



Noble Energy Inc.

Weld County, CO

Sec 14, T9N, R58W, 6th PM

Castor Federal LD14-68HN

Wellbore #1

Survey: MWD FINAL

DDC Survey Report

09 July, 2012



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor Federal LD14-68HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4702.0usft (H&P #326)
Site:	Sec 14, T9N, R58W, 6th PM	MD Reference:	WELL @ 4702.0usft (H&P #326)
Well:	Castor Federal LD14-68HN	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 14, T9N, R58W, 6th PM			
Site Position:		Northing:	1,523,054.52 usft	Latitude:	40° 45' 26.430 N
From:	Map	Easting:	3,460,144.88 usft	Longitude:	103° 50' 20.340 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.07 °

Well	Castor Federal LD14-68HN					
Well Position	+N-S	0.0 usft	Northing:	1,523,054.52 usft	Latitude:	40° 45' 26.430 N
	+E-W	0.0 usft	Easting:	3,460,144.88 usft	Longitude:	103° 50' 20.340 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,672.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/14/2012	8.25	67.45	53,309

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	89.88	

Survey Program		Date	7/9/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
1,214.0	9,850.0	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 @ 1176' MD / 1176' TVD									
1,176.0	0.00	0.00	1,176.0	0.0	0.0	0.0	0.00	0.00	0.00
1,214.0	1.60	130.20	1,214.0	-0.3	0.4	0.4	4.21	4.21	0.00
1,306.0	0.70	79.60	1,306.0	-1.1	1.9	1.9	1.39	-0.98	-55.00
1,584.0	0.90	79.80	1,584.0	-0.4	5.8	5.8	0.07	0.07	0.07
1,773.0	0.70	108.40	1,772.9	-0.5	8.3	8.3	0.23	-0.11	15.13
1,867.0	2.10	245.00	1,866.9	-1.4	7.3	7.3	2.82	1.49	145.32
1,961.0	3.90	275.60	1,960.8	-1.8	2.6	2.6	2.50	1.91	32.55
2,053.0	6.00	274.40	2,052.4	-1.1	-5.4	-5.4	2.29	2.28	-1.30
2,146.0	8.20	270.80	2,144.7	-0.7	-16.8	-16.8	2.41	2.37	-3.87
2,238.0	10.10	267.30	2,235.5	-1.0	-31.5	-31.5	2.15	2.07	-3.80

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor Federal LD14-68HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4702.0usft (H&P #326)
Site:	Sec 14, T9N, R58W, 6th PM	MD Reference:	WELL @ 4702.0usft (H&P #326)
Well:	Castor Federal LD14-68HN	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)
2,332.0	12.40	260.50	2,327.7	-3.0	-49.6	-49.6	2.82	2.45	-7.23
2,425.0	14.60	257.50	2,418.2	-7.2	-70.9	-71.0	2.48	2.37	-3.23
2,520.0	15.90	250.80	2,509.8	-14.1	-94.9	-94.9	2.30	1.37	-7.05
2,615.0	15.30	250.10	2,601.3	-22.6	-119.0	-119.0	0.66	-0.63	-0.74
2,711.0	14.30	248.70	2,694.1	-31.2	-142.0	-142.0	1.11	-1.04	-1.46
2,806.0	15.70	248.30	2,785.9	-40.2	-164.8	-164.9	1.48	1.47	-0.42
2,901.0	13.90	248.00	2,877.7	-49.3	-187.3	-187.4	1.90	-1.89	-0.32
2,996.0	14.10	254.30	2,969.9	-56.7	-209.1	-209.2	1.62	0.21	6.63
3,091.0	15.80	254.70	3,061.7	-63.2	-232.7	-232.8	1.79	1.79	0.42
3,186.0	16.20	254.10	3,153.0	-70.3	-257.9	-258.0	0.46	0.42	-0.63
3,281.0	16.20	253.30	3,244.3	-77.7	-283.3	-283.5	0.23	0.00	-0.84
3,376.0	16.70	253.80	3,335.4	-85.3	-309.1	-309.3	0.55	0.53	0.53
3,471.0	15.60	250.30	3,426.6	-93.4	-334.3	-334.5	1.55	-1.16	-3.68
3,566.0	12.40	249.40	3,518.8	-101.3	-355.9	-356.1	3.38	-3.37	-0.95
3,661.0	10.60	248.70	3,611.9	-108.1	-373.6	-373.8	1.90	-1.89	-0.74
3,756.0	8.00	247.10	3,705.6	-113.8	-387.8	-388.0	2.75	-2.74	-1.68
3,851.0	7.10	242.90	3,799.8	-119.1	-399.1	-399.3	1.11	-0.95	-4.42
3,946.0	5.90	239.20	3,894.2	-124.3	-408.5	-408.8	1.34	-1.26	-3.89
4,041.0	4.80	240.80	3,988.8	-128.7	-416.2	-416.4	1.17	-1.16	1.68
4,136.0	3.90	246.20	4,083.5	-131.9	-422.6	-422.9	1.04	-0.95	5.68
4,231.0	3.00	242.90	4,178.3	-134.4	-427.8	-428.1	0.97	-0.95	-3.47
4,326.0	2.50	248.20	4,273.2	-136.3	-431.9	-432.2	0.59	-0.53	5.58
4,421.0	2.40	286.00	4,368.1	-136.5	-435.8	-436.0	1.67	-0.11	39.79
4,516.0	2.30	287.00	4,463.0	-135.4	-439.5	-439.8	0.11	-0.11	1.05
4,611.0	1.70	286.30	4,558.0	-134.4	-442.7	-442.9	0.63	-0.63	-0.74
4,801.0	1.00	277.00	4,747.9	-133.5	-447.0	-447.3	0.38	-0.37	-4.89
4,897.0	1.20	102.30	4,843.9	-133.6	-446.9	-447.1	2.29	0.21	-181.98
4,992.0	12.00	95.20	4,938.2	-134.7	-436.0	-436.3	11.38	11.37	-7.47
5,037.0	16.10	88.70	4,981.8	-135.0	-425.1	-425.4	9.75	9.11	-14.44
5,087.0	21.20	93.50	5,029.2	-135.4	-409.2	-409.4	10.64	10.20	9.60
5,132.0	25.60	97.50	5,070.5	-137.1	-391.4	-391.7	10.39	9.78	8.89
5,182.0	29.60	100.70	5,114.8	-140.8	-368.5	-368.8	8.53	8.00	6.40
5,227.0	33.00	99.50	5,153.2	-144.9	-345.5	-345.8	7.68	7.56	-2.67
5,277.0	36.10	95.10	5,194.4	-148.5	-317.4	-317.7	7.96	6.20	-8.80
5,322.0	40.10	91.90	5,229.8	-150.1	-289.7	-290.0	9.91	8.89	-7.11
5,372.0	43.70	92.80	5,267.0	-151.5	-256.3	-256.7	7.30	7.20	1.80
5,417.0	46.80	92.90	5,298.7	-153.1	-224.4	-224.7	6.89	6.89	0.22
5,467.0	46.20	92.40	5,333.1	-154.8	-188.2	-188.5	1.40	-1.20	-1.00
5,512.0	49.70	91.40	5,363.2	-155.9	-154.8	-155.1	7.95	7.78	-2.22
5,562.0	55.80	89.40	5,393.5	-156.1	-115.0	-115.3	12.61	12.20	-4.00
5,607.0	59.60	88.00	5,417.5	-155.3	-77.0	-77.3	8.84	8.44	-3.11
5,657.0	60.00	87.00	5,442.7	-153.4	-33.8	-34.2	1.90	0.80	-2.00
5,702.0	63.10	87.70	5,464.1	-151.5	5.7	5.4	7.02	6.89	1.56

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor Federal LD14-68HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4702.0usft (H&P #326)
Site:	Sec 14, T9N, R58W, 6th PM	MD Reference:	WELL @ 4702.0usft (H&P #326)
Well:	Castor Federal LD14-68HN	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)
5,752.0	65.50	87.00	5,485.8	-149.5	50.7	50.4	4.96	4.80	-1.40
5,797.0	68.80	88.90	5,503.3	-148.0	92.1	91.8	8.30	7.33	4.22
CROSSED HARD LINE @ 5810' MD / 5508' TVD									
5,810.0	69.55	89.37	5,507.9	-147.8	104.3	104.0	6.72	5.79	3.65
5,847.0	71.70	90.70	5,520.2	-147.8	139.2	138.9	6.72	5.80	3.58
5,892.0	73.30	90.50	5,533.7	-148.3	182.1	181.8	3.58	3.56	-0.44
5,941.0	75.90	90.50	5,546.7	-148.7	229.3	229.0	5.31	5.31	0.00
5,986.0	79.60	90.70	5,556.3	-149.1	273.3	273.0	8.23	8.22	0.44
6,025.0	82.80	90.50	5,562.2	-149.5	311.8	311.5	8.22	8.21	-0.51
6,080.0	85.90	91.70	5,567.6	-150.6	366.5	366.2	6.04	5.64	2.18
6,173.0	89.40	92.10	5,571.5	-153.7	459.4	459.1	3.79	3.76	0.43
6,265.0	89.20	91.20	5,572.6	-156.3	551.3	551.0	1.00	-0.22	-0.98
6,360.0	90.30	90.30	5,573.0	-157.6	646.3	646.0	1.50	1.16	-0.95
6,456.0	89.90	90.10	5,572.8	-157.9	742.3	742.0	0.47	-0.42	-0.21
6,551.0	91.70	89.40	5,571.5	-157.5	837.3	837.0	2.03	1.89	-0.74
6,645.0	92.20	89.80	5,568.3	-156.8	931.2	930.9	0.68	0.53	0.43
6,740.0	88.80	86.30	5,567.5	-153.6	1,026.2	1,025.8	5.14	-3.58	-3.68
6,835.0	88.00	86.10	5,570.1	-147.3	1,120.9	1,120.6	0.87	-0.84	-0.21
6,930.0	89.60	86.80	5,572.1	-141.4	1,215.7	1,215.4	1.84	1.68	0.74
7,025.0	91.70	88.00	5,571.0	-137.1	1,310.6	1,310.3	2.55	2.21	1.26
7,120.0	93.00	87.80	5,567.1	-133.6	1,405.5	1,405.2	1.38	1.37	-0.21
7,215.0	92.20	86.80	5,562.8	-129.2	1,500.2	1,500.0	1.35	-0.84	-1.05
7,310.0	91.40	87.80	5,559.8	-124.7	1,595.1	1,594.8	1.35	-0.84	1.05
7,405.0	91.90	86.80	5,557.1	-120.2	1,689.9	1,689.7	1.18	0.53	-1.05
7,500.0	91.30	88.00	5,554.5	-115.9	1,784.8	1,784.6	1.41	-0.63	1.26
7,595.0	91.10	88.70	5,552.5	-113.2	1,879.7	1,879.5	0.77	-0.21	0.74
7,690.0	90.00	88.20	5,551.6	-110.6	1,974.7	1,974.5	1.27	-1.16	-0.53
7,785.0	88.40	86.80	5,552.9	-106.5	2,069.6	2,069.4	2.24	-1.68	-1.47
7,880.0	88.30	87.50	5,555.6	-101.8	2,164.4	2,164.2	0.74	-0.11	0.74
7,975.0	88.30	88.90	5,558.4	-98.8	2,259.4	2,259.2	1.47	0.00	1.47
8,070.0	88.80	88.70	5,560.8	-96.8	2,354.3	2,354.1	0.57	0.53	-0.21
8,165.0	89.80	88.90	5,562.0	-94.8	2,449.3	2,449.1	1.07	1.05	0.21
8,260.0	90.80	90.10	5,561.5	-94.0	2,544.3	2,544.1	1.64	1.05	1.26
8,355.0	88.60	87.20	5,562.0	-91.7	2,639.2	2,639.0	3.83	-2.32	-3.05
8,450.0	87.20	85.90	5,565.5	-86.0	2,734.0	2,733.8	2.01	-1.47	-1.37
8,545.0	87.20	85.70	5,570.1	-79.1	2,828.6	2,828.4	0.21	0.00	-0.21
8,640.0	87.10	86.10	5,574.8	-72.3	2,923.3	2,923.1	0.43	-0.11	0.42
8,735.0	89.70	87.00	5,577.5	-66.6	3,018.0	3,017.9	2.90	2.74	0.95
8,830.0	90.80	87.80	5,577.1	-62.3	3,112.9	3,112.8	1.43	1.16	0.84
8,925.0	89.30	85.60	5,577.0	-56.8	3,207.8	3,207.6	2.80	-1.58	-2.32
9,020.0	90.90	85.40	5,576.8	-49.3	3,302.5	3,302.4	1.70	1.68	-0.21
9,115.0	93.20	87.50	5,573.4	-43.5	3,397.2	3,397.1	3.28	2.42	2.21
9,210.0	93.50	87.00	5,567.9	-38.9	3,491.9	3,491.9	0.61	0.32	-0.53

Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Castor Federal LD14-68HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4702.0usft (H&P #326)
Site:	Sec 14, T9N, R58W, 6th PM	MD Reference:	WELL @ 4702.0usft (H&P #326)
Well:	Castor Federal LD14-68HN	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)	
9,305.0	94.30	85.90	5,561.4	-33.0	3,586.5	3,586.5	1.43	0.84	-1.16	
9,400.0	94.80	85.60	5,553.9	-26.0	3,681.0	3,680.9	0.61	0.53	-0.32	
9,495.0	95.80	86.10	5,545.1	-19.2	3,775.3	3,775.3	1.18	1.05	0.53	
9,590.0	94.30	86.40	5,536.8	-13.0	3,869.8	3,869.7	1.61	-1.58	0.32	
9,685.0	93.40	85.40	5,530.4	-6.2	3,964.3	3,964.3	1.41	-0.95	-1.05	
9,794.0	92.50	84.70	5,524.8	3.2	4,072.7	4,072.7	1.05	-0.83	-0.64	
TD @ 9850' MD / 5522' TVD										
9,850.0	92.50	84.70	5,522.3	8.4	4,128.4	4,128.5	0.00	0.00	0.00	

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,176.0	1,176.0	0.0	0.0	TIE IN @ 1176' MD / 1176' TVD	
5,810.0	5,507.9	-147.8	104.3	CROSSED HARD LINE @ 5810' MD / 5508' TVD	
9,850.0	5,522.3	8.4	4,128.4	TD @ 9850' MD / 5522' TVD	

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



Survey Certification Sheet

Noble Energy
Company

RM-12474
Job Number

7/9/2012
Date

Sec 14, T9N, R58W, 6th PM
Lease

Castor Fed LD14-68HN
Well Name

Weld, CO
County & State

Surveyed from a depth of: 1176 feet to 9850 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Kurt Buresh

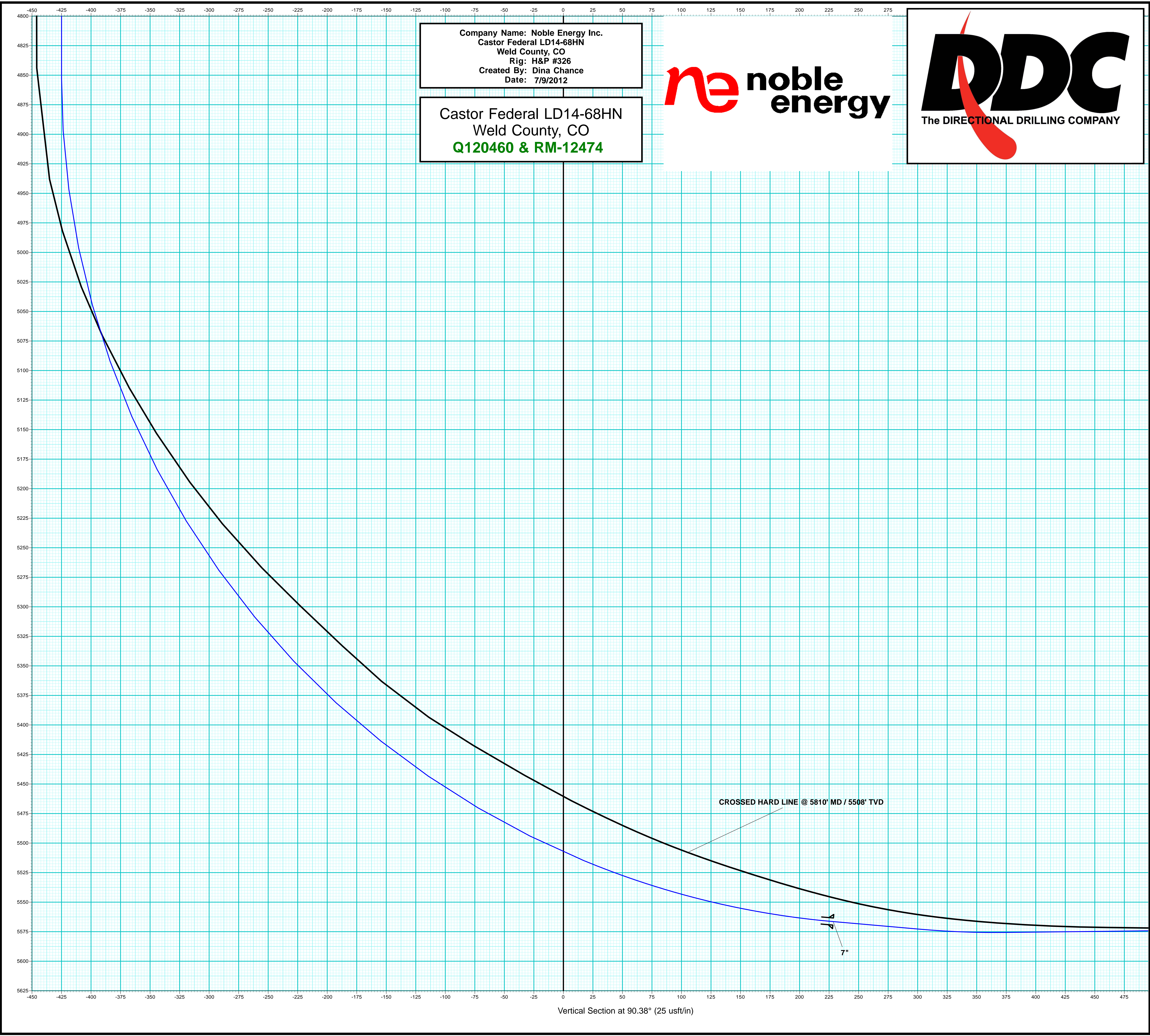
The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore 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@directionaldriller
s.com, c=US
Date: 2012.07.10 16:02:50
-05'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Castor Federal LD14-68HN
Weld County, CO
Rig: H&P #326
Created By: Dina Chance
Date: 7/9/2012

Castor Federal LD14-68HN
Weld County, CO
Q120460 & RM-12474



Company Name: Noble Energy Inc.
Castor Federal LD14-68HN
Weld County, CO
Rig: H&P #326
Created By: Dina Chance
Date: 7/9/2012

Castor Federal LD14-68HN
Weld County, CO
Q120460 & RM-12474
Design #1



T

G

M

Azimuths to Grid North

Magnetic North: 7.18°

Magnetic Field Strength: 53308.7snT

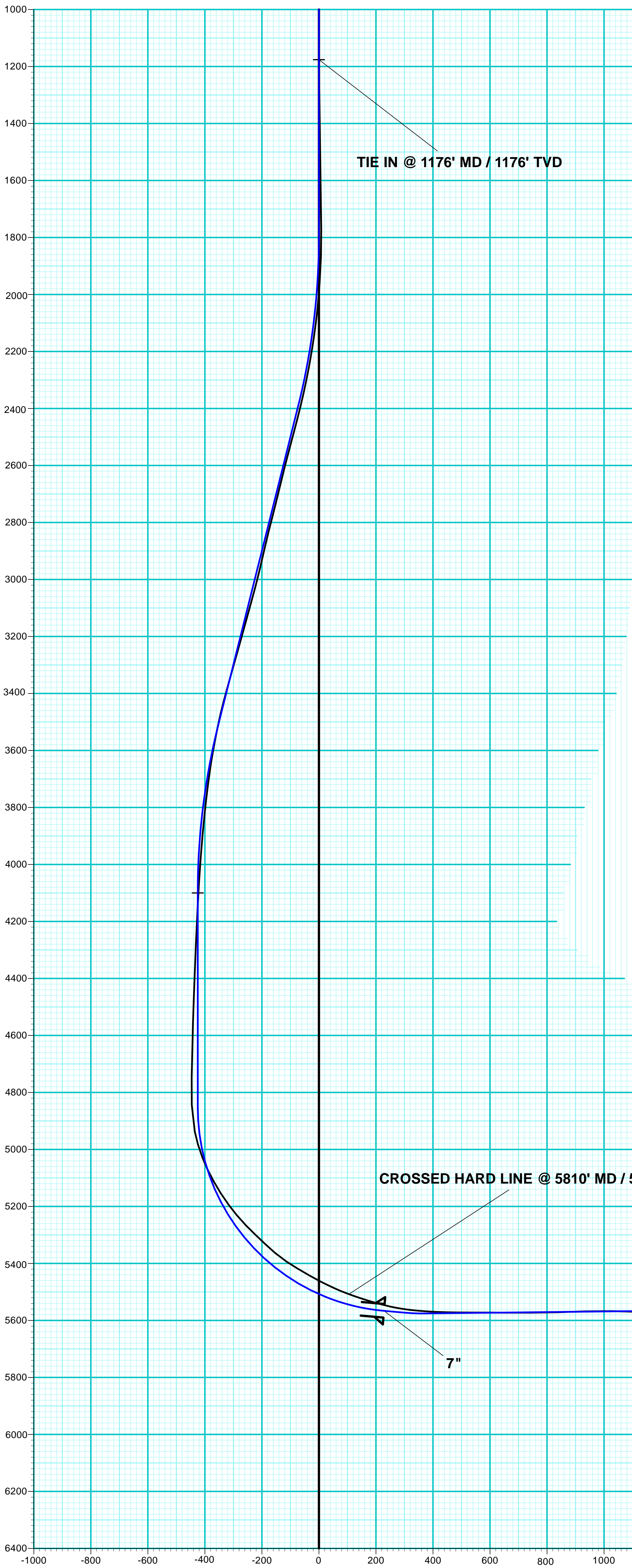
Dip Angle: 67.45°

Date: 6/14/2012

Model: IGRF2010

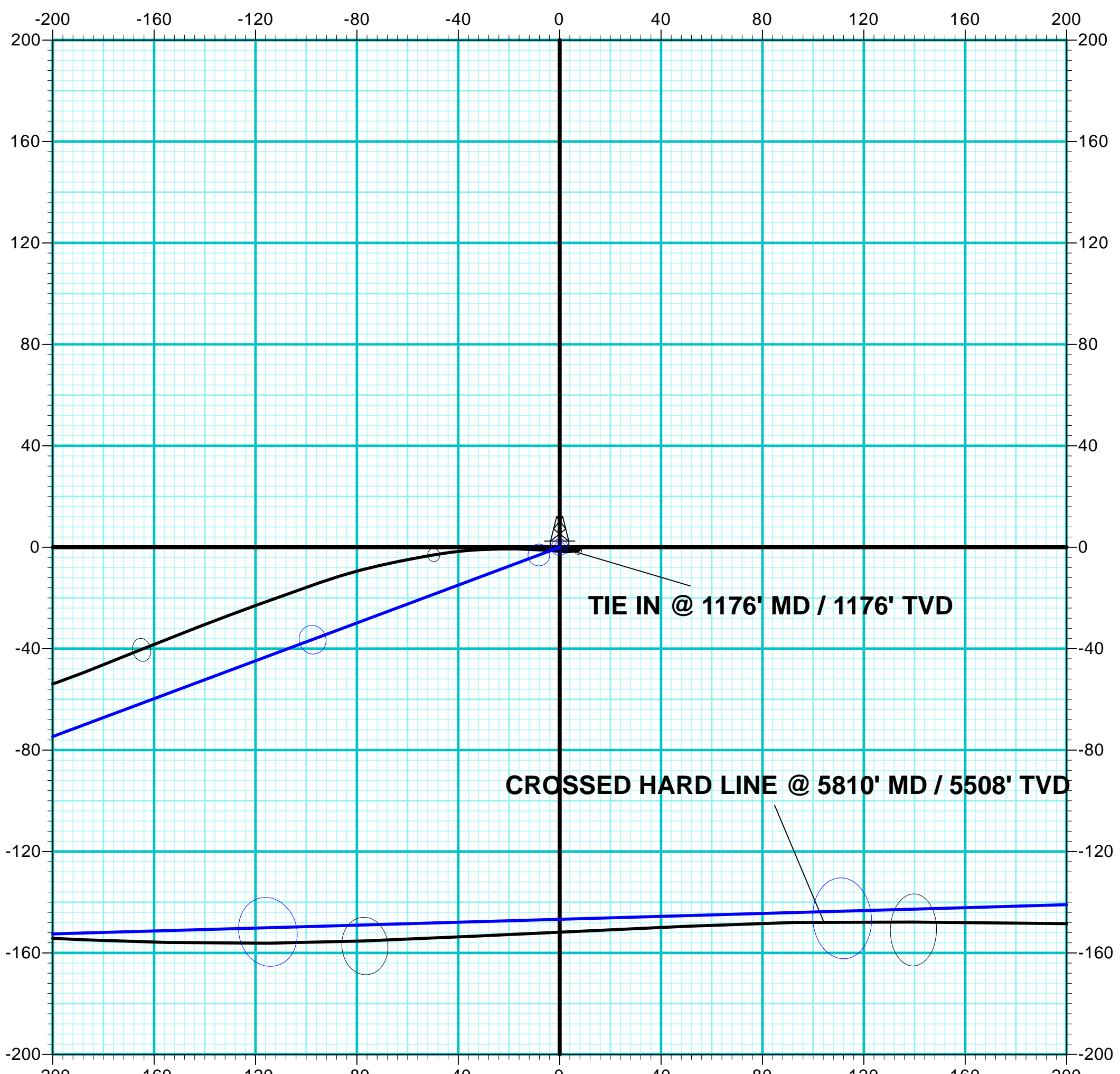
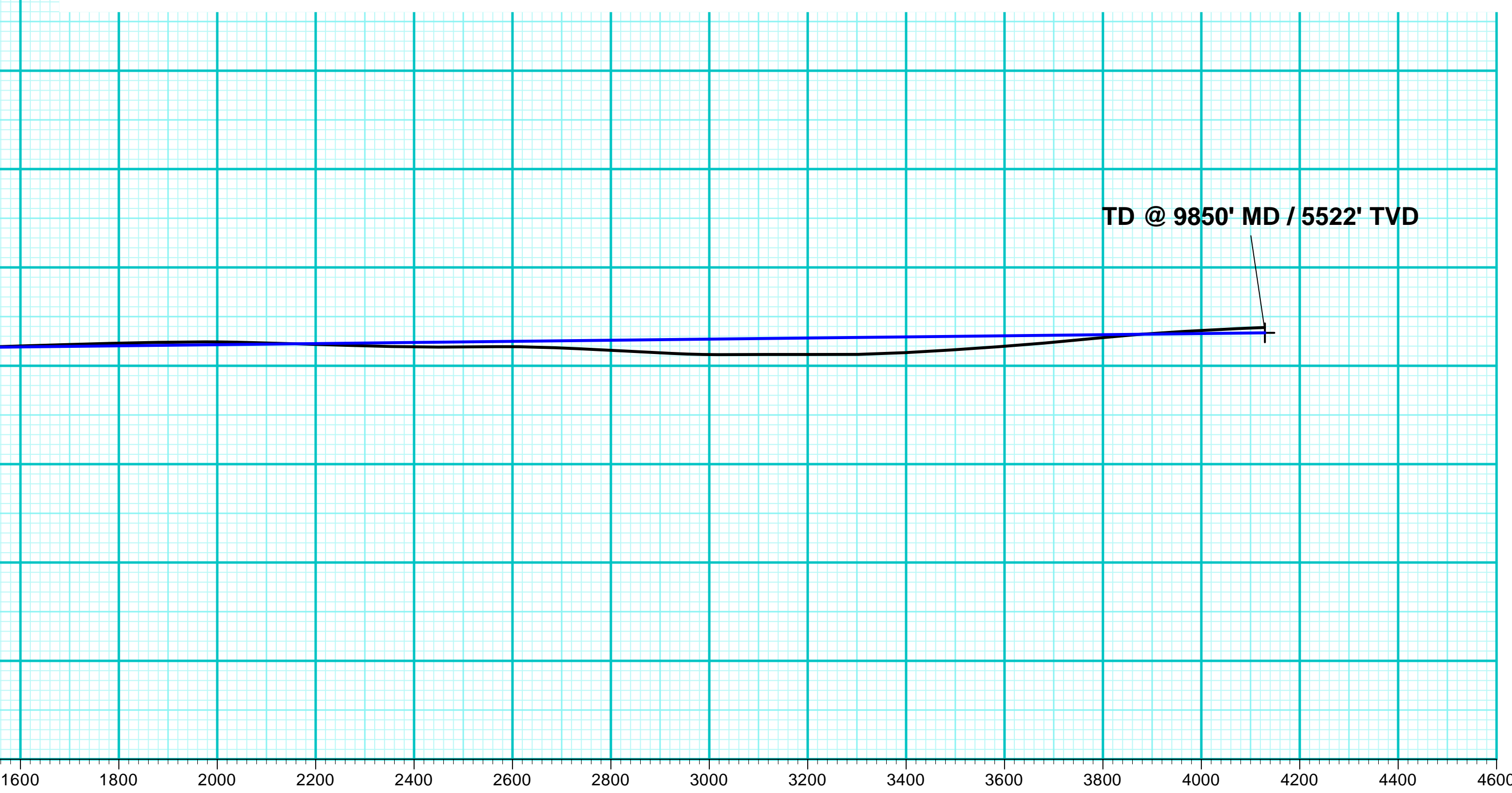
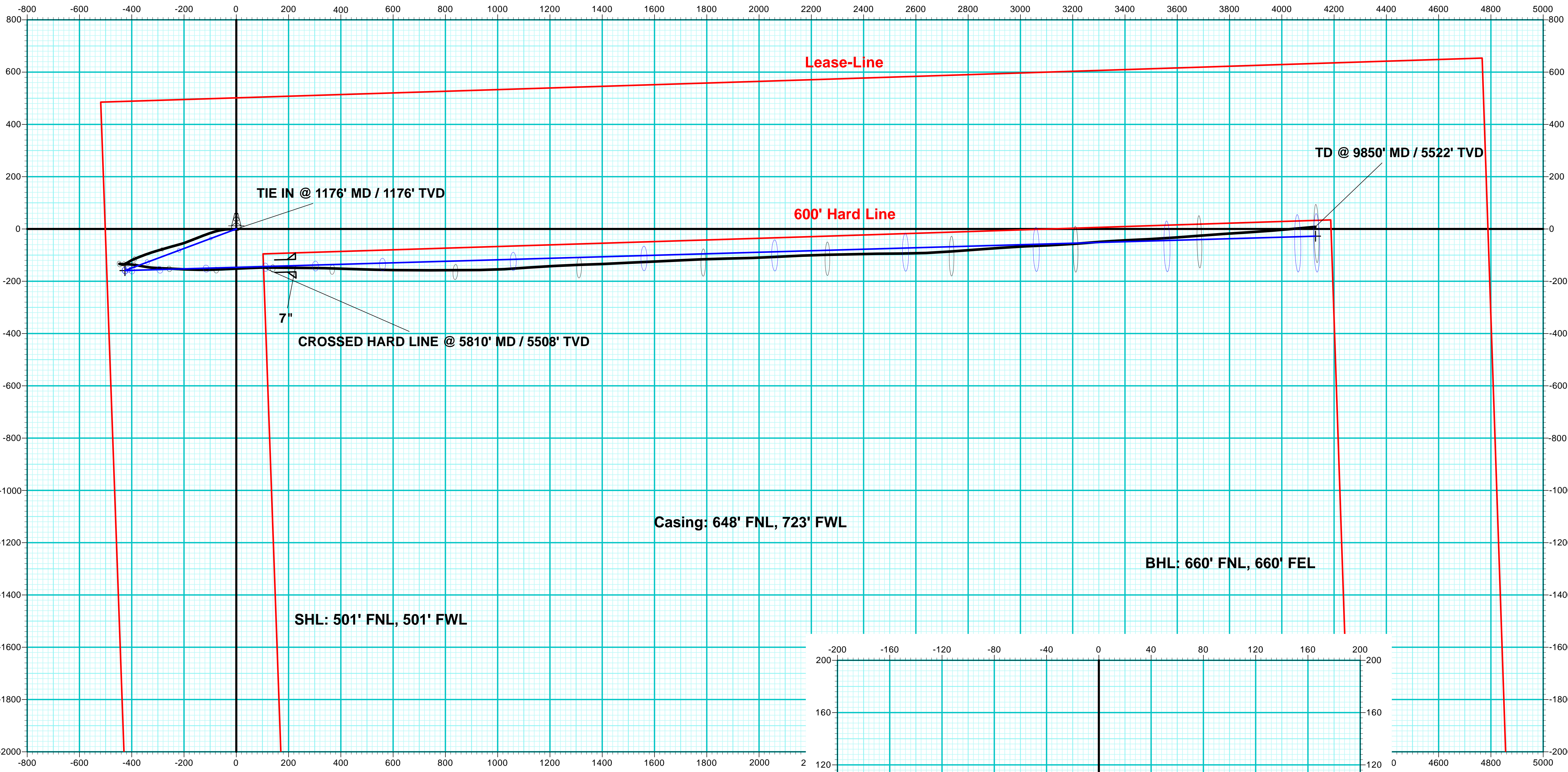
WELL DETAILS:		Castor Federal LD14-68HN			
+N/-S	+E/-W	Ground Level:		4672.0	
		North	East	Latitude	Longitude
0.0	0.0	1523054.52	3460144.88	40° 45' 26.430 N	103° 50' 20.340 W

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	Annotation	
5810.0	69.55	89.37	5507.9	-147.8	104.3	104.0	1044.7	CROSSED HARD LINE @ 5810' MD / 5508' TVD	
9850.0	92.50	84.70	5522.3	8.4	4128.4	4128.5	5073.9	TD @ 9850' MD / 5522' TVD	

DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	North	East	Latitude
TIE IN @ 1176' MD / 1176' TVD	1176.0	0.0	0.0	1523054.52	3460144.88	40° 45' 26.430 N
- plan hits target center						
VP Castor Federal LD14-68HN	4100.0	-159.0	-426.0	1522895.52	3459718.88	40° 45' 24.938 N
- plan hits target center						
PBHL Castor Federal LD14-68HN	5533.2	-27.6	4129.2	1523026.95	3464274.07	40° 45' 25.390 N
- plan hits target center						



Vertical Section at 90.38° (200 usft/in)