



# **Laramie Energy, LLC**

**Mesa County, CO**

**Bruton 30-10 Pad**

**Bruton Federal 30-18W**

**A-4**

**Design: A-4**

## **QES Survey Report**

**14 January, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Bruton Federal 30-18W
<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 30-18W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-4	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-4	<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 30-18W					
Well Position	+N/-S	0.0 usft	Northing:	1,523,557.09 usft	Latitude:	39.248083
	+E/-W	0.0 usft	Easting:	2,346,212.10 usft	Longitude:	-107.808867
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,643.0 usft

<b>Wellbore</b>	A-4				
<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	51,344.00916734

<b>Design</b>	A-4				
<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	230.72	

<b>Survey Program</b>	<b>Date</b>	1/14/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
111.0	8,354.0	QES MWD Surveys (A-4)	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	2.40	225.20	111.0	-1.6	-1.6	2.3	2.16	2.16	0.00
202.0	4.20	236.20	201.8	-4.8	-5.8	7.5	2.09	1.98	12.09
293.0	6.10	233.80	292.4	-9.5	-12.4	15.7	2.10	2.09	-2.64
384.0	9.20	237.30	382.6	-16.3	-22.5	27.7	3.44	3.41	3.85
475.0	10.80	230.90	472.2	-25.6	-35.2	43.5	2.14	1.76	-7.03
567.0	12.50	234.20	562.3	-36.9	-50.0	62.0	1.98	1.85	3.59
658.0	14.10	229.90	650.9	-49.8	-66.4	83.0	2.07	1.76	-4.73
749.0	16.30	231.20	738.7	-64.9	-84.9	106.8	2.45	2.42	1.43
840.0	19.40	230.10	825.3	-82.6	-106.4	134.7	3.43	3.41	-1.21



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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 30-18W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-4	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-4	<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	21.30	221.10	910.7	-104.8	-128.9	166.1	4.02	2.09	-9.89
1,022.0	23.10	231.70	994.9	-128.3	-153.8	200.3	4.82	1.98	11.65
1,116.0	24.10	228.90	1,081.1	-152.4	-182.7	237.9	1.60	1.06	-2.98
1,210.0	25.50	231.80	1,166.4	-177.5	-213.1	277.3	1.97	1.49	3.09
1,305.0	27.50	230.80	1,251.4	-204.0	-246.2	319.7	2.16	2.11	-1.05
1,399.0	29.20	232.40	1,334.2	-231.7	-281.1	364.3	1.98	1.81	1.70
1,491.0	30.70	233.60	1,413.9	-259.4	-317.8	410.2	1.76	1.63	1.30
1,608.0	29.80	234.10	1,514.9	-294.1	-365.4	469.1	0.80	-0.77	0.43
1,702.0	32.10	233.70	1,595.5	-322.6	-404.5	517.3	2.46	2.45	-0.43
1,796.0	31.90	234.40	1,675.3	-351.9	-444.8	567.1	0.45	-0.21	0.74
1,890.0	33.20	231.20	1,754.5	-382.5	-485.0	617.6	2.29	1.38	-3.40
1,985.0	32.40	230.70	1,834.4	-414.9	-525.0	669.1	0.89	-0.84	-0.53
2,079.0	33.50	230.70	1,913.2	-447.3	-564.6	720.2	1.17	1.17	0.00
2,173.0	33.10	230.10	1,991.8	-480.1	-604.3	771.8	0.55	-0.43	-0.64
2,267.0	32.40	230.40	2,070.9	-512.7	-643.4	822.6	0.76	-0.74	0.32
2,362.0	33.50	229.00	2,150.6	-546.1	-682.8	874.3	1.41	1.16	-1.47
2,456.0	33.10	228.40	2,229.1	-580.1	-721.6	925.9	0.55	-0.43	-0.64
2,550.0	32.20	228.20	2,308.3	-613.9	-759.5	976.5	0.96	-0.96	-0.21
2,645.0	32.90	228.80	2,388.4	-647.8	-797.8	1,027.6	0.81	0.74	0.63
2,739.0	32.10	228.30	2,467.6	-681.2	-835.6	1,078.1	0.90	-0.85	-0.53
2,833.0	33.70	228.80	2,546.6	-715.0	-873.9	1,129.1	1.73	1.70	0.53
2,927.0	32.70	228.10	2,625.2	-749.1	-912.4	1,180.5	1.14	-1.06	-0.74
3,021.0	30.90	227.30	2,705.1	-782.4	-949.0	1,230.0	1.97	-1.91	-0.85
3,115.0	32.70	227.90	2,785.0	-815.8	-985.6	1,279.5	1.94	1.91	0.64
3,210.0	33.10	232.10	2,864.8	-849.0	-1,025.1	1,331.0	2.44	0.42	4.42
3,304.0	32.50	231.10	2,943.8	-880.6	-1,065.1	1,381.9	0.86	-0.64	-1.06
3,398.0	32.30	231.00	3,023.1	-912.3	-1,104.2	1,432.3	0.22	-0.21	-0.11
3,493.0	33.70	230.80	3,102.8	-944.9	-1,144.4	1,484.0	1.48	1.47	-0.21
3,587.0	32.90	231.90	3,181.4	-977.1	-1,184.7	1,535.6	1.07	-0.85	1.17
3,681.0	32.10	230.80	3,260.7	-1,008.7	-1,224.1	1,586.1	1.06	-0.85	-1.17
3,775.0	31.40	231.80	3,340.6	-1,039.6	-1,262.7	1,635.6	0.93	-0.74	1.06
3,869.0	32.50	232.10	3,420.4	-1,070.3	-1,301.9	1,685.3	1.18	1.17	0.32
3,963.0	33.70	231.70	3,499.1	-1,101.9	-1,342.3	1,736.7	1.30	1.28	-0.43
4,057.0	33.30	231.30	3,577.5	-1,134.2	-1,382.9	1,788.5	0.49	-0.43	-0.43
4,152.0	32.40	230.70	3,657.3	-1,166.7	-1,422.9	1,840.1	1.01	-0.95	-0.63
4,246.0	33.60	231.40	3,736.1	-1,198.8	-1,462.8	1,891.3	1.34	1.28	0.74
4,340.0	33.50	231.60	3,814.5	-1,231.2	-1,503.4	1,943.2	0.16	-0.11	0.21
4,434.0	33.50	230.80	3,892.9	-1,263.7	-1,543.8	1,995.1	0.47	0.00	-0.85
4,529.0	32.40	229.60	3,972.6	-1,296.8	-1,583.5	2,046.7	1.35	-1.16	-1.26
4,623.0	32.80	229.20	4,051.8	-1,329.7	-1,622.0	2,097.4	0.48	0.43	-0.43
4,717.0	31.90	230.00	4,131.2	-1,362.3	-1,660.3	2,147.7	1.06	-0.96	0.85
4,812.0	32.80	231.10	4,211.4	-1,394.6	-1,699.5	2,198.5	1.13	0.95	1.16
4,906.0	32.40	230.30	4,290.6	-1,426.7	-1,738.7	2,249.1	0.63	-0.43	-0.85



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Survey										
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5,000.0	32.10	231.30	4,370.1	-1,458.4	-1,777.6	2,299.3	0.65	-0.32	1.06	
5,094.0	30.00	230.60	4,450.6	-1,488.9	-1,815.3	2,347.8	2.27	-2.23	-0.74	
5,188.0	27.90	229.80	4,532.9	-1,518.0	-1,850.2	2,393.3	2.27	-2.23	-0.85	
5,283.0	24.90	229.30	4,618.0	-1,545.4	-1,882.4	2,435.5	3.17	-3.16	-0.53	
5,377.0	23.80	228.60	4,703.6	-1,570.9	-1,911.6	2,474.2	1.21	-1.17	-0.74	
5,471.0	20.70	230.00	4,790.6	-1,594.1	-1,938.6	2,509.8	3.35	-3.30	1.49	
5,565.0	17.40	232.40	4,879.4	-1,613.4	-1,962.4	2,540.5	3.61	-3.51	2.55	
5,660.0	16.50	231.30	4,970.3	-1,630.5	-1,984.2	2,568.2	1.01	-0.95	-1.16	
5,754.0	16.00	230.10	5,060.6	-1,647.1	-2,004.6	2,594.5	0.64	-0.53	-1.28	
5,848.0	15.40	230.80	5,151.1	-1,663.3	-2,024.2	2,619.9	0.67	-0.64	0.74	
5,942.0	12.20	230.60	5,242.3	-1,677.5	-2,041.5	2,642.3	3.40	-3.40	-0.21	
6,036.0	9.50	233.20	5,334.6	-1,688.5	-2,055.4	2,660.0	2.92	-2.87	2.77	
6,131.0	9.00	231.80	5,428.4	-1,697.8	-2,067.5	2,675.3	0.58	-0.53	-1.47	
6,226.0	6.60	231.40	5,522.5	-1,705.8	-2,077.6	2,688.2	2.53	-2.53	-0.42	
6,320.0	4.40	252.00	5,616.1	-1,710.2	-2,085.3	2,696.9	3.11	-2.34	21.91	
6,414.0	2.80	290.00	5,709.9	-1,710.6	-2,090.9	2,701.5	2.97	-1.70	40.43	
6,508.0	2.50	293.80	5,803.8	-1,709.0	-2,094.9	2,703.6	0.37	-0.32	4.04	
6,603.0	3.00	287.60	5,898.7	-1,707.4	-2,099.2	2,705.9	0.61	0.53	-6.53	
6,697.0	0.80	287.60	5,992.6	-1,706.4	-2,102.2	2,707.6	2.34	-2.34	0.00	
6,791.0	0.60	13.10	6,086.6	-1,705.8	-2,102.7	2,707.5	1.02	-0.21	90.96	
6,885.0	0.50	341.90	6,180.6	-1,704.9	-2,102.7	2,707.0	0.33	-0.11	-33.19	
6,979.0	0.20	235.30	6,274.6	-1,704.6	-2,103.0	2,707.0	0.63	-0.32	-113.40	
7,073.0	0.10	279.50	6,368.6	-1,704.7	-2,103.2	2,707.2	0.16	-0.11	47.02	
7,167.0	0.40	203.20	6,462.6	-1,705.0	-2,103.4	2,707.6	0.41	0.32	-81.17	
7,262.0	0.60	241.00	6,557.6	-1,705.5	-2,103.9	2,708.4	0.39	0.21	39.79	
7,356.0	1.40	241.10	6,651.6	-1,706.3	-2,105.4	2,710.0	0.85	0.85	0.11	
7,450.0	1.90	237.30	6,745.6	-1,707.7	-2,107.7	2,712.6	0.54	0.53	-4.04	
7,544.0	1.60	239.50	6,839.5	-1,709.2	-2,110.1	2,715.5	0.33	-0.32	2.34	
7,639.0	2.20	230.80	6,934.5	-1,711.0	-2,112.7	2,718.6	0.70	0.63	-9.16	
7,733.0	2.70	244.90	7,028.4	-1,713.1	-2,116.1	2,722.6	0.83	0.53	15.00	
7,827.0	3.80	244.50	7,122.2	-1,715.4	-2,120.9	2,727.7	1.17	1.17	-0.43	
7,921.0	4.40	241.80	7,216.0	-1,718.4	-2,126.9	2,734.3	0.67	0.64	-2.87	
8,015.0	5.20	233.00	7,309.7	-1,722.7	-2,133.5	2,742.1	1.15	0.85	-9.36	
8,109.0	5.00	230.60	7,403.3	-1,727.9	-2,140.0	2,750.5	0.31	-0.21	-2.55	
8,203.0	4.40	229.30	7,497.0	-1,732.8	-2,145.9	2,758.2	0.65	-0.64	-1.38	
8,294.0	5.00	228.90	7,587.7	-1,737.7	-2,151.6	2,765.6	0.66	0.66	-0.44	
TD @ 8354.0' MD / 7647.5' TVD										
8,354.0	5.00	228.90	7,647.5	-1,741.1	-2,155.5	2,770.8	0.00	0.00	0.00	



## Survey Report



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<b>Design:</b>	A-4	<b>Database:</b>	EDM 5000.1 Single User Db

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
111.0	111.0	-1.6	-1.6	First MWD Survey @ 111.0' MD / 111.0' TVD
8,354.0	7,647.5	-1,741.1	-2,155.5	TD @ 8354.0' MD / 7647.5' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_