



Noble Energy Inc.

**Weld County, CO
Sec 26, T9N, R59W, 6th PM
Castor LC26-75HN**

Wellbore #1

Survey: MWD FINAL

DDC Survey Report

02 November, 2012



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor LC26-75HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4853.0usft (H&P #326)
Site:	Sec 26, T9N, R59W, 6th PM	MD Reference:	WELL @ 4853.0usft (H&P #326)
Well:	Castor LC26-75HN	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 26, T9N, R59W, 6th PM			
Site Position:		Northing:	1,507,236.82 usft	Latitude:	40° 42' 55.370 N
From:	Map	Easting:	3,431,059.00 usft	Longitude:	103° 56' 41.840 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.00 °

Well	Castor LC26-75HN					
Well Position	+N-S	0.0 usft	Northing:	1,507,236.82 usft	Latitude:	40° 42' 55.370 N
	+E-W	0.0 usft	Easting:	3,431,059.00 usft	Longitude:	103° 56' 41.840 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,823.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/23/2012	8.26	67.39	53,237

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	358.40	

Survey Program		Date	11/2/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
739.0	10,354.0	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 @ 646' MD / 646' TVD									
646.0	0.00	0.00	646.0	0.0	0.0	0.0	0.00	0.00	0.00
739.0	0.30	278.00	739.0	0.0	-0.2	0.0	0.32	0.32	0.00
1,023.0	0.10	261.30	1,023.0	0.1	-1.2	0.1	0.07	-0.07	-5.88
1,310.0	0.30	293.70	1,310.0	0.4	-2.2	0.4	0.08	0.07	11.29
1,591.0	0.30	253.00	1,591.0	0.4	-3.5	0.5	0.07	0.00	-14.48
1,872.0	0.30	325.60	1,872.0	0.8	-4.7	1.0	0.13	0.00	25.84
2,151.0	0.00	199.60	2,151.0	1.4	-5.1	1.6	0.11	-0.11	0.00
2,245.0	2.60	145.10	2,245.0	-0.3	-3.8	-0.2	2.77	2.77	0.00
2,338.0	4.60	171.70	2,337.8	-5.7	-2.1	-5.7	2.75	2.15	28.60
2,431.0	6.70	178.80	2,430.3	-14.8	-1.4	-14.8	2.38	2.26	7.63

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor LC26-75HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4853.0usft (H&P #326)
Site:	Sec 26, T9N, R59W, 6th PM	MD Reference:	WELL @ 4853.0usft (H&P #326)
Well:	Castor LC26-75HN	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)
2,524.0	9.10	185.30	2,522.4	-27.6	-2.0	-27.5	2.75	2.58	6.99
2,616.0	11.70	181.60	2,612.9	-44.2	-2.9	-44.1	2.92	2.83	-4.02
2,708.0	14.00	176.70	2,702.6	-64.6	-2.6	-64.5	2.76	2.50	-5.33
2,800.0	14.80	175.10	2,791.7	-87.4	-0.9	-87.4	0.97	0.87	-1.74
2,895.0	13.90	173.40	2,883.7	-110.8	1.4	-110.8	1.05	-0.95	-1.79
2,990.0	14.80	171.20	2,975.8	-134.2	4.6	-134.3	1.11	0.95	-2.32
3,085.0	13.80	170.20	3,067.8	-157.3	8.4	-157.5	1.08	-1.05	-1.05
3,180.0	14.20	181.20	3,160.0	-180.1	10.1	-180.4	2.83	0.42	11.58
3,275.0	16.50	179.30	3,251.6	-205.3	10.0	-205.5	2.48	2.42	-2.00
3,370.0	17.00	178.60	3,342.6	-232.7	10.5	-232.9	0.57	0.53	-0.74
3,465.0	17.60	178.70	3,433.3	-260.9	11.2	-261.1	0.63	0.63	0.11
3,560.0	15.50	172.80	3,524.4	-287.9	13.1	-288.1	2.83	-2.21	-6.21
3,655.0	12.70	172.70	3,616.5	-310.8	16.0	-311.1	2.95	-2.95	-0.11
3,750.0	9.10	172.40	3,709.8	-328.6	18.3	-329.0	3.79	-3.79	-0.32
3,845.0	5.70	167.70	3,804.0	-340.7	20.3	-341.1	3.63	-3.58	-4.95
3,940.0	2.00	172.80	3,898.7	-346.9	21.5	-347.4	3.91	-3.89	5.37
4,035.0	1.60	65.50	3,993.7	-348.0	22.9	-348.5	3.06	-0.42	-112.95
4,130.0	1.50	53.60	4,088.7	-346.8	25.1	-347.3	0.35	-0.11	-12.53
4,225.0	1.70	42.00	4,183.6	-345.0	27.1	-345.6	0.40	0.21	-12.21
4,320.0	2.10	35.10	4,278.6	-342.5	29.0	-343.2	0.48	0.42	-7.26
4,415.0	1.90	22.30	4,373.5	-339.6	30.6	-340.3	0.51	-0.21	-13.47
4,510.0	2.10	22.20	4,468.5	-336.5	31.9	-337.3	0.21	0.21	-0.11
4,605.0	2.40	12.60	4,563.4	-333.0	33.0	-333.8	0.51	0.32	-10.11
4,700.0	3.40	1.50	4,658.3	-328.2	33.5	-329.0	1.20	1.05	-11.68
4,795.0	0.60	29.00	4,753.2	-325.0	33.8	-325.8	3.03	-2.95	28.95
4,890.0	0.60	45.80	4,848.2	-324.2	34.4	-325.0	0.18	0.00	17.68
4,985.0	0.60	103.10	4,943.2	-324.0	35.2	-324.8	0.61	0.00	60.32
5,080.0	1.00	117.60	5,038.2	-324.5	36.5	-325.4	0.47	0.42	15.26
5,175.0	0.70	83.80	5,133.2	-324.8	37.8	-325.7	0.60	-0.32	-35.58
5,221.0	0.80	84.20	5,179.2	-324.7	38.4	-325.7	0.22	0.22	0.87
5,270.0	0.80	79.30	5,228.2	-324.6	39.0	-325.6	0.14	0.00	-10.00
5,365.0	4.60	314.60	5,323.1	-321.8	37.0	-322.7	5.37	4.00	-131.26
5,410.0	9.90	326.80	5,367.7	-317.3	33.6	-318.1	12.20	11.78	27.11
5,460.0	13.70	338.80	5,416.6	-308.2	29.1	-308.9	9.01	7.60	24.00
5,505.0	18.50	337.60	5,459.9	-296.6	24.4	-297.2	10.69	10.67	-2.67
5,555.0	23.00	342.40	5,506.6	-280.0	18.4	-280.4	9.61	9.00	9.60
5,600.0	25.30	344.40	5,547.7	-262.3	13.2	-262.6	5.42	5.11	4.44
5,650.0	27.70	349.90	5,592.4	-240.6	8.3	-240.7	6.86	4.80	11.00
5,695.0	31.20	356.30	5,631.6	-218.6	5.7	-218.7	10.45	7.78	14.22
5,745.0	35.40	4.70	5,673.4	-191.3	6.1	-191.4	12.46	8.40	16.80
5,790.0	38.00	4.00	5,709.5	-164.5	8.1	-164.6	5.85	5.78	-1.56
5,840.0	42.30	3.80	5,747.7	-132.3	10.3	-132.5	8.60	8.60	-0.40
5,885.0	46.80	2.30	5,779.8	-100.8	11.9	-101.1	10.27	10.00	-3.33

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor LC26-75HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4853.0usft (H&P #326)
Site:	Sec 26, T9N, R59W, 6th PM	MD Reference:	WELL @ 4853.0usft (H&P #326)
Well:	Castor LC26-75HN	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)
5,935.0	51.70	0.20	5,812.4	-62.9	12.7	-63.3	10.30	9.80	-4.20
5,980.0	53.60	358.90	5,839.7	-27.2	12.5	-27.5	4.81	4.22	-2.89
6,030.0	58.20	2.20	5,867.7	14.2	12.9	13.9	10.70	9.20	6.60
6,075.0	59.00	1.60	5,891.2	52.6	14.2	52.2	2.11	1.78	-1.33
6,125.0	62.80	2.30	5,915.5	96.3	15.7	95.8	7.70	7.60	1.40
6,170.0	65.10	2.20	5,935.2	136.7	17.2	136.1	5.12	5.11	-0.22
6,220.0	66.10	3.20	5,955.9	182.1	19.4	181.5	2.71	2.00	2.00
CROSSED HARD LINE @ 6265' MD / 5973' TVD									
6,265.0	69.60	1.40	5,972.9	223.8	21.0	223.1	8.61	7.78	-4.00
6,315.0	75.20	359.90	5,988.0	271.4	21.6	270.7	11.56	11.20	-3.00
6,380.0	84.10	358.50	5,999.6	335.3	20.7	334.6	13.85	13.69	-2.15
6,455.0	90.70	358.50	6,003.0	410.1	18.7	409.5	8.80	8.80	0.00
6,550.0	90.50	357.90	6,002.1	505.1	15.7	504.5	0.67	-0.21	-0.63
6,645.0	90.60	358.00	6,001.1	600.0	12.3	599.4	0.15	0.11	0.11
6,740.0	89.60	357.80	6,001.0	695.0	8.9	694.4	1.07	-1.05	-0.21
6,835.0	90.50	357.90	6,000.9	789.9	5.3	789.4	0.95	0.95	0.11
6,930.0	91.50	357.90	5,999.2	884.8	1.8	884.4	1.05	1.05	0.00
7,025.0	90.10	357.80	5,997.9	979.7	-1.8	979.4	1.48	-1.47	-0.11
7,119.0	89.90	357.10	5,997.9	1,073.6	-5.9	1,073.4	0.77	-0.21	-0.74
7,214.0	90.60	356.50	5,997.5	1,168.5	-11.2	1,168.3	0.97	0.74	-0.63
7,309.0	89.50	357.40	5,997.4	1,263.4	-16.3	1,263.3	1.50	-1.16	0.95
7,404.0	89.80	356.90	5,998.0	1,358.2	-21.0	1,358.3	0.61	0.32	-0.53
7,499.0	90.20	356.50	5,998.0	1,453.1	-26.5	1,453.2	0.60	0.42	-0.42
7,594.0	88.40	354.40	5,999.2	1,547.8	-34.0	1,548.1	2.91	-1.89	-2.21
7,689.0	90.40	356.00	6,000.1	1,642.4	-42.0	1,642.9	2.70	2.11	1.68
7,784.0	91.00	358.00	5,999.0	1,737.3	-46.9	1,737.9	2.20	0.63	2.11
7,879.0	91.10	357.90	5,997.2	1,832.2	-50.3	1,832.9	0.15	0.11	-0.11
7,974.0	91.10	357.80	5,995.4	1,927.1	-53.9	1,927.9	0.11	0.00	-0.11
8,069.0	91.20	357.00	5,993.5	2,022.0	-58.2	2,022.8	0.85	0.11	-0.84
8,164.0	90.40	357.30	5,992.2	2,116.9	-62.9	2,117.8	0.90	-0.84	0.32
8,259.0	89.50	359.50	5,992.3	2,211.8	-65.6	2,212.8	2.50	-0.95	2.32
8,354.0	89.20	358.50	5,993.4	2,306.8	-67.2	2,307.8	1.10	-0.32	-1.05
8,449.0	89.40	358.30	5,994.5	2,401.8	-69.9	2,402.8	0.30	0.21	-0.21
8,544.0	89.60	357.90	5,995.3	2,496.7	-73.0	2,497.8	0.47	0.21	-0.42
8,639.0	89.90	357.40	5,995.8	2,591.6	-76.9	2,592.8	0.61	0.32	-0.53
8,734.0	90.10	357.30	5,995.8	2,686.5	-81.3	2,687.7	0.24	0.21	-0.11
8,829.0	90.60	356.80	5,995.2	2,781.4	-86.2	2,782.7	0.74	0.53	-0.53
8,924.0	90.80	356.40	5,994.0	2,876.2	-91.9	2,877.7	0.47	0.21	-0.42
9,019.0	91.10	356.00	5,992.4	2,971.0	-98.2	2,972.6	0.53	0.32	-0.42
9,114.0	91.50	357.20	5,990.3	3,065.8	-103.8	3,067.5	1.33	0.42	1.26
9,209.0	92.00	358.30	5,987.4	3,160.7	-107.5	3,162.4	1.27	0.53	1.16
9,304.0	91.00	359.90	5,984.9	3,255.6	-109.0	3,257.4	1.99	-1.05	1.68
9,399.0	89.10	0.70	5,984.8	3,350.6	-108.5	3,352.3	2.17	-2.00	0.84

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor LC26-75HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4853.0usft (H&P #326)
Site:	Sec 26, T9N, R59W, 6th PM	MD Reference:	WELL @ 4853.0usft (H&P #326)
Well:	Castor LC26-75HN	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)	
9,494.0	88.80	0.00	5,986.6	3,445.6	-107.9	3,447.3	0.80	-0.32	-0.74	
9,589.0	90.90	0.40	5,986.8	3,540.6	-107.6	3,542.2	2.25	2.21	0.42	
9,684.0	91.30	359.80	5,985.0	3,635.6	-107.4	3,637.2	0.76	0.42	-0.63	
9,778.0	90.30	0.70	5,983.7	3,729.6	-107.0	3,731.1	1.43	-1.06	0.96	
9,873.0	91.20	359.80	5,982.4	3,824.6	-106.6	3,826.0	1.34	0.95	-0.95	
9,968.0	92.10	359.40	5,979.7	3,919.5	-107.3	3,921.0	1.04	0.95	-0.42	
10,063.0	91.90	359.90	5,976.4	4,014.5	-107.8	4,015.9	0.57	-0.21	0.53	
10,158.0	89.90	0.60	5,974.9	4,109.4	-107.4	4,110.8	2.23	-2.11	0.74	
10,253.0	90.40	0.00	5,974.6	4,204.4	-106.9	4,205.8	0.82	0.53	-0.63	
10,309.0	90.60	0.10	5,974.1	4,260.4	-106.9	4,261.8	0.40	0.36	0.18	
TD @ 10354' MD / 5974' TVD										
10,354.0	90.60	0.10	5,973.7	4,305.4	-106.8	4,306.7	0.00	0.00	0.00	

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
646.0	646.0	0.0	0.0	TIE IN @ 646' MD / 646' TVD	
6,265.0	5,972.9	223.8	21.0	CROSSED HARD LINE @ 6265' MD / 5973' TVD	
10,354.0	5,973.7	4,305.4	-106.8	TD @ 10354' MD / 5974' TVD	

Checked By: _____	Approved By: _____	Date: _____
-------------------	--------------------	-------------



Survey Certification Sheet

Noble Energy
Company

RM-12790
Job Number

11/2/2012
Date

Sec16,T9N,R59W,6thPM
Lease

Castor LC26-75HN
Well Name

Weld,CO
County & State

Surveyed from a depth of: 646 feet to 10354 feet MD

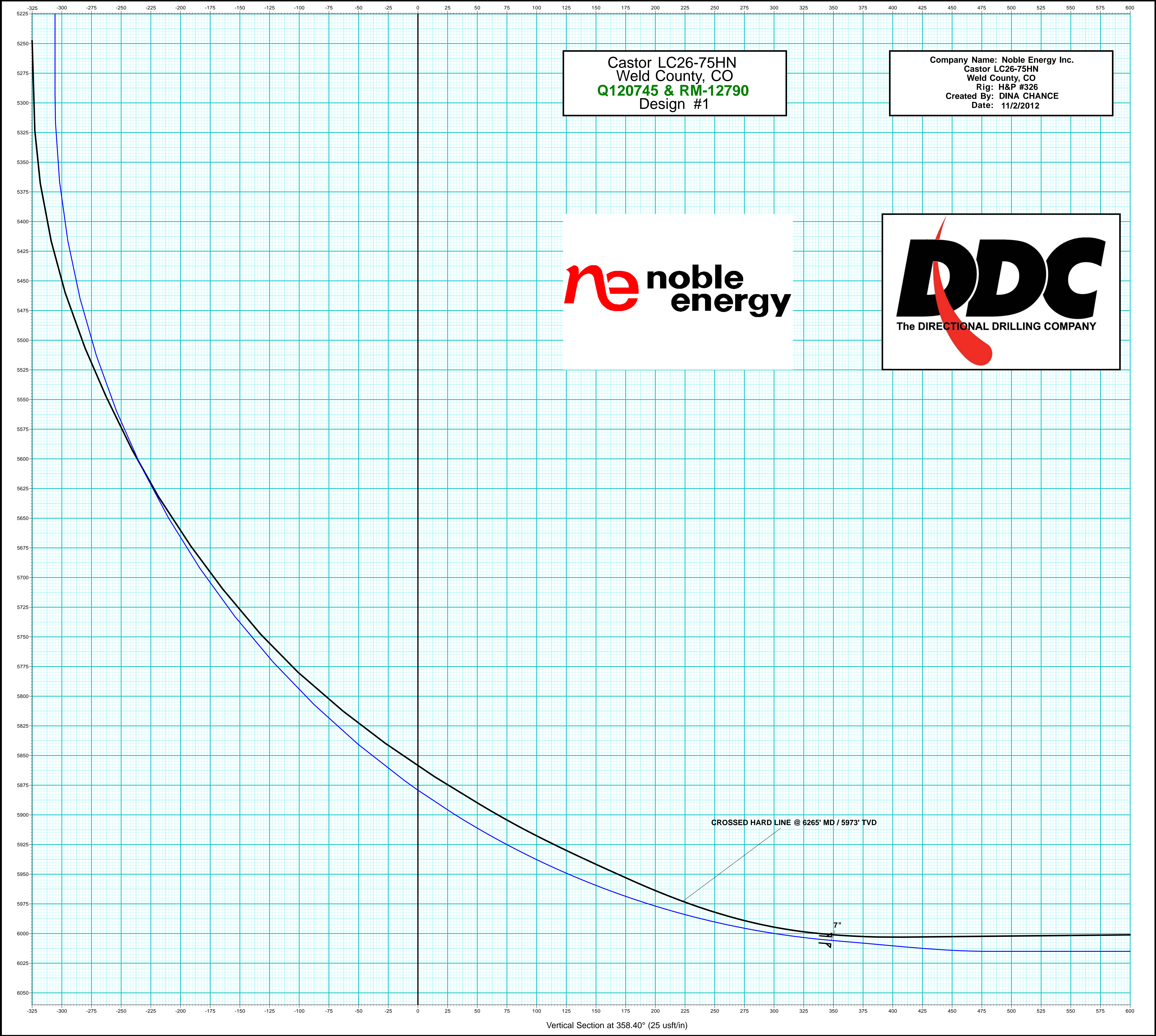
Type of Survey: MWD

Directional Supervisor/Surveyor: Bob Kubistek

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.

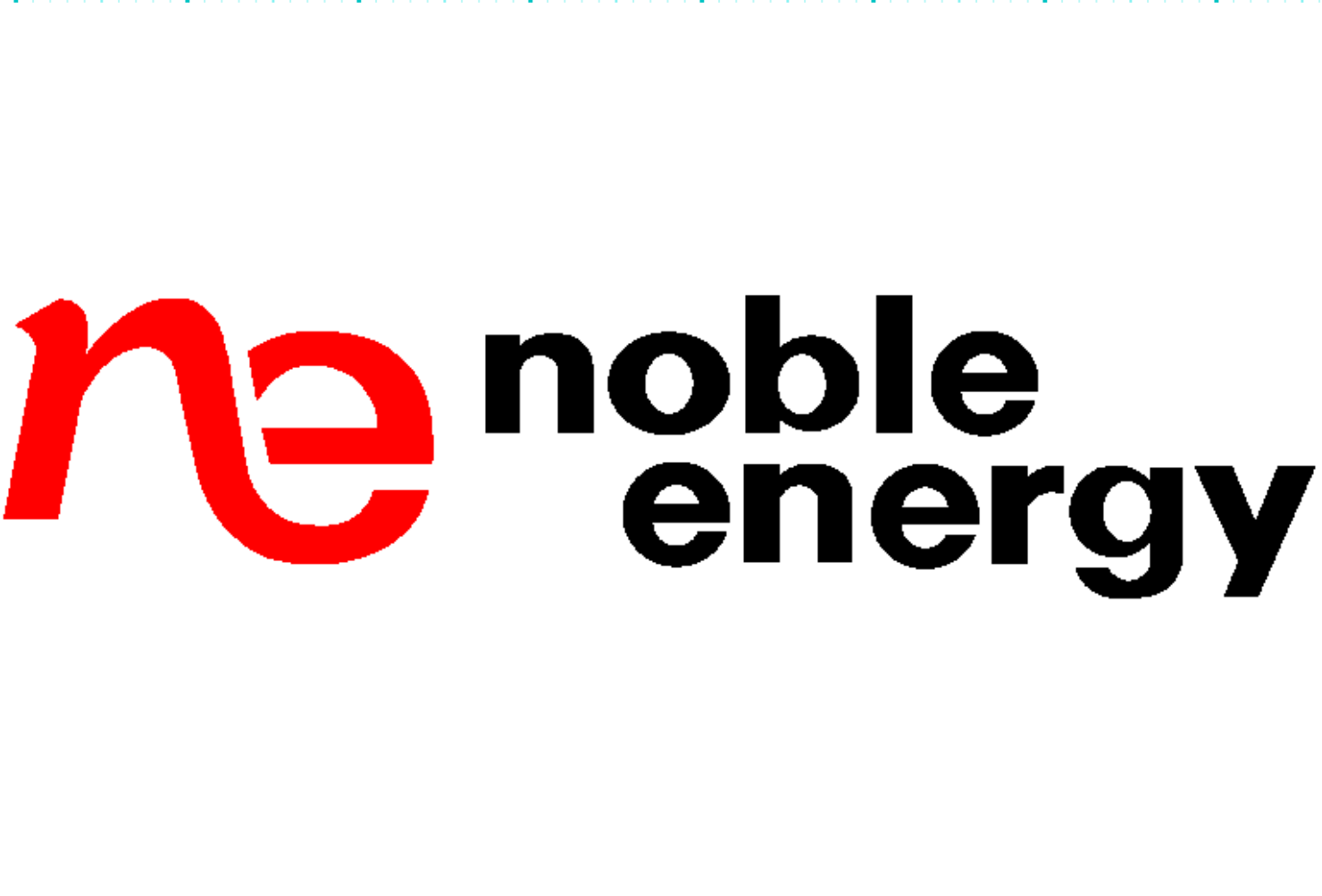
Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers.c
om, c=US
Date: 2012.11.05 16:52:44 -06'00'

Larry Wright
MWD General Manager



Castor LC26-75HN
Weld County, CO
Q120745 & RM-12790
Design #1

Company Name: Noble Energy Inc.
Castor LC26-75HN
Weld County, CO
Rig: H&P #326
Created By: DINA CHANCE
Date: 11/2/2012



Vertical Section at 358.40° (25 usft/in)

Company Name: Noble Energy Inc.
Castor LC26-75HN
Weld County, CO
Rig: H&P #326
Created By: Dina Chance
Date: 11/2/2012

Castor LC26-75HN
Weld County, CO
Q120745 & RM-12790
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



T

G

M

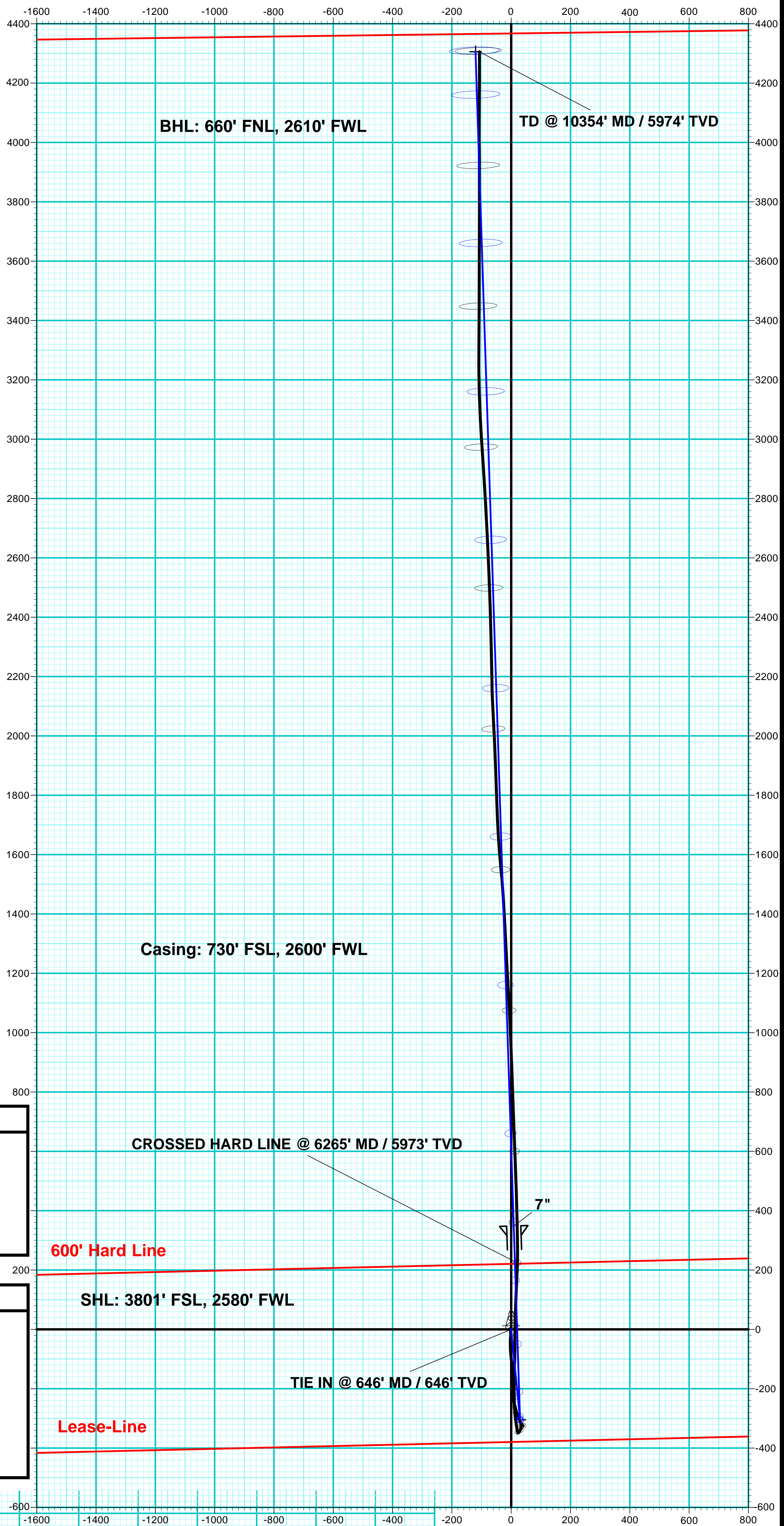
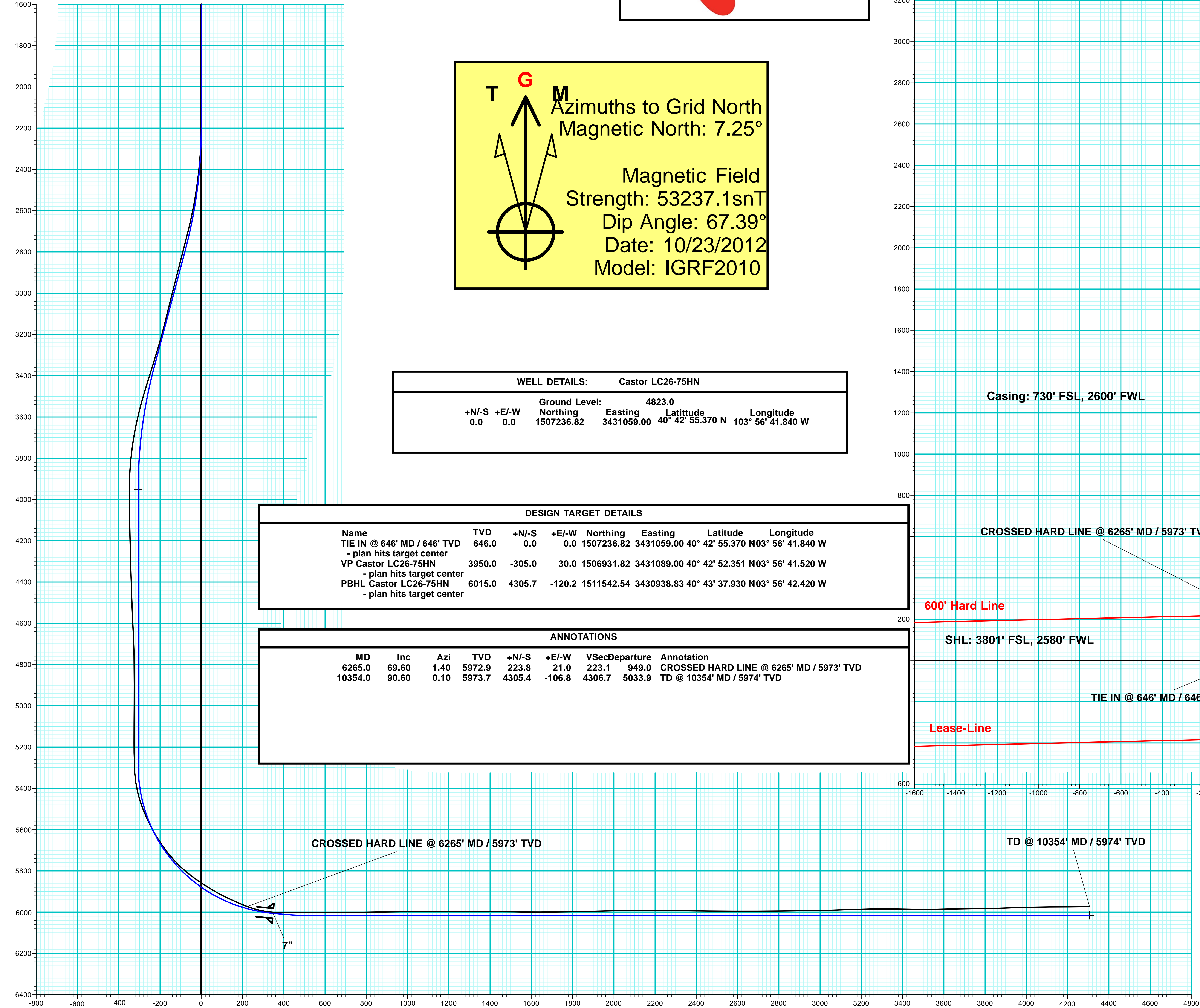
Azimuths to Grid North
Magnetic North: 7.25°

Magnetic Field
Strength: 53237.1snT
Dip Angle: 67.39°
Date: 10/23/2012
Model: IGRF2010

WELL DETAILS:		Castor LC26-75HN				
		Ground Level:	4823.0			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.0	0.0	1507236.82	3431059.00	40° 42' 55.370 N	103° 56' 41.840 W	

DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
TIE IN @ 646' MD / 646' TVD - plan hits target center	646.0	0.0	0.0	1507236.82	3431059.00	40° 42' 55.370 N	103° 56' 41.840 W
VP Castor LC26-75HN - plan hits target center	3950.0	-305.0	30.0	1506931.82	3431089.00	40° 42' 52.351 N	103° 56' 41.520 W
PBHL Castor LC26-75HN - plan hits target center	6015.0	4305.7	-120.2	1511542.54	3430938.83	40° 43' 37.930 N	103° 56' 42.420 W

ANNOTATIONS								
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation
6265.0	69.60	1.40	5972.9	223.8	21.0	223.1	949.0	CROSSED HARD LINE @ 6265' MD / 5973' TVD
10354.0	90.60	0.10	5973.7	4305.4	-106.8	4306.7	5033.9	TD @ 10354' MD / 5974' TVD



Vertical Section at 358.40° (200 usft/in)