



NM OIL CONSERVATION
ARTESIA DISTRICT
MAY 03 2017
RECEIVED

December 12, 2016

15-43741

Devon Energy Production Company, L.P.
Well: Cotton Draw Unit 277H
County/Parish: Eddy County, NM

LEAM MWD: (OH) from 0' MD – 13,670' MD
Projection: 13,730'

This Borehole Survey taken between 11/26/2016 and 12/06/2016 had been conducted and calculated according to the highest professional standards and complies with all known State and Federal requirements.

Reviewed and Approved:

Date: December 12, 2016



Survey Certification Form

State of New Mexico

Eddy County

I, Randy W. Rakowitz, certify that; I am employed by LEAM Drilling Systems LLC, that I did on the day(s) of November 26, 2016 through December 6, 2016, conduct or supervise the taking of MWD Survey from a depth of 0' MD to 13,730' MD; that the data is true, correct, complete and within the limitations of the tools as set forth by LEAM Drilling Systems LLC, that I am authorized and qualified to make this report; that this survey was conducted at the request of Devon Energy Production Company, L.P. for the Cotton Draw Unit 277H 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 Systems LLC.

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

Randy W. Rakowitz
MWD Operations Coordinator

LEAM Drilling Systems LLC

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well 277H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	3401.3' GL + 23.5' KB @ 3424.80usft
Site:	Cotton Draw Unit	MD Reference:	3401.3' GL + 23.5' KB @ 3424.80usft
Well:	277H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 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	Cotton Draw Unit				
Site Position:		Northing:	419,194.51 usft	Latitude:	32° 9' 3.901 N
From:	Map	Easting:	722,955.98 usft	Longitude:	103° 44' 47.345 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.31 °

Well	277H, Delaware					
Well Position	+N/-S	0.00 usft	Northing:	413,981.29 usft	Latitude:	32° 8' 12.023 N
	+E/-W	0.00 usft	Easting:	728,242.23 usft	Longitude:	103° 43' 46.197 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	3,424.80 usft	Ground Level:	3,401.30 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	08/01/16	6.95	59.88	48,135

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	0.35	

Survey Program	Date	12/12/16			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
161.00	13,670.00	Survey #1 (OH)	LEAM MWD+HDGM	MWD+HDGM	
13,730.00	13,730.00	Survey #2 (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
161.00	0.70	258.10	161.00	-0.20	-0.96	-0.21	0.43	0.43	0.00
245.00	1.10	268.10	244.99	-0.34	-2.27	-0.35	0.51	0.48	11.90
337.00	0.80	268.70	336.97	-0.38	-3.79	-0.40	0.33	-0.33	0.65
429.00	0.80	302.50	428.96	-0.05	-4.98	-0.08	0.51	0.00	36.74
521.00	0.70	267.00	520.96	0.27	-6.08	0.23	0.51	-0.11	-38.59
611.00	0.40	321.10	610.95	0.48	-6.83	0.44	0.63	-0.33	60.11
668.00	0.60	335.50	667.95	0.91	-7.08	0.87	0.41	0.35	25.26
794.00	0.20	309.60	793.95	1.65	-7.52	1.60	0.34	-0.32	-20.56
978.00	0.50	304.90	977.94	2.31	-8.43	2.26	0.16	0.16	-2.55

LEAM Drilling Systems LLC

Survey Report

Company: Devon Energy
Project: Eddy County, NM (NAD-83)
Site: Cotton Draw Unit
Well: 277H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well 277H
TVD Reference: 3401.3' GL + 23.5' KB @ 3424.80usft
MD Reference: 3401.3' GL + 23.5' KB @ 3424.80usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 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)
1,162.00	0.40	258.20	1,161.94	2.64	-9.71	2.58	0.20	-0.05	-25.38
1,346.00	0.50	245.90	1,345.93	2.18	-11.07	2.11	0.08	0.05	-6.68
1,537.00	0.60	171.00	1,536.93	0.85	-11.68	0.78	0.35	0.05	-39.21
1,728.00	0.40	150.80	1,727.92	-0.72	-11.20	-0.78	0.14	-0.10	-10.58
1,920.00	0.70	101.30	1,919.91	-1.53	-9.72	-1.59	0.28	0.16	-25.78
2,111.00	0.40	99.40	2,110.90	-1.87	-7.92	-1.92	0.16	-0.16	-0.99
2,302.00	0.70	127.40	2,301.89	-2.69	-6.33	-2.72	0.21	0.16	14.66
2,493.00	1.50	162.60	2,492.86	-5.78	-4.66	-5.81	0.53	0.42	18.43
2,685.00	2.80	177.00	2,684.72	-12.86	-3.66	-12.88	0.73	0.68	7.50
2,876.00	3.20	180.70	2,875.46	-22.85	-3.48	-22.87	0.23	0.21	1.94
3,067.00	3.40	180.60	3,066.14	-33.84	-3.61	-33.87	0.10	0.10	-0.05
3,258.00	3.70	180.50	3,256.78	-45.67	-3.72	-45.69	0.16	0.16	-0.05
3,449.00	4.00	177.70	3,447.34	-58.49	-3.51	-58.51	0.19	0.16	-1.47
3,641.00	4.50	176.70	3,638.82	-72.70	-2.80	-72.72	0.26	0.26	-0.52
3,832.00	4.60	169.30	3,829.22	-87.71	-0.95	-87.71	0.31	0.05	-3.87
4,023.00	5.00	171.20	4,019.55	-103.46	1.74	-103.45	0.23	0.21	0.99
4,182.00	5.10	177.90	4,177.93	-117.37	3.06	-117.35	0.38	0.06	4.21
4,276.00	4.70	177.70	4,271.59	-125.39	3.37	-125.37	0.43	-0.43	-0.21
4,407.00	4.40	182.90	4,402.17	-135.77	3.33	-135.75	0.39	-0.23	3.97
4,502.00	3.90	183.70	4,496.92	-142.64	2.94	-142.62	0.53	-0.53	0.84
4,598.00	4.00	183.90	4,592.70	-149.23	2.50	-149.22	0.11	0.10	0.21
4,694.00	4.00	185.00	4,688.46	-155.91	1.98	-155.90	0.08	0.00	1.15
4,789.00	4.00	186.40	4,783.23	-162.50	1.32	-162.49	0.10	0.00	1.47
4,885.00	4.50	180.30	4,878.97	-169.60	0.93	-169.59	0.70	0.52	-6.35
4,981.00	4.70	180.60	4,974.66	-177.30	0.87	-177.29	0.21	0.21	0.31
5,076.00	4.50	180.70	5,069.35	-184.91	0.78	-184.91	0.21	-0.21	0.11
5,172.00	4.80	183.70	5,165.04	-192.69	0.48	-192.68	0.40	0.31	3.13
5,267.00	4.70	186.90	5,259.71	-200.52	-0.25	-200.52	0.30	-0.11	3.37
5,363.00	4.50	186.10	5,355.40	-208.17	-1.12	-208.17	0.22	-0.21	-0.83
5,459.00	4.10	186.20	5,451.13	-215.32	-1.89	-215.33	0.42	-0.42	0.10
5,554.00	3.90	183.70	5,545.90	-221.93	-2.47	-221.94	0.28	-0.21	-2.63
5,650.00	3.90	186.80	5,641.68	-228.42	-3.06	-228.44	0.22	0.00	3.23
5,745.00	4.40	181.90	5,736.43	-235.28	-3.57	-235.29	0.64	0.53	-5.16
5,841.00	4.20	183.50	5,832.16	-242.46	-3.90	-242.48	0.24	-0.21	1.67
5,937.00	4.70	185.20	5,927.87	-249.89	-4.47	-249.91	0.54	0.52	1.77
6,032.00	4.90	188.40	6,022.53	-257.78	-5.42	-257.81	0.35	0.21	3.37
6,127.00	4.70	189.30	6,117.20	-265.63	-6.64	-265.67	0.22	-0.21	0.95
6,223.00	4.60	191.00	6,212.88	-273.30	-8.01	-273.34	0.18	-0.10	1.77
6,318.00	4.70	189.70	6,307.57	-280.87	-9.39	-280.92	0.15	0.11	-1.37
6,414.00	4.80	191.40	6,403.24	-288.69	-10.85	-288.75	0.18	0.10	1.77
6,509.00	4.80	191.70	6,497.91	-296.47	-12.44	-296.54	0.03	0.00	0.32
6,605.00	4.70	194.70	6,593.58	-304.21	-14.25	-304.29	0.28	-0.10	3.13
6,701.00	4.70	190.70	6,689.26	-311.88	-15.98	-311.97	0.34	0.00	-4.17

LEAM Drilling Systems LLC

Survey Report

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Well:	277H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 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)
6,796.00	4.60	184.90	6,783.95	-319.50	-17.03	-319.60	0.51	-0.11	-6.11
6,892.00	4.50	189.60	6,879.64	-327.05	-17.99	-327.15	0.40	-0.10	4.90
6,987.00	4.40	185.50	6,974.36	-334.35	-18.96	-334.46	0.35	-0.11	-4.32
7,083.00	3.70	186.90	7,070.12	-341.09	-19.68	-341.21	0.74	-0.73	1.46
7,178.00	3.30	194.50	7,164.94	-346.78	-20.74	-346.90	0.64	-0.42	8.00
7,274.00	3.40	191.70	7,260.78	-352.24	-22.01	-352.37	0.20	0.10	-2.92
7,369.00	2.60	183.70	7,355.65	-357.15	-22.72	-357.29	0.95	-0.84	-8.42
7,465.00	2.20	185.10	7,451.56	-361.16	-23.02	-361.30	0.42	-0.42	1.46
7,560.00	2.50	176.20	7,546.48	-365.05	-23.04	-365.18	0.50	0.32	-9.37
7,642.00	2.30	179.10	7,628.41	-368.47	-22.90	-368.61	0.29	-0.24	3.54
7,705.00	0.90	176.10	7,691.38	-370.23	-22.85	-370.37	2.23	-2.22	-4.76
7,753.00	5.00	7.70	7,739.33	-368.53	-22.54	-368.67	12.26	8.54	-350.83
7,801.00	11.80	6.30	7,786.79	-361.57	-21.72	-361.70	14.17	14.17	-2.92
7,848.00	18.60	6.50	7,832.12	-349.34	-20.34	-349.45	14.47	14.47	0.43
7,896.00	25.70	6.80	7,876.55	-331.37	-18.24	-331.48	14.79	14.79	0.63
7,944.00	31.70	4.70	7,918.63	-308.45	-15.97	-308.54	12.67	12.50	-4.38
7,992.00	37.90	3.50	7,958.03	-281.14	-14.04	-281.22	12.99	12.92	-2.50
8,040.00	43.40	2.20	7,994.43	-249.92	-12.50	-249.99	11.59	11.46	-2.71
8,088.00	48.50	2.10	8,027.79	-215.46	-11.21	-215.52	10.63	10.63	-0.21
8,135.00	53.10	2.40	8,057.49	-179.07	-9.78	-179.13	9.80	9.79	0.64
8,183.00	56.70	1.20	8,085.09	-139.83	-8.55	-139.88	7.77	7.50	-2.50
8,231.00	60.60	0.10	8,110.06	-98.85	-8.10	-98.89	8.36	8.13	-2.29
8,279.00	65.50	359.80	8,131.80	-56.07	-8.14	-56.12	10.22	10.21	-0.63
8,326.00	70.70	0.30	8,149.33	-12.48	-8.10	-12.53	11.11	11.06	1.06
8,374.00	76.30	1.40	8,162.96	33.52	-7.41	33.47	11.87	11.67	2.29
8,422.00	81.00	1.40	8,172.40	80.55	-6.26	80.51	9.79	9.79	0.00
8,541.00	89.30	1.00	8,182.45	199.00	-3.78	198.97	6.98	6.97	-0.34
8,637.00	91.70	359.80	8,181.62	294.98	-3.11	294.96	2.80	2.50	-1.25
8,732.00	93.90	0.70	8,176.97	389.86	-2.70	389.84	2.50	2.32	0.95
8,828.00	92.90	0.50	8,171.28	485.69	-1.69	485.67	1.06	-1.04	-0.21
8,923.00	91.90	0.30	8,167.30	580.60	-1.03	580.58	1.07	-1.05	-0.21
9,019.00	90.40	359.80	8,165.38	676.58	-0.95	676.56	1.65	-1.56	-0.52
9,115.00	91.50	1.50	8,163.78	772.55	0.14	772.54	2.11	1.15	1.77
9,211.00	90.70	1.00	8,161.94	868.51	2.24	868.51	0.98	-0.83	-0.52
9,306.00	90.30	0.30	8,161.11	963.50	3.31	963.50	0.85	-0.42	-0.74
9,402.00	91.10	359.40	8,159.94	1,059.49	3.06	1,059.49	1.25	0.83	-0.94
9,497.00	90.30	359.80	8,158.78	1,154.48	2.40	1,154.48	0.94	-0.84	0.42
9,593.00	89.70	359.60	8,158.78	1,250.48	1.90	1,250.47	0.66	-0.63	-0.21
9,689.00	89.90	359.10	8,159.11	1,346.47	0.81	1,346.45	0.56	0.21	-0.52
9,784.00	91.00	358.40	8,158.37	1,441.45	-1.26	1,441.41	1.37	1.16	-0.74
9,880.00	92.30	359.40	8,155.60	1,537.38	-3.11	1,537.34	1.71	1.35	1.04
9,976.00	89.30	356.40	8,154.26	1,633.29	-6.62	1,633.22	4.42	-3.13	-3.13
10,071.00	89.90	358.20	8,154.93	1,728.18	-11.10	1,728.08	2.00	0.63	1.89

LEAM Drilling Systems LLC

Survey Report

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Site: Cotton Draw Unit
Well: 277H
Wellbore: OH
Design: OH

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10,167.00	89.30	357.80	8,155.60	1,824.12	-14.45	1,823.99	0.75	-0.63	-0.42
10,262.00	90.00	358.40	8,156.18	1,919.06	-17.60	1,918.92	0.97	0.74	0.63
10,358.00	90.80	358.00	8,155.51	2,015.01	-20.61	2,014.85	0.93	0.83	-0.42
10,454.00	91.70	359.20	8,153.41	2,110.96	-22.96	2,110.78	1.56	0.94	1.25
10,549.00	92.60	359.80	8,149.85	2,205.88	-23.79	2,205.70	1.14	0.95	0.63
10,645.00	92.40	0.00	8,145.66	2,301.79	-23.96	2,301.60	0.29	-0.21	0.21
10,740.00	90.60	0.80	8,143.17	2,396.75	-23.29	2,396.57	2.07	-1.89	0.84
10,836.00	92.80	3.60	8,140.33	2,492.62	-19.61	2,492.46	3.71	2.29	2.92
10,931.00	90.50	1.00	8,137.59	2,587.49	-15.80	2,587.35	3.65	-2.42	-2.74
11,027.00	90.10	1.40	8,137.09	2,683.47	-13.79	2,683.34	0.59	-0.42	0.42
11,122.00	91.30	2.80	8,135.93	2,778.40	-10.31	2,778.28	1.94	1.26	1.47
11,218.00	89.40	2.80	8,135.34	2,874.28	-5.62	2,874.19	1.98	-1.98	0.00
11,314.00	88.70	2.60	8,136.93	2,970.15	-1.10	2,970.09	0.76	-0.73	-0.21
11,409.00	88.30	2.90	8,139.42	3,065.01	3.46	3,064.98	0.53	-0.42	0.32
11,505.00	89.60	2.40	8,141.18	3,160.89	7.89	3,160.88	1.45	1.35	-0.52
11,600.00	89.20	1.70	8,142.17	3,255.82	11.29	3,255.83	0.85	-0.42	-0.74
11,696.00	90.50	0.70	8,142.42	3,351.80	13.30	3,351.82	1.71	1.35	-1.04
11,791.00	91.90	0.70	8,140.44	3,446.77	14.46	3,446.79	1.47	1.47	0.00
11,887.00	93.40	1.00	8,136.00	3,542.65	15.89	3,542.68	1.59	1.56	0.31
11,983.00	92.20	0.50	8,131.31	3,638.53	17.14	3,638.57	1.35	-1.25	-0.52
12,078.00	90.00	359.40	8,129.48	3,733.50	17.06	3,733.54	2.59	-2.32	-1.16
12,174.00	91.60	1.40	8,128.14	3,829.48	17.73	3,829.52	2.67	1.67	2.08
12,270.00	90.30	359.40	8,126.55	3,925.46	18.40	3,925.50	2.48	-1.35	-2.08
12,365.00	89.80	357.50	8,126.47	4,020.42	15.83	4,020.44	2.07	-0.53	-2.00
12,461.00	90.00	355.70	8,126.64	4,116.25	10.13	4,116.23	1.89	0.21	-1.88
12,556.00	91.10	356.60	8,125.72	4,211.03	3.76	4,210.97	1.50	1.16	0.95
12,652.00	89.80	357.10	8,124.97	4,306.88	-1.52	4,306.79	1.45	-1.35	0.52
12,747.00	90.00	358.50	8,125.14	4,401.80	-5.17	4,401.69	1.49	0.21	1.47
12,843.00	90.20	359.20	8,124.97	4,497.78	-7.09	4,497.66	0.76	0.21	0.73
12,939.00	90.00	359.80	8,124.80	4,593.78	-7.93	4,593.65	0.66	-0.21	0.63
13,034.00	90.00	0.30	8,124.80	4,688.78	-7.85	4,688.64	0.53	0.00	0.53
13,130.00	90.00	0.80	8,124.80	4,784.78	-6.93	4,784.64	0.52	0.00	0.52
13,225.00	90.10	1.70	8,124.72	4,879.75	-4.85	4,879.63	0.95	0.11	0.95
13,321.00	89.30	1.50	8,125.22	4,975.71	-2.17	4,975.61	0.86	-0.83	-0.21
13,416.00	89.30	2.20	8,126.38	5,070.66	0.89	5,070.57	0.74	0.00	0.74
13,511.00	90.00	3.10	8,126.96	5,165.55	5.29	5,165.49	1.20	0.74	0.95
13,607.00	90.40	3.80	8,126.63	5,261.37	11.06	5,261.34	0.84	0.42	0.73
13,670.00	90.20	3.80	8,126.30	5,324.24	15.24	5,324.23	0.32	-0.32	0.00
13,730.00	90.20	3.80	8,126.09	5,384.10	19.21	5,384.12	0.00	0.00	0.00
Projection									