

30-015-41249

RKI Exploration & Production

Eddy County (NM83E)

Sec 17-T26S-R30E

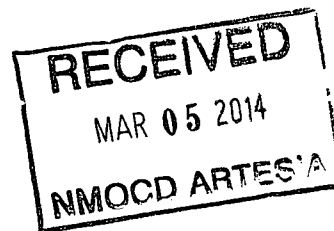
RDX 17-19

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

21 October, 2013



Wolverine Directional, LLC

Survey Report

Company:	RKI Exploration & Production	Local Co-ordinate Reference:	Well RDX-17-19
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0ft (Original Well Elev)
Site:	Sec 17-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
Well:	RDX 17-19	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 2003.21 Single User Db

Design:	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	297.75

Survey Program:	Date 2013/10/21			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.0	7,329.0	MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.24	292.63	100.0	0.1	-0.2	0.2	0.24	0.24	0.00
First GYRO Survey									
200.0	0.13	313.26	200.0	0.2	-0.5	0.5	0.13	-0.11	20.63
300.0	0.18	184.70	300.0	0.2	-0.6	0.6	0.28	0.05	-128.56
400.0	0.52	124.43	400.0	-0.3	-0.2	0.1	0.46	0.34	-60.27
500.0	0.63	141.38	500.0	-0.9	0.5	-0.9	0.20	0.11	16.95
600.0	0.78	144.11	600.0	-1.9	1.3	-2.0	0.15	0.15	2.73
700.0	0.54	119.77	700.0	-2.7	2.1	-3.1	0.36	-0.24	-24.34
800.0	0.89	117.64	800.0	-3.3	3.2	-4.3	0.35	0.35	-2.13
860.0	1.40	102.70	860.0	-3.7	4.3	-5.5	0.98	0.85	-24.90
Last GYRO Survey									
1,024.0	2.20	110.60	1,023.9	-5.2	9.2	-10.6	0.51	0.49	4.82
First MWD Survey									
1,116.0	2.40	118.50	1,115.8	-6.8	12.5	-14.2	0.41	0.22	8.59
1,147.0	1.90	115.50	1,146.8	-7.3	13.6	-15.4	1.65	-1.61	-9.68
1,178.0	1.40	115.70	1,177.8	-7.7	14.4	-16.3	1.61	-1.61	0.65
1,209.0	1.10	122.30	1,208.8	-8.0	15.0	-17.0	1.07	-0.97	21.29
1,239.0	0.70	123.60	1,238.8	-8.3	15.4	-17.4	1.33	-1.33	4.33
1,270.0	0.10	275.60	1,269.8	-8.4	15.5	-17.6	2.55	-1.94	490.32
1,301.0	0.80	300.60	1,300.8	-8.2	15.3	-17.4	2.29	2.26	80.65
1,332.0	1.60	300.30	1,331.7	-7.9	14.7	-16.7	2.58	2.58	-0.97
1,363.0	2.40	303.20	1,362.7	-7.3	13.8	-15.6	2.60	2.58	9.35
1,395.0	3.40	303.70	1,394.7	-6.5	12.5	-14.0	3.13	3.13	1.56
1,426.0	4.30	304.90	1,425.6	-5.3	10.7	-12.0	2.91	2.90	3.87
1,458.0	5.40	304.40	1,457.5	-3.7	8.5	-9.3	3.44	3.44	-1.56
1,489.0	6.90	302.80	1,488.3	-1.9	5.7	-6.0	4.87	4.84	-5.16
1,521.0	8.20	303.70	1,520.0	0.4	2.2	-1.8	4.08	4.06	2.81
1,552.0	9.80	303.50	1,550.7	3.1	-1.8	3.0	5.16	5.16	-0.65
1,583.0	11.20	302.10	1,581.1	6.1	-6.6	8.7	4.59	4.52	-4.52
1,615.0	12.10	299.20	1,612.5	9.4	-12.1	15.1	3.35	2.81	-9.06
1,647.0	12.50	296.70	1,643.7	12.6	-18.1	21.9	2.08	1.25	-7.81
1,679.0	12.70	296.20	1,675.0	15.7	-24.4	28.9	0.71	0.63	-1.56
1,710.0	12.80	296.60	1,705.2	18.8	-30.5	35.8	0.43	0.32	1.29
1,773.0	13.10	295.60	1,766.6	25.0	-43.2	49.9	0.59	0.48	-1.59
1,836.0	13.60	296.20	1,827.9	31.3	-56.3	64.4	0.82	0.79	0.95
1,900.0	13.20	296.00	1,890.2	37.9	-69.6	79.2	0.63	-0.63	-0.31
1,963.0	12.20	297.80	1,951.6	44.1	-82.0	93.1	1.71	-1.59	2.86

Wolverine Directional, LLC

Survey Report

Company:	RKI Exploration & Production	Local Co-ordinate Reference:	Well RDX 17-19
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0ft (Original Well Elev)
Site:	Sec 17-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
Well:	RDX 17-19	North Reference:	True
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 2003.21 Single User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,027.0	12.40	298.60	2,014.2	50.6	-94.0	106.7	0.41	0.31	1.25
2,090.0	12.80	297.80	2,075.6	57.1	-106.1	120.5	0.69	0.63	-1.27
2,154.0	13.00	296.20	2,138.0	63.5	-118.8	134.7	0.64	0.31	-2.50
2,217.0	13.10	295.60	2,199.4	69.8	-131.6	149.0	0.27	0.16	-0.95
2,280.0	13.70	294.20	2,260.7	75.9	-144.9	163.5	1.08	0.95	-2.22
2,344.0	14.30	293.60	2,322.8	82.2	-159.0	179.0	0.96	0.94	-0.94
2,407.0	14.40	293.70	2,383.8	88.4	-173.3	194.6	0.16	0.16	0.16
2,470.0	13.30	294.10	2,445.0	94.5	-187.1	209.6	1.75	-1.75	0.63
2,533.0	12.00	296.70	2,506.5	100.4	-199.6	223.4	2.25	-2.06	4.13
2,596.0	11.60	299.20	2,568.1	106.5	-211.0	236.3	1.03	-0.63	3.97
2,659.0	12.20	297.90	2,629.8	112.7	-222.4	249.3	1.04	0.95	-2.06
2,722.0	12.40	297.10	2,691.3	118.9	-234.3	262.7	0.42	0.32	-1.27
2,785.0	12.10	297.60	2,752.9	125.0	-246.1	276.0	0.51	-0.48	0.79
2,849.0	11.40	296.20	2,815.5	130.9	-257.8	289.1	1.18	-1.09	-2.19
2,912.0	11.50	296.40	2,877.3	136.5	-269.0	301.6	0.17	0.16	0.32
2,975.0	11.60	296.30	2,939.0	142.1	-280.3	314.2	0.16	0.16	-0.16
3,039.0	11.30	295.90	3,001.7	147.6	-291.7	326.9	0.48	-0.47	-0.63
3,102.0	11.20	295.40	3,063.5	153.0	-302.8	339.2	0.22	-0.16	-0.79
3,165.0	11.20	294.70	3,125.3	158.1	-313.8	351.4	0.22	0.00	-1.11
3,228.0	11.20	293.10	3,187.1	163.1	-325.0	363.6	0.49	0.00	-2.54
3,291.0	11.30	294.40	3,248.9	168.1	-336.3	375.9	0.43	0.16	2.06
3,354.0	11.40	297.10	3,310.7	173.4	-347.4	388.2	0.86	0.16	4.29
3,417.0	11.60	297.40	3,367.5	178.7	-357.7	399.8	0.36	0.34	0.52
3,538.0	11.40	292.00	3,491.0	189.2	-380.5	424.9	0.87	-0.16	-4.29
3,601.0	11.60	297.40	3,552.7	194.5	-391.9	437.4	1.74	0.32	8.57
3,664.0	11.70	298.50	3,614.4	200.4	-403.2	450.1	0.39	0.16	1.75
3,727.0	11.70	298.50	3,676.1	206.5	-414.4	462.9	0.00	0.00	0.00
3,791.0	11.60	298.20	3,738.8	212.7	-425.8	475.8	0.18	-0.16	-0.47
3,854.0	11.80	297.80	3,800.5	218.7	-437.0	488.6	0.34	0.32	-0.63
3,906.9	10.29	298.54	3,852.5	223.5	-446.0	498.7	2.87	-2.86	1.39
RDX 17-19 TGT									
3,917.0	10.00	298.70	3,862.4	224.3	-447.5	500.5	2.87	-2.86	1.64
3,980.0	8.50	296.40	3,924.5	229.0	-456.5	510.6	2.45	-2.38	-3.65
4,044.0	6.90	296.60	3,988.0	232.8	-464.2	519.2	2.50	-2.50	0.31
4,107.0	4.60	296.80	4,050.6	235.7	-469.8	525.5	3.65	-3.65	0.32
4,171.0	3.00	297.00	4,114.5	237.6	-473.6	529.7	2.50	-2.50	0.31
4,234.0	1.00	291.00	4,177.5	238.5	-475.6	531.9	3.19	-3.17	-9.52
4,297.0	0.80	281.80	4,240.4	238.8	-476.5	532.9	0.39	-0.32	-14.60
4,361.0	0.90	276.60	4,304.4	239.0	-477.5	533.8	0.20	0.16	-8.13
4,424.0	0.30	36.90	4,367.4	239.1	-477.9	534.2	1.72	-0.95	190.95
4,519.0	0.60	56.00	4,462.4	239.6	-477.3	534.0	0.35	0.32	20.11
4,614.0	0.60	49.00	4,557.4	240.2	-476.5	533.6	0.08	0.00	-7.37
4,709.0	0.60	34.70	4,652.4	241.0	-475.8	533.3	0.16	0.00	-15.05
4,804.0	0.50	20.40	4,747.4	241.8	-475.4	533.3	0.18	-0.11	-15.05
4,899.0	0.40	22.20	4,842.4	242.5	-475.1	533.4	0.11	-0.11	1.89
4,994.0	0.50	21.60	4,937.4	243.1	-474.9	533.5	0.11	0.11	-0.63
5,089.0	0.40	12.30	5,032.4	243.9	-474.6	533.6	0.13	-0.11	-9.79
5,184.0	0.50	339.10	5,127.4	244.6	-474.7	534.0	0.29	0.11	-34.95
5,278.0	0.30	323.60	5,221.4	245.1	-475.0	534.5	0.24	-0.21	-16.49
5,374.0	0.50	307.50	5,317.4	245.6	-475.5	535.2	0.24	0.21	-16.77
5,469.0	0.80	294.90	5,412.4	246.1	-476.4	536.2	0.35	0.32	-13.26
5,564.0	0.90	289.40	5,507.4	246.7	-477.7	537.6	0.14	0.11	-5.79
5,659.0	0.30	67.70	5,602.4	247.0	-478.2	538.2	1.20	-0.63	145.58
5,755.0	1.00	95.00	5,698.4	247.0	-477.1	537.3	0.78	0.73	28.44

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Survey Report

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Site:	Sec 17-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM-2003.21 Single User Db

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
5,850.0	1.30	104.70	5,793.4	246.7	-475.3	535.5	0.38	0.32	10.21	
5,944.0	1.20	105.40	5,887.3	246.2	-473.3	533.5	0.11	-0.11	0.74	
6,039.0	1.30	157.20	5,982.3	244.9	-471.9	531.7	1.15	0.11	54.53	
6,134.0	1.40	155.50	6,077.3	242.8	-471.0	529.9	0.11	0.11	-1.79	
6,228.0	0.60	242.80	6,171.3	241.6	-471.0	529.3	1.59	-0.85	92.87	
6,323.0	0.60	214.60	6,266.3	240.9	-471.7	529.6	0.31	0.00	-29.68	
6,418.0	0.80	217.60	6,361.3	240.0	-472.4	529.8	0.21	0.21	3.16	
6,512.0	0.60	193.70	6,455.3	239.0	-472.9	529.8	0.37	-0.21	-25.43	
6,607.0	0.70	189.30	6,550.3	237.9	-473.1	529.5	0.12	0.11	-4.63	
6,702.0	0.80	182.80	6,645.2	236.7	-473.2	529.0	0.14	0.11	-6.84	
6,797.0	0.90	170.70	6,740.2	235.3	-473.2	528.3	0.22	0.11	-12.74	
6,892.0	1.00	171.20	6,835.2	233.8	-472.9	527.4	0.11	0.11	0.53	
6,985.0	0.30	87.90	6,928.2	233.0	-472.5	526.7	1.09	-0.75	-89.57	
7,080.0	0.30	124.40	7,023.2	232.8	-472.1	526.2	0.20	0.00	38.42	
7,175.0	0.30	98.70	7,118.2	232.7	-471.6	525.7	0.14	0.00	-27.05	
7,269.0	0.30	128.60	7,212.2	232.5	-471.2	525.2	0.16	0.00	31.81	
Last MWD Survey										
7,329.0	0.30	128.60	7,272.2	232.3	-471.0	524.9	0.00	0.00	0.00	
Proj to TD										

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
100.0	100.0	0.1	-0.2	First GYRO Survey	
860.0	860.0	-3.7	4.3	Last GYRO Survey	
1,024.0	1,023.9	-5.2	9.2	First MWD Survey	
7,269.0	7,212.2	232.5	-471.2	Last MWD Survey	
7,329.0	7,272.2	232.3	-471.0	Proj to TD	

Checked By: _____	Approved By: _____	Date: _____
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