

MALLARD EXPLORATION

WELD COUNTY, COLORADO (NAD 83)

SE NW SEC. 31 T9N R59W 6th P.M.

SHULL FED 31-32-5HC

ORIGINAL WELLBORE

17 December, 2017

Plan: PROPOSAL #1





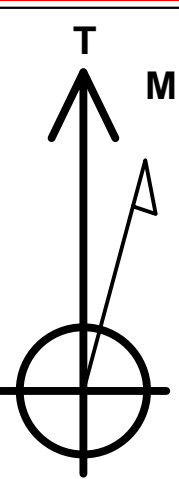
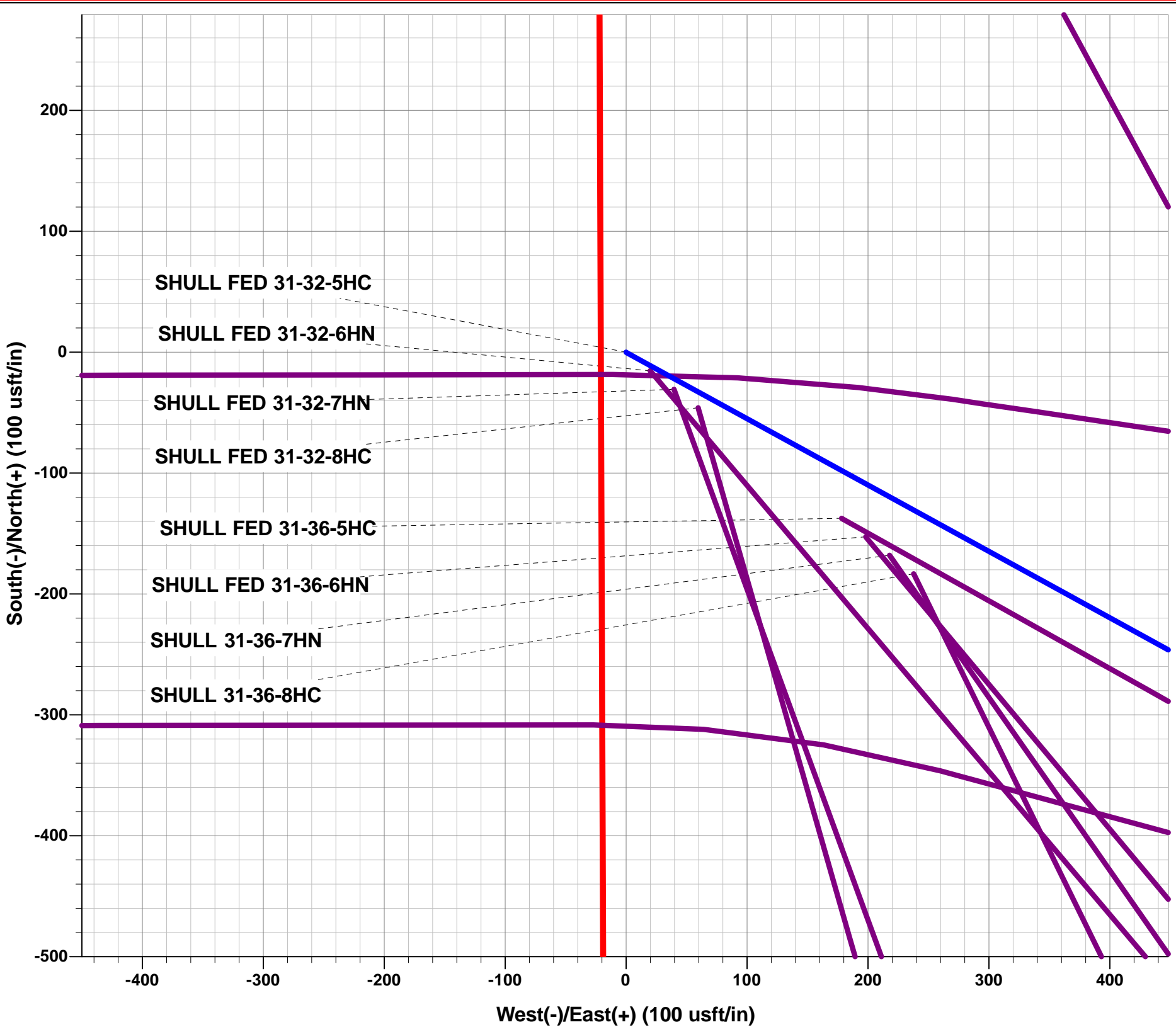
Project: WELD COUNTY, COLORADO (NAD 83)
Site: SE NW SEC. 31 T9N R59W 6th P.M.
Well: SHULL FED 31-32-5HC
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #1

ANNOTATIONS

| TVD | MD | Inc | Azi | +N/-S | +E/-W | VSec | Dep | Annotation |
|---------|----------|-------|--------|---------|---------|---------|---------|--|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | SHL: 1746ft FNL & 2070ft FWL of Sec 31 |
| 1750.00 | 1750.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | START NUDGE (2°/100ft BUR) |
| 2345.62 | 2350.00 | 12.00 | 118.76 | -30.12 | 54.88 | 55.77 | 62.60 | EOB TO 12° INC |
| 4417.56 | 4468.22 | 12.00 | 118.76 | -242.03 | 440.95 | 448.10 | 503.01 | END OF TANGENT |
| 5013.18 | 5068.22 | 0.00 | 0.00 | -272.15 | 495.83 | 503.87 | 565.61 | EOD TO VERTICAL |
| 5717.04 | 5772.08 | 0.00 | 0.00 | -272.15 | 495.83 | 503.87 | 565.61 | KOP (10°/100ft BUR) |
| 6290.00 | 6672.08 | 90.00 | 89.78 | -269.95 | 1068.78 | 1076.49 | 1138.57 | HZ LP: 2015ft FNL & 2140ft FEL of Sec 31 |
| 6290.00 | 13605.50 | 90.00 | 89.78 | -243.16 | 8002.15 | 8005.85 | 8071.99 | BHL: 2015ft FNL & 460ft FEL of Sec 32 |

WELLBORE TARGET DETAILS (LAT/LONG)

| Name | TVD | +N/-S | +E/-W | Latitude | Longitude |
|-----------------------------|---------|---------|---------|-----------|-------------|
| KOP - SHULL FED 31-32-5HC | 5717.04 | -272.15 | 495.83 | 40.708423 | -104.021075 |
| HZ LP - SHULL FED 31-32-5HC | 6290.00 | -269.95 | 1068.78 | 40.708429 | -104.019008 |
| BHL - SHULL FED 31-32-5HC | 6290.00 | -243.16 | 8002.15 | 40.708499 | -103.994000 |



Azimuths to True North
Magnetic North: 7.78°

Magnetic Field
Strength: 52569.7snT
Dip Angle: 67.20°
Date: 17/12/2017
Model: IGRF2015

FORMATION TOP DETAILS

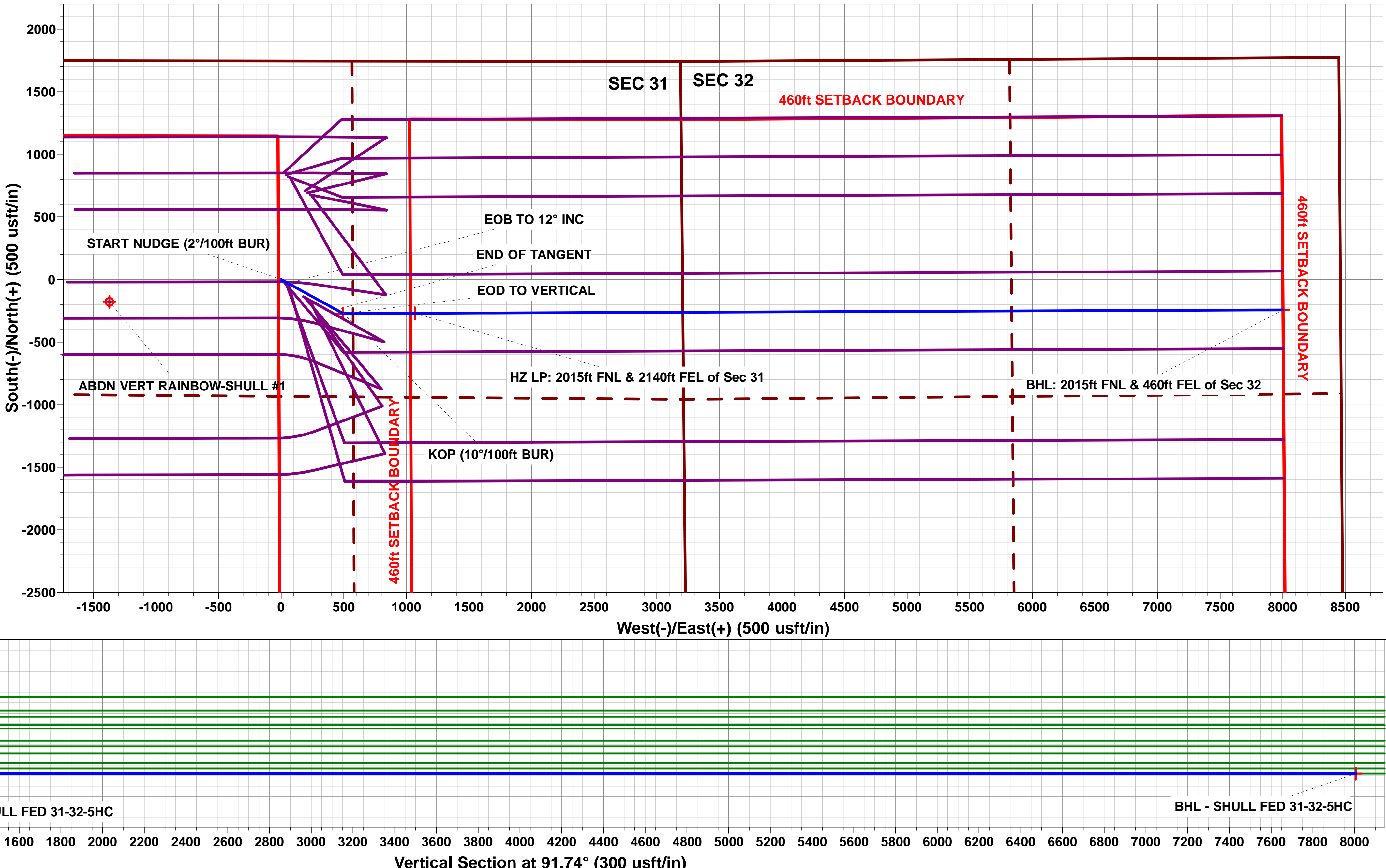
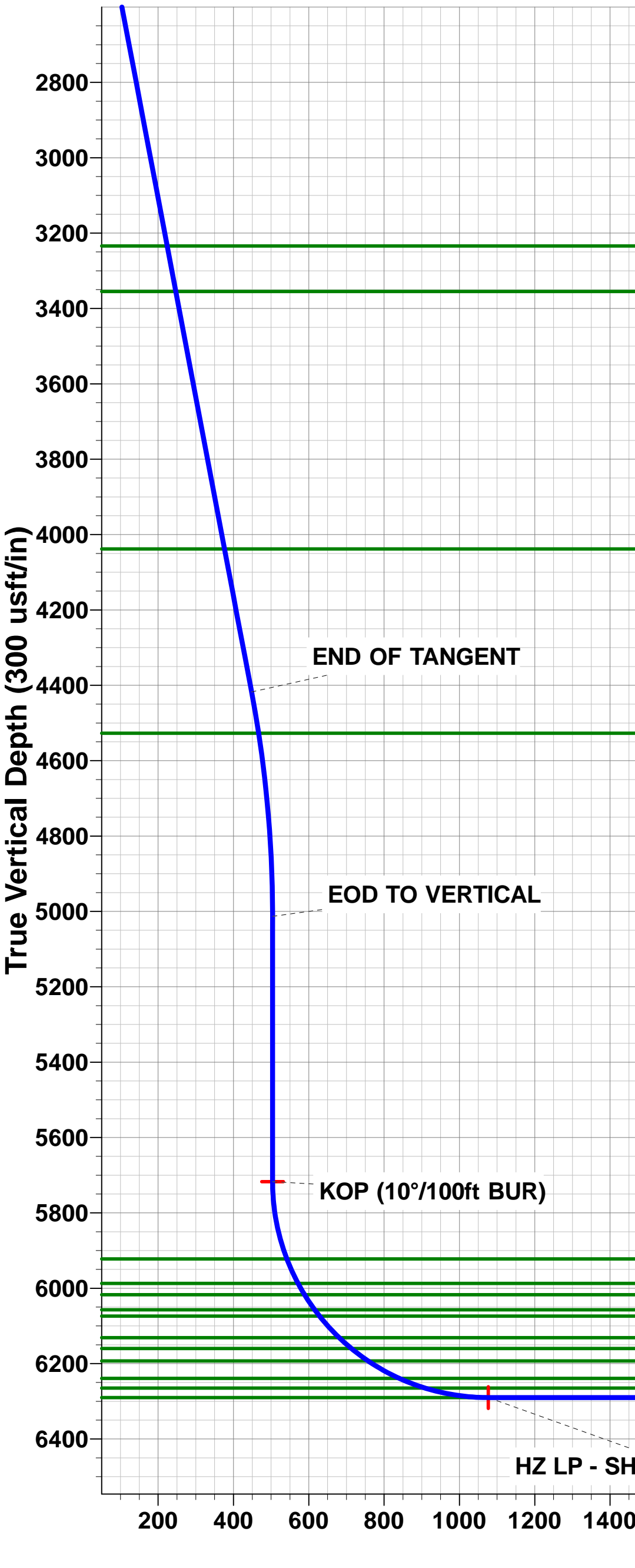
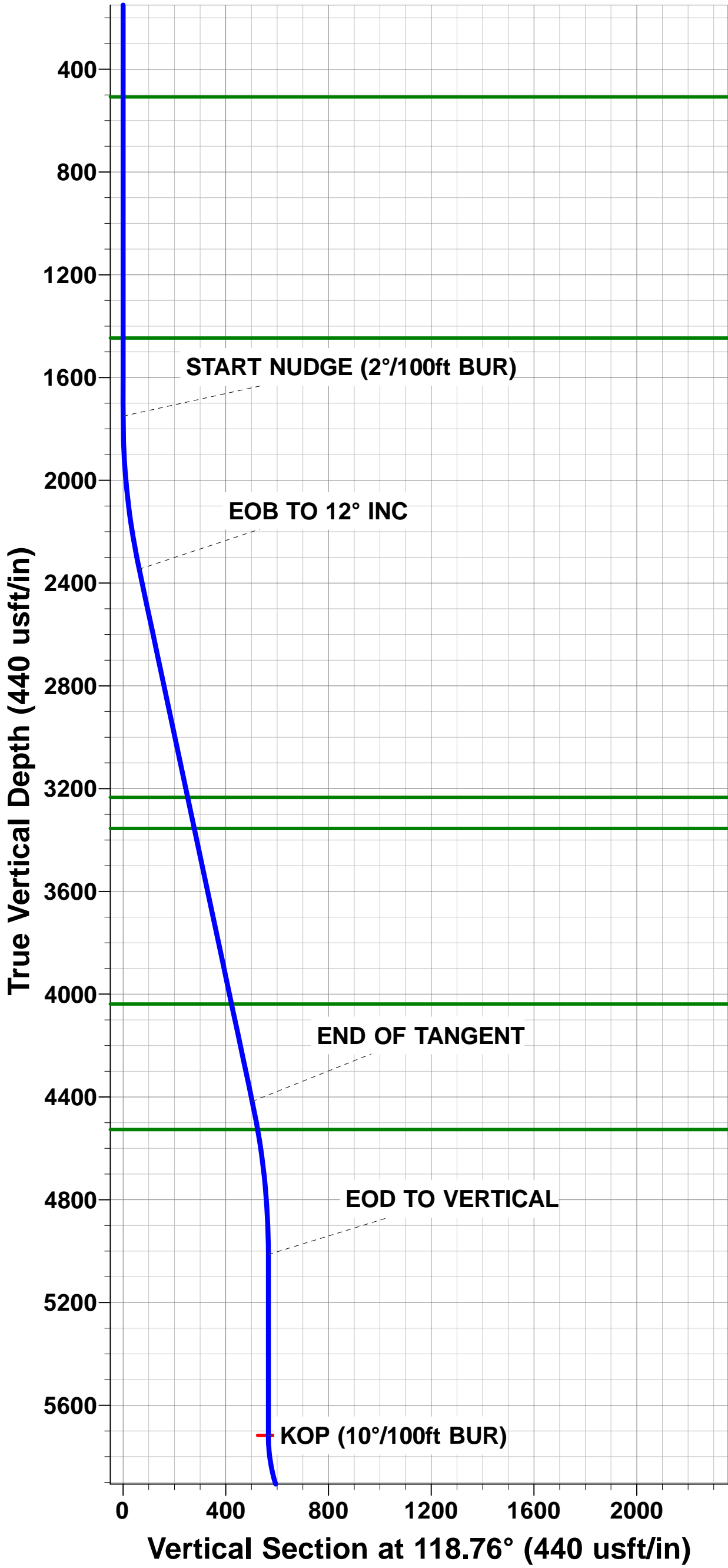
| TVDPath | MDPath | Formation |
|---------|---------|------------------------|
| 508.00 | 508.00 | Fox Hills Base |
| 1446.00 | 1446.00 | Pierre Shale Top |
| 3234.00 | 3258.22 | Richard Sandstone |
| 3355.00 | 3381.93 | Parkman Sandstone |
| 4038.00 | 4080.19 | Sussex Sandstone |
| 4527.00 | 4579.68 | Shannon Sandstone |
| 5922.00 | 5981.69 | Sharon Springs |
| 5987.00 | 6053.18 | Niobrara A Chalk |
| 6017.00 | 6087.77 | Niobrara A Chalk Base |
| 6057.00 | 6136.03 | Niobrara B1 Chalk Top |
| 6074.00 | 6157.45 | Niobrara B1 Chalk Base |
| 6131.00 | 6234.69 | Niobrara B2 Chalk Base |
| 6160.00 | 6278.42 | Niobrara C Chalk Top |
| 6193.00 | 6333.80 | Niobrara C Chalk Base |
| 6239.00 | 6428.51 | Niobrara D Chalk Top |
| 6265.00 | 6502.21 | Ft. Hays |
| 6290.00 | 6672.08 | Codell (Target) |

PROPOSED LOCAL COORDINATES:

SHL: 1746ft FNL & 2070ft FWL of Sec 31

HZ LP: 2015ft FNL & 2140ft FEL of Sec 31

BHL: 2015ft FNL & 460ft FEL of Sec 32



Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| | | | |
|--------------------|--------------------------------|----------------------|-----------------------------|
| Project | WELD COUNTY, COLORADO (NAD 83) | | |
| Map System: | US State Plane 1983 | System Datum: | Mean Sea Level |
| Geo Datum: | North American Datum 1983 | | |
| Map Zone: | Colorado Northern Zone | | Using geodetic scale factor |

| | | | |
|------------------------------|---------------------------------|--------------------------|-------------------|
| Site | SE NW SEC. 31 T9N R59W 6th P.M. | | |
| Site Position: | | Northing: | 1,504,605.23 usft |
| From: | Lat/Long | Easting: | 3,409,502.77 usft |
| Position Uncertainty: | 0.00 usft | Slot Radius: | 1.10000ft |
| | | Latitude: | 40.709170 |
| | | Longitude: | -104.022863 |
| | | Grid Convergence: | 0.95 ° |

| | | | |
|-----------------------------|---------------------|----------------------------|------------------|
| Well | SHULL FED 31-32-5HC | | |
| Well Position | +N-S | 0.00 usft | Northing: |
| | +E-W | 0.00 usft | Easting: |
| Position Uncertainty | 0.00 usft | Wellhead Elevation: | usft |
| | | Latitude: | 40.709170 |
| | | Longitude: | -104.022863 |
| | | Ground Level: | 4,878.00 usft |

| | | | | | |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | ORIGINAL WELLBORE | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2015 | 17/12/2017 | 7.78 | 67.20 | 52,570 |

| | | | | |
|--------------------------|--------------------------------|--------------------|----------------------|----------------------|
| Design | PROPOSAL #1 | | | |
| Audit Notes: | | | | |
| Version: | Phase: | PROTOTYPE | Tie On Depth: | 0.00 |
| Vertical Section: | Depth From (TVD) (usft) | +N-S (usft) | +E-W (usft) | Direction (°) |
| | 0.00 | 0.00 | 0.00 | 91.74 |

| Plan Sections | | | | | | | | | | | |
|----------------------|---------|---------|----------------|-----------|-------------|-------------|------------------------|-----------------------|----------------------|---------|-------------------|
| MD (usft) | Inc (°) | Azi (°) | Vertical Depth | SS (usft) | +N-S (usft) | +E-W (usft) | Dogleg Rate (°/100usf) | Build Rate (°/100usf) | Turn Rate (°/100usf) | TFO (°) | Target |
| 0.00 | 0.00 | 0.00 | 0.00 | -4,898.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1,750.00 | 0.00 | 0.00 | 1,750.00 | -3,148.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2,350.00 | 12.00 | 118.76 | 2,345.62 | -2,552.38 | -30.12 | 54.88 | 2.00 | 2.00 | 0.00 | 118.76 | |
| 4,468.22 | 12.00 | 118.76 | 4,417.56 | -480.44 | -242.03 | 440.95 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5,068.22 | 0.00 | 0.00 | 5,013.18 | 115.18 | -272.15 | 495.83 | 2.00 | -2.00 | 0.00 | 180.00 | |
| 5,772.08 | 0.00 | 0.00 | 5,717.04 | 819.04 | -272.15 | 495.83 | 0.00 | 0.00 | 0.00 | 0.00 | KOP - SHULL FED |
| 6,672.08 | 90.00 | 89.78 | 6,290.00 | 1,392.00 | -269.95 | 1,068.78 | 10.00 | 10.00 | 9.98 | 89.78 | HZ LP - SHULL FEI |
| 13,605.50 | 90.00 | 89.78 | 6,290.00 | 1,392.00 | -243.16 | 8,002.15 | 0.00 | 0.00 | 0.00 | -82.37 | BHL - SHULL FED |

Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| Planned Survey | | | | | | | | | | |
|---|------------|------------|---------------|--------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| MD (usft) | Inc (°) | Azi (°) | TVD (usft) | SS (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| SHL: 1746ft FNL & 2070ft FWL of Sec 31 | | | | | | | | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 4,898.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100.00 | 0.00 | 0.00 | 100.00 | 4,798.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200.00 | 0.00 | 0.00 | 200.00 | 4,698.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 300.00 | 0.00 | 0.00 | 300.00 | 4,598.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 400.00 | 0.00 | 0.00 | 400.00 | 4,498.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 500.00 | 0.00 | 0.00 | 500.00 | 4,398.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fox Hills Base | | | | | | | | | | |
| 508.00 | 0.00 | 0.00 | 508.00 | 4,390.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 600.00 | 0.00 | 0.00 | 600.00 | 4,298.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 700.00 | 0.00 | 0.00 | 700.00 | 4,198.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 800.00 | 0.00 | 0.00 | 800.00 | 4,098.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 900.00 | 0.00 | 0.00 | 900.00 | 3,998.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,000.00 | 0.00 | 0.00 | 1,000.00 | 3,898.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,100.00 | 0.00 | 0.00 | 1,100.00 | 3,798.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,200.00 | 0.00 | 0.00 | 1,200.00 | 3,698.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,300.00 | 0.00 | 0.00 | 1,300.00 | 3,598.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,400.00 | 0.00 | 0.00 | 1,400.00 | 3,498.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pierre Shale Top | | | | | | | | | | |
| 1,446.00 | 0.00 | 0.00 | 1,446.00 | 3,452.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,500.00 | 0.00 | 0.00 | 1,500.00 | 3,398.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,600.00 | 0.00 | 0.00 | 1,600.00 | 3,298.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,700.00 | 0.00 | 0.00 | 1,700.00 | 3,198.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| START NUDGE (2°/100ft BUR) | | | | | | | | | | |
| 1,750.00 | 0.00 | 0.00 | 1,750.00 | 3,148.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1,800.00 | 1.00 | 118.76 | 1,800.00 | 3,098.00 | -0.21 | 0.38 | 0.39 | 2.00 | 2.00 | 0.00 |
| 1,900.00 | 3.00 | 118.76 | 1,899.93 | 2,998.07 | -1.89 | 3.44 | 3.50 | 2.00 | 2.00 | 0.00 |
| 2,000.00 | 5.00 | 118.76 | 1,999.68 | 2,898.32 | -5.25 | 9.56 | 9.71 | 2.00 | 2.00 | 0.00 |
| 2,100.00 | 7.00 | 118.76 | 2,099.13 | 2,798.87 | -10.27 | 18.72 | 19.02 | 2.00 | 2.00 | 0.00 |
| 2,200.00 | 9.00 | 118.76 | 2,198.15 | 2,699.85 | -16.97 | 30.92 | 31.42 | 2.00 | 2.00 | 0.00 |
| 2,300.00 | 11.00 | 118.76 | 2,296.63 | 2,601.37 | -25.33 | 46.14 | 46.89 | 2.00 | 2.00 | 0.00 |
| EOB TO 12° INC | | | | | | | | | | |
| 2,350.00 | 12.00 | 118.76 | 2,345.62 | 2,552.38 | -30.12 | 54.88 | 55.77 | 2.00 | 2.00 | 0.00 |
| 2,400.00 | 12.00 | 118.76 | 2,394.53 | 2,503.47 | -35.12 | 63.99 | 65.03 | 0.00 | 0.00 | 0.00 |
| 2,500.00 | 12.00 | 118.76 | 2,492.35 | 2,405.65 | -45.13 | 82.22 | 83.55 | 0.00 | 0.00 | 0.00 |
| 2,600.00 | 12.00 | 118.76 | 2,590.16 | 2,307.84 | -55.13 | 100.44 | 102.07 | 0.00 | 0.00 | 0.00 |
| 2,700.00 | 12.00 | 118.76 | 2,687.97 | 2,210.03 | -65.14 | 118.67 | 120.59 | 0.00 | 0.00 | 0.00 |
| 2,800.00 | 12.00 | 118.76 | 2,785.79 | 2,112.21 | -75.14 | 136.90 | 139.12 | 0.00 | 0.00 | 0.00 |
| 2,900.00 | 12.00 | 118.76 | 2,883.60 | 2,014.40 | -85.14 | 155.12 | 157.64 | 0.00 | 0.00 | 0.00 |
| 3,000.00 | 12.00 | 118.76 | 2,981.42 | 1,916.58 | -95.15 | 173.35 | 176.16 | 0.00 | 0.00 | 0.00 |
| 3,100.00 | 12.00 | 118.76 | 3,079.23 | 1,818.77 | -105.15 | 191.58 | 194.68 | 0.00 | 0.00 | 0.00 |
| 3,200.00 | 12.00 | 118.76 | 3,177.05 | 1,720.95 | -115.16 | 209.80 | 213.20 | 0.00 | 0.00 | 0.00 |
| Richard Sandstone | | | | | | | | | | |
| 3,258.22 | 12.00 | 118.76 | 3,234.00 | 1,664.00 | -120.98 | 220.41 | 223.99 | 0.00 | 0.00 | 0.00 |
| 3,300.00 | 12.00 | 118.76 | 3,274.86 | 1,623.14 | -125.16 | 228.03 | 231.72 | 0.00 | 0.00 | 0.00 |
| Parkman Sandstone | | | | | | | | | | |
| 3,381.93 | 12.00 | 118.76 | 3,355.00 | 1,543.00 | -133.36 | 242.96 | 246.90 | 0.00 | 0.00 | 0.00 |
| 3,400.00 | 12.00 | 118.76 | 3,372.68 | 1,525.32 | -135.16 | 246.25 | 250.25 | 0.00 | 0.00 | 0.00 |
| 3,500.00 | 12.00 | 118.76 | 3,470.49 | 1,427.51 | -145.17 | 264.48 | 268.77 | 0.00 | 0.00 | 0.00 |
| 3,600.00 | 12.00 | 118.76 | 3,568.31 | 1,329.69 | -155.17 | 282.71 | 287.29 | 0.00 | 0.00 | 0.00 |
| 3,700.00 | 12.00 | 118.76 | 3,666.12 | 1,231.88 | -165.18 | 300.93 | 305.81 | 0.00 | 0.00 | 0.00 |
| 3,800.00 | 12.00 | 118.76 | 3,763.94 | 1,134.06 | -175.18 | 319.16 | 324.33 | 0.00 | 0.00 | 0.00 |
| 3,900.00 | 12.00 | 118.76 | 3,861.75 | 1,036.25 | -185.18 | 337.39 | 342.85 | 0.00 | 0.00 | 0.00 |

Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| Planned Survey | | | | | | | | | | |
|-------------------------------|--------------|---------------|-----------------|------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| MD (usft) | Inc (°) | Azi (°) | TVD (usft) | SS (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 4,000.00 | 12.00 | 118.76 | 3,959.57 | 938.43 | -195.19 | 355.61 | 361.38 | 0.00 | 0.00 | 0.00 |
| Sussex Sandstone | | | | | | | | | | |
| 4,080.19 | 12.00 | 118.76 | 4,038.00 | 860.00 | -203.21 | 370.23 | 376.23 | 0.00 | 0.00 | 0.00 |
| 4,100.00 | 12.00 | 118.76 | 4,057.38 | 840.62 | -205.19 | 373.84 | 379.90 | 0.00 | 0.00 | 0.00 |
| 4,200.00 | 12.00 | 118.76 | 4,155.20 | 742.80 | -215.20 | 392.06 | 398.42 | 0.00 | 0.00 | 0.00 |
| 4,300.00 | 12.00 | 118.76 | 4,253.01 | 644.99 | -225.20 | 410.29 | 416.94 | 0.00 | 0.00 | 0.00 |
| 4,400.00 | 12.00 | 118.76 | 4,350.83 | 547.17 | -235.20 | 428.52 | 435.46 | 0.00 | 0.00 | 0.00 |
| END OF TANGENT | | | | | | | | | | |
| 4,468.22 | 12.00 | 118.76 | 4,417.56 | 480.44 | -242.03 | 440.95 | 448.10 | 0.00 | 0.00 | 0.00 |
| 4,500.00 | 11.36 | 118.76 | 4,448.68 | 449.32 | -245.12 | 446.59 | 453.83 | 2.00 | -2.00 | 0.00 |
| Shannon Sandstone | | | | | | | | | | |
| 4,579.68 | 9.77 | 118.76 | 4,527.00 | 371.00 | -252.15 | 459.40 | 466.85 | 2.00 | -2.00 | 0.00 |
| 4,600.00 | 9.36 | 118.76 | 4,547.04 | 350.96 | -253.78 | 462.36 | 469.86 | 2.00 | -2.00 | 0.00 |
| 4,700.00 | 7.36 | 118.76 | 4,645.97 | 252.03 | -260.78 | 475.11 | 482.81 | 2.00 | -2.00 | 0.00 |
| 4,800.00 | 5.36 | 118.76 | 4,745.35 | 152.65 | -266.11 | 484.83 | 492.69 | 2.00 | -2.00 | 0.00 |
| 4,900.00 | 3.36 | 118.76 | 4,845.05 | 52.95 | -269.77 | 491.50 | 499.47 | 2.00 | -2.00 | 0.00 |
| 5,000.00 | 1.36 | 118.76 | 4,944.96 | -46.96 | -271.76 | 495.12 | 503.14 | 2.00 | -2.00 | 0.00 |
| EOD TO VERTICAL | | | | | | | | | | |
| 5,068.22 | 0.00 | 0.00 | 5,013.18 | -115.18 | -272.15 | 495.83 | 503.87 | 2.00 | -2.00 | 0.00 |
| 5,100.00 | 0.00 | 0.00 | 5,044.96 | -146.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,200.00 | 0.00 | 0.00 | 5,144.96 | -246.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,300.00 | 0.00 | 0.00 | 5,244.96 | -346.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,400.00 | 0.00 | 0.00 | 5,344.96 | -446.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,500.00 | 0.00 | 0.00 | 5,444.96 | -546.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,600.00 | 0.00 | 0.00 | 5,544.96 | -646.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,700.00 | 0.00 | 0.00 | 5,644.96 | -746.96 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| KOP (10°/100ft BUR) | | | | | | | | | | |
| 5,772.08 | 0.00 | 0.00 | 5,717.04 | -819.04 | -272.15 | 495.83 | 503.87 | 0.00 | 0.00 | 0.00 |
| 5,800.00 | 2.79 | 89.78 | 5,744.95 | -846.95 | -272.15 | 496.51 | 504.55 | 10.00 | 10.00 | 0.00 |
| 5,900.00 | 12.79 | 89.78 | 5,843.90 | -945.90 | -272.10 | 510.05 | 518.08 | 10.00 | 10.00 | 0.00 |
| Sharon Springs | | | | | | | | | | |
| 5,981.69 | 20.96 | 89.78 | 5,922.00 | -1,024.00 | -272.00 | 533.74 | 541.76 | 10.00 | 10.00 | 0.00 |
| 6,000.00 | 22.79 | 89.78 | 5,938.99 | -1,040.99 | -271.98 | 540.57 | 548.58 | 10.00 | 10.00 | 0.00 |
| Niobrara A Chalk | | | | | | | | | | |
| 6,053.18 | 28.11 | 89.78 | 5,987.00 | -1,089.00 | -271.89 | 563.41 | 571.41 | 10.00 | 10.00 | 0.00 |
| Niobrara A Chalk Base | | | | | | | | | | |
| 6,087.77 | 31.57 | 89.78 | 6,017.00 | -1,119.00 | -271.82 | 580.62 | 588.61 | 10.00 | 10.00 | 0.00 |
| 6,100.00 | 32.79 | 89.78 | 6,027.35 | -1,129.35 | -271.80 | 587.13 | 595.12 | 10.00 | 10.00 | 0.00 |
| Niobrara B1 Chalk Top | | | | | | | | | | |
| 6,136.03 | 36.39 | 89.78 | 6,057.00 | -1,159.00 | -271.72 | 607.58 | 615.56 | 10.00 | 10.00 | 0.00 |
| Niobrara B1 Chalk Base | | | | | | | | | | |
| 6,157.45 | 38.54 | 89.78 | 6,074.00 | -1,176.00 | -271.67 | 620.61 | 628.58 | 10.00 | 10.00 | 0.00 |
| 6,200.00 | 42.79 | 89.78 | 6,106.27 | -1,208.27 | -271.56 | 648.33 | 656.28 | 10.00 | 10.00 | 0.00 |
| Niobrara B2 Chalk Base | | | | | | | | | | |
| 6,234.69 | 46.26 | 89.78 | 6,131.00 | -1,233.00 | -271.47 | 672.66 | 680.59 | 10.00 | 10.00 | 0.00 |
| Niobrara C Chalk Top | | | | | | | | | | |
| 6,278.42 | 50.63 | 89.78 | 6,160.00 | -1,262.00 | -271.34 | 705.37 | 713.29 | 10.00 | 10.00 | 0.00 |
| 6,300.00 | 52.79 | 89.78 | 6,173.37 | -1,275.37 | -271.28 | 722.31 | 730.22 | 10.00 | 10.00 | 0.00 |
| Niobrara C Chalk Base | | | | | | | | | | |
| 6,333.80 | 56.17 | 89.78 | 6,193.00 | -1,295.00 | -271.17 | 749.81 | 757.70 | 10.00 | 10.00 | 0.00 |
| 6,400.00 | 62.79 | 89.78 | 6,226.60 | -1,328.60 | -270.95 | 806.81 | 814.67 | 10.00 | 10.00 | 0.00 |
| Niobrara D Chalk Top | | | | | | | | | | |
| 6,428.51 | 65.64 | 89.78 | 6,239.00 | -1,341.00 | -270.85 | 832.48 | 840.32 | 10.00 | 10.00 | 0.00 |

Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| Planned Survey | | | | | | | | | | |
|---|--------------|--------------|-----------------|------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| MD (usft) | Inc (°) | Azi (°) | TVD (usft) | SS (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 6,500.00 | 72.79 | 89.78 | 6,264.35 | -1,366.35 | -270.60 | 899.28 | 907.08 | 10.00 | 10.00 | 0.00 |
| Ft. Hays | | | | | | | | | | |
| 6,502.21 | 73.01 | 89.78 | 6,265.00 | -1,367.00 | -270.59 | 901.39 | 909.19 | 10.00 | 10.00 | 0.00 |
| 6,600.00 | 82.79 | 89.78 | 6,285.47 | -1,387.47 | -270.22 | 996.89 | 1,004.64 | 10.00 | 10.00 | 0.00 |
| HZ LP: 2015ft FNL & 2140ft FEL of Sec 31 - Codell (Target) | | | | | | | | | | |
| 6,672.08 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -269.95 | 1,068.78 | 1,076.49 | 10.00 | 10.00 | 0.00 |
| 6,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -269.84 | 1,096.70 | 1,104.39 | 0.00 | 0.00 | 0.00 |
| 6,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -269.45 | 1,196.70 | 1,204.33 | 0.00 | 0.00 | 0.00 |
| 6,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -269.07 | 1,296.70 | 1,304.27 | 0.00 | 0.00 | 0.00 |
| 7,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -268.68 | 1,396.70 | 1,404.21 | 0.00 | 0.00 | 0.00 |
| 7,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -268.30 | 1,496.70 | 1,504.16 | 0.00 | 0.00 | 0.00 |
| 7,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -267.91 | 1,596.70 | 1,604.10 | 0.00 | 0.00 | 0.00 |
| 7,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -267.53 | 1,696.70 | 1,704.04 | 0.00 | 0.00 | 0.00 |
| 7,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -267.14 | 1,796.69 | 1,803.98 | 0.00 | 0.00 | 0.00 |
| 7,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -266.76 | 1,896.69 | 1,903.92 | 0.00 | 0.00 | 0.00 |
| 7,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -266.37 | 1,996.69 | 2,003.86 | 0.00 | 0.00 | 0.00 |
| 7,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -265.99 | 2,096.69 | 2,103.80 | 0.00 | 0.00 | 0.00 |
| 7,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -265.60 | 2,196.69 | 2,203.75 | 0.00 | 0.00 | 0.00 |
| 7,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -265.22 | 2,296.69 | 2,303.69 | 0.00 | 0.00 | 0.00 |
| 8,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -264.83 | 2,396.69 | 2,403.63 | 0.00 | 0.00 | 0.00 |
| 8,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -264.45 | 2,496.69 | 2,503.57 | 0.00 | 0.00 | 0.00 |
| 8,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -264.06 | 2,596.69 | 2,603.51 | 0.00 | 0.00 | 0.00 |
| 8,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -263.68 | 2,696.69 | 2,703.45 | 0.00 | 0.00 | 0.00 |
| 8,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -263.29 | 2,796.69 | 2,803.39 | 0.00 | 0.00 | 0.00 |
| 8,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -262.91 | 2,896.69 | 2,903.34 | 0.00 | 0.00 | 0.00 |
| 8,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -262.52 | 2,996.69 | 3,003.28 | 0.00 | 0.00 | 0.00 |
| 8,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -262.14 | 3,096.69 | 3,103.22 | 0.00 | 0.00 | 0.00 |
| 8,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -261.75 | 3,196.68 | 3,203.16 | 0.00 | 0.00 | 0.00 |
| 8,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -261.36 | 3,296.68 | 3,303.10 | 0.00 | 0.00 | 0.00 |
| 9,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -260.98 | 3,396.68 | 3,403.04 | 0.00 | 0.00 | 0.00 |
| 9,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -260.59 | 3,496.68 | 3,502.98 | 0.00 | 0.00 | 0.00 |
| 9,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -260.21 | 3,596.68 | 3,602.93 | 0.00 | 0.00 | 0.00 |
| 9,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -259.82 | 3,696.68 | 3,702.87 | 0.00 | 0.00 | 0.00 |
| 9,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -259.44 | 3,796.68 | 3,802.81 | 0.00 | 0.00 | 0.00 |
| 9,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -259.05 | 3,896.68 | 3,902.75 | 0.00 | 0.00 | 0.00 |
| 9,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -258.66 | 3,996.68 | 4,002.69 | 0.00 | 0.00 | 0.00 |
| 9,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -258.28 | 4,096.68 | 4,102.63 | 0.00 | 0.00 | 0.00 |
| 9,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -257.89 | 4,196.68 | 4,202.57 | 0.00 | 0.00 | 0.00 |
| 9,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -257.50 | 4,296.68 | 4,302.52 | 0.00 | 0.00 | 0.00 |
| 10,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -257.12 | 4,396.68 | 4,402.46 | 0.00 | 0.00 | 0.00 |
| 10,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -256.73 | 4,496.67 | 4,502.40 | 0.00 | 0.00 | 0.00 |
| 10,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -256.35 | 4,596.67 | 4,602.34 | 0.00 | 0.00 | 0.00 |
| 10,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -255.96 | 4,696.67 | 4,702.28 | 0.00 | 0.00 | 0.00 |
| 10,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -255.57 | 4,796.67 | 4,802.22 | 0.00 | 0.00 | 0.00 |
| 10,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -255.19 | 4,896.67 | 4,902.16 | 0.00 | 0.00 | 0.00 |
| 10,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -254.80 | 4,996.67 | 5,002.10 | 0.00 | 0.00 | 0.00 |
| 10,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -254.41 | 5,096.67 | 5,102.05 | 0.00 | 0.00 | 0.00 |
| 10,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -254.03 | 5,196.67 | 5,201.99 | 0.00 | 0.00 | 0.00 |
| 10,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -253.64 | 5,296.67 | 5,301.93 | 0.00 | 0.00 | 0.00 |
| 11,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -253.25 | 5,396.67 | 5,401.87 | 0.00 | 0.00 | 0.00 |
| 11,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -252.87 | 5,496.67 | 5,501.81 | 0.00 | 0.00 | 0.00 |
| 11,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -252.48 | 5,596.67 | 5,601.75 | 0.00 | 0.00 | 0.00 |
| 11,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -252.09 | 5,696.67 | 5,701.69 | 0.00 | 0.00 | 0.00 |

Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| Planned Survey | | | | | | | | | | |
|--|--------------|--------------|-----------------|------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| MD (usft) | Inc (°) | Azi (°) | TVD (usft) | SS (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
| 11,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -251.71 | 5,796.67 | 5,801.64 | 0.00 | 0.00 | 0.00 |
| 11,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -251.32 | 5,896.66 | 5,901.58 | 0.00 | 0.00 | 0.00 |
| 11,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -250.93 | 5,996.66 | 6,001.52 | 0.00 | 0.00 | 0.00 |
| 11,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -250.55 | 6,096.66 | 6,101.46 | 0.00 | 0.00 | 0.00 |
| 11,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -250.16 | 6,196.66 | 6,201.40 | 0.00 | 0.00 | 0.00 |
| 11,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -249.77 | 6,296.66 | 6,301.34 | 0.00 | 0.00 | 0.00 |
| 12,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -249.39 | 6,396.66 | 6,401.28 | 0.00 | 0.00 | 0.00 |
| 12,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -249.00 | 6,496.66 | 6,501.23 | 0.00 | 0.00 | 0.00 |
| 12,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -248.61 | 6,596.66 | 6,601.17 | 0.00 | 0.00 | 0.00 |
| 12,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -248.22 | 6,696.66 | 6,701.11 | 0.00 | 0.00 | 0.00 |
| 12,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -247.84 | 6,796.66 | 6,801.05 | 0.00 | 0.00 | 0.00 |
| 12,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -247.45 | 6,896.66 | 6,900.99 | 0.00 | 0.00 | 0.00 |
| 12,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -247.06 | 6,996.66 | 7,000.93 | 0.00 | 0.00 | 0.00 |
| 12,700.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -246.67 | 7,096.66 | 7,100.87 | 0.00 | 0.00 | 0.00 |
| 12,800.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -246.29 | 7,196.65 | 7,200.81 | 0.00 | 0.00 | 0.00 |
| 12,900.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -245.90 | 7,296.65 | 7,300.76 | 0.00 | 0.00 | 0.00 |
| 13,000.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -245.51 | 7,396.65 | 7,400.70 | 0.00 | 0.00 | 0.00 |
| 13,100.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -245.12 | 7,496.65 | 7,500.64 | 0.00 | 0.00 | 0.00 |
| 13,200.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -244.74 | 7,596.65 | 7,600.58 | 0.00 | 0.00 | 0.00 |
| 13,300.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -244.35 | 7,696.65 | 7,700.52 | 0.00 | 0.00 | 0.00 |
| 13,400.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -243.96 | 7,796.65 | 7,800.46 | 0.00 | 0.00 | 0.00 |
| 13,500.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -243.57 | 7,896.65 | 7,900.40 | 0.00 | 0.00 | 0.00 |
| 13,600.00 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -243.19 | 7,996.65 | 8,000.35 | 0.00 | 0.00 | 0.00 |
| BHL: 2015ft FNL & 460ft FEL of Sec 32 | | | | | | | | | | |
| 13,605.50 | 90.00 | 89.78 | 6,290.00 | -1,392.00 | -243.16 | 8,002.15 | 8,005.85 | 0.00 | 0.00 | 0.00 |

| Formations | | | | | | |
|--------------|---------------|------------------------|-----------|------------|-------------------------|--|
| MD (usft) | TVD (usft) | Name | Lithology | Dip (°) | Dip Direction (°) | |
| 508.00 | 508.00 | Fox Hills Base | | | | |
| 1,446.00 | 1,446.00 | Pierre Shale Top | | | | |
| 3,258.22 | 3,234.00 | Richard Sandstone | | | | |
| 3,381.93 | 3,355.00 | Parkman Sandstone | | | | |
| 4,080.19 | 4,038.00 | Sussex Sandstone | | | | |
| 4,579.68 | 4,527.00 | Shannon Sandstone | | | | |
| 5,981.69 | 5,922.00 | Sharon Springs | | | | |
| 6,053.18 | 5,987.00 | Niobrara A Chalk | | | | |
| 6,087.77 | 6,017.00 | Niobrara A Chalk Base | | | | |
| 6,136.03 | 6,057.00 | Niobrara B1 Chalk Top | | | | |
| 6,157.45 | 6,074.00 | Niobrara B1 Chalk Base | | | | |
| 6,234.69 | 6,131.00 | Niobrara B2 Chalk Base | | | | |
| 6,278.42 | 6,160.00 | Niobrara C Chalk Top | | | | |
| 6,333.80 | 6,193.00 | Niobrara C Chalk Base | | | | |
| 6,428.51 | 6,239.00 | Niobrara D Chalk Top | | | | |
| 6,502.21 | 6,265.00 | Ft. Hays | | | | |
| 6,672.08 | 6,290.00 | Codell (Target) | | | | |

Planning Report



| | | | |
|------------------|---------------------------------|-------------------------------------|---|
| Database: | EDM 5000.1 Single User Db | Local Co-ordinate Reference: | Well SHULL FED 31-32-5HC |
| Company: | MALLARD EXPLORATION | TVD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Project: | WELD COUNTY, COLORADO (NAD 83) | MD Reference: | KB-EST @ 4898.00usft (Original Well Elev) |
| Site: | SE NW SEC. 31 T9N R59W 6th P.M. | North Reference: | True |
| Well: | SHULL FED 31-32-5HC | Survey Calculation Method: | Minimum Curvature |
| Wellbore: | ORIGINAL WELLBORE | | |
| Design: | PROPOSAL #1 | | |

| Plan Annotations | | | | |
|-------------------|---------------|-----------------|-----------------|--|
| Local Coordinates | | | | |
| MD (usft) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Comment |
| 0.00 | 0.00 | 0.00 | 0.00 | SHL: 1746ft FNL & 2070ft FWL of Sec 31 |
| 1,750.00 | 1,750.00 | 0.00 | 0.00 | START NUDGE (2°/100ft BUR) |
| 2,350.00 | 2,345.62 | -30.12 | 54.88 | EOB TO 12° INC |
| 4,468.22 | 4,417.56 | -242.03 | 440.95 | END OF TANGENT |
| 5,068.22 | 5,013.18 | -272.15 | 495.83 | EOD TO VERTICAL |
| 5,772.08 | 5,717.04 | -272.15 | 495.83 | KOP (10°/100ft BUR) |
| 6,672.08 | 6,290.00 | -269.95 | 1,068.78 | HZ LP: 2015ft FNL & 2140ft FEL of Sec 31 |
| 13,605.50 | 6,290.00 | -243.16 | 8,002.15 | BHL: 2015ft FNL & 460ft FEL of Sec 32 |