



# **Laramie Energy, LLC**

**Mesa County, CO**

**Bruton 30-10 Pad**

**Bruton Federal 30-17W**

**A-5**

**Design: A-5**

## **QES Survey Report**

**08 January, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Bruton Federal 30-17W
<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 30-17W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-5	<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 30-17W					
Well Position	+N/-S	0.0 usft	Northing:	1,523,565.58 usft	Latitude:	39.248106
	+E/-W	0.0 usft	Easting:	2,346,207.78 usft	Longitude:	-107.808883
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,643.0 usft

<b>Wellbore</b>	A-5				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	12/21/2017	9.53	65.41	51,348.88554191

<b>Design</b>	A-5				
<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	234.78	

<b>Survey Program</b>	<b>Date</b>	1/8/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
111.0	8,313.0	QES MWD Surveys (A-5)	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	1.10	234.10	111.0	-0.6	-0.9	1.1	0.99	0.99	0.00
202.0	3.40	240.10	201.9	-2.5	-3.9	4.6	2.54	2.53	6.59
293.0	5.90	239.90	292.6	-6.2	-10.3	12.0	2.75	2.75	-0.22
384.0	8.10	241.40	382.9	-11.6	-20.0	23.0	2.43	2.42	1.65
476.0	12.00	235.90	473.5	-20.1	-33.6	39.0	4.36	4.24	-5.98
567.0	15.10	232.80	562.0	-32.5	-50.9	60.3	3.50	3.41	-3.41
658.0	18.00	234.40	649.2	-47.9	-71.7	86.2	3.23	3.19	1.76
749.0	18.90	235.80	735.5	-64.4	-95.4	115.0	1.10	0.99	1.54
840.0	18.90	231.50	821.6	-81.8	-119.1	144.5	1.53	0.00	-4.73



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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 30-17W	<b>North Reference:</b>	True
<b>Wellbore:</b>	A-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	A-5	<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	20.00	232.90	907.4	-100.4	-143.0	174.7	1.31	1.21	1.54
1,022.0	20.20	230.40	992.9	-119.8	-167.6	206.0	0.97	0.22	-2.75
1,117.0	23.40	233.70	1,081.1	-141.4	-195.4	241.2	3.61	3.37	3.47
1,211.0	24.60	234.10	1,166.9	-163.9	-226.3	279.4	1.29	1.28	0.43
1,305.0	26.20	236.10	1,251.8	-187.0	-259.4	319.7	1.93	1.70	2.13
1,399.0	27.80	238.20	1,335.6	-210.1	-295.2	362.4	1.98	1.70	2.23
1,491.0	31.00	237.40	1,415.7	-234.2	-333.4	407.5	3.50	3.48	-0.87
1,608.0	30.50	236.40	1,516.3	-266.8	-383.5	467.2	0.61	-0.43	-0.85
1,702.0	31.10	236.20	1,597.0	-293.6	-423.6	515.3	0.65	0.64	-0.21
1,796.0	31.00	234.80	1,677.6	-321.0	-463.5	563.8	0.78	-0.11	-1.49
1,890.0	30.40	233.90	1,758.4	-349.0	-502.5	611.8	0.80	-0.64	-0.96
1,985.0	30.00	234.30	1,840.5	-377.0	-541.3	659.6	0.47	-0.42	0.42
2,079.0	30.70	232.80	1,921.6	-405.2	-579.5	707.1	1.10	0.74	-1.60
2,173.0	30.00	233.10	2,002.7	-433.8	-617.4	754.5	0.76	-0.74	0.32
2,267.0	31.60	232.60	2,083.5	-462.9	-655.7	802.7	1.72	1.70	-0.53
2,362.0	30.70	231.60	2,164.8	-493.1	-694.5	851.7	1.09	-0.95	-1.05
2,456.0	31.00	232.10	2,245.5	-522.9	-732.4	899.9	0.42	0.32	0.53
2,550.0	31.00	233.90	2,326.1	-552.0	-771.1	948.3	0.99	0.00	1.91
2,645.0	30.20	234.20	2,407.8	-580.4	-810.2	996.6	0.86	-0.84	0.32
2,739.0	31.20	236.60	2,488.6	-607.6	-849.7	1,044.6	1.68	1.06	2.55
2,833.0	29.70	235.90	2,569.7	-634.1	-889.3	1,092.2	1.64	-1.60	-0.74
2,927.0	28.10	235.60	2,652.0	-659.6	-926.9	1,137.6	1.71	-1.70	-0.32
3,021.0	29.10	236.20	2,734.5	-684.9	-964.1	1,182.6	1.11	1.06	0.64
3,115.0	31.20	234.70	2,815.8	-711.7	-1,003.0	1,229.8	2.37	2.23	-1.60
3,210.0	30.50	235.00	2,897.3	-739.7	-1,042.8	1,278.5	0.75	-0.74	0.32
3,304.0	29.70	234.40	2,978.7	-766.9	-1,081.3	1,325.7	0.91	-0.85	-0.64
3,398.0	32.10	234.40	3,059.3	-795.0	-1,120.6	1,374.0	2.55	2.55	0.00
3,493.0	31.60	234.10	3,140.0	-824.3	-1,161.2	1,424.1	0.55	-0.53	-0.32
3,587.0	30.80	234.20	3,220.4	-852.9	-1,200.7	1,472.8	0.85	-0.85	0.11
3,681.0	31.30	234.30	3,300.9	-881.2	-1,240.1	1,521.3	0.53	0.53	0.11
3,775.0	30.20	234.00	3,381.7	-909.3	-1,279.0	1,569.3	1.18	-1.17	-0.32
3,870.0	31.30	235.80	3,463.4	-937.2	-1,318.8	1,617.9	1.51	1.16	1.89
3,964.0	30.80	235.30	3,543.9	-964.7	-1,358.7	1,666.4	0.60	-0.53	-0.53
4,058.0	32.10	235.80	3,624.1	-992.4	-1,399.2	1,715.4	1.41	1.38	0.53
4,153.0	31.20	235.30	3,705.0	-1,020.6	-1,440.3	1,765.2	0.99	-0.95	-0.53
4,247.0	30.70	235.30	3,785.6	-1,048.1	-1,480.0	1,813.6	0.53	-0.53	0.00
4,341.0	29.80	233.50	3,866.8	-1,075.7	-1,518.5	1,860.9	1.36	-0.96	-1.91
4,435.0	31.00	234.50	3,947.9	-1,103.6	-1,557.0	1,908.5	1.39	1.28	1.06
4,530.0	30.50	234.70	4,029.5	-1,131.8	-1,596.6	1,957.1	0.54	-0.53	0.21
4,624.0	31.60	233.70	4,110.0	-1,160.1	-1,635.9	2,005.5	1.29	1.17	-1.06
4,718.0	30.90	233.70	4,190.4	-1,189.0	-1,675.2	2,054.3	0.74	-0.74	0.00
4,812.0	30.60	233.20	4,271.2	-1,217.6	-1,713.9	2,102.3	0.42	-0.32	-0.53
4,906.0	29.70	232.40	4,352.5	-1,246.2	-1,751.5	2,149.5	1.05	-0.96	-0.85



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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)	
5,001.0	29.20	231.50	4,435.2	-1,274.9	-1,788.2	2,196.2	0.70	-0.53	-0.95	
5,095.0	28.30	231.30	4,517.6	-1,303.2	-1,823.6	2,241.3	0.96	-0.96	-0.21	
5,189.0	24.50	232.60	4,601.8	-1,328.9	-1,856.5	2,283.0	4.09	-4.04	1.38	
5,283.0	21.40	237.20	4,688.3	-1,350.1	-1,886.4	2,319.7	3.81	-3.30	4.89	
5,378.0	20.70	235.20	4,777.0	-1,369.0	-1,914.7	2,353.8	1.06	-0.74	-2.11	
5,472.0	19.60	235.80	4,865.2	-1,387.4	-1,941.4	2,386.2	1.19	-1.17	0.64	
5,566.0	16.90	237.90	4,954.5	-1,403.5	-1,966.0	2,415.6	2.96	-2.87	2.23	
5,660.0	14.20	242.10	5,045.1	-1,416.2	-1,987.8	2,440.6	3.11	-2.87	4.47	
5,754.0	13.40	240.20	5,136.3	-1,427.0	-2,007.4	2,462.9	0.98	-0.85	-2.02	
5,849.0	12.70	239.50	5,228.9	-1,437.7	-2,026.0	2,484.3	0.76	-0.74	-0.74	
5,943.0	11.60	241.60	5,320.8	-1,447.5	-2,043.2	2,504.0	1.26	-1.17	2.23	
6,037.0	10.10	241.50	5,413.1	-1,455.9	-2,058.8	2,521.5	1.60	-1.60	-0.11	
6,131.0	6.70	246.50	5,506.1	-1,462.0	-2,071.0	2,535.1	3.70	-3.62	5.32	
6,225.0	4.20	251.80	5,599.6	-1,465.3	-2,079.3	2,543.8	2.71	-2.66	5.64	
6,319.0	1.10	246.70	5,693.5	-1,466.7	-2,083.4	2,547.9	3.30	-3.30	-5.43	
6,413.0	1.40	55.10	5,787.5	-1,466.4	-2,083.3	2,547.7	2.65	0.32	179.15	
6,508.0	1.50	66.60	5,882.5	-1,465.3	-2,081.2	2,545.3	0.32	0.11	12.11	
6,602.0	1.10	77.50	5,976.5	-1,464.6	-2,079.2	2,543.3	0.50	-0.43	11.60	
6,696.0	0.60	112.60	6,070.5	-1,464.6	-2,077.9	2,542.2	0.74	-0.53	37.34	
6,790.0	0.20	114.00	6,164.5	-1,464.8	-2,077.3	2,541.8	0.43	-0.43	1.49	
6,884.0	0.80	162.60	6,258.5	-1,465.5	-2,076.9	2,541.9	0.73	0.64	51.70	
6,978.0	1.00	198.00	6,352.4	-1,466.9	-2,077.0	2,542.8	0.62	0.21	37.66	
7,072.0	1.20	188.10	6,446.4	-1,468.7	-2,077.4	2,544.1	0.29	0.21	-10.53	
7,167.0	1.40	212.30	6,541.4	-1,470.7	-2,078.1	2,545.9	0.61	0.21	25.47	
7,261.0	2.20	208.00	6,635.4	-1,473.2	-2,079.6	2,548.6	0.86	0.85	-4.57	
7,356.0	2.30	215.50	6,730.3	-1,476.4	-2,081.6	2,552.0	0.33	0.11	7.89	
7,450.0	3.30	223.60	6,824.2	-1,479.9	-2,084.5	2,556.4	1.14	1.06	8.62	
7,544.0	3.90	223.00	6,918.0	-1,484.2	-2,088.6	2,562.2	0.64	0.64	-0.64	
7,638.0	4.30	215.60	7,011.7	-1,489.4	-2,092.8	2,568.7	0.70	0.43	-7.87	
7,732.0	4.70	224.00	7,105.5	-1,495.0	-2,097.5	2,575.8	0.82	0.43	8.94	
7,826.0	5.10	223.80	7,199.1	-1,500.8	-2,103.1	2,583.7	0.43	0.43	-0.21	
7,920.0	5.20	233.30	7,292.7	-1,506.4	-2,109.4	2,592.0	0.91	0.11	10.11	
8,014.0	3.30	235.60	7,386.5	-1,510.4	-2,115.1	2,599.0	2.03	-2.02	2.45	
8,109.0	3.20	234.60	7,481.3	-1,513.5	-2,119.5	2,604.4	0.12	-0.11	-1.05	
8,203.0	2.70	238.40	7,575.2	-1,516.2	-2,123.5	2,609.2	0.57	-0.53	4.04	
8,253.0	2.60	229.00	7,625.1	-1,517.6	-2,125.4	2,611.5	0.89	-0.20	-18.80	
Projection to TD @ 8313.0' MD / 7685.1' TVD										
8,313.0	2.60	229.00	7,685.1	-1,519.3	-2,127.4	2,614.2	0.00	0.00	0.00	



## Survey Report



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Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
111.0	111.0	-0.6	-0.9	First MWD Survey @ 111.0' MD / 111.0' TVD	
8,313.0	7,685.1	-1,519.3	-2,127.4	Projection to TD @ 8313.0' MD / 7685.1' TVD	

Checked By: _____	Approved By: _____	Date: _____
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