



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-24-02E

A-5

Design: A-5

QES Survey Report

07 January, 2018





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-24-02E
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 0994-24-02E	North Reference:	True
Wellbore:	A-5	Survey Calculation Method:	Minimum Curvature
Design:	A-5	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 0994-24-02E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,749.93 usft	Latitude:	39.264661
	+E/-W	0.0 usft	Easting:	2,340,226.21 usft	Longitude:	-107.830558
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	A-5				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/24/2017	9.54	65.42	51,358.18418291

Design	A-5				
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	40.97	

Survey Program	Date	1/7/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
292.0	7,849.0	QES MWD Surveys (A-5)	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 @ 292.0' MD / 291.5' TVD									
292.0	5.60	75.50	291.5	3.6	13.8	11.7	1.92	1.92	0.00
382.0	6.80	59.70	381.0	7.4	22.7	20.4	2.31	1.33	-17.56
472.0	7.90	39.90	470.3	14.8	31.2	31.6	3.05	1.22	-22.00
564.0	9.50	37.60	561.2	25.7	39.9	45.5	1.78	1.74	-2.50
654.0	11.60	39.70	649.7	38.5	50.2	62.0	2.37	2.33	2.33
744.0	12.90	37.80	737.6	53.4	62.2	81.1	1.51	1.44	-2.11
835.0	13.60	39.30	826.2	69.7	75.2	101.9	0.86	0.77	1.65
926.0	14.80	38.20	914.4	87.1	89.1	124.2	1.35	1.32	-1.21
1,021.0	17.90	37.60	1,005.6	108.2	105.5	150.9	3.27	3.26	-0.63



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Wellbore:	A-5	Survey Calculation Method:	Minimum Curvature
Design:	A-5	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)
1,115.0	20.00	38.60	1,094.5	132.2	124.4	181.4	2.26	2.23	1.06
1,210.0	21.10	39.80	1,183.4	158.1	145.5	214.7	1.24	1.16	1.26
1,304.0	23.40	40.80	1,270.4	185.2	168.5	250.3	2.48	2.45	1.06
1,399.0	25.00	40.60	1,357.1	214.7	193.9	289.3	1.69	1.68	-0.21
1,493.0	24.00	39.50	1,442.6	244.6	219.0	328.2	1.17	-1.06	-1.17
1,585.0	24.00	39.90	1,526.7	273.4	242.9	365.7	0.18	0.00	0.43
1,679.0	23.40	39.30	1,612.7	302.5	267.0	403.4	0.69	-0.64	-0.64
1,774.0	22.40	38.80	1,700.3	331.2	290.3	440.4	1.07	-1.05	-0.53
1,868.0	23.20	42.90	1,786.9	358.7	314.1	476.8	1.89	0.85	4.36
1,963.0	24.30	42.70	1,873.9	386.8	340.1	515.0	1.16	1.16	-0.21
2,057.0	23.60	41.70	1,959.8	415.0	365.7	553.2	0.86	-0.74	-1.06
2,152.0	24.60	43.70	2,046.5	443.5	392.0	591.9	1.36	1.05	2.11
2,246.0	23.70	43.50	2,132.3	471.4	418.6	630.3	0.96	-0.96	-0.21
2,341.0	22.90	43.40	2,219.5	498.7	444.4	667.9	0.84	-0.84	-0.11
2,435.0	23.70	45.30	2,305.9	525.2	470.4	705.0	1.17	0.85	2.02
2,530.0	24.00	45.30	2,392.7	552.3	497.7	743.3	0.32	0.32	0.00
2,624.0	25.20	45.00	2,478.2	579.9	525.4	782.3	1.28	1.28	-0.32
2,719.0	25.30	41.10	2,564.1	609.5	553.1	822.8	1.75	0.11	-4.11
2,814.0	25.00	39.30	2,650.1	640.3	579.1	863.2	0.86	-0.32	-1.89
2,908.0	24.70	37.90	2,735.4	671.2	603.8	902.6	0.70	-0.32	-1.49
3,003.0	24.00	40.60	2,822.0	701.5	628.6	941.8	1.38	-0.74	2.84
3,098.0	23.20	41.30	2,909.0	730.2	653.5	979.8	0.89	-0.84	0.74
3,192.0	25.10	41.90	2,994.8	759.0	679.0	1,018.3	2.04	2.02	0.64
3,287.0	25.10	40.50	3,080.8	789.3	705.6	1,058.6	0.63	0.00	-1.47
3,382.0	24.50	39.00	3,167.1	819.9	731.0	1,098.4	0.92	-0.63	-1.58
3,477.0	23.60	38.80	3,253.8	850.0	755.4	1,137.1	0.95	-0.95	-0.21
3,571.0	24.90	39.90	3,339.5	879.9	779.8	1,175.7	1.46	1.38	1.17
3,666.0	24.20	39.70	3,425.9	910.2	805.1	1,215.1	0.74	-0.74	-0.21
3,760.0	23.50	39.10	3,511.9	939.6	829.2	1,253.1	0.79	-0.74	-0.64
3,855.0	24.30	39.10	3,598.8	969.5	853.5	1,291.6	0.84	0.84	0.00
3,950.0	23.90	39.10	3,685.5	999.6	878.0	1,330.4	0.42	-0.42	0.00
4,044.0	23.10	38.10	3,771.7	1,028.8	901.4	1,367.8	0.95	-0.85	-1.06
4,138.0	23.40	41.50	3,858.1	1,057.3	925.1	1,404.9	1.46	0.32	3.62
4,233.0	23.00	41.90	3,945.4	1,085.3	950.0	1,442.3	0.45	-0.42	0.42
4,328.0	25.10	42.80	4,032.1	1,113.9	976.1	1,481.0	2.24	2.21	0.95
4,422.0	24.80	41.30	4,117.4	1,143.3	1,002.6	1,520.7	0.74	-0.32	-1.60
4,517.0	23.40	41.40	4,204.1	1,172.4	1,028.3	1,559.5	1.47	-1.47	0.11
4,612.0	22.30	42.60	4,291.6	1,199.9	1,052.9	1,596.3	1.26	-1.16	1.26
4,706.0	22.20	41.10	4,378.6	1,226.4	1,076.7	1,631.9	0.61	-0.11	-1.60
4,800.0	23.10	42.20	4,465.4	1,253.4	1,100.8	1,668.1	1.06	0.96	1.17
4,895.0	22.80	40.50	4,552.8	1,281.2	1,125.2	1,705.2	0.77	-0.32	-1.79
4,990.0	21.10	39.60	4,641.0	1,308.4	1,148.1	1,740.7	1.82	-1.79	-0.95
5,084.0	19.80	41.50	4,729.0	1,333.4	1,169.4	1,773.5	1.55	-1.38	2.02



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Survey										
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5,179.0	20.00	44.10	4,818.4	1,357.1	1,191.4	1,805.8	0.95	0.21	2.74	
5,273.0	18.90	43.70	4,907.0	1,379.6	1,213.1	1,837.1	1.18	-1.17	-0.43	
5,368.0	18.00	40.50	4,997.1	1,401.9	1,233.3	1,867.1	1.43	-0.95	-3.37	
5,462.0	17.00	38.30	5,086.8	1,423.7	1,251.2	1,895.4	1.28	-1.06	-2.34	
5,557.0	13.10	37.90	5,178.5	1,443.1	1,266.4	1,920.0	4.11	-4.11	-0.42	
5,651.0	11.20	35.90	5,270.4	1,458.9	1,278.3	1,939.7	2.07	-2.02	-2.13	
5,746.0	10.00	37.40	5,363.8	1,473.0	1,288.8	1,957.2	1.30	-1.26	1.58	
5,840.0	9.20	36.50	5,456.4	1,485.5	1,298.2	1,972.8	0.87	-0.85	-0.96	
5,935.0	7.60	31.80	5,550.4	1,496.9	1,306.0	1,986.6	1.83	-1.68	-4.95	
6,029.0	6.10	23.00	5,643.7	1,506.8	1,311.2	1,997.5	1.94	-1.60	-9.36	
6,124.0	5.40	20.10	5,738.3	1,515.7	1,314.7	2,006.4	0.80	-0.74	-3.05	
6,218.0	3.50	22.10	5,832.0	1,522.5	1,317.3	2,013.3	2.03	-2.02	2.13	
6,313.0	2.50	11.80	5,926.8	1,527.2	1,318.9	2,017.8	1.19	-1.05	-10.84	
6,408.0	1.90	357.50	6,021.8	1,530.8	1,319.2	2,020.8	0.85	-0.63	-15.05	
6,502.0	2.00	1.70	6,115.7	1,534.0	1,319.2	2,023.2	0.19	0.11	4.47	
6,597.0	1.20	331.60	6,210.7	1,536.5	1,318.8	2,024.8	1.19	-0.84	-31.68	
6,691.0	1.00	335.40	6,304.7	1,538.1	1,318.0	2,025.5	0.23	-0.21	4.04	
6,785.0	1.30	330.40	6,398.7	1,539.8	1,317.1	2,026.2	0.34	0.32	-5.32	
6,880.0	1.30	328.00	6,493.6	1,541.7	1,316.0	2,026.9	0.06	0.00	-2.53	
6,975.0	0.53	288.78	6,588.6	1,542.7	1,315.0	2,027.0	1.00	-0.81	-41.28	
7,069.0	0.48	279.55	6,682.6	1,542.9	1,314.2	2,026.7	0.10	-0.05	-9.82	
7,164.0	0.70	229.28	6,777.6	1,542.6	1,313.4	2,025.9	0.57	0.23	-52.92	
7,259.0	0.75	197.37	6,872.6	1,541.6	1,312.7	2,024.7	0.42	0.05	-33.59	
7,353.0	1.19	197.99	6,966.6	1,540.1	1,312.3	2,023.3	0.47	0.47	0.66	
7,448.0	1.23	220.57	7,061.6	1,538.4	1,311.3	2,021.3	0.50	0.04	23.77	
7,543.0	1.18	238.33	7,156.5	1,537.1	1,309.8	2,019.4	0.40	-0.05	18.69	
7,637.0	1.01	264.96	7,250.5	1,536.5	1,308.1	2,017.9	0.56	-0.18	28.33	
7,732.0	1.31	249.22	7,345.5	1,536.1	1,306.3	2,016.3	0.46	0.32	-16.57	
7,795.0	1.84	252.39	7,408.5	1,535.5	1,304.7	2,014.8	0.85	0.84	5.03	
Projection to TD @ 7849.0' MD / 7462.5' TVD										
7,849.0	1.84	252.39	7,462.5	1,535.0	1,303.0	2,013.3	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
292.0	291.5	3.6	13.8	First MWD Survey @ 292.0' MD / 291.5' TVD	
7,849.0	7,462.5	1,535.0	1,303.0	Projection to TD @ 7849.0' MD / 7462.5' TVD	

Checked By: _____	Approved By: _____	Date: _____
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