

LEAM Drilling Systems LLC

Survey Report

30-015-44088

NM OIL CONSERVATION

ARTESTIA DISTRICT

DEC 27 2017

Company:	Rockcliff Energy	Well Name:	Well Toro 14 #301H
Project:	Eddy County, NM	GL 2995 + 25' RKB @ 3020.00usft	
Site:	Toro Pad	GL 2995 + 25' RKB @ 3020.00usft	
Well:	Toro 14 #301H	Grid	
Wellbore:	OH	Minimum Curvature	
Design:	OH	EDM 5000.1 Multi User Db	

Project:	Eddy County, NM		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Toro Pad		
Site Position:		Northing:	472,609.00 usft
From:	Map	Easting:	582,897.00 usft
Position Uncertainty:	1.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 17' 56.521 N
		Longitude:	104° 3' 54.163 W
		Grid Convergence:	0.14 °

Well:	Toro 14 #301H					
Well Position	+N/-S	0.00 usft	Northing:	472,612.00 usft	Latitude:	32° 17' 56.539 N
	+E/-W	0.00 usft	Easting:	583,347.00 usft	Longitude:	104° 3' 48.919 W
Position Uncertainty	1.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	2,995.00 usft	

Wellbore:	OH		
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Magnetometer	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	12/24/2016	7.35	60.15	48,183

Design:	OH		
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00

Vertical Section	Depth From (NVD) (usft)	N/S (usft)	E/W (usft)	Direction (°)
	0.00	0.00	0.00	355.25

Survey Program	From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
	232.00	11,489.00	Survey #1 (OH)	MWD-ISCWSA	MWD - Standard
	11,517.00	14,377.00	Survey #2 (OH)	LEAM MWD+HDGM	MWD+HDGM
	14,459.00	14,459.00	Survey #3 (OH)	Project	Projection

Survey	Measured Depth (usft)	Rotation (°)	Azimuth (°)	Vertical Depth (usft)	N/S (usft)	E/W (usft)	Vertical Section (usft)	Depth (usft)	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
	232.00	0.41	32.11	232.00	0.70	0.44	0.66	0.18	0.18	0.00
	407.00	0.48	29.57	406.99	1.87	1.14	1.77	0.04	0.04	-1.45
	468.00	0.25	329.02	467.99	2.21	1.19	2.10	0.69	-0.38	-99.26
	652.00	0.29	88.99	651.99	2.56	1.45	2.43	0.25	0.02	65.20
	834.00	0.30	167.98	833.99	2.10	2.01	1.93	0.21	0.01	43.40
	1,017.00	0.06	126.50	1,016.99	1.58	2.19	1.39	0.14	-0.13	-22.67
	1,141.00	0.25	194.21	1,140.99	1.28	2.17	1.09	0.19	0.15	54.60
	1,323.00	0.35	185.92	1,322.98	0.34	2.02	0.17	0.06	0.05	-4.55

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Survey Report

Company:	Rockcliff Energy	Local Coordinate Reference:	Well Toro 14 #301H
Project:	Eddy County, NM	VD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Site:	Toro Pad	MD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Well:	Toro 14 #301H	Map Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Drillup:	OH	Database:	EDM 5000.1 Multi User Db

Survey										
Measured Depth (ft)	inclination (°)	Azimuth (°)	Vertical Depth (ft)	NAS (usft)	EAV (usft)	Vertical Section (ft)	Dogleg Rate (1/1000usft)	Build Rate (1/1000usft)	Turn Rate (1/1000usft)	
1,505.00	0.28	170.08	1,504.98	-0.65	2.04	-0.82	0.06	-0.04	-8.70	
1,686.00	0.25	163.54	1,685.98	-1.47	2.23	-1.65	0.02	-0.02	-3.61	
1,867.00	1.24	137.08	1,866.96	-3.28	3.67	-3.57	0.56	0.55	-14.62	
2,048.00	1.76	133.22	2,047.90	-6.62	7.03	-7.18	0.29	0.29	-2.13	
2,230.00	3.18	135.63	2,229.73	-12.14	12.60	-13.14	0.78	0.78	1.32	
2,412.00	0.51	83.22	2,411.62	-15.65	16.93	-17.00	1.59	-1.47	-28.80	
2,593.00	0.61	25.33	2,592.61	-14.69	18.15	-16.14	0.30	0.06	-31.98	
2,775.00	0.40	25.64	2,774.61	-13.24	18.84	-14.75	0.12	-0.12	0.17	
2,957.00	0.44	15.27	2,956.60	-11.99	19.29	-13.55	0.05	0.02	-5.70	
3,138.00	0.45	348.91	3,137.60	-10.63	19.34	-12.19	0.11	0.01	-14.56	
3,320.00	0.45	342.29	3,319.59	-9.24	18.99	-10.78	0.03	0.00	-3.64	
3,501.00	0.48	336.94	3,500.59	-7.87	18.47	-9.37	0.03	0.02	-2.96	
3,683.00	0.50	337.80	3,682.58	-6.43	17.87	-7.89	0.01	0.01	0.47	
3,864.00	0.50	324.57	3,863.57	-5.06	17.12	-6.46	0.06	0.00	-7.31	
3,955.00	1.29	243.32	3,954.56	-5.19	15.97	-6.50	1.44	0.87	-89.29	
4,136.00	4.18	223.76	4,135.34	-10.87	9.59	-11.63	1.66	1.60	-10.81	
4,318.00	4.13	223.38	4,316.86	-20.43	0.50	-20.40	0.03	-0.03	-0.21	
4,500.00	4.32	223.10	4,498.37	-30.20	-8.69	-29.37	0.11	0.10	-0.15	
4,681.00	4.08	221.48	4,678.88	-40.00	-17.61	-38.40	0.15	-0.13	-0.90	
4,862.00	4.32	227.27	4,859.40	-49.45	-26.88	-47.05	0.27	0.13	3.20	
5,044.00	3.99	228.96	5,040.92	-58.26	-36.69	-55.02	0.19	-0.18	0.93	
5,225.00	4.23	230.61	5,221.45	-66.63	-46.60	-62.54	0.15	0.13	0.91	
5,407.00	3.91	230.14	5,402.99	-74.86	-56.55	-69.92	0.18	-0.18	-0.26	
5,588.00	4.61	231.12	5,583.49	-83.39	-66.95	-77.55	0.39	0.39	0.54	
5,769.00	3.92	225.05	5,763.99	-92.32	-76.99	-85.63	0.46	-0.38	-3.35	
5,951.00	4.75	226.83	5,945.47	-101.87	-86.89	-94.33	0.46	0.46	0.98	
6,132.00	4.09	224.20	6,125.93	-111.63	-96.86	-103.22	0.38	-0.36	-1.45	
6,314.00	4.21	223.56	6,307.45	-121.12	-105.99	-111.93	0.07	0.07	-0.35	
6,401.00	4.12	225.22	6,394.22	-125.64	-110.40	-116.06	0.17	-0.10	1.91	
6,491.00	4.33	223.72	6,483.98	-130.37	-115.05	-120.40	0.26	0.23	-1.67	
6,582.00	4.09	224.19	6,574.73	-135.18	-119.68	-124.80	0.27	-0.26	0.52	
6,673.00	4.17	231.28	6,665.50	-139.58	-124.53	-128.79	0.57	0.09	7.79	
6,764.00	4.12	239.11	6,756.26	-143.32	-129.91	-132.07	0.62	-0.05	8.60	
6,855.00	4.69	237.27	6,846.99	-147.01	-135.85	-135.26	0.65	0.63	-2.02	
6,946.00	5.55	234.27	6,937.63	-151.60	-142.55	-139.27	0.99	0.95	-3.30	
7,036.00	5.14	229.85	7,027.23	-156.74	-149.17	-143.85	0.65	-0.46	-4.91	
7,127.00	3.77	236.97	7,117.96	-161.00	-154.79	-147.62	1.62	-1.51	7.82	
7,218.00	3.25	247.13	7,208.79	-163.63	-159.67	-149.84	0.89	-0.57	11.16	
7,309.00	3.69	241.33	7,299.62	-166.04	-164.62	-151.83	0.62	0.48	-6.37	
7,399.00	3.53	229.97	7,389.44	-169.21	-169.28	-154.61	0.81	-0.18	-12.62	
7,491.00	3.64	215.88	7,481.27	-173.40	-173.16	-158.46	0.96	0.12	-15.32	
7,582.00	3.81	219.99	7,572.07	-178.05	-176.80	-162.80	0.35	0.19	4.52	
7,673.00	4.42	213.53	7,662.84	-183.29	-180.68	-167.70	0.84	0.67	-7.10	

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Survey Report

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Project:	Eddy County, NM	EVD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Site:	Toro Pad	MD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Well:	Toro 14 #301H	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/G (usft)	E/W (usft)	Vertical Section (usft)	Decline Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
7,763.00	4.85	223.49	7,752.55	-188.94	-185.21	-172.96	1.01	0.48	11.07	
7,854.00	5.03	216.17	7,843.21	-194.96	-190.22	-178.53	0.72	0.20	-8.04	
7,945.00	3.71	216.22	7,933.94	-200.55	-194.31	-183.77	1.45	-1.45	0.05	
8,036.00	3.19	228.74	8,024.78	-204.60	-197.95	-187.50	1.00	-0.57	13.76	
8,126.00	2.43	248.67	8,114.67	-206.94	-201.61	-189.54	1.36	-0.84	22.14	
8,217.00	1.80	253.49	8,205.61	-208.05	-204.78	-190.38	0.72	-0.69	5.30	
8,308.00	2.71	238.23	8,296.54	-209.59	-207.98	-191.65	1.19	1.00	-16.77	
8,398.00	5.09	241.63	8,386.32	-212.61	-213.30	-194.21	2.66	2.64	3.78	
8,489.00	5.50	242.47	8,476.94	-216.54	-220.72	-197.52	0.46	0.45	0.92	
8,580.00	5.17	238.35	8,567.54	-220.71	-228.08	-201.06	0.56	-0.36	-4.53	
8,671.00	4.76	239.09	8,658.20	-224.80	-234.81	-204.58	0.46	-0.45	0.81	
8,762.00	5.07	236.89	8,748.86	-228.93	-241.42	-208.16	0.40	0.34	-2.42	
8,853.00	4.28	226.60	8,839.56	-233.46	-247.25	-212.19	1.26	-0.87	-11.31	
8,944.00	4.16	227.25	8,856.52	-234.32	-248.17	-212.96	0.76	-0.71	3.82	
8,999.00	3.80	225.58	8,895.42	-236.18	-250.13	-214.66	0.97	-0.92	-4.28	
9,045.00	6.27	249.02	8,940.25	-238.11	-253.49	-216.30	7.04	5.49	52.09	
9,090.00	12.33	262.01	8,984.64	-239.66	-260.55	-217.26	14.17	13.47	28.87	
9,136.00	13.24	273.98	9,029.51	-239.97	-270.67	-216.74	6.08	1.98	26.02	
9,181.00	14.62	287.37	9,073.20	-237.92	-281.23	-213.81	7.77	3.07	29.76	
9,227.00	18.80	299.10	9,117.26	-232.58	-293.26	-207.49	11.63	9.09	25.50	
9,272.00	21.95	307.84	9,159.45	-223.89	-306.24	-197.76	9.72	7.00	19.42	
9,309.00	23.88	312.84	9,201.82	-212.28	-319.86	-185.06	5.96	4.20	10.87	
9,354.00	26.58	321.07	9,242.53	-198.25	-332.87	-170.00	9.82	6.00	18.29	
9,399.00	27.67	326.51	9,275.47	-184.64	-342.82	-155.62	7.32	2.95	14.70	
9,449.00	29.86	330.85	9,314.92	-166.14	-354.04	-136.25	6.72	4.87	9.64	
9,494.00	32.61	334.93	9,353.40	-145.37	-364.64	-114.67	7.71	6.11	9.07	
9,539.00	36.17	338.13	9,394.65	-119.46	-375.85	-87.93	7.98	7.12	6.40	
9,585.00	39.45	344.88	9,430.22	-93.32	-384.53	-61.15	11.73	7.29	15.00	
9,610.67	43.60	351.49	9,463.91	-64.14	-390.56	-31.58	13.40	9.22	14.69	
9,675.00	46.63	357.29	9,496.39	-31.73	-393.70	0.98	11.09	6.59	12.61	
9,720.00	49.31	0.64	9,513.57	-12.68	-394.03	20.00	14.23	10.42	13.06	
330' HL Crossing 330' FSL 406' FWL										
9,630.00	51.38	2.99	9,525.91	2.20	-393.56	34.78	14.23	10.73	12.15	
9,675.00	56.98	5.36	9,552.24	38.57	-390.88	70.80	13.16	12.44	5.27	
9,720.00	63.77	6.71	9,574.47	77.44	-386.75	109.20	15.31	15.09	3.00	
9,766.00	67.93	7.20	9,593.29	119.10	-381.67	150.29	9.10	9.04	1.07	
9,811.00	71.99	8.27	9,608.70	160.98	-375.97	191.56	9.29	9.02	2.38	
9,856.00	75.84	9.30	9,621.17	203.70	-369.37	233.59	8.83	8.56	2.29	
9,947.00	85.22	11.11	9,636.13	291.93	-353.46	320.20	10.49	10.31	1.99	
10,037.00	89.22	6.84	9,640.49	380.69	-339.45	407.49	6.50	4.44	-4.74	
10,128.00	92.05	4.42	9,639.49	471.23	-330.52	496.98	4.09	3.11	-2.66	
10,218.00	92.82	3.91	9,635.66	560.91	-323.99	585.81	1.03	0.86	-0.57	
10,309.00	92.74	3.11	9,631.25	651.63	-318.43	675.76	0.88	-0.09	-0.88	
10,400.00	89.57	0.68	9,629.41	742.54	-315.42	766.11	4.39	-3.48	-2.67	

LEAM Drilling Systems LLC

Survey Report

Company:	Rockcliff Energy	Local Coordinate Reference:	Well Toro 14 #301H
Project:	Eddy County, NM	TVD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Site:	Toro Pad	MD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Well:	Toro 14 #301H	North Reference:	Grid
Wallbox:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi User Db

Survey	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	True North (ft)	East (ft)	Vertical Section (ft)	Dogleg Rate (1/1000ft)	Build Rate (1/1000ft)	Turn Rate (1/1000ft)
	10,491.00	87.48	359.41	9,631.76	833.51	-315.35	856.76	2.69	-2.30	-1.40
	10,582.00	88.08	359.32	9,635.28	924.43	-316.36	947.45	0.67	0.66	-0.10
	10,673.00	89.00	359.15	9,637.60	1,015.39	-317.57	1,038.20	1.03	1.01	-0.19
	10,763.00	89.99	359.22	9,638.39	1,105.38	-318.85	1,127.99	1.10	1.10	0.08
	10,854.00	90.67	359.28	9,637.87	1,196.37	-320.04	1,218.76	0.75	0.75	0.07
	10,945.00	89.81	359.10	9,637.49	1,287.36	-321.33	1,309.55	0.97	-0.95	-0.20
	11,035.00	89.88	359.10	9,637.73	1,377.35	-322.74	1,399.34	0.08	0.08	0.00
	11,126.00	90.87	359.52	9,637.14	1,468.34	-323.84	1,490.11	1.18	1.09	0.46
	11,217.00	90.38	358.71	9,636.14	1,559.32	-325.25	1,580.90	1.04	-0.54	-0.89
	11,308.00	90.76	358.45	9,635.24	1,650.29	-327.50	1,671.74	0.51	0.42	-0.29
	11,398.00	91.46	357.76	9,633.49	1,740.22	-330.48	1,761.61	1.09	0.78	-0.77
	11,489.00	90.85	358.23	9,631.66	1,831.15	-333.66	1,852.49	0.85	-0.67	0.52
	11,517.00	91.35	358.18	9,631.12	1,859.13	-334.54	1,880.44	1.79	1.79	-0.18
LEAMS First Survey										
	11,607.00	90.78	357.71	9,629.45	1,949.05	-337.76	1,970.33	0.82	-0.63	-0.52
	11,698.00	91.11	358.25	9,627.95	2,039.98	-340.97	2,061.21	0.70	0.36	0.59
	11,789.00	92.16	359.45	9,625.35	2,130.93	-342.80	2,151.99	1.75	1.15	1.32
	11,880.00	90.56	0.81	9,623.19	2,221.89	-342.59	2,242.63	2.31	-1.76	1.49
	11,971.00	88.58	1.59	9,623.87	2,312.87	-340.68	2,333.13	2.34	-2.18	0.86
	12,062.00	87.15	1.01	9,627.27	2,403.78	-338.62	2,423.56	1.70	-1.57	-0.64
	12,153.00	87.84	0.03	9,631.24	2,494.68	-337.80	2,514.09	1.32	0.76	-1.08
	12,243.00	87.40	358.00	9,634.98	2,584.59	-339.34	2,603.81	2.31	-0.49	-2.26
	12,334.00	89.66	356.68	9,637.31	2,675.45	-343.56	2,694.71	2.88	2.48	-1.45
	12,425.00	90.16	357.55	9,637.46	2,766.34	-348.14	2,785.66	1.10	0.55	0.96
	12,516.00	91.35	358.64	9,636.26	2,857.28	-351.17	2,876.54	1.77	1.31	1.20
	12,606.00	90.01	357.77	9,635.19	2,947.22	-353.99	2,966.41	1.78	-1.49	-0.97
	12,697.00	91.46	357.91	9,634.02	3,038.15	-357.42	3,057.31	1.60	1.59	0.15
	12,788.00	92.52	356.23	9,630.86	3,128.97	-362.06	3,148.20	2.18	1.16	-1.85
	12,878.00	91.02	354.96	9,628.08	3,218.66	-368.97	3,238.16	2.18	-1.67	-1.41
	12,969.00	91.48	355.55	9,626.10	3,309.32	-376.50	3,329.13	0.82	0.51	0.65
	13,060.00	91.70	355.83	9,623.57	3,400.03	-383.34	3,420.10	0.39	0.24	0.31
	13,151.00	92.23	355.79	9,620.45	3,490.73	-389.98	3,511.04	0.58	0.58	-0.04
	13,241.00	90.76	358.31	9,618.10	3,580.57	-394.61	3,600.95	3.24	-1.63	2.80
	13,332.00	87.86	1.26	9,619.20	3,671.55	-394.95	3,691.64	4.55	-3.19	3.24
	13,423.00	88.67	1.89	9,621.96	3,762.47	-392.45	3,782.04	1.13	0.89	0.69
	13,514.00	88.69	0.36	9,624.05	3,853.42	-390.67	3,872.54	1.68	0.02	-1.68
	13,605.00	89.24	359.54	9,625.70	3,944.41	-390.74	3,963.22	1.08	0.60	-0.90
	13,696.00	90.05	359.17	9,626.26	4,035.40	-391.77	4,053.98	0.98	0.89	-0.41
	13,786.00	89.81	358.39	9,626.37	4,125.38	-393.69	4,143.81	0.91	-0.27	-0.87
	13,877.00	90.30	357.76	9,626.28	4,216.33	-396.74	4,234.70	0.88	0.54	-0.69
	13,968.00	90.76	358.56	9,625.44	4,307.27	-399.66	4,325.58	1.01	0.51	0.88
	14,059.00	92.30	359.11	9,623.01	4,398.22	-401.51	4,416.36	1.80	1.69	0.60
	14,150.00	91.66	1.09	9,619.87	4,489.16	-401.35	4,506.98	2.29	-0.70	2.18

LEAM Drilling Systems LLC

Survey Report

Company:	Rockcliff Energy	Local Coordinate Reference:	Well Toro 14 #301H
Project:	Eddy County, NM	TVD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Site:	Toro Pad	MD Reference:	GL 2995 + 25' RKB @ 3020.00usft
Well:	Toro 14 #301H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Multi User Db

Survey										
Measured Depth (USF)	Inclination (°)	Azimuth (°)	Vertical Depth (USF)	N-S (USF)	E-W (USF)	Vertical Section (USF)	Dogleg Rate (1/1000usft)	Build Rate (1/1000usft)	Turn Rate (1/1000usft)	
14,240.00	90.16	1.54	9,618.44	4,579.12	-399.29	4,596.46	1.74	-1.67	0.50	
14,304.52	89.82	1.87	9,618.45	4,643.61	-397.37	4,660.57	0.74	-0.53	0.52	
330' HL Crossing 330' FNL 405' FWL										
14,331.00	89.68	2.01	9,618.56	4,670.08	-396.47	4,686.87	0.74	-0.53	0.52	
14,377.00	90.03	1.84	9,618.68	4,716.05	-394.93	4,732.56	0.85	0.76	-0.37	
14,459.00	90.03	1.84	9,618.64	4,798.01	-392.29	4,814.02	0.00	0.00	0.00	
Projection										