



Noble Energy Inc.

Weld County, CO

Sec 16, T9N, R58W, 6th PM

Timbro State LD16-65HN

Wellbore #1

Design: Wellbore #1 **FINAL**

DDC Survey Report

16 December, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Timbro State LD16-65HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4789.0usft (H&P #326)
Site:	Sec 16, T9N, R58W, 6th PM	MD Reference:	WELL @ 4789.0usft (H&P #326)
Well:	Timbro State LD16-65HN	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 16, T9N, R58W, 6th PM			
Site Position:		Northing:	1,519,245.91 usft	Latitude:	40° 44' 49.884 N
From:	Lat/Long	Easting:	3,454,267.11 usft	Longitude:	103° 51' 37.620 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.06 °

Well	Timbro State LD16-65HN					
Well Position	+N-S	0.0 usft	Northing:	1,521,513.56 usft	Latitude:	40° 45' 12.312 N
	+E-W	0.0 usft	Easting:	3,454,130.97 usft	Longitude:	103° 51' 38.844 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,759.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/3/2013	8.06	67.39	53,147

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	259.08	

Survey Program		Date	12/16/2013		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
365.0	1,203.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
1,301.0	9,702.0	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
365.0	0.80	46.40	365.0	1.8	1.8	-2.1	0.22	0.22	0.00
647.0	0.20	90.60	647.0	3.1	3.8	-4.3	0.24	-0.21	15.67
935.0	0.50	115.60	935.0	2.6	5.4	-5.8	0.11	0.10	8.68
FIRST MWD SURVEY'S @ 1203' MD / 1203' TVD									
1,203.0	0.30	28.10	1,203.0	2.7	6.8	-7.2	0.21	-0.07	-32.65
1,301.0	1.30	258.50	1,301.0	2.7	5.8	-6.2	1.54	1.02	-132.24
1,394.0	4.20	255.40	1,393.8	1.6	1.5	-1.8	3.12	3.12	-3.33
1,439.0	4.80	251.20	1,438.7	0.6	-1.9	1.7	1.52	1.33	-9.33
1,486.0	5.20	247.60	1,485.5	-0.9	-5.7	5.8	1.08	0.85	-7.66

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Well:	Timbro State LD16-65HN	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)
1,531.0	5.40	248.50	1,530.3	-2.4	-9.6	9.9	0.48	0.44	2.00
1,579.0	5.30	241.70	1,578.1	-4.3	-13.6	14.2	1.34	-0.21	-14.17
1,624.0	5.60	227.40	1,622.9	-6.8	-17.1	18.0	3.08	0.67	-31.78
1,671.0	6.40	217.20	1,669.7	-10.4	-20.3	22.0	2.83	1.70	-21.70
1,716.0	6.60	211.10	1,714.4	-14.6	-23.2	25.6	1.60	0.44	-13.56
1,764.0	8.40	193.90	1,762.0	-20.4	-25.5	28.9	5.96	3.75	-35.83
1,857.0	9.60	190.00	1,853.8	-34.6	-28.4	34.5	1.45	1.29	-4.19
1,949.0	9.30	190.50	1,944.6	-49.5	-31.1	39.9	0.34	-0.33	0.54
2,042.0	10.50	189.50	2,036.2	-65.2	-33.9	45.6	1.30	1.29	-1.08
2,135.0	10.60	191.20	2,127.6	-82.0	-37.0	51.8	0.35	0.11	1.83
2,227.0	10.30	193.50	2,218.1	-98.3	-40.5	58.4	0.56	-0.33	2.50
2,320.0	10.70	189.50	2,309.5	-114.9	-43.9	64.9	0.89	0.43	-4.30
2,413.0	10.60	189.50	2,400.9	-131.8	-46.7	70.9	0.11	-0.11	0.00
2,506.0	11.30	190.70	2,492.2	-149.2	-49.8	77.2	0.79	0.75	1.29
2,599.0	10.30	183.10	2,583.6	-166.5	-52.0	82.6	1.87	-1.08	-8.17
2,692.0	10.50	183.50	2,675.1	-183.2	-52.9	86.7	0.23	0.22	0.43
2,786.0	10.70	183.80	2,767.5	-200.5	-54.0	91.1	0.22	0.21	0.32
2,880.0	9.80	182.60	2,860.0	-217.2	-55.0	95.1	0.98	-0.96	-1.28
2,975.0	9.20	185.40	2,953.7	-232.8	-56.1	99.2	0.80	-0.63	2.95
3,069.0	9.50	193.10	3,046.4	-247.9	-58.5	104.4	1.37	0.32	8.19
3,164.0	9.60	193.50	3,140.1	-263.2	-62.2	110.9	0.13	0.11	0.42
3,258.0	10.30	192.80	3,232.7	-279.0	-65.8	117.5	0.76	0.74	-0.74
3,353.0	10.80	193.70	3,326.1	-295.9	-69.8	124.7	0.55	0.53	0.95
3,448.0	10.60	191.90	3,419.4	-313.1	-73.7	131.8	0.41	-0.21	-1.89
3,542.0	11.40	191.90	3,511.7	-330.7	-77.4	138.7	0.85	0.85	0.00
3,637.0	10.60	188.60	3,605.0	-348.5	-80.7	145.3	1.07	-0.84	-3.47
3,731.0	10.30	187.20	3,697.4	-365.4	-83.0	150.8	0.42	-0.32	-1.49
3,826.0	9.80	184.70	3,790.9	-381.9	-84.8	155.6	0.70	-0.53	-2.63
3,920.0	10.00	186.10	3,883.5	-398.0	-86.3	160.1	0.33	0.21	1.49
4,015.0	9.70	185.20	3,977.1	-414.1	-87.9	164.8	0.35	-0.32	-0.95
4,109.0	9.90	185.80	4,069.8	-430.1	-89.4	169.3	0.24	0.21	0.64
4,204.0	9.60	187.90	4,163.4	-446.0	-91.3	174.2	0.49	-0.32	2.21
4,298.0	9.30	189.60	4,256.1	-461.3	-93.7	179.4	0.44	-0.32	1.81
4,393.0	9.10	194.20	4,349.9	-476.1	-96.8	185.3	0.80	-0.21	4.84
4,487.0	9.90	194.00	4,442.6	-491.2	-100.6	191.8	0.85	0.85	-0.21
4,582.0	9.10	191.00	4,536.3	-506.5	-104.0	198.1	0.99	-0.84	-3.16
4,677.0	9.50	197.00	4,630.1	-521.4	-107.7	204.6	1.10	0.42	6.32
4,771.0	9.80	192.10	4,722.7	-536.6	-111.7	211.3	0.93	0.32	-5.21
4,866.0	10.80	189.10	4,816.2	-553.3	-114.8	217.5	1.19	1.05	-3.16
4,960.0	9.20	192.30	4,908.8	-569.3	-117.8	223.5	1.80	-1.70	3.40
5,055.0	10.00	194.40	5,002.4	-584.7	-121.4	230.0	0.92	0.84	2.21
5,149.0	8.80	192.30	5,095.2	-599.7	-125.0	236.4	1.33	-1.28	-2.23
5,244.0	9.90	187.00	5,188.9	-614.9	-127.5	241.7	1.47	1.16	-5.58

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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)
5,339.0	23.90	212.70	5,279.7	-639.3	-139.0	257.6	16.37	14.74	27.05
5,433.0	33.60	225.70	5,362.1	-673.6	-168.0	292.6	12.22	10.32	13.83
5,528.0	44.30	245.70	5,436.1	-705.9	-217.4	347.2	17.27	11.26	21.05
CROSSED HARDLINE @ 5622' MD / 5499.1' TVD									
5,622.0	51.70	255.70	5,499.1	-728.6	-283.2	416.2	11.14	7.87	10.64
5,717.0	51.60	256.80	5,558.0	-746.3	-355.6	490.6	0.91	-0.11	1.16
5,811.0	58.00	270.00	5,612.4	-754.7	-431.6	566.8	13.32	6.81	14.04
5,906.0	64.30	273.70	5,658.2	-751.9	-514.7	647.9	7.46	6.63	3.89
6,001.0	71.10	269.80	5,694.2	-749.3	-602.5	733.6	8.10	7.16	-4.11
6,089.0	79.40	265.00	5,716.6	-753.3	-687.4	817.7	10.80	9.43	-5.45
6,164.0	83.10	265.00	5,728.0	-759.7	-761.2	891.4	4.93	4.93	0.00
6,226.0	86.10	264.00	5,733.9	-765.6	-822.7	952.9	5.10	4.84	-1.61
6,319.0	87.80	263.50	5,738.8	-775.7	-915.0	1,045.4	1.91	1.83	-0.54
6,411.0	91.30	265.60	5,739.5	-784.5	-1,006.5	1,137.0	4.44	3.80	2.28
6,506.0	88.90	267.00	5,739.4	-790.6	-1,101.3	1,231.2	2.92	-2.53	1.47
6,601.0	88.00	267.00	5,741.9	-795.6	-1,196.2	1,325.3	0.95	-0.95	0.00
6,696.0	89.90	268.20	5,743.7	-799.6	-1,291.1	1,419.2	2.37	2.00	1.26
6,790.0	89.30	268.20	5,744.3	-802.5	-1,385.0	1,512.0	0.64	-0.64	0.00
6,885.0	89.70	269.60	5,745.2	-804.3	-1,480.0	1,605.6	1.53	0.42	1.47
6,979.0	89.40	269.30	5,745.9	-805.2	-1,574.0	1,698.1	0.45	-0.32	-0.32
7,074.0	89.60	269.10	5,746.7	-806.6	-1,669.0	1,791.6	0.30	0.21	-0.21
7,169.0	89.20	268.00	5,747.7	-809.0	-1,763.9	1,885.3	1.23	-0.42	-1.16
7,264.0	89.70	268.70	5,748.6	-811.7	-1,858.9	1,979.0	0.91	0.53	0.74
7,359.0	91.30	270.10	5,747.8	-812.7	-1,953.9	2,072.5	2.24	1.68	1.47
7,453.0	89.20	271.20	5,747.4	-811.6	-2,047.9	2,164.6	2.52	-2.23	1.17
7,547.0	87.60	270.00	5,750.0	-810.6	-2,141.8	2,256.6	2.13	-1.70	-1.28
7,642.0	88.40	270.30	5,753.3	-810.4	-2,236.7	2,349.8	0.90	0.84	0.32
7,736.0	88.90	268.60	5,755.5	-811.3	-2,330.7	2,442.2	1.88	0.53	-1.81
7,831.0	90.80	269.10	5,755.8	-813.2	-2,425.7	2,535.8	2.07	2.00	0.53
7,925.0	89.70	268.90	5,755.4	-814.8	-2,519.7	2,628.4	1.19	-1.17	-0.21
8,020.0	89.30	267.50	5,756.2	-817.8	-2,614.6	2,722.2	1.53	-0.42	-1.47
8,115.0	93.30	271.50	5,754.1	-818.7	-2,709.6	2,815.6	5.95	4.21	4.21
8,210.0	91.10	273.30	5,750.4	-814.7	-2,804.4	2,908.0	2.99	-2.32	1.89
8,304.0	90.60	272.60	5,749.0	-809.8	-2,898.3	2,999.2	0.92	-0.53	-0.74
8,399.0	90.20	271.70	5,748.4	-806.3	-2,993.2	3,091.7	1.04	-0.42	-0.95
8,493.0	88.20	271.90	5,749.7	-803.3	-3,087.1	3,183.4	2.14	-2.13	0.21
8,588.0	88.80	270.90	5,752.2	-801.0	-3,182.1	3,276.2	1.23	0.63	-1.05
8,682.0	88.60	270.90	5,754.3	-799.5	-3,276.0	3,368.2	0.21	-0.21	0.00
8,776.0	88.40	270.70	5,756.7	-798.2	-3,370.0	3,460.2	0.30	-0.21	-0.21
8,871.0	87.40	270.00	5,760.2	-797.6	-3,464.9	3,553.3	1.28	-1.05	-0.74
8,966.0	87.90	268.40	5,764.1	-799.0	-3,559.8	3,646.7	1.76	0.53	-1.68
9,060.0	88.90	267.90	5,766.7	-802.0	-3,653.7	3,739.5	1.19	1.06	-0.53
9,155.0	90.60	269.80	5,767.2	-803.9	-3,748.7	3,833.1	2.68	1.79	2.00
9,249.0	89.10	268.40	5,767.4	-805.4	-3,842.7	3,925.7	2.18	-1.60	-1.49

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Site:	Sec 16, T9N, R58W, 6th PM	MD Reference:	WELL @ 4789.0usft (H&P #326)
Well:	Timbro State LD16-65HN	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)
9,344.0	92.00	268.70	5,766.5	-807.8	-3,937.6	4,019.4	3.07	3.05	0.32
9,439.0	90.50	267.70	5,764.4	-810.8	-4,032.6	4,113.1	1.90	-1.58	-1.05
9,533.0	89.10	264.90	5,764.8	-816.8	-4,126.4	4,206.4	3.33	-1.49	-2.98
9,628.0	89.00	266.50	5,766.3	-824.0	-4,221.1	4,300.7	1.69	-0.11	1.68
9,638.0	88.60	266.10	5,766.5	-824.6	-4,231.1	4,310.7	5.66	-4.00	-4.00
TD @ 9702' MD / 5768.1' TVD									
9,702.0	88.60	266.10	5,768.1	-829.0	-4,294.9	4,374.2	0.00	0.00	0.00

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
1,203.0	1,203.0	2.7	6.8	FIRST MWD SURVEY'S @ 1203' MD / 1203' TVD	
5,622.0	5,499.1	-728.6	-283.2	CROSSED HARDLINE @ 5622' MD / 5499.1' TVD	
9,702.0	5,768.1	-829.0	-4,294.9	TD @ 9702' MD / 5768.1' TVD	

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

<u>Noble Energy</u> Company	<u>RM-13951</u> Job Number	<u>12/17/13</u> Date
<u>Sec16,T9N,R58W,6thPM</u> Lease	<u>Timbro State LD16-65HN</u> Well Name	<u>Weld, CO</u> County & State

API: 05-123-37489

Surveyed from a depth of: 1203 feet to 9702 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.

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: 2013.12.20 09:59:56 -06'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
Timbro State LD16-65HN
Weld County, CO
Rig: H&P #326
Created By: TIFFANI MIZELL
Date: 12/16/2013

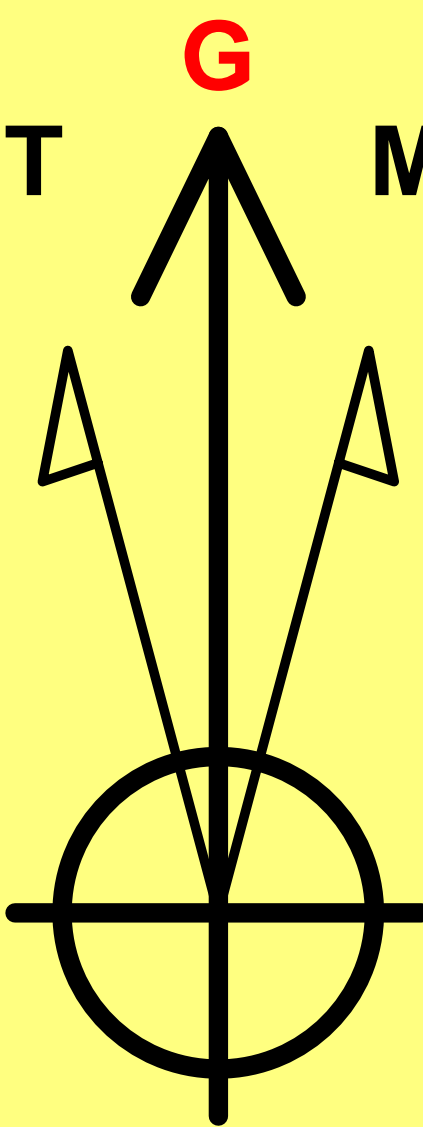
Timbro State LD16-65HN
Weld County, CO
Q130881 & RM-13951
Design #4

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

noble energy

DDC
The DIRECTIONAL DRILLING COMPANY



M Azimuths to Grid North

Magnetic North: 7.00°

Magnetic Field

Strength: 53147.1snT

Dip Angle: 67.39°

Date: 12/3/2013

Model: IGRF2010

ANNOTATIONS

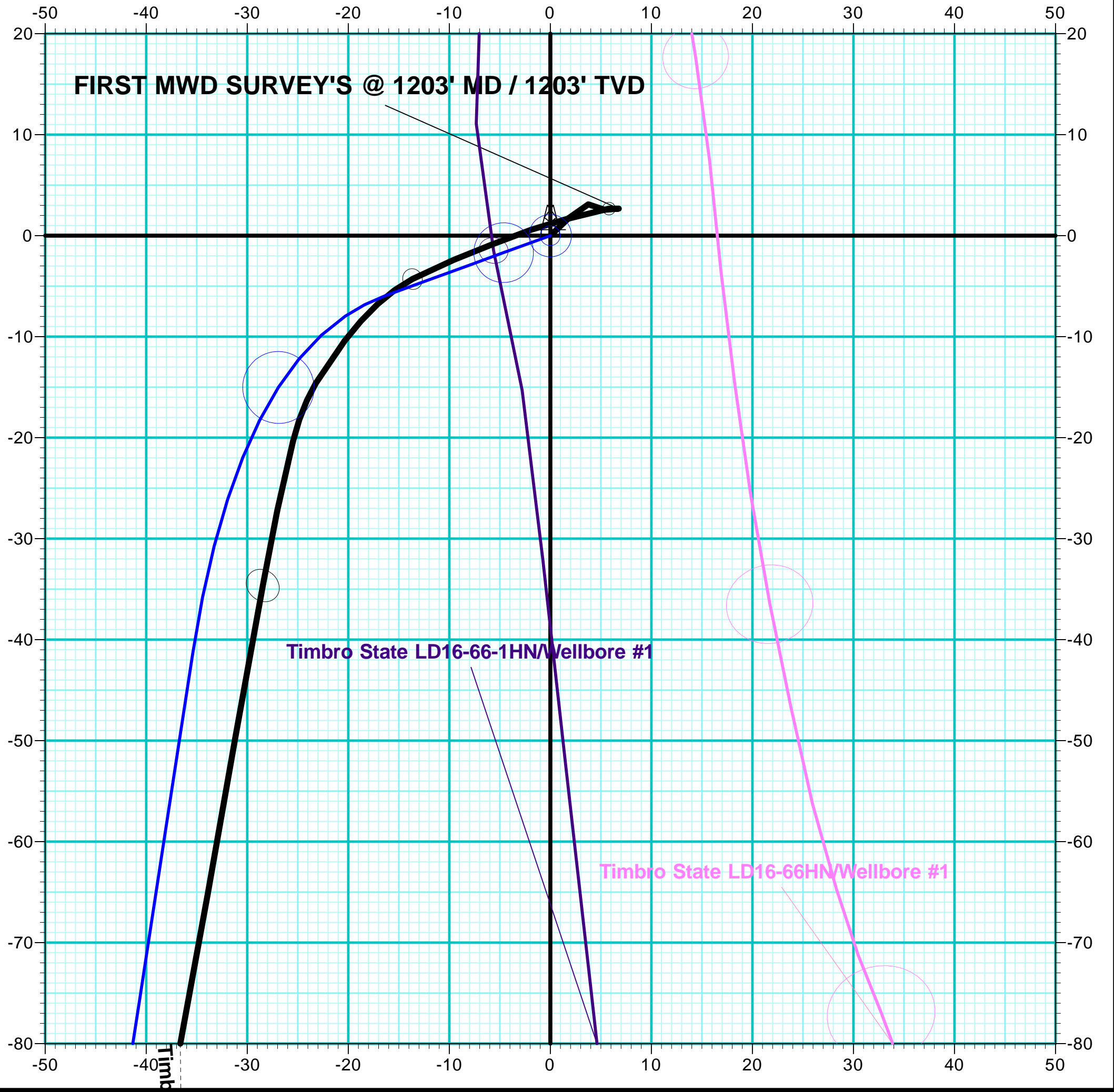
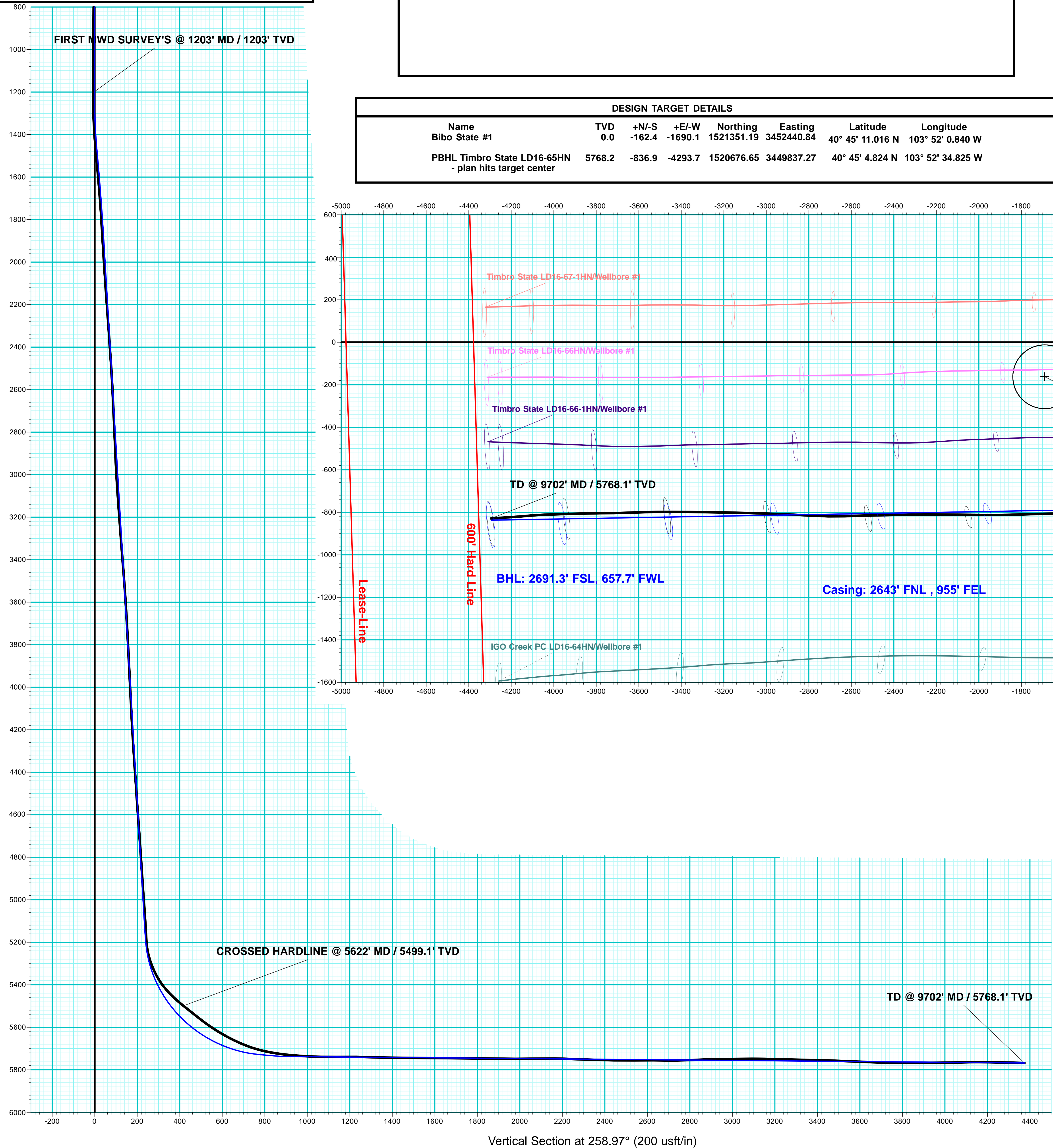
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
1203.0	0.30	28.10	1203.0	2.7	6.8	-7.2	8.6	FIRST MWD SURVEY'S @ 1203' MD / 1203' TVD
5622.0	51.70	255.70	5499.1	-728.6	-283.2	416.2	857.9	CROSSED HARDLINE @ 5622' MD / 5499.1' TVD
9702.0	88.60	266.10	5768.1	-829.0	-4294.9	4374.2	4876.1	TD @ 9702' MD / 5768.1' TVD

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Bibo State #1	0.0	-162.4	-1690.1	1521351.19	3452440.84	40° 45' 11.016 N	103° 52' 0.840 W
PBHL Timbro State LD16-65HN - plan hits target center	5768.2	-836.9	-4293.7	1520676.65	3449837.27	40° 45' 4.824 N	103° 52' 34.825 W

WELL DETAILS: Timbro State LD16-65HN

+N/-S	+E/-W	Ground Level:	4759.0
0.0	0.0	Northing	Easting
		1521513.55	3454130.97
		Latitude	Longitude
		40° 45' 12.312 N	103° 51' 38.844 W



Vertical Section at 258.97° (200 usft/in)