



# **Laramie Energy, LLC**

**Mesa County, CO**

**Bruton 30-10 Pad**

**Bruton 30-17E**

**B-5**

**Design: B-5**

## **QES Survey Report**

**03 January, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Bruton 30-17E
<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 30-17E	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-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 30-17E					
Well Position	+N/-S	0.0 usft	Northing:	1,523,570.12 usft	Latitude:	39.248119
	+E/-W	0.0 usft	Easting:	2,346,215.54 usft	Longitude:	-107.808856
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,643.0 usft

<b>Wellbore</b>	B-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	51,348.89596861

<b>Design</b>	B-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	161.11	

<b>Survey Program</b>	<b>Date</b>	1/3/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
111.0	8,006.0	QES MWD Surveys (B-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	0.40	119.40	111.0	-0.2	0.3	0.3	0.36	0.36	0.00
202.0	0.10	343.70	202.0	-0.3	0.6	0.4	0.52	-0.33	-149.12
293.0	0.40	81.80	293.0	-0.1	0.9	0.4	0.47	0.33	107.80
384.0	0.30	19.30	384.0	0.1	1.3	0.3	0.41	-0.11	-68.68
476.0	0.40	48.90	476.0	0.6	1.6	0.0	0.22	0.11	32.17
567.0	0.60	68.40	567.0	0.9	2.3	-0.2	0.29	0.22	21.43
658.0	0.30	65.50	658.0	1.2	2.9	-0.2	0.33	-0.33	-3.19
749.0	0.90	96.30	749.0	1.2	3.9	0.1	0.73	0.66	33.85
840.0	0.60	349.40	840.0	1.6	4.5	-0.1	1.34	-0.33	-117.47



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<b>Well:</b>	Bruton 30-17E	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-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	0.40	341.70	931.0	2.4	4.3	-0.9	0.23	-0.22	-8.46
1,022.0	0.80	356.20	1,022.0	3.3	4.2	-1.8	0.47	0.44	15.93
1,117.0	1.30	147.10	1,117.0	3.1	4.7	-1.4	2.14	0.53	158.84
1,211.0	4.00	174.60	1,210.9	-1.1	5.6	2.8	3.10	2.87	29.26
1,305.0	7.10	173.10	1,304.4	-10.1	6.6	11.7	3.30	3.30	-1.60
1,399.0	10.60	171.00	1,397.3	-24.4	8.6	25.9	3.74	3.72	-2.23
1,524.0	14.50	168.90	1,519.3	-51.1	13.5	52.7	3.14	3.12	-1.68
1,586.0	14.80	169.40	1,579.2	-66.5	16.4	68.3	0.53	0.48	0.81
1,681.0	16.60	164.00	1,670.7	-91.5	22.4	93.8	2.44	1.89	-5.68
1,775.0	19.70	161.90	1,760.0	-119.5	31.0	123.1	3.37	3.30	-2.23
1,869.0	22.40	161.50	1,847.7	-151.5	41.6	156.8	2.88	2.87	-0.43
1,963.0	21.80	161.10	1,934.8	-185.0	53.0	192.2	0.66	-0.64	-0.43
2,057.0	22.90	160.30	2,021.8	-218.8	64.8	228.0	1.21	1.17	-0.85
2,152.0	23.30	159.40	2,109.1	-253.8	77.6	265.2	0.56	0.42	-0.95
2,246.0	22.00	157.00	2,195.9	-287.4	91.0	301.4	1.70	-1.38	-2.55
2,340.0	22.90	158.80	2,282.8	-320.6	104.5	337.2	1.20	0.96	1.91
2,434.0	23.10	158.90	2,369.3	-354.9	117.8	373.9	0.22	0.21	0.11
2,528.0	22.60	157.90	2,455.9	-388.8	131.2	410.4	0.67	-0.53	-1.06
2,622.0	23.30	159.10	2,542.5	-422.9	144.6	447.0	0.90	0.74	1.28
2,716.0	21.80	158.90	2,629.3	-456.6	157.6	483.0	1.60	-1.60	-0.21
2,811.0	21.70	162.30	2,717.5	-489.8	169.3	518.2	1.33	-0.11	3.58
2,905.0	22.40	162.50	2,804.7	-523.4	179.9	553.5	0.75	0.74	0.21
2,999.0	23.20	164.40	2,891.3	-558.3	190.3	589.9	1.16	0.85	2.02
3,093.0	23.10	163.70	2,977.7	-593.8	200.4	626.8	0.31	-0.11	-0.74
3,188.0	22.10	164.70	3,065.5	-629.0	210.4	663.2	1.13	-1.05	1.05
3,282.0	23.30	162.60	3,152.2	-663.8	220.6	699.4	1.54	1.28	-2.23
3,376.0	22.60	162.30	3,238.7	-698.7	231.7	736.1	0.76	-0.74	-0.32
3,470.0	21.80	163.00	3,325.8	-732.6	242.3	771.6	0.90	-0.85	0.74
3,564.0	21.30	161.80	3,413.2	-765.5	252.7	806.1	0.71	-0.53	-1.28
3,659.0	23.30	162.10	3,501.1	-799.8	263.9	842.2	2.11	2.11	0.32
3,753.0	24.00	161.40	3,587.2	-835.6	275.7	879.9	0.80	0.74	-0.74
3,847.0	24.30	158.30	3,673.0	-871.7	288.9	918.3	1.39	0.32	-3.30
3,942.0	24.40	158.20	3,759.5	-908.1	303.4	957.4	0.11	0.11	-0.11
4,036.0	24.00	158.00	3,845.2	-943.8	317.8	995.9	0.43	-0.43	-0.21
4,130.0	23.90	158.50	3,931.2	-979.3	331.9	1,034.0	0.24	-0.11	0.53
4,224.0	23.70	158.20	4,017.2	-1,014.5	345.9	1,071.9	0.25	-0.21	-0.32
4,319.0	22.40	158.10	4,104.6	-1,049.1	359.8	1,109.0	1.37	-1.37	-0.11
4,413.0	23.60	157.40	4,191.1	-1,083.0	373.7	1,145.7	1.31	1.28	-0.74
4,507.0	23.60	157.40	4,277.2	-1,117.8	388.2	1,183.3	0.00	0.00	0.00
4,601.0	23.60	157.90	4,363.4	-1,152.6	402.5	1,220.8	0.21	0.00	0.53
4,695.0	23.30	154.40	4,449.6	-1,186.8	417.6	1,258.1	1.52	-0.32	-3.72
4,790.0	21.90	155.90	4,537.3	-1,219.9	432.9	1,294.4	1.59	-1.47	1.58
4,885.0	20.80	156.70	4,625.8	-1,251.6	446.8	1,328.8	1.20	-1.16	0.84



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<b>Wellbore:</b>	B-5	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-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)	
4,979.0	19.50	155.90	4,714.0	-1,281.2	459.8	1,361.1	1.41	-1.38	-0.85	
5,073.0	17.80	156.70	4,803.1	-1,308.8	471.9	1,391.1	1.83	-1.81	0.85	
5,167.0	18.20	160.60	4,892.5	-1,335.8	482.5	1,420.1	1.35	0.43	4.15	
5,262.0	16.90	160.60	4,983.1	-1,362.8	492.0	1,448.7	1.37	-1.37	0.00	
5,356.0	15.40	162.10	5,073.4	-1,387.6	500.4	1,474.8	1.66	-1.60	1.60	
5,450.0	14.20	161.40	5,164.3	-1,410.4	507.9	1,498.9	1.29	-1.28	-0.74	
5,544.0	13.60	160.40	5,255.5	-1,431.7	515.3	1,521.4	0.69	-0.64	-1.06	
5,638.0	11.70	156.90	5,347.2	-1,450.9	522.7	1,542.0	2.18	-2.02	-3.72	
5,732.0	8.80	152.70	5,439.7	-1,466.1	529.8	1,558.6	3.18	-3.09	-4.47	
5,827.0	7.60	152.10	5,533.7	-1,478.1	536.0	1,572.0	1.27	-1.26	-0.63	
5,921.0	3.60	151.90	5,627.3	-1,486.2	540.3	1,581.1	4.26	-4.26	-0.21	
6,015.0	2.50	154.00	5,721.1	-1,490.6	542.6	1,586.0	1.18	-1.17	2.23	
6,109.0	2.20	159.20	5,815.1	-1,494.1	544.2	1,589.9	0.39	-0.32	5.53	
6,204.0	0.60	236.40	5,910.0	-1,496.1	544.4	1,591.8	2.26	-1.68	81.26	
6,298.0	0.60	279.60	6,004.0	-1,496.3	543.5	1,591.7	0.47	0.00	45.96	
6,392.0	0.30	196.20	6,098.0	-1,496.5	543.0	1,591.7	0.68	-0.32	-88.72	
6,486.0	0.70	204.80	6,192.0	-1,497.2	542.6	1,592.3	0.43	0.43	9.15	
6,581.0	0.70	226.80	6,287.0	-1,498.2	542.0	1,592.9	0.28	0.00	23.16	
6,675.0	0.90	223.40	6,381.0	-1,499.1	541.1	1,593.5	0.22	0.21	-3.62	
6,769.0	1.10	228.80	6,475.0	-1,500.2	539.9	1,594.2	0.23	0.21	5.74	
6,863.0	1.50	224.00	6,569.0	-1,501.7	538.3	1,595.1	0.44	0.43	-5.11	
6,957.0	2.00	230.50	6,662.9	-1,503.6	536.2	1,596.2	0.57	0.53	6.91	
7,051.0	1.90	230.40	6,756.9	-1,505.7	533.8	1,597.4	0.11	-0.11	-0.11	
7,145.0	2.10	228.30	6,850.8	-1,507.8	531.3	1,598.6	0.23	0.21	-2.23	
7,239.0	2.70	227.20	6,944.7	-1,510.4	528.4	1,600.2	0.64	0.64	-1.17	
7,334.0	3.20	236.40	7,039.6	-1,513.4	524.5	1,601.7	0.72	0.53	9.68	
7,428.0	3.60	235.00	7,133.4	-1,516.6	519.9	1,603.2	0.43	0.43	-1.49	
7,522.0	4.00	234.70	7,227.2	-1,520.2	514.8	1,605.0	0.43	0.43	-0.32	
7,616.0	4.10	233.10	7,321.0	-1,524.1	509.4	1,606.9	0.16	0.11	-1.70	
7,710.0	4.00	228.80	7,414.8	-1,528.3	504.3	1,609.2	0.34	-0.11	-4.57	
7,804.0	4.10	227.20	7,508.5	-1,532.7	499.4	1,611.8	0.16	0.11	-1.70	
7,898.0	4.00	229.60	7,602.3	-1,537.1	494.4	1,614.4	0.21	-0.11	2.55	
7,946.0	4.10	231.00	7,650.2	-1,539.3	491.8	1,615.6	0.29	0.21	2.92	
Projection to TD @ 8006.0' MD / 7710.0' TVD										
8,006.0	4.10	231.00	7,710.0	-1,542.0	488.5	1,617.1	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
111.0	111.0	-0.2	0.3	First MWD Survey @ 111.0' MD / 111.0' TVD	
8,006.0	7,710.0	-1,542.0	488.5	Projection to TD @ 8006.0' MD / 7710.0' TVD	



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