

# **MALLARD EXPLORATION**

**WELD COUNTY, COLORADO (NAD 83)**

**SW SE SEC. 9 T8N R60W 6th P.M.**

**DUCLAIR 16-10HC**

**ORIGINAL WELLBORE**

**18 June, 2018**

**Plan: PROPOSAL #1**



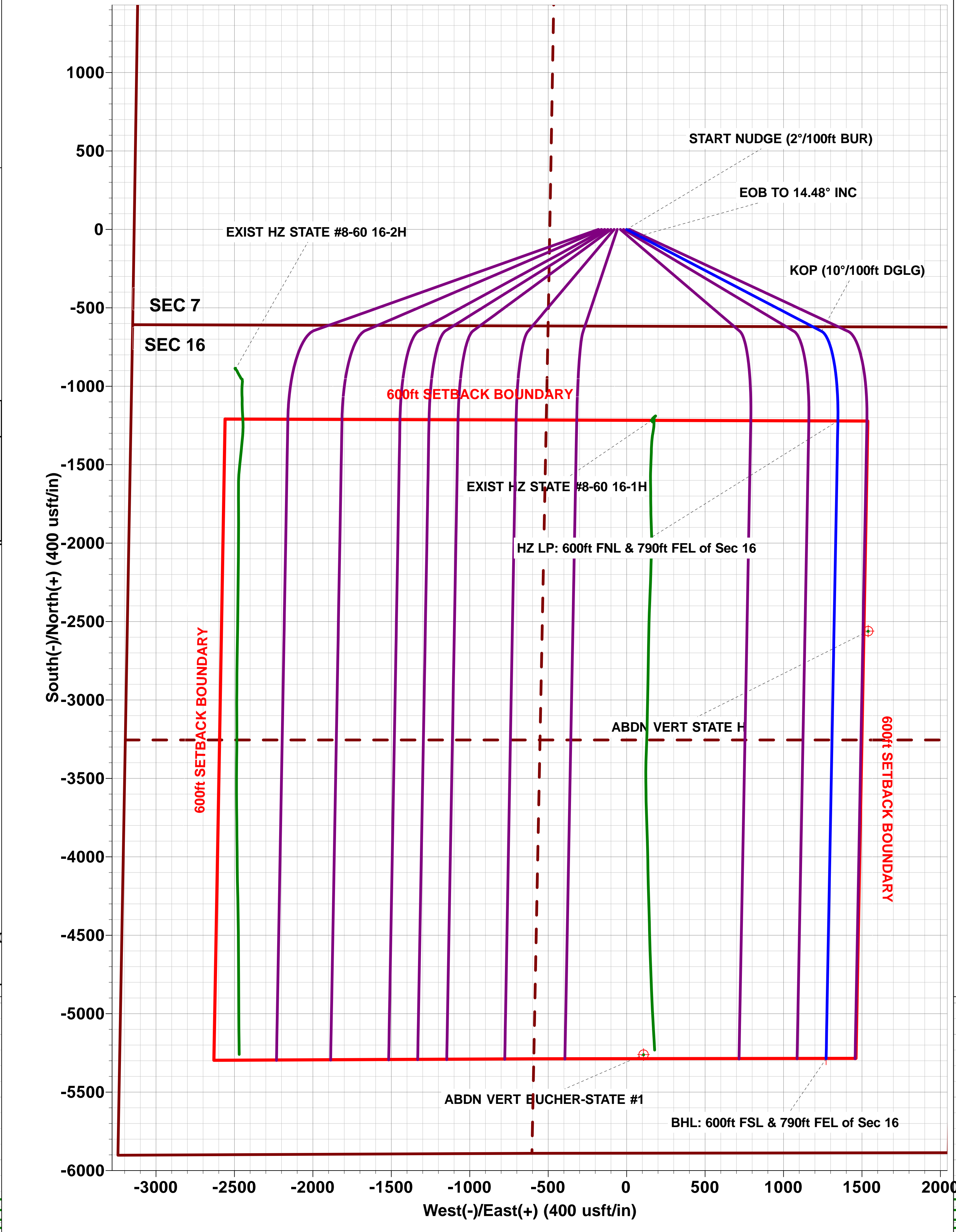
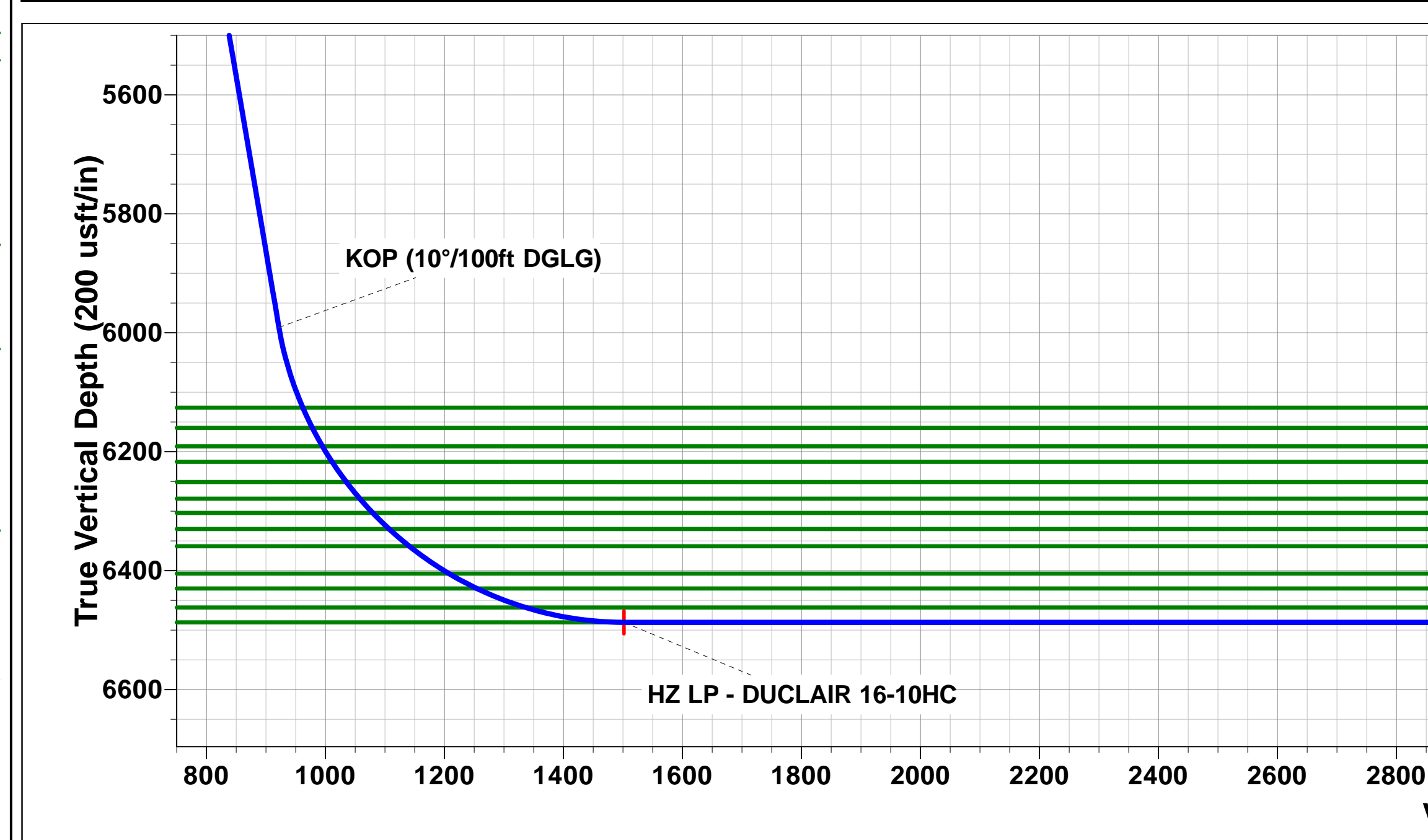
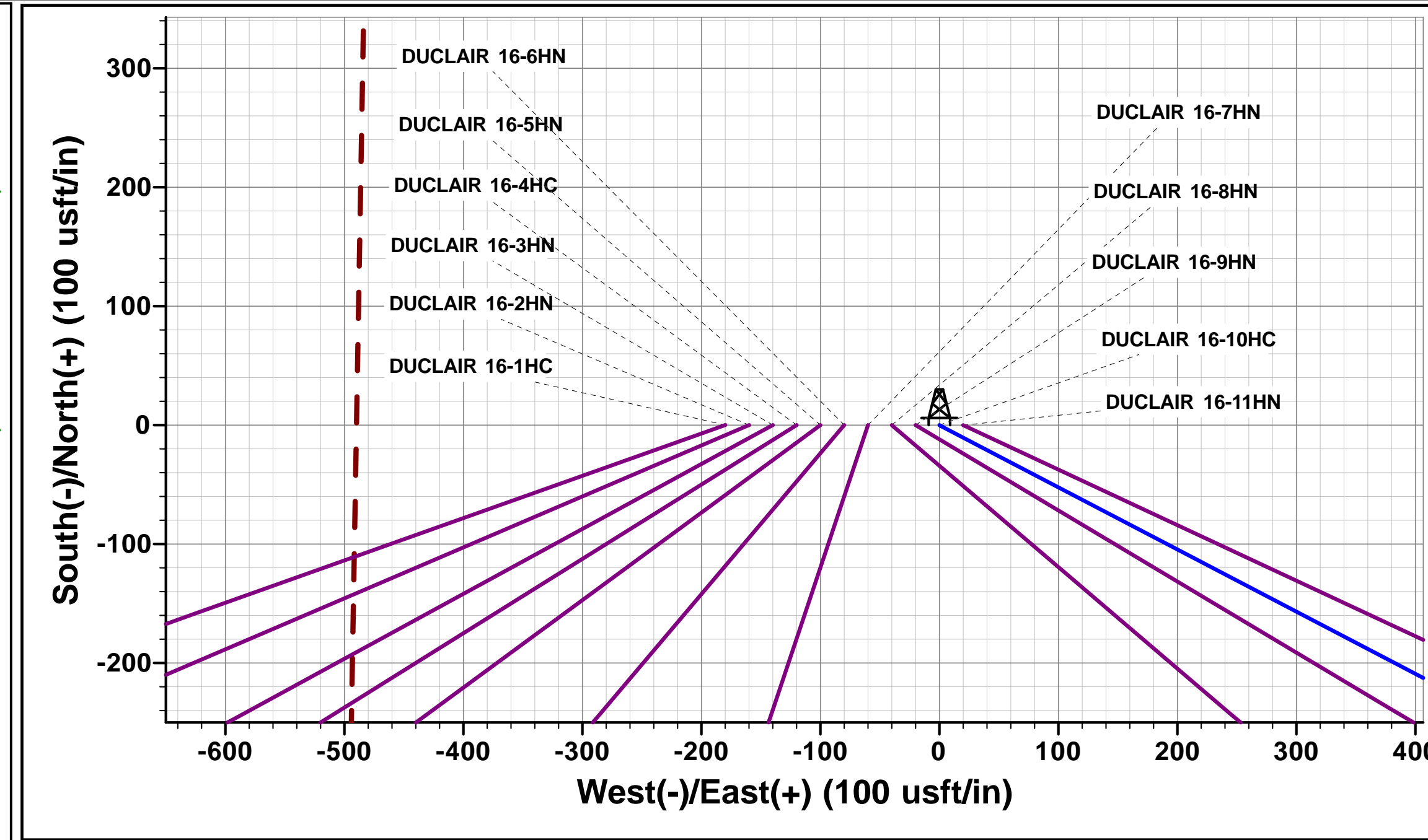
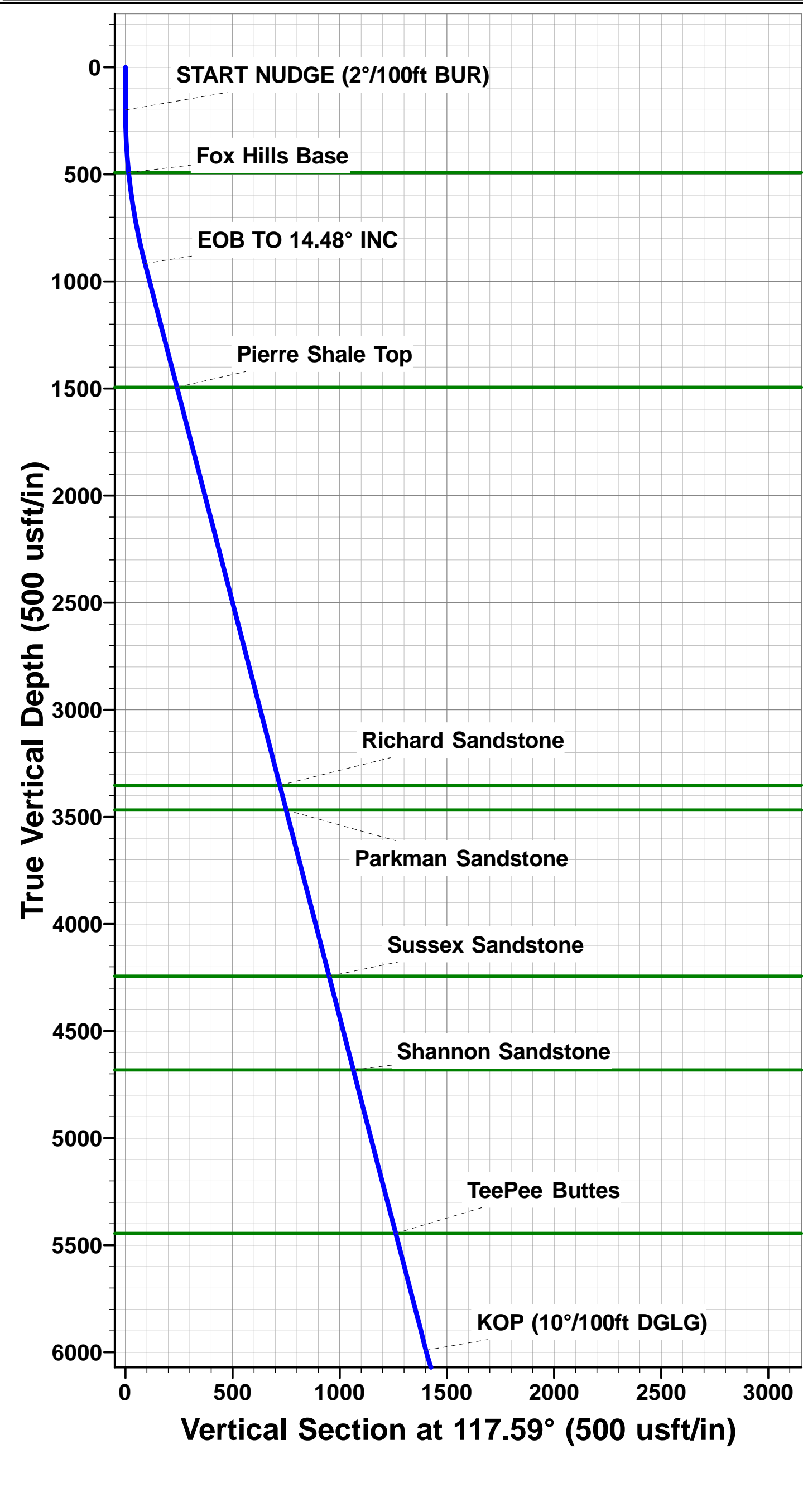


Project: WELD COUNTY, COLORADO (NAD 83)  
Site: SW SE SEC. 9 T8N R60W 6th P.M.  
Well: DUCLAIR 16-10HC  
Wellbore: ORIGINAL WELLBORE  
Design: PROPOSAL #1

| ANNOTATIONS |          |       |        |          |         |         |         |  |  |  |
|-------------|----------|-------|--------|----------|---------|---------|---------|--|--|--|
| TVD         | MD       | Inc   | Azi    | +N/-S    | +E/-W   | VSect   | Dep     | Annotation                             |  |  |
| 0.00        | 0.00     | 0.00  | 0.00   | 0.00     | 0.00    | 0.00    | 0.00    | SHL: 617ft FSL & 2160ft FEL of Sec 9   |  |  |
| 200.00      | 200.00   | 0.00  | 0.00   | 0.00     | 0.00    | 0.00    | 0.00    | START NUDGE (2°/100ft BUR)             |  |  |
| 916.51      | 924.20   | 14.48 | 117.59 | -42.17   | 80.70   | 59.87   | 91.05   | EOB TO 14.48° INC                      |  |  |
| 5991.13     | 6165.40  | 14.48 | 117.59 | -649.33  | 1242.48 | 921.86  | 1401.93 | KOP (10°/100ft DGLG)                   |  |  |
| 6487.00     | 7001.25  | 90.00 | 181.06 | -1220.72 | 1346.57 | 1501.75 | 1995.08 | HZ LP: 600ft FNL & 790ft FEL of Sec 16 |  |  |
| 6487.00     | 11068.57 | 90.00 | 181.06 | -5287.35 | 1271.60 | 5438.11 | 6062.40 | BHL: 600ft FSL & 790ft FEL of Sec 16   |  |  |

PROPOSED LOCAL COORDINATES:  
  
SHL: 617ft FSL & 2160ft FEL Sec 9  
HZ LP: 600ft FNL & 790ft FEL Sec 16  
BHL: 600ft FSL & 790ft FEL of Sec 16

| WELLBORE TARGET DETAILS (LAT/LONG) |         |          |         |           |             |
|------------------------------------|---------|----------|---------|-----------|-------------|
| Name                               | TVD     | +N/-S    | +E/-W   | Latitude  | Longitude   |
| HZ LP - DUCLAIR 16-10HC            | 6487.00 | -1220.72 | 1346.57 | 40.667903 | -104.089377 |
| BHL - DUCLAIR 16-10HC              | 6487.00 | -5287.35 | 1271.60 | 40.656741 | -104.089648 |



# Planning Report



|                  |                                |                                     |   |
|------------------|--------------------------------|-------------------------------------|---|
| <b>Database:</b> | EDM 5000.1 Single User Db      | <b>Local Co-ordinate Reference:</b> | Well DUCLAIR 16-10HC                      |
| <b>Company:</b>  | MALLARD EXPLORATION            | <b>TVD Reference:</b>               | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Project:</b>  | WELD COUNTY, COLORADO (NAD 83) | <b>MD Reference:</b>                | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Site:</b>     | SW SE SEC. 9 T8N R60W 6th P.M. | <b>North Reference:</b>             | True                                      |
| <b>Well:</b>     | DUCLAIR 16-10HC                | <b>Survey Calculation Method:</b>   | Minimum Curvature                         |
| <b>Wellbore:</b> | ORIGINAL WELLBORE              |                                     |   |
| <b>Design:</b>   | PROPOSAL #1                    |                                     |   |

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

| Site                  | SW SE SEC. 9 T8N R60W 6th P.M. |              |                   |                   |             |
|-----------------------|--------------------------------|--------------|-------------------|-------------------|-------------|
| Site Position:        |                                | Northing:    | 1,490,468.76 usft | Latitude:         | 40.671254   |
| From:                 | Lat/Long                       | Easting:     | 3,389,758.56 usft | Longitude:        | -104.094879 |
| Position Uncertainty: | 0.00 usft                      | Slot Radius: | 1.10000 ft        | Grid Convergence: | 0.91 °      |

| Well                 | DUCLAIR 16-10HC |             |                     |                   |               |               |
|----------------------|-----------------|-------------|---------------------|-------------------|---------------|---------------|
| Well Position        | +N/-S           | -0.11 usft  | Northing:           | 1,490,471.50 usft | Latitude:     | 40.671254     |
|                      | +E/-W           | 179.76 usft | Easting:            | 3,389,938.29 usft | Longitude:    | -104.094231   |
| Position Uncertainty |                 | 0.00 usft   | Wellhead Elevation: | usft              | Ground Level: | 4,912.00 usft |

|                  |                   |                    |                        |                      |                            |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | ORIGINAL WELLBORE |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | IGRF2015          | 18/06/2018         | 7.76                   | 67.15                | 52,485                     |

|                          |                                |                     |                      |                      |
|--------------------------|--------------------------------|---------------------|----------------------|----------------------|
| <b>Design</b>            | PROPOSAL #1                    |                     |                      |                      |
| <b>Audit Notes:</b>      |                                |                     |                      |                      |
| <b>Version:</b>          | <b>Phase:</b>                  | PROTOTYPE           | <b>Tie On Depth:</b> | 0.00                 |
| <b>Vertical Section:</b> | <b>Depth From (TVD) (usft)</b> | <b>+N/-S (usft)</b> | <b>+E/-W (usft)</b>  | <b>Direction (°)</b> |
|                          | 6,487.00                       | 0.00                | 0.00                 | 166.48               |

| <b>Plan Sections</b> |         |         |                |           |              |              |                        |                       |                      |         |                  |
|----------------------|---------|---------|----------------|-----------|--------------|--------------|------------------------|-----------------------|----------------------|---------|------------------|
| 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           | -4,932.00 | 0.00         | 0.00         | 0.00                   | 0.00                  | 0.00                 | 0.00    |                  |
| 200.00               | 0.00    | 0.00    | 200.00         | -4,732.00 | 0.00         | 0.00         | 0.00                   | 0.00                  | 0.00                 | 0.00    |                  |
| 924.20               | 14.48   | 117.59  | 916.51         | -4,015.49 | -42.17       | 80.70        | 2.00                   | 2.00                  | 0.00                 | 117.59  |                  |
| 6,165.40             | 14.48   | 117.59  | 5,991.13       | 1,059.13  | -649.33      | 1,242.48     | 0.00                   | 0.00                  | 0.00                 | 0.00    |                  |
| 7,001.25             | 90.00   | 181.06  | 6,487.00       | 1,555.00  | -1,220.72    | 1,346.57     | 10.00                  | 9.03                  | 7.59                 | 64.20   | HZ LP - DUCLAIR  |
| 11,068.57            | 90.00   | 181.06  | 6,487.00       | 1,555.00  | -5,287.35    | 1,271.60     | 0.00                   | 0.00                  | 0.00                 | 0.00    | BHL - DUCLAIR 16 |

# Planning Report



|                  |                                |                                     |   |
|------------------|--------------------------------|-------------------------------------|---|
| <b>Database:</b> | EDM 5000.1 Single User Db      | <b>Local Co-ordinate Reference:</b> | Well DUCLAIR 16-10HC                      |
| <b>Company:</b>  | MALLARD EXPLORATION            | <b>TVD Reference:</b>               | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Project:</b>  | WELD COUNTY, COLORADO (NAD 83) | <b>MD Reference:</b>                | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Site:</b>     | SW SE SEC. 9 T8N R60W 6th P.M. | <b>North Reference:</b>             | True                                      |
| <b>Well:</b>     | DUCLAIR 16-10HC                | <b>Survey Calculation Method:</b>   | Minimum Curvature                         |
| <b>Wellbore:</b> | ORIGINAL WELLBORE              |                                     |   |
| <b>Design:</b>   | PROPOSAL #1                    |                                     |   |

## Planned Survey

| MD<br>(usft)                                    | Inc<br>(°) | Azi<br>(°) | TVD<br>(usft) | SS<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|---|------------|------------|---------------|--------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| <b>SHL: 617ft FSL &amp; 2160ft FEL of Sec 9</b> |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 0.00  | 0.00       | 0.00       | 0.00          | 4,932.00     | 0.00            | 0.00            | 0.00                          | 0.00                          | 0.00                         | 0.00                        |
| 100.00  | 0.00       | 0.00       | 100.00        | 4,832.00     | 0.00            | 0.00            | 0.00                          | 0.00                          | 0.00                         | 0.00                        |
| <b>START NUDGE (2°/100ft BUR)</b>               |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 200.00  | 0.00       | 0.00       | 200.00        | 4,732.00     | 0.00            | 0.00            | 0.00                          | 0.00                          | 0.00                         | 0.00                        |
| 300.00  | 2.00       | 117.59     | 299.98        | 4,632.02     | -0.81           | 1.55            | 1.15                          | 2.00                          | 2.00                         | 0.00                        |
| 400.00  | 4.00       | 117.59     | 399.84        | 4,532.16     | -3.23           | 6.18            | 4.59                          | 2.00                          | 2.00                         | 0.00                        |
| <b>Fox Hills Base</b>                           |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 492.51  | 5.85       | 117.59     | 492.00        | 4,440.00     | -6.91           | 13.22           | 9.81                          | 2.00                          | 2.00                         | 0.00                        |
| 500.00  | 6.00       | 117.59     | 499.45        | 4,432.55     | -7.27           | 13.91           | 10.32                         | 2.00                          | 2.00                         | 0.00                        |
| 600.00  | 8.00       | 117.59     | 598.70        | 4,333.30     | -12.91          | 24.71           | 18.33                         | 2.00                          | 2.00                         | 0.00                        |
| 700.00  | 10.00      | 117.59     | 697.47        | 4,234.53     | -20.16          | 38.57           | 28.62                         | 2.00                          | 2.00                         | 0.00                        |
| 800.00  | 12.00      | 117.59     | 795.62        | 4,136.38     | -29.00          | 55.48           | 41.17                         | 2.00                          | 2.00                         | 0.00                        |
| 900.00  | 14.00      | 117.59     | 893.06        | 4,038.94     | -39.41          | 75.42           | 55.96                         | 2.00                          | 2.00                         | 0.00                        |
| <b>EOB TO 14.48° INC</b>                        |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 924.20  | 14.48      | 117.59     | 916.51        | 4,015.49     | -42.17          | 80.70           | 59.87                         | 2.00                          | 2.00                         | 0.00                        |
| 1,000.00  | 14.48      | 117.59     | 989.90        | 3,942.10     | -50.95          | 97.50           | 72.34                         | 0.00                          | 0.00                         | 0.00                        |
| 1,100.00  | 14.48      | 117.59     | 1,086.72      | 3,845.28     | -62.54          | 119.66          | 88.78                         | 0.00                          | 0.00                         | 0.00                        |
| 1,200.00  | 14.48      | 117.59     | 1,183.55      | 3,748.45     | -74.12          | 141.83          | 105.23                        | 0.00                          | 0.00                         | 0.00                        |
| 1,300.00  | 14.48      | 117.59     | 1,280.37      | 3,651.63     | -85.71          | 164.00          | 121.68                        | 0.00                          | 0.00                         | 0.00                        |
| 1,400.00  | 14.48      | 117.59     | 1,377.19      | 3,554.81     | -97.29          | 186.16          | 138.12                        | 0.00                          | 0.00                         | 0.00                        |
| 1,500.00  | 14.48      | 117.59     | 1,474.01      | 3,457.99     | -108.87         | 208.33          | 154.57                        | 0.00                          | 0.00                         | 0.00                        |
| <b>Pierre Shale Top</b>                         |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 1,521.68  | 14.48      | 117.59     | 1,495.00      | 3,437.00     | -111.39         | 213.13          | 158.14                        | 0.00                          | 0.00                         | 0.00                        |
| 1,600.00  | 14.48      | 117.59     | 1,570.83      | 3,361.17     | -120.46         | 230.50          | 171.02                        | 0.00                          | 0.00                         | 0.00                        |
| 1,700.00  | 14.48      | 117.59     | 1,667.65      | 3,264.35     | -132.04         | 252.66          | 187.46                        | 0.00                          | 0.00                         | 0.00                        |
| 1,800.00  | 14.48      | 117.59     | 1,764.48      | 3,167.52     | -143.63         | 274.83          | 203.91                        | 0.00                          | 0.00                         | 0.00                        |
| 1,900.00  | 14.48      | 117.59     | 1,861.30      | 3,070.70     | -155.21         | 297.00          | 220.36                        | 0.00                          | 0.00                         | 0.00                        |
| 2,000.00  | 14.48      | 117.59     | 1,958.12      | 2,973.88     | -166.80         | 319.16          | 236.80                        | 0.00                          | 0.00                         | 0.00                        |
| 2,100.00  | 14.48      | 117.59     | 2,054.94      | 2,877.06     | -178.38         | 341.33          | 253.25                        | 0.00                          | 0.00                         | 0.00                        |
| 2,200.00  | 14.48      | 117.59     | 2,151.76      | 2,780.24     | -189.97         | 363.49          | 269.70                        | 0.00                          | 0.00                         | 0.00                        |
| 2,300.00  | 14.48      | 117.59     | 2,248.58      | 2,683.42     | -201.55         | 385.66          | 286.14                        | 0.00                          | 0.00                         | 0.00                        |
| 2,400.00  | 14.48      | 117.59     | 2,345.41      | 2,586.59     | -213.13         | 407.83          | 302.59                        | 0.00                          | 0.00                         | 0.00                        |
| 2,500.00  | 14.48      | 117.59     | 2,442.23      | 2,489.77     | -224.72         | 429.99          | 319.04                        | 0.00                          | 0.00                         | 0.00                        |
| 2,600.00  | 14.48      | 117.59     | 2,539.05      | 2,392.95     | -236.30         | 452.16          | 335.48                        | 0.00                          | 0.00                         | 0.00                        |
| 2,700.00  | 14.48      | 117.59     | 2,635.87      | 2,296.13     | -247.89         | 474.33          | 351.93                        | 0.00                          | 0.00                         | 0.00                        |
| 2,800.00  | 14.48      | 117.59     | 2,732.69      | 2,199.31     | -259.47         | 496.49          | 368.37                        | 0.00                          | 0.00                         | 0.00                        |
| 2,900.00  | 14.48      | 117.59     | 2,829.52      | 2,102.48     | -271.06         | 518.66          | 384.82                        | 0.00                          | 0.00                         | 0.00                        |
| 3,000.00  | 14.48      | 117.59     | 2,926.34      | 2,005.66     | -282.64         | 540.83          | 401.27                        | 0.00                          | 0.00                         | 0.00                        |
| 3,100.00  | 14.48      | 117.59     | 3,023.16      | 1,908.84     | -294.23         | 562.99          | 417.71                        | 0.00                          | 0.00                         | 0.00                        |
| 3,200.00  | 14.48      | 117.59     | 3,119.98      | 1,812.02     | -305.81         | 585.16          | 434.16                        | 0.00                          | 0.00                         | 0.00                        |
| 3,300.00  | 14.48      | 117.59     | 3,216.80      | 1,715.20     | -317.39         | 607.33          | 450.61                        | 0.00                          | 0.00                         | 0.00                        |
| 3,400.00  | 14.48      | 117.59     | 3,313.62      | 1,618.38     | -328.98         | 629.49          | 467.05                        | 0.00                          | 0.00                         | 0.00                        |
| <b>Richard Sandstone</b>                        |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 3,440.67  | 14.48      | 117.59     | 3,353.00      | 1,579.00     | -333.69         | 638.51          | 473.74                        | 0.00                          | 0.00                         | 0.00                        |
| 3,500.00  | 14.48      | 117.59     | 3,410.45      | 1,521.55     | -340.56         | 651.66          | 483.50                        | 0.00                          | 0.00                         | 0.00                        |
| <b>Parkman Sandstone</b>                        |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 3,559.44  | 14.48      | 117.59     | 3,468.00      | 1,464.00     | -347.45         | 664.84          | 493.28                        | 0.00                          | 0.00                         | 0.00                        |
| 3,600.00  | 14.48      | 117.59     | 3,507.27      | 1,424.73     | -352.15         | 673.83          | 499.95                        | 0.00                          | 0.00                         | 0.00                        |
| 3,700.00  | 14.48      | 117.59     | 3,604.09      | 1,327.91     | -363.73         | 695.99          | 516.39                        | 0.00                          | 0.00                         | 0.00                        |
| 3,800.00  | 14.48      | 117.59     | 3,700.91      | 1,231.09     | -375.32         | 718.16          | 532.84                        | 0.00                          | 0.00                         | 0.00                        |
| 3,900.00  | 14.48      | 117.59     | 3,797.73      | 1,134.27     | -386.90         | 740.32          | 549.29                        | 0.00                          | 0.00                         | 0.00                        |
| 4,000.00  | 14.48      | 117.59     | 3,894.55      | 1,037.45     | -398.49         | 762.49          | 565.73                        | 0.00                          | 0.00                         | 0.00                        |

# Planning Report



|                  |                                |                                     |   |
|------------------|--------------------------------|-------------------------------------|---|
| <b>Database:</b> | EDM 5000.1 Single User Db      | <b>Local Co-ordinate Reference:</b> | Well DUCLAIR 16-10HC                      |
| <b>Company:</b>  | MALLARD EXPLORATION            | <b>TVD Reference:</b>               | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Project:</b>  | WELD COUNTY, COLORADO (NAD 83) | <b>MD Reference:</b>                | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Site:</b>     | SW SE SEC. 9 T8N R60W 6th P.M. | <b>North Reference:</b>             | True                                      |
| <b>Well:</b>     | DUCLAIR 16-10HC                | <b>Survey Calculation Method:</b>   | Minimum Curvature                         |
| <b>Wellbore:</b> | ORIGINAL WELLBORE              |                                     |   |
| <b>Design:</b>   | PROPOSAL #1                    |                                     |   |

## Planned Survey

| MD<br>(usft)                  | Inc<br>(°)   | Azi<br>(°)    | TVD<br>(usft)   | SS<br>(usft)     | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-------------------------------|--------------|---------------|-----------------|------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 4,100.00                      | 14.48        | 117.59        | 3,991.38        | 940.62           | -410.07         | 784.66          | 582.18                        | 0.00                          | 0.00                         | 0.00                        |
| 4,200.00                      | 14.48        | 117.59        | 4,088.20        | 843.80           | -421.65         | 806.82          | 598.63                        | 0.00                          | 0.00                         | 0.00                        |
| 4,300.00                      | 14.48        | 117.59        | 4,185.02        | 746.98           | -433.24         | 828.99          | 615.07                        | 0.00                          | 0.00                         | 0.00                        |
| <b>Sussex Sandstone</b>       |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>4,360.92</b>               | <b>14.48</b> | <b>117.59</b> | <b>4,244.00</b> | <b>688.00</b>    | <b>-440.30</b>  | <b>842.49</b>   | <b>625.09</b>                 | <b>0.00</b>                   | <b>0.00</b>                  | <b>0.00</b>                 |
| 4,400.00                      | 14.48        | 117.59        | 4,281.84        | 650.16           | -444.82         | 851.16          | 631.52                        | 0.00                          | 0.00                         | 0.00                        |
| 4,500.00                      | 14.48        | 117.59        | 4,378.66        | 553.34           | -456.41         | 873.32          | 647.96                        | 0.00                          | 0.00                         | 0.00                        |
| 4,600.00                      | 14.48        | 117.59        | 4,475.48        | 456.52           | -467.99         | 895.49          | 664.41                        | 0.00                          | 0.00                         | 0.00                        |
| 4,700.00                      | 14.48        | 117.59        | 4,572.31        | 359.69           | -479.58         | 917.66          | 680.86                        | 0.00                          | 0.00                         | 0.00                        |
| 4,800.00                      | 14.48        | 117.59        | 4,669.13        | 262.87           | -491.16         | 939.82          | 697.30                        | 0.00                          | 0.00                         | 0.00                        |
| <b>Shannon Sandstone</b>      |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>4,813.29</b>               | <b>14.48</b> | <b>117.59</b> | <b>4,682.00</b> | <b>250.00</b>    | <b>-492.70</b>  | <b>942.77</b>   | <b>699.49</b>                 | <b>0.00</b>                   | <b>0.00</b>                  | <b>0.00</b>                 |
| 4,900.00                      | 14.48        | 117.59        | 4,765.95        | 166.05           | -502.74         | 961.99          | 713.75                        | 0.00                          | 0.00                         | 0.00                        |
| 5,000.00                      | 14.48        | 117.59        | 4,862.77        | 69.23            | -514.33         | 984.16          | 730.20                        | 0.00                          | 0.00                         | 0.00                        |
| 5,100.00                      | 14.48        | 117.59        | 4,959.59        | -27.59           | -525.91         | 1,006.32        | 746.64                        | 0.00                          | 0.00                         | 0.00                        |
| 5,200.00                      | 14.48        | 117.59        | 5,056.42        | -124.42          | -537.50         | 1,028.49        | 763.09                        | 0.00                          | 0.00                         | 0.00                        |
| 5,300.00                      | 14.48        | 117.59        | 5,153.24        | -221.24          | -549.08         | 1,050.66        | 779.54                        | 0.00                          | 0.00                         | 0.00                        |
| 5,400.00                      | 14.48        | 117.59        | 5,250.06        | -318.06          | -560.67         | 1,072.82        | 795.98                        | 0.00                          | 0.00                         | 0.00                        |
| 5,500.00                      | 14.48        | 117.59        | 5,346.88        | -414.88          | -572.25         | 1,094.99        | 812.43                        | 0.00                          | 0.00                         | 0.00                        |
| 5,600.00                      | 14.48        | 117.59        | 5,443.70        | -511.70          | -583.84         | 1,117.15        | 828.88                        | 0.00                          | 0.00                         | 0.00                        |
| <b>TeePee Buttes</b>          |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>5,601.34</b>               | <b>14.48</b> | <b>117.59</b> | <b>5,445.00</b> | <b>-513.00</b>   | <b>-583.99</b>  | <b>1,117.45</b> | <b>829.10</b>                 | <b>0.00</b>                   | <b>0.00</b>                  | <b>0.00</b>                 |
| 5,700.00                      | 14.48        | 117.59        | 5,540.52        | -608.52          | -595.42         | 1,139.32        | 845.32                        | 0.00                          | 0.00                         | 0.00                        |
| 5,800.00                      | 14.48        | 117.59        | 5,637.35        | -705.35          | -607.00         | 1,161.49        | 861.77                        | 0.00                          | 0.00                         | 0.00                        |
| 5,900.00                      | 14.48        | 117.59        | 5,734.17        | -802.17          | -618.59         | 1,183.65        | 878.22                        | 0.00                          | 0.00                         | 0.00                        |
| 6,000.00                      | 14.48        | 117.59        | 5,830.99        | -898.99          | -630.17         | 1,205.82        | 894.66                        | 0.00                          | 0.00                         | 0.00                        |
| 6,100.00                      | 14.48        | 117.59        | 5,927.81        | -995.81          | -641.76         | 1,227.99        | 911.11                        | 0.00                          | 0.00                         | 0.00                        |
| <b>KOP (10°/100ft DGLG)</b>   |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,165.40</b>               | <b>14.48</b> | <b>117.59</b> | <b>5,991.13</b> | <b>-1,059.13</b> | <b>-649.33</b>  | <b>1,242.48</b> | <b>921.86</b>                 | <b>0.00</b>                   | <b>0.00</b>                  | <b>0.00</b>                 |
| 6,200.00                      | 16.28        | 128.76        | 6,024.50        | -1,092.50        | -654.38         | 1,250.10        | 928.55                        | 10.00                         | 5.20                         | 32.29                       |
| 6,300.00                      | 23.61        | 149.14        | 6,118.55        | -1,186.55        | -680.41         | 1,271.36        | 958.83                        | 10.00                         | 7.33                         | 20.37                       |
| <b>Sharon Springs</b>         |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,308.16</b>               | <b>24.29</b> | <b>150.25</b> | <b>6,126.00</b> | <b>-1,194.00</b> | <b>-683.27</b>  | <b>1,273.03</b> | <b>962.00</b>                 | <b>10.00</b>                  | <b>8.32</b>                  | <b>13.67</b>                |
| <b>Niobrara Top</b>           |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,345.96</b>               | <b>27.53</b> | <b>154.73</b> | <b>6,160.00</b> | <b>-1,228.00</b> | <b>-697.93</b>  | <b>1,280.62</b> | <b>978.03</b>                 | <b>10.00</b>                  | <b>8.56</b>                  | <b>11.85</b>                |
| <b>Niobrara A Chalk</b>       |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,381.44</b>               | <b>30.67</b> | <b>158.12</b> | <b>6,191.00</b> | <b>-1,259.00</b> | <b>-713.74</b>  | <b>1,287.50</b> | <b>995.01</b>                 | <b>10.00</b>                  | <b>8.86</b>                  | <b>9.55</b>                 |
| 6,400.00                      | 32.34        | 159.65        | 6,206.83        | -1,274.83        | -722.79         | 1,290.99        | 1,004.63                      | 10.00                         | 9.02                         | 8.25                        |
| <b>Niobrara A Chalk Base</b>  |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,412.12</b>               | <b>33.45</b> | <b>160.58</b> | <b>6,217.00</b> | <b>-1,285.00</b> | <b>-728.98</b>  | <b>1,293.22</b> | <b>1,011.17</b>               | <b>10.00</b>                  | <b>9.10</b>                  | <b>7.64</b>                 |
| <b>Niobrara B1 Chalk Top</b>  |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,453.82</b>               | <b>37.29</b> | <b>163.39</b> | <b>6,251.00</b> | <b>-1,319.00</b> | <b>-751.93</b>  | <b>1,300.66</b> | <b>1,035.22</b>               | <b>10.00</b>                  | <b>9.21</b>                  | <b>6.74</b>                 |
| <b>Niobrara B1 Chalk Base</b> |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,489.83</b>               | <b>40.65</b> | <b>165.44</b> | <b>6,279.00</b> | <b>-1,347.00</b> | <b>-773.75</b>  | <b>1,306.73</b> | <b>1,057.85</b>               | <b>10.00</b>                  | <b>9.34</b>                  | <b>5.70</b>                 |
| 6,500.00                      | 41.61        | 165.97        | 6,286.66        | -1,354.66        | -780.23         | 1,308.38        | 1,064.54                      | 10.00                         | 9.40                         | 5.21                        |
| <b>Niobrara B2 Chalk Top</b>  |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,522.22</b>               | <b>43.70</b> | <b>167.06</b> | <b>6,303.00</b> | <b>-1,371.00</b> | <b>-794.87</b>  | <b>1,311.89</b> | <b>1,079.60</b>               | <b>10.00</b>                  | <b>9.43</b>                  | <b>4.91</b>                 |
| <b>Niobrara B2 Chalk Base</b> |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,560.77</b>               | <b>47.36</b> | <b>168.77</b> | <b>6,330.00</b> | <b>-1,398.00</b> | <b>-821.77</b>  | <b>1,317.63</b> | <b>1,107.09</b>               | <b>10.00</b>                  | <b>9.49</b>                  | <b>4.43</b>                 |
| 6,600.00                      | 51.10        | 170.31        | 6,355.61        | -1,423.61        | -850.98         | 1,323.02        | 1,136.75                      | 10.00                         | 9.55                         | 3.93                        |
| <b>Niobrara C Chalk Top</b>   |              |               |                 |                  |                 |                 |                               |                               |                              |                             |
| <b>6,605.42</b>               | <b>51.62</b> | <b>170.51</b> | <b>6,359.00</b> | <b>-1,427.00</b> | <b>-855.16</b>  | <b>1,323.72</b> | <b>1,140.98</b>               | <b>10.00</b>                  | <b>9.58</b>                  | <b>3.69</b>                 |



# Planning Report



|                  |                                |                                     |   |
|------------------|--------------------------------|-------------------------------------|---|
| <b>Database:</b> | EDM 5000.1 Single User Db      | <b>Local Co-ordinate Reference:</b> | Well DUCLAIR 16-10HC                      |
| <b>Company:</b>  | MALLARD EXPLORATION            | <b>TVD Reference:</b>               | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Project:</b>  | WELD COUNTY, COLORADO (NAD 83) | <b>MD Reference:</b>                | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Site:</b>     | SW SE SEC. 9 T8N R60W 6th P.M. | <b>North Reference:</b>             | True                                      |
| <b>Well:</b>     | DUCLAIR 16-10HC                | <b>Survey Calculation Method:</b>   | Minimum Curvature                         |
| <b>Wellbore:</b> | ORIGINAL WELLBORE              |                                     |   |
| <b>Design:</b>   | PROPOSAL #1                    |                                     |   |

## Planned Survey

| MD<br>(usft)  | Inc<br>(°) | Azi<br>(°) | TVD<br>(usft) | SS<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|---|------------|------------|---------------|--------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| <b>Niobrara C Chalk Base</b>  |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 6,686.76  | 59.45      | 173.22     | 6,405.00      | -1,473.00    | -921.49         | 1,333.13        | 1,207.67                      | 10.00                         | 9.62                         | 3.33                        |
| 6,700.00  | 60.73      | 173.61     | 6,411.60      | -1,479.60    | -932.89         | 1,334.45        | 1,219.06                      | 10.00                         | 9.66                         | 3.00                        |
| <b>Niobrara D Chalk Top</b>   |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 6,740.07  | 64.60      | 174.76     | 6,430.00      | -1,498.00    | -968.30         | 1,338.05        | 1,254.33                      | 10.00                         | 9.67                         | 2.86                        |
| 6,800.00  | 70.41      | 176.34     | 6,452.92      | -1,520.92    | -1,023.47       | 1,342.33        | 1,308.98                      | 10.00                         | 9.70                         | 2.64                        |
| <b>Ft. Hays</b>   |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 6,829.13  | 73.24      | 177.07     | 6,462.00      | -1,530.00    | -1,051.10       | 1,343.92        | 1,336.21                      | 10.00                         | 9.72                         | 2.49                        |
| 6,900.00  | 80.14      | 178.75     | 6,478.31      | -1,546.31    | -1,119.98       | 1,346.42        | 1,403.77                      | 10.00                         | 9.73                         | 2.38                        |
| 7,000.00  | 89.88      | 181.03     | 6,487.00      | -1,555.00    | -1,219.47       | 1,346.59        | 1,500.54                      | 10.00                         | 9.74                         | 2.27                        |
| <b>HZ LP: 600ft FNL &amp; 790ft FEL of Sec 16 - Codell (Target)</b> |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 7,001.25  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,220.72       | 1,346.57        | 1,501.75                      | 10.00                         | 9.74                         | 2.25                        |
| 7,100.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,319.46       | 1,344.75        | 1,597.32                      | 0.00                          | 0.00                         | 0.00                        |
| 7,200.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,419.44       | 1,342.91        | 1,694.10                      | 0.00                          | 0.00                         | 0.00                        |
| 7,300.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,519.42       | 1,341.06        | 1,790.88                      | 0.00                          | 0.00                         | 0.00                        |
| 7,400.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,619.41       | 1,339.22        | 1,887.66                      | 0.00                          | 0.00                         | 0.00                        |
| 7,500.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,719.39       | 1,337.38        | 1,984.44                      | 0.00                          | 0.00                         | 0.00                        |
| 7,600.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,819.37       | 1,335.53        | 2,081.22                      | 0.00                          | 0.00                         | 0.00                        |
| 7,700.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -1,919.35       | 1,333.69        | 2,178.00                      | 0.00                          | 0.00                         | 0.00                        |
| 7,800.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,019.34       | 1,331.85        | 2,274.78                      | 0.00                          | 0.00                         | 0.00                        |
| 7,900.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,119.32       | 1,330.00        | 2,371.56                      | 0.00                          | 0.00                         | 0.00                        |
| 8,000.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,219.30       | 1,328.16        | 2,468.34                      | 0.00                          | 0.00                         | 0.00                        |
| 8,100.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,319.29       | 1,326.32        | 2,565.12                      | 0.00                          | 0.00                         | 0.00                        |
| 8,200.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,419.27       | 1,324.47        | 2,661.90                      | 0.00                          | 0.00                         | 0.00                        |
| 8,300.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,519.25       | 1,322.63        | 2,758.68                      | 0.00                          | 0.00                         | 0.00                        |
| 8,400.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,619.24       | 1,320.79        | 2,855.46                      | 0.00                          | 0.00                         | 0.00                        |
| 8,500.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,719.22       | 1,318.94        | 2,952.24                      | 0.00                          | 0.00                         | 0.00                        |
| 8,600.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,819.20       | 1,317.10        | 3,049.03                      | 0.00                          | 0.00                         | 0.00                        |
| 8,700.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -2,919.19       | 1,315.26        | 3,145.81                      | 0.00                          | 0.00                         | 0.00                        |
| 8,800.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,019.17       | 1,313.41        | 3,242.59                      | 0.00                          | 0.00                         | 0.00                        |
| 8,900.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,119.15       | 1,311.57        | 3,339.37                      | 0.00                          | 0.00                         | 0.00                        |
| 9,000.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,219.13       | 1,309.73        | 3,436.15                      | 0.00                          | 0.00                         | 0.00                        |
| 9,100.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,319.12       | 1,307.88        | 3,532.93                      | 0.00                          | 0.00                         | 0.00                        |
| 9,200.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,419.10       | 1,306.04        | 3,629.71                      | 0.00                          | 0.00                         | 0.00                        |
| 9,300.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,519.08       | 1,304.20        | 3,726.49                      | 0.00                          | 0.00                         | 0.00                        |
| 9,400.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,619.07       | 1,302.35        | 3,823.27                      | 0.00                          | 0.00                         | 0.00                        |
| 9,500.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,719.05       | 1,300.51        | 3,920.05                      | 0.00                          | 0.00                         | 0.00                        |
| 9,600.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,819.03       | 1,298.67        | 4,016.83                      | 0.00                          | 0.00                         | 0.00                        |
| 9,700.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -3,919.02       | 1,296.83        | 4,113.61                      | 0.00                          | 0.00                         | 0.00                        |
| 9,800.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,019.00       | 1,294.98        | 4,210.39                      | 0.00                          | 0.00                         | 0.00                        |
| 9,900.00  | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,118.98       | 1,293.14        | 4,307.17                      | 0.00                          | 0.00                         | 0.00                        |
| 10,000.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,218.96       | 1,291.30        | 4,403.95                      | 0.00                          | 0.00                         | 0.00                        |
| 10,100.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,318.95       | 1,289.45        | 4,500.73                      | 0.00                          | 0.00                         | 0.00                        |
| 10,200.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,418.93       | 1,287.61        | 4,597.51                      | 0.00                          | 0.00                         | 0.00                        |
| 10,300.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,518.91       | 1,285.77        | 4,694.29                      | 0.00                          | 0.00                         | 0.00                        |
| 10,400.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,618.90       | 1,283.92        | 4,791.07                      | 0.00                          | 0.00                         | 0.00                        |
| 10,500.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,718.88       | 1,282.08        | 4,887.85                      | 0.00                          | 0.00                         | 0.00                        |
| 10,600.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,818.86       | 1,280.24        | 4,984.63                      | 0.00                          | 0.00                         | 0.00                        |
| 10,700.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -4,918.85       | 1,278.39        | 5,081.41                      | 0.00                          | 0.00                         | 0.00                        |
| 10,800.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -5,018.83       | 1,276.55        | 5,178.19                      | 0.00                          | 0.00                         | 0.00                        |
| 10,900.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -5,118.81       | 1,274.71        | 5,274.97                      | 0.00                          | 0.00                         | 0.00                        |
| 11,000.00   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -5,218.79       | 1,272.86        | 5,371.75                      | 0.00                          | 0.00                         | 0.00                        |
| <b>BHL: 600ft FSL &amp; 790ft FEL of Sec 16</b>                     |            |            |               |              |                 |                 |                               |                               |                              |                             |
| 11,068.57   | 90.00      | 181.06     | 6,487.00      | -1,555.00    | -5,287.35       | 1,271.60        | 5,438.11                      | 0.00                          | 0.00                         | 0.00                        |

# Planning Report



|                  |                                |                                     |   |
|------------------|--------------------------------|-------------------------------------|---|
| <b>Database:</b> | EDM 5000.1 Single User Db      | <b>Local Co-ordinate Reference:</b> | Well DUCLAIR 16-10HC                      |
| <b>Company:</b>  | MALLARD EXPLORATION            | <b>TVD Reference:</b>               | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Project:</b>  | WELD COUNTY, COLORADO (NAD 83) | <b>MD Reference:</b>                | KB-EST @ 4932.00usft (Original Well Elev) |
| <b>Site:</b>     | SW SE SEC. 9 T8N R60W 6th P.M. | <b>North Reference:</b>             | True                                      |
| <b>Well:</b>     | DUCLAIR 16-10HC                | <b>Survey Calculation Method:</b>   | Minimum Curvature                         |
| <b>Wellbore:</b> | ORIGINAL WELLBORE              |                                     |   |
| <b>Design:</b>   | PROPOSAL #1                    |                                     |   |

| Planned Survey |            |            |               |              |                 |                 |                               |                               |                              |                             |
|----------------|------------|------------|---------------|--------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| MD<br>(usft)   | Inc<br>(°) | Azi<br>(°) | TVD<br>(usft) | SS<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |

| Formations   |               |                        |           |            |                         |  |
|--------------|---------------|------------------------|-----------|------------|-------------------------|--|
| MD<br>(usft) | TVD<br>(usft) | Name                   | Lithology | Dip<br>(°) | Dip<br>Direction<br>(°) |  |
| 492.51       | 492.00        | Fox Hills Base         |           |            |                         |  |
| 1,521.68     | 1,495.00      | Pierre Shale Top       |           |            |                         |  |
| 3,440.67     | 3,353.00      | Richard Sandstone      |           |            |                         |  |
| 3,559.44     | 3,468.00      | Parkman Sandstone      |           |            |                         |  |
| 4,360.92     | 4,244.00      | Sussex Sandstone       |           |            |                         |  |
| 4,813.29     | 4,682.00      | Shannon Sandstone      |           |            |                         |  |
| 5,601.34     | 5,445.00      | TeePee Buttes          |           |            |                         |  |
| 6,308.16     | 6,126.00      | Sharon Springs         |           |            |                         |  |
| 6,345.96     | 6,160.00      | Niobrara Top           |           |            |                         |  |
| 6,381.44     | 6,191.00      | Niobrara A Chalk       |           |            |                         |  |
| 6,412.12     | 6,217.00      | Niobrara A Chalk Base  |           |            |                         |  |
| 6,453.82     | 6,251.00      | Niobrara B1 Chalk Top  |           |            |                         |  |
| 6,489.83     | 6,279.00      | Niobrara B1 Chalk Base |           |            |                         |  |
| 6,522.22     | 6,303.00      | Niobrara B2 Chalk Top  |           |            |                         |  |
| 6,560.77     | 6,330.00      | Niobrara B2 Chalk Base |           |            |                         |  |
| 6,605.42     | 6,359.00      | Niobrara C Chalk Top   |           |            |                         |  |
| 6,686.76     | 6,405.00      | Niobrara C Chalk Base  |           |            |                         |  |
| 6,740.07     | 6,430.00      | Niobrara D Chalk Top   |           |            |                         |  |
| 6,829.13     | 6,462.00      | Ft. Hays               |           |            |                         |  |
| 7,001.25     | 6,487.00      | Codell (Target)        |           |            |                         |  |

| Plan Annotations |               |                   |                 |  |
|------------------|---------------|-------------------|-----------------|--|
| MD<br>(usft)     | TVD<br>(usft) | Local Coordinates |                 | Comment                                |
|                  |               | +N/-S<br>(usft)   | +E/-W<br>(usft) |  |
| 0.00             | 0.00          | 0.00              | 0.00            | SHL: 617ft FSL & 2160ft FEL of Sec 9   |
| 200.00           | 200.00        | 0.00              | 0.00            | START NUDGE (2°/100ft BUR)             |
| 924.20           | 916.51        | -42.17            | 80.70           | EOB TO 14.48° INC                      |
| 6,165.40         | 5,991.13      | -649.33           | 1,242.48        | KOP (10°/100ft DGLG)                   |
| 7,001.25         | 6,487.00      | -1,220.72         | 1,346.57        | HZ LP: 600ft FNL & 790ft FEL of Sec 16 |
| 11,068.57        | 6,487.00      | -5,287.35         | 1,271.60        | BHL: 600ft FSL & 790ft FEL of Sec 16   |