



30-015-43182

January 25, 2016

NM OIL CONSERVATION
ARTESIA DISTRICT

SEP 16 2016

Devon Energy Production Company, L.P.
Well: Cotton Draw Unit 224H (OH)
County/Parish: Eddy County, NM

RECEIVED

LEAM MWD: (OH) from 4,499' MD – 17,349' MD
Projection: 17,503' MD

This Borehole Survey taken between 01/12/2016 and 01/23/2016 had been conducted and calculated according to the highest professional standards and complies with all known State and Federal requirements.

Reviewed and Approved:

Date: January 25, 2016

Physical & Mailing: 303 Longmire Dr., Suite 801, Conroe, TX 77304
936-756-7577 • www.leaf.net • 1 (800) 756-7504

[Handwritten signature]



Survey Certification Form

State of NM

Eddy County

I, Randy W. Rakowitz, certify that; I am employed by LEAM Drilling Systems LLC, that I did on the day(s) of January 12, 2016 through January 23, 2016, conduct or supervise the taking of MWD Survey from a depth of 4,499' MD to 17503' 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 224H (OH) in Eddy County, NM; 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', 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 224H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	KB: 23.5' @ 3446.80usft (Cactus 167)
Site:	Cotton Draw Unit	MD Reference:	KB: 23.5' @ 3446.80usft (Cactus 167)
Well:	224H	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
From:	Map	Easting:	722,955.98 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 9' 3.901 N
		Longitude:	103° 44' 47.345 W
		Grid Convergence:	0.31 °

Well	224H		
Well Position	+N/-S	0.00 usft	Northing: 416,720.84 usft
	+E/-W	0.00 usft	Easting: 729,615.59 usft
Position Uncertainty	1.00 usft	Wellhead Elevation:	3,467.40 usft
		Latitude:	32° 8' 39.056 N
		Longitude:	103° 43' 30.045 W
		Ground Level:	3,423.30 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	BGGM2015	12/30/15	(°)
			7.29
		Dip Angle	(°)
		60.03	
		Field Strength	(nT)
			48,098

Design	OH		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
		Direction	(°)
			180.04

Survey Program	Date 01/25/16		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
172.00	4,389.00	Survey #1 (OH)	MWD-ISCWSA
4,499.00	17,349.00	Survey #2 (OH)	LEAM MWD+HDGM
17,503.00	17,503.00	Survey #3 (OH)	Project
			Description
			MWD - Standard
			MWD+HDGM
			Projection

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/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	136.50	172.00	-0.44	0.41	0.44	0.23	0.23	0.00	
237.00	0.40	146.79	237.00	-0.79	0.69	0.79	0.11	0.00	15.83	
331.00	0.70	143.50	330.99	-1.53	1.21	1.53	0.32	0.32	-3.50	
423.00	1.10	155.50	422.98	-2.78	1.92	2.78	0.48	0.43	13.04	
516.00	1.10	168.59	515.96	-4.47	2.46	4.47	0.27	0.00	14.08	
608.00	1.71	171.49	607.94	-6.69	2.84	6.69	0.67	0.66	3.15	
699.00	2.02	176.50	698.89	-9.64	3.14	9.63	0.38	0.34	5.51	
853.00	2.02	186.33	852.79	-15.04	3.01	15.04	0.22	0.00	6.38	

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Well:	224H	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)
1,035.00	2.59	192.19	1,034.64	-22.25	1.78	22.25	0.34	0.31	3.22
1,220.00	2.42	188.41	1,219.47	-30.20	0.33	30.20	0.13	-0.09	-2.04
1,402.00	2.42	183.97	1,401.31	-37.83	-0.50	37.83	0.10	0.00	-2.44
1,593.00	2.42	195.09	1,592.14	-45.75	-1.83	45.75	0.25	0.00	5.82
1,785.00	2.20	189.20	1,783.98	-53.30	-3.47	53.30	0.17	-0.11	-3.07
1,976.00	2.20	186.39	1,974.84	-60.56	-4.47	60.57	0.06	0.00	-1.47
2,167.00	1.80	193.68	2,165.72	-67.12	-5.58	67.13	0.25	-0.21	3.82
2,359.00	1.49	190.21	2,357.64	-72.51	-6.74	72.51	0.17	-0.16	-1.81
2,550.00	1.58	183.79	2,548.58	-77.58	-7.35	77.58	0.10	0.05	-3.36
2,741.00	1.58	184.59	2,739.50	-82.83	-7.74	82.84	0.01	0.00	0.42
2,933.00	1.32	187.31	2,931.44	-87.66	-8.23	87.67	0.14	-0.14	1.42
3,124.00	1.41	184.99	3,122.39	-92.19	-8.72	92.19	0.06	0.05	-1.21
3,315.00	1.32	169.60	3,313.33	-96.69	-8.52	96.70	0.20	-0.05	-8.06
3,506.00	1.10	182.87	3,504.29	-100.69	-8.22	100.69	0.19	-0.12	6.95
3,697.00	1.32	153.30	3,695.25	-104.48	-7.32	104.49	0.34	0.12	-15.48
3,889.00	1.41	159.67	3,887.20	-108.67	-5.51	108.68	0.09	0.05	3.32
4,080.00	2.11	176.81	4,078.11	-114.39	-4.49	114.39	0.45	0.37	8.97
4,271.00	2.20	187.09	4,268.97	-121.54	-4.75	121.54	0.21	0.05	5.38
4,389.00	2.11	184.89	4,386.89	-125.95	-5.22	125.95	0.10	-0.08	-1.86
4,499.00	2.00	189.40	4,496.82	-129.86	-5.70	129.86	0.18	-0.10	4.10
4,595.00	2.10	195.30	4,592.76	-133.21	-6.44	133.21	0.24	0.10	6.15
4,691.00	1.50	195.50	4,688.71	-136.12	-7.24	136.12	0.63	-0.63	0.21
4,882.00	1.00	169.10	4,879.66	-140.16	-7.59	140.17	0.39	-0.26	-13.82
5,073.00	0.30	343.20	5,070.66	-141.32	-7.42	141.33	0.68	-0.37	91.15
5,263.00	0.50	310.30	5,260.65	-140.31	-8.20	140.31	0.16	0.11	-17.32
5,456.00	0.50	323.00	5,453.64	-139.09	-9.35	139.10	0.06	0.00	6.58
5,647.00	0.40	353.00	5,644.64	-137.76	-9.93	137.77	0.13	-0.05	15.71
5,838.00	0.90	328.60	5,835.63	-135.82	-10.79	135.83	0.29	0.26	-12.77
6,029.00	0.80	323.70	6,026.61	-133.47	-12.36	133.47	0.06	-0.05	-2.57
6,221.00	0.80	307.70	6,218.59	-131.57	-14.22	131.58	0.12	0.00	-8.33
6,412.00	0.30	29.40	6,409.58	-130.32	-15.03	130.33	0.43	-0.26	42.77
6,603.00	0.80	75.10	6,600.57	-129.54	-13.49	129.55	0.33	0.26	23.93
6,795.00	1.00	75.10	6,792.55	-128.76	-10.58	128.77	0.10	0.10	0.00
6,986.00	0.90	58.60	6,983.52	-127.55	-7.69	127.56	0.15	-0.05	-8.64
7,177.00	0.60	77.90	7,174.50	-126.56	-5.43	126.56	0.20	-0.16	10.10
7,369.00	0.60	90.40	7,366.49	-126.36	-3.44	126.36	0.07	0.00	6.51
7,560.00	0.80	112.40	7,557.48	-126.87	-1.21	126.87	0.17	0.10	11.52
7,751.00	1.30	113.80	7,748.45	-128.25	2.01	128.25	0.26	0.26	0.73
7,942.00	0.80	150.00	7,939.42	-130.28	4.66	130.28	0.42	-0.26	18.95
8,133.00	0.70	152.10	8,130.40	-132.47	5.87	132.46	0.05	-0.05	1.10
8,325.00	0.80	156.10	8,322.38	-134.73	6.96	134.73	0.06	0.05	2.08
8,516.00	0.40	320.70	8,513.38	-135.43	7.08	135.43	0.62	-0.21	86.18
8,707.00	1.30	304.00	8,704.36	-133.71	4.86	133.70	0.48	0.47	-8.74

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Survey

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8,899.00	1.00	1.10	8,896.32	-130.81	3.09	130.81	0.59	-0.16	29.74
9,090.00	1.40	345.30	9,087.28	-126.89	2.53	126.89	0.27	0.21	-8.27
9,281.00	0.70	351.50	9,278.25	-123.48	1.76	123.48	0.37	-0.37	3.25
9,473.00	0.30	358.30	9,470.24	-121.82	1.57	121.82	0.21	-0.21	3.54
9,664.00	0.40	350.60	9,661.24	-120.66	1.45	120.66	0.06	0.05	-4.03
9,843.00	1.20	222.50	9,840.23	-121.42	0.08	121.42	0.83	0.45	-71.56
9,942.00	6.70	192.80	9,938.96	-127.83	-1.90	127.83	5.75	5.56	-30.00
9,987.00	11.80	193.30	9,983.36	-134.87	-3.54	134.87	11.33	11.33	1.11
10,038.00	16.30	192.10	10,032.82	-146.95	-6.24	146.95	8.84	8.82	-2.35
10,083.00	21.50	191.90	10,075.38	-161.20	-9.27	161.21	11.56	11.56	-0.44
10,134.00	26.40	192.40	10,121.97	-181.43	-13.63	181.44	9.62	9.61	0.98
10,179.00	32.40	192.80	10,161.16	-202.98	-18.46	202.99	13.34	13.33	0.89
10,229.00	37.10	191.90	10,202.23	-230.81	-24.54	230.83	9.46	9.40	-1.80
10,274.00	42.30	190.10	10,236.84	-259.02	-30.00	259.04	11.83	11.56	-4.00
10,325.00	48.00	189.80	10,272.80	-294.62	-36.24	294.65	11.18	11.18	-0.59
10,370.00	54.30	187.30	10,301.01	-329.26	-41.41	329.29	14.65	14.00	-5.56
10,420.00	60.50	185.00	10,327.94	-371.12	-45.89	371.15	12.99	12.40	-4.60
10,465.00	65.20	181.90	10,348.47	-411.07	-48.28	411.10	12.11	10.44	-6.89
10,516.00	69.60	181.20	10,368.07	-458.13	-49.55	458.16	8.72	8.63	-1.37
10,561.00	74.60	181.70	10,381.89	-500.92	-50.63	500.96	11.16	11.11	1.11
10,610.00	80.60	180.30	10,392.41	-548.75	-51.46	548.78	12.56	12.24	-2.86
10,670.00	87.50	179.20	10,398.63	-608.39	-51.20	608.42	11.64	11.50	-1.83
10,765.00	90.40	181.00	10,400.37	-703.36	-51.36	703.39	3.59	3.05	1.89
10,861.00	89.90	182.90	10,400.12	-799.29	-54.63	799.33	2.05	-0.52	1.98
10,957.00	90.10	184.00	10,400.12	-895.12	-60.41	895.16	1.16	0.21	1.15
11,052.00	89.70	184.30	10,400.28	-989.87	-67.28	989.92	0.53	-0.42	0.32
11,148.00	89.10	183.10	10,401.29	-1,085.66	-73.47	1,085.71	1.40	-0.63	-1.25
11,243.00	89.40	182.40	10,402.53	-1,180.54	-78.03	1,180.60	0.80	0.32	-0.74
11,339.00	88.90	182.20	10,403.96	-1,276.46	-81.88	1,276.51	0.56	-0.52	-0.21
11,435.00	88.70	179.60	10,405.97	-1,372.41	-83.39	1,372.47	2.72	-0.21	-2.71
11,530.00	88.50	179.00	10,408.29	-1,467.38	-82.23	1,467.44	0.67	-0.21	-0.63
11,626.00	87.90	178.90	10,411.30	-1,563.31	-80.47	1,563.37	0.63	-0.63	-0.10
11,722.00	86.80	177.10	10,415.74	-1,659.15	-77.13	1,659.20	2.20	-1.15	-1.88
11,817.00	86.80	177.10	10,421.05	-1,753.88	-72.33	1,753.93	0.00	0.00	0.00
11,913.00	87.30	177.50	10,425.99	-1,849.64	-67.81	1,849.69	0.67	0.52	0.42
12,009.00	88.20	178.50	10,429.76	-1,945.51	-64.47	1,945.55	1.40	0.94	1.04
12,104.00	88.90	178.70	10,432.16	-2,040.45	-62.14	2,040.49	0.77	0.74	0.21
12,200.00	90.00	180.50	10,433.08	-2,136.44	-61.47	2,136.48	2.20	1.15	1.88
12,295.00	89.10	179.40	10,433.83	-2,231.43	-61.39	2,231.48	1.50	-0.95	-1.16
12,391.00	88.60	178.20	10,435.75	-2,327.39	-59.38	2,327.43	1.35	-0.52	-1.25
12,487.00	87.80	178.70	10,438.77	-2,423.31	-56.79	2,423.35	0.98	-0.83	0.52
12,582.00	87.00	179.00	10,443.08	-2,518.19	-54.88	2,518.23	0.90	-0.84	0.32
12,678.00	87.50	178.90	10,447.68	-2,614.06	-53.12	2,614.10	0.53	0.52	-0.10

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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)
12,773.00	89.50	180.10	10,450.17	-2,709.02	-52.30	2,709.06	2.45	2.11	1.26
12,869.00	90.30	179.90	10,450.34	-2,805.02	-52.30	2,805.05	0.86	0.83	-0.21
12,965.00	88.90	180.10	10,451.01	-2,901.01	-52.30	2,901.05	1.47	-1.46	0.21
13,060.00	89.10	180.60	10,452.67	-2,996.00	-52.88	2,996.03	0.57	0.21	0.53
13,156.00	87.70	180.10	10,455.35	-3,091.96	-53.46	3,091.99	1.55	-1.46	-0.52
13,252.00	86.80	180.30	10,459.95	-3,187.84	-53.80	3,187.88	0.96	-0.94	0.21
13,347.00	89.40	180.80	10,463.10	-3,282.78	-54.71	3,282.82	2.79	2.74	0.53
13,443.00	90.00	180.60	10,463.61	-3,378.77	-55.88	3,378.81	0.66	0.63	-0.21
13,539.00	88.40	180.30	10,464.95	-3,474.75	-56.64	3,474.79	1.70	-1.67	-0.31
13,634.00	86.50	180.10	10,469.17	-3,569.65	-56.97	3,569.69	2.01	-2.00	-0.21
13,730.00	86.70	179.00	10,474.87	-3,665.48	-56.21	3,665.52	1.16	0.21	-1.15
13,826.00	85.90	178.70	10,481.06	-3,761.26	-54.29	3,761.30	0.89	-0.83	-0.31
13,921.00	86.30	178.50	10,487.52	-3,856.01	-51.98	3,856.05	0.47	0.42	-0.21
14,017.00	88.50	179.90	10,491.88	-3,951.90	-50.64	3,951.93	2.72	2.29	1.46
14,112.00	87.60	178.30	10,495.11	-4,046.83	-49.15	4,046.86	1.93	-0.95	-1.68
14,208.00	87.60	178.90	10,499.13	-4,142.71	-46.80	4,142.74	0.62	0.00	0.63
14,304.00	89.80	177.70	10,501.31	-4,238.64	-43.96	4,238.67	2.61	2.29	-1.25
14,399.00	87.70	177.40	10,503.38	-4,333.52	-39.90	4,333.55	2.23	-2.21	-0.32
14,495.00	87.50	176.30	10,507.40	-4,429.29	-34.63	4,429.31	1.16	-0.21	-1.15
14,591.00	88.40	175.50	10,510.83	-4,524.98	-27.77	4,525.00	1.25	0.94	-0.83
14,686.00	89.20	176.60	10,512.82	-4,619.73	-21.22	4,619.75	1.43	0.84	1.16
14,767.00	88.90	174.50	10,514.17	-4,700.47	-14.94	4,700.48	2.62	-0.37	-2.59
14,863.00	89.70	175.40	10,515.34	-4,796.09	-6.49	4,796.10	1.25	0.83	0.94
14,958.00	89.90	176.20	10,515.67	-4,890.84	0.47	4,890.83	0.87	0.21	0.84
15,054.00	87.90	177.10	10,517.52	-4,986.65	6.07	4,986.64	2.28	-2.08	0.94
15,150.00	87.70	177.50	10,521.20	-5,082.47	10.59	5,082.46	0.47	-0.21	0.42
15,245.00	87.00	179.60	10,525.59	-5,177.33	13.00	5,177.32	2.33	-0.74	2.21
15,341.00	86.60	180.10	10,530.95	-5,273.18	13.25	5,273.17	0.67	-0.42	0.52
15,437.00	87.50	180.50	10,535.89	-5,369.05	12.74	5,369.04	1.03	0.94	0.42
15,532.00	88.10	180.50	10,539.54	-5,463.98	11.92	5,463.97	0.63	0.63	0.00
15,628.00	88.60	181.50	10,542.30	-5,559.92	10.24	5,559.91	1.16	0.52	1.04
15,723.00	88.90	181.70	10,544.38	-5,654.86	7.59	5,654.86	0.38	0.32	0.21
15,819.00	88.10	181.30	10,546.89	-5,750.80	5.08	5,750.79	0.93	-0.83	-0.42
15,915.00	88.60	182.00	10,549.65	-5,846.72	2.31	5,846.71	0.90	0.52	0.73
16,010.00	87.80	181.90	10,552.64	-5,941.61	-0.92	5,941.61	0.85	-0.84	-0.11
16,106.00	87.20	180.30	10,556.82	-6,037.50	-2.76	6,037.50	1.78	-0.63	-1.67
16,202.00	86.90	179.80	10,561.77	-6,133.37	-2.84	6,133.37	0.61	-0.31	-0.52
16,297.00	86.40	180.30	10,567.32	-6,228.21	-2.93	6,228.21	0.74	-0.53	0.53
16,393.00	86.50	180.30	10,573.26	-6,324.02	-3.43	6,324.03	0.10	0.10	0.00
16,489.00	87.20	180.50	10,578.54	-6,419.88	-4.10	6,419.88	0.76	0.73	0.21
16,584.00	88.00	180.80	10,582.51	-6,514.79	-5.17	6,514.79	0.90	0.84	0.32
16,680.00	90.80	182.00	10,583.52	-6,610.74	-7.52	6,610.74	3.17	2.92	1.25
16,776.00	91.00	181.30	10,582.01	-6,706.69	-10.28	6,706.69	0.76	0.21	-0.73
16,871.00	90.00	180.30	10,581.18	-6,801.67	-11.61	6,801.68	1.49	-1.05	-1.05

LEAM Drilling Systems LLC

Survey Report

Company:	Devon Energy	Local Co-ordinate Reference:	Well 224H
Project:	Eddy County, NM (NAD-83)	TVD Reference:	KB: 23.5' @ 3446.80usft (Cactus 167)
Site:	Cotton Draw Unit	MD Reference:	KB: 23.5' @ 3446.80usft (Cactus 167)
Well:	224H	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)
16,967.00	89.20	180.30	10,581.85	-6,897.67	-12.11	6,897.68	0.83	-0.83	0.00
17,063.00	89.60	179.60	10,582.86	-6,993.66	-12.03	6,993.67	0.84	0.42	-0.73
17,158.00	90.70	179.00	10,582.61	-7,088.65	-10.87	7,088.66	1.32	1.16	-0.63
17,254.00	91.50	179.20	10,580.77	-7,184.62	-9.36	7,184.63	0.86	0.83	0.21
17,349.00	91.90	179.40	10,577.95	-7,279.57	-8.20	7,279.58	0.47	0.42	0.21
17,503.00	91.90	179.40	10,572.84	-7,433.48	-6.59	7,433.48	0.00	0.00	0.00
Projection									