



# **Laramie Energy, LLC**

**Mesa County, CO**

**Bruton 30-10 Pad**

**Bruton Federal 30-19W**

**A-3**

**Design: A-3**

## **QES Survey Report**

**25 January, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Bruton Federal 30-19W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	well @ 7673.0usft (H&P #522)
<b>Site:</b>	Bruton 30-10 Pad	<b>MD Reference:</b>	well @ 7673.0usft (H&P #522)
<b>Well:</b>	Bruton Federal 30-19W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-3	<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 30-10 Pad				
Site Position:		Northing:	1,523,424.58 usft	Latitude:	39.247725
From:	Map	Easting:	2,346,291.81 usft	Longitude:	-107.808574
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.46 °

Well	Bruton Federal 30-19W					
Well Position	+N/-S	0.0 usft	Northing:	1,523,547.87 usft	Latitude:	39.248058
	+E/-W	0.0 usft	Easting:	2,346,216.68 usft	Longitude:	-107.808850
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,643.0 usft

<b>Wellbore</b>	A-3				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	1/6/2018	9.53	65.41	51,343.99783587

<b>Design</b>	A-3				
<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	227.12	

<b>Survey Program</b>	<b>Date</b>	1/25/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
111.0	8,422.0	QES MWD Surveys (A-3)	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 @ 111.0' MD / 111.0' TVD</b>									
111.0	0.40	342.90	111.0	0.4	-0.1	-0.2	0.36	0.36	0.00
202.0	1.30	228.50	202.0	0.0	-1.0	0.7	1.66	0.99	-125.71
293.0	3.30	229.20	292.9	-2.4	-3.7	4.4	2.20	2.20	0.77
384.0	7.20	225.80	383.5	-8.1	-9.8	12.7	4.30	4.29	-3.74
475.0	10.60	225.90	473.4	-17.9	-19.9	26.8	3.74	3.74	0.11
567.0	12.40	224.20	563.6	-30.9	-32.9	45.1	1.99	1.96	-1.85
658.0	13.70	228.80	652.2	-45.0	-47.8	65.6	1.83	1.43	5.05
749.0	17.70	228.50	739.8	-61.2	-66.3	90.2	4.40	4.40	-0.33
840.0	20.60	223.60	825.8	-82.0	-87.7	120.1	3.64	3.19	-5.38



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<b>Site:</b>	Bruton 30-10 Pad	<b>MD Reference:</b>	well @ 7673.0usft (H&P #522)
<b>Well:</b>	Bruton Federal 30-19W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-3	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-3	<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)
931.0	23.40	223.10	910.1	-106.8	-111.1	154.1	3.08	3.08	-0.55
1,022.0	24.50	233.30	993.3	-131.3	-138.6	190.9	4.70	1.21	11.21
1,116.0	26.80	226.00	1,078.1	-157.7	-169.4	231.4	4.15	2.45	-7.77
1,210.0	28.70	230.00	1,161.3	-186.9	-202.0	275.2	2.83	2.02	4.26
1,305.0	30.60	227.40	1,243.8	-217.9	-237.3	322.2	2.41	2.00	-2.74
1,399.0	33.10	227.30	1,323.7	-251.5	-273.7	371.8	2.66	2.66	-0.11
1,493.0	34.40	229.20	1,401.8	-286.3	-312.7	424.0	1.78	1.38	2.02
1,518.0	34.20	229.90	1,422.5	-295.4	-323.4	438.0	1.77	-0.80	2.80
1,610.0	33.20	229.30	1,499.0	-328.5	-362.3	489.0	1.15	-1.09	-0.65
1,704.0	34.50	228.10	1,577.1	-363.1	-401.6	541.4	1.56	1.38	-1.28
1,799.0	34.10	227.20	1,655.6	-399.1	-441.2	594.9	0.68	-0.42	-0.95
1,893.0	35.60	227.20	1,732.7	-435.6	-480.6	648.6	1.60	1.60	0.00
1,987.0	34.80	227.40	1,809.5	-472.4	-520.4	702.8	0.86	-0.85	0.21
2,081.0	33.90	227.50	1,887.1	-508.2	-559.5	755.8	0.96	-0.96	0.11
2,176.0	36.00	226.90	1,965.0	-545.2	-599.4	810.3	2.24	2.21	-0.63
2,270.0	34.80	226.50	2,041.6	-582.6	-639.0	864.7	1.30	-1.28	-0.43
2,364.0	34.00	226.00	2,119.2	-619.3	-677.4	917.8	0.90	-0.85	-0.53
2,458.0	35.40	226.50	2,196.4	-656.3	-716.1	971.3	1.52	1.49	0.53
2,552.0	34.50	225.60	2,273.5	-693.7	-754.8	1,025.1	1.10	-0.96	-0.96
2,646.0	33.60	225.30	2,351.4	-730.6	-792.3	1,077.8	0.97	-0.96	-0.32
2,740.0	34.70	225.40	2,429.2	-767.7	-829.9	1,130.5	1.17	1.17	0.11
2,835.0	36.50	225.80	2,506.4	-806.4	-869.4	1,185.8	1.91	1.89	0.42
2,929.0	35.20	226.40	2,582.6	-844.5	-909.1	1,240.8	1.43	-1.38	0.64
3,023.0	33.50	225.40	2,660.2	-881.4	-947.2	1,293.8	1.91	-1.81	-1.06
3,117.0	34.20	225.70	2,738.3	-918.1	-984.5	1,346.2	0.77	0.74	0.32
3,212.0	36.40	226.40	2,815.8	-956.2	-1,024.1	1,401.1	2.35	2.32	0.74
3,306.0	35.10	226.10	2,892.1	-994.2	-1,063.7	1,456.0	1.40	-1.38	-0.32
3,400.0	34.30	225.50	2,969.4	-1,031.5	-1,102.1	1,509.5	0.93	-0.85	-0.64
3,494.0	35.00	226.00	3,046.7	-1,068.8	-1,140.4	1,562.9	0.80	0.74	0.53
3,588.0	34.10	226.20	3,124.1	-1,105.7	-1,178.8	1,616.2	0.97	-0.96	0.21
3,682.0	34.90	229.20	3,201.6	-1,141.5	-1,218.2	1,669.4	2.00	0.85	3.19
3,777.0	33.90	228.40	3,280.0	-1,176.9	-1,258.6	1,723.1	1.16	-1.05	-0.84
3,871.0	35.00	227.90	3,357.5	-1,212.4	-1,298.2	1,776.2	1.21	1.17	-0.53
3,965.0	33.90	227.90	3,435.0	-1,248.0	-1,337.6	1,829.4	1.17	-1.17	0.00
4,059.0	34.60	228.10	3,512.7	-1,283.4	-1,376.9	1,882.3	0.75	0.74	0.21
4,153.0	33.80	228.90	3,590.4	-1,318.4	-1,416.5	1,935.1	0.98	-0.85	0.85
4,248.0	32.90	227.50	3,669.8	-1,353.2	-1,455.4	1,987.3	1.25	-0.95	-1.47
4,342.0	34.20	228.20	3,748.1	-1,388.1	-1,494.0	2,039.3	1.44	1.38	0.74
4,436.0	32.70	227.70	3,826.6	-1,422.8	-1,532.4	2,091.1	1.62	-1.60	-0.53
4,530.0	33.30	226.90	3,905.4	-1,457.5	-1,570.1	2,142.3	0.79	0.64	-0.85
4,624.0	33.90	227.60	3,983.7	-1,492.8	-1,608.3	2,194.3	0.76	0.64	0.74
4,718.0	32.60	228.10	4,062.3	-1,527.4	-1,646.5	2,245.8	1.41	-1.38	0.53
4,812.0	33.90	228.60	4,140.9	-1,561.6	-1,685.0	2,297.4	1.41	1.38	0.53



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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)	
4,907.0	32.90	228.10	4,220.2	-1,596.4	-1,724.0	2,349.6	1.09	-1.05	-0.53	
5,001.0	32.10	226.10	4,299.5	-1,630.8	-1,761.0	2,400.1	1.43	-0.85	-2.13	
5,095.0	30.30	227.90	4,379.9	-1,664.0	-1,796.6	2,448.8	2.16	-1.91	1.91	
5,190.0	28.80	227.60	4,462.5	-1,695.5	-1,831.3	2,495.7	1.59	-1.58	-0.32	
5,284.0	27.30	227.90	4,545.5	-1,725.2	-1,864.0	2,539.9	1.60	-1.60	0.32	
5,378.0	25.90	226.40	4,629.5	-1,753.8	-1,894.9	2,582.0	1.65	-1.49	-1.60	
5,472.0	24.40	227.70	4,714.6	-1,781.0	-1,924.1	2,621.9	1.70	-1.60	1.38	
5,567.0	22.90	224.20	4,801.7	-1,807.5	-1,951.5	2,660.0	2.16	-1.58	-3.68	
5,661.0	20.70	226.00	4,888.9	-1,832.2	-1,976.2	2,694.9	2.45	-2.34	1.91	
5,755.0	18.40	230.00	4,977.5	-1,853.2	-1,999.6	2,726.3	2.83	-2.45	4.26	
5,849.0	17.10	227.70	5,067.0	-1,872.1	-2,021.1	2,754.9	1.57	-1.38	-2.45	
5,944.0	15.60	231.10	5,158.2	-1,889.5	-2,041.4	2,781.7	1.87	-1.58	3.58	
6,038.0	13.30	232.60	5,249.2	-1,904.0	-2,059.8	2,805.0	2.48	-2.45	1.60	
6,132.0	10.10	232.00	5,341.2	-1,915.6	-2,074.9	2,824.0	3.41	-3.40	-0.64	
6,226.0	7.00	237.70	5,434.2	-1,923.8	-2,086.3	2,837.9	3.41	-3.30	6.06	
6,320.0	7.00	235.80	5,527.5	-1,930.1	-2,095.9	2,849.1	0.25	0.00	-2.02	
6,415.0	3.60	228.60	5,622.1	-1,935.3	-2,102.9	2,857.9	3.64	-3.58	-7.58	
6,509.0	1.40	249.40	5,716.0	-1,937.6	-2,106.2	2,861.9	2.49	-2.34	22.13	
6,603.0	0.50	8.90	5,810.0	-1,937.6	-2,107.2	2,862.6	1.81	-0.96	127.13	
6,697.0	1.00	16.60	5,904.0	-1,936.5	-2,106.9	2,861.6	0.54	0.53	8.19	
6,792.0	0.40	351.60	5,999.0	-1,935.3	-2,106.7	2,860.7	0.69	-0.63	-26.32	
6,886.0	0.60	279.50	6,093.0	-1,934.9	-2,107.2	2,860.8	0.65	0.21	-76.70	
6,981.0	1.00	254.80	6,187.9	-1,935.1	-2,108.5	2,861.8	0.55	0.42	-26.00	
7,075.0	1.20	226.10	6,281.9	-1,936.0	-2,110.0	2,863.5	0.62	0.21	-30.53	
7,169.0	1.70	235.40	6,375.9	-1,937.4	-2,111.9	2,865.9	0.59	0.53	9.89	
7,263.0	1.80	232.60	6,469.9	-1,939.1	-2,114.2	2,868.8	0.14	0.11	-2.98	
7,357.0	2.20	239.40	6,563.8	-1,940.9	-2,116.9	2,872.0	0.49	0.43	7.23	
7,452.0	2.10	247.30	6,658.7	-1,942.5	-2,120.1	2,875.4	0.33	-0.11	8.32	
7,546.0	2.40	245.40	6,752.7	-1,944.0	-2,123.5	2,878.9	0.33	0.32	-2.02	
7,640.0	2.10	238.80	6,846.6	-1,945.7	-2,126.7	2,882.4	0.42	-0.32	-7.02	
7,734.0	2.60	249.10	6,940.5	-1,947.4	-2,130.2	2,886.1	0.69	0.53	10.96	
7,828.0	1.20	229.60	7,034.5	-1,948.8	-2,132.9	2,889.1	1.62	-1.49	-20.74	
7,923.0	1.60	249.70	7,129.4	-1,949.9	-2,135.0	2,891.3	0.66	0.42	21.16	
8,017.0	2.00	265.40	7,223.4	-1,950.5	-2,137.8	2,893.8	0.67	0.43	16.70	
8,111.0	2.20	260.70	7,317.3	-1,950.9	-2,141.2	2,896.6	0.28	0.21	-5.00	
8,206.0	2.30	265.90	7,412.2	-1,951.3	-2,144.9	2,899.6	0.24	0.11	5.47	
8,300.0	2.40	247.80	7,506.2	-1,952.2	-2,148.6	2,902.9	0.79	0.11	-19.26	
8,362.0	2.40	242.30	7,568.1	-1,953.3	-2,151.0	2,905.4	0.37	0.00	-8.87	
Projection to TD @ 8422.0' MD / 7628.1' TVD										
8,422.0	2.40	242.30	7,628.1	-1,954.5	-2,153.2	2,907.8	0.00	0.00	0.00	



## Survey Report



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Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
111.0	111.0	0.4	-0.1	First MWD Survey @ 111.0' MD / 111.0' TVD	
8,422.0	7,628.1	-1,954.5	-2,153.2	Projection to TD @ 8422.0' MD / 7628.1' TVD	

Checked By: _____	Approved By: _____	Date: _____
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