

30-015-41091

RKI Exploration & Production

Eddy County (NM83E)

Sec 12-T23S-R28E

Longview Fed 12-13H

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

12 December, 2013

Wolverine Directional, LLC

Survey Report

Company: RKI Exploration & Production	Local Co-ordinate Reference: Well Longview Fed 12-13H
Project: Eddy County (NM83E)	TVD Reference: WELL @ 0.0ft (Original Well Elev)
Site: Sec 12-T23S-R28E	MD Reference: WELL @ 0.0ft (Original Well Elev)
Well: Longview Fed 12-13H	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	359.30

Survey Program **Date:** 2013/12/12

From	To	Survey (Wellbore)	Tool Name	Description
(ft)	(ft)			
377.0	13,517.0	MWD Surveys (Wellbore #1)	MWD	MWD - Standard

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
377.0	1.80	188.60	376.9	-5.9	-0.9	-5.8	0.48	0.48	0.00
First MWD Survey									
469.0	2.10	187.70	468.9	-9.0	-1.3	-8.9	0.33	0.33	-0.98
561.0	2.60	187.90	560.8	-12.7	-1.8	-12.7	0.54	0.54	0.22
652.0	3.20	197.00	651.7	-17.2	-2.9	-17.1	0.83	0.66	10.00
745.0	4.00	201.20	744.5	-22.7	-4.8	-22.6	0.91	0.86	4.52
838.0	4.90	205.30	837.2	-29.3	-7.7	-29.2	1.03	0.97	4.41
930.0	5.50	208.80	928.8	-36.7	-11.5	-36.6	0.74	0.65	3.80
1,021.0	6.30	210.50	1,019.4	-44.8	-16.1	-44.6	0.90	0.88	1.87
1,113.0	5.90	202.10	1,110.8	-53.6	-20.4	-53.3	1.06	-0.43	-9.13
1,205.0	5.40	191.90	1,202.4	-62.2	-23.1	-61.9	1.22	-0.54	-11.09
1,299.0	5.30	179.60	1,296.0	-70.8	-24.0	-70.5	1.22	-0.11	-13.09
1,389.0	6.00	171.00	1,385.6	-79.6	-23.2	-79.4	1.22	0.78	-9.56
1,478.0	6.50	172.60	1,474.0	-89.2	-21.9	-89.0	0.59	0.56	1.80
1,572.0	6.10	168.70	1,567.5	-99.4	-20.2	-99.2	0.62	-0.43	-4.15
1,664.0	5.60	166.40	1,659.0	-108.6	-18.2	-108.3	0.60	-0.54	-2.50
1,759.0	5.80	169.10	1,753.5	-117.8	-16.2	-117.6	0.35	0.21	2.84
1,854.0	6.10	164.10	1,848.0	-127.4	-13.9	-127.2	0.63	0.32	-5.26
1,949.0	6.30	160.30	1,942.4	-137.1	-10.8	-137.0	0.48	0.21	-4.00
2,043.0	6.20	167.30	2,035.9	-146.9	-7.9	-146.8	0.82	-0.11	7.45
2,138.0	5.60	170.50	2,130.4	-156.5	-6.0	-156.4	0.72	-0.63	3.37
2,233.0	6.70	165.70	2,224.8	-166.4	-3.9	-166.4	1.28	1.16	-5.05
2,328.0	6.40	168.20	2,319.2	-177.0	-1.4	-177.0	0.44	-0.32	2.63
2,423.0	6.00	176.60	2,413.7	-187.1	0.0	-187.1	1.04	-0.42	8.84
2,518.0	6.10	180.80	2,508.1	-197.1	0.2	-197.1	0.48	0.11	4.42
2,612.0	5.80	178.00	2,601.6	-206.9	0.3	-206.9	0.44	-0.32	-2.98
2,707.0	5.50	176.40	2,696.2	-216.2	0.7	-216.2	0.36	-0.32	-1.68
2,801.0	6.40	177.30	2,789.7	-225.9	1.3	-225.9	0.96	0.96	0.96
2,896.0	7.40	176.30	2,884.0	-237.3	1.9	-237.3	1.06	1.05	-1.05
2,991.0	7.60	176.80	2,978.2	-249.7	2.6	-249.7	0.22	0.21	0.53
3,087.0	7.80	174.90	3,073.3	-262.5	3.6	-262.6	0.34	0.21	-1.98
3,182.0	8.10	175.60	3,167.4	-275.6	4.7	-275.7	0.33	0.32	0.74
3,277.0	8.00	176.40	3,261.4	-288.9	5.6	-289.0	0.16	-0.11	0.84
3,371.0	8.20	176.40	3,354.5	-302.1	6.4	-302.2	0.21	0.21	0.00
3,466.0	8.20	176.30	3,448.5	-315.7	7.3	-315.7	0.02	0.00	-0.11
3,562.0	7.90	174.90	3,543.6	-329.1	8.3	-329.1	0.37	-0.31	-1.46
3,657.0	8.10	174.70	3,637.7	-342.2	9.5	-342.3	0.21	0.21	-0.21
3,752.0	8.40	175.60	3,731.7	-355.8	10.7	-355.9	0.34	0.32	0.95

Wolverine Directional, LLC

Survey Report

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Site: Sec 12-T23S-R28E
Well: Longview Fed 12-13H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Longview Fed 12-13H
TVD Reference: WELL @ 0.0ft (Original Well Elev)
MD Reference: WELL @ 0.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature
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)
3,847.0	7.40	174.30	3,825.8	-368.8	11.8	-368.9	1.07	-1.05	-1.37
3,942.0	6.90	175.20	3,920.0	-380.6	12.9	-380.7	0.54	-0.53	0.95
4,107.0	3.40	185.10	4,084.3	-395.3	13.3	-395.5	2.18	-2.12	6.00
4,202.0	1.40	204.20	4,179.3	-399.2	12.6	-399.3	2.24	-2.11	20.11
4,298.0	1.30	214.20	4,275.2	-401.2	11.5	-401.3	0.27	-0.10	10.42
4,392.0	0.80	154.50	4,369.2	-402.7	11.2	-402.8	1.20	-0.53	-63.51
4,487.0	0.70	139.50	4,464.2	-403.7	11.8	-403.8	0.23	-0.11	-15.79
4,582.0	0.90	143.90	4,559.2	-404.7	12.6	-404.9	0.22	0.21	4.63
4,678.0	1.10	132.00	4,655.2	-406.0	13.8	-406.1	0.30	0.21	-12.40
4,773.0	0.40	45.30	4,750.2	-406.3	14.7	-406.5	1.21	-0.74	-91.26
4,868.0	2.00	355.40	4,845.2	-404.5	14.8	-404.6	1.86	1.68	-52.53
4,963.0	2.10	357.00	4,940.1	-401.1	14.6	-401.2	0.12	0.11	1.68
5,058.0	1.80	350.50	5,035.0	-397.9	14.2	-398.0	0.39	-0.32	-6.84
5,153.0	1.70	347.80	5,130.0	-395.0	13.7	-395.1	0.14	-0.11	-2.84
5,249.0	1.40	348.00	5,226.0	-392.5	13.1	-392.6	0.31	-0.31	0.21
5,344.0	1.00	349.10	5,320.9	-390.5	12.7	-390.6	0.42	-0.42	1.16
5,439.0	0.90	357.50	5,415.9	-389.0	12.5	-389.1	0.18	-0.11	8.84
5,534.0	1.10	350.10	5,510.9	-387.3	12.3	-387.4	0.25	0.21	-7.79
5,629.0	0.80	355.20	5,605.9	-385.8	12.1	-385.9	0.33	-0.32	5.37
5,724.0	0.50	16.00	5,700.9	-384.7	12.2	-384.8	0.40	-0.32	21.89
5,820.0	0.40	2.60	5,796.9	-384.0	12.3	-384.1	0.15	-0.10	-13.96
5,915.0	0.40	359.60	5,891.9	-383.3	12.3	-383.4	0.02	0.00	-3.16
6,009.0	0.40	359.60	5,985.9	-382.6	12.3	-382.8	0.00	0.00	0.00
6,104.0	0.40	1.90	6,080.9	-382.0	12.3	-382.1	0.02	0.00	2.42
6,198.0	0.00	47.20	6,174.9	-381.6	12.4	-381.8	0.43	-0.43	0.00
6,293.0	0.40	234.10	6,269.9	-381.8	12.1	-382.0	0.42	0.42	0.00
6,388.0	0.40	286.50	6,364.9	-381.9	11.5	-382.1	0.37	0.00	55.16
6,483.0	0.40	256.60	6,459.9	-381.9	10.9	-382.0	0.22	0.00	-31.47
6,578.0	0.40	28.80	6,554.9	-381.7	10.7	-381.8	0.77	0.00	139.16
6,673.0	0.40	73.40	6,649.9	-381.3	11.2	-381.4	0.32	0.00	46.95
6,768.0	0.70	72.70	6,744.9	-381.1	12.0	-381.2	0.32	0.32	-0.74
6,792.0	1.00	64.50	6,768.9	-380.9	12.4	-381.0	1.35	1.25	-34.17
6,824.0	1.10	56.40	6,800.9	-380.6	12.9	-380.8	0.56	0.31	-25.31
6,856.0	2.90	22.50	6,832.8	-379.7	13.4	-379.8	6.50	5.63	-105.94
6,887.0	5.60	5.90	6,863.8	-377.5	13.9	-377.6	9.48	8.71	-53.55
6,919.0	9.00	358.20	6,895.5	-373.4	14.0	-373.6	11.03	10.63	-24.06
6,951.0	12.00	356.40	6,927.0	-367.6	13.7	-367.7	9.43	9.38	-5.63
6,983.0	14.60	356.10	6,958.1	-360.3	13.2	-360.4	8.13	8.13	-0.94
7,014.0	17.10	357.00	6,987.9	-351.8	12.7	-351.9	8.10	8.06	2.90
7,046.0	19.00	359.30	7,018.3	-341.9	12.4	-342.0	6.34	5.94	7.19
7,077.0	22.30	0.30	7,047.3	-331.0	12.4	-331.1	10.71	10.65	3.23
7,109.0	26.20	359.10	7,076.5	-317.8	12.3	-318.0	12.28	12.19	-3.75
7,141.0	29.60	356.80	7,104.8	-302.9	11.7	-303.0	11.14	10.63	-7.19
7,172.0	33.20	354.30	7,131.2	-286.8	10.5	-286.9	12.35	11.61	-8.06
7,204.0	36.50	352.40	7,157.5	-268.6	8.3	-268.7	10.86	10.31	-5.94
7,235.0	39.90	351.90	7,181.9	-249.6	5.7	-249.7	11.01	10.97	-1.61
7,267.0	41.80	353.60	7,206.1	-228.9	3.1	-228.9	6.88	5.94	5.31
7,299.0	42.60	355.60	7,229.8	-207.5	1.1	-207.5	4.89	2.50	6.25
7,330.0	42.90	355.60	7,252.5	-186.5	-0.6	-186.5	0.97	0.97	0.00
7,362.0	43.30	355.20	7,275.9	-164.7	-2.3	-164.7	1.51	1.25	-1.25
7,394.0	44.60	356.10	7,298.9	-142.6	-4.0	-142.5	4.51	4.06	2.81
7,426.0	48.20	356.80	7,321.0	-119.4	-5.4	-119.4	11.36	11.25	2.19
7,457.0	52.40	357.90	7,340.8	-95.6	-6.5	-95.5	13.82	13.55	3.55
7,489.0	55.90	358.70	7,359.5	-69.7	-7.3	-69.6	11.12	10.94	2.50

Wolverine Directional, LLC

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7,521.0	59.40	359.60	7,376.7	-42.7	-7.7	-42.6	11.19	10.94	2.81
7,553.0	62.50	0.00	7,392.2	-14.7	-7.8	-14.6	9.75	9.69	1.25
7,584.0	66.10	0.10	7,405.6	13.2	-7.7	13.3	11.62	11.61	0.32
7,616.0	69.50	0.50	7,417.7	42.9	-7.6	43.0	10.69	10.63	1.25
7,648.0	72.30	0.70	7,428.2	73.1	-7.3	73.2	8.77	8.75	0.63
7,680.0	75.20	0.30	7,437.2	103.8	-7.0	103.9	9.14	9.06	-1.25
7,711.0	78.50	359.80	7,444.2	134.0	-7.0	134.1	10.76	10.65	-1.61
7,743.0	81.70	0.00	7,449.7	165.5	-7.0	165.6	10.02	10.00	0.63
7,775.0	83.30	0.70	7,453.9	197.2	-6.8	197.3	5.45	5.00	2.19
7,807.0	85.50	0.80	7,457.0	229.1	-6.4	229.1	6.88	6.88	0.31
7,838.0	87.20	1.00	7,459.0	260.0	-5.9	260.1	5.52	5.48	0.65
7,870.0	88.50	2.10	7,460.2	292.0	-5.1	292.0	5.32	4.06	3.44
7,902.0	89.40	2.10	7,460.8	324.0	-3.9	324.0	2.81	2.81	0.00
7,934.0	90.00	2.10	7,460.9	355.9	-2.7	355.9	1.88	1.88	0.00
8,029.0	91.80	1.20	7,459.4	450.9	0.0	450.8	2.12	1.89	-0.95
8,124.0	94.00	0.70	7,454.6	545.7	1.6	545.7	2.37	2.32	-0.53
8,219.0	92.10	359.30	7,449.6	640.6	1.6	640.5	2.48	-2.00	-1.47
8,315.0	91.30	359.40	7,446.7	736.5	0.5	736.5	0.84	-0.83	0.10
8,410.0	90.00	359.30	7,445.7	831.5	-0.6	831.5	1.37	-1.37	-0.11
8,506.0	89.30	359.40	7,446.2	927.5	-1.7	927.5	0.74	-0.73	0.10
8,601.0	90.80	358.60	7,446.2	1,022.5	-3.3	1,022.5	1.79	1.58	-0.84
8,696.0	91.30	357.90	7,444.4	1,117.4	-6.2	1,117.4	0.91	0.53	-0.74
8,792.0	91.90	358.20	7,441.7	1,213.3	-9.5	1,213.4	0.70	0.63	0.31
8,887.0	90.70	356.40	7,439.6	1,308.2	-14.0	1,308.3	2.28	-1.26	-1.89
8,982.0	92.70	355.40	7,436.8	1,402.9	-20.8	1,403.1	2.35	2.11	-1.05
9,097.0	91.70	356.40	7,432.3	1,517.5	-29.0	1,517.8	1.23	-0.87	0.87
9,193.0	90.20	357.70	7,430.8	1,613.4	-33.9	1,613.7	2.07	-1.56	1.35
9,287.0	89.10	359.60	7,431.3	1,707.4	-36.1	1,707.7	2.34	-1.17	2.02
9,381.0	90.10	359.40	7,432.0	1,801.4	-37.0	1,801.7	1.08	1.06	-0.21
9,476.0	91.60	359.10	7,430.6	1,896.3	-38.2	1,896.7	1.61	1.58	-0.32
9,569.0	90.10	0.00	7,429.2	1,989.3	-38.9	1,989.6	1.88	-1.61	0.97
9,664.0	92.00	359.40	7,427.5	2,084.3	-39.4	2,084.6	2.10	2.00	-0.63
9,759.0	90.70	359.60	7,425.2	2,179.3	-40.3	2,179.6	1.38	-1.37	0.21
9,853.0	89.40	0.00	7,425.1	2,273.3	-40.6	2,273.6	1.45	-1.38	0.43
9,947.0	90.20	359.40	7,425.5	2,367.3	-41.1	2,367.6	1.06	0.85	-0.64
10,042.0	88.00	0.10	7,427.0	2,462.2	-41.5	2,462.6	2.43	-2.32	0.74
10,135.0	88.90	359.60	7,429.5	2,555.2	-41.7	2,555.5	1.11	0.97	-0.54
10,230.0	89.60	358.90	7,430.7	2,650.2	-43.0	2,650.5	1.04	0.74	-0.74
10,324.0	89.80	1.00	7,431.2	2,744.2	-43.1	2,744.5	2.24	0.21	2.23
10,418.0	90.70	359.80	7,430.8	2,838.2	-42.4	2,838.5	1.60	0.96	-1.28
10,512.0	91.30	359.60	7,429.2	2,932.2	-42.9	2,932.5	0.67	0.64	-0.21
10,607.0	88.90	359.60	7,429.0	3,027.1	-43.6	3,027.4	2.53	-2.53	0.00
10,700.0	89.90	358.90	7,430.0	3,120.1	-44.8	3,120.4	1.31	1.08	-0.75
10,795.0	91.50	358.40	7,428.8	3,215.1	-47.0	3,215.4	1.76	1.68	-0.53
10,890.0	90.40	358.60	7,427.2	3,310.0	-49.5	3,310.4	1.18	-1.16	0.21
10,983.0	91.50	358.20	7,425.7	3,403.0	-52.1	3,403.4	1.26	1.18	-0.43
11,077.0	90.70	359.80	7,423.9	3,497.0	-53.7	3,497.4	1.90	-0.85	1.70
11,171.0	91.60	359.10	7,422.0	3,590.9	-54.6	3,591.3	1.21	0.96	-0.74
11,266.0	91.00	0.10	7,419.8	3,685.9	-55.3	3,686.3	1.23	-0.63	1.05
11,360.0	91.60	2.40	7,417.7	3,779.9	-53.2	3,780.2	2.53	0.64	2.45
11,455.0	91.60	1.70	7,415.1	3,874.8	-49.9	3,875.1	0.74	0.00	-0.74
11,549.0	89.70	2.10	7,414.0	3,968.7	-46.7	3,969.0	2.07	-2.02	0.43
11,643.0	90.70	1.70	7,413.7	4,062.6	-43.6	4,062.9	1.15	1.06	-0.43
11,734.0	91.10	0.80	7,412.2	4,153.6	-41.6	4,153.8	1.08	0.44	-0.99

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Project: Eddy County (NM83E)	TVD Reference: WELL @ 0.0ft (Original Well Elev)	
Site: Sec 12-T23S-R28E	MD Reference: WELL @ 0.0ft (Original Well Elev)	
Well: Longview Fed 12-13H	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)
11,828.0	91.60	0.10	7,410.0	4,247.6	-40.9	4,247.8	0.91	0.53	-0.74
11,922.0	90.20	359.80	7,408.5	4,341.6	-41.0	4,341.7	1.52	-1.49	-0.32
12,015.0	90.10	359.80	7,408.3	4,434.6	-41.3	4,434.7	0.11	-0.11	0.00
12,110.0	90.40	359.40	7,407.9	4,529.6	-42.0	4,529.7	0.53	0.32	-0.42
12,203.0	91.70	358.90	7,406.2	4,622.5	-43.3	4,622.7	1.50	1.40	-0.54
12,297.0	92.20	358.20	7,403.0	4,716.4	-45.7	4,716.6	0.91	0.53	-0.74
12,390.0	90.80	358.90	7,400.5	4,809.4	-48.1	4,809.6	1.68	-1.51	0.75
12,485.0	90.00	358.20	7,399.9	4,904.3	-50.5	4,904.6	1.12	-0.84	-0.74
12,579.0	91.40	358.00	7,398.7	4,998.3	-53.6	4,998.6	1.50	1.49	-0.21
12,673.0	91.50	358.40	7,396.4	5,092.2	-56.5	5,092.5	0.44	0.11	0.43
12,766.0	91.20	359.40	7,394.2	5,185.2	-58.3	5,185.5	1.12	-0.32	1.08
12,860.0	91.40	359.10	7,392.0	5,279.1	-59.6	5,279.5	0.38	0.21	-0.32
12,954.0	91.70	358.60	7,389.5	5,373.1	-61.4	5,373.4	0.62	0.32	-0.53
13,049.0	89.00	358.90	7,388.9	5,468.0	-63.5	5,468.4	2.86	-2.84	0.32
13,143.0	90.20	358.90	7,389.6	5,562.0	-65.3	5,562.4	1.28	1.28	0.00
13,237.0	90.30	358.40	7,389.2	5,656.0	-67.5	5,656.4	0.54	0.11	-0.53
13,331.0	91.10	357.90	7,388.0	5,749.9	-70.6	5,750.4	1.00	0.85	-0.53
13,426.0	92.20	357.50	7,385.3	5,844.8	-74.4	5,845.3	1.23	1.16	-0.42
13,471.0	92.70	357.50	7,383.3	5,889.7	-76.3	5,890.2	1.11	1.11	0.00
Last MWD Survey									
13,517.0	92.70	357.50	7,381.2	5,935.6	-78.3	5,936.2	0.00	0.00	0.00
Proj to TD - Longview Fed 1-13H PBHL									

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
377.0	376.9	-5.9	-0.9	First MWD Survey
13,471.0	7,383.3	5,889.7	-76.3	Last MWD Survey
13,517.0	7,381.2	5,935.6	-78.3	Proj to TD

Checked By: _____ Approved By: _____ Date: _____