



# **Laramie Energy, LLC**

**Mesa County, CO**

**Bruton 19-06 Pad**

**Bruton 19-05E**

**Wellbore #1**

**Design: Wellbore #1**

## **QES Survey Report**

**18 September, 2017**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Bruton 19-05E
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	well @ 7286.0usft (H&P #290)
<b>Site:</b>	Bruton 19-06 Pad	<b>MD Reference:</b>	well @ 7286.0usft (H&P #290)
<b>Well:</b>	Bruton 19-05E	<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>	Mesa 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	Bruton 19-06 Pad				
Site Position:		Northing:	1,528,940.55 usft	Latitude:	39.262756
From:	Lat/Long	Easting:	2,344,737.10 usft	Longitude:	-107.814558
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.46 °

Well	Bruton 19-05E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,009.52 usft	Latitude:	39.262936
	+E/-W	0.0 usft	Easting:	2,344,603.48 usft	Longitude:	-107.815036
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,262.0 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>
	IGRF2015	8/30/2017	9.57	65.42	51,393.53181068

<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	60.05	

<b>Survey Program</b>	<b>Date</b>	9/18/2017			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
204.0	8,311.0	MWD Surveys (Wellbore #1)	MWD default	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 / TVD</b>									
204.0	3.00	60.50	203.9	2.6	4.6	5.3	1.47	1.47	0.00
476.0	12.50	63.90	473.1	19.1	37.4	41.9	3.50	3.49	1.25
567.0	14.70	53.00	561.6	30.4	55.4	63.2	3.70	2.42	-11.98
658.0	16.40	57.60	649.2	44.2	75.5	87.5	2.31	1.87	5.05
749.0	18.20	52.30	736.1	59.8	97.6	114.4	2.63	1.98	-5.82
840.0	20.20	62.00	822.1	75.9	122.7	144.2	4.13	2.20	10.66
930.0	21.40	65.60	906.2	90.0	151.4	176.1	1.95	1.33	4.00
1,025.0	23.90	64.10	993.9	105.5	184.5	212.5	2.70	2.63	-1.58
1,119.0	27.20	61.50	1,078.7	124.1	220.5	253.0	3.71	3.51	-2.77



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<b>Well:</b>	Bruton 19-05E	<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)
1,214.0	31.60	60.30	1,161.4	146.8	261.2	299.6	4.67	4.63	-1.26
1,309.0	33.60	58.30	1,241.5	173.0	305.2	350.8	2.39	2.11	-2.11
1,404.0	33.70	58.50	1,320.5	200.5	350.1	403.4	0.16	0.11	0.21
1,489.0	33.60	60.10	1,391.3	224.6	390.5	450.5	1.05	-0.12	1.88
1,562.0	34.10	60.00	1,451.9	244.9	425.8	491.2	0.69	0.68	-0.14
1,657.0	32.80	59.80	1,531.2	271.1	471.1	543.5	1.37	-1.37	-0.21
1,752.0	32.70	58.80	1,611.1	297.4	515.3	594.9	0.58	-0.11	-1.05
1,846.0	31.90	59.80	1,690.5	323.0	558.5	645.2	1.02	-0.85	1.06
1,941.0	31.00	60.60	1,771.6	347.7	601.5	694.7	1.04	-0.95	0.84
2,036.0	30.70	60.40	1,853.1	371.7	643.9	743.4	0.33	-0.32	-0.21
2,130.0	29.60	61.20	1,934.4	394.7	685.1	790.6	1.25	-1.17	0.85
2,225.0	31.20	59.60	2,016.4	418.5	726.9	838.7	1.89	1.68	-1.68
2,319.0	30.30	59.80	2,097.2	442.7	768.4	886.8	0.96	-0.96	0.21
2,414.0	29.50	59.10	2,179.5	466.8	809.1	934.1	0.92	-0.84	-0.74
2,509.0	31.10	60.80	2,261.5	490.8	850.6	982.0	1.91	1.68	1.79
2,603.0	30.20	60.20	2,342.4	514.3	892.3	1,030.0	1.01	-0.96	-0.64
2,698.0	29.40	60.00	2,424.8	537.9	933.3	1,077.2	0.85	-0.84	-0.21
2,792.0	31.20	60.90	2,506.0	561.3	974.5	1,124.6	1.97	1.91	0.96
2,887.0	30.10	61.70	2,587.7	584.5	1,017.0	1,173.0	1.23	-1.16	0.84
2,981.0	29.20	61.50	2,669.4	606.6	1,057.9	1,219.5	0.96	-0.96	-0.21
3,076.0	31.40	59.00	2,751.4	630.4	1,099.5	1,267.4	2.67	2.32	-2.63
3,170.0	30.50	58.30	2,832.0	655.6	1,140.8	1,315.7	1.03	-0.96	-0.74
3,265.0	29.90	57.80	2,914.1	680.9	1,181.3	1,363.5	0.68	-0.63	-0.53
3,360.0	30.30	60.50	2,996.3	705.3	1,222.2	1,411.1	1.49	0.42	2.84
3,454.0	29.20	60.20	3,078.0	728.4	1,262.8	1,457.8	1.18	-1.17	-0.32
3,549.0	31.50	59.10	3,159.9	752.6	1,304.2	1,505.8	2.49	2.42	-1.16
3,644.0	30.40	58.50	3,241.4	777.9	1,346.0	1,554.6	1.20	-1.16	-0.63
3,738.0	31.60	61.00	3,322.0	802.3	1,387.8	1,603.0	1.87	1.28	2.66
3,833.0	30.40	61.30	3,403.4	825.9	1,430.6	1,651.9	1.27	-1.26	0.32
3,928.0	30.00	60.40	3,485.5	849.2	1,472.4	1,699.7	0.64	-0.42	-0.95
4,022.0	29.00	60.60	3,567.3	872.0	1,512.7	1,746.0	1.07	-1.06	0.21
4,117.0	31.40	60.70	3,649.4	895.4	1,554.3	1,793.8	2.53	2.53	0.11
4,212.0	30.90	60.60	3,730.7	919.5	1,597.1	1,842.9	0.53	-0.53	-0.11
4,306.0	30.10	61.20	3,811.7	942.7	1,638.8	1,890.6	0.91	-0.85	0.64
4,401.0	30.90	59.80	3,893.6	966.4	1,680.8	1,938.8	1.13	0.84	-1.47
4,495.0	30.00	59.80	3,974.6	990.4	1,722.0	1,986.5	0.96	-0.96	0.00
4,590.0	29.70	58.80	4,057.0	1,014.5	1,762.6	2,033.7	0.61	-0.32	-1.05
4,684.0	31.80	61.00	4,137.8	1,038.6	1,804.2	2,081.8	2.53	2.23	2.34
4,779.0	31.10	61.80	4,218.8	1,062.3	1,847.7	2,131.4	0.86	-0.74	0.84
4,873.0	29.90	60.00	4,299.8	1,085.5	1,889.4	2,179.0	1.60	-1.28	-1.91
4,968.0	28.20	60.60	4,382.9	1,108.4	1,929.5	2,225.2	1.82	-1.79	0.63
5,062.0	29.40	57.00	4,465.2	1,131.9	1,968.2	2,270.4	2.24	1.28	-3.83
5,157.0	28.40	57.20	4,548.4	1,156.8	2,006.7	2,316.3	1.06	-1.05	0.21



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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)	
5,251.0	27.10	55.60	4,631.6	1,181.0	2,043.2	2,360.0	1.59	-1.38	-1.70	
5,346.0	25.30	58.00	4,716.8	1,204.0	2,078.3	2,401.8	2.20	-1.89	2.53	
5,441.0	21.70	62.00	4,804.0	1,223.0	2,111.0	2,439.7	4.14	-3.79	4.21	
5,535.0	20.30	62.30	4,891.7	1,238.7	2,140.8	2,473.3	1.49	-1.49	0.32	
5,630.0	19.10	59.80	4,981.1	1,254.2	2,168.8	2,505.3	1.54	-1.26	-2.63	
5,725.0	16.10	60.70	5,071.7	1,268.5	2,193.7	2,534.1	3.17	-3.16	0.95	
5,819.0	14.80	59.10	5,162.3	1,281.0	2,215.4	2,559.1	1.46	-1.38	-1.70	
5,914.0	13.20	58.50	5,254.5	1,292.9	2,235.1	2,582.1	1.69	-1.68	-0.63	
6,008.0	10.90	54.90	5,346.4	1,303.7	2,251.5	2,601.7	2.57	-2.45	-3.83	
6,103.0	10.50	55.70	5,439.7	1,313.7	2,266.0	2,619.2	0.45	-0.42	0.84	
6,197.0	8.50	52.00	5,532.4	1,322.8	2,278.5	2,634.7	2.22	-2.13	-3.94	
6,292.0	8.70	50.40	5,626.4	1,331.7	2,289.6	2,648.7	0.33	0.21	-1.68	
6,386.0	7.30	53.10	5,719.5	1,339.8	2,299.9	2,661.6	1.54	-1.49	2.87	
6,481.0	6.00	51.20	5,813.8	1,346.6	2,308.6	2,672.5	1.39	-1.37	-2.00	
6,576.0	5.10	51.20	5,908.4	1,352.3	2,315.7	2,681.6	0.95	-0.95	0.00	
6,670.0	4.10	56.00	6,002.1	1,356.8	2,321.8	2,689.1	1.14	-1.06	5.11	
6,765.0	3.80	55.90	6,096.8	1,360.5	2,327.2	2,695.6	0.32	-0.32	-0.11	
6,859.0	1.80	79.70	6,190.7	1,362.5	2,331.2	2,700.1	2.42	-2.13	25.32	
6,954.0	1.30	106.90	6,285.7	1,362.4	2,333.7	2,702.3	0.92	-0.53	28.63	
7,048.0	1.10	97.30	6,379.7	1,362.0	2,335.6	2,703.7	0.30	-0.21	-10.21	
7,143.0	0.50	99.60	6,474.7	1,361.8	2,336.9	2,704.8	0.63	-0.63	2.42	
7,238.0	0.60	144.70	6,569.7	1,361.4	2,337.6	2,705.1	0.45	0.11	47.47	
7,332.0	0.70	157.40	6,663.7	1,360.4	2,338.1	2,705.1	0.19	0.11	13.51	
7,427.0	0.60	197.80	6,758.7	1,359.4	2,338.2	2,704.6	0.48	-0.11	42.53	
7,521.0	0.80	191.60	6,852.6	1,358.3	2,337.9	2,703.8	0.23	0.21	-6.60	
7,616.0	1.00	185.30	6,947.6	1,356.8	2,337.7	2,702.9	0.23	0.21	-6.63	
7,711.0	0.70	186.60	7,042.6	1,355.4	2,337.6	2,702.1	0.32	-0.32	1.37	
7,805.0	0.50	233.50	7,136.6	1,354.6	2,337.2	2,701.4	0.54	-0.21	49.89	
7,900.0	0.30	69.50	7,231.6	1,354.5	2,337.1	2,701.2	0.83	-0.21	-172.63	
7,994.0	0.80	12.60	7,325.6	1,355.2	2,337.4	2,701.9	0.73	0.53	-60.53	
8,089.0	0.60	348.80	7,420.6	1,356.3	2,337.5	2,702.5	0.37	-0.21	-25.05	
8,183.0	0.70	318.90	7,514.6	1,357.2	2,337.0	2,702.5	0.37	0.11	-31.81	
8,255.0	1.10	285.30	7,586.6	1,357.7	2,336.1	2,702.0	0.90	0.56	-46.67	
Projection to TD @ 8311.0' MD / 7642.6' TVD										
8,311.0	1.10	285.30	7,642.6	1,358.0	2,335.0	2,701.2	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	203.9	2.6	4.6	First MWD Survey @ 204.0' MD / TVD	
8,311.0	7,642.6	1,358.0	2,335.0	Projection to TD @ 8311.0' MD / 7642.6' TVD	



## Survey Report



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