



# **Laramie Energy, LLC**

**Garfield County, CO**

**CC 604-41-32 Pad**

**CC 0697-04-06E**

**Wellbore #1**

**Design: Wellbore #1**

## **QES Survey Report**

**03 June, 2019**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well CC 0697-04-06E
<b>Project:</b>	Garfield County, CO	<b>TVD Reference:</b>	Well @ 8639.0usft (RKB 30')
<b>Site:</b>	CC 604-41-32 Pad	<b>MD Reference:</b>	Well @ 8639.0usft (RKB 30')
<b>Well:</b>	CC 0697-04-06E	<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 0697-04-06E					
Well Position	+N/-S	0.0 usft	Northing:	1,639,424.82 usft	Latitude:	39.557519
	+E/-W	0.0 usft	Easting:	2,233,533.61 usft	Longitude:	-108.218817
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	5/25/2019	9.58	65.80	51,434.40000000

<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	325.01	

<b>Survey Program</b>	<b>Date</b>	6/3/2019			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
204.0	10,006.0	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 @ 204.0'MD / 204.0' TVD</b>										
204.0	1.30	354.80	204.0	2.3	-0.2	2.0	0.64	0.64	0.00	
388.0	2.60	332.90	387.9	8.1	-2.3	8.0	0.80	0.71	-11.90	
480.0	4.20	327.80	479.7	12.8	-5.0	13.4	1.77	1.74	-5.54	
571.0	4.70	321.40	570.4	18.5	-9.1	20.4	0.77	0.55	-7.03	
662.0	5.50	318.70	661.1	24.7	-14.4	28.5	0.92	0.88	-2.97	
754.0	5.80	314.70	752.6	31.3	-20.6	37.4	0.54	0.33	-4.35	
845.0	4.90	316.60	843.2	37.4	-26.5	45.8	1.01	-0.99	2.09	
937.0	4.70	313.20	934.9	42.8	-32.0	53.4	0.38	-0.22	-3.70	
1,029.0	4.70	316.30	1,026.6	48.1	-37.3	60.8	0.28	0.00	3.37	



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<b>Site:</b>	CC 604-41-32 Pad	<b>MD Reference:</b>	Well @ 8639.0usft (RKB 30')
<b>Well:</b>	CC 0697-04-06E	<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)
1,124.0	5.10	312.50	1,121.3	53.8	-43.1	68.8	0.54	0.42	-4.00
1,218.0	5.10	319.30	1,214.9	59.8	-48.9	77.0	0.64	0.00	7.23
1,313.0	5.60	325.50	1,309.5	66.8	-54.3	85.8	0.80	0.53	6.53
1,407.0	6.60	323.70	1,402.9	74.9	-60.1	95.8	1.08	1.06	-1.91
1,502.0	6.30	327.80	1,497.3	83.7	-66.1	106.5	0.58	-0.32	4.32
1,597.0	6.40	329.40	1,591.8	92.7	-71.6	117.0	0.21	0.11	1.68
1,691.0	6.90	330.60	1,685.1	102.1	-77.0	127.8	0.55	0.53	1.28
1,786.0	6.90	327.90	1,779.4	111.9	-82.8	139.2	0.34	0.00	-2.84
1,881.0	6.20	327.80	1,873.8	121.1	-88.6	150.0	0.74	-0.74	-0.11
1,975.0	6.00	327.70	1,967.3	129.6	-93.9	160.0	0.21	-0.21	-0.11
2,070.0	5.40	321.70	2,061.8	137.3	-99.4	169.4	0.89	-0.63	-6.32
2,165.0	5.10	325.50	2,156.4	144.3	-104.5	178.1	0.48	-0.32	4.00
2,259.0	5.30	325.60	2,250.0	151.3	-109.3	186.6	0.21	0.21	0.11
2,354.0	5.20	322.60	2,344.6	158.3	-114.4	195.3	0.31	-0.11	-3.16
2,449.0	4.40	316.00	2,439.3	164.4	-119.6	203.2	1.02	-0.84	-6.95
2,543.0	4.40	323.50	2,533.0	169.9	-124.2	210.4	0.61	0.00	7.98
2,635.0	4.30	325.00	2,624.7	175.5	-128.3	217.4	0.16	-0.11	1.63
2,731.0	5.00	311.20	2,720.4	181.2	-133.5	225.0	1.37	0.73	-14.38
2,826.0	5.30	321.20	2,815.1	187.4	-139.4	233.4	0.99	0.32	10.53
2,920.0	5.10	336.70	2,908.7	194.6	-143.8	241.9	1.50	-0.21	16.49
3,015.0	4.80	338.30	3,003.3	202.2	-146.9	249.9	0.35	-0.32	1.68
3,110.0	3.80	330.20	3,098.0	208.6	-149.9	256.9	1.23	-1.05	-8.53
3,204.0	4.00	334.40	3,191.8	214.2	-152.9	263.2	0.37	0.21	4.47
3,299.0	5.50	327.10	3,286.5	221.1	-156.8	271.0	1.70	1.58	-7.68
3,394.0	4.20	316.50	3,381.2	227.4	-161.7	279.0	1.66	-1.37	-11.16
3,488.0	6.10	323.70	3,474.8	233.9	-167.0	287.4	2.13	2.02	7.66
3,583.0	7.00	336.50	3,569.2	243.3	-172.3	298.1	1.80	0.95	13.47
3,678.0	6.50	336.60	3,663.5	253.5	-176.7	309.1	0.53	-0.53	0.11
3,772.0	5.50	336.40	3,757.0	262.6	-180.7	318.7	1.06	-1.06	-0.21
3,867.0	6.00	338.30	3,851.5	271.3	-184.3	328.0	0.56	0.53	2.00
3,962.0	5.30	336.20	3,946.0	280.0	-187.9	337.1	0.77	-0.74	-2.21
4,056.0	7.40	339.40	4,039.5	289.6	-191.8	347.2	2.26	2.23	3.40
4,151.0	7.30	339.60	4,133.7	301.0	-196.1	359.0	0.11	-0.11	0.21
4,246.0	6.60	340.80	4,228.0	311.8	-200.0	370.1	0.75	-0.74	1.26
4,341.0	7.00	341.50	4,322.3	322.4	-203.6	380.9	0.43	0.42	0.74
4,435.0	5.90	340.30	4,415.7	332.4	-207.0	391.1	1.18	-1.17	-1.28
4,530.0	6.20	339.90	4,510.2	341.8	-210.4	400.7	0.32	0.32	-0.42
4,625.0	5.80	342.00	4,604.7	351.2	-213.7	410.3	0.48	-0.42	2.21
4,719.0	5.00	343.50	4,698.3	359.7	-216.3	418.7	0.86	-0.85	1.60
4,814.0	5.80	337.10	4,792.8	368.1	-219.4	427.3	1.05	0.84	-6.74
4,909.0	5.40	335.10	4,887.4	376.5	-223.1	436.4	0.47	-0.42	-2.11
5,003.0	4.70	333.30	4,981.0	384.0	-226.7	444.6	0.76	-0.74	-1.91
5,098.0	4.70	324.10	5,075.7	390.6	-230.7	452.3	0.79	0.00	-9.68



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<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)	
5,192.0	5.30	309.80	5,169.3	396.5	-236.3	460.4	1.47	0.64	-15.21	
5,287.0	5.90	308.50	5,263.9	402.4	-243.5	469.3	0.65	0.63	-1.37	
5,382.0	5.70	320.30	5,358.4	409.0	-250.4	478.7	1.27	-0.21	12.42	
5,476.0	5.70	335.70	5,451.9	416.9	-255.3	487.9	1.62	0.00	16.38	
5,571.0	5.30	337.60	5,546.5	425.2	-258.9	496.8	0.46	-0.42	2.00	
5,665.0	5.00	337.40	5,640.1	433.0	-262.1	505.1	0.32	-0.32	-0.21	
5,760.0	4.30	337.10	5,734.8	440.1	-265.1	512.6	0.74	-0.74	-0.32	
5,855.0	5.20	334.60	5,829.5	447.3	-268.3	520.3	0.97	0.95	-2.63	
5,949.0	5.00	332.10	5,923.1	454.8	-272.1	528.6	0.32	-0.21	-2.66	
6,044.0	5.00	332.00	6,017.8	462.1	-275.9	536.8	0.01	0.00	-0.11	
6,139.0	5.20	334.10	6,112.4	469.6	-279.8	545.2	0.29	0.21	2.21	
6,234.0	4.90	334.80	6,207.0	477.2	-283.4	553.4	0.32	-0.32	0.74	
6,328.0	4.70	330.80	6,300.7	484.2	-287.0	561.2	0.41	-0.21	-4.26	
6,423.0	4.00	336.10	6,395.4	490.6	-290.2	568.3	0.85	-0.74	5.58	
6,518.0	4.10	329.40	6,490.2	496.5	-293.3	575.0	0.51	0.11	-7.05	
6,612.0	4.70	329.50	6,583.9	502.7	-296.9	582.2	0.64	0.64	0.11	
6,707.0	4.60	321.60	6,678.6	509.1	-301.3	589.8	0.68	-0.11	-8.32	
6,802.0	4.80	337.30	6,773.3	515.7	-305.2	597.5	1.37	0.21	16.53	
6,896.0	4.10	341.50	6,867.0	522.6	-307.8	604.6	0.82	-0.74	4.47	
6,991.0	3.50	341.00	6,961.8	528.5	-309.8	610.6	0.63	-0.63	-0.53	
7,086.0	3.10	332.00	7,056.6	533.5	-311.9	616.0	0.69	-0.42	-9.47	
7,180.0	2.50	325.50	7,150.5	537.5	-314.3	620.5	0.72	-0.64	-6.91	
7,275.0	2.20	337.80	7,245.4	540.9	-316.2	624.4	0.62	-0.32	12.95	
7,370.0	1.70	33.70	7,340.4	543.7	-316.1	626.7	1.98	-0.53	58.84	
7,464.0	1.50	57.70	7,434.3	545.5	-314.2	627.1	0.74	-0.21	25.53	
7,559.0	2.20	36.60	7,529.3	547.7	-312.1	627.6	1.02	0.74	-22.21	
7,654.0	2.10	35.20	7,624.2	550.5	-310.0	628.8	0.12	-0.11	-1.47	
7,748.0	1.60	34.80	7,718.2	553.0	-308.3	629.9	0.53	-0.53	-0.43	
7,843.0	2.00	29.10	7,813.1	555.6	-306.7	631.0	0.46	0.42	-6.00	
7,938.0	1.60	28.00	7,908.1	558.2	-305.3	632.4	0.42	-0.42	-1.16	
8,032.0	1.00	27.20	8,002.1	560.1	-304.3	633.3	0.64	-0.64	-0.85	
8,127.0	0.40	44.60	8,097.1	561.1	-303.7	633.8	0.66	-0.63	18.32	
8,222.0	0.50	240.60	8,192.0	561.1	-303.8	633.9	0.94	0.11	-172.63	
8,317.0	1.60	243.40	8,287.0	560.3	-305.4	634.1	1.16	1.16	2.95	
8,412.0	2.50	248.50	8,382.0	558.9	-308.5	634.8	0.97	0.95	5.37	
8,506.0	2.90	239.50	8,475.9	557.0	-312.4	635.5	0.62	0.43	-9.57	
8,601.0	3.10	240.20	8,570.7	554.5	-316.7	635.9	0.21	0.21	0.74	
8,695.0	3.70	243.90	8,664.6	551.9	-321.7	636.6	0.68	0.64	3.94	
8,790.0	4.30	243.50	8,759.3	548.9	-327.6	637.6	0.63	0.63	-0.42	
8,885.0	5.40	243.80	8,854.0	545.4	-334.8	638.8	1.16	1.16	0.32	
8,980.0	4.00	245.30	8,948.7	542.0	-341.8	640.1	1.48	-1.47	1.58	
9,074.0	2.30	247.70	9,042.5	539.9	-346.5	641.1	1.81	-1.81	2.55	
9,169.0	1.90	247.20	9,137.5	538.6	-349.8	641.8	0.42	-0.42	-0.53	



# Survey Report



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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)	
9,264.0	2.50	241.90	9,232.4	537.0	-353.0	642.4	0.67	0.63	-5.58	
9,358.0	3.20	245.50	9,326.3	535.0	-357.2	643.1	0.77	0.74	3.83	
9,453.0	3.90	251.30	9,421.1	532.8	-362.7	644.5	0.83	0.74	6.11	
9,548.0	4.90	243.40	9,515.8	530.0	-369.4	646.0	1.23	1.05	-8.32	
9,642.0	6.30	238.40	9,609.4	525.5	-377.4	646.9	1.58	1.49	-5.32	
9,737.0	7.60	237.00	9,703.7	519.3	-387.1	647.4	1.38	1.37	-1.47	
9,832.0	8.70	233.00	9,797.7	511.6	-398.1	647.4	1.30	1.16	-4.21	
9,926.0	10.40	230.60	9,890.4	501.9	-410.3	646.5	1.86	1.81	-2.55	
9,946.0	10.50	229.60	9,910.1	499.6	-413.1	646.2	1.04	0.50	-5.00	
TD @ 10006.0' MD / 9969.1' TVD										
10,006.0	10.50	229.60	9,969.1	492.5	-421.4	645.1	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
204.0	204.0	2.3	-0.2	First MWD Survey @ 204.0'MD / 204.0' TVD	
10,006.0	9,969.1	492.5	-421.4	TD @ 10006.0' MD / 9969.1' TVD	