



## **Noble Energy Inc.**

Weld County, CO

Sec 12, T9N, R59W, 6th P.M.

Timbro LC12-78HN

Wellbore #1

Survey: MWD **FINAL**

## **DDC Survey Report**

26 June, 2012



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro LC12-78HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4938.0usft (H&P #326)
Site:	Sec 12, T9N, R59W, 6th P.M.	MD Reference:	WELL @ 4938.0usft (H&P #326)
Well:	Timbro LC12-78HN	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 12, T9N, R59W, 6th P.M.		
Site Position:	Map	Northing:	1,527,709.72 usft
From:		Easting:	3,433,728.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	40° 46' 17.170 N
		Longitude:	103° 56' 2.490 W
		Grid Convergence:	1.01 °

Well	Timbro LC12-78HN		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	40° 46' 17.170 N
		Longitude:	103° 56' 2.490 W
		Ground Level:	4,908.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	6/6/2012	8.31
			Dip Angle (°)
			67.45
			Field Strength (nT)
			53,307

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)
	0.0	0.0	0.0
			Direction (°)
			176.94

Survey Program	Date 6/26/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
838.0	10,400.0	MWD (Wellbore #1)	MWD default
			Description
			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)	
762.0	0.00	0.00	762.0	0.0	0.0	0.0	0.00	0.00	0.00	
TIE IN @ 762' MD / 762' TVD										
762.1	0.00	89.20	762.1	0.0	0.0	0.0	0.00	0.00	0.00	
838.0	0.50	89.20	838.0	0.0	0.3	0.0	0.66	0.66	0.00	
1,122.0	0.50	66.20	1,122.0	0.5	2.7	-0.4	0.07	0.00	-8.10	
1,404.0	0.90	77.40	1,404.0	1.5	6.0	-1.2	0.15	0.14	3.97	
1,681.0	0.70	87.30	1,680.9	2.1	9.8	-1.5	0.09	-0.07	3.57	
1,773.0	0.60	83.60	1,772.9	2.1	10.8	-1.6	0.12	-0.11	-4.02	
1,867.0	1.90	43.30	1,866.9	3.3	12.4	-2.7	1.59	1.38	-42.87	
1,960.0	4.00	19.80	1,959.8	7.5	14.6	-6.7	2.56	2.26	-25.27	
2,055.0	5.60	22.40	2,054.4	14.9	17.4	-14.0	1.70	1.68	2.74	



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Well:	Timbro LC12-78HN	North Reference:	Grid
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)
2,148.0	8.20	17.30	2,146.8	25.4	21.2	-24.3	2.87	2.80	-5.48
2,243.0	9.90	19.10	2,240.6	39.6	25.8	-38.2	1.81	1.79	1.89
2,336.0	11.20	14.50	2,332.0	55.9	30.7	-54.2	1.66	1.40	-4.95
2,428.0	13.20	15.20	2,421.9	74.7	35.7	-72.7	2.18	2.17	0.76
2,522.0	14.40	14.10	2,513.2	96.4	41.4	-94.1	1.31	1.28	-1.17
2,614.0	15.20	21.40	2,602.2	118.7	48.6	-116.0	2.20	0.87	7.93
2,706.0	15.10	22.40	2,691.0	141.0	57.5	-137.8	0.30	-0.11	1.09
2,799.0	15.10	21.40	2,780.8	163.5	66.6	-159.7	0.28	0.00	-1.08
2,892.0	15.00	20.10	2,870.6	186.1	75.1	-181.8	0.38	-0.11	-1.40
2,987.0	14.30	20.00	2,962.5	208.7	83.4	-203.9	0.74	-0.74	-0.11
3,082.0	14.70	16.80	3,054.5	231.2	90.9	-226.1	0.94	0.42	-3.37
3,177.0	14.30	18.40	3,146.4	253.9	98.0	-248.3	0.60	-0.42	1.68
3,272.0	11.40	12.60	3,239.0	274.2	103.8	-268.3	3.34	-3.05	-6.11
3,367.0	12.90	13.10	3,331.9	293.7	108.2	-287.5	1.58	1.58	0.53
3,462.0	16.20	15.00	3,423.9	316.8	114.1	-310.3	3.51	3.47	2.00
3,557.0	17.10	14.30	3,514.9	343.2	121.0	-336.2	0.97	0.95	-0.74
3,652.0	16.40	16.60	3,605.8	369.6	128.2	-362.2	1.01	-0.74	2.42
3,747.0	14.30	16.60	3,697.4	393.7	135.4	-385.9	2.21	-2.21	0.00
3,842.0	11.40	22.40	3,790.1	413.6	142.4	-405.4	3.34	-3.05	6.11
3,937.0	7.10	27.00	3,883.8	427.5	148.6	-419.0	4.59	-4.53	4.84
4,032.0	3.40	36.10	3,978.4	435.0	152.9	-426.2	3.98	-3.89	9.58
4,127.0	1.70	59.70	4,073.3	438.0	155.8	-429.1	2.07	-1.79	24.84
4,222.0	1.70	72.50	4,168.3	439.1	158.4	-430.0	0.40	0.00	13.47
4,317.0	1.10	155.10	4,263.2	438.7	160.1	-429.6	2.00	-0.63	86.95
4,602.0	1.80	187.30	4,548.1	431.8	160.7	-422.6	0.37	0.25	11.30
4,697.0	0.40	185.90	4,643.1	430.0	160.5	-420.8	1.47	-1.47	-1.47
4,982.0	0.70	48.80	4,928.1	430.2	161.7	-420.9	0.36	0.11	-48.11
5,261.0	0.70	5.50	5,207.1	433.0	163.1	-423.6	0.19	0.00	-15.52
5,270.0	0.90	17.10	5,216.1	433.1	163.1	-423.8	2.85	2.22	128.89
5,364.0	2.20	118.00	5,310.1	433.0	164.9	-423.5	2.69	1.38	107.34
5,459.0	6.30	151.80	5,404.8	427.5	169.0	-417.9	4.88	4.32	35.58
5,504.0	9.90	155.50	5,449.3	421.8	171.8	-412.0	8.08	8.00	8.22
5,551.0	11.70	149.00	5,495.5	414.0	175.9	-404.1	4.62	3.83	-13.83
5,596.0	12.70	151.10	5,539.5	405.8	180.7	-395.6	2.43	2.22	4.67
5,647.0	14.10	160.00	5,589.1	395.0	185.5	-384.6	4.88	2.75	17.45
5,692.0	17.10	162.00	5,632.5	383.6	189.4	-372.9	6.77	6.67	4.44
5,742.0	21.30	165.80	5,679.7	367.8	193.9	-356.9	8.76	8.40	7.60
5,787.0	25.60	168.30	5,720.9	350.3	197.9	-339.3	9.81	9.56	5.56
5,836.0	29.90	168.80	5,764.3	328.0	202.4	-316.7	8.79	8.78	1.02
5,881.0	33.80	172.00	5,802.5	304.6	206.3	-293.1	9.44	8.67	7.11
5,930.0	37.60	176.20	5,842.3	276.2	209.2	-264.6	9.22	7.76	8.57
6,025.0	48.80	176.40	5,911.4	211.4	213.4	-199.7	11.79	11.79	0.21
6,119.0	62.40	178.00	5,964.4	134.1	217.1	-122.3	14.54	14.47	1.70

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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)
6,164.0	69.50	178.30	5,982.8	93.0	218.4	-81.2	15.79	15.78	0.67
6,213.0	74.50	180.60	5,997.9	46.5	218.9	-34.7	11.14	10.20	4.69
6,258.0	75.20	181.30	6,009.7	3.0	218.1	8.6	2.16	1.56	1.56
6,308.0	81.80	182.00	6,019.6	-45.9	216.7	57.4	13.27	13.20	1.40
<b>CROSSED HARD LINE @ 6353' MD / 6024' TVD</b>									
6,353.0	87.50	182.00	6,023.8	-90.7	215.2	102.0	12.67	12.67	0.00
6,383.0	88.10	182.20	6,025.0	-120.6	214.1	131.9	2.11	2.00	0.67
6,438.0	88.20	182.40	6,026.7	-175.6	211.9	186.6	0.41	0.18	0.36
6,532.0	88.10	182.00	6,029.8	-269.5	208.2	280.2	0.44	-0.11	-0.43
6,626.0	87.70	181.10	6,033.2	-363.4	205.7	373.8	1.05	-0.43	-0.96
6,721.0	89.60	181.00	6,035.5	-458.3	204.0	468.5	2.00	2.00	-0.11
6,816.0	90.30	181.00	6,035.5	-553.3	202.3	563.3	0.74	0.74	0.00
6,911.0	90.10	180.40	6,035.2	-648.3	201.1	658.1	0.67	-0.21	-0.63
7,005.0	90.80	180.80	6,034.5	-742.3	200.2	751.9	0.86	0.74	0.43
7,101.0	91.10	180.80	6,032.9	-838.3	198.8	847.7	0.31	0.31	0.00
7,196.0	91.20	180.40	6,031.0	-933.2	197.8	942.5	0.43	0.11	-0.42
7,291.0	91.30	179.90	6,028.9	-1,028.2	197.6	1,037.3	0.54	0.11	-0.53
7,386.0	90.60	180.10	6,027.3	-1,123.2	197.6	1,132.1	0.77	-0.74	0.21
7,481.0	89.20	178.00	6,027.5	-1,218.2	199.2	1,227.1	2.66	-1.47	-2.21
7,576.0	89.30	178.50	6,028.7	-1,313.1	202.1	1,322.0	0.54	0.11	0.53
7,671.0	89.70	177.30	6,029.6	-1,408.0	205.5	1,417.0	1.33	0.42	-1.26
7,766.0	88.70	179.20	6,030.9	-1,503.0	208.4	1,512.0	2.26	-1.05	2.00
7,861.0	90.10	181.80	6,031.9	-1,598.0	207.6	1,606.8	3.11	1.47	2.74
7,956.0	89.20	181.00	6,032.5	-1,692.9	205.3	1,701.5	1.27	-0.95	-0.84
8,051.0	90.00	180.30	6,033.1	-1,787.9	204.2	1,796.3	1.12	0.84	-0.74
8,146.0	89.20	179.90	6,033.8	-1,882.9	204.0	1,891.1	0.94	-0.84	-0.42
8,241.0	90.00	180.30	6,034.5	-1,977.9	203.9	1,986.0	0.94	0.84	0.42
8,339.0	89.40	181.00	6,035.0	-2,075.9	202.8	2,083.8	0.94	-0.61	0.71
8,431.0	89.50	181.10	6,035.9	-2,167.9	201.1	2,175.5	0.15	0.11	0.11
8,526.0	90.10	178.10	6,036.2	-2,262.9	201.7	2,270.4	3.22	0.63	-3.16
8,621.0	90.00	176.90	6,036.1	-2,357.8	205.9	2,365.4	1.27	-0.11	-1.26
8,716.0	90.00	178.70	6,036.1	-2,452.7	209.5	2,460.4	1.89	0.00	1.89
8,812.0	91.00	178.00	6,035.3	-2,548.7	212.3	2,556.4	1.27	1.04	-0.73
8,907.0	91.20	177.60	6,033.4	-2,643.6	215.9	2,651.3	0.47	0.21	-0.42
9,002.0	90.00	176.60	6,032.4	-2,738.4	220.7	2,746.3	1.64	-1.26	-1.05
9,057.0	90.00	176.20	6,032.4	-2,793.3	224.2	2,801.3	0.73	0.00	-0.73
9,192.0	90.20	173.80	6,032.2	-2,927.8	236.0	2,936.2	1.78	0.15	-1.78
9,287.0	90.50	173.60	6,031.6	-3,022.2	246.4	3,031.1	0.38	0.32	-0.21
9,382.0	89.90	173.20	6,031.3	-3,116.6	257.3	3,125.9	0.76	-0.63	-0.42
9,476.0	91.30	174.80	6,030.3	-3,210.1	267.1	3,219.8	2.26	1.49	1.70
9,571.0	90.70	171.60	6,028.7	-3,304.4	278.4	3,314.5	3.43	-0.63	-3.37
9,666.0	91.40	174.60	6,026.9	-3,398.7	289.8	3,409.3	3.24	0.74	3.16
9,761.0	91.30	176.20	6,024.7	-3,493.3	297.4	3,504.2	1.69	-0.11	1.68

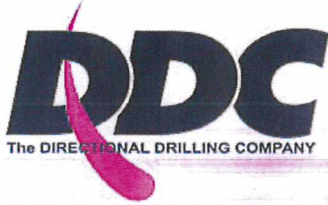


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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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)	
9,856.0	91.70	178.90	6,022.2	-3,588.2	301.5	3,599.2	2.87	0.42	2.84	
9,951.0	93.30	179.20	6,018.0	-3,683.1	303.0	3,694.0	1.71	1.68	0.32	
10,046.0	92.40	181.10	6,013.3	-3,778.0	302.8	3,788.8	2.21	-0.95	2.00	
10,141.0	93.70	179.60	6,008.3	-3,872.8	302.2	3,883.4	2.09	1.37	-1.58	
10,236.0	90.80	180.30	6,004.5	-3,967.8	302.3	3,978.2	3.14	-3.05	0.74	
10,331.0	90.30	178.90	6,003.6	-4,062.7	303.0	4,073.1	1.56	-0.53	-1.47	
10,345.0	89.90	178.30	6,003.6	-4,076.7	303.3	4,087.1	5.15	-2.86	-4.29	
TD @ 10400' MD / 6004' TVD										
10,400.0	89.90	178.30	6,003.7	-4,131.7	304.9	4,142.1	0.00	0.00	0.00	

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
762.1	762.1	0.0	0.0	TIE IN @ 762' MD / 762' TVD	
6,353.0	6,023.8	-90.7	215.2	CROSSED HARD LINE @ 6353' MD / 6024' TVD	
10,400.0	6,003.7	-4,131.7	304.9	TD @ 10400' MD / 6004' TVD	

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



## Survey Certification Sheet

Noble Energy  
Company

RM-12439  
Job Number

6/26/2012  
Date

Sec 12, T9N, R59W, 6th PM  
Lease

Timbro LC12-78HN  
Well Name

Weld, CO  
County & State

Surveyed from a depth of:

762 feet to 10400 feet MD

Type of Survey:

MWD

Directional Supervisor/Surveyor:

Worth Barham

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.c  
om, c=US  
Date: 2012.06.27 11:33:18 -05'00'

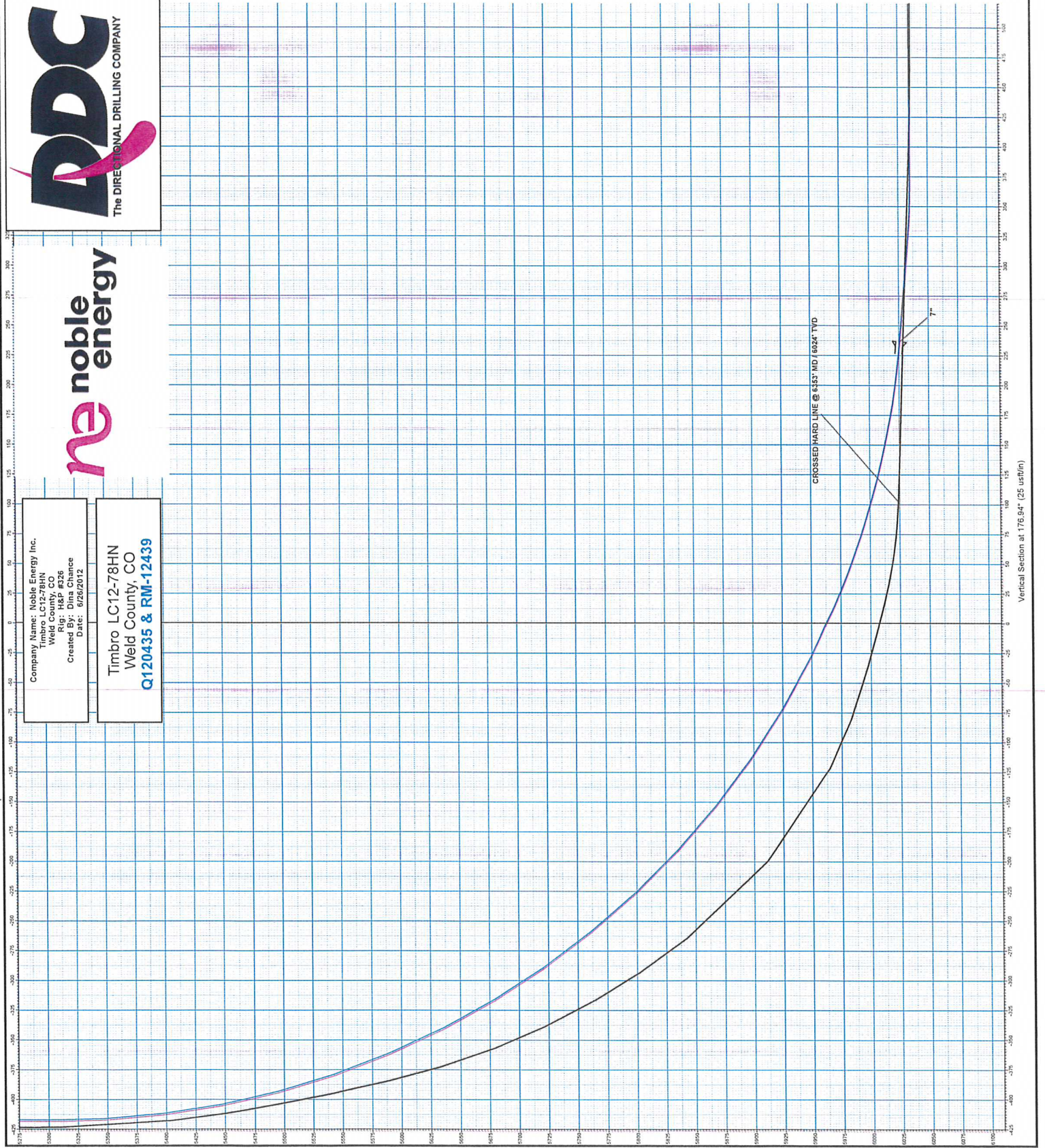
Larry Wright  
MWD General Manager





Company Name: Noble Energy Inc.  
Timbro LC12-78HN  
Weld County, CO  
Rig: H&P #326  
Created By: Dina Chance  
Date: 8/28/2012

Timbro LC12-78HN  
Weld County, CO  
Q120435 & RM-12439





Company Name: Noble Energy Inc.  
Timbro LC12-78HN  
Weld County, CO  
Rig: R&P #328  
Created By: J. H. H. H.  
Date: 6/26/2012

Timbro LC12-78HN  
Weld County, CO  
Q120435 & RM-12439



**G** **T** **M**  
Magnetic North: 7.29°  
Magnetic Field  
Strength: 53306.9snT  
Dip Angle: 67.45°  
Date: 6/6/2012  
Model: IGRF2010

**WELL DETAILS:**  
Timbro LC12-78HN  
Ground Level: Easting 4888.0  
Northing 152779.72  
Longitude 103° 56' 2.480 W  
+N-S +E-W  
0.0 0.0  
Datum: 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Northern Zone  
System Datum: Mean Sea Level

**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

