



Noble Energy Inc.

Weld County, CO
Sec 23, T4N, R67W, 6th PM
Ehrlich PC O23-69HN

Wellbore #1

Survey: MWD FINAL

DDC Survey Report

24 August, 2012



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Ehrlich PC O23-69HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4858.0usft (H&P #323)
Site:	Sec 23, T4N, R67W, 6th PM	MD Reference:	WELL @ 4858.0usft (H&P #323)
Well:	Ehrlich PC O23-69HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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 23, T4N, R67W, 6th PM			
Site Position:		Northing:	1,353,755.13 usft	Latitude:	40° 18' 9.504 N
From:	Lat/Long	Easting:	3,181,000.03 usft	Longitude:	104° 51' 3.744 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.42 °

Well	Ehrlich PC O23-69HN					
Well Position	+N-S	0.0 usft	Northing:	1,353,776.98 usft	Latitude:	40° 18' 9.720 N
	+E-W	0.0 usft	Easting:	3,180,999.87 usft	Longitude:	104° 51' 3.744 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,834.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/27/2012	8.75	66.92	52,953

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	279.72	

Survey Program		Date	8/22/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
600.0	11,630.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

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)
TIE IN @ 572' MD / 572' TVD									
572.0	0.00	0.00	572.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.10	310.90	600.0	0.0	0.0	0.0	0.36	0.36	0.00
876.0	0.40	275.90	876.0	0.3	-1.2	1.2	0.12	0.11	-12.68
1,152.0	2.00	38.00	1,151.9	4.2	0.8	-0.1	0.81	0.58	44.24
1,336.0	2.00	29.10	1,335.8	9.5	4.4	-2.7	0.17	0.00	-4.84
1,428.0	3.40	58.30	1,427.7	12.3	7.5	-5.3	2.09	1.52	31.74
1,523.0	5.50	48.90	1,522.4	16.8	13.3	-10.3	2.33	2.21	-9.89
1,618.0	6.90	43.50	1,616.9	23.9	20.7	-16.3	1.59	1.47	-5.68
1,713.0	8.10	45.80	1,711.1	32.8	29.4	-23.5	1.30	1.26	2.42
1,808.0	9.50	46.00	1,805.0	42.9	39.8	-32.0	1.47	1.47	0.21

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)
1,903.0	10.20	47.90	1,898.5	53.9	51.7	-41.9	0.81	0.74	2.00
1,998.0	11.20	50.00	1,991.9	65.5	65.0	-53.0	1.13	1.05	2.21
2,093.0	11.50	38.90	2,085.1	78.8	78.0	-63.6	2.32	0.32	-11.68
2,188.0	12.40	41.40	2,178.0	93.8	90.7	-73.6	1.09	0.95	2.63
2,283.0	12.50	42.10	2,270.8	109.1	104.4	-84.5	0.19	0.11	0.74
2,378.0	14.40	41.20	2,363.1	125.6	119.1	-96.1	2.01	2.00	-0.95
2,473.0	13.90	42.10	2,455.3	143.0	134.5	-108.4	0.58	-0.53	0.95
2,568.0	15.90	39.60	2,547.1	161.5	150.4	-121.0	2.21	2.11	-2.63
2,663.0	16.50	36.50	2,638.3	182.4	166.7	-133.6	1.11	0.63	-3.26
2,758.0	16.90	40.80	2,729.3	203.7	183.8	-146.8	1.37	0.42	4.53
CROSSED HARD LINE @ 2800' MD / 2770' TVD									
2,800.0	15.66	41.88	2,769.6	212.5	191.6	-152.9	3.04	-2.96	2.57
2,853.0	14.10	43.50	2,820.8	222.5	200.8	-160.3	3.04	-2.94	3.06
2,948.0	14.10	39.10	2,913.0	239.9	216.1	-172.5	1.13	0.00	-4.63
3,043.0	15.30	40.30	3,004.9	258.4	231.5	-184.5	1.30	1.26	1.26
3,138.0	14.90	40.80	3,096.6	277.2	247.5	-197.2	0.44	-0.42	0.53
3,233.0	11.90	35.20	3,189.0	294.5	261.2	-207.7	3.44	-3.16	-5.89
3,328.0	13.10	37.30	3,281.7	311.1	273.3	-216.9	1.35	1.26	2.21
3,423.0	13.60	38.90	3,374.2	328.3	286.9	-227.3	0.65	0.53	1.68
3,518.0	14.80	38.40	3,466.3	346.5	301.4	-238.6	1.27	1.26	-0.53
3,613.0	15.00	43.30	3,558.1	365.0	317.4	-251.2	1.34	0.21	5.16
3,708.0	15.70	43.30	3,649.7	383.3	334.7	-265.1	0.74	0.74	0.00
3,803.0	17.00	45.10	3,740.8	402.4	353.3	-280.3	1.47	1.37	1.89
3,898.0	16.50	43.50	3,831.8	422.0	372.4	-295.8	0.72	-0.53	-1.68
3,993.0	17.40	44.00	3,922.7	442.0	391.6	-311.3	0.96	0.95	0.53
4,088.0	14.00	43.70	4,014.1	460.6	409.4	-325.8	3.58	-3.58	-0.32
4,183.0	12.70	39.80	4,106.6	476.9	424.0	-337.4	1.66	-1.37	-4.11
4,278.0	12.10	36.30	4,199.3	492.9	436.6	-347.1	1.01	-0.63	-3.68
4,373.0	13.40	41.50	4,292.0	509.2	449.8	-357.4	1.82	1.37	5.47
4,468.0	13.10	37.50	4,384.5	526.0	463.6	-368.2	1.02	-0.32	-4.21
4,563.0	13.90	36.80	4,476.8	543.7	477.0	-378.4	0.86	0.84	-0.74
4,658.0	12.60	38.40	4,569.3	560.9	490.3	-388.6	1.42	-1.37	1.68
4,753.0	11.20	36.50	4,662.3	576.5	502.2	-397.7	1.53	-1.47	-2.00
4,848.0	10.30	32.90	4,755.6	591.0	512.3	-405.2	1.18	-0.95	-3.79
4,943.0	9.90	33.60	4,849.1	604.9	521.5	-411.8	0.44	-0.42	0.74
5,038.0	9.90	35.40	4,942.7	618.4	530.7	-418.7	0.33	0.00	1.89
5,133.0	8.20	43.00	5,036.5	630.0	540.1	-425.9	2.18	-1.79	8.00
5,228.0	5.20	36.10	5,130.9	638.5	547.2	-431.6	3.26	-3.16	-7.26
5,323.0	5.00	38.00	5,225.5	645.2	552.3	-435.4	0.28	-0.21	2.00
5,419.0	4.40	54.40	5,321.2	650.6	557.9	-440.0	1.53	-0.63	17.08
5,513.0	3.10	46.80	5,415.0	654.5	562.7	-444.1	1.48	-1.38	-8.09
5,608.0	3.00	47.00	5,509.8	657.9	566.3	-447.1	0.11	-0.11	0.21
5,703.0	2.40	36.80	5,604.7	661.2	569.4	-449.6	0.81	-0.63	-10.74

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Survey

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5,798.0	2.50	15.90	5,699.7	664.8	571.1	-450.7	0.94	0.11	-22.00
5,894.0	0.20	155.10	5,795.6	666.7	571.8	-451.0	2.77	-2.40	145.00
5,989.0	0.80	258.60	5,890.6	666.4	571.2	-450.5	0.91	0.63	108.95
6,084.0	1.30	281.30	5,985.6	666.5	569.5	-448.8	0.67	0.53	23.89
6,179.0	1.60	276.60	6,080.6	666.8	567.1	-446.4	0.34	0.32	-4.95
6,274.0	1.80	277.30	6,175.5	667.2	564.3	-443.6	0.21	0.21	0.74
6,369.0	2.10	277.10	6,270.5	667.6	561.1	-440.3	0.32	0.32	-0.21
6,409.0	2.00	281.50	6,310.5	667.8	559.7	-438.9	0.47	-0.25	11.00
6,487.0	2.10	284.70	6,388.4	668.4	557.0	-436.1	0.19	0.13	4.10
6,532.0	4.30	268.70	6,433.3	668.6	554.5	-433.6	5.23	4.89	-35.56
6,582.0	9.00	266.40	6,483.0	668.3	548.7	-428.0	9.41	9.40	-4.60
6,627.0	11.40	269.50	6,527.3	668.1	540.7	-420.2	5.47	5.33	6.89
6,676.0	14.50	271.50	6,575.0	668.2	529.8	-409.4	6.39	6.33	4.08
6,721.0	17.30	268.70	6,618.3	668.2	517.4	-397.2	6.45	6.22	-6.22
6,772.0	20.20	267.60	6,666.6	667.6	501.1	-381.1	5.73	5.69	-2.16
6,817.0	21.90	268.10	6,708.6	667.0	484.9	-365.3	3.80	3.78	1.11
6,866.0	22.70	266.70	6,753.9	666.2	466.3	-347.2	1.96	1.63	-2.86
6,911.0	24.80	267.10	6,795.1	665.2	448.2	-329.5	4.68	4.67	0.89
6,962.0	28.00	269.70	6,840.8	664.6	425.6	-307.3	6.67	6.27	5.10
7,057.0	35.20	267.80	6,921.6	663.4	375.9	-258.4	7.65	7.58	-2.00
7,152.0	43.40	268.70	6,995.1	661.6	315.8	-199.5	8.65	8.63	0.95
7,197.0	48.80	268.30	7,026.3	660.8	283.4	-167.7	12.02	12.00	-0.89
7,247.0	51.80	268.00	7,058.2	659.5	244.9	-130.0	6.02	6.00	-0.60
7,342.0	55.70	270.20	7,114.4	658.4	168.3	-54.8	4.51	4.11	2.32
7,387.0	62.00	268.30	7,137.7	657.8	129.8	-16.9	14.46	14.00	-4.22
7,437.0	69.00	269.00	7,158.4	656.8	84.4	27.7	14.06	14.00	1.40
7,478.0	74.20	269.50	7,171.3	656.3	45.5	66.0	12.74	12.68	1.22
7,532.0	82.30	268.00	7,182.3	655.1	-7.3	117.8	15.24	15.00	-2.78
7,585.0	89.40	268.00	7,186.1	653.3	-60.1	169.5	13.40	13.40	0.00
7,621.0	91.10	267.30	7,186.0	651.8	-96.1	204.7	5.11	4.72	-1.94
7,733.0	93.30	269.20	7,181.7	648.4	-207.9	314.4	2.59	1.96	1.70
7,827.0	91.90	271.50	7,177.4	648.9	-301.8	407.0	2.86	-1.49	2.45
7,922.0	90.30	272.00	7,175.6	651.9	-396.7	501.1	1.76	-1.68	0.53
8,017.0	90.00	271.30	7,175.3	654.6	-491.7	595.2	0.80	-0.32	-0.74
8,112.0	91.40	269.90	7,174.2	655.6	-586.7	689.0	2.08	1.47	-1.47
8,207.0	91.30	269.90	7,171.9	655.4	-681.7	782.5	0.11	-0.11	0.00
8,303.0	91.60	269.20	7,169.5	654.7	-777.6	877.0	0.79	0.31	-0.73
8,398.0	92.20	269.00	7,166.4	653.2	-872.6	970.3	0.67	0.63	-0.21
8,493.0	92.20	268.50	7,162.7	651.1	-967.5	1,063.5	0.53	0.00	-0.53
8,588.0	92.20	270.40	7,159.1	650.2	-1,062.4	1,156.9	2.00	0.00	2.00
8,683.0	91.80	271.10	7,155.7	651.4	-1,157.3	1,250.7	0.85	-0.42	0.74
8,778.0	92.00	270.60	7,152.6	652.8	-1,252.3	1,344.5	0.57	0.21	-0.53
8,873.0	92.10	270.80	7,149.2	654.0	-1,347.2	1,438.3	0.24	0.11	0.21

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8,968.0	91.10	271.00	7,146.5	655.5	-1,442.1	1,532.1	1.07	-1.05	0.21
9,062.0	90.80	270.20	7,145.0	656.5	-1,536.1	1,624.9	0.91	-0.32	-0.85
9,158.0	92.10	270.40	7,142.6	657.0	-1,632.1	1,719.6	1.37	1.35	0.21
9,253.0	92.90	270.20	7,138.4	657.5	-1,727.0	1,813.2	0.87	0.84	-0.21
9,284.0	92.30	271.10	7,137.0	657.8	-1,758.0	1,843.8	3.49	-1.94	2.90
9,348.0	93.00	271.50	7,134.1	659.3	-1,821.9	1,907.0	1.26	1.09	0.63
9,443.0	92.50	274.50	7,129.5	664.2	-1,916.6	2,001.3	3.20	-0.53	3.16
9,538.0	92.20	273.80	7,125.6	671.1	-2,011.3	2,095.7	0.80	-0.32	-0.74
9,633.0	90.00	274.10	7,123.8	677.7	-2,106.1	2,190.2	2.34	-2.32	0.32
9,728.0	90.00	273.80	7,123.8	684.2	-2,200.8	2,284.7	0.32	0.00	-0.32
9,823.0	90.40	273.20	7,123.4	690.0	-2,295.6	2,379.2	0.76	0.42	-0.63
9,918.0	90.70	272.90	7,122.5	695.1	-2,390.5	2,473.5	0.45	0.32	-0.32
10,013.0	90.30	272.00	7,121.7	699.1	-2,485.4	2,567.8	1.04	-0.42	-0.95
10,108.0	91.90	271.10	7,119.9	701.7	-2,580.4	2,661.8	1.93	1.68	-0.95
10,203.0	92.20	270.10	7,116.5	702.7	-2,675.3	2,755.5	1.10	0.32	-1.05
10,297.0	91.90	269.70	7,113.1	702.5	-2,769.2	2,848.1	0.53	-0.32	-0.43
10,392.0	91.30	269.50	7,110.5	701.8	-2,864.2	2,941.6	0.67	-0.63	-0.21
10,487.0	90.40	269.70	7,109.1	701.2	-2,959.2	3,035.1	0.97	-0.95	0.21
10,582.0	89.70	269.40	7,109.0	700.4	-3,054.2	3,128.6	0.80	-0.74	-0.32
10,677.0	89.30	268.80	7,109.8	698.9	-3,149.2	3,222.0	0.76	-0.42	-0.63
10,772.0	90.00	269.90	7,110.4	697.9	-3,244.1	3,315.4	1.37	0.74	1.16
10,804.0	89.40	269.70	7,110.5	697.8	-3,276.1	3,346.9	1.98	-1.88	-0.63
10,836.0	90.00	269.90	7,110.7	697.6	-3,308.1	3,378.4	1.98	1.88	0.63
10,867.0	90.60	269.70	7,110.6	697.5	-3,339.1	3,409.0	2.04	1.94	-0.65
10,899.0	91.40	270.60	7,110.0	697.6	-3,371.1	3,440.5	3.76	2.50	2.81
10,962.0	89.90	268.50	7,109.3	697.1	-3,434.1	3,502.5	4.10	-2.38	-3.33
11,057.0	91.20	269.00	7,108.4	695.1	-3,529.1	3,595.8	1.47	1.37	0.53
11,152.0	91.80	269.40	7,105.9	693.7	-3,624.1	3,689.2	0.76	0.63	0.42
11,247.0	91.80	269.50	7,102.9	692.8	-3,719.0	3,782.6	0.11	0.00	0.11
11,342.0	91.00	268.50	7,100.6	691.2	-3,814.0	3,875.9	1.35	-0.84	-1.05
11,437.0	90.00	267.30	7,099.7	687.7	-3,908.9	3,968.9	1.64	-1.05	-1.26
11,532.0	90.60	268.80	7,099.3	684.4	-4,003.8	4,061.9	1.70	0.63	1.58
11,574.0	90.60	270.20	7,098.8	684.1	-4,045.8	4,103.2	3.33	0.00	3.33
TD @ 11630' MD / 7098' TVD									
11,630.0	90.60	270.20	7,098.2	684.3	-4,101.8	4,158.5	0.00	0.00	0.00

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
572.0	572.0	0.0	0.0	TIE IN @ 572' MD / 572' TVD
2,800.0	2,769.6	212.5	191.6	CROSSED HARD LINE @ 2800' MD / 2770' TVD
11,630.0	7,098.2	684.3	-4,101.8	TD @ 11630' MD / 7098' TVD

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Project:	Weld County, CO	TVD Reference:	WELL @ 4858.0usft (H&P #323)
Site:	Sec 23, T4N, R67W, 6th PM	MD Reference:	WELL @ 4858.0usft (H&P #323)
Well:	Ehrlich PC O23-69HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Checked By: _____	Approved By: _____	Date: _____
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Survey Certification Sheet

Noble Energy
Company

RM-12604
Job Number

8/21/2012
Date

Sec 23,T4N,R67W,6thPM
Lease

Ehrlich PC O23-69HN
Well Name

Weld, CO
County & State

Surveyed from a depth of: 572 feet to 11630 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Boyd Wolff

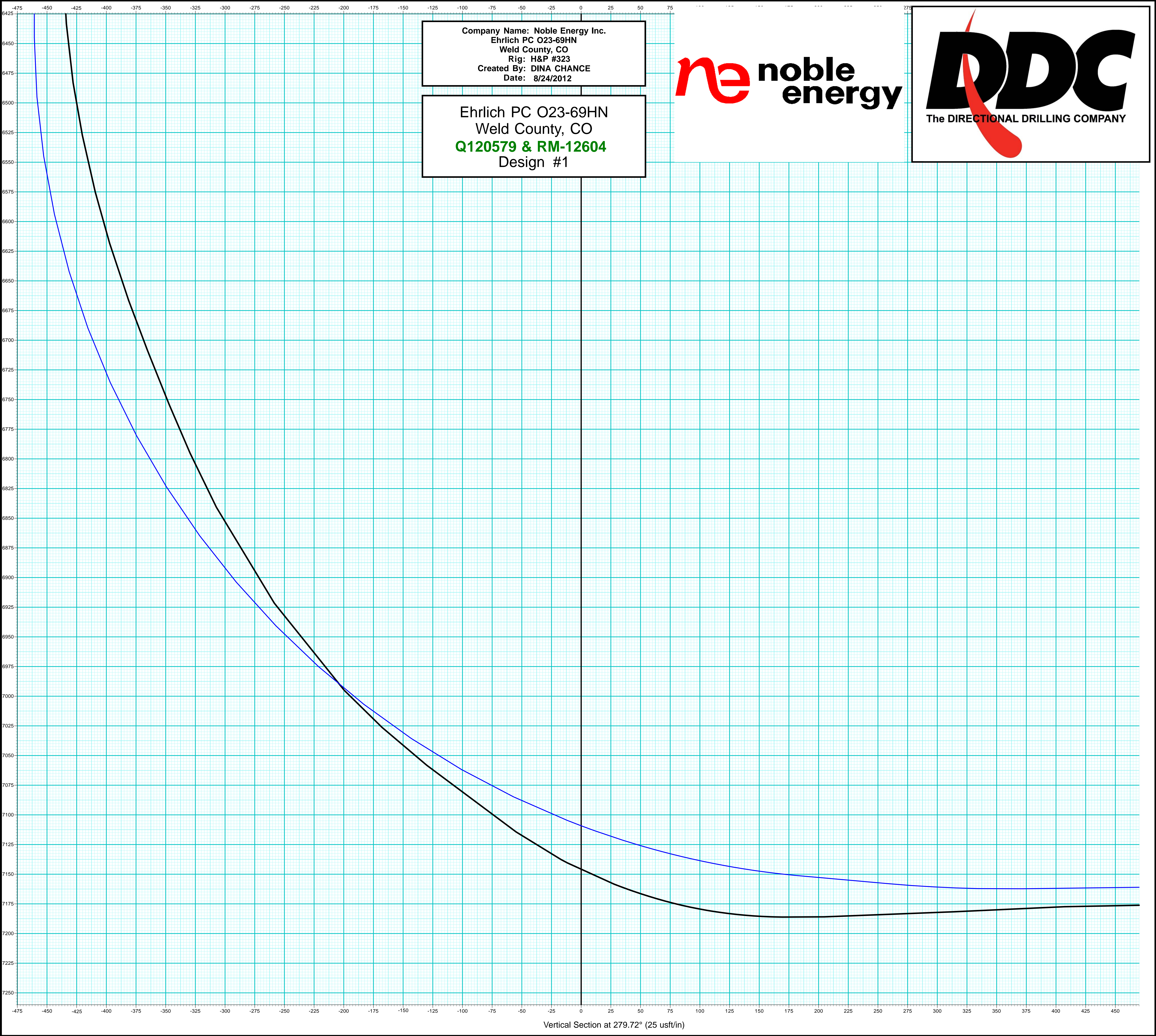
The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore 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@directionaldrillers.co
m, c=US
Date: 2012.08.27 12:15:58 -05'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Ehrlich PC O23-69HN
Weld County, CO
Rig: H&P #323
Created By: DINA CHANCE
Date: 8/24/2012

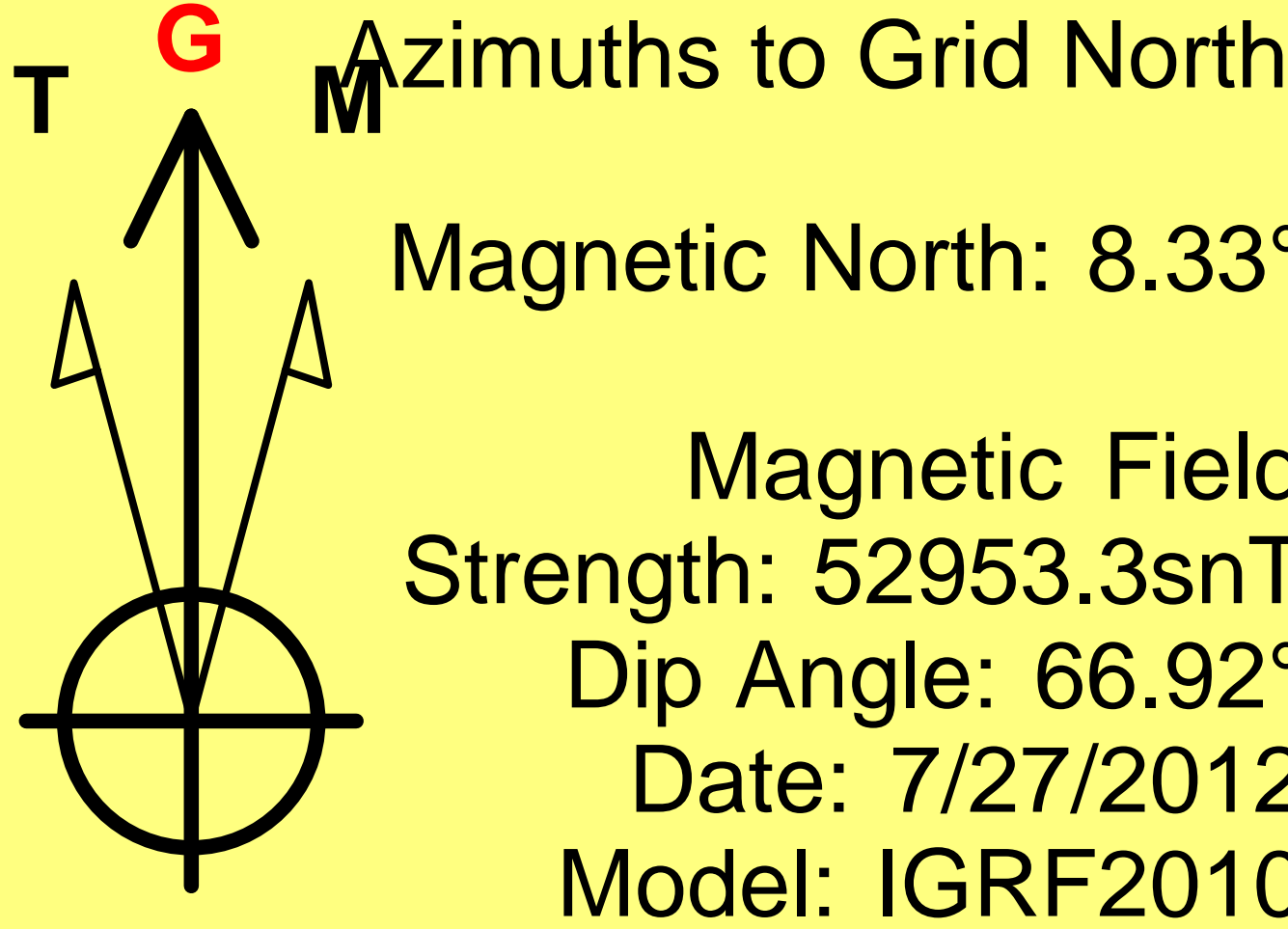
Ehrlich PC O23-69HN
Weld County, CO
Q120579 & RM-12604
Design #1



Vertical Section at 279.72° (25 usft/in)

Company Name: Noble Energy Inc.
Ehrlich PC O23-69HN
Weld County, CO
Rig: H&P #323
Created By: DINA CHANCE
Date: 8/24/2012

Ehrlich PC O23-69HN
Weld County, CO
Q120579 & RM-12604
Design #1

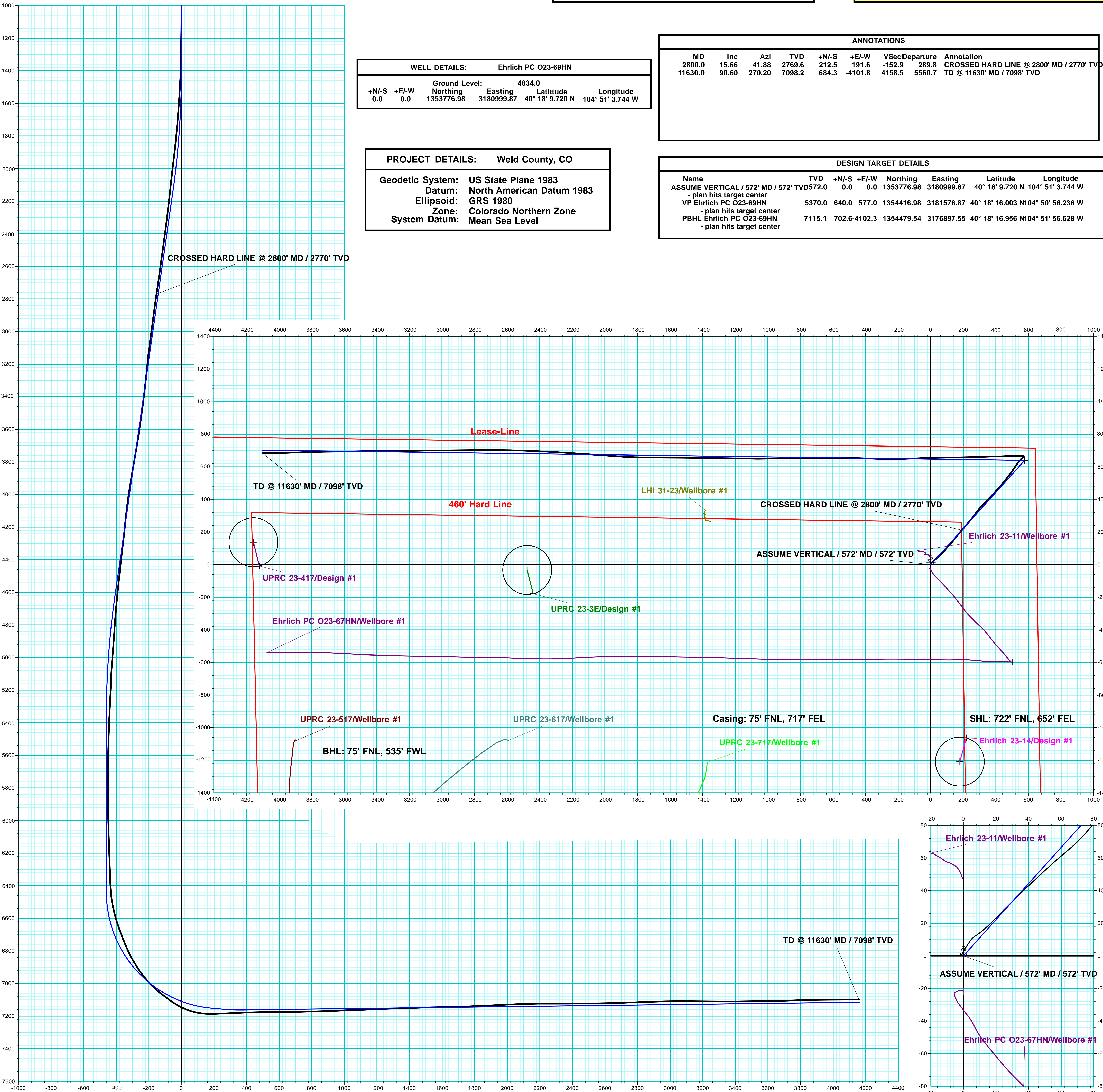


WELL DETAILS: Ehrlich PC O23-69HN					
Ground Level: 4834.0					
+N/-S	+E/-W	North	East	Latitude	Longitude
0.0	0.0	1353776.98	3180999.87	40° 18' 9.720 N	104° 51' 3.744 W

PROJECT DETAILS: Weld County, CO	
Geodetic System:	US State Plane 1983
Datum:	North American Datum 1983
Ellipsoid:	GRS 1980
Zone:	Colorado Northern Zone
System Datum:	Mean Sea Level

ANNOTATIONS							
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure
2800.0	15.66	41.88	2769.6	212.5	191.6	-152.9	289.8
11630.0	90.60	270.20	7098.2	684.3	-4101.8	4158.5	5560.7
CROSSED HARD LINE @ 2800' MD / 2770' TVD							
TD @ 11630' MD / 7098' TVD							

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	North	East	Latitude	Longitude
ASSUME VERTICAL / 572' MD / 572' TVD	572.0	0.0	0.0	1353776.98	3180999.87	40° 18' 9.720 N	104° 51' 3.744 W
- plan hits target center							
VP Ehrlich PC O23-69HN	5370.0	640.0	577.0	1354416.98	3181576.87	40° 18' 16.003 N	104° 50' 56.236 W
- plan hits target center							
PBHL Ehrlich PC O23-69HN	7115.1	702.6	-4102.3	1354479.54	3176897.55	40° 18' 16.956 N	104° 51' 56.628 W
- plan hits target center							



Vertical Section at 279.72° (200 usf/in)