

RKI Exploration & Production

Eddy County (NM83E)

Sec 21-T26S-R30E

RDX 21-31

30-015-41266

Wellbore #1

Survey: Survey #1

Standard Survey Report

01 December, 2013

Wolverine Directional, LLC

Survey Report

Company:	RKI Exploration & Production	Local Co-ordinate Reference:	Well RDX 21-31
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0ft (Original Well Elev)
Site:	Sec 21-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
Well:	RDX 21-31	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)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.0	0.0	0.0	264.13

Survey Program	Date 2013/12/01			
From	To	Survey (Wellbore)	Tool Name	Description
(ft)	(ft)			
838.0	7,470.0	Survey #1 (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
838.0	0.30	328.20	838.0	1.9	-1.2	1.0	0.04	0.04	0.00
First MWD Survey									
869.0	0.80	306.40	869.0	2.1	-1.4	1.2	1.72	1.61	-70.32
899.0	1.90	303.50	899.0	2.5	-2.0	1.7	3.67	3.67	-9.67
930.0	2.60	301.10	930.0	3.1	-3.0	2.7	2.28	2.26	-7.74
961.0	3.40	298.20	960.9	3.9	-4.4	4.0	2.63	2.58	-9.35
992.0	4.30	294.30	991.8	4.8	-6.3	5.7	3.02	2.90	-12.58
1,022.0	5.10	290.10	1,021.7	5.7	-8.5	7.9	2.90	2.67	-14.00
1,053.0	6.10	288.00	1,052.6	6.7	-11.4	10.7	3.29	3.23	-6.77
1,084.0	6.80	286.20	1,083.4	7.7	-14.7	13.9	2.35	2.26	-5.81
1,115.0	7.50	285.40	1,114.2	8.8	-18.4	17.5	2.28	2.26	-2.58
1,145.0	8.00	283.80	1,143.9	9.8	-22.4	21.2	1.82	1.67	-5.33
1,175.0	8.50	281.90	1,173.6	10.8	-26.6	25.3	1.90	1.67	-6.33
1,206.0	9.20	279.50	1,204.2	11.6	-31.2	29.9	2.55	2.26	-7.74
1,237.0	9.80	277.50	1,234.8	12.4	-36.3	34.8	2.21	1.94	-6.45
1,269.0	10.40	275.80	1,266.3	13.0	-41.9	40.3	2.09	1.88	-5.31
1,300.0	11.00	273.50	1,296.7	13.5	-47.6	46.0	2.38	1.94	-7.42
1,332.0	11.80	272.30	1,328.1	13.8	-53.9	52.2	2.61	2.50	-3.75
1,363.0	12.30	271.10	1,358.4	14.0	-60.4	58.7	1.80	1.61	-3.87
1,395.0	12.90	269.10	1,389.7	14.0	-67.4	65.6	2.32	1.88	-6.25
1,426.0	13.40	267.60	1,419.8	13.8	-74.4	72.6	1.95	1.61	-4.84
1,458.0	14.10	267.20	1,450.9	13.5	-82.0	80.2	2.21	2.19	-1.25
1,490.0	14.60	267.40	1,481.9	13.1	-89.9	88.1	1.57	1.56	0.63
1,521.0	14.60	266.90	1,511.9	12.7	-97.8	95.9	0.41	0.00	-1.61
1,553.0	14.90	267.90	1,542.9	12.3	-105.9	104.1	1.23	0.94	3.13
1,584.0	15.10	266.60	1,572.8	12.0	-113.9	112.1	1.26	0.65	-4.19
1,616.0	15.20	265.00	1,603.7	11.3	-122.2	120.4	1.34	0.31	-5.00
1,647.0	15.30	263.30	1,633.6	10.5	-130.4	128.6	1.48	0.32	-5.48
1,679.0	15.30	263.00	1,664.5	9.5	-138.7	137.0	0.25	0.00	-0.94
1,710.0	15.30	261.50	1,694.4	8.4	-146.8	145.2	1.28	0.00	-4.84
1,742.0	14.90	258.80	1,725.3	7.0	-155.1	153.5	2.53	-1.25	-8.44
1,774.0	14.90	257.70	1,756.2	5.3	-163.1	161.7	0.88	0.00	-3.44
1,805.0	14.90	257.20	1,786.2	3.6	-170.9	169.6	0.41	0.00	-1.61
1,869.0	13.40	256.60	1,848.2	0.0	-186.1	185.2	2.35	-2.34	-0.94
1,932.0	13.30	255.90	1,909.5	-3.4	-200.3	199.6	0.30	-0.16	-1.11
1,996.0	13.60	254.60	1,971.8	-7.2	-214.7	214.3	0.67	0.47	-2.03
2,059.0	13.60	253.50	2,033.0	-11.3	-228.9	228.9	0.41	0.00	-1.75
2,122.0	13.20	252.20	2,094.3	-15.6	-242.8	243.2	0.79	-0.63	-2.06

Wolverine Directional, LLC

Survey Report

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Site:	Sec 21-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
Well:	RDX 21-31	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)	
2,185.0	13.10	251.80	2,155.6	-20.0	-256.5	257.2	0.21	-0.16	-0.63	
2,281.0	13.30	251.80	2,249.1	-26.9	-277.3	278.6	0.21	0.21	0.00	
2,376.0	13.30	255.40	2,341.5	-33.0	-298.3	300.1	0.87	0.00	3.79	
2,470.0	13.90	259.00	2,432.9	-37.9	-319.8	322.0	1.10	0.64	3.83	
2,565.0	14.00	257.90	2,525.1	-42.5	-342.2	344.8	0.30	0.11	-1.16	
2,660.0	13.70	259.30	2,617.3	-47.0	-364.5	367.4	0.47	-0.32	1.47	
2,755.0	12.80	264.80	2,709.8	-50.0	-386.1	389.2	1.63	-0.95	5.79	
2,849.0	12.40	264.90	2,801.6	-51.9	-406.5	409.7	0.43	-0.43	0.11	
2,944.0	13.10	264.90	2,894.2	-53.7	-427.4	430.6	0.74	0.74	0.00	
3,039.0	12.90	260.90	2,986.8	-56.4	-448.6	452.0	0.97	-0.21	-4.21	
3,134.0	12.60	255.50	3,079.4	-60.6	-469.1	472.8	1.29	-0.32	-5.68	
3,228.0	12.10	252.00	3,171.3	-66.3	-488.4	492.6	0.96	-0.53	-3.72	
3,305.0	12.80	252.60	3,246.5	-71.3	-504.2	508.8	0.92	0.91	0.78	
3,378.0	12.40	252.30	3,317.7	-76.1	-519.4	524.4	0.56	-0.55	-0.41	
3,442.0	12.30	251.30	3,380.2	-80.4	-532.4	537.8	0.37	-0.16	-1.56	
3,505.0	13.40	256.60	3,441.6	-84.2	-545.8	551.6	2.56	1.75	8.41	
3,568.0	14.80	264.40	3,502.7	-86.7	-560.9	566.9	3.74	2.22	12.38	
3,631.0	15.10	264.90	3,563.6	-88.2	-577.1	583.1	0.52	0.48	0.79	
3,695.0	14.90	264.50	3,625.4	-89.7	-593.6	599.7	0.35	-0.31	-0.63	
3,758.0	14.80	263.80	3,686.3	-91.4	-609.7	615.8	0.33	-0.16	-1.11	
3,821.0	15.20	265.90	3,747.2	-92.9	-625.9	632.1	1.07	0.63	3.33	
3,885.0	15.30	266.80	3,808.9	-93.9	-642.7	649.0	0.40	0.16	1.41	
3,948.0	15.00	266.40	3,869.7	-94.9	-659.2	665.4	0.50	-0.48	-0.63	
4,011.0	14.50	266.10	3,930.7	-95.9	-675.2	681.4	0.80	-0.79	-0.48	
4,074.0	14.30	265.50	3,991.7	-97.1	-690.8	697.1	0.40	-0.32	-0.95	
4,137.0	14.20	266.20	4,052.7	-98.2	-706.2	712.6	0.32	-0.16	1.11	
4,201.0	14.20	265.50	4,114.8	-99.4	-721.9	728.3	0.27	0.00	-1.09	
4,264.0	14.10	267.80	4,175.9	-100.3	-737.3	743.7	0.91	-0.16	3.65	
4,328.0	13.20	267.90	4,238.1	-100.8	-752.4	758.7	1.41	-1.41	0.16	
4,391.0	12.10	264.00	4,299.5	-101.8	-766.1	772.5	2.21	-1.75	-6.19	
4,454.0	11.30	263.50	4,361.2	-103.2	-778.8	785.3	1.28	-1.27	-0.79	
4,517.0	10.90	261.70	4,423.1	-104.7	-790.9	797.4	0.84	-0.63	-2.86	
4,580.0	10.30	265.90	4,485.0	-106.0	-802.4	809.0	1.55	-0.95	6.67	
4,644.0	9.80	271.50	4,548.0	-106.2	-813.5	820.1	1.71	-0.78	8.75	
4,707.0	8.70	280.10	4,610.2	-105.3	-823.6	830.0	2.80	-1.75	13.65	
4,770.0	6.70	287.10	4,672.6	-103.4	-831.8	838.0	3.50	-3.17	11.11	
4,833.0	4.50	285.90	4,735.3	-101.6	-837.7	843.7	3.50	-3.49	-1.90	
4,896.0	3.30	278.90	4,798.2	-100.6	-841.8	847.7	2.05	-1.90	-11.11	
4,959.0	2.40	278.90	4,861.1	-100.2	-844.9	850.7	1.43	-1.43	0.00	
5,023.0	1.20	281.00	4,925.0	-99.8	-846.9	852.7	1.88	-1.88	3.28	
5,086.0	1.30	322.10	4,988.0	-99.1	-848.0	853.7	1.40	0.16	65.24	
5,150.0	1.30	352.00	5,052.0	-97.8	-848.5	854.1	1.05	0.00	46.72	
5,213.0	1.70	14.40	5,115.0	-96.2	-848.4	853.8	1.12	0.63	35.56	
5,276.0	1.90	20.10	5,178.0	-94.3	-847.8	853.0	0.43	0.32	9.05	
5,340.0	1.80	12.20	5,241.9	-92.4	-847.2	852.2	0.43	-0.16	-12.34	
5,403.0	1.50	27.00	5,304.9	-90.7	-846.7	851.5	0.82	-0.48	23.49	
5,466.0	1.30	28.30	5,367.9	-89.3	-845.9	850.6	0.32	-0.32	2.06	
5,530.0	1.30	28.50	5,431.9	-88.0	-845.3	849.8	0.01	0.00	0.31	
5,593.0	1.30	19.30	5,494.9	-86.7	-844.7	849.1	0.33	0.00	-14.60	
5,656.0	1.50	15.90	5,557.8	-85.2	-844.2	848.5	0.34	0.32	-5.40	
5,720.0	0.30	24.10	5,621.8	-84.3	-843.9	848.1	1.88	-1.88	12.81	
5,783.0	0.00	146.30	5,684.8	-84.1	-843.9	848.0	0.48	-0.48	0.00	
5,846.0	0.10	321.40	5,747.8	-84.1	-843.9	848.1	0.16	0.16	0.00	
5,940.0	0.10	220.30	5,841.8	-84.1	-844.0	848.2	0.16	0.00	-107.55	

Wolverine Directional, LLC

Survey Report

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Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 0.0ft (Original Well Elev)
Site:	Sec 21-T26S-R30E	MD Reference:	WELL @ 0.0ft (Original Well Elev)
Well:	RDX 21-31	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)
6,035.0	0.10	170.50	5,936.8	-84.2	-844.0	848.2	0.09	0.00	-52.42
6,129.0	0.20	71.80	6,030.8	-84.3	-843.9	848.1	0.25	.011	-105.00
6,225.0	0.20	105.30	6,126.8	-84.3	-843.5	847.7	0.12	0.00	34.90
6,320.0	0.10	15.90	6,221.8	-84.2	-843.4	847.5	0.23	-0.11	-94.11
6,415.0	0.30	199.80	6,316.8	-84.4	-843.4	847.6	0.42	0.21	-185.37
6,511.0	0.50	174.90	6,412.8	-85.0	-843.5	847.7	0.27	0.21	-25.94
6,605.0	0.30	198.90	6,506.8	-85.7	-843.5	847.8	0.27	-0.21	25.53
6,700.0	0.30	184.90	6,601.8	-86.2	-843.6	848.0	0.08	0.00	-14.74
6,795.0	0.40	168.30	6,696.8	-86.7	-843.6	848.0	0.15	0.11	-17.47
6,890.0	0.50	190.80	6,791.8	-87.5	-843.6	848.1	0.21	0.11	23.68
6,985.0	0.70	191.60	6,886.8	-88.4	-843.8	848.4	0.21	0.21	0.84
7,081.0	0.70	174.20	6,982.8	-89.6	-843.8	848.6	0.22	0.00	-18.13
7,175.0	0.60	174.10	7,076.8	-90.7	-843.7	848.6	0.11	-0.11	-0.11
7,270.0	0.60	191.20	7,171.8	-91.6	-843.8	848.7	0.19	0.00	18.00
7,365.0	0.40	212.60	7,266.8	-92.4	-844.0	849.1	0.28	-0.21	22.53
7,422.0	0.80	185.50	7,323.8	-93.0	-844.2	849.3	0.84	0.70	-47.54
Last MWD Survey									
7,470.0	0.80	185.50	7,371.8	-93.6	-844.2	849.4	0.00	0.00	0.00
Proj to TD - RDX 21-31 PBHL									

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
838.0	838.0	1.9	-1.2	First MWD Survey
7,422.0	7,323.8	-93.0	-844.2	Last MWD Survey
7,470.0	7,371.8	-93.6	-844.2	Proj to TD

Checked By: _____ Approved By: _____ Date: _____