



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-13-20W

B-2

Design: B-2

QES Survey Report

02 February, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-13-20W
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 0994-13-20W	North Reference:	True
Wellbore:	B-2	Survey Calculation Method:	Minimum Curvature
Design:	B-2	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 0994-13-20W					
Well Position	+N/-S	0.0 usft	Northing:	1,529,774.36 usft	Latitude:	39.264728
	+E/-W	0.0 usft	Easting:	2,340,225.99 usft	Longitude:	-107.830561
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	B-2				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/24/2018	9.54	65.42	51,348.78781022

Design	B-2				
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	328.91	

Survey Program	Date	2/2/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
203.0	8,011.0	QES MWD Surveys (B-2)	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 @ 203.0' MD / 203.0' TVD										
203.0	2.20	322.10	203.0	3.1	-2.4	3.9	1.08	1.08	0.00	
294.0	4.20	321.00	293.8	7.0	-5.6	8.9	2.20	2.20	-1.21	
384.0	6.20	331.30	383.4	13.9	-10.0	17.0	2.44	2.22	11.44	
475.0	8.30	330.40	473.7	23.9	-15.6	28.5	2.31	2.31	-0.99	
566.0	10.30	329.00	563.5	36.6	-23.0	43.2	2.21	2.20	-1.54	
656.0	12.50	331.40	651.7	52.0	-31.8	61.0	2.50	2.44	2.67	
746.0	14.90	331.00	739.1	70.7	-42.1	82.3	2.67	2.67	-0.44	
837.0	17.70	329.20	826.5	92.8	-54.9	107.8	3.13	3.08	-1.98	
929.0	19.80	328.50	913.6	118.1	-70.2	137.4	2.30	2.28	-0.76	



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Wellbore:	B-2	Survey Calculation Method:	Minimum Curvature
Design:	B-2	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)
1,023.0	22.70	326.70	1,001.2	146.9	-88.4	171.4	3.16	3.09	-1.91
1,117.0	25.40	327.60	1,087.0	179.1	-109.2	209.7	2.90	2.87	0.96
1,212.0	28.70	327.20	1,171.6	215.4	-132.5	252.9	3.48	3.47	-0.42
1,306.0	31.60	327.60	1,252.9	255.2	-157.9	300.1	3.09	3.09	0.43
1,401.0	32.50	327.70	1,333.4	297.8	-184.9	350.5	0.95	0.95	0.11
1,495.0	32.87	326.92	1,412.5	340.5	-212.3	401.2	0.60	0.39	-0.83
1,619.0	33.10	326.60	1,516.5	397.0	-249.3	468.7	0.23	0.19	-0.26
1,714.0	32.80	325.90	1,596.3	439.9	-278.0	520.3	0.51	-0.32	-0.74
1,809.0	32.20	329.80	1,676.4	483.1	-305.2	571.3	2.29	-0.63	4.11
1,903.0	31.20	329.30	1,756.4	525.7	-330.2	620.7	1.10	-1.06	-0.53
1,998.0	30.30	327.40	1,838.0	567.1	-355.7	669.3	1.39	-0.95	-2.00
2,092.0	28.90	331.10	1,919.8	606.9	-379.4	715.7	2.45	-1.49	3.94
2,187.0	29.30	332.60	2,002.8	647.7	-401.2	761.8	0.88	0.42	1.58
2,282.0	28.70	332.00	2,085.9	688.4	-422.6	807.8	0.70	-0.63	-0.63
2,376.0	30.10	332.30	2,167.7	729.2	-444.2	853.9	1.50	1.49	0.32
2,471.0	28.10	331.10	2,250.8	769.9	-466.1	900.0	2.19	-2.11	-1.26
2,566.0	29.60	330.50	2,334.0	809.9	-488.4	945.8	1.61	1.58	-0.63
2,661.0	29.40	331.00	2,416.6	850.8	-511.3	992.6	0.33	-0.21	0.53
2,755.0	28.10	329.60	2,499.1	890.0	-533.7	1,037.8	1.56	-1.38	-1.49
2,850.0	30.00	332.50	2,582.1	930.4	-556.0	1,083.9	2.49	2.00	3.05
2,945.0	28.60	331.10	2,664.9	971.4	-577.9	1,130.3	1.64	-1.47	-1.47
3,039.0	31.10	332.30	2,746.5	1,012.6	-600.1	1,177.0	2.73	2.66	1.28
3,134.0	29.70	330.80	2,828.4	1,054.8	-623.0	1,225.0	1.68	-1.47	-1.58
3,228.0	30.10	331.00	2,909.9	1,095.8	-645.8	1,271.9	0.44	0.43	0.21
3,323.0	31.60	331.40	2,991.5	1,138.5	-669.2	1,320.5	1.59	1.58	0.42
3,417.0	31.50	331.60	3,071.6	1,181.7	-692.7	1,369.7	0.15	-0.11	0.21
3,512.0	30.20	330.40	3,153.1	1,224.3	-716.3	1,418.3	1.51	-1.37	-1.26
3,607.0	29.60	329.70	3,235.5	1,265.3	-740.0	1,465.7	0.73	-0.63	-0.74
3,704.0	29.50	329.30	3,319.9	1,306.6	-764.2	1,513.5	0.23	-0.10	-0.41
3,798.0	29.20	329.10	3,401.8	1,346.1	-787.8	1,559.6	0.34	-0.32	-0.21
3,892.0	28.70	329.10	3,484.0	1,385.2	-811.2	1,605.1	0.53	-0.53	0.00
3,987.0	27.60	327.00	3,567.8	1,423.2	-834.9	1,649.9	1.56	-1.16	-2.21
4,081.0	29.60	329.20	3,650.3	1,461.4	-858.6	1,694.9	2.40	2.13	2.34
4,176.0	28.40	329.30	3,733.4	1,501.0	-882.2	1,740.9	1.26	-1.26	0.11
4,270.0	27.60	328.30	3,816.4	1,538.7	-905.0	1,785.1	0.99	-0.85	-1.06
4,365.0	30.30	328.70	3,899.5	1,578.0	-929.1	1,831.0	2.85	2.84	0.42
4,459.0	29.70	328.00	3,980.9	1,618.0	-953.7	1,878.0	0.74	-0.64	-0.74
4,554.0	29.30	328.90	4,063.6	1,657.8	-978.2	1,924.8	0.63	-0.42	0.95
4,648.0	27.80	329.80	4,146.2	1,696.5	-1,001.1	1,969.7	1.66	-1.60	0.96
4,743.0	26.60	328.90	4,230.7	1,733.8	-1,023.2	2,013.2	1.34	-1.26	-0.95
4,837.0	25.60	327.90	4,315.1	1,769.1	-1,044.9	2,054.5	1.16	-1.06	-1.06
4,932.0	24.90	334.90	4,401.0	1,804.6	-1,064.3	2,094.9	3.23	-0.74	7.37
5,026.0	22.90	332.40	4,487.0	1,838.7	-1,081.2	2,132.9	2.38	-2.13	-2.66



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5,121.0	20.90	329.60	4,575.1	1,869.7	-1,098.3	2,168.3	2.37	-2.11	-2.95	
5,215.0	19.50	326.90	4,663.3	1,897.3	-1,115.4	2,200.7	1.79	-1.49	-2.87	
5,310.0	18.60	328.40	4,753.1	1,923.5	-1,132.0	2,231.7	1.08	-0.95	1.58	
5,405.0	17.80	329.60	4,843.4	1,948.9	-1,147.2	2,261.4	0.93	-0.84	1.26	
5,499.0	15.90	325.90	4,933.4	1,972.0	-1,161.7	2,288.6	2.32	-2.02	-3.94	
5,594.0	15.80	329.20	5,024.7	1,993.9	-1,175.7	2,314.5	0.95	-0.11	3.47	
5,689.0	14.50	325.30	5,116.4	2,014.7	-1,189.1	2,339.3	1.74	-1.37	-4.11	
5,783.0	12.30	329.60	5,207.9	2,033.1	-1,200.8	2,361.1	2.57	-2.34	4.57	
5,877.0	11.10	322.80	5,299.9	2,048.9	-1,211.4	2,380.1	1.94	-1.28	-7.23	
5,972.0	10.10	330.20	5,393.3	2,063.4	-1,221.0	2,397.5	1.78	-1.05	7.79	
6,066.0	9.80	329.40	5,485.9	2,077.5	-1,229.2	2,413.8	0.35	-0.32	-0.85	
6,161.0	9.10	326.70	5,579.6	2,090.7	-1,237.4	2,429.4	0.87	-0.74	-2.84	
6,256.0	6.20	324.60	5,673.8	2,101.2	-1,244.5	2,442.0	3.07	-3.05	-2.21	
6,350.0	6.10	329.30	5,767.2	2,109.6	-1,250.0	2,452.1	0.55	-0.11	5.00	
6,445.0	5.30	324.00	5,861.7	2,117.5	-1,255.2	2,461.5	1.01	-0.84	-5.58	
6,540.0	3.38	330.18	5,956.5	2,123.5	-1,259.2	2,468.6	2.08	-2.02	6.51	
6,634.0	2.80	334.30	6,050.3	2,127.9	-1,261.5	2,473.7	0.66	-0.62	4.38	
6,729.0	1.76	334.92	6,145.3	2,131.3	-1,263.2	2,477.5	1.10	-1.09	0.65	
6,824.0	1.71	317.34	6,240.2	2,133.7	-1,264.7	2,480.3	0.56	-0.05	-18.51	
6,918.0	0.26	78.28	6,334.2	2,134.8	-1,265.5	2,481.6	1.98	-1.54	128.66	
7,013.0	0.13	134.35	6,429.2	2,134.7	-1,265.2	2,481.4	0.23	-0.14	59.02	
7,107.0	0.18	225.59	6,523.2	2,134.6	-1,265.2	2,481.3	0.24	0.05	97.06	
7,202.0	0.26	317.78	6,618.2	2,134.6	-1,265.5	2,481.5	0.34	0.08	97.04	
7,296.0	0.79	282.63	6,712.2	2,134.9	-1,266.2	2,482.1	0.63	0.56	-37.39	
7,391.0	1.27	296.07	6,807.2	2,135.5	-1,267.8	2,483.5	0.56	0.51	14.15	
7,485.0	1.93	290.18	6,901.1	2,136.5	-1,270.2	2,485.6	0.72	0.70	-6.27	
7,580.0	2.07	271.20	6,996.1	2,137.1	-1,273.5	2,487.7	0.71	0.15	-19.98	
7,675.0	1.45	261.36	7,091.0	2,137.0	-1,276.4	2,489.1	0.72	-0.65	-10.36	
7,769.0	1.71	291.24	7,185.0	2,137.3	-1,278.8	2,490.7	0.91	0.28	31.79	
7,864.0	1.36	267.25	7,280.0	2,137.8	-1,281.3	2,492.3	0.76	-0.37	-25.25	
7,959.0	1.97	269.88	7,374.9	2,137.7	-1,284.1	2,493.7	0.65	0.64	2.77	
Projection to TD @ 8011.0' MD / 7426.9' TVD										
8,011.0	1.97	269.88	7,426.9	2,137.7	-1,285.8	2,494.6	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
203.0	203.0	3.1	-2.4	First MWD Survey @ 203.0' MD / 203.0' TVD	
8,011.0	7,426.9	2,137.7	-1,285.8	Projection to TD @ 8011.0' MD / 7426.9' TVD	

Checked By: _____ Approved By: _____ Date: _____