



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-24-01W

B-4

Design: B-4

QES Survey Report

19 January, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-24-01W
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 0994-24-01W	North Reference:	True
Wellbore:	B-4	Survey Calculation Method:	Minimum Curvature
Design:	B-4	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 0994-24-01W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,760.32 usft	Latitude:	39.264689
	+E/-W	0.0 usft	Easting:	2,340,219.40 usft	Longitude:	-107.830583
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	B-4				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/11/2018	9.54	65.42	51,352.71662114

Design	B-4				
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	320.54	

Survey Program	Date	1/17/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
241.0	7,848.0	QES MWD Surveys (B-4)	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 @ 241.0' MD / 241.0' TVD										
241.0	1.20	284.70	241.0	0.6	-2.4	2.0	0.50	0.50	0.00	
382.0	1.10	271.60	382.0	1.1	-5.2	4.1	0.20	-0.07	-9.29	
507.0	3.30	321.60	506.9	3.9	-8.7	8.5	2.18	1.76	40.00	
564.0	4.90	322.70	563.7	7.1	-11.2	12.6	2.81	2.81	1.93	
744.0	10.20	318.70	742.1	25.2	-26.3	36.2	2.96	2.94	-2.22	
866.0	14.00	316.60	861.4	44.1	-43.6	61.7	3.14	3.11	-1.72	
926.0	14.90	320.20	919.5	55.3	-53.5	76.7	2.12	1.50	6.00	
1,021.0	18.00	323.80	1,010.6	76.5	-70.0	103.6	3.43	3.26	3.79	
1,115.0	19.80	318.70	1,099.5	100.2	-89.1	134.0	2.60	1.91	-5.43	



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Well:	Nichols 0994-24-01W	North Reference:	True
Wellbore:	B-4	Survey Calculation Method:	Minimum Curvature
Design:	B-4	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)
1,210.0	20.70	321.60	1,188.6	125.4	-110.2	166.9	1.42	0.95	3.05
1,304.0	22.90	318.90	1,275.9	152.2	-132.5	201.8	2.57	2.34	-2.87
1,399.0	25.53	319.18	1,362.5	181.7	-158.1	240.7	2.77	2.77	0.29
1,493.0	25.66	317.87	1,447.3	212.1	-184.9	281.3	0.62	0.14	-1.39
1,511.0	25.53	317.87	1,463.5	217.9	-190.2	289.1	0.72	-0.72	0.00
1,619.0	25.40	319.50	1,561.1	252.7	-220.8	335.5	0.66	-0.12	1.51
1,713.0	25.70	323.40	1,645.9	284.4	-246.1	376.0	1.82	0.32	4.15
1,808.0	26.90	324.50	1,731.0	318.5	-270.8	418.0	1.36	1.26	1.16
1,903.0	25.50	323.80	1,816.3	352.5	-295.4	459.9	1.51	-1.47	-0.74
1,997.0	25.00	322.80	1,901.3	384.6	-319.3	499.9	0.70	-0.53	-1.06
2,092.0	26.70	323.70	1,986.8	417.8	-344.1	541.3	1.84	1.79	0.95
2,187.0	27.40	323.80	2,071.4	452.6	-369.7	584.4	0.74	0.74	0.11
2,281.0	26.90	323.50	2,155.0	487.2	-395.1	627.2	0.55	-0.53	-0.32
2,376.0	25.70	322.70	2,240.2	520.9	-420.4	669.3	1.32	-1.26	-0.84
2,471.0	27.10	319.60	2,325.3	553.7	-446.9	711.5	2.07	1.47	-3.26
2,565.0	26.20	318.80	2,409.3	585.6	-474.4	753.7	1.03	-0.96	-0.85
2,660.0	27.60	319.80	2,494.0	618.2	-502.4	796.6	1.55	1.47	1.05
2,755.0	27.10	319.50	2,578.4	651.5	-530.7	840.3	0.55	-0.53	-0.32
2,849.0	26.50	319.80	2,662.3	683.8	-558.1	882.7	0.65	-0.64	0.32
2,944.0	28.10	320.20	2,746.7	717.2	-586.1	926.2	1.70	1.68	0.42
3,039.0	27.30	320.20	2,830.8	751.1	-614.4	970.4	0.84	-0.84	0.00
3,134.0	26.50	319.90	2,915.6	784.1	-642.0	1,013.4	0.85	-0.84	-0.32
3,228.0	27.40	320.20	2,999.3	816.7	-669.3	1,056.0	0.97	0.96	0.32
3,322.0	27.00	320.20	3,083.0	849.7	-696.9	1,098.9	0.43	-0.43	0.00
3,417.0	26.20	319.30	3,167.9	882.2	-724.3	1,141.5	0.94	-0.84	-0.95
3,511.0	26.90	319.30	3,252.0	914.0	-751.7	1,183.5	0.74	0.74	0.00
3,606.0	26.20	319.40	3,337.0	946.3	-779.4	1,225.9	0.74	-0.74	0.11
3,701.0	26.90	321.40	3,421.9	979.0	-806.4	1,268.4	1.20	0.74	2.11
3,795.0	26.10	320.20	3,506.1	1,011.5	-833.0	1,310.3	1.02	-0.85	-1.28
3,889.0	28.00	321.20	3,589.8	1,044.6	-860.0	1,353.1	2.08	2.02	1.06
3,984.0	27.30	320.20	3,673.9	1,078.7	-887.9	1,397.1	0.88	-0.74	-1.05
4,079.0	26.00	318.50	3,758.8	1,111.0	-915.7	1,439.7	1.59	-1.37	-1.79
4,173.0	27.50	321.70	3,842.8	1,143.5	-942.8	1,482.0	2.21	1.60	3.40
4,267.0	26.50	321.20	3,926.5	1,176.9	-969.4	1,524.7	1.09	-1.06	-0.53
4,362.0	27.70	319.50	4,011.1	1,210.2	-997.0	1,568.0	1.50	1.26	-1.79
4,457.0	26.90	318.00	4,095.5	1,242.9	-1,025.7	1,611.5	1.11	-0.84	-1.58
4,551.0	26.40	319.00	4,179.5	1,274.5	-1,053.7	1,653.7	0.71	-0.53	1.06
4,646.0	25.90	321.70	4,264.8	1,306.7	-1,080.4	1,695.5	1.36	-0.53	2.84
4,740.0	25.80	319.70	4,349.4	1,338.4	-1,106.3	1,736.5	0.93	-0.11	-2.13
4,835.0	25.40	323.10	4,435.1	1,370.5	-1,131.9	1,777.5	1.60	-0.42	3.58
4,929.0	23.10	321.50	4,520.8	1,401.1	-1,155.5	1,816.1	2.54	-2.45	-1.70
5,024.0	21.80	320.00	4,608.6	1,429.2	-1,178.5	1,852.4	1.50	-1.37	-1.58
5,118.0	20.00	322.90	4,696.4	1,455.4	-1,199.4	1,885.9	2.21	-1.91	3.09



Survey Report



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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)	
5,213.0	17.20	323.80	4,786.4	1,479.7	-1,217.5	1,916.2	2.96	-2.95	0.95	
5,307.0	15.60	321.60	4,876.6	1,500.8	-1,233.5	1,942.7	1.83	-1.70	-2.34	
5,402.0	14.40	325.70	4,968.4	1,520.6	-1,248.1	1,967.2	1.69	-1.26	4.32	
5,496.0	12.80	326.20	5,059.7	1,538.9	-1,260.5	1,989.2	1.71	-1.70	0.53	
5,591.0	11.30	327.50	5,152.6	1,555.5	-1,271.4	2,008.9	1.60	-1.58	1.37	
5,686.0	8.70	319.70	5,246.2	1,568.8	-1,281.0	2,025.4	3.08	-2.74	-8.21	
5,780.0	6.90	324.80	5,339.3	1,578.8	-1,288.9	2,038.1	2.05	-1.91	5.43	
5,875.0	5.20	317.90	5,433.8	1,586.7	-1,295.1	2,048.1	1.94	-1.79	-7.26	
5,969.0	4.70	305.90	5,527.4	1,592.1	-1,301.0	2,056.1	1.22	-0.53	-12.77	
6,064.0	3.07	298.88	5,622.2	1,595.6	-1,306.4	2,062.2	1.78	-1.72	-7.39	
6,158.0	1.49	353.20	5,716.2	1,598.0	-1,308.8	2,065.6	2.67	-1.68	57.79	
6,253.0	0.87	38.99	5,811.1	1,599.8	-1,308.4	2,066.7	1.14	-0.65	48.20	
6,348.0	0.66	35.65	5,906.1	1,600.8	-1,307.7	2,067.0	0.23	-0.22	-3.52	
6,442.0	0.53	15.61	6,000.1	1,601.7	-1,307.2	2,067.4	0.26	-0.14	-21.32	
6,537.0	0.31	324.73	6,095.1	1,602.3	-1,307.3	2,067.9	0.43	-0.23	-53.56	
6,632.0	0.31	291.24	6,190.1	1,602.6	-1,307.7	2,068.4	0.19	0.00	-35.25	
6,726.0	0.62	233.93	6,284.1	1,602.4	-1,308.3	2,068.7	0.56	0.33	-60.97	
6,821.0	0.97	244.22	6,379.1	1,601.8	-1,309.4	2,068.9	0.40	0.37	10.83	
6,916.0	1.41	240.09	6,474.1	1,600.8	-1,311.2	2,069.3	0.47	0.46	-4.35	
7,010.0	1.54	241.76	6,568.1	1,599.7	-1,313.3	2,069.7	0.15	0.14	1.78	
7,104.0	1.89	248.09	6,662.0	1,598.5	-1,315.9	2,070.4	0.42	0.37	6.73	
7,199.0	1.89	246.77	6,757.0	1,597.3	-1,318.7	2,071.3	0.05	0.00	-1.39	
7,294.0	1.97	243.60	6,851.9	1,595.9	-1,321.6	2,072.1	0.14	0.08	-3.34	
7,388.0	2.15	240.17	6,945.8	1,594.3	-1,324.6	2,072.8	0.23	0.19	-3.65	
7,483.0	2.59	226.20	7,040.8	1,592.0	-1,327.7	2,072.9	0.76	0.46	-14.71	
7,577.0	2.72	228.48	7,134.7	1,589.0	-1,330.9	2,072.7	0.18	0.14	2.43	
7,672.0	2.59	231.65	7,229.6	1,586.2	-1,334.3	2,072.7	0.21	-0.14	3.34	
7,766.0	2.54	232.79	7,323.5	1,583.6	-1,337.6	2,072.8	0.08	-0.05	1.21	
7,802.0	2.59	234.02	7,359.4	1,582.7	-1,338.9	2,072.9	0.21	0.14	3.42	
Projection to TD @ 7848.0' MD / 7405.4' TVD										
7,848.0	2.59	234.02	7,405.4	1,581.4	-1,340.6	2,073.0	0.00	0.00	0.00	

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
241.0	241.0	0.6	-2.4	First MWD Survey @ 241.0' MD / 241.0' TVD
7,848.0	7,405.4	1,581.4	-1,340.6	Projection to TD @ 7848.0' MD / 7405.4' TVD