



Laramie Energy, LLC

Mesa County, CO

Nichols 24-06A

Nichols 0994-24-05E

A-8

Design: A-8

QES Survey Report

21 December, 2017





Survey Report



Company:	Laramie Energy, LLC	Local Co-ordinate Reference:	Well Nichols 0994-24-05E
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 0994-24-05E	North Reference:	True
Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	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 0994-24-05E					
Well Position	+N/-S	0.0 usft	Northing:	1,529,729.07 usft	Latitude:	39.264603
	+E/-W	0.0 usft	Easting:	2,340,216.04 usft	Longitude:	-107.830592
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,137.0 usft

Wellbore	A-8				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/4/2017	9.55	65.42	51,364.23427663

Design	A-8				
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	58.66	

Survey Program	Date	12/21/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
415.0	7,682.0	QES MWD Surveys (A-8)	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 @ 415.0' MD / 414.9' TVD									
415.0	2.00	95.80	414.9	-0.7	7.2	5.8	0.48	0.48	0.00
474.0	2.30	85.60	473.9	-0.7	9.4	7.6	0.82	0.51	-17.29
565.0	3.50	75.10	564.8	0.1	13.9	11.9	1.44	1.32	-11.54
655.0	5.20	53.80	654.5	3.2	19.9	18.6	2.58	1.89	-23.67
745.0	7.70	57.00	743.9	8.9	28.2	28.7	2.81	2.78	3.56
837.0	10.20	59.60	834.8	16.4	40.4	43.0	2.75	2.72	2.83
928.0	12.80	53.00	924.0	26.5	55.4	61.1	3.20	2.86	-7.25
1,022.0	15.50	55.40	1,015.1	39.9	74.1	84.0	2.94	2.87	2.55
1,117.0	17.80	56.20	1,106.1	55.2	96.6	111.2	2.43	2.42	0.84



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Wellbore:	A-8	Survey Calculation Method:	Minimum Curvature
Design:	A-8	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)
1,211.0	18.70	56.90	1,195.4	71.5	121.2	140.6	0.99	0.96	0.74
1,306.0	18.10	56.50	1,285.5	87.9	146.2	170.6	0.65	-0.63	-0.42
1,400.0	20.80	58.90	1,374.2	104.6	172.7	201.9	2.99	2.87	2.55
1,495.0	21.50	58.20	1,462.8	122.5	201.9	236.2	0.78	0.74	-0.74
1,585.0	21.80	57.50	1,546.4	140.2	230.0	269.4	0.44	0.33	-0.78
1,679.0	21.80	57.10	1,633.7	159.0	259.4	304.3	0.16	0.00	-0.43
1,774.0	21.70	56.10	1,721.9	178.4	288.8	339.5	0.40	-0.11	-1.05
1,868.0	21.00	59.90	1,809.5	196.5	317.8	373.7	1.65	-0.74	4.04
1,963.0	20.80	58.90	1,898.2	213.8	347.0	407.5	0.43	-0.21	-1.05
2,057.0	19.50	60.40	1,986.5	230.2	374.9	439.9	1.49	-1.38	1.60
2,152.0	19.00	59.60	2,076.2	245.8	402.0	471.2	0.60	-0.53	-0.84
2,246.0	18.30	58.20	2,165.2	261.3	427.8	501.3	0.88	-0.74	-1.49
2,340.0	17.80	58.10	2,254.6	276.7	452.5	530.4	0.53	-0.53	-0.11
2,435.0	18.40	60.70	2,344.9	291.7	477.9	559.9	1.06	0.63	2.74
2,530.0	17.60	60.40	2,435.2	306.1	503.5	589.2	0.85	-0.84	-0.32
2,624.0	19.10	60.80	2,524.5	320.7	529.3	618.8	1.60	1.60	0.43
2,719.0	18.70	60.90	2,614.3	335.7	556.1	649.6	0.42	-0.42	0.11
2,813.0	18.40	61.00	2,703.5	350.2	582.3	679.5	0.32	-0.32	0.11
2,908.0	19.80	59.60	2,793.2	365.6	609.3	710.5	1.55	1.47	-1.47
3,003.0	19.10	59.30	2,882.8	381.7	636.5	742.2	0.74	-0.74	-0.32
3,098.0	18.00	58.20	2,972.9	397.3	662.4	772.4	1.22	-1.16	-1.16
3,192.0	19.90	58.90	3,061.8	413.3	688.4	802.9	2.04	2.02	0.74
3,287.0	19.40	57.60	3,151.2	430.1	715.6	834.8	0.70	-0.53	-1.37
3,382.0	18.40	57.50	3,241.1	446.6	741.5	865.6	1.05	-1.05	-0.11
3,476.0	18.50	57.00	3,330.3	462.7	766.6	895.3	0.20	0.11	-0.53
3,571.0	19.50	60.30	3,420.1	478.7	793.0	926.3	1.54	1.05	3.47
3,666.0	18.90	59.70	3,509.8	494.4	820.0	957.5	0.66	-0.63	-0.63
3,760.0	18.30	60.20	3,598.9	509.4	846.0	987.5	0.66	-0.64	0.53
3,855.0	17.90	59.50	3,689.2	524.2	871.5	1,017.0	0.48	-0.42	-0.74
3,949.0	18.90	56.80	3,778.4	539.9	896.7	1,046.6	1.40	1.06	-2.87
4,044.0	20.30	57.00	3,867.9	557.3	923.4	1,078.5	1.48	1.47	0.21
4,138.0	20.00	56.10	3,956.2	575.1	950.4	1,110.9	0.46	-0.32	-0.96
4,233.0	20.00	56.30	4,045.4	593.2	977.4	1,143.3	0.07	0.00	0.21
4,327.0	19.30	56.10	4,133.9	610.8	1,003.7	1,174.9	0.75	-0.74	-0.21
4,422.0	18.30	54.30	4,223.9	628.2	1,028.8	1,205.5	1.22	-1.05	-1.89
4,517.0	18.80	58.80	4,313.9	644.9	1,054.0	1,235.6	1.60	0.53	4.74
4,612.0	17.00	60.00	4,404.3	659.7	1,079.1	1,264.8	1.93	-1.89	1.26
4,706.0	16.70	58.70	4,494.3	673.6	1,102.6	1,292.1	0.51	-0.32	-1.38
4,800.0	16.00	56.70	4,584.5	687.7	1,124.9	1,318.5	0.96	-0.74	-2.13
4,895.0	15.10	55.20	4,676.0	702.0	1,146.1	1,344.0	1.04	-0.95	-1.58
4,989.0	15.80	55.20	4,766.6	716.3	1,166.6	1,369.0	0.74	0.74	0.00
5,084.0	13.80	55.10	4,858.5	730.2	1,186.5	1,393.2	2.11	-2.11	-0.11
5,179.0	13.80	53.10	4,950.7	743.4	1,204.9	1,415.8	0.50	0.00	-2.11



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Survey										
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5,273.0	12.70	52.80	5,042.2	756.4	1,222.1	1,437.2	1.17	-1.17	-0.32	
5,368.0	11.30	54.70	5,135.2	768.1	1,238.0	1,456.9	1.53	-1.47	2.00	
5,462.0	10.00	54.80	5,227.5	778.1	1,252.2	1,474.2	1.38	-1.38	0.11	
5,556.0	8.70	53.90	5,320.3	787.0	1,264.6	1,489.4	1.39	-1.38	-0.96	
5,651.0	7.80	54.70	5,414.3	795.0	1,275.7	1,503.0	0.96	-0.95	0.84	
5,745.0	7.00	56.60	5,507.5	801.8	1,285.6	1,515.1	0.89	-0.85	2.02	
5,840.0	6.50	57.10	5,601.9	807.9	1,295.0	1,526.3	0.53	-0.53	0.53	
5,934.0	4.40	55.60	5,695.4	812.9	1,302.4	1,535.2	2.24	-2.23	-1.60	
6,029.0	2.80	54.60	5,790.2	816.3	1,307.3	1,541.1	1.69	-1.68	-1.05	
6,123.0	2.60	58.40	5,884.1	818.7	1,311.0	1,545.6	0.29	-0.21	4.04	
6,218.0	0.40	104.30	5,979.1	819.8	1,313.2	1,548.0	2.46	-2.32	48.32	
6,313.0	0.40	84.90	6,074.1	819.7	1,313.8	1,548.5	0.14	0.00	-20.42	
6,407.0	0.50	69.50	6,168.1	819.9	1,314.5	1,549.2	0.17	0.11	-16.38	
6,502.0	0.50	106.90	6,263.1	819.9	1,315.3	1,549.9	0.34	0.00	39.37	
6,597.0	0.90	60.50	6,358.1	820.2	1,316.4	1,550.9	0.70	0.42	-48.84	
6,691.0	0.50	60.10	6,452.1	820.7	1,317.4	1,552.0	0.43	-0.43	-0.43	
6,785.0	0.60	3.20	6,546.1	821.4	1,317.8	1,552.7	0.57	0.11	-60.53	
6,880.0	0.00	95.50	6,641.1	821.9	1,317.8	1,553.0	0.63	-0.63	0.00	
6,975.0	0.20	9.00	6,736.1	822.1	1,317.8	1,553.1	0.21	0.21	0.00	
7,069.0	0.00	23.00	6,830.1	822.2	1,317.8	1,553.2	0.21	-0.21	0.00	
7,164.0	0.60	109.60	6,925.1	822.1	1,318.3	1,553.5	0.63	0.63	0.00	
7,258.0	1.20	119.00	7,019.1	821.4	1,319.6	1,554.3	0.66	0.64	10.00	
7,353.0	1.50	115.50	7,114.0	820.4	1,321.6	1,555.5	0.33	0.32	-3.68	
7,448.0	0.80	129.90	7,209.0	819.5	1,323.3	1,556.4	0.79	-0.74	15.16	
7,543.0	0.70	122.90	7,304.0	818.7	1,324.2	1,556.9	0.14	-0.11	-7.37	
7,628.0	0.70	161.30	7,389.0	817.9	1,324.9	1,557.0	0.54	0.00	45.18	
Projection to TD @ 7682.0' MD / 7443.0' TVD										
7,682.0	0.70	161.30	7,443.0	817.3	1,325.1	1,556.8	0.00	0.00	0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
415.0	414.9	-0.7	7.2	First MWD Survey @ 415.0' MD / 414.9' TVD	
7,682.0	7,443.0	817.3	1,325.1	Projection to TD @ 7682.0' MD / 7443.0' TVD	