



# **Laramie Energy, LLC**

**Mesa County, CO**

**Nichols 24-06A**

**Nichols 0994-13-18W**

**B-1**

**Design: B-1**

## **QES Survey Report**

**14 February, 2018**





# Survey Report



<b>Company:</b>	Laramie Energy, LLC	<b>Local Co-ordinate Reference:</b>	Well Nichols 0994-13-18W
<b>Project:</b>	Mesa County, CO	<b>TVD Reference:</b>	well @ 7161.0usft (H&P #290)
<b>Site:</b>	Nichols 24-06A	<b>MD Reference:</b>	well @ 7161.0usft (H&P #290)
<b>Well:</b>	Nichols 0994-13-18W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-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		

<b>Site</b>	Nichols 24-06A				
<b>Site Position:</b>		<b>Northing:</b>	1,529,702.08 usft	<b>Latitude:</b>	39.264528
<b>From:</b>	Lat/Long	<b>Easting:</b>	2,340,203.74 usft	<b>Longitude:</b>	-107.830633
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "	<b>Grid Convergence:</b>	-1.47 °

Well	Nichols 0994-13-18W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,781.19 usft	Latitude:	39.264747
	+E/-W	0.0 usft	Easting:	2,340,229.28 usft	Longitude:	-107.830550
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

<b>Wellbore</b>	B-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	1/24/2018	9.54	65.42	51,348.79944809

<b>Design</b>	B-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	334.23	

<b>Survey Program</b>	<b>Date</b>	2/14/2018			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
203.0	8,310.0	QES MWD Surveys (B-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 @ 203.0' MD / 202.9' TVD</b>									
203.0	3.60	349.10	202.9	6.3	-1.2	6.2	1.77	1.77	0.00
294.0	5.80	343.40	293.6	13.5	-3.1	13.5	2.47	2.42	-6.26
384.0	8.60	342.60	382.8	24.3	-6.4	24.6	3.11	3.11	-0.89
475.0	11.50	336.00	472.4	39.0	-12.1	40.4	3.42	3.19	-7.25
566.0	14.10	334.30	561.2	57.3	-20.6	60.6	2.89	2.86	-1.87
656.0	16.80	334.50	647.9	78.9	-31.0	84.5	3.00	3.00	0.22
746.0	19.30	336.50	733.5	104.3	-42.5	112.4	2.86	2.78	2.22
837.0	21.10	333.70	818.9	132.8	-55.7	143.8	2.24	1.98	-3.08
929.0	23.20	334.20	904.1	164.0	-71.0	178.5	2.29	2.28	0.54



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<b>Well:</b>	Nichols 0994-13-18W	<b>North Reference:</b>	True
<b>Wellbore:</b>	B-1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	B-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)
1,023.0	25.00	334.90	989.9	198.6	-87.4	216.9	1.94	1.91	0.74
1,117.0	27.20	335.10	1,074.3	236.1	-104.9	258.2	2.34	2.34	0.21
1,212.0	28.70	334.00	1,158.2	276.3	-124.1	302.8	1.67	1.58	-1.16
1,306.0	31.40	334.00	1,239.6	318.6	-144.7	349.8	2.87	2.87	0.00
1,401.0	34.00	334.20	1,319.5	364.8	-167.1	401.1	2.74	2.74	0.21
1,495.0	34.50	334.60	1,397.2	412.5	-190.0	454.0	0.58	0.53	0.43
1,621.0	34.10	335.30	1,501.3	476.8	-220.0	525.0	0.45	-0.32	0.56
1,716.0	35.60	335.40	1,579.2	526.1	-242.7	579.3	1.58	1.58	0.11
1,811.0	35.40	334.40	1,656.6	576.1	-266.1	634.5	0.65	-0.21	-1.05
1,905.0	34.80	334.30	1,733.5	624.8	-289.5	688.5	0.64	-0.64	-0.11
2,000.0	33.90	334.00	1,811.9	673.1	-312.8	742.1	0.96	-0.95	-0.32
2,095.0	34.10	335.70	1,890.7	721.1	-335.4	795.2	1.02	0.21	1.79
2,189.0	34.00	336.50	1,968.6	769.3	-356.7	847.9	0.49	-0.11	0.85
2,284.0	34.50	337.50	2,047.1	818.5	-377.6	901.3	0.79	0.53	1.05
2,379.0	35.60	336.90	2,124.9	868.8	-398.8	955.7	1.21	1.16	-0.63
2,473.0	36.70	335.90	2,200.8	919.6	-421.0	1,011.1	1.33	1.17	-1.06
2,568.0	35.90	334.20	2,277.3	970.6	-444.7	1,067.4	1.35	-0.84	-1.79
2,663.0	35.80	333.10	2,354.3	1,020.4	-469.4	1,123.0	0.69	-0.11	-1.16
2,757.0	34.40	331.70	2,431.2	1,068.3	-494.4	1,177.0	1.72	-1.49	-1.49
2,852.0	35.10	333.30	2,509.3	1,116.4	-519.4	1,231.1	1.21	0.74	1.68
2,947.0	37.00	333.80	2,586.1	1,166.4	-544.3	1,287.0	2.02	2.00	0.53
3,041.0	36.40	333.60	2,661.5	1,216.8	-569.2	1,343.2	0.65	-0.64	-0.21
3,136.0	36.10	333.50	2,738.1	1,267.1	-594.2	1,399.4	0.32	-0.32	-0.11
3,230.0	35.00	333.70	2,814.6	1,316.0	-618.5	1,454.0	1.18	-1.17	0.21
3,325.0	35.70	334.80	2,892.0	1,365.5	-642.4	1,509.0	1.00	0.74	1.16
3,419.0	36.60	336.20	2,968.0	1,416.0	-665.4	1,564.4	1.30	0.96	1.49
3,514.0	36.60	335.90	3,044.2	1,467.7	-688.4	1,621.0	0.19	0.00	-0.32
3,609.0	35.70	335.30	3,120.9	1,518.8	-711.5	1,677.1	1.02	-0.95	-0.63
3,703.0	36.20	335.60	3,197.0	1,569.0	-734.4	1,732.2	0.56	0.53	0.32
3,798.0	35.80	334.80	3,273.9	1,619.7	-757.9	1,788.1	0.65	-0.42	-0.84
3,892.0	37.40	335.40	3,349.3	1,670.5	-781.5	1,844.1	1.74	1.70	0.64
3,987.0	36.70	335.50	3,425.2	1,722.6	-805.2	1,901.3	0.74	-0.74	0.11
4,081.0	36.20	334.70	3,500.8	1,773.2	-828.7	1,957.2	0.73	-0.53	-0.85
4,176.0	36.40	335.00	3,577.3	1,824.1	-852.6	2,013.4	0.28	0.21	0.32
4,270.0	35.50	333.30	3,653.4	1,873.8	-876.7	2,068.6	1.43	-0.96	-1.81
4,365.0	36.10	335.10	3,730.5	1,923.8	-900.9	2,124.2	1.28	0.63	1.89
4,459.0	33.90	334.10	3,807.5	1,972.5	-924.0	2,178.1	2.42	-2.34	-1.06
4,554.0	34.60	334.70	3,886.0	2,020.7	-947.1	2,231.5	0.82	0.74	0.63
4,648.0	35.90	335.10	3,962.8	2,069.9	-970.1	2,285.8	1.40	1.38	0.43
4,743.0	35.90	334.50	4,039.7	2,120.3	-993.8	2,341.5	0.37	0.00	-0.63
4,837.0	35.00	334.00	4,116.3	2,169.4	-1,017.5	2,396.0	1.01	-0.96	-0.53
4,932.0	31.80	333.40	4,195.6	2,216.3	-1,040.7	2,448.3	3.39	-3.37	-0.63
5,026.0	30.50	332.60	4,276.0	2,259.6	-1,062.7	2,496.9	1.45	-1.38	-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)	
5,121.0	29.10	333.30	4,358.5	2,301.6	-1,084.2	2,544.1	1.52	-1.47	0.74	
5,215.0	27.70	332.00	4,441.2	2,341.3	-1,104.7	2,588.8	1.63	-1.49	-1.38	
5,310.0	24.80	333.10	4,526.4	2,378.6	-1,124.1	2,630.8	3.10	-3.05	1.16	
5,404.0	22.90	331.80	4,612.3	2,412.3	-1,141.7	2,668.8	2.10	-2.02	-1.38	
5,499.0	20.90	330.50	4,700.5	2,443.4	-1,158.8	2,704.1	2.17	-2.11	-1.37	
5,594.0	19.10	332.50	4,789.7	2,471.9	-1,174.3	2,736.6	2.03	-1.89	2.11	
5,688.0	17.40	332.30	4,879.0	2,498.0	-1,187.9	2,766.0	1.81	-1.81	-0.21	
5,783.0	16.80	333.70	4,969.8	2,522.9	-1,200.6	2,793.9	0.77	-0.63	1.47	
5,877.0	16.30	332.80	5,059.9	2,546.8	-1,212.7	2,820.7	0.60	-0.53	-0.96	
5,972.0	14.70	333.20	5,151.5	2,569.4	-1,224.2	2,846.1	1.69	-1.68	0.42	
6,066.0	13.10	332.90	5,242.7	2,589.5	-1,234.4	2,868.7	1.70	-1.70	-0.32	
6,161.0	12.20	331.10	5,335.4	2,607.9	-1,244.2	2,889.5	1.03	-0.95	-1.89	
6,255.0	10.90	331.50	5,427.5	2,624.4	-1,253.2	2,908.3	1.39	-1.38	0.43	
6,350.0	8.80	333.10	5,521.1	2,638.8	-1,260.8	2,924.5	2.23	-2.21	1.68	
6,445.0	6.90	332.60	5,615.2	2,650.3	-1,266.7	2,937.5	2.00	-2.00	-0.53	
6,540.0	5.10	335.40	5,709.7	2,659.2	-1,271.1	2,947.4	1.92	-1.89	2.95	
6,634.0	4.20	345.60	5,803.4	2,666.4	-1,273.7	2,954.9	1.30	-0.96	10.85	
6,729.0	2.90	352.80	5,898.2	2,672.1	-1,274.8	2,960.6	1.44	-1.37	7.58	
6,824.0	2.37	355.58	5,993.1	2,676.5	-1,275.3	2,964.7	0.57	-0.56	2.93	
6,918.0	2.02	339.67	6,087.0	2,680.0	-1,276.0	2,968.2	0.74	-0.37	-16.93	
7,013.0	2.00	328.90	6,181.9	2,683.0	-1,277.5	2,971.5	0.40	-0.02	-11.34	
7,107.0	0.75	346.08	6,275.9	2,685.0	-1,278.5	2,973.7	1.39	-1.33	18.28	
7,202.0	0.75	322.88	6,370.9	2,686.1	-1,279.0	2,975.0	0.32	0.00	-24.42	
7,296.0	0.75	275.42	6,464.9	2,686.6	-1,280.0	2,975.9	0.64	0.00	-50.49	
7,391.0	0.79	256.70	6,559.9	2,686.5	-1,281.2	2,976.4	0.27	0.04	-19.71	
7,485.0	1.23	255.91	6,653.9	2,686.1	-1,282.8	2,976.7	0.47	0.47	-0.84	
7,580.0	1.67	231.12	6,748.9	2,685.0	-1,284.9	2,976.6	0.80	0.46	-26.09	
7,674.0	1.67	222.68	6,842.8	2,683.1	-1,286.9	2,975.8	0.26	0.00	-8.98	
7,769.0	1.36	232.88	6,937.8	2,681.4	-1,288.7	2,975.0	0.43	-0.33	10.74	
7,864.0	1.54	239.74	7,032.7	2,680.1	-1,290.7	2,974.7	0.26	0.19	7.22	
7,958.0	2.24	232.26	7,126.7	2,678.3	-1,293.3	2,974.2	0.79	0.74	-7.96	
8,053.0	2.20	238.77	7,221.6	2,676.3	-1,296.3	2,973.7	0.27	-0.04	6.85	
8,146.0	2.37	230.86	7,314.6	2,674.1	-1,299.3	2,973.1	0.38	0.18	-8.51	
8,237.0	2.37	241.23	7,405.5	2,672.0	-1,302.4	2,972.5	0.47	0.00	11.40	
8,252.0	2.24	235.60	7,420.5	2,671.7	-1,302.9	2,972.5	1.74	-0.87	-37.53	
Projection to TD @ 8310.0' MD / 7478.4' TVD										
8,310.0	2.24	235.60	7,478.4	2,670.4	-1,304.8	2,972.1	0.00	0.00	0.00	



## Survey Report



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8,310.0	7,478.4	2,670.4	-1,304.8	Projection to TD @ 8310.0' MD / 7478.4' TVD	