

## **Noble Energy Inc.**

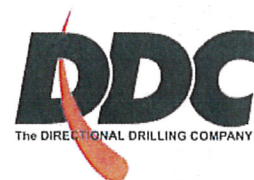
**Weld County, CO  
Sec 25, T9N, R61W  
Krier GV25-62HN**

**Wellbore #1**

**Survey: MWD**

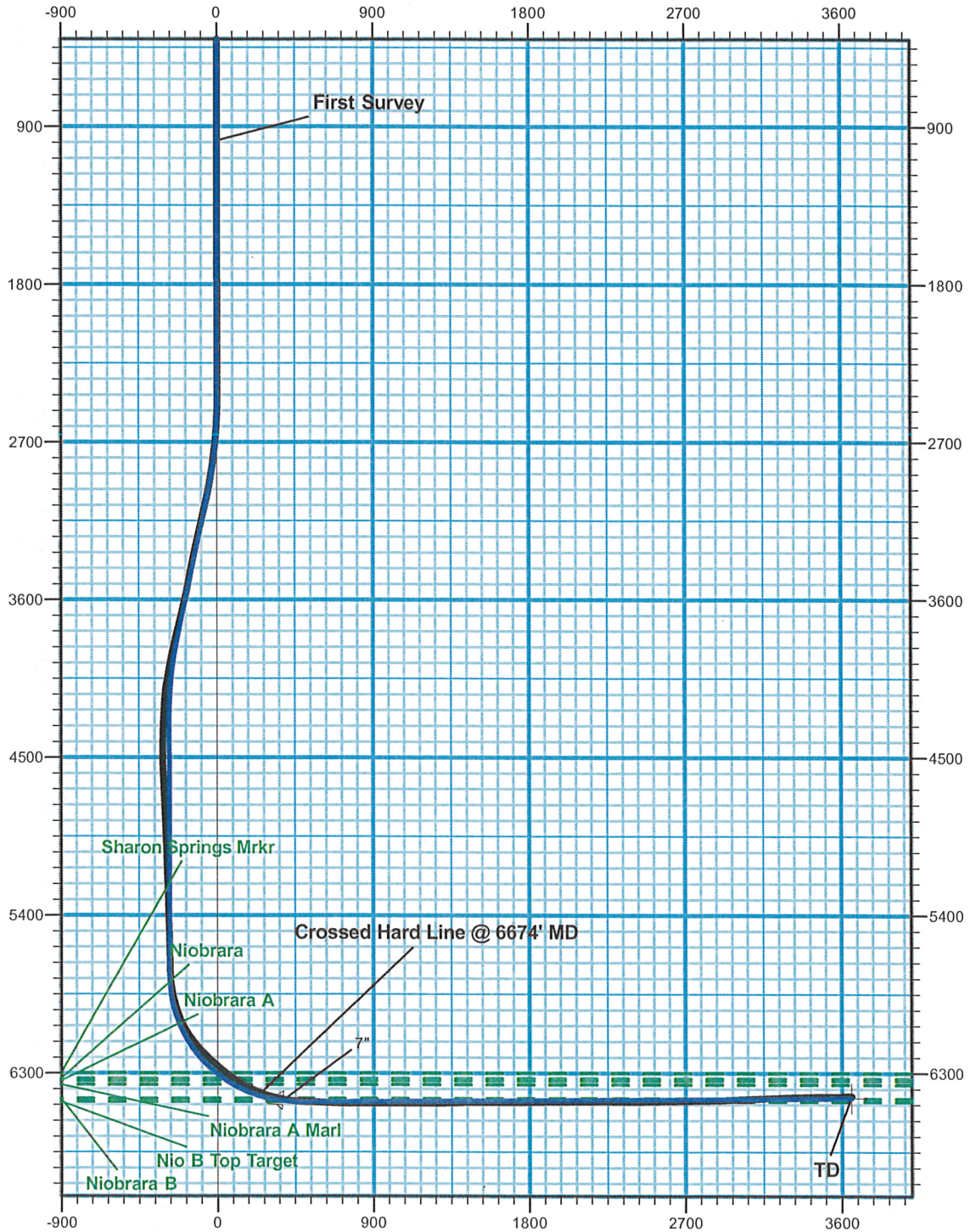
## **DDC Survey Report**

**28 November, 2011**



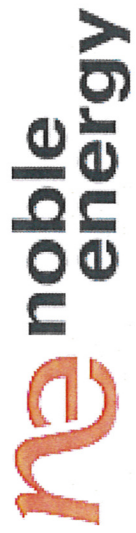


Weld County, CO  
Krier GV25-62HN  
RM-11593

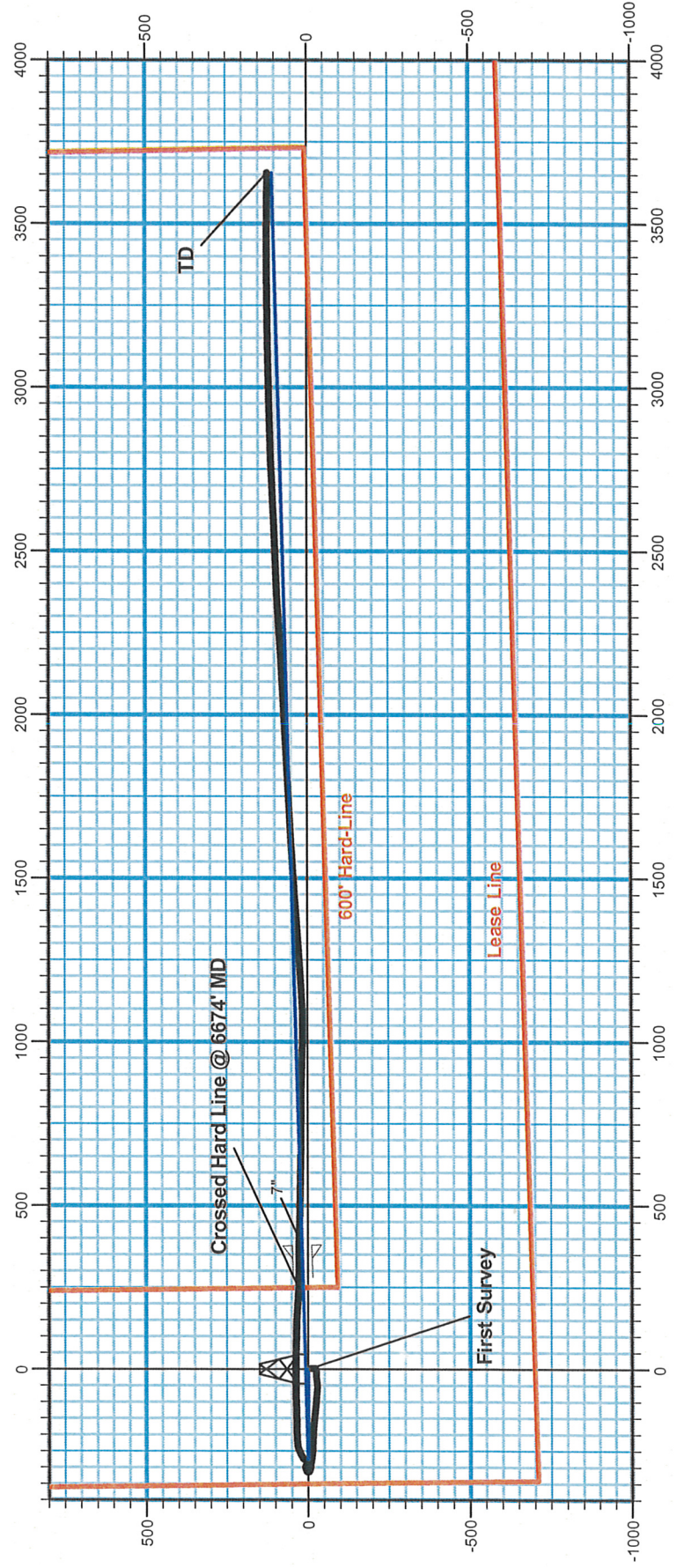


Vertical Section at 88.33° (900 usft/in)





Weld County, CO  
Krier GV25-62HN  
RM-11593





Company: Noble Energy Inc.  
Project: Weld County, CO  
Site: Sec 25, T9N, R61W  
Well: Krier GV25-62HN  
Wellbore: Wellbore #1  
Design: Wellbore #1

Local Co-ordinate Reference: Site Sec 25, T9N, R61W  
TVD Reference: WELL @ 4982.0usft (H&P #323)  
MD Reference: WELL @ 4982.0usft (H&P #323)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Single User Db

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site	Sec 25, T9N, R61W				
Site Position:		Northing:	1,505,878.19 usft	Latitude:	40° 42' 51.624 N
From:	Lat/Long	Easting:	3,371,029.57 usft	Longitude:	104° 9' 41.580 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.86 °

Well	Krier GV25-62HN					
Well Position	+N/-S	0.0 usft	Northing:	1,505,878.18 usft	Latitude:	40° 42' 51.624 N
	+E/-W	0.0 usft	Easting:	3,371,029.57 usft	Longitude:	104° 9' 41.580 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,958.0 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/2/2011	8.51	67.39	53,317

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	88.33	

Survey Program	Date	11/28/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
978.0	10,090.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

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)
First Survey									
978.0	0.00	0.00	978.0	0.0	0.0	0.0	0.00	0.00	0.00
1,059.0	0.50	345.70	1,059.0	0.3	-0.1	-0.1	0.62	0.62	0.00
1,343.0	0.20	122.60	1,343.0	1.3	0.0	0.1	0.23	-0.11	48.20
1,627.0	0.30	153.40	1,627.0	0.3	0.8	0.8	0.06	0.04	10.85
1,910.0	1.90	172.90	1,909.9	-5.0	1.7	1.5	0.57	0.57	6.89
2,197.0	1.80	181.30	2,196.8	-14.2	2.2	1.8	0.10	-0.03	2.93
2,482.0	1.10	166.00	2,481.7	-21.3	2.7	2.1	0.28	-0.25	-5.37
2,514.0	1.40	239.20	2,513.7	-21.8	2.5	1.8	4.72	0.94	228.75
2,545.0	2.80	247.60	2,544.7	-22.3	1.4	0.8	4.61	4.52	27.10



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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)
2,577.0	3.70	251.80	2,576.6	-22.9	-0.3	-0.9	2.91	2.81	13.13
2,640.0	4.80	256.90	2,639.4	-24.2	-4.8	-5.5	1.84	1.75	8.10
2,672.0	4.80	260.40	2,671.3	-24.7	-7.4	-8.1	0.92	0.00	10.94
2,735.0	6.20	271.00	2,734.0	-25.1	-13.4	-14.1	2.74	2.22	16.83
2,767.0	6.60	271.50	2,765.8	-25.0	-16.9	-17.7	1.26	1.25	1.56
2,862.0	8.60	264.10	2,860.0	-25.6	-29.5	-30.2	2.34	2.11	-7.79
2,926.0	10.30	263.90	2,923.1	-26.7	-39.9	-40.7	2.66	2.66	-0.31
2,957.0	11.10	264.10	2,953.6	-27.3	-45.6	-46.4	2.58	2.58	0.65
2,989.0	12.20	268.70	2,984.9	-27.7	-52.1	-52.9	4.50	3.44	14.38
3,021.0	12.70	271.90	3,016.2	-27.6	-59.0	-59.8	2.66	1.56	10.00
3,053.0	12.60	270.30	3,047.4	-27.5	-66.0	-66.8	1.14	-0.31	-5.00
3,148.0	13.40	277.30	3,140.0	-26.1	-87.3	-88.0	1.86	0.84	7.37
3,243.0	12.60	274.30	3,232.5	-23.9	-108.5	-109.2	1.10	-0.84	-3.16
3,338.0	12.70	277.50	3,325.2	-21.7	-129.2	-129.8	0.75	0.11	3.37
3,433.0	10.60	278.20	3,418.3	-19.1	-148.2	-148.7	2.22	-2.21	0.74
3,528.0	11.90	273.10	3,511.4	-17.4	-166.6	-167.1	1.72	1.37	-5.37
3,623.0	13.10	273.30	3,604.2	-16.2	-187.2	-187.6	1.26	1.26	0.21
3,718.0	13.50	272.40	3,696.6	-15.1	-209.0	-209.4	0.47	0.42	-0.95
3,813.0	13.80	271.10	3,789.0	-14.4	-231.4	-231.7	0.45	0.32	-1.37
3,908.0	13.20	275.40	3,881.3	-13.2	-253.5	-253.8	1.23	-0.63	4.53
3,972.0	11.70	275.50	3,943.8	-11.9	-267.3	-267.5	2.34	-2.34	0.16
4,003.0	11.30	276.20	3,974.2	-11.3	-273.4	-273.6	1.37	-1.29	2.26
4,066.0	9.30	281.20	4,036.2	-9.6	-284.6	-284.7	3.47	-3.17	7.94
4,098.0	8.90	281.30	4,067.8	-8.6	-289.5	-289.6	1.25	-1.25	0.31
4,162.0	6.20	279.80	4,131.2	-7.1	-297.8	-297.9	4.23	-4.22	-2.34
4,193.0	5.80	278.50	4,162.1	-6.5	-301.0	-301.0	1.36	-1.29	-4.19
4,257.0	3.40	272.40	4,225.8	-6.0	-306.1	-306.1	3.82	-3.75	-9.53
4,288.0	2.80	271.50	4,256.8	-5.9	-307.7	-307.8	1.94	-1.94	-2.90
4,352.0	2.80	311.20	4,320.7	-4.9	-310.5	-310.5	2.97	0.00	62.03
4,383.0	2.90	314.90	4,351.7	-3.8	-311.6	-311.6	0.68	0.32	11.94
4,415.0	3.00	330.60	4,383.7	-2.5	-312.6	-312.5	2.54	0.31	49.06
4,447.0	2.90	335.00	4,415.6	-1.0	-313.3	-313.2	0.77	-0.31	13.75
4,478.0	2.20	351.00	4,446.6	0.3	-313.8	-313.6	3.20	-2.26	51.61
4,510.0	2.00	6.80	4,478.6	1.4	-313.8	-313.6	1.91	-0.63	49.38
4,573.0	2.50	56.50	4,541.5	3.3	-312.5	-312.3	3.09	0.79	78.89
4,636.0	2.70	56.00	4,604.4	4.9	-310.2	-309.9	0.32	0.32	-0.79
4,668.0	2.60	54.10	4,636.4	5.7	-308.9	-308.6	0.42	-0.31	-5.94
4,763.0	3.80	72.70	4,731.3	7.9	-304.2	-303.8	1.65	1.26	19.58
4,858.0	3.00	94.70	4,826.1	8.6	-298.7	-298.3	1.60	-0.84	23.16
4,953.0	2.10	115.40	4,921.0	7.7	-294.7	-294.3	1.34	-0.95	21.79
5,048.0	2.00	118.00	5,015.9	6.2	-291.6	-291.3	0.14	-0.11	2.74
5,143.0	1.90	115.80	5,110.9	4.7	-288.7	-288.5	0.13	-0.11	-2.32
5,238.0	2.10	81.50	5,205.8	4.3	-285.6	-285.4	1.26	0.21	-36.11
5,333.0	1.60	61.10	5,300.8	5.2	-282.7	-282.4	0.86	-0.53	-21.47

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Survey

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5,428.0	2.50	52.10	5,395.7	7.1	-279.9	-279.6	1.00	0.95	-9.47
5,523.0	2.30	45.80	5,490.6	9.7	-276.9	-276.5	0.35	-0.21	-6.63
5,618.0	1.80	33.10	5,585.6	12.3	-274.7	-274.3	0.71	-0.53	-13.37
5,661.0	1.60	30.50	5,628.6	13.3	-274.1	-273.6	0.50	-0.47	-6.05
5,746.0	1.10	24.70	5,713.5	15.1	-273.1	-272.6	0.61	-0.59	-6.82
5,778.0	3.30	62.70	5,745.5	15.8	-272.2	-271.6	7.89	6.88	118.75
5,810.0	6.80	68.10	5,777.4	16.9	-269.6	-269.0	11.03	10.94	16.88
5,841.0	9.10	61.40	5,808.1	18.8	-265.7	-265.1	7.99	7.42	-21.61
5,873.0	11.90	58.50	5,839.6	21.7	-260.7	-260.0	8.90	8.75	-9.06
5,904.0	14.70	64.80	5,869.7	25.1	-254.4	-253.6	10.16	9.03	20.32
5,936.0	17.10	70.20	5,900.5	28.4	-246.3	-245.4	8.80	7.50	16.88
5,968.0	18.40	76.90	5,931.0	31.1	-237.0	-236.0	7.56	4.06	20.94
5,999.0	20.50	84.30	5,960.2	32.8	-226.8	-225.7	10.43	6.77	23.87
6,031.0	23.10	87.80	5,989.9	33.6	-214.9	-213.9	9.08	8.13	10.94
6,063.0	26.40	89.40	6,019.0	33.9	-201.6	-200.5	10.52	10.31	5.00
6,094.0	29.80	88.30	6,046.3	34.2	-187.0	-185.9	11.09	10.97	-3.55
6,126.0	32.60	87.30	6,073.7	34.8	-170.4	-169.3	8.90	8.75	-3.13
6,158.0	35.50	88.00	6,100.2	35.6	-152.5	-151.4	9.14	9.06	2.19
6,189.0	37.90	89.00	6,125.0	36.1	-134.0	-132.9	7.98	7.74	3.23
6,221.0	41.00	88.90	6,149.8	36.4	-113.7	-112.5	9.69	9.69	-0.31
6,253.0	43.10	88.20	6,173.5	37.0	-92.2	-91.1	6.72	6.56	-2.19
6,284.0	44.60	88.20	6,195.9	37.6	-70.8	-69.6	4.84	4.84	0.00
6,316.0	46.90	88.30	6,218.2	38.3	-47.9	-46.7	7.19	7.19	0.31
6,347.0	48.70	89.00	6,239.0	38.9	-24.9	-23.8	6.04	5.81	2.26
6,379.0	50.20	90.60	6,259.8	39.0	-0.6	0.6	6.03	4.69	5.00
6,411.0	51.20	92.70	6,280.1	38.3	24.2	25.3	5.96	3.13	6.56
6,442.0	53.40	92.20	6,299.1	37.2	48.7	49.7	7.21	7.10	-1.61
6,474.0	55.30	91.70	6,317.7	36.3	74.7	75.7	6.07	5.94	-1.56
6,506.0	56.60	91.20	6,335.6	35.7	101.2	102.2	4.26	4.06	-1.56
6,537.0	58.20	91.50	6,352.3	35.0	127.3	128.2	5.23	5.16	0.97
6,569.0	60.40	92.60	6,368.7	34.1	154.8	155.7	7.48	6.88	3.44
6,601.0	62.90	93.40	6,383.9	32.6	182.9	183.8	8.12	7.81	2.50
6,632.0	65.50	93.40	6,397.3	30.9	210.7	211.6	8.39	8.39	0.00
6,664.0	68.80	92.90	6,409.8	29.3	240.2	240.9	10.41	10.31	-1.56
Crossed Hard Line @ 6674' MD									
6,674.0	69.36	92.30	6,413.3	28.9	249.5	250.2	7.92	5.60	-5.99
6,696.0	70.60	91.00	6,420.9	28.3	270.2	270.9	7.92	5.64	-5.92
6,727.0	72.40	89.70	6,430.7	28.1	299.6	300.3	7.04	5.81	-4.19
6,759.0	75.60	90.10	6,439.5	28.2	330.3	331.0	10.07	10.00	1.25
6,791.0	79.10	91.30	6,446.5	27.8	361.5	362.2	11.53	10.94	3.75
6,821.0	82.10	91.00	6,451.4	27.2	391.1	391.8	10.05	10.00	-1.00
6,897.0	86.30	91.80	6,459.1	25.3	466.7	467.2	5.62	5.53	1.05
6,992.0	87.70	91.30	6,464.1	22.8	561.5	562.0	1.56	1.47	-0.53



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7,087.0	87.50	90.80	6,468.1	21.0	656.4	656.8	0.57	-0.21	-0.53
7,182.0	89.30	90.40	6,470.7	20.0	751.4	751.7	1.94	1.89	-0.42
7,277.0	90.80	90.10	6,470.6	19.6	846.4	846.6	1.61	1.58	-0.32
7,372.0	90.20	92.90	6,469.8	17.1	941.3	941.4	3.01	-0.63	2.95
7,436.0	89.70	90.80	6,469.9	15.1	1,005.3	1,005.3	3.37	-0.78	-3.28
7,468.0	89.50	89.40	6,470.1	15.0	1,037.3	1,037.3	4.42	-0.63	-4.38
7,563.0	89.80	87.40	6,470.7	17.7	1,132.3	1,132.3	2.13	0.32	-2.11
7,658.0	89.50	85.30	6,471.2	23.7	1,227.1	1,227.2	2.23	-0.32	-2.21
7,690.0	89.70	85.70	6,471.5	26.2	1,259.0	1,259.2	1.40	0.63	1.25
7,753.0	92.00	86.60	6,470.5	30.4	1,321.8	1,322.1	3.92	3.65	1.43
7,816.0	91.40	85.70	6,468.7	34.7	1,384.6	1,385.1	1.72	-0.95	-1.43
7,848.0	91.80	85.90	6,467.8	37.0	1,416.5	1,417.0	1.40	1.25	0.63
7,879.0	92.30	86.20	6,466.7	39.2	1,447.4	1,448.0	1.88	1.61	0.97
7,911.0	91.10	85.50	6,465.7	41.5	1,479.3	1,479.9	4.34	-3.75	-2.19
7,943.0	89.50	86.10	6,465.5	43.8	1,511.3	1,511.9	5.34	-5.00	1.88
8,006.0	89.60	86.40	6,466.0	47.9	1,574.1	1,574.8	0.50	0.16	0.48
8,038.0	89.50	86.10	6,466.3	50.0	1,606.0	1,606.8	0.99	-0.31	-0.94
8,133.0	90.00	86.80	6,466.7	55.9	1,700.9	1,701.8	0.91	0.53	0.74
8,228.0	91.80	87.10	6,465.2	61.0	1,795.7	1,796.7	1.92	1.89	0.32
8,291.0	90.90	86.80	6,463.7	64.3	1,858.6	1,859.7	1.51	-1.43	-0.48
8,322.0	90.60	87.10	6,463.3	66.0	1,889.6	1,890.7	1.37	-0.97	0.97
8,417.0	89.80	87.40	6,463.0	70.5	1,984.4	1,985.7	0.90	-0.84	0.32
8,512.0	89.70	86.90	6,463.4	75.2	2,079.3	2,080.6	0.54	-0.11	-0.53
8,607.0	91.30	86.60	6,462.6	80.6	2,174.2	2,175.6	1.71	1.68	-0.32
8,702.0	88.70	85.90	6,462.6	86.8	2,269.0	2,270.5	2.83	-2.74	-0.74
8,797.0	89.60	86.80	6,464.0	92.9	2,363.7	2,365.5	1.34	0.95	0.95
8,892.0	91.40	88.70	6,463.2	96.6	2,458.7	2,460.4	2.75	1.89	2.00
8,987.0	90.80	86.80	6,461.3	100.3	2,553.6	2,555.4	2.10	-0.63	-2.00
9,082.0	91.10	87.60	6,459.8	105.0	2,648.4	2,650.4	0.90	0.32	0.84
9,146.0	91.60	87.40	6,458.2	107.8	2,712.4	2,714.4	0.84	0.78	-0.31
9,177.0	91.50	87.40	6,457.4	109.2	2,743.3	2,745.3	0.32	-0.32	0.00
9,209.0	91.40	87.80	6,456.6	110.5	2,775.3	2,777.3	1.29	-0.31	1.25
9,241.0	91.20	88.00	6,455.9	111.7	2,807.3	2,809.3	0.88	-0.63	0.63
9,272.0	90.90	87.60	6,455.3	112.9	2,838.2	2,840.3	1.61	-0.97	-1.29
9,304.0	91.10	88.20	6,454.7	114.1	2,870.2	2,872.3	1.98	0.63	1.88
9,367.0	91.90	88.70	6,453.1	115.8	2,933.2	2,935.3	1.50	1.27	0.79
9,431.0	92.20	88.90	6,450.8	117.1	2,997.1	2,999.2	0.56	0.47	0.31
9,462.0	92.40	88.90	6,449.6	117.7	3,028.1	3,030.2	0.65	0.65	0.00
9,526.0	93.00	89.40	6,446.5	118.6	3,092.0	3,094.1	1.22	0.94	0.78
9,557.0	93.20	88.30	6,444.9	119.3	3,122.9	3,125.1	3.60	0.65	-3.55
9,652.0	92.00	89.60	6,440.6	121.0	3,217.8	3,220.0	1.86	-1.26	1.37
9,747.0	92.80	89.40	6,436.6	121.8	3,312.7	3,314.9	0.87	0.84	-0.21
9,811.0	91.50	89.70	6,434.2	122.3	3,376.7	3,378.8	2.08	-2.03	0.47
9,843.0	91.30	89.70	6,433.4	122.5	3,408.7	3,410.8	0.63	-0.63	0.00

Company: Noble Energy Inc.  
Project: Weld County, CO  
Site: Sec 25, T9N, R61W  
Well: Krier GV25-62HN  
Wellbore: Wellbore #1  
Design: Wellbore #1

Local Co-ordinate Reference: Site Sec 25, T9N, R61W  
TVD Reference: WELL @ 4982.0usft (H&P #323)  
MD Reference: WELL @ 4982.0usft (H&P #323)  
North Reference: Grid  
Survey Calculation Method: Minimum Curvature  
Database: EDM 5000.1 Single User Db

#### Survey

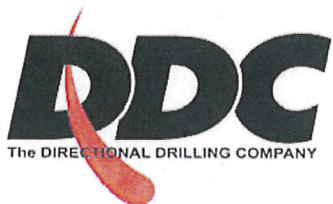
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,874.0	89.80	90.60	6,433.1	122.4	3,439.7	3,441.8	5.64	-4.84	2.90
9,938.0	90.20	90.40	6,433.1	121.9	3,503.7	3,505.7	0.70	0.63	-0.31
9,969.0	90.60	90.30	6,432.9	121.7	3,534.7	3,536.7	1.33	1.29	-0.32
10,033.0	91.30	90.10	6,431.8	121.4	3,598.7	3,600.7	1.14	1.09	-0.31
10,035.0	91.40	90.10	6,431.8	121.4	3,600.7	3,602.7	5.00	5.00	0.00
TD									
10,090.0	91.40	90.10	6,430.4	121.3	3,655.6	3,657.6	0.00	0.00	0.00

#### Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
978.0	978.0	0.0	0.0	First Survey
6,674.0	6,413.3	28.9	249.5	Crossed Hard Line @ 6674' MD
10,090.0	6,430.4	121.3	3,655.6	TD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_





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## Survey Certification Sheet

Noble Energy.  
Company

RM-11593  
Job Number

11/18/11  
Date

Sec 25, T9N, R61W  
Lease

Krier GV25-62HN  
Well Name

Weld, CO  
County & State

Surveyed from a depth of: 978 feet to 10090 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Boyd Wolff

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry  
Wright  
DN: cn=Larry Wright, o=The  
Directional Drilling Company,  
ou=GM of Guidance Services,  
email=larryw@directionaldrill  
ers.com, c=US  
Date: 2011.11.29 16:42:10  
-06'00'

Larry Wright  
MWD General Manager