



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-24-06E

A-9

Design: A-9

QES Survey Report

18 December, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-24-06E
Project:	Mesa County, CO	TVD Reference:	well @ 7161.0usft (H&P #290)
Site:	Nichols 24-06A	MD Reference:	well @ 7161.0usft (H&P #290)
Well:	Nichols 0994-24-06E	North Reference:	True
Wellbore:	A-9	Survey Calculation Method:	Minimum Curvature
Design:	A-9	Database:	EDM 5000.1 Single User Db

Project	Mesa County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

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

Well	Nichols 0994-24-06E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,722.96 usft	Latitude:	39.264586
	+E/-W	0.0 usft	Easting:	2,340,212.77 usft	Longitude:	-107.830603
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	A-9				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/4/2017	9.55	65.42	51,364.22371317

Design	A-9				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	66.44	

Survey Program	Date	12/18/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
293.0	7,656.0	QES MWD Surveys (A-9)	MWD default	MWD - Standard	

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First MWD Survey @ 293.0' MD / 292.8' TVD									
293.0	3.70	102.60	292.8	-2.1	9.2	7.6	1.26	1.26	0.00
384.0	4.50	89.50	383.6	-2.7	15.7	13.3	1.35	0.88	-14.40
474.0	5.30	86.50	473.2	-2.4	23.3	20.4	0.93	0.89	-3.33
565.0	5.80	79.70	563.8	-1.3	32.1	28.9	0.91	0.55	-7.47
655.0	6.70	64.80	653.3	1.7	41.3	38.5	2.05	1.00	-16.56
745.0	8.10	58.10	742.5	7.3	51.4	50.1	1.82	1.56	-7.44
837.0	10.00	58.00	833.4	15.0	63.7	64.4	2.07	2.07	-0.11
928.0	11.50	63.40	922.8	23.2	78.5	81.3	1.98	1.65	5.93
1,022.0	13.40	64.40	1,014.6	32.1	96.7	101.5	2.03	2.02	1.06



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Wellbore:	A-9	Survey Calculation Method:	Minimum Curvature
Design:	A-9	Database:	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)
1,117.0	14.80	60.90	1,106.7	42.8	117.2	124.6	1.72	1.47	-3.68
1,211.0	15.90	60.40	1,197.4	55.0	138.9	149.3	1.18	1.17	-0.53
1,306.0	17.10	63.30	1,288.4	67.7	162.7	176.2	1.53	1.26	3.05
1,400.0	17.60	64.60	1,378.2	80.0	187.9	204.2	0.67	0.53	1.38
1,495.0	17.20	64.20	1,468.8	92.3	213.5	232.6	0.44	-0.42	-0.42
1,587.0	16.60	64.70	1,556.8	103.8	237.7	259.3	0.67	-0.65	0.54
1,681.0	16.80	65.70	1,646.9	115.1	262.2	286.4	0.37	0.21	1.06
1,776.0	17.20	69.10	1,737.7	125.8	287.8	314.1	1.13	0.42	3.58
1,870.0	17.50	71.70	1,827.5	135.2	314.2	342.1	0.88	0.32	2.77
1,965.0	18.70	72.00	1,917.7	144.4	342.3	371.4	1.27	1.26	0.32
2,059.0	19.20	68.10	2,006.7	154.8	370.9	401.9	1.45	0.53	-4.15
2,154.0	18.50	67.30	2,096.6	166.5	399.3	432.6	0.79	-0.74	-0.84
2,248.0	17.60	66.20	2,185.9	177.9	426.1	461.7	1.02	-0.96	-1.17
2,342.0	17.50	65.00	2,275.6	189.7	451.9	490.0	0.40	-0.11	-1.28
2,437.0	18.10	69.20	2,366.0	200.9	478.7	519.1	1.49	0.63	4.42
2,532.0	17.10	71.20	2,456.6	210.7	505.7	547.7	1.23	-1.05	2.11
2,626.0	19.50	68.10	2,545.8	221.0	533.3	577.2	2.75	2.55	-3.30
2,721.0	20.20	64.90	2,635.2	233.9	562.9	609.4	1.36	0.74	-3.37
2,815.0	19.80	64.30	2,723.5	247.6	591.9	641.6	0.48	-0.43	-0.64
2,910.0	18.90	64.60	2,813.1	261.2	620.3	673.0	0.95	-0.95	0.32
3,005.0	18.10	64.30	2,903.2	274.2	647.5	703.1	0.85	-0.84	-0.32
3,100.0	17.60	65.90	2,993.6	286.5	673.9	732.3	0.74	-0.53	1.68
3,194.0	17.40	65.50	3,083.3	298.1	699.7	760.5	0.25	-0.21	-0.43
3,289.0	16.30	64.70	3,174.2	309.7	724.7	788.1	1.18	-1.16	-0.84
3,384.0	17.20	66.80	3,265.2	320.9	749.6	815.4	1.14	0.95	2.21
3,478.0	19.40	64.30	3,354.4	333.2	776.5	844.9	2.48	2.34	-2.66
3,573.0	19.10	65.10	3,444.1	346.6	804.8	876.2	0.42	-0.32	0.84
3,667.0	18.40	65.60	3,533.1	359.2	832.3	906.4	0.76	-0.74	0.53
3,762.0	17.20	66.30	3,623.6	371.0	858.8	935.5	1.28	-1.26	0.74
3,857.0	18.60	63.30	3,714.0	383.5	885.2	964.7	1.76	1.47	-3.16
3,951.0	18.00	64.00	3,803.2	396.6	911.6	994.1	0.68	-0.64	0.74
4,046.0	17.60	65.00	3,893.7	409.1	937.8	1,023.2	0.53	-0.42	1.05
4,140.0	17.60	64.70	3,983.3	421.2	963.6	1,051.6	0.10	0.00	-0.32
4,235.0	17.80	62.80	4,073.8	433.9	989.5	1,080.4	0.64	0.21	-2.00
4,329.0	16.40	65.50	4,163.6	446.0	1,014.3	1,108.0	1.71	-1.49	2.87
4,424.0	17.20	64.90	4,254.6	457.5	1,039.2	1,135.5	0.86	0.84	-0.63
4,519.0	17.40	67.50	4,345.3	468.9	1,065.1	1,163.7	0.84	0.21	2.74
4,614.0	16.40	66.80	4,436.2	479.6	1,090.5	1,191.3	1.07	-1.05	-0.74
4,708.0	15.20	68.20	4,526.6	489.4	1,114.2	1,216.9	1.34	-1.28	1.49
4,802.0	14.80	69.50	4,617.4	498.2	1,136.9	1,241.2	0.56	-0.43	1.38
4,897.0	13.60	70.10	4,709.5	506.3	1,158.7	1,264.5	1.27	-1.26	0.63
4,991.0	13.80	64.90	4,800.8	514.8	1,179.3	1,286.7	1.33	0.21	-5.53
5,086.0	12.70	66.30	4,893.3	523.8	1,199.1	1,308.5	1.21	-1.16	1.47



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Survey										
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5,181.0	12.30	61.30	4,986.1	532.8	1,217.5	1,329.0	1.21	-0.42	-5.26	
5,275.0	11.50	62.30	5,078.0	542.0	1,234.6	1,348.3	0.88	-0.85	1.06	
5,370.0	11.30	64.20	5,171.2	550.5	1,251.4	1,367.1	0.45	-0.21	2.00	
5,464.0	9.30	66.50	5,263.6	557.5	1,266.6	1,383.9	2.17	-2.13	2.45	
5,558.0	10.00	62.00	5,356.3	564.4	1,280.8	1,399.6	1.09	0.74	-4.79	
5,653.0	8.60	56.10	5,450.1	572.2	1,294.0	1,414.8	1.78	-1.47	-6.21	
5,747.0	8.10	57.90	5,543.1	579.6	1,305.4	1,428.3	0.60	-0.53	1.91	
5,842.0	6.40	56.30	5,637.3	586.1	1,315.5	1,440.1	1.80	-1.79	-1.68	
5,936.0	3.60	48.90	5,730.9	591.0	1,322.1	1,448.1	3.05	-2.98	-7.87	
6,031.0	1.60	60.40	5,825.8	593.6	1,325.5	1,452.3	2.17	-2.11	12.11	
6,125.0	1.80	53.80	5,919.8	595.1	1,327.8	1,455.0	0.30	0.21	-7.02	
6,220.0	1.30	51.10	6,014.8	596.7	1,329.9	1,457.5	0.53	-0.53	-2.84	
6,315.0	0.80	58.90	6,109.7	597.7	1,331.3	1,459.2	0.55	-0.53	8.21	
6,409.0	1.00	75.00	6,203.7	598.2	1,332.6	1,460.7	0.34	0.21	17.13	
6,504.0	0.90	154.60	6,298.7	597.8	1,333.7	1,461.5	1.28	-0.11	83.79	
6,599.0	0.50	78.50	6,393.7	597.2	1,334.5	1,461.9	0.97	-0.42	-80.11	
6,693.0	1.00	157.10	6,487.7	596.5	1,335.2	1,462.3	1.09	0.53	83.62	
6,787.0	1.60	200.70	6,581.7	594.5	1,335.0	1,461.4	1.19	0.64	46.38	
6,882.0	1.40	185.30	6,676.7	592.1	1,334.5	1,459.9	0.47	-0.21	-16.21	
6,977.0	1.90	190.00	6,771.6	589.4	1,334.1	1,458.5	0.54	0.53	4.95	
7,071.0	3.20	181.20	6,865.5	585.3	1,333.8	1,456.5	1.44	1.38	-9.36	
7,166.0	2.80	165.40	6,960.4	580.4	1,334.3	1,455.1	0.96	-0.42	-16.63	
7,260.0	2.90	156.80	7,054.3	576.0	1,335.8	1,454.7	0.47	0.11	-9.15	
7,355.0	2.20	151.10	7,149.2	572.2	1,337.6	1,454.8	0.78	-0.74	-6.00	
7,450.0	2.00	157.60	7,244.1	569.0	1,339.1	1,455.0	0.33	-0.21	6.84	
7,545.0	2.20	146.20	7,339.1	566.0	1,340.8	1,455.3	0.49	0.21	-12.00	
7,602.0	1.70	160.70	7,396.0	564.3	1,341.7	1,455.4	1.23	-0.88	25.44	
Projection to TD @ 7656.0' MD / 7450.0' TVD										
7,656.0	1.70	160.70	7,450.0	562.8	1,342.2	1,455.3	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
293.0	292.8	-2.1	9.2	First MWD Survey @ 293.0' MD / 292.8' TVD	
7,656.0	7,450.0	562.8	1,342.2	Projection to TD @ 7656.0' MD / 7450.0' TVD	