



## **Noble Energy Inc.**

Weld County, CO

Sec 7, T9N, R58W, 6th PM

Timbro Federal LD07-78HN

Wellbore #1

Design: Wellbore #1 **FINAL**

## **DDC Survey Report**

02 July, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro Federal LD07-78HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4884.0usft (H&P #326)
Site:	Sec 7, T9N, R58W, 6th PM	MD Reference:	WELL @ 4884.0usft (H&P #326)
Well:	Timbro Federal LD07-78HN	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 7, T9N, R58W, 6th PM				
Site Position:		Northing:	1,528,089.59 usft	Latitude:	40° 46' 20.040 N
From:	Lat/Long	Easting:	3,438,758.52 usft	Longitude:	103° 54' 57.030 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.02 °

Well	Timbro Federal LD07-78HN					
Well Position	+N/-S	0.0 usft	Northing:	1,528,089.59 usft	Latitude:	40° 46' 20.040 N
	+E/-W	0.0 usft	Easting:	3,438,758.52 usft	Longitude:	103° 54' 57.030 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,854.0 usft

Wellbore	Wellbore #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/5/2013	8.16	67.42	53,203

Design	Wellbore #1				
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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	174.52

Survey Program		Date	7/2/2013	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
290.0	633.0	MAG-SINGLE SHOT (Wellbore #1)	Flexi-Shot	VES Flexi-Shot Tool
643.0	10,293.0	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)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
	290.0	0.10	292.70	290.0	0.1	-0.2	-0.1	0.03	0.03	0.00
	633.0	0.20	297.80	633.0	0.5	-1.0	-0.6	0.03	0.03	1.49
TIE IN @ 633' MD / 633' TVD										
	633.1	0.20	297.80	633.1	0.5	-1.0	-0.6	0.00	0.00	0.00
	643.0	0.20	49.30	643.0	0.5	-1.0	-0.6	3.34	0.00	1,126.26
	926.0	0.30	70.10	926.0	1.1	0.0	-1.1	0.05	0.04	7.35
	1,209.0	0.30	13.80	1,209.0	2.1	0.9	-2.0	0.10	0.00	-19.89
	1,493.0	0.30	27.20	1,493.0	3.4	1.4	-3.3	0.02	0.00	4.72
	1,771.0	0.50	7.50	1,771.0	5.3	1.9	-5.1	0.09	0.07	-7.09



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Well:	Timbro Federal LD07-78HN	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)
1,863.0	2.40	51.30	1,862.9	6.9	3.5	-6.5	2.25	2.07	47.61
1,955.0	4.20	63.20	1,954.8	9.6	8.0	-8.8	2.08	1.96	12.93
2,048.0	7.10	56.30	2,047.3	14.3	15.8	-12.8	3.20	3.12	-7.42
2,141.0	8.60	65.50	2,139.5	20.4	26.9	-17.8	2.10	1.61	9.89
2,233.0	10.60	62.20	2,230.2	27.2	40.7	-23.2	2.25	2.17	-3.59
2,325.0	12.10	56.70	2,320.4	36.5	56.2	-30.9	2.01	1.63	-5.98
2,418.0	12.90	58.30	2,411.2	47.3	73.2	-40.1	0.94	0.86	1.72
2,511.0	14.30	58.30	2,501.6	58.8	91.8	-49.7	1.51	1.51	0.00
2,605.0	14.50	59.00	2,592.6	70.9	111.8	-59.9	0.28	0.21	0.74
2,698.0	14.90	59.30	2,682.6	83.0	132.0	-70.0	0.44	0.43	0.32
2,792.0	14.50	57.80	2,773.5	95.5	152.4	-80.5	0.59	-0.43	-1.60
2,885.0	14.30	57.80	2,863.6	107.8	171.9	-90.9	0.22	-0.22	0.00
2,980.0	13.40	56.00	2,955.8	120.2	191.0	-101.4	1.05	-0.95	-1.89
3,075.0	11.80	54.40	3,048.5	132.0	208.0	-111.5	1.72	-1.68	-1.68
3,170.0	9.40	54.20	3,141.9	142.2	222.2	-120.3	2.53	-2.53	-0.21
3,265.0	10.80	52.70	3,235.4	152.1	235.6	-128.9	1.50	1.47	-1.58
3,360.0	12.70	52.50	3,328.4	163.9	250.9	-139.2	2.00	2.00	-0.21
3,455.0	13.60	52.50	3,420.9	177.0	268.1	-150.6	0.95	0.95	0.00
3,550.0	11.50	56.00	3,513.6	189.1	284.8	-161.1	2.35	-2.21	3.68
3,644.0	9.20	56.70	3,606.1	198.5	298.9	-169.1	2.45	-2.45	0.74
3,739.0	6.70	52.30	3,700.2	206.1	309.6	-175.6	2.71	-2.63	-4.63
3,834.0	3.30	43.70	3,794.8	211.4	315.9	-180.3	3.65	-3.58	-9.05
3,929.0	1.50	27.50	3,889.7	214.5	318.3	-183.1	2.01	-1.89	-17.05
4,024.0	1.20	186.60	3,984.7	214.6	318.8	-183.2	2.80	-0.32	167.47
4,119.0	1.00	159.20	4,079.7	212.9	319.0	-181.4	0.59	-0.21	-28.84
4,213.0	1.40	182.20	4,173.7	210.9	319.2	-179.5	0.66	0.43	24.47
4,308.0	0.50	220.40	4,268.7	209.5	318.9	-178.1	1.11	-0.95	40.21
4,403.0	0.50	294.70	4,363.7	209.3	318.3	-178.0	0.64	0.00	78.21
4,498.0	1.30	322.80	4,458.7	210.4	317.2	-179.1	0.94	0.84	29.58
4,593.0	2.40	332.30	4,553.6	213.0	315.7	-181.9	1.20	1.16	10.00
4,688.0	2.10	305.40	4,648.5	215.7	313.3	-184.8	1.14	-0.32	-28.32
4,783.0	2.50	316.50	4,743.5	218.3	310.5	-187.6	0.63	0.42	11.68
4,878.0	2.00	310.70	4,838.4	220.8	307.8	-190.4	0.58	-0.53	-6.11
4,972.0	1.40	189.20	4,932.4	220.8	306.4	-190.5	3.17	-0.64	-129.26
5,067.0	1.20	173.20	5,027.3	218.6	306.3	-188.4	0.43	-0.21	-16.84
5,162.0	1.20	154.60	5,122.3	216.8	306.8	-186.5	0.41	0.00	-19.58
5,257.0	1.20	152.30	5,217.3	215.0	307.7	-184.6	0.05	0.00	-2.42
5,352.0	9.30	156.00	5,311.8	207.1	311.3	-176.4	8.53	8.53	3.89
5,447.0	18.40	178.20	5,404.0	185.0	314.9	-154.1	10.93	9.58	23.37
5,541.0	24.70	185.40	5,491.4	150.6	313.5	-120.0	7.26	6.70	7.66
5,636.0	29.60	182.20	5,575.9	107.4	310.8	-77.2	5.38	5.16	-3.37
5,732.0	33.50	179.80	5,657.7	57.2	309.9	-27.3	4.27	4.06	-2.50
5,827.0	42.00	178.50	5,732.8	-0.9	310.9	30.6	8.99	8.95	-1.37

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro Federal LD07-78HN
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Well:	Timbro Federal LD07-78HN	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)
5,922.0	52.20	178.90	5,797.4	-70.4	312.4	99.9	10.74	10.74	0.42
6,017.0	55.60	179.40	5,853.3	-147.2	313.6	176.4	3.60	3.58	0.53
6,112.0	60.80	178.70	5,903.4	-227.9	314.9	256.9	5.51	5.47	-0.74
6,157.0	66.70	178.70	5,923.3	-268.2	315.8	297.1	13.11	13.11	0.00
6,207.0	73.30	177.80	5,940.4	-315.1	317.3	344.0	13.31	13.20	-1.80
CROSSED HARD LINE @ 6230' MD / 5946' TVD									
6,229.5	76.72	177.89	5,946.2	-336.8	318.1	365.7	15.20	15.19	0.39
6,259.0	81.20	178.00	5,951.8	-365.8	319.1	394.6	15.20	15.19	0.38
6,338.0	84.60	179.40	5,961.6	-444.1	320.9	472.8	4.65	4.30	1.77
6,369.0	85.30	179.00	5,964.3	-475.0	321.3	503.5	2.60	2.26	-1.29
6,463.0	88.00	178.90	5,969.8	-568.8	323.0	597.1	2.87	2.87	-0.11
6,556.0	89.20	179.40	5,972.1	-661.8	324.4	689.7	1.40	1.29	0.54
6,651.0	90.30	180.40	5,972.5	-756.8	324.6	784.3	1.56	1.16	1.05
6,746.0	91.90	180.40	5,970.7	-851.8	323.9	878.8	1.68	1.68	0.00
6,841.0	92.30	180.30	5,967.2	-946.7	323.3	973.2	0.43	0.42	-0.11
6,936.0	92.60	180.60	5,963.1	-1,041.6	322.6	1,067.7	0.45	0.32	0.32
7,031.0	91.40	179.90	5,959.8	-1,136.5	322.2	1,162.1	1.46	-1.26	-0.74
7,126.0	90.90	180.30	5,957.9	-1,231.5	322.0	1,256.7	0.67	-0.53	0.42
7,221.0	90.50	178.70	5,956.7	-1,326.5	322.9	1,351.3	1.74	-0.42	-1.68
7,316.0	89.70	178.30	5,956.6	-1,421.5	325.3	1,446.1	0.94	-0.84	-0.42
7,411.0	92.90	177.50	5,954.4	-1,516.4	328.8	1,540.8	3.47	3.37	-0.84
7,506.0	93.40	177.30	5,949.2	-1,611.1	333.1	1,635.6	0.57	0.53	-0.21
7,601.0	91.00	177.80	5,945.6	-1,706.0	337.2	1,730.4	2.58	-2.53	0.53
7,695.0	89.70	178.90	5,945.0	-1,799.9	339.9	1,824.2	1.81	-1.38	1.17
7,790.0	89.80	178.50	5,945.4	-1,894.9	342.0	1,918.9	0.43	0.11	-0.42
7,885.0	89.80	178.50	5,945.7	-1,989.9	344.5	2,013.7	0.00	0.00	0.00
7,980.0	89.70	179.80	5,946.1	-2,084.9	345.9	2,108.4	1.37	-0.11	1.37
8,075.0	90.00	178.20	5,946.4	-2,179.8	347.6	2,203.1	1.71	0.32	-1.68
8,170.0	90.00	178.30	5,946.4	-2,274.8	350.5	2,297.9	0.11	0.00	0.11
8,265.0	89.90	178.70	5,946.5	-2,369.8	353.0	2,392.6	0.43	-0.11	0.42
8,360.0	89.90	178.20	5,946.6	-2,464.7	355.6	2,487.4	0.53	0.00	-0.53
8,455.0	90.80	177.50	5,946.1	-2,559.7	359.1	2,582.3	1.20	0.95	-0.74
8,550.0	90.80	177.60	5,944.7	-2,654.6	363.2	2,677.1	0.11	0.00	0.11
8,644.0	90.00	178.20	5,944.1	-2,748.5	366.6	2,770.9	1.06	-0.85	0.64
8,739.0	88.70	178.50	5,945.2	-2,843.4	369.4	2,865.7	1.40	-1.37	0.32
8,834.0	88.60	178.20	5,947.4	-2,938.4	372.1	2,960.5	0.33	-0.11	-0.32
8,929.0	88.10	178.30	5,950.1	-3,033.3	375.0	3,055.2	0.54	-0.53	0.11
9,024.0	90.70	177.50	5,951.1	-3,128.2	378.5	3,150.1	2.86	2.74	-0.84
9,119.0	90.50	176.90	5,950.1	-3,223.1	383.1	3,245.0	0.67	-0.21	-0.63
9,214.0	90.80	177.80	5,949.1	-3,318.0	387.5	3,339.8	1.00	0.32	0.95
9,309.0	91.10	177.60	5,947.5	-3,412.9	391.3	3,434.7	0.38	0.32	-0.21
9,404.0	89.70	179.00	5,946.8	-3,507.9	394.1	3,529.5	2.08	-1.47	1.47
9,499.0	89.80	179.40	5,947.2	-3,602.8	395.5	3,624.1	0.43	0.11	0.42
9,594.0	90.40	178.30	5,947.1	-3,697.8	397.4	3,718.9	1.32	0.63	-1.16

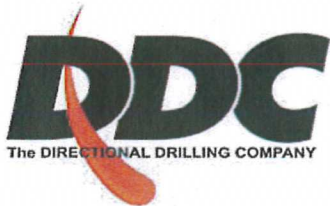


Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro Federal LD07-78HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4884.0usft (H&P #326)
Site:	Sec 7, T9N, R58W, 6th PM	MD Reference:	WELL @ 4884.0usft (H&P #326)
Well:	Timbro Federal LD07-78HN	North Reference:	Grid
Wellbore:	Wellbore #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)
9,689.0	89.60	178.70	5,947.1	-3,792.8	399.9	3,813.6	0.94	-0.84	0.42
9,783.0	89.30	178.70	5,948.0	-3,886.8	402.0	3,907.4	0.32	-0.32	0.00
9,879.0	89.20	178.50	5,949.2	-3,982.7	404.3	4,003.1	0.23	-0.10	-0.21
9,973.0	89.00	179.00	5,950.7	-4,076.7	406.4	4,096.9	0.57	-0.21	0.53
10,068.0	89.40	178.00	5,952.0	-4,171.6	408.9	4,191.6	1.13	0.42	-1.05
10,163.0	89.20	178.70	5,953.2	-4,266.6	411.6	4,286.4	0.77	-0.21	0.74
10,240.0	88.60	178.70	5,954.7	-4,343.6	413.3	4,363.2	0.78	-0.78	0.00
TD @ 10293' MD / 5956' TVD									
10,293.0	88.60	178.70	5,956.0	-4,396.5	414.6	4,416.0	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
633.1	633.1	0.5	-1.0	TIE IN @ 633' MD / 633' TVD
6,229.5	5,946.2	-336.8	318.1	CROSSED HARD LINE @ 6230' MD / 5946' TVD
10,293.0	5,956.0	-4,396.5	414.6	TD @ 10293' MD / 5956' TVD

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



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## Survey Certification Sheet

Noble Energy Inc  
Company

RM-13503  
Job Number

7/2/13  
Date

Sec7,T9N,R58W,6<sup>th</sup>PM  
Lease

Timbro Federal LD07-78HN  
Well Name

Weld, CO  
County & State

API: 05-123-37002

Surveyed from a depth of: 633 feet to 10293 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Chris Abbott

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.

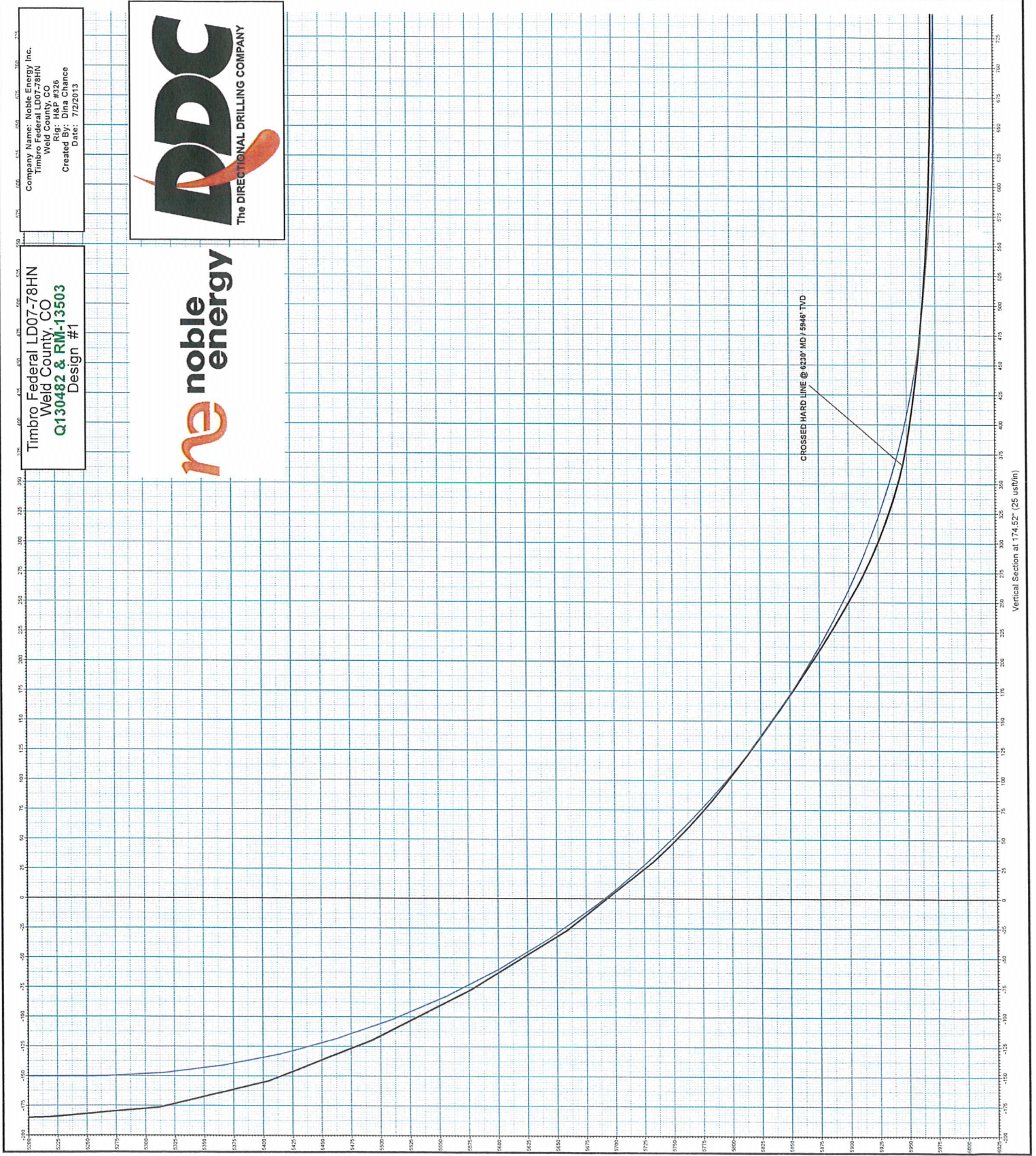
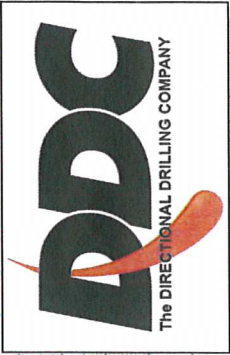
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Directional Drilling Company,  
ou=GM of Guidance Services,  
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Larry Wright  
MWD General Manager



Company Name: Noble Energy, Inc.  
Timbro Federal LD07-78HN  
Weid County, CO  
Rig: H&P #326  
Created By: Dina Chance  
Date: 7/2/2013

Timbro Federal LD07-78HN  
Weid County, CO  
Q130482 & RM-13503  
Design #1



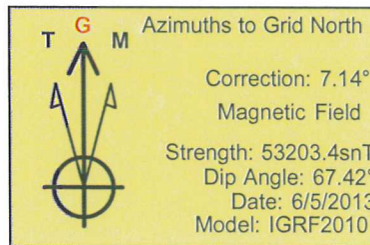
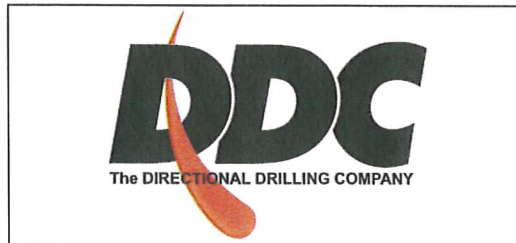


Company Name: Noble Energy Inc.  
Timbro Federal LD07-78HN  
Weld County, CO  
Rig: H&P #326  
Created By: Dina Chance  
Date: 7/2/2013

Timbro Federal LD07-78HN  
Weld County, CO  
Q130482 & RM-13503  
Design #1

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



WELL DETAILS: Timbro Federal LD07-78HN					
Ground Level: 4854.0					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1528089.58	3438758.52	40° 46' 20.040 N	103° 54' 57.030 W

ANNOTATIONS							
MD	Inc	Azi	TVD	+N/-S	+E/-W	V-Sect	Departure
633.1	0.20	297.80	633.1	0.5	-1.0	-0.6	1.2
6229.5	76.72	177.89	5946.2	-336.8	318.1	365.7	974.6
10293.0	88.60	178.70	5956.0	-4396.5	414.6	4416.0	5035.7

DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude
PBHL Timbro Federal LD07-78HN - plan hits target center	5993.5	-4396.5	421.8	1523693.05	3439180.27	40° 45' 36.530 N

Vertical Section at 174.52° (200 usf/in)

