



NM OIL CONSERVATION
ARTESIA DISTRICT

NOV 26 2019

RECEIVED

February 19, 2019

Devon Energy Production Company, LP
Well: Spud Muffin 31-30 623H
County/Parish: Eddy County, NM

LEAM MWD: (OH) from 0' MD – 20,101' MD
Projection: 20,155' MD

This Borehole Survey taken between 01/22/19 and 02/14/19 had been conducted and calculated according to the highest professional standards and complies with all known State and Federal requirements.

Reviewed and Approved:

Date: February 19, 2019



Survey Certification Form

State of New Mexico

Eddy County

I, Randy W. Rakowitz, certify that; I am employed by LEAM Drilling Services, that I did on the day(s) of 01/22/2019 through 02/14/2019, conduct or supervise the taking of MWD Survey from a depth of 0' MD to 20,155' MD; that the data is true, correct, complete and within the limitations of the tools as set forth by LEAM Drilling Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Devon Energy Production Company, LP for the Spud Muffin 31-30 623H in Eddy County, New Mexico; and that I reviewed this report and find that it conforms to the principals and procedures as set forth by LEAM Drilling Services.

A handwritten signature in black ink, appearing to read 'Randy W. Rakowitz', is written over a horizontal line.

Randy W. Rakowitz
MWD Operations Coordinator

LEAM Drilling Systems

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well Spud Muffin 31-30 623H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Site:	Spud Muffin 31-30 Com	MD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Well:	Spud Muffin 31-30 623H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_User Db

Project:	Eddy County, NM (NAD-83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Spud Muffin 31-30 Com			
Site Position:		Northing:	456,837.82 usft	Latitude:	32° 15' 19.9378 N
From:	Map	Easting:	637,646.02 usft	Longitude:	104° 1' 18.4160 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.17 °

Well	Spud Muffin 31-30 623H					
Well Position	+N/-S	0.00 usft	Northing:	456,993.59 usft	Latitude:	32° 15' 21.5030 N
	+E/-W	0.00 usft	Easting:	636,815.61 usft	Longitude:	104° 1' 28.0814 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	2,959.30 usft

Wellbore						OH
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)	
	HDGM	12/3/2018	7.12	60.03	47,955.10000000	

Design		OH			
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00		0.01

Survey Program		Date: 3/1/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
172.00	20,101.00	Survey #1 - MWD (OH)	LEAM MWD+HDGM	MWD+HDGM
20,155.00	20,155.00	Projection (OH)	Project	Projection

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172.00	0.40	1.00	172.00	0.60	0.01	0.60	0.23	0.23	0.00
263.00	0.70	358.70	262.99	1.47	0.00	1.47	0.33	0.33	-2.53
299.00	0.80	346.90	298.99	1.94	-0.06	1.94	0.51	0.28	-32.78
414.00	0.60	330.20	413.98	3.24	-0.54	3.24	0.25	-0.17	-14.52
506.00	0.90	339.90	505.97	4.34	-1.03	4.34	0.35	0.33	10.54
598.00	1.20	347.40	597.96	5.96	-1.49	5.96	0.36	0.33	8.15
690.00	1.50	349.70	689.93	8.08	-1.91	8.08	0.33	0.33	2.50
783.00	1.80	353.40	782.89	10.73	-2.30	10.73	0.34	0.32	3.98
875.00	0.90	338.80	874.87	12.84	-2.72	12.84	1.04	-0.98	-15.87

LEAM Drilling Systems

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Well:	Spud Muffin 31-30 623H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_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)
967.00	1.30	348.80	966.85	14.54	-3.19	14.54	0.48	0.43	10.87
1,058.00	1.10	332.10	1,057.83	16.32	-3.80	16.32	0.44	-0.22	-18.35
1,149.00	0.20	248.50	1,148.83	17.04	-4.35	17.04	1.20	-0.99	-91.87
1,241.00	0.40	338.80	1,240.83	17.28	-4.62	17.28	0.49	0.22	98.15
1,332.00	0.90	7.50	1,331.82	18.28	-4.64	18.28	0.64	0.55	31.54
1,423.00	0.60	139.30	1,422.82	18.63	-4.24	18.63	1.51	-0.33	144.84
1,514.00	0.40	116.30	1,513.81	18.13	-3.64	18.13	0.31	-0.22	-25.27
1,606.00	0.30	78.80	1,605.81	18.03	-3.12	18.03	0.27	-0.11	-40.76
1,698.00	0.40	43.90	1,697.81	18.31	-2.66	18.31	0.25	0.11	-37.93
1,791.00	0.60	158.60	1,790.81	18.09	-2.26	18.09	0.91	0.22	123.33
1,885.00	0.40	181.30	1,884.80	17.30	-2.08	17.30	0.30	-0.21	24.15
1,979.00	0.10	263.20	1,978.80	16.97	-2.17	16.97	0.42	-0.32	87.13
2,074.00	0.50	308.60	2,073.80	17.21	-2.58	17.21	0.46	0.42	47.79
2,169.00	0.20	351.50	2,168.80	17.64	-2.93	17.64	0.40	-0.32	45.16
2,264.00	1.40	140.40	2,263.79	16.91	-2.21	16.91	1.66	1.26	156.74
2,358.00	2.20	152.10	2,357.74	14.43	-0.64	14.43	0.93	0.85	12.45
2,453.00	2.30	134.00	2,452.67	11.49	1.59	11.49	0.75	0.11	-19.05
2,547.00	2.80	145.50	2,546.58	8.29	4.25	8.29	0.76	0.53	12.23
2,641.00	2.60	147.90	2,640.47	4.59	6.68	4.59	0.24	-0.21	2.55
2,736.00	2.40	147.40	2,735.38	1.09	8.90	1.09	0.21	-0.21	-0.53
2,831.00	3.50	138.40	2,830.26	-2.75	11.89	-2.75	1.25	1.16	-9.47
2,926.00	4.40	131.80	2,925.03	-7.35	16.54	-7.35	1.06	0.95	-6.95
3,020.00	5.50	130.30	3,018.68	-12.67	22.66	-12.67	1.18	1.17	-1.60
3,115.00	6.60	128.40	3,113.15	-19.00	30.41	-19.00	1.18	1.16	-2.00
3,210.00	7.70	128.90	3,207.41	-26.39	39.64	-26.39	1.16	1.16	0.53
3,304.00	7.80	129.30	3,300.55	-34.39	49.48	-34.38	0.12	0.11	0.43
3,398.00	8.40	125.40	3,393.61	-42.40	60.01	-42.40	0.87	0.64	-4.15
3,493.00	9.10	124.00	3,487.51	-50.63	71.90	-50.62	0.77	0.74	-1.47
3,587.00	9.90	121.40	3,580.22	-58.99	84.96	-58.99	0.97	0.85	-2.77
3,682.00	10.80	120.30	3,673.67	-67.74	99.61	-67.73	0.97	0.95	-1.16
3,777.00	11.70	119.80	3,766.84	-77.02	115.66	-77.01	0.95	0.95	-0.53
3,871.00	12.60	121.40	3,858.74	-87.09	132.68	-87.08	1.02	0.96	1.70
3,966.00	12.50	122.40	3,951.47	-98.00	150.20	-97.99	0.25	-0.11	1.05
4,060.00	12.50	121.20	4,043.24	-108.72	167.49	-108.71	0.28	0.00	-1.28
4,154.00	11.70	121.40	4,135.15	-118.96	184.33	-118.94	0.85	-0.85	0.21
4,249.00	10.60	121.00	4,228.36	-128.48	200.04	-128.46	1.16	-1.16	-0.42
4,344.00	10.90	124.00	4,321.69	-138.00	214.98	-137.98	0.67	0.32	3.16
4,438.00	12.00	126.30	4,413.82	-148.76	230.22	-148.74	1.27	1.17	2.45
4,532.00	12.20	126.00	4,505.73	-160.38	246.13	-160.36	0.22	0.21	-0.32
4,627.00	12.00	126.50	4,598.62	-172.15	262.19	-172.13	0.24	-0.21	0.53
4,721.00	12.00	125.30	4,690.56	-183.61	278.02	-183.59	0.27	0.00	-1.28
4,814.00	11.70	125.10	4,781.58	-194.62	293.63	-194.60	0.33	-0.32	-0.22
4,909.00	11.30	124.90	4,874.68	-205.49	309.14	-205.46	0.42	-0.42	-0.21

LEAM Drilling Systems

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_User Db

Survey									
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5,005.00	10.60	122.60	4,968.93	-215.62	324.30	-215.60	0.86	-0.73	-2.40
5,100.00	11.30	126.70	5,062.20	-225.89	339.12	-225.86	1.10	0.74	4.32
5,194.00	12.20	126.70	5,154.23	-237.33	354.47	-237.30	0.96	0.96	0.00
5,289.00	11.20	125.10	5,247.25	-248.64	370.06	-248.61	1.11	-1.05	-1.68
5,383.00	11.30	123.80	5,339.45	-259.01	385.19	-258.98	0.29	0.11	-1.38
5,477.00	12.20	122.60	5,431.48	-269.49	401.21	-269.45	0.99	0.96	-1.28
5,572.00	11.60	121.60	5,524.43	-279.90	417.80	-279.86	0.67	-0.63	-1.05
5,666.00	11.10	121.60	5,616.60	-289.59	433.55	-289.55	0.53	-0.53	0.00
5,761.00	12.20	121.60	5,709.64	-299.64	449.89	-299.60	1.16	1.16	0.00
5,856.00	12.70	120.90	5,802.40	-310.27	467.40	-310.23	0.55	0.53	-0.74
5,950.00	12.10	120.20	5,894.21	-320.53	484.78	-320.49	0.66	-0.64	-0.74
6,045.00	11.50	120.70	5,987.20	-330.37	501.53	-330.33	0.64	-0.63	0.53
6,138.00	10.80	120.30	6,078.45	-339.50	517.03	-339.46	0.76	-0.75	-0.43
6,233.00	11.30	121.70	6,171.68	-348.88	532.63	-348.84	0.60	0.53	1.47
6,327.00	12.40	124.20	6,263.68	-359.39	548.82	-359.35	1.29	1.17	2.66
6,422.00	12.00	124.00	6,356.54	-370.65	565.44	-370.60	0.42	-0.42	-0.21
6,517.00	11.30	123.30	6,449.58	-381.28	581.41	-381.23	0.75	-0.74	-0.74
6,612.00	10.50	125.80	6,542.86	-391.46	596.21	-391.40	0.98	-0.84	2.63
6,707.00	11.20	124.20	6,636.16	-401.71	610.86	-401.65	0.80	0.74	-1.68
6,801.00	11.60	124.40	6,728.31	-412.18	626.21	-412.12	0.43	0.43	0.21
6,896.00	11.90	126.70	6,821.32	-423.43	641.94	-423.37	0.59	0.32	2.42
6,991.00	9.80	121.40	6,914.62	-433.49	656.70	-433.44	2.45	-2.21	-5.58
7,086.00	10.60	121.00	7,008.12	-442.21	671.09	-442.15	0.85	0.84	-0.42
7,180.00	11.00	124.50	7,100.45	-451.74	685.89	-451.68	0.82	0.43	3.72
7,274.00	11.30	122.80	7,192.68	-461.81	701.02	-461.75	0.47	0.32	-1.81
7,370.00	9.50	120.20	7,287.10	-470.89	715.77	-470.83	1.94	-1.88	-2.71
7,464.00	10.30	125.10	7,379.70	-479.62	729.36	-479.56	1.24	0.85	5.21
7,558.00	11.20	127.00	7,472.05	-489.95	743.52	-489.88	1.03	0.96	2.02
7,653.00	9.90	127.20	7,565.44	-500.44	757.40	-500.37	1.37	-1.37	0.21
7,747.00	9.50	123.80	7,658.10	-509.64	770.28	-509.57	0.74	-0.43	-3.62
7,842.00	7.90	120.00	7,752.00	-517.27	782.45	-517.20	1.79	-1.68	-4.00
7,936.00	7.10	112.10	7,845.20	-522.68	793.43	-522.61	1.39	-0.85	-8.40
8,032.00	7.20	124.20	7,940.46	-528.30	803.90	-528.23	1.57	0.10	12.60
8,126.00	6.50	128.10	8,033.79	-534.89	812.96	-534.82	0.89	-0.74	4.15
8,220.00	4.20	127.50	8,127.37	-540.27	819.88	-540.20	2.45	-2.45	-0.64
8,315.00	3.20	130.90	8,222.17	-544.12	824.64	-544.05	1.08	-1.05	3.58
8,410.00	2.60	140.40	8,317.05	-547.52	828.02	-547.45	0.81	-0.63	10.00
8,505.00	2.70	149.50	8,411.95	-551.11	830.53	-551.04	0.45	0.11	9.58
8,599.00	2.50	154.30	8,505.85	-554.86	832.54	-554.79	0.31	-0.21	5.11
8,693.00	1.80	155.10	8,599.79	-558.05	834.05	-557.98	0.75	-0.74	0.85
8,788.00	1.10	165.30	8,694.76	-560.29	834.91	-560.21	0.78	-0.74	10.74
8,883.00	1.20	165.50	8,789.74	-562.13	835.39	-562.06	0.11	0.11	0.21
8,977.00	0.90	114.70	8,883.72	-563.39	836.31	-563.32	1.00	-0.32	-54.04

LEAM Drilling Systems

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_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)
9,072.00	1.20	150.90	8,978.71	-564.57	837.47	-564.50	0.75	0.32	38.11
9,167.00	1.20	179.40	9,073.69	-566.44	837.96	-566.36	0.62	0.00	30.00
9,205.00	1.30	192.90	9,111.68	-567.25	837.87	-567.18	0.82	0.26	35.53
9,268.00	1.30	196.80	9,174.66	-568.64	837.51	-568.56	0.14	0.00	6.19
9,363.00	4.70	355.50	9,269.58	-565.78	836.89	-565.71	6.24	3.58	167.05
9,457.00	17.90	6.60	9,361.56	-547.51	838.25	-547.44	14.17	14.04	11.81
9,504.42	23.93	10.07	9,405.83	-530.79	840.77	-530.72	12.97	12.71	7.31
100' FSL HL Crossing @ 9504.42' MD									
9,505.00	24.00	10.10	9,406.36	-530.56	840.82	-530.49	12.97	12.77	5.53
9,551.00	26.80	9.60	9,447.91	-511.12	844.19	-511.05	6.10	6.09	-1.09
9,598.00	31.20	7.70	9,489.01	-488.60	847.59	-488.52	9.56	9.36	-4.04
9,646.00	36.10	5.50	9,528.96	-462.18	850.61	-462.11	10.52	10.21	-4.58
9,693.00	39.60	4.00	9,566.06	-433.45	852.98	-433.37	7.70	7.45	-3.19
9,741.00	44.60	2.70	9,601.67	-401.33	854.84	-401.26	10.57	10.42	-2.71
9,788.00	47.50	3.10	9,634.28	-367.54	856.56	-367.47	6.20	6.17	0.85
9,836.00	50.50	3.40	9,665.77	-331.38	858.61	-331.31	6.27	6.25	0.63
9,883.00	54.30	3.10	9,694.44	-294.21	860.72	-294.13	8.10	8.09	-0.64
9,930.00	58.60	3.30	9,720.41	-255.11	862.91	-255.03	9.16	9.15	0.43
9,977.00	63.00	3.30	9,743.34	-214.16	865.27	-214.08	9.36	9.36	0.00
10,024.00	66.50	2.40	9,763.38	-171.71	867.38	-171.63	7.65	7.45	-1.91
10,071.00	70.40	1.10	9,780.64	-128.03	868.71	-127.95	8.69	8.30	-2.77
10,120.00	74.10	359.40	9,795.58	-81.37	868.90	-81.29	8.24	7.55	-3.47
10,167.00	76.20	358.70	9,807.63	-35.95	868.15	-35.87	4.69	4.47	-1.49
10,214.00	79.80	358.90	9,817.40	10.01	867.19	10.08	7.67	7.66	0.43
10,261.00	83.40	359.70	9,824.26	56.49	866.62	56.57	7.84	7.66	1.70
10,309.00	86.90	0.10	9,828.32	104.31	866.54	104.39	7.34	7.29	0.83
10,403.00	88.40	0.30	9,832.17	198.23	866.87	198.31	1.61	1.60	0.21
10,498.00	88.50	0.40	9,834.74	293.19	867.45	293.27	0.15	0.11	0.11
10,592.00	87.70	0.60	9,837.86	387.14	868.27	387.21	0.88	-0.85	0.21
10,686.00	87.50	1.00	9,841.80	481.05	869.58	481.12	0.48	-0.21	0.43
10,781.00	88.90	2.70	9,844.78	575.94	872.64	576.02	2.32	1.47	1.79
10,876.00	91.60	3.10	9,844.36	670.81	877.45	670.89	2.87	2.84	0.42
10,970.00	90.80	1.50	9,842.40	764.71	881.22	764.79	1.90	-0.85	-1.70
11,065.00	89.80	0.30	9,841.90	859.70	882.71	859.77	1.64	-1.05	-1.26
11,159.00	90.50	1.30	9,841.65	953.68	884.02	953.76	1.30	0.74	1.06
11,254.00	88.40	0.30	9,842.56	1,048.66	885.35	1,048.74	2.45	-2.21	-1.05
11,349.00	89.10	0.10	9,844.64	1,143.64	885.68	1,143.72	0.77	0.74	-0.21
11,444.00	88.50	359.40	9,846.63	1,238.62	885.27	1,238.69	0.97	-0.63	-0.74
11,496.00	88.90	358.90	9,847.81	1,290.60	884.50	1,290.68	1.23	0.77	-0.96
11,587.00	90.10	359.90	9,848.60	1,381.59	883.54	1,381.66	1.72	1.32	1.10
11,679.00	91.00	1.30	9,847.72	1,473.57	884.51	1,473.65	1.81	0.98	1.52
11,770.00	88.90	2.20	9,847.80	1,564.53	887.29	1,564.60	2.51	-2.31	0.99
11,862.00	88.60	4.00	9,849.80	1,656.37	892.26	1,656.44	1.98	-0.33	1.96
11,953.00	89.20	5.20	9,851.55	1,747.05	899.56	1,747.13	1.47	0.66	1.32

LEAM Drilling Systems

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well Spud Muffin 31-30 623H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Site:	Spud Muffin 31-30 Com	MD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Well:	Spud Muffin 31-30 623H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_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)
12,043.00	89.10	8.40	9,852.89	1,836.40	910.21	1,836.48	3.56	-0.11	3.56
12,135.00	88.30	7.80	9,854.97	1,927.46	923.17	1,927.54	1.09	-0.87	-0.65
12,226.00	89.30	9.80	9,856.88	2,017.36	937.09	2,017.44	2.46	1.10	2.20
12,321.00	89.30	9.40	9,858.04	2,111.02	952.93	2,111.11	0.42	0.00	-0.42
12,416.00	88.70	8.40	9,859.70	2,204.86	967.62	2,204.95	1.23	-0.63	-1.05
12,510.00	87.30	7.30	9,862.98	2,297.92	980.46	2,298.01	1.89	-1.49	-1.17
12,605.00	89.40	7.10	9,865.71	2,392.13	992.36	2,392.21	2.22	2.21	-0.21
12,699.00	86.00	3.40	9,869.49	2,485.63	1,000.95	2,485.72	5.34	-3.62	-3.94
12,794.00	86.80	2.00	9,875.45	2,580.33	1,005.42	2,580.42	1.69	0.84	-1.47
12,889.00	88.20	358.90	9,879.60	2,675.22	1,006.16	2,675.31	3.58	1.47	-3.26
12,983.00	90.10	357.80	9,880.99	2,769.17	1,003.45	2,769.26	2.34	2.02	-1.17
13,078.00	91.80	357.50	9,879.42	2,864.07	999.56	2,864.16	1.82	1.79	-0.32
13,172.00	92.50	357.50	9,875.89	2,957.92	995.46	2,958.00	0.74	0.74	0.00
13,267.00	90.20	354.60	9,873.65	3,052.65	988.92	3,052.73	3.90	-2.42	-3.05
13,361.00	89.00	353.20	9,874.31	3,146.11	978.93	3,146.20	1.96	-1.28	-1.49
13,456.00	91.60	353.10	9,873.81	3,240.42	967.60	3,240.51	2.74	2.74	-0.11
13,550.00	89.50	353.20	9,872.91	3,333.74	956.39	3,333.83	2.24	-2.23	0.11
13,644.00	89.10	353.40	9,874.06	3,427.09	945.43	3,427.18	0.48	-0.43	0.21
13,739.00	89.60	354.30	9,875.13	3,521.54	935.25	3,521.62	1.08	0.53	0.95
13,834.00	94.50	355.50	9,871.74	3,616.07	926.81	3,616.15	5.31	5.16	1.26
13,928.00	91.50	355.90	9,866.82	3,709.67	919.77	3,709.75	3.22	-3.19	0.43
14,023.00	91.70	354.80	9,864.17	3,804.32	912.08	3,804.40	1.18	0.21	-1.16
14,118.00	91.80	354.30	9,861.26	3,898.84	903.06	3,898.92	0.54	0.11	-0.53
14,212.00	92.70	354.60	9,857.57	3,992.33	893.97	3,992.41	1.01	0.96	0.32
14,307.00	90.60	354.80	9,854.84	4,086.88	885.20	4,086.95	2.22	-2.21	0.21
14,401.00	89.60	355.00	9,854.67	4,180.50	876.85	4,180.58	1.08	-1.06	0.21
14,495.00	87.80	354.10	9,856.81	4,274.05	867.92	4,274.13	2.14	-1.91	-0.96
14,590.00	90.00	355.50	9,858.63	4,368.63	859.31	4,368.71	2.74	2.32	1.47
14,685.00	90.00	356.20	9,858.63	4,463.38	852.44	4,463.46	0.74	0.00	0.74
14,780.00	89.10	358.20	9,859.38	4,558.26	847.80	4,558.34	2.31	-0.95	2.11
14,867.61	90.30	359.12	9,859.84	4,645.84	845.75	4,645.92	1.73	1.37	1.05
SL Crossing @ 14867.61' MD									
14,875.00	90.40	359.20	9,859.79	4,653.23	845.64	4,653.31	1.73	1.37	1.05
14,969.00	90.90	1.70	9,858.72	4,747.22	846.38	4,747.29	2.71	0.53	2.66
15,064.00	90.10	0.60	9,857.90	4,842.19	848.29	4,842.27	1.43	-0.84	-1.16
15,158.00	87.70	0.10	9,859.70	4,936.17	848.86	4,936.24	2.61	-2.55	-0.53
15,252.00	90.80	1.70	9,860.93	5,030.13	850.34	5,030.21	3.71	3.30	1.70
15,346.00	90.00	1.70	9,860.27	5,124.09	853.13	5,124.16	0.85	-0.85	0.00
15,439.00	89.80	1.50	9,860.44	5,217.05	855.72	5,217.13	0.30	-0.22	-0.22
15,534.00	90.10	1.70	9,860.52	5,312.01	858.38	5,312.09	0.38	0.32	0.21
15,630.00	90.80	2.70	9,859.77	5,407.94	862.06	5,408.01	1.27	0.73	1.04
15,724.00	90.40	1.90	9,858.78	5,501.86	865.83	5,501.93	0.95	-0.43	-0.85
15,819.00	91.80	2.90	9,856.96	5,596.75	869.81	5,596.83	1.81	1.47	1.05

LEAM Drilling Systems

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well Spud Muffin 31-30 623H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Site:	Spud Muffin 31-30 Com	MD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Well:	Spud Muffin 31-30 623H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_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)
15,914.00	86.50	359.70	9,858.37	5,691.67	871.97	5,691.75	6.52	-5.58	-3.37
16,009.00	86.50	359.20	9,864.17	5,786.49	871.06	5,786.56	0.53	0.00	-0.53
16,104.00	89.40	358.20	9,867.56	5,881.39	868.90	5,881.47	3.23	3.05	-1.05
16,198.00	89.10	358.00	9,868.79	5,975.33	865.79	5,975.41	0.38	-0.32	-0.21
16,293.00	89.10	358.20	9,870.29	6,070.27	862.64	6,070.34	0.21	0.00	0.21
16,387.00	90.10	0.40	9,870.94	6,164.25	861.49	6,164.33	2.57	1.06	2.34
16,482.00	90.70	0.10	9,870.28	6,259.25	861.90	6,259.32	0.71	0.63	-0.32
16,577.00	91.50	0.10	9,868.46	6,354.23	862.07	6,354.30	0.84	0.84	0.00
16,671.00	91.80	0.30	9,865.75	6,448.19	862.40	6,448.27	0.38	0.32	0.21
16,766.00	92.50	0.80	9,862.19	6,543.12	863.31	6,543.19	0.91	0.74	0.53
16,860.00	89.30	0.40	9,860.71	6,637.09	864.29	6,637.16	3.43	-3.40	-0.43
16,955.00	89.30	0.60	9,861.87	6,732.08	865.12	6,732.15	0.21	0.00	0.21
17,049.00	92.90	2.00	9,860.07	6,826.02	867.25	6,826.09	4.11	3.83	1.49
17,144.00	88.80	0.60	9,858.66	6,920.96	869.41	6,921.04	4.56	-4.32	-1.47
17,238.00	88.70	0.80	9,860.71	7,014.93	870.55	7,015.01	0.24	-0.11	0.21
17,333.00	89.10	0.10	9,862.53	7,109.91	871.30	7,109.99	0.85	0.42	-0.74
17,429.00	92.40	1.10	9,861.27	7,205.88	872.30	7,205.96	3.59	3.44	1.04
17,523.00	90.20	0.10	9,859.14	7,299.85	873.29	7,299.92	2.57	-2.34	-1.06
17,618.00	87.50	359.40	9,861.05	7,394.82	872.87	7,394.89	2.94	-2.84	-0.74
17,711.00	89.40	359.40	9,863.56	7,487.77	871.90	7,487.85	2.04	2.04	0.00
17,805.00	91.80	0.60	9,862.58	7,581.76	871.90	7,581.84	2.85	2.55	1.28
17,900.00	91.20	0.60	9,860.09	7,676.72	872.89	7,676.80	0.63	-0.63	0.00
17,996.00	89.60	359.80	9,859.42	7,772.71	873.23	7,772.79	1.86	-1.67	-0.83
18,090.00	89.40	0.50	9,860.24	7,866.71	873.48	7,866.79	0.77	-0.21	0.74
18,184.00	89.00	1.00	9,861.56	7,960.69	874.71	7,960.77	0.68	-0.43	0.53
18,279.00	88.50	1.00	9,863.63	8,055.65	876.36	8,055.73	0.53	-0.53	0.00
18,374.00	88.40	1.30	9,866.20	8,150.60	878.27	8,150.68	0.33	-0.11	0.32
18,469.00	87.30	359.80	9,869.76	8,245.53	879.18	8,245.60	1.96	-1.16	-1.58
18,563.00	86.10	358.50	9,875.17	8,339.36	877.79	8,339.43	1.88	-1.28	-1.38
18,658.00	86.70	358.20	9,881.14	8,434.13	875.06	8,434.20	0.71	0.63	-0.32
18,753.00	91.90	358.20	9,882.30	8,529.04	872.08	8,529.12	5.47	5.47	0.00
18,848.00	92.30	359.10	9,878.82	8,623.95	869.84	8,624.03	1.04	0.42	0.95
18,941.00	91.30	358.50	9,875.90	8,716.88	867.89	8,716.96	1.25	-1.08	-0.65
19,035.00	91.20	358.20	9,873.84	8,810.82	865.19	8,810.90	0.34	-0.11	-0.32
19,130.00	91.10	358.40	9,871.94	8,905.76	862.37	8,905.84	0.24	-0.11	0.21
19,225.00	90.00	358.20	9,871.03	9,000.71	859.55	9,000.79	1.18	-1.16	-0.21
19,320.00	89.80	358.90	9,871.19	9,095.68	857.15	9,095.76	0.77	-0.21	0.74
19,414.00	90.00	359.20	9,871.36	9,189.67	855.59	9,189.74	0.38	0.21	0.32
19,508.00	89.10	358.20	9,872.09	9,283.64	853.46	9,283.71	1.43	-0.96	-1.06
19,603.00	88.00	357.60	9,874.50	9,378.54	849.98	9,378.62	1.32	-1.16	-0.63
19,698.00	87.10	358.20	9,878.56	9,473.39	846.50	9,473.46	1.14	-0.95	0.63
19,792.00	89.20	0.30	9,881.59	9,567.32	845.27	9,567.40	3.16	2.23	2.23
19,886.00	90.60	359.80	9,881.76	9,661.32	845.35	9,661.39	1.58	1.49	-0.53
19,981.00	88.90	359.60	9,882.17	9,756.31	844.85	9,756.39	1.80	-1.79	-0.21

LEAM Drilling Systems

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well Spud Muffin 31-30 623H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Site:	Spud Muffin 31-30 Com	MD Reference:	2959.3' GE + 23.5' KB @ 2982.80usft
Well:	Spud Muffin 31-30 623H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	LEAM Multi_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)
20,073.98	88.41	358.71	9,884.36	9,849.26	843.48	9,849.33	1.10	-0.53	-0.96
100' FNL HL Crossing @ 20073.98' MD									
20,075.00	88.40	358.70	9,884.39	9,850.28	843.46	9,850.35	1.10	-0.53	-0.96
20,101.00	88.00	358.40	9,885.20	9,876.26	842.80	9,876.33	1.92	-1.54	-1.15
20,155.00	88.00	358.40	9,887.09	9,930.20	841.30	9,930.27	0.00	0.00	0.00
TD Projection									