ENSIGN Directional

**Well Name: Long C20-21D**

Surface Location: Long C20-18 Pad Sec.20-T4N-R64W

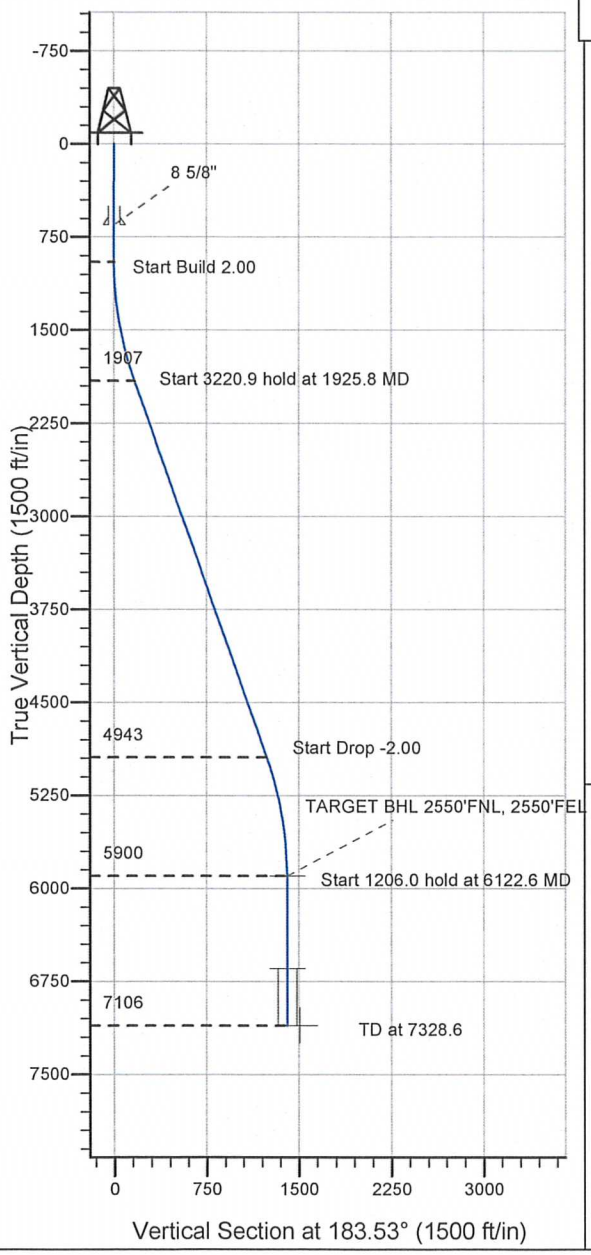
North American Datum 1983 US State Plane 1983 Colorado Northern Zone

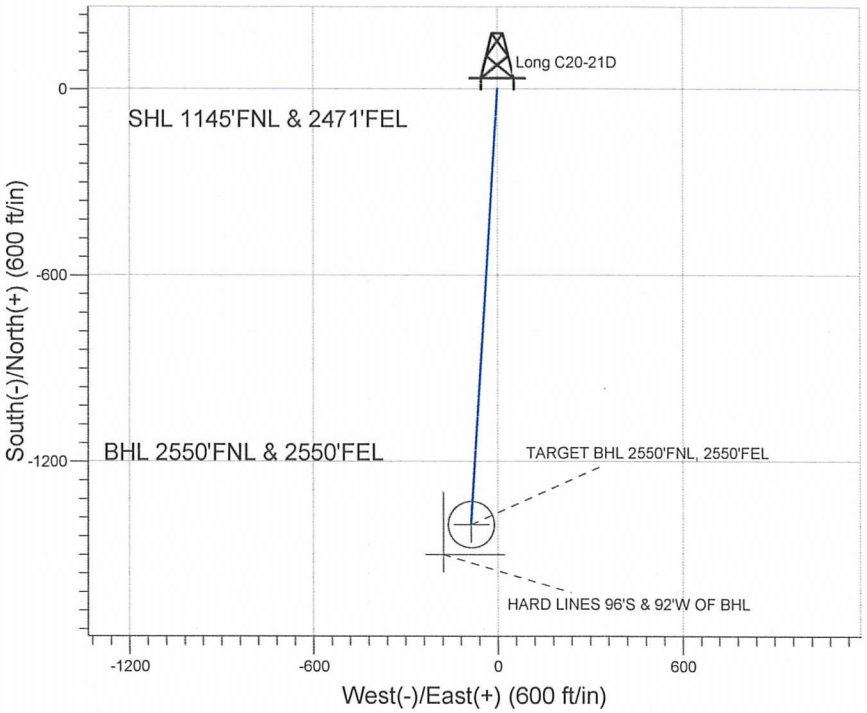
Ground Elevation: 4733.0

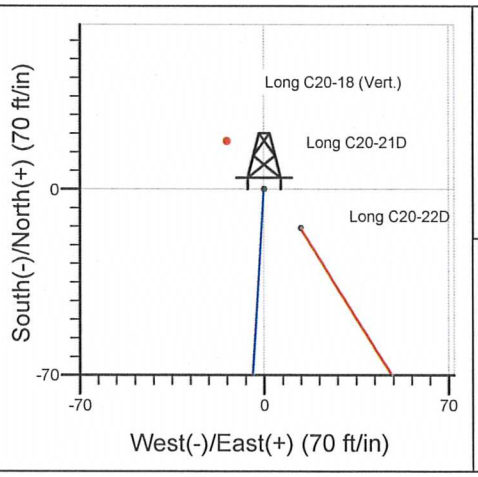
| +N/-S | +E/-W | Northing | Easting | Latitude | Longitude | Slot |
|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 1354215.39 | 3258263.05 | 40.302020 | -104.574020 | |

Original Well Elev WELL @ 4746.0ft (Original Well Elev)

# NOBLE ENERGY INC WELD COUNTY CO




Long C20-18 Pad Sec.20-T4N-R64W
Long C20-21D
Noble Long C20-21D Plan #1 (7-06-11)
9:36, July 07 2011


Azimuths to True North
Magnetic North: 8.75°

Magnetic Field
Strength: 53095.3snT
Dip Angle: 67.00°
Date: 7/6/2011
Model: IGRF2010

## WELLBORE TARGET DETAILS (LAT/LONG)

| Name | TVD | +N/-S | +E/-W | Latitude | Longitude | Shape |
|---|---|---|---|---|---|---|
| TARGET BHL 2550'FNL, 2550'FEL | 5900.0 | -1402.6 | -86.5 | 40.298170 | -104.574330 | Point |
| TARGET CIRCLE 2550'FNL & 2550'FEL | 6646.0 | -1402.6 | -86.5 | 40.298170 | -104.574330 | Circle (Radius: 75.0) |
| HARD LINES 96'S & 92'W OF BHL | 7106.0 | -1498.6 | -178.5 | 40.297906 | -104.574660 | Polygon |

## SECTION DETAILS

| Sec | MD | Inc | Azi | TVD | +N/-S | +E/-W | DLeg | TFace | VSec | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 2 | 950.0 | 0.00 | 0.00 | 950.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.0 | |
| 3 | 1925.8 | 19.52 | 183.53 | 1907.1 | -164.3 | -10.1 | 2.00 | 183.53 | 164.6 | |
| 4 | 5146.8 | 19.52 | 183.53 | 4942.9 | -1238.3 | -76.3 | 0.00 | 0.00 | 1240.6 | |
| 5 | 6122.6 | 0.00 | 0.00 | 5900.0 | -1402.6 | -86.5 | 2.00 | 180.00 | 1405.2 | TARGET BHL 2550'FNL, 2550'FEL |
| 6 | 7328.6 | 0.00 | 0.00 | 7106.0 | -1402.6 | -86.5 | 0.00 | 0.00 | 1405.2 | |

ENSIGN
Directional

# NOBLE ENERGY INC WELD COUNTY CO

**SEC.20-T4N-R64W**
**Long C20-18 Pad Sec.20-T4N-R64W**
**Long C20-21D**

**Wellbore #1**

**Plan: Noble Long C20-21D Plan #1 (7-06-11)**

# Standard Planning Report

**07 July, 2011**

noble energy

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Project** SEC.20-T4N-R64W, Weld County, Colorado

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | Using Well Reference Point |
| **Map Zone:** | Colorado Northern Zone | | Using geodetic scale factor |

**Site** Long C20-18 Pad Sec.20-T4N-R64W

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 1,354,233.47 ft | **Latitude:** | 40.302070 |
| **From:** | Lat/Long | **Easting:** | 3,258,248.92 ft | **Longitude:** | -104.574070 |
| **Position Uncertainty:** | 0.0 ft | **Slot Radius:** | " | **Grid Convergence:** | 0.60 ° |

**Well** Long C20-21D

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | -18.2 ft | **Northing:** | 1,354,215.39 ft | **Latitude:** | 40.302020 |
| | **+E/-W** | 13.9 ft | **Easting:** | 3,258,263.05 ft | **Longitude:** | -104.574020 |
| **Position Uncertainty** | | 0.0 ft | **Wellhead Elevation:** | ft | **Ground Level:** | 4,733.0 ft |

**Wellbore** Wellbore #1

| **Magnetics** | **Model Name** | **Sample Date** | **Declination (°)** | **Dip Angle (°)** | **Field Strength (nT)** |
|---|---|---|---|---|---|
| | IGRF2010 | 7/6/2011 | 8.75 | 67.00 | 53,095 |

**Design** Noble Long C20-21D Plan #1 (7-06-11)

**Audit Notes:**

| | | | | |
|---|---|---|---|---|
| **Version:** | **Phase:** | PROTOTYPE | **Tie On Depth:** | 0.0 |

| **Vertical Section:** | **Depth From (TVD) (ft)** | **+N/-S (ft)** | **+E/-W (ft)** | **Direction (°)** |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 183.53 |

**Plan Sections**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | TFO (°) | Target |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 950.0 | 0.00 | 0.00 | 950.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1,925.8 | 19.52 | 183.53 | 1,907.1 | -164.3 | -10.1 | 2.00 | 2.00 | 0.00 | 183.53 | |
| 5,146.8 | 19.52 | 183.53 | 4,942.9 | -1,238.3 | -76.3 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6,122.6 | 0.00 | 0.00 | 5,900.0 | -1,402.6 | -86.5 | 2.00 | -2.00 | 0.00 | 180.00 | TARGET BHL 255C |
| 7,328.6 | 0.00 | 0.00 | 7,106.0 | -1,402.6 | -86.5 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 40.0 | 0.00 | 0.00 | 40.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 80.0 | 0.00 | 0.00 | 80.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 120.0 | 0.00 | 0.00 | 120.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 160.0 | 0.00 | 0.00 | 160.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 240.0 | 0.00 | 0.00 | 240.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 280.0 | 0.00 | 0.00 | 280.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 320.0 | 0.00 | 0.00 | 320.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 360.0 | 0.00 | 0.00 | 360.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 400.0 | 0.00 | 0.00 | 400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 440.0 | 0.00 | 0.00 | 440.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 480.0 | 0.00 | 0.00 | 480.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 520.0 | 0.00 | 0.00 | 520.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 560.0 | 0.00 | 0.00 | 560.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 600.0 | 0.00 | 0.00 | 600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 640.0 | 0.00 | 0.00 | 640.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 650.0 | 0.00 | 0.00 | 650.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| **8 5/8"** | | | | | | | | | |
| 680.0 | 0.00 | 0.00 | 680.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 720.0 | 0.00 | 0.00 | 720.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 760.0 | 0.00 | 0.00 | 760.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 800.0 | 0.00 | 0.00 | 800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 840.0 | 0.00 | 0.00 | 840.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 880.0 | 0.00 | 0.00 | 880.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 920.0 | 0.00 | 0.00 | 920.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 950.0 | 0.00 | 0.00 | 950.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 960.0 | 0.20 | 183.53 | 960.0 | 0.0 | 0.0 | 0.0 | 2.00 | 2.00 | 0.00 |
| 1,000.0 | 1.00 | 183.53 | 1,000.0 | -0.4 | 0.0 | 0.4 | 2.00 | 2.00 | 0.00 |
| 1,040.0 | 1.80 | 183.53 | 1,040.0 | -1.4 | -0.1 | 1.4 | 2.00 | 2.00 | 0.00 |
| 1,080.0 | 2.60 | 183.53 | 1,080.0 | -2.9 | -0.2 | 2.9 | 2.00 | 2.00 | 0.00 |
| 1,120.0 | 3.40 | 183.53 | 1,119.9 | -5.0 | -0.3 | 5.0 | 2.00 | 2.00 | 0.00 |
| 1,160.0 | 4.20 | 183.53 | 1,159.8 | -7.7 | -0.5 | 7.7 | 2.00 | 2.00 | 0.00 |
| 1,200.0 | 5.00 | 183.53 | 1,199.7 | -10.9 | -0.7 | 10.9 | 2.00 | 2.00 | 0.00 |
| 1,240.0 | 5.80 | 183.53 | 1,239.5 | -14.6 | -0.9 | 14.7 | 2.00 | 2.00 | 0.00 |
| 1,280.0 | 6.60 | 183.53 | 1,279.3 | -18.9 | -1.2 | 19.0 | 2.00 | 2.00 | 0.00 |
| 1,320.0 | 7.40 | 183.53 | 1,319.0 | -23.8 | -1.5 | 23.9 | 2.00 | 2.00 | 0.00 |
| 1,360.0 | 8.20 | 183.53 | 1,358.6 | -29.2 | -1.8 | 29.3 | 2.00 | 2.00 | 0.00 |
| 1,400.0 | 9.00 | 183.53 | 1,398.2 | -35.2 | -2.2 | 35.3 | 2.00 | 2.00 | 0.00 |
| 1,440.0 | 9.80 | 183.53 | 1,437.6 | -41.7 | -2.6 | 41.8 | 2.00 | 2.00 | 0.00 |
| 1,480.0 | 10.60 | 183.53 | 1,477.0 | -48.8 | -3.0 | 48.9 | 2.00 | 2.00 | 0.00 |
| 1,520.0 | 11.40 | 183.53 | 1,516.2 | -56.4 | -3.5 | 56.5 | 2.00 | 2.00 | 0.00 |
| 1,560.0 | 12.20 | 183.53 | 1,555.4 | -64.6 | -4.0 | 64.7 | 2.00 | 2.00 | 0.00 |
| 1,600.0 | 13.00 | 183.53 | 1,594.4 | -73.3 | -4.5 | 73.4 | 2.00 | 2.00 | 0.00 |
| 1,640.0 | 13.80 | 183.53 | 1,633.3 | -82.5 | -5.1 | 82.7 | 2.00 | 2.00 | 0.00 |
| 1,680.0 | 14.60 | 183.53 | 1,672.1 | -92.3 | -5.7 | 92.5 | 2.00 | 2.00 | 0.00 |
| 1,720.0 | 15.40 | 183.53 | 1,710.8 | -102.7 | -6.3 | 102.9 | 2.00 | 2.00 | 0.00 |
| 1,760.0 | 16.20 | 183.53 | 1,749.3 | -113.5 | -7.0 | 113.7 | 2.00 | 2.00 | 0.00 |
| 1,800.0 | 17.00 | 183.53 | 1,787.6 | -124.9 | -7.7 | 125.2 | 2.00 | 2.00 | 0.00 |
| 1,840.0 | 17.80 | 183.53 | 1,825.8 | -136.9 | -8.4 | 137.1 | 2.00 | 2.00 | 0.00 |
| 1,880.0 | 18.60 | 183.53 | 1,863.8 | -149.3 | -9.2 | 149.6 | 2.00 | 2.00 | 0.00 |
| 1,920.0 | 19.40 | 183.53 | 1,901.6 | -162.3 | -10.0 | 162.7 | 2.00 | 2.00 | 0.00 |
| 1,925.8 | 19.52 | 183.53 | 1,907.1 | -164.3 | -10.1 | 164.6 | 2.00 | 2.00 | 0.00 |
| 1,960.0 | 19.52 | 183.53 | 1,939.3 | -175.7 | -10.8 | 176.0 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 2,000.0 | 19.52 | 183.53 | 1,977.0 | -189.0 | -11.7 | 189.4 | 0.00 | 0.00 | 0.00 |
| 2,040.0 | 19.52 | 183.53 | 2,014.7 | -202.4 | -12.5 | 202.7 | 0.00 | 0.00 | 0.00 |
| 2,080.0 | 19.52 | 183.53 | 2,052.4 | -215.7 | -13.3 | 216.1 | 0.00 | 0.00 | 0.00 |
| 2,120.0 | 19.52 | 183.53 | 2,090.1 | -229.0 | -14.1 | 229.5 | 0.00 | 0.00 | 0.00 |
| 2,160.0 | 19.52 | 183.53 | 2,127.8 | -242.4 | -14.9 | 242.8 | 0.00 | 0.00 | 0.00 |
| 2,200.0 | 19.52 | 183.53 | 2,165.5 | -255.7 | -15.8 | 256.2 | 0.00 | 0.00 | 0.00 |
| 2,240.0 | 19.52 | 183.53 | 2,203.2 | -269.0 | -16.6 | 269.6 | 0.00 | 0.00 | 0.00 |
| 2,280.0 | 19.52 | 183.53 | 2,240.9 | -282.4 | -17.4 | 282.9 | 0.00 | 0.00 | 0.00 |
| 2,320.0 | 19.52 | 183.53 | 2,278.6 | -295.7 | -18.2 | 296.3 | 0.00 | 0.00 | 0.00 |
| 2,360.0 | 19.52 | 183.53 | 2,316.3 | -309.1 | -19.1 | 309.6 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 19.52 | 183.53 | 2,354.0 | -322.4 | -19.9 | 323.0 | 0.00 | 0.00 | 0.00 |
| 2,440.0 | 19.52 | 183.53 | 2,391.7 | -335.7 | -20.7 | 336.4 | 0.00 | 0.00 | 0.00 |
| 2,480.0 | 19.52 | 183.53 | 2,429.4 | -349.1 | -21.5 | 349.7 | 0.00 | 0.00 | 0.00 |
| 2,520.0 | 19.52 | 183.53 | 2,467.1 | -362.4 | -22.3 | 363.1 | 0.00 | 0.00 | 0.00 |
| 2,560.0 | 19.52 | 183.53 | 2,504.8 | -375.7 | -23.2 | 376.5 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 19.52 | 183.53 | 2,542.5 | -389.1 | -24.0 | 389.8 | 0.00 | 0.00 | 0.00 |
| 2,640.0 | 19.52 | 183.53 | 2,580.2 | -402.4 | -24.8 | 403.2 | 0.00 | 0.00 | 0.00 |
| 2,680.0 | 19.52 | 183.53 | 2,617.9 | -415.8 | -25.6 | 416.5 | 0.00 | 0.00 | 0.00 |
| 2,720.0 | 19.52 | 183.53 | 2,655.6 | -429.1 | -26.5 | 429.9 | 0.00 | 0.00 | 0.00 |
| 2,760.0 | 19.52 | 183.53 | 2,693.3 | -442.4 | -27.3 | 443.3 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 19.52 | 183.53 | 2,731.0 | -455.8 | -28.1 | 456.6 | 0.00 | 0.00 | 0.00 |
| 2,840.0 | 19.52 | 183.53 | 2,768.7 | -469.1 | -28.9 | 470.0 | 0.00 | 0.00 | 0.00 |
| 2,880.0 | 19.52 | 183.53 | 2,806.4 | -482.4 | -29.7 | 483.4 | 0.00 | 0.00 | 0.00 |
| 2,920.0 | 19.52 | 183.53 | 2,844.1 | -495.8 | -30.6 | 496.7 | 0.00 | 0.00 | 0.00 |
| 2,960.0 | 19.52 | 183.53 | 2,881.8 | -509.1 | -31.4 | 510.1 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 19.52 | 183.53 | 2,919.5 | -522.5 | -32.2 | 523.5 | 0.00 | 0.00 | 0.00 |
| 3,040.0 | 19.52 | 183.53 | 2,957.2 | -535.8 | -33.0 | 536.8 | 0.00 | 0.00 | 0.00 |
| 3,080.0 | 19.52 | 183.53 | 2,994.9 | -549.1 | -33.9 | 550.2 | 0.00 | 0.00 | 0.00 |
| 3,120.0 | 19.52 | 183.53 | 3,032.6 | -562.5 | -34.7 | 563.5 | 0.00 | 0.00 | 0.00 |
| 3,160.0 | 19.52 | 183.53 | 3,070.3 | -575.8 | -35.5 | 576.9 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 19.52 | 183.53 | 3,108.0 | -589.1 | -36.3 | 590.3 | 0.00 | 0.00 | 0.00 |
| 3,240.0 | 19.52 | 183.53 | 3,145.7 | -602.5 | -37.1 | 603.6 | 0.00 | 0.00 | 0.00 |
| 3,280.0 | 19.52 | 183.53 | 3,183.4 | -615.8 | -38.0 | 617.0 | 0.00 | 0.00 | 0.00 |
| 3,320.0 | 19.52 | 183.53 | 3,221.1 | -629.2 | -38.8 | 630.4 | 0.00 | 0.00 | 0.00 |
| 3,360.0 | 19.52 | 183.53 | 3,258.8 | -642.5 | -39.6 | 643.7 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 19.52 | 183.53 | 3,296.5 | -655.8 | -40.4 | 657.1 | 0.00 | 0.00 | 0.00 |
| 3,440.0 | 19.52 | 183.53 | 3,334.2 | -669.2 | -41.3 | 670.4 | 0.00 | 0.00 | 0.00 |
| 3,480.0 | 19.52 | 183.53 | 3,371.9 | -682.5 | -42.1 | 683.8 | 0.00 | 0.00 | 0.00 |
| 3,520.0 | 19.52 | 183.53 | 3,409.6 | -695.8 | -42.9 | 697.2 | 0.00 | 0.00 | 0.00 |
| 3,560.0 | 19.52 | 183.53 | 3,447.3 | -709.2 | -43.7 | 710.5 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 19.52 | 183.53 | 3,485.1 | -722.5 | -44.5 | 723.9 | 0.00 | 0.00 | 0.00 |
| 3,640.0 | 19.52 | 183.53 | 3,522.8 | -735.9 | -45.4 | 737.3 | 0.00 | 0.00 | 0.00 |
| 3,680.0 | 19.52 | 183.53 | 3,560.5 | -749.2 | -46.2 | 750.6 | 0.00 | 0.00 | 0.00 |
| 3,720.0 | 19.52 | 183.53 | 3,598.2 | -762.5 | -47.0 | 764.0 | 0.00 | 0.00 | 0.00 |
| 3,760.0 | 19.52 | 183.53 | 3,635.9 | -775.9 | -47.8 | 777.3 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 19.52 | 183.53 | 3,673.6 | -789.2 | -48.7 | 790.7 | 0.00 | 0.00 | 0.00 |
| 3,840.0 | 19.52 | 183.53 | 3,711.3 | -802.6 | -49.5 | 804.1 | 0.00 | 0.00 | 0.00 |
| 3,880.0 | 19.52 | 183.53 | 3,749.0 | -815.9 | -50.3 | 817.4 | 0.00 | 0.00 | 0.00 |
| 3,920.0 | 19.52 | 183.53 | 3,786.7 | -829.2 | -51.1 | 830.8 | 0.00 | 0.00 | 0.00 |
| 3,960.0 | 19.52 | 183.53 | 3,824.4 | -842.6 | -51.9 | 844.2 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 19.52 | 183.53 | 3,862.1 | -855.9 | -52.8 | 857.5 | 0.00 | 0.00 | 0.00 |
| 4,040.0 | 19.52 | 183.53 | 3,899.8 | -869.2 | -53.6 | 870.9 | 0.00 | 0.00 | 0.00 |
| 4,080.0 | 19.52 | 183.53 | 3,937.5 | -882.6 | -54.4 | 884.3 | 0.00 | 0.00 | 0.00 |
| 4,120.0 | 19.52 | 183.53 | 3,975.2 | -895.9 | -55.2 | 897.6 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 4,160.0 | 19.52 | 183.53 | 4,012.9 | -909.3 | -56.1 | 911.0 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 19.52 | 183.53 | 4,050.6 | -922.6 | -56.9 | 924.3 | 0.00 | 0.00 | 0.00 |
| 4,240.0 | 19.52 | 183.53 | 4,088.3 | -935.9 | -57.7 | 937.7 | 0.00 | 0.00 | 0.00 |
| 4,280.0 | 19.52 | 183.53 | 4,126.0 | -949.3 | -58.5 | 951.1 | 0.00 | 0.00 | 0.00 |
| 4,320.0 | 19.52 | 183.53 | 4,163.7 | -962.6 | -59.3 | 964.4 | 0.00 | 0.00 | 0.00 |
| 4,360.0 | 19.52 | 183.53 | 4,201.4 | -975.9 | -60.2 | 977.8 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 19.52 | 183.53 | 4,239.1 | -989.3 | -61.0 | 991.2 | 0.00 | 0.00 | 0.00 |
| 4,440.0 | 19.52 | 183.53 | 4,276.8 | -1,002.6 | -61.8 | 1,004.5 | 0.00 | 0.00 | 0.00 |
| 4,480.0 | 19.52 | 183.53 | 4,314.5 | -1,016.0 | -62.6 | 1,017.9 | 0.00 | 0.00 | 0.00 |
| 4,520.0 | 19.52 | 183.53 | 4,352.2 | -1,029.3 | -63.5 | 1,031.2 | 0.00 | 0.00 | 0.00 |
| 4,560.0 | 19.52 | 183.53 | 4,389.9 | -1,042.6 | -64.3 | 1,044.6 | 0.00 | 0.00 | 0.00 |
| 4,600.0 | 19.52 | 183.53 | 4,427.6 | -1,056.0 | -65.1 | 1,058.0 | 0.00 | 0.00 | 0.00 |
| 4,640.0 | 19.52 | 183.53 | 4,465.3 | -1,069.3 | -65.9 | 1,071.3 | 0.00 | 0.00 | 0.00 |
| 4,680.0 | 19.52 | 183.53 | 4,503.0 | -1,082.6 | -66.7 | 1,084.7 | 0.00 | 0.00 | 0.00 |
| 4,720.0 | 19.52 | 183.53 | 4,540.7 | -1,096.0 | -67.6 | 1,098.1 | 0.00 | 0.00 | 0.00 |
| 4,760.0 | 19.52 | 183.53 | 4,578.4 | -1,109.3 | -68.4 | 1,111.4 | 0.00 | 0.00 | 0.00 |
| 4,800.0 | 19.52 | 183.53 | 4,616.1 | -1,122.7 | -69.2 | 1,124.8 | 0.00 | 0.00 | 0.00 |
| 4,840.0 | 19.52 | 183.53 | 4,653.8 | -1,136.0 | -70.0 | 1,138.2 | 0.00 | 0.00 | 0.00 |
| 4,880.0 | 19.52 | 183.53 | 4,691.5 | -1,149.3 | -70.9 | 1,151.5 | 0.00 | 0.00 | 0.00 |
| 4,920.0 | 19.52 | 183.53 | 4,729.2 | -1,162.7 | -71.7 | 1,164.9 | 0.00 | 0.00 | 0.00 |
| 4,960.0 | 19.52 | 183.53 | 4,766.9 | -1,176.0 | -72.5 | 1,178.2 | 0.00 | 0.00 | 0.00 |
| 5,000.0 | 19.52 | 183.53 | 4,804.6 | -1,189.3 | -73.3 | 1,191.6 | 0.00 | 0.00 | 0.00 |
| 5,040.0 | 19.52 | 183.53 | 4,842.3 | -1,202.7 | -74.1 | 1,205.0 | 0.00 | 0.00 | 0.00 |
| 5,080.0 | 19.52 | 183.53 | 4,880.0 | -1,216.0 | -75.0 | 1,218.3 | 0.00 | 0.00 | 0.00 |
| 5,120.0 | 19.52 | 183.53 | 4,917.7 | -1,229.4 | -75.8 | 1,231.7 | 0.00 | 0.00 | 0.00 |
| 5,146.8 | 19.52 | 183.53 | 4,942.9 | -1,238.3 | -76.3 | 1,240.6 | 0.00 | 0.00 | 0.00 |
| 5,160.0 | 19.25 | 183.53 | 4,955.4 | -1,242.7 | -76.6 | 1,245.0 | 2.00 | -2.00 | 0.00 |
| 5,200.0 | 18.45 | 183.53 | 4,993.3 | -1,255.6 | -77.4 | 1,258.0 | 2.00 | -2.00 | 0.00 |
| 5,240.0 | 17.65 | 183.53 | 5,031.3 | -1,267.9 | -78.2 | 1,270.3 | 2.00 | -2.00 | 0.00 |
| 5,280.0 | 16.85 | 183.53 | 5,069.5 | -1,279.8 | -78.9 | 1,282.2 | 2.00 | -2.00 | 0.00 |
| 5,320.0 | 16.05 | 183.53 | 5,107.9 | -1,291.1 | -79.6 | 1,293.5 | 2.00 | -2.00 | 0.00 |
| 5,360.0 | 15.25 | 183.53 | 5,146.4 | -1,301.9 | -80.3 | 1,304.3 | 2.00 | -2.00 | 0.00 |
| 5,400.0 | 14.45 | 183.53 | 5,185.1 | -1,312.1 | -80.9 | 1,314.6 | 2.00 | -2.00 | 0.00 |
| 5,440.0 | 13.65 | 183.53 | 5,223.9 | -1,321.8 | -81.5 | 1,324.3 | 2.00 | -2.00 | 0.00 |
| 5,480.0 | 12.85 | 183.53 | 5,262.8 | -1,330.9 | -82.1 | 1,333.5 | 2.00 | -2.00 | 0.00 |
| 5,520.0 | 12.05 | 183.53 | 5,301.9 | -1,339.5 | -82.6 | 1,342.1 | 2.00 | -2.00 | 0.00 |
| 5,560.0 | 11.25 | 183.53 | 5,341.0 | -1,347.6 | -83.1 | 1,350.2 | 2.00 | -2.00 | 0.00 |
| 5,600.0 | 10.45 | 183.53 | 5,380.3 | -1,355.1 | -83.5 | 1,357.7 | 2.00 | -2.00 | 0.00 |
| 5,640.0 | 9.65 | 183.53 | 5,419.7 | -1,362.1 | -84.0 | 1,364.7 | 2.00 | -2.00 | 0.00 |
| 5,680.0 | 8.85 | 183.53 | 5,459.2 | -1,368.5 | -84.4 | 1,371.1 | 2.00 | -2.00 | 0.00 |
| 5,720.0 | 8.05 | 183.53 | 5,498.7 | -1,374.4 | -84.7 | 1,377.0 | 2.00 | -2.00 | 0.00 |
| 5,760.0 | 7.25 | 183.53 | 5,538.4 | -1,379.7 | -85.1 | 1,382.3 | 2.00 | -2.00 | 0.00 |
| 5,800.0 | 6.45 | 183.53 | 5,578.1 | -1,384.5 | -85.4 | 1,387.1 | 2.00 | -2.00 | 0.00 |
| 5,840.0 | 5.65 | 183.53 | 5,617.9 | -1,388.7 | -85.6 | 1,391.3 | 2.00 | -2.00 | 0.00 |
| 5,880.0 | 4.85 | 183.53 | 5,657.7 | -1,392.3 | -85.8 | 1,395.0 | 2.00 | -2.00 | 0.00 |
| 5,920.0 | 4.05 | 183.53 | 5,697.6 | -1,395.4 | -86.0 | 1,398.1 | 2.00 | -2.00 | 0.00 |
| 5,960.0 | 3.25 | 183.53 | 5,737.5 | -1,398.0 | -86.2 | 1,400.6 | 2.00 | -2.00 | 0.00 |
| 6,000.0 | 2.45 | 183.53 | 5,777.5 | -1,399.9 | -86.3 | 1,402.6 | 2.00 | -2.00 | 0.00 |
| 6,040.0 | 1.65 | 183.53 | 5,817.4 | -1,401.4 | -86.4 | 1,404.0 | 2.00 | -2.00 | 0.00 |
| 6,080.0 | 0.85 | 183.53 | 5,857.4 | -1,402.2 | -86.5 | 1,404.9 | 2.00 | -2.00 | 0.00 |
| 6,120.0 | 0.05 | 183.53 | 5,897.4 | -1,402.6 | -86.5 | 1,405.2 | 2.00 | -2.00 | 0.00 |
| 6,122.6 | 0.00 | 0.00 | 5,900.0 | -1,402.6 | -86.5 | 1,405.2 | 2.00 | -2.00 | 6,849.36 |
| **TARGET BHL 2550'FNL, 2550'FEL** | | | | | | | | | |
| 6,160.0 | 0.00 | 0.00 | 5,937.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 6,200.0 | 0.00 | 0.00 | 5,977.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,240.0 | 0.00 | 0.00 | 6,017.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,280.0 | 0.00 | 0.00 | 6,057.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,320.0 | 0.00 | 0.00 | 6,097.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,360.0 | 0.00 | 0.00 | 6,137.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,400.0 | 0.00 | 0.00 | 6,177.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,440.0 | 0.00 | 0.00 | 6,217.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,480.0 | 0.00 | 0.00 | 6,257.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,520.0 | 0.00 | 0.00 | 6,297.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,560.0 | 0.00 | 0.00 | 6,337.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,600.0 | 0.00 | 0.00 | 6,377.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,640.0 | 0.00 | 0.00 | 6,417.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,680.0 | 0.00 | 0.00 | 6,457.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,720.0 | 0.00 | 0.00 | 6,497.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,760.0 | 0.00 | 0.00 | 6,537.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,800.0 | 0.00 | 0.00 | 6,577.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,840.0 | 0.00 | 0.00 | 6,617.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,868.6 | 0.00 | 0.00 | 6,646.0 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| **NIOBRARA - TARGET CIRCLE 2550'FNL & 2550'FEL** | | | | | | | | | |
| 6,880.0 | 0.00 | 0.00 | 6,657.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,920.0 | 0.00 | 0.00 | 6,697.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 6,960.0 | 0.00 | 0.00 | 6,737.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,000.0 | 0.00 | 0.00 | 6,777.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,040.0 | 0.00 | 0.00 | 6,817.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,080.0 | 0.00 | 0.00 | 6,857.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,120.0 | 0.00 | 0.00 | 6,897.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,160.0 | 0.00 | 0.00 | 6,937.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,178.6 | 0.00 | 0.00 | 6,956.0 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| **CODELL** | | | | | | | | | |
| 7,200.0 | 0.00 | 0.00 | 6,977.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,240.0 | 0.00 | 0.00 | 7,017.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,280.0 | 0.00 | 0.00 | 7,057.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,320.0 | 0.00 | 0.00 | 7,097.4 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| 7,328.6 | 0.00 | 0.00 | 7,106.0 | -1,402.6 | -86.5 | 1,405.2 | 0.00 | 0.00 | 0.00 |
| **HARD LINES 96'S & 92'W OF BHL** | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Database:** | Landmark | **Local Co-ordinate Reference:** | Well Long C20-21D |
| **Company:** | NOBLE ENERGY INC WELD COUNTY CO | **TVD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Project:** | SEC.20-T4N-R64W | **MD Reference:** | WELL @ 4746.0ft (Original Well Elev) |
| **Site:** | Long C20-18 Pad Sec.20-T4N-R64W | **North Reference:** | True |
| **Well:** | Long C20-21D | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | Wellbore #1 | | |
| **Design:** | Noble Long C20-21D Plan #1 (7-06-11) | | |

**Targets**

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| HARD LINES 96'S & S | 0.00 | 0.00 | 7,106.0 | -1,498.6 | -178.5 | 1,352,715.09 | 3,258,100.22 | 40.297906 | -104.574660 |
| - plan misses target center by 133.0ft at 7328.6ft MD (7106.0 TVD, -1402.6 N, -86.5 E) | | | | | | | | | |
| - Polygon | | | | | | | | | |
| Point 1 | | | 7,106.0 | 0.0 | 0.0 | 1,352,715.09 | 3,258,100.22 | | |
| Point 2 | | | 7,106.0 | 200.0 | 0.0 | 1,352,915.07 | 3,258,098.13 | | |
| Point 3 | | | 7,106.0 | 0.0 | 0.0 | 1,352,715.09 | 3,258,100.22 | | |
| Point 4 | | | 7,106.0 | 0.0 | 200.0 | 1,352,717.18 | 3,258,300.20 | | |
| TARGET BHL 2550'F | 0.00 | 0.00 | 5,900.0 | -1,402.6 | -86.5 | 1,352,812.07 | 3,258,191.23 | 40.298170 | -104.574330 |
| - plan hits target center | | | | | | | | | |
| - Point | | | | | | | | | |
| TARGET CIRCLE 25 | 0.00 | 0.00 | 6,646.0 | -1,402.6 | -86.5 | 1,352,812.07 | 3,258,191.23 | 40.298170 | -104.574330 |
| - plan hits target center | | | | | | | | | |
| - Circle (radius 75.0) | | | | | | | | | |

**Casing Points**

| Measured Depth (ft) | Vertical Depth (ft) | Name | Casing Diameter (") | Hole Diameter (") |
|---|---|---|---|---|
| 650.0 | 650.0 | 8 5/8" | 8-5/8 | 12-1/4 |

**Formations**

| Measured Depth (ft) | Vertical Depth (ft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 6,868.6 | 6,646.0 | NIOBRARA | | 0.00 | |
| 7,178.6 | 6,956.0 | CODELL | | 0.00 | |