64	0.11	1.47
4,282.0	25.40	49.50	3,957.7	984.5	1,150.8	1,514.4	0.83	0.11	1.91
4,377.0	25.80	49.20	4,043.3	1,011.3	1,182.0	1,555.5	0.44	0.42	-0.32
4,471.0	24.40	48.30	4,128.5	1,037.6	1,212.0	1,595.4	1.54	-1.49	-0.96
4,566.0	24.60	49.20	4,214.9	1,063.5	1,241.6	1,634.7	0.45	0.21	0.95
4,661.0	25.00	51.30	4,301.1	1,089.0	1,272.2	1,674.6	1.02	0.42	2.21
4,755.0	24.10	51.00	4,386.6	1,113.5	1,302.6	1,713.6	0.97	-0.96	-0.32
4,850.0	23.90	51.60	4,473.4	1,137.7	1,332.8	1,752.3	0.33	-0.21	0.63
4,945.0	24.70	51.40	4,560.0	1,162.0	1,363.4	1,791.3	0.85	0.84	-0.21
5,039.0	22.90	51.10	4,646.0	1,185.7	1,393.0	1,829.3	1.92	-1.91	-0.32
5,134.0	24.00	49.10	4,733.2	1,210.0	1,421.9	1,867.1	1.43	1.16	-2.11



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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)
5,229.0	24.00	49.60	4,820.0	1,235.2	1,451.3	1,905.7	0.21	0.00	0.53
5,324.0	21.70	48.80	4,907.5	1,259.3	1,479.2	1,942.6	2.44	-2.42	-0.84
5,418.0	22.80	49.70	4,994.5	1,282.5	1,506.2	1,978.2	1.23	1.17	0.96
5,513.0	23.50	50.20	5,081.8	1,306.5	1,534.8	2,015.5	0.77	0.74	0.53
5,608.0	22.30	52.00	5,169.4	1,329.7	1,563.5	2,052.5	1.46	-1.26	1.89
5,702.0	22.10	51.20	5,256.4	1,351.8	1,591.3	2,088.0	0.39	-0.21	-0.85
5,797.0	22.50	51.10	5,344.3	1,374.4	1,619.4	2,124.0	0.42	0.42	-0.11
5,892.0	22.90	51.90	5,431.9	1,397.2	1,648.1	2,160.7	0.53	0.42	0.84
5,987.0	24.70	53.30	5,518.8	1,420.5	1,678.6	2,199.0	1.99	1.89	1.47
6,081.0	25.90	51.80	5,603.8	1,444.9	1,710.5	2,239.1	1.45	1.28	-1.60
6,176.0	25.20	51.50	5,689.5	1,470.4	1,742.6	2,280.0	0.75	-0.74	-0.32
6,270.0	25.70	49.60	5,774.4	1,496.0	1,773.8	2,320.4	1.02	0.53	-2.02
6,365.0	24.70	50.10	5,860.4	1,522.1	1,804.7	2,360.9	1.08	-1.05	0.53
6,460.0	25.70	50.20	5,946.3	1,548.0	1,835.7	2,401.3	1.05	1.05	0.11
6,554.0	25.40	50.60	6,031.1	1,573.9	1,867.0	2,441.9	0.37	-0.32	0.43
6,649.0	24.50	49.40	6,117.3	1,599.6	1,897.7	2,481.9	1.09	-0.95	-1.26
6,744.0	25.50	50.20	6,203.4	1,625.5	1,928.3	2,522.1	1.11	1.05	0.84
6,838.0	24.90	50.60	6,288.4	1,651.1	1,959.2	2,562.1	0.66	-0.64	0.43
6,933.0	22.70	50.50	6,375.3	1,675.4	1,988.8	2,600.4	2.32	-2.32	-0.11
7,028.0	22.60	51.10	6,463.0	1,698.5	2,017.1	2,637.0	0.27	-0.11	0.63
7,123.0	20.60	50.40	6,551.3	1,720.6	2,044.2	2,672.0	2.12	-2.11	-0.74
7,217.0	20.70	51.60	6,639.3	1,741.5	2,070.0	2,705.1	0.46	0.11	1.28
7,312.0	20.80	51.30	6,728.1	1,762.5	2,096.3	2,738.8	0.15	0.11	-0.32
7,407.0	19.60	52.20	6,817.3	1,782.8	2,122.1	2,771.6	1.30	-1.26	0.95
7,502.0	17.70	51.80	6,907.3	1,801.5	2,146.0	2,801.9	2.00	-2.00	-0.42
7,596.0	15.60	51.30	6,997.3	1,818.2	2,167.1	2,828.8	2.24	-2.23	-0.53
7,691.0	13.80	50.90	7,089.2	1,833.4	2,185.9	2,852.9	1.90	-1.89	-0.42
7,785.0	11.50	47.60	7,180.9	1,846.8	2,201.5	2,873.5	2.56	-2.45	-3.51
7,880.0	9.90	46.00	7,274.3	1,858.8	2,214.3	2,891.1	1.71	-1.68	-1.68
7,975.0	8.00	45.10	7,368.1	1,869.2	2,224.9	2,905.9	2.01	-2.00	-0.95
8,070.0	8.10	47.80	7,462.2	1,878.3	2,234.5	2,919.1	0.41	0.11	2.84
8,164.0	6.80	46.30	7,555.4	1,886.6	2,243.5	2,931.3	1.40	-1.38	-1.60
8,258.0	6.20	46.00	7,648.8	1,894.0	2,251.2	2,941.9	0.64	-0.64	-0.32
8,352.0	4.50	37.70	7,742.4	1,900.4	2,257.1	2,950.6	1.98	-1.81	-8.83
8,446.0	4.40	46.80	7,836.1	1,905.8	2,261.9	2,957.8	0.76	-0.11	9.68
8,540.0	4.90	63.40	7,929.8	1,910.1	2,268.2	2,965.3	1.52	0.53	17.66
8,633.0	4.20	67.50	8,022.5	1,913.2	2,274.9	2,972.4	0.83	-0.75	4.41
8,727.0	3.60	67.70	8,116.3	1,915.6	2,280.8	2,978.5	0.64	-0.64	0.21
8,822.0	2.30	73.10	8,211.2	1,917.3	2,285.4	2,983.1	1.40	-1.37	5.68
8,916.0	1.80	86.50	8,305.1	1,917.9	2,288.6	2,986.0	0.73	-0.53	14.26
9,011.0	0.70	137.40	8,400.1	1,917.6	2,290.5	2,987.2	1.54	-1.16	53.58
9,106.0	1.10	197.00	8,495.1	1,916.3	2,290.6	2,986.5	1.01	0.42	62.74
9,201.0	2.00	199.60	8,590.0	1,913.9	2,289.8	2,984.3	0.95	0.95	2.74



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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	EDM 5000.1 Single User Db

Survey										
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9,295.0	2.40	203.80	8,684.0	1,910.5	2,288.5	2,981.1	0.46	0.43	4.47	
9,390.0	2.90	207.40	8,778.9	1,906.6	2,286.6	2,977.1	0.55	0.53	3.79	
9,484.0	3.70	215.60	8,872.7	1,902.0	2,283.7	2,972.0	0.99	0.85	8.72	
9,579.0	4.10	226.50	8,967.5	1,897.2	2,279.5	2,965.6	0.88	0.42	11.47	
9,674.0	4.50	230.00	9,062.2	1,892.4	2,274.1	2,958.5	0.50	0.42	3.68	
9,768.0	5.80	228.40	9,155.8	1,886.9	2,267.8	2,950.1	1.39	1.38	-1.70	
9,862.0	6.60	230.40	9,249.3	1,880.3	2,260.0	2,939.9	0.88	0.85	2.13	
9,957.0	6.40	232.90	9,343.7	1,873.6	2,251.6	2,929.2	0.36	-0.21	2.63	
10,052.0	5.30	233.70	9,438.2	1,867.8	2,243.9	2,919.5	1.16	-1.16	0.84	
10,146.0	5.40	232.70	9,531.8	1,862.6	2,236.8	2,910.8	0.15	0.11	-1.06	
10,200.0	5.30	232.10	9,585.5	1,859.5	2,232.9	2,905.7	0.21	-0.19	-1.11	
Projection To TD @ 10260.0' MD / 9645.3' TVD										
10,260.0	5.30	232.10	9,645.3	1,856.1	2,228.5	2,900.2	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
341.0	340.8	7.7	7.4	First MWD Survey @ 341.0'MD / 340.8' TVD	
10,260.0	9,645.3	1,856.1	2,228.5	Projection To TD @ 10260.0' MD / 9645.3' TVD	

Checked By: _____	Approved By: _____	Date: _____
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