



Project: Weld County, CO  
Site: Sec 7-T9N-R57W  
Well: Cottonwood #07M-0634  
Wellbore: Hz  
Design: APD

PROJECT DETAILS: Weld County, CO  
Geodetic System: US State Plane 1983  
Datum: North American Datum 1983  
Ellipsoid: GRS 1980  
Zone: Colorado Northern Zone  
System Datum: Mean Sea Level



Azimuths to True North  
Magnetic North: 7.70°  
Magnetic Field  
Strength: 52630.3snT  
Dip Angle: 67.25°  
Date: 1/26/2017  
Model: MVHD

WELL DETAILS: Cottonwood #07M-0634

| +N/-S | +E/-W | Northing   | Easting    | 4628.00 | Latitude         | Longitude         | Slot |
|-------|-------|------------|------------|---------|------------------|-------------------|------|
| 0.00  | 0.00  | 1524123.26 | 3470977.20 |         | 40° 45' 34.960 N | 103° 47' 59.340 W |      |

#### SECTION DETAILS

| Sec | MD       | Inc   | Azi    | TVD     | +N/-S    | +E/-W   | Dleg | TFace  | VSect    | Target                   |
|-----|----------|-------|--------|---------|----------|---------|------|--------|----------|--------------------------|
| 1   | 0.00     | 0.00  | 0.00   | 0.00    | 0.00     | 0.00    | 0.00 | 0.00   | 0.00     |                          |
| 2   | 300.00   | 0.00  | 0.00   | 300.00  | 0.00     | 0.00    | 0.00 | 0.00   | 0.00     |                          |
| 3   | 980.60   | 13.61 | 203.20 | 974.21  | -73.96   | -31.70  | 2.00 | 203.20 | -72.30   |                          |
| 4   | 4147.63  | 13.61 | 203.20 | 4052.29 | -759.04  | -325.30 | 0.00 | 0.00   | -741.99  |                          |
| 5   | 4828.22  | 0.00  | 0.00   | 4726.50 | -833.00  | -357.00 | 2.00 | 180.00 | -814.29  |                          |
| 6   | 5028.22  | 0.00  | 0.00   | 4926.50 | -833.00  | -357.00 | 0.00 | 0.00   | -814.29  |                          |
| 7   | 6028.04  | 90.00 | 360.00 | 5563.00 | -196.50  | -357.00 | 9.00 | 360.00 | -178.57  |                          |
| 8   | 11115.54 | 90.00 | 360.00 | 5563.00 | 4891.00  | -357.00 | 0.00 | 0.00   | 4902.68  |                          |
| 9   | 11195.84 | 90.00 | 358.39 | 5563.00 | 4971.29  | -358.13 | 2.00 | -90.00 | 4982.93  | PBHL Cottonwood 07M-0634 |
| 10  | 16367.23 | 90.00 | 358.39 | 5563.00 | 10140.66 | -503.07 | 0.00 | 0.00   | 10153.13 | PBHL Cottonwood 07M-0634 |

#### FORMATION TOP DETAILS

| TVDPth  | MDPath  | Formation             |
|---------|---------|-----------------------|
| 1200.00 | 1212.91 | Upper Pierre          |
| 3500.00 | 3579.38 | Hygiene               |
| 3650.00 | 3733.71 | Lower Pierre          |
| 5282.00 | 5405.42 | P200 Marker           |
| 5306.00 | 5434.82 | P300 Marker           |
| 5321.00 | 5453.71 | P350 Marker           |
| 5332.00 | 5467.86 | Sharon Springs        |
| 5339.00 | 5476.99 | Niobrara              |
| 5354.00 | 5496.96 | Top A Chalk (N100)    |
| 5384.00 | 5538.72 | Top A Marl (N200)     |
| 5391.00 | 5548.87 | A Marl (N250)         |
| 5400.00 | 5562.19 | Top Upper B (N400)    |
| 5429.00 | 5607.41 | Base Upper B (N430)   |
| 5446.00 | 5635.94 | Top Lower B (N460)    |
| 5476.00 | 5691.33 | Base Lower B (N490)   |
| 5481.00 | 5701.37 | Top B Marl (N500)     |
| 5525.00 | 5806.99 | Top C Chalk (N700)    |
| 5532.00 | 5828.50 | Middle C Chalk (N710) |
| 5547.00 | 5885.02 | Middle C Marl (N720)  |
| 5563.00 | 6028.04 | Lower C Chalk (N730)  |

#### ANNOTATIONS

| MD       | Inc   | Azi    | TVD     | +N/-S    | +E/-W   | VSect    | Departure | Annotation         |
|----------|-------|--------|---------|----------|---------|----------|-----------|--------------------|
| 300.00   | 0.00  | 0.00   | 300.00  | 0.00     | 0.00    | 0.00     | 0.00      | Build 2°/100'      |
| 980.60   | 13.61 | 203.20 | 974.21  | -73.96   | -31.70  | -72.30   | 80.47     | Hold 13.61° Inc    |
| 4147.63  | 13.61 | 203.20 | 4052.29 | -759.04  | -325.30 | -741.99  | 825.81    | Drop 2°/100'       |
| 4828.22  | 0.00  | 0.00   | 4726.50 | -833.00  | -357.00 | -814.29  | 906.28    | Hold Vertical      |
| 5028.22  | 0.00  | 0.00   | 4926.50 | -833.00  | -357.00 | -814.29  | 906.28    | KOP, Build 9°/100' |
| 6028.04  | 90.00 | 360.00 | 5563.00 | -196.50  | -357.00 | -178.57  | 1542.78   | LP @ 90° Inc, Hold |
| 11115.54 | 90.00 | 360.00 | 5563.00 | 4891.00  | -357.00 | 4902.68  | 6630.28   | Turn 2°/100'       |
| 11195.84 | 90.00 | 358.39 | 5563.00 | 4971.29  | -358.13 | 4982.93  | 6710.58   | End Turn, Hold     |
| 16367.23 | 90.00 | 358.39 | 5563.00 | 10140.66 | -503.07 | 10153.13 | 11881.97  | TD at 16367.23     |

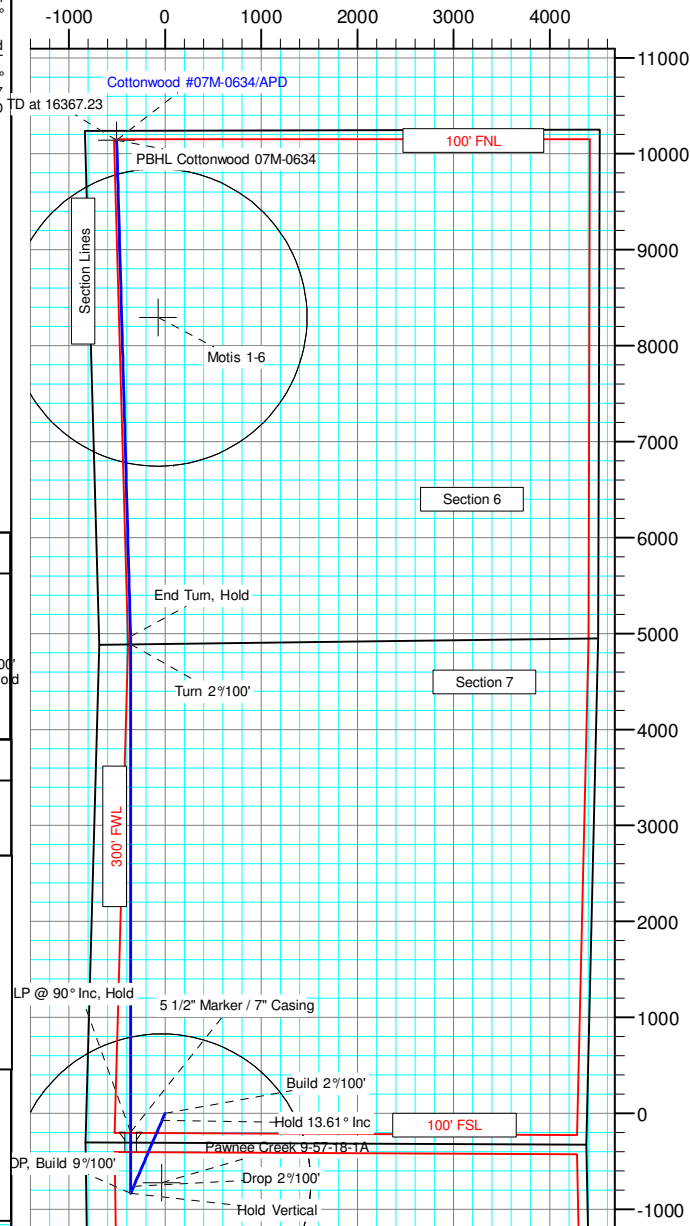
#### DESIGN TARGET DETAILS

| Name                     | TVD     | +N/-S    | +E/-W   | Northing   | Easting    | Latitude         | Longitude         |
|--------------------------|---------|----------|---------|------------|------------|------------------|-------------------|
| PBHL Cottonwood 07M-0634 | 5563.00 | 10140.66 | -503.07 | 1534252.41 | 3470279.81 | 40° 47' 15.160 N | 103° 48' 5.880 W  |
| Pawnee Creek 9-57-18-1A  | 6023.00 | -721.29  | -35.25  | 1523401.43 | 3470955.79 | 40° 45' 27.833 N | 103° 47' 59.798 W |
| Motis 1-6                | 6325.00 | 8295.49  | -73.20  | 1532415.82 | 3470744.97 | 40° 46' 56.928 N | 103° 48' 0.292 W  |

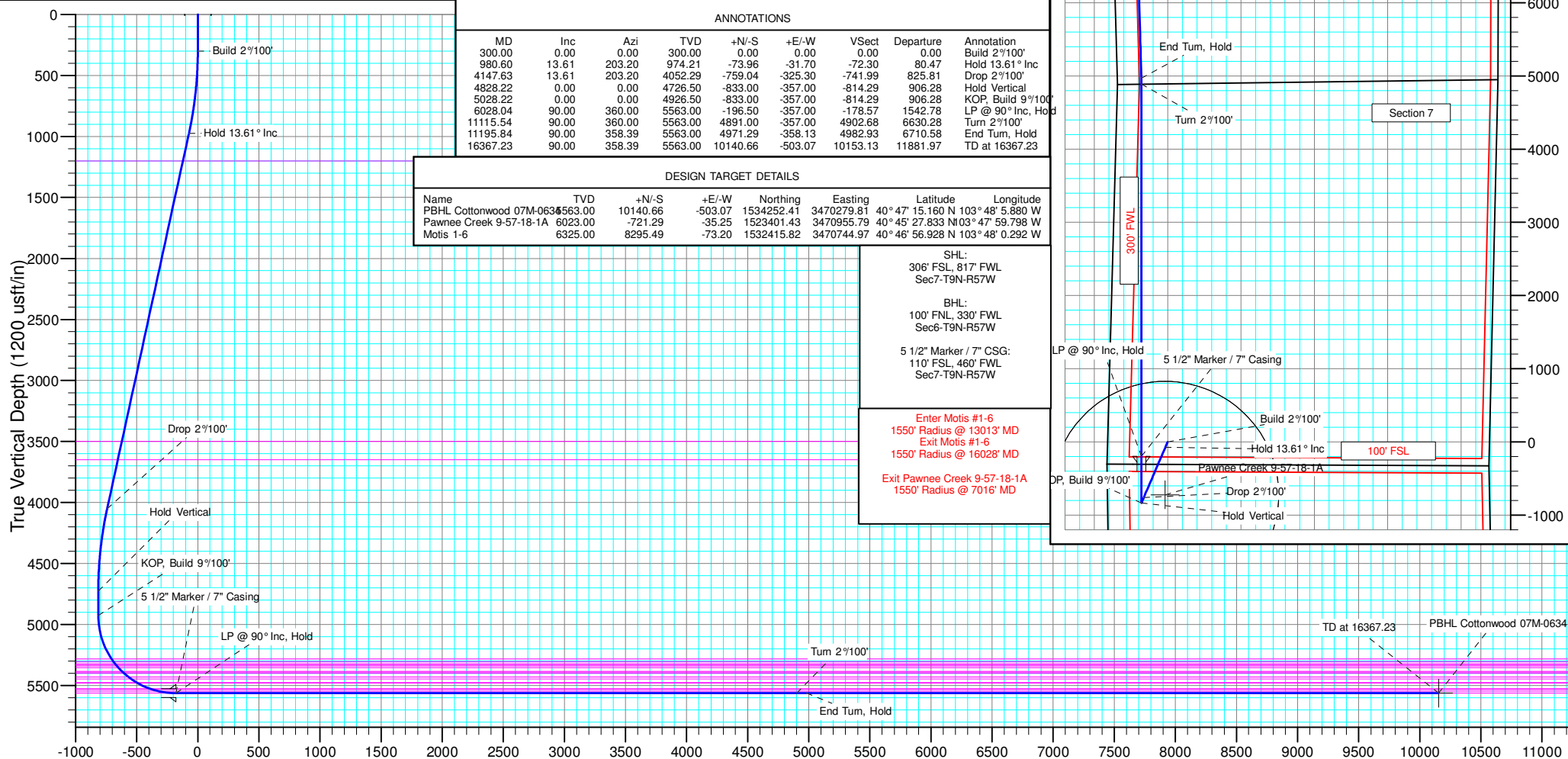
SHL:  
306' FSL, 817' FWL  
Sec7-T9N-R57W  
  
BHL:  
100' FNL, 330' FWL  
Sec6-T9N-R57W  
  
5 1/2" Marker / 7" CSG:  
110' FSL, 460' FWL  
Sec7-T9N-R57W

Enter Motis #1-6  
1550' Radius @ 13013' MD  
Exit Motis #1-6  
1550' Radius @ 16028' MD  
  
Exit Pawnee Creek 9-57-18-1A  
1550' Radius @ 7016' MD

West(-)/East(+) (2000 usft/in)



South(-)/North(+) (2000 usft/in)



Vertical Section at 357.16° (1200 usft/in)



# **Whiting Petroleum Corp.**

**Weld County, CO**

**Sec 7-T9N-R57W**

**Cottonwood #07M-0634**

**Hz**

**Plan: APD**

## **Standard Planning Report**

**26 January, 2017**



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

|                    |                           |                      |                |
|--------------------|---------------------------|----------------------|----------------|
| <b>Project</b>     | Weld County, CO           |                      |                |
| <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    |                      |                |

|                              |                |                     |                   |                                     |
|------------------------------|----------------|---------------------|-------------------|-------------------------------------|
| <b>Site</b>                  | Sec 7-T9N-R57W |                     |                   |                                     |
| <b>Site Position:</b>        |                | <b>Northing:</b>    | 1,524,361.37 usft | <b>Latitude:</b> 40° 45' 36.630 N   |
| <b>From:</b>                 | Lat/Long       | <b>Easting:</b>     | 3,474,564.69 usft | <b>Longitude:</b> 103° 47' 12.670 W |
| <b>Position Uncertainty:</b> | 0.00 usft      | <b>Slot Radius:</b> | 13.200 in         | <b>Grid Convergence:</b> 1.11 °     |

|                             |                      |                            |                  |                                    |
|-----------------------------|----------------------|----------------------------|------------------|------------------------------------|
| <b>Well</b>                 | Cottonwood #07M-0634 |                            |                  |                                    |
| <b>Well Position</b>        | <b>+N/-S</b>         | -168.76 usft               | <b>Northing:</b> | 1,524,123.26 usft                  |
|                             | <b>+E/-W</b>         | -3,591.42 usft             | <b>Easting:</b>  | 3,470,977.20 usft                  |
| <b>Position Uncertainty</b> | 0.00 usft            | <b>Wellhead Elevation:</b> |                  | <b>Ground Level:</b> 4,628.00 usft |

|                  |                   |                    |                        |                      |                            |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | Hz                |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | MVHD              | 1/26/2017          | 7.70                   | 67.25                | 52,630.34826598            |

|                          |                                |                     |                      |                      |
|--------------------------|--------------------------------|---------------------|----------------------|----------------------|
| <b>Design</b>            | APD                            |                     |                      |                      |
| <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> |
|                          | 0.00                           | 0.00                | 0.00                 | 357.16               |

|                                 |                        |                          |                            |                |
|---------------------------------|------------------------|--------------------------|----------------------------|----------------|
| <b>Plan Survey Tool Program</b> | <b>Date</b>            | 1/26/2017                |                            |                |
| <b>Depth From (usft)</b>        | <b>Depth To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b>           | <b>Remarks</b> |
| 1                               | 0.00                   | 16,367.23 APD (Hz)       | OWSG Rev2 MWD+IFR1+MS      |                |
|                                 |                        |                          | OWSG MWD + IFR1 + Multi-St |                |



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Plan Sections         |                 |             |                       |              |              |                       |                      |                     |         |                    |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-----------------------|----------------------|---------------------|---------|--------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | TFO (°) | Target             |
| 0.00                  | 0.00            | 0.00        | 0.00                  | 0.00         | 0.00         | 0.00                  | 0.00                 | 0.00                | 0.00    |                    |
| 300.00                | 0.00            | 0.00        | 300.00                | 0.00         | 0.00         | 0.00                  | 0.00                 | 0.00                | 0.00    |                    |
| 980.60                | 13.61           | 203.20      | 974.21                | -73.96       | -31.70       | 2.00                  | 2.00                 | 0.00                | 203.20  |                    |
| 4,147.63              | 13.61           | 203.20      | 4,052.29              | -759.04      | -325.30      | 0.00                  | 0.00                 | 0.00                | 0.00    |                    |
| 4,828.22              | 0.00            | 0.00        | 4,726.50              | -833.00      | -357.00      | 2.00                  | -2.00                | 0.00                | 180.00  |                    |
| 5,028.22              | 0.00            | 0.00        | 4,926.50              | -833.00      | -357.00      | 0.00                  | 0.00                 | 0.00                | 0.00    |                    |
| 6,028.04              | 90.00           | 360.00      | 5,563.00              | -196.50      | -357.00      | 9.00                  | 9.00                 | 0.00                | 360.00  |                    |
| 11,115.54             | 90.00           | 360.00      | 5,563.00              | 4,891.00     | -357.00      | 0.00                  | 0.00                 | 0.00                | 0.00    |                    |
| 11,195.84             | 90.00           | 358.39      | 5,563.00              | 4,971.29     | -358.13      | 2.00                  | 0.00                 | -2.00               | -90.00  | PBHL Cottonwood 07 |
| 16,367.23             | 90.00           | 358.39      | 5,563.00              | 10,140.66    | -503.07      | 0.00                  | 0.00                 | 0.00                | 0.00    | PBHL Cottonwood 07 |



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Planned Survey         |                 |             |                       |              |              |                         |                       |                      |                     |
|------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-----------------------|----------------------|---------------------|
| Measured Depth (usft)  | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
| 0.00                   | 0.00            | 0.00        | 0.00                  | 0.00         | 0.00         | 0.00                    | 0.00                  | 0.00                 | 0.00                |
| 100.00                 | 0.00            | 0.00        | 100.00                | 0.00         | 0.00         | 0.00                    | 0.00                  | 0.00                 | 0.00                |
| 200.00                 | 0.00            | 0.00        | 200.00                | 0.00         | 0.00         | 0.00                    | 0.00                  | 0.00                 | 0.00                |
| 300.00                 | 0.00            | 0.00        | 300.00                | 0.00         | 0.00         | 0.00                    | 0.00                  | 0.00                 | 0.00                |
| <b>Build 2°/100'</b>   |                 |             |                       |              |              |                         |                       |                      |                     |
| 400.00                 | 2.00            | 203.20      | 399.98                | -1.60        | -0.69        | -1.57                   | 2.00                  | 2.00                 | 0.00                |
| 500.00                 | 4.00            | 203.20      | 499.84                | -6.41        | -2.75        | -6.27                   | 2.00                  | 2.00                 | 0.00                |
| 600.00                 | 6.00            | 203.20      | 599.45                | -14.42       | -6.18        | -14.10                  | 2.00                  | 2.00                 | 0.00                |
| 700.00                 | 8.00            | 203.20      | 698.70                | -25.63       | -10.98       | -25.05                  | 2.00                  | 2.00                 | 0.00                |
| 800.00                 | 10.00           | 203.20      | 797.47                | -40.00       | -17.14       | -39.11                  | 2.00                  | 2.00                 | 0.00                |
| 900.00                 | 12.00           | 203.20      | 895.62                | -57.54       | -24.66       | -56.25                  | 2.00                  | 2.00                 | 0.00                |
| 980.60                 | 13.61           | 203.20      | 974.21                | -73.96       | -31.70       | -72.30                  | 2.00                  | 2.00                 | 0.00                |
| <b>Hold 13.61° Inc</b> |                 |             |                       |              |              |                         |                       |                      |                     |
| 1,000.00               | 13.61           | 203.20      | 993.07                | -78.16       | -33.50       | -76.40                  | 0.00                  | 0.00                 | 0.00                |
| 1,100.00               | 13.61           | 203.20      | 1,090.26              | -99.79       | -42.77       | -97.55                  | 0.00                  | 0.00                 | 0.00                |
| 1,200.00               | 13.61           | 203.20      | 1,187.45              | -121.42      | -52.04       | -118.69                 | 0.00                  | 0.00                 | 0.00                |
| 1,212.91               | 13.61           | 203.20      | 1,200.00              | -124.21      | -53.23       | -121.42                 | 0.00                  | 0.00                 | 0.00                |
| <b>Upper Pierre</b>    |                 |             |                       |              |              |                         |                       |                      |                     |
| 1,300.00               | 13.61           | 203.20      | 1,284.64              | -143.05      | -61.31       | -139.84                 | 0.00                  | 0.00                 | 0.00                |
| 1,400.00               | 13.61           | 203.20      | 1,381.84              | -164.68      | -70.58       | -160.98                 | 0.00                  | 0.00                 | 0.00                |
| 1,500.00               | 13.61           | 203.20      | 1,479.03              | -186.32      | -79.85       | -182.13                 | 0.00                  | 0.00                 | 0.00                |
| 1,600.00               | 13.61           | 203.20      | 1,576.22              | -207.95      | -89.12       | -203.28                 | 0.00                  | 0.00                 | 0.00                |
| 1,700.00               | 13.61           | 203.20      | 1,673.41              | -229.58      | -98.39       | -224.42                 | 0.00                  | 0.00                 | 0.00                |
| 1,800.00               | 13.61           | 203.20      | 1,770.60              | -251.21      | -107.66      | -245.57                 | 0.00                  | 0.00                 | 0.00                |
| 1,900.00               | 13.61           | 203.20      | 1,867.79              | -272.84      | -116.93      | -266.71                 | 0.00                  | 0.00                 | 0.00                |
| 2,000.00               | 13.61           | 203.20      | 1,964.98              | -294.47      | -126.20      | -287.86                 | 0.00                  | 0.00                 | 0.00                |
| 2,100.00               | 13.61           | 203.20      | 2,062.17              | -316.11      | -135.47      | -309.00                 | 0.00                  | 0.00                 | 0.00                |
| 2,200.00               | 13.61           | 203.20      | 2,159.37              | -337.74      | -144.74      | -330.15                 | 0.00                  | 0.00                 | 0.00                |
| 2,300.00               | 13.61           | 203.20      | 2,256.56              | -359.37      | -154.01      | -351.30                 | 0.00                  | 0.00                 | 0.00                |
| 2,400.00               | 13.61           | 203.20      | 2,353.75              | -381.00      | -163.29      | -372.44                 | 0.00                  | 0.00                 | 0.00                |
| 2,500.00               | 13.61           | 203.20      | 2,450.94              | -402.63      | -172.56      | -393.59                 | 0.00                  | 0.00                 | 0.00                |
| 2,600.00               | 13.61           | 203.20      | 2,548.13              | -424.26      | -181.83      | -414.73                 | 0.00                  | 0.00                 | 0.00                |
| 2,700.00               | 13.61           | 203.20      | 2,645.32              | -445.89      | -191.10      | -435.88                 | 0.00                  | 0.00                 | 0.00                |
| 2,800.00               | 13.61           | 203.20      | 2,742.51              | -467.53      | -200.37      | -457.02                 | 0.00                  | 0.00                 | 0.00                |
| 2,900.00               | 13.61           | 203.20      | 2,839.70              | -489.16      | -209.64      | -478.17                 | 0.00                  | 0.00                 | 0.00                |
| 3,000.00               | 13.61           | 203.20      | 2,936.89              | -510.79      | -218.91      | -499.32                 | 0.00                  | 0.00                 | 0.00                |
| 3,100.00               | 13.61           | 203.20      | 3,034.09              | -532.42      | -228.18      | -520.46                 | 0.00                  | 0.00                 | 0.00                |
| 3,200.00               | 13.61           | 203.20      | 3,131.28              | -554.05      | -237.45      | -541.61                 | 0.00                  | 0.00                 | 0.00                |
| 3,300.00               | 13.61           | 203.20      | 3,228.47              | -575.68      | -246.72      | -562.75                 | 0.00                  | 0.00                 | 0.00                |
| 3,400.00               | 13.61           | 203.20      | 3,325.66              | -597.32      | -255.99      | -583.90                 | 0.00                  | 0.00                 | 0.00                |
| 3,500.00               | 13.61           | 203.20      | 3,422.85              | -618.95      | -265.26      | -605.04                 | 0.00                  | 0.00                 | 0.00                |
| 3,579.38               | 13.61           | 203.20      | 3,500.00              | -636.12      | -272.62      | -621.83                 | 0.00                  | 0.00                 | 0.00                |
| <b>Hygiene</b>         |                 |             |                       |              |              |                         |                       |                      |                     |
| 3,600.00               | 13.61           | 203.20      | 3,520.04              | -640.58      | -274.53      | -626.19                 | 0.00                  | 0.00                 | 0.00                |
| 3,700.00               | 13.61           | 203.20      | 3,617.23              | -662.21      | -283.80      | -647.34                 | 0.00                  | 0.00                 | 0.00                |
| 3,733.71               | 13.61           | 203.20      | 3,650.00              | -669.50      | -286.93      | -654.46                 | 0.00                  | 0.00                 | 0.00                |
| <b>Lower Pierre</b>    |                 |             |                       |              |              |                         |                       |                      |                     |
| 3,800.00               | 13.61           | 203.20      | 3,714.42              | -683.84      | -293.08      | -668.48                 | 0.00                  | 0.00                 | 0.00                |
| 3,900.00               | 13.61           | 203.20      | 3,811.62              | -705.47      | -302.35      | -689.63                 | 0.00                  | 0.00                 | 0.00                |
| 4,000.00               | 13.61           | 203.20      | 3,908.81              | -727.11      | -311.62      | -710.77                 | 0.00                  | 0.00                 | 0.00                |
| 4,100.00               | 13.61           | 203.20      | 4,006.00              | -748.74      | -320.89      | -731.92                 | 0.00                  | 0.00                 | 0.00                |
| 4,147.63               | 13.61           | 203.20      | 4,052.29              | -759.04      | -325.30      | -741.99                 | 0.00                  | 0.00                 | 0.00                |
| <b>Drop 2°/100'</b>    |                 |             |                       |              |              |                         |                       |                      |                     |



# WOG Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Planned Survey          |                 |             |                       |              |              |                         |                       |                      |                     |  |
|-------------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-----------------------|----------------------|---------------------|--|
| Measured Depth (usft)   | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |  |
| 4,200.00                | 12.56           | 203.20      | 4,103.30              | -769.94      | -329.97      | -752.65                 | 2.00                  | -2.00                | 0.00                |  |
| 4,300.00                | 10.56           | 203.20      | 4,201.26              | -788.37      | -337.87      | -770.66                 | 2.00                  | -2.00                | 0.00                |  |
| 4,400.00                | 8.56            | 203.20      | 4,299.87              | -803.64      | -344.42      | -785.59                 | 2.00                  | -2.00                | 0.00                |  |
| 4,500.00                | 6.56            | 203.20      | 4,398.99              | -815.74      | -349.60      | -797.41                 | 2.00                  | -2.00                | 0.00                |  |
| 4,600.00                | 4.56            | 203.20      | 4,498.52              | -824.65      | -353.42      | -806.12                 | 2.00                  | -2.00                | 0.00                |  |
| 4,700.00                | 2.56            | 203.20      | 4,598.32              | -830.36      | -355.87      | -811.71                 | 2.00                  | -2.00                | 0.00                |  |
| 4,800.00                | 0.56            | 203.20      | 4,698.28              | -832.87      | -356.95      | -814.16                 | 2.00                  | -2.00                | 0.00                |  |
| 4,828.22                | 0.00            | 0.00        | 4,726.50              | -833.00      | -357.00      | -814.29                 | 2.00                  | -2.00                | 0.00                |  |
| Hold Vertical           |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 4,900.00                | 0.00            | 0.00        | 4,798.28              | -833.00      | -357.00      | -814.29                 | 0.00                  | 0.00                 | 0.00                |  |
| 5,000.00                | 0.00            | 0.00        | 4,898.28              | -833.00      | -357.00      | -814.29                 | 0.00                  | 0.00                 | 0.00                |  |
| 5,028.22                | 0.00            | 0.00        | 4,926.50              | -833.00      | -357.00      | -814.29                 | 0.00                  | 0.00                 | 0.00                |  |
| KOP, Build 9°/100'      |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,100.00                | 6.46            | 360.00      | 4,998.12              | -828.96      | -357.00      | -810.25                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,200.00                | 15.46           | 360.00      | 5,096.20              | -809.96      | -357.00      | -791.28                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,300.00                | 24.46           | 360.00      | 5,190.09              | -775.85      | -357.00      | -757.21                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,400.00                | 33.47           | 360.00      | 5,277.49              | -727.48      | -357.00      | -708.89                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,405.42                | 33.95           | 360.00      | 5,282.00              | -724.47      | -357.00      | -705.89                 | 9.00                  | 9.00                 | 0.00                |  |
| P200 Marker             |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,434.82                | 36.60           | 360.00      | 5,306.00              | -707.49      | -357.00      | -688.93                 | 9.00                  | 9.00                 | 0.00                |  |
| P300 Marker             |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,453.71                | 38.30           | 360.00      | 5,321.00              | -696.00      | -357.00      | -677.46                 | 9.00                  | 9.00                 | 0.00                |  |
| P350 Marker             |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,467.86                | 39.57           | 360.00      | 5,332.00              | -687.11      | -357.00      | -668.58                 | 9.00                  | 9.00                 | 0.00                |  |
| Sharon Springs          |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,476.99                | 40.40           | 360.00      | 5,339.00              | -681.24      | -357.00      | -662.72                 | 9.00                  | 9.00                 | 0.00                |  |
| Niobrara                |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,496.96                | 42.19           | 360.00      | 5,354.00              | -668.07      | -357.00      | -649.56                 | 9.00                  | 9.00                 | 0.00                |  |
| Top A Chalk (N100)      |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,500.00                | 42.47           | 360.00      | 5,356.25              | -666.02      | -357.00      | -647.51                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,538.72                | 45.95           | 360.00      | 5,384.00              | -639.02      | -357.00      | -620.55                 | 9.00                  | 9.00                 | 0.00                |  |
| Top A Marl (N200)       |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,548.87                | 46.87           | 360.00      | 5,391.00              | -631.67      | -357.00      | -613.20                 | 9.00                  | 9.00                 | 0.00                |  |
| A Marl (N250)           |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,562.19                | 48.07           | 360.00      | 5,400.00              | -621.86      | -357.00      | -603.41                 | 9.00                  | 9.00                 | 0.00                |  |
| Top Upper B (N400)      |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,600.00                | 51.47           | 360.00      | 5,424.42              | -593.00      | -357.00      | -574.58                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,607.41                | 52.14           | 360.00      | 5,429.00              | -587.17      | -357.00      | -568.76                 | 9.00                  | 9.00                 | 0.00                |  |
| Base Upper B (N430)     |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,635.94                | 54.70           | 360.00      | 5,446.00              | -564.27      | -357.00      | -545.88                 | 9.00                  | 9.00                 | 0.00                |  |
| Top Lower B (N460)      |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,691.33                | 59.69           | 360.00      | 5,476.00              | -517.72      | -357.00      | -499.40                 | 9.00                  | 9.00                 | 0.00                |  |
| Base Lower B (N490)     |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,700.00                | 60.47           | 360.00      | 5,480.32              | -510.21      | -357.00      | -491.89                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,701.37                | 60.59           | 360.00      | 5,481.00              | -509.01      | -357.00      | -490.70                 | 9.00                  | 9.00                 | 0.00                |  |
| Top B Marl (N500)       |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,737.74                | 63.87           | 360.00      | 5,497.94              | -476.84      | -357.00      | -458.56                 | 9.00                  | 9.00                 | 0.00                |  |
| Pawnee Creek 9-57-18-1A |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,800.00                | 69.47           | 360.00      | 5,522.59              | -419.69      | -357.00      | -401.48                 | 9.00                  | 9.00                 | 0.00                |  |
| 5,806.99                | 70.10           | 360.00      | 5,525.00              | -413.13      | -357.00      | -394.94                 | 9.00                  | 9.00                 | 0.00                |  |
| Top C Chalk (N700)      |                 |             |                       |              |              |                         |                       |                      |                     |  |
| 5,828.57                | 72.04           | 360.00      | 5,532.00              | -392.72      | -357.00      | -374.55                 | 9.00                  | 9.00                 | 0.00                |  |



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Planned Survey   |                 |             |                       |              |              |                         |                       |                      |                     |
|--|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-----------------------|----------------------|---------------------|
| Measured Depth (usft)  | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
| <b>Middle C Chalk (N710)</b>   |                 |             |                       |              |              |                         |                       |                      |                     |
| 5,885.02   | 77.13           | 360.00      | 5,547.00              | -338.32      | -357.00      | -320.21                 | 9.00                  | 9.00                 | 0.00                |
| <b>Middle C Marl (N720)</b>  |                 |             |                       |              |              |                         |                       |                      |                     |
| 5,900.00   | 78.47           | 360.00      | 5,550.17              | -323.67      | -357.00      | -305.59                 | 9.00                  | 9.00                 | 0.00                |
| 6,000.00   | 87.48           | 360.00      | 5,562.38              | -224.53      | -357.00      | -206.56                 | 9.00                  | 9.00                 | 0.00                |
| 6,028.04   | 90.00           | 360.00      | 5,563.00              | -196.50      | -357.00      | -178.57                 | 9.00                  | 9.00                 | 0.00                |
| <b>LP @ 90° Inc, Hold - Lower C Chalk (N730) - 5 1/2" Marker / 7" Casing</b> |                 |             |                       |              |              |                         |                       |                      |                     |
| 6,100.00   | 90.00           | 360.00      | 5,563.00              | -124.54      | -357.00      | -106.69                 | 0.00                  | 0.00                 | 0.00                |
| 6,200.00   | 90.00           | 360.00      | 5,563.00              | -24.54       | -357.00      | -6.82                   | 0.00                  | 0.00                 | 0.00                |
| 6,300.00   | 90.00           | 360.00      | 5,563.00              | 75.46        | -357.00      | 93.06                   | 0.00                  | 0.00                 | 0.00                |
| 6,400.00   | 90.00           | 360.00      | 5,563.00              | 175.46       | -357.00      | 192.94                  | 0.00                  | 0.00                 | 0.00                |
| 6,500.00   | 90.00           | 360.00      | 5,563.00              | 275.46       | -357.00      | 292.81                  | 0.00                  | 0.00                 | 0.00                |
| 6,600.00   | 90.00           | 360.00      | 5,563.00              | 375.46       | -357.00      | 392.69                  | 0.00                  | 0.00                 | 0.00                |
| 6,700.00   | 90.00           | 360.00      | 5,563.00              | 475.46       | -357.00      | 492.57                  | 0.00                  | 0.00                 | 0.00                |
| 6,800.00   | 90.00           | 360.00      | 5,563.00              | 575.46       | -357.00      | 592.45                  | 0.00                  | 0.00                 | 0.00                |
| 6,900.00   | 90.00           | 360.00      | 5,563.00              | 675.46       | -357.00      | 692.32                  | 0.00                  | 0.00                 | 0.00                |
| 7,000.00   | 90.00           | 360.00      | 5,563.00              | 775.46       | -357.00      | 792.20                  | 0.00                  | 0.00                 | 0.00                |
| 7,100.00   | 90.00           | 360.00      | 5,563.00              | 875.46       | -357.00      | 892.08                  | 0.00                  | 0.00                 | 0.00                |
| 7,200.00   | 90.00           | 360.00      | 5,563.00              | 975.46       | -357.00      | 991.95                  | 0.00                  | 0.00                 | 0.00                |
| 7,300.00   | 90.00           | 360.00      | 5,563.00              | 1,075.46     | -357.00      | 1,091.83                | 0.00                  | 0.00                 | 0.00                |
| 7,400.00   | 90.00           | 360.00      | 5,563.00              | 1,175.46     | -357.00      | 1,191.71                | 0.00                  | 0.00                 | 0.00                |
| 7,500.00   | 90.00           | 360.00      | 5,563.00              | 1,275.46     | -357.00      | 1,291.59                | 0.00                  | 0.00                 | 0.00                |
| 7,600.00   | 90.00           | 360.00      | 5,563.00              | 1,375.46     | -357.00      | 1,391.46                | 0.00                  | 0.00                 | 0.00                |
| 7,700.00   | 90.00           | 360.00      | 5,563.00              | 1,475.46     | -357.00      | 1,491.34                | 0.00                  | 0.00                 | 0.00                |
| 7,800.00   | 90.00           | 360.00      | 5,563.00              | 1,575.46     | -357.00      | 1,591.22                | 0.00                  | 0.00                 | 0.00                |
| 7,900.00   | 90.00           | 360.00      | 5,563.00              | 1,675.46     | -357.00      | 1,691.09                | 0.00                  | 0.00                 | 0.00                |
| 8,000.00   | 90.00           | 360.00      | 5,563.00              | 1,775.46     | -357.00      | 1,790.97                | 0.00                  | 0.00                 | 0.00                |
| 8,100.00   | 90.00           | 360.00      | 5,563.00              | 1,875.46     | -357.00      | 1,890.85                | 0.00                  | 0.00                 | 0.00                |
| 8,200.00   | 90.00           | 360.00      | 5,563.00              | 1,975.46     | -357.00      | 1,990.73                | 0.00                  | 0.00                 | 0.00                |
| 8,300.00   | 90.00           | 360.00      | 5,563.00              | 2,075.46     | -357.00      | 2,090.60                | 0.00                  | 0.00                 | 0.00                |
| 8,400.00   | 90.00           | 360.00      | 5,563.00              | 2,175.46     | -357.00      | 2,190.48                | 0.00                  | 0.00                 | 0.00                |
| 8,500.00   | 90.00           | 360.00      | 5,563.00              | 2,275.46     | -357.00      | 2,290.36                | 0.00                  | 0.00                 | 0.00                |
| 8,600.00   | 90.00           | 360.00      | 5,563.00              | 2,375.46     | -357.00      | 2,390.23                | 0.00                  | 0.00                 | 0.00                |
| 8,700.00   | 90.00           | 360.00      | 5,563.00              | 2,475.46     | -357.00      | 2,490.11                | 0.00                  | 0.00                 | 0.00                |
| 8,800.00   | 90.00           | 360.00      | 5,563.00              | 2,575.46     | -357.00      | 2,589.99                | 0.00                  | 0.00                 | 0.00                |
| 8,900.00   | 90.00           | 360.00      | 5,563.00              | 2,675.46     | -357.00      | 2,689.87                | 0.00                  | 0.00                 | 0.00                |
| 9,000.00   | 90.00           | 360.00      | 5,563.00              | 2,775.46     | -357.00      | 2,789.74                | 0.00                  | 0.00                 | 0.00                |
| 9,100.00   | 90.00           | 360.00      | 5,563.00              | 2,875.46     | -357.00      | 2,889.62                | 0.00                  | 0.00                 | 0.00                |
| 9,200.00   | 90.00           | 360.00      | 5,563.00              | 2,975.46     | -357.00      | 2,989.50                | 0.00                  | 0.00                 | 0.00                |
| 9,300.00   | 90.00           | 360.00      | 5,563.00              | 3,075.46     | -357.00      | 3,089.38                | 0.00                  | 0.00                 | 0.00                |
| 9,400.00   | 90.00           | 360.00      | 5,563.00              | 3,175.46     | -357.00      | 3,189.25                | 0.00                  | 0.00                 | 0.00                |
| 9,500.00   | 90.00           | 360.00      | 5,563.00              | 3,275.46     | -357.00      | 3,289.13                | 0.00                  | 0.00                 | 0.00                |
| 9,600.00   | 90.00           | 360.00      | 5,563.00              | 3,375.46     | -357.00      | 3,389.01                | 0.00                  | 0.00                 | 0.00                |
| 9,700.00   | 90.00           | 360.00      | 5,563.00              | 3,475.46     | -357.00      | 3,488.88                | 0.00                  | 0.00                 | 0.00                |
| 9,800.00   | 90.00           | 360.00      | 5,563.00              | 3,575.46     | -357.00      | 3,588.76                | 0.00                  | 0.00                 | 0.00                |
| 9,900.00   | 90.00           | 360.00      | 5,563.00              | 3,675.46     | -357.00      | 3,688.64                | 0.00                  | 0.00                 | 0.00                |
| 10,000.00  | 90.00           | 360.00      | 5,563.00              | 3,775.46     | -357.00      | 3,788.52                | 0.00                  | 0.00                 | 0.00                |
| 10,100.00  | 90.00           | 360.00      | 5,563.00              | 3,875.46     | -357.00      | 3,888.39                | 0.00                  | 0.00                 | 0.00                |
| 10,200.00  | 90.00           | 360.00      | 5,563.00              | 3,975.46     | -357.00      | 3,988.27                | 0.00                  | 0.00                 | 0.00                |
| 10,300.00  | 90.00           | 360.00      | 5,563.00              | 4,075.46     | -357.00      | 4,088.15                | 0.00                  | 0.00                 | 0.00                |
| 10,400.00  | 90.00           | 360.00      | 5,563.00              | 4,175.46     | -357.00      | 4,188.02                | 0.00                  | 0.00                 | 0.00                |
| 10,500.00  | 90.00           | 360.00      | 5,563.00              | 4,275.46     | -357.00      | 4,287.90                | 0.00                  | 0.00                 | 0.00                |
| 10,600.00  | 90.00           | 360.00      | 5,563.00              | 4,375.46     | -357.00      | 4,387.78                | 0.00                  | 0.00                 | 0.00                |



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Planned Survey        |                 |             |                       |              |              |                         |                       |                      |                     |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-----------------------|----------------------|---------------------|
| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
| 10,700.00             | 90.00           | 360.00      | 5,563.00              | 4,475.46     | -357.00      | 4,487.66                | 0.00                  | 0.00                 | 0.00                |
| 10,800.00             | 90.00           | 360.00      | 5,563.00              | 4,575.46     | -357.00      | 4,587.53                | 0.00                  | 0.00                 | 0.00                |
| 10,900.00             | 90.00           | 360.00      | 5,563.00              | 4,675.46     | -357.00      | 4,687.41                | 0.00                  | 0.00                 | 0.00                |
| 11,000.00             | 90.00           | 360.00      | 5,563.00              | 4,775.46     | -357.00      | 4,787.29                | 0.00                  | 0.00                 | 0.00                |
| 11,100.00             | 90.00           | 360.00      | 5,563.00              | 4,875.46     | -357.00      | 4,887.16                | 0.00                  | 0.00                 | 0.00                |
| 11,115.54             | 90.00           | 360.00      | 5,563.00              | 4,891.00     | -357.00      | 4,902.68                | 0.00                  | 0.00                 | 0.00                |
| <b>Turn 2°/100'</b>   |                 |             |                       |              |              |                         |                       |                      |                     |
| 11,195.84             | 90.00           | 358.39      | 5,563.00              | 4,971.29     | -358.13      | 4,982.93                | 2.00                  | 0.00                 | -2.00               |
| <b>End Turn, Hold</b> |                 |             |                       |              |              |                         |                       |                      |                     |
| 11,200.00             | 90.00           | 358.39      | 5,563.00              | 4,975.45     | -358.24      | 4,987.09                | 0.00                  | 0.00                 | 0.00                |
| 11,300.00             | 90.00           | 358.39      | 5,563.00              | 5,075.41     | -361.04      | 5,087.07                | 0.00                  | 0.00                 | 0.00                |
| 11,400.00             | 90.00           | 358.39      | 5,563.00              | 5,175.37     | -363.85      | 5,187.04                | 0.00                  | 0.00                 | 0.00                |
| 11,500.00             | 90.00           | 358.39      | 5,563.00              | 5,275.33     | -366.65      | 5,287.02                | 0.00                  | 0.00                 | 0.00                |
| 11,600.00             | 90.00           | 358.39      | 5,563.00              | 5,375.29     | -369.45      | 5,387.00                | 0.00                  | 0.00                 | 0.00                |
| 11,700.00             | 90.00           | 358.39      | 5,563.00              | 5,475.26     | -372.26      | 5,486.97                | 0.00                  | 0.00                 | 0.00                |
| 11,800.00             | 90.00           | 358.39      | 5,563.00              | 5,575.22     | -375.06      | 5,586.95                | 0.00                  | 0.00                 | 0.00                |
| 11,900.00             | 90.00           | 358.39      | 5,563.00              | 5,675.18     | -377.86      | 5,686.93                | 0.00                  | 0.00                 | 0.00                |
| 12,000.00             | 90.00           | 358.39      | 5,563.00              | 5,775.14     | -380.66      | 5,786.91                | 0.00                  | 0.00                 | 0.00                |
| 12,100.00             | 90.00           | 358.39      | 5,563.00              | 5,875.10     | -383.47      | 5,886.88                | 0.00                  | 0.00                 | 0.00                |
| 12,200.00             | 90.00           | 358.39      | 5,563.00              | 5,975.06     | -386.27      | 5,986.86                | 0.00                  | 0.00                 | 0.00                |
| 12,300.00             | 90.00           | 358.39      | 5,563.00              | 6,075.02     | -389.07      | 6,086.84                | 0.00                  | 0.00                 | 0.00                |
| 12,400.00             | 90.00           | 358.39      | 5,563.00              | 6,174.98     | -391.88      | 6,186.81                | 0.00                  | 0.00                 | 0.00                |
| 12,500.00             | 90.00           | 358.39      | 5,563.00              | 6,274.94     | -394.68      | 6,286.79                | 0.00                  | 0.00                 | 0.00                |
| 12,600.00             | 90.00           | 358.39      | 5,563.00              | 6,374.90     | -397.48      | 6,386.77                | 0.00                  | 0.00                 | 0.00                |
| 12,700.00             | 90.00           | 358.39      | 5,563.00              | 6,474.86     | -400.28      | 6,486.74                | 0.00                  | 0.00                 | 0.00                |
| 12,800.00             | 90.00           | 358.39      | 5,563.00              | 6,574.82     | -403.09      | 6,586.72                | 0.00                  | 0.00                 | 0.00                |
| 12,900.00             | 90.00           | 358.39      | 5,563.00              | 6,674.78     | -405.89      | 6,686.70                | 0.00                  | 0.00                 | 0.00                |
| 13,000.00             | 90.00           | 358.39      | 5,563.00              | 6,774.74     | -408.69      | 6,786.67                | 0.00                  | 0.00                 | 0.00                |
| 13,100.00             | 90.00           | 358.39      | 5,563.00              | 6,874.71     | -411.49      | 6,886.65                | 0.00                  | 0.00                 | 0.00                |
| 13,200.00             | 90.00           | 358.39      | 5,563.00              | 6,974.67     | -414.30      | 6,986.63                | 0.00                  | 0.00                 | 0.00                |
| 13,300.00             | 90.00           | 358.39      | 5,563.00              | 7,074.63     | -417.10      | 7,086.60                | 0.00                  | 0.00                 | 0.00                |
| 13,400.00             | 90.00           | 358.39      | 5,563.00              | 7,174.59     | -419.90      | 7,186.58                | 0.00                  | 0.00                 | 0.00                |
| 13,500.00             | 90.00           | 358.39      | 5,563.00              | 7,274.55     | -422.71      | 7,286.56                | 0.00                  | 0.00                 | 0.00                |
| 13,600.00             | 90.00           | 358.39      | 5,563.00              | 7,374.51     | -425.51      | 7,386.53                | 0.00                  | 0.00                 | 0.00                |
| 13,700.00             | 90.00           | 358.39      | 5,563.00              | 7,474.47     | -428.31      | 7,486.51                | 0.00                  | 0.00                 | 0.00                |
| 13,800.00             | 90.00           | 358.39      | 5,563.00              | 7,574.43     | -431.11      | 7,586.49                | 0.00                  | 0.00                 | 0.00                |
| 13,900.00             | 90.00           | 358.39      | 5,563.00              | 7,674.39     | -433.92      | 7,686.46                | 0.00                  | 0.00                 | 0.00                |
| 14,000.00             | 90.00           | 358.39      | 5,563.00              | 7,774.35     | -436.72      | 7,786.44                | 0.00                  | 0.00                 | 0.00                |
| 14,100.00             | 90.00           | 358.39      | 5,563.00              | 7,874.31     | -439.52      | 7,886.42                | 0.00                  | 0.00                 | 0.00                |
| 14,200.00             | 90.00           | 358.39      | 5,563.00              | 7,974.27     | -442.33      | 7,986.40                | 0.00                  | 0.00                 | 0.00                |
| 14,300.00             | 90.00           | 358.39      | 5,563.00              | 8,074.23     | -445.13      | 8,086.37                | 0.00                  | 0.00                 | 0.00                |
| 14,400.00             | 90.00           | 358.39      | 5,563.00              | 8,174.19     | -447.93      | 8,186.35                | 0.00                  | 0.00                 | 0.00                |
| 14,500.00             | 90.00           | 358.39      | 5,563.00              | 8,274.16     | -450.73      | 8,286.33                | 0.00                  | 0.00                 | 0.00                |
| 14,510.75             | 90.00           | 358.39      | 5,563.00              | 8,284.90     | -451.03      | 8,297.07                | 0.00                  | 0.00                 | 0.00                |
| <b>Motis 1-6</b>      |                 |             |                       |              |              |                         |                       |                      |                     |
| 14,600.00             | 90.00           | 358.39      | 5,563.00              | 8,374.12     | -453.54      | 8,386.30                | 0.00                  | 0.00                 | 0.00                |
| 14,700.00             | 90.00           | 358.39      | 5,563.00              | 8,474.08     | -456.34      | 8,486.28                | 0.00                  | 0.00                 | 0.00                |
| 14,800.00             | 90.00           | 358.39      | 5,563.00              | 8,574.04     | -459.14      | 8,586.26                | 0.00                  | 0.00                 | 0.00                |
| 14,900.00             | 90.00           | 358.39      | 5,563.00              | 8,674.00     | -461.94      | 8,686.23                | 0.00                  | 0.00                 | 0.00                |
| 15,000.00             | 90.00           | 358.39      | 5,563.00              | 8,773.96     | -464.75      | 8,786.21                | 0.00                  | 0.00                 | 0.00                |
| 15,100.00             | 90.00           | 358.39      | 5,563.00              | 8,873.92     | -467.55      | 8,886.19                | 0.00                  | 0.00                 | 0.00                |
| 15,200.00             | 90.00           | 358.39      | 5,563.00              | 8,973.88     | -470.35      | 8,986.16                | 0.00                  | 0.00                 | 0.00                |
| 15,300.00             | 90.00           | 358.39      | 5,563.00              | 9,073.84     | -473.16      | 9,086.14                | 0.00                  | 0.00                 | 0.00                |





# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Planned Survey                            |                 |             |                       |              |              |                         |                       |                      |                     |  |
|---|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-----------------------|----------------------|---------------------|--|
| Measured Depth (usft)                     | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |  |
| 15,400.00                                 | 90.00           | 358.39      | 5,563.00              | 9,173.80     | -475.96      | 9,186.12                | 0.00                  | 0.00                 | 0.00                |  |
| 15,500.00                                 | 90.00           | 358.39      | 5,563.00              | 9,273.76     | -478.76      | 9,286.09                | 0.00                  | 0.00                 | 0.00                |  |
| 15,600.00                                 | 90.00           | 358.39      | 5,563.00              | 9,373.72     | -481.56      | 9,386.07                | 0.00                  | 0.00                 | 0.00                |  |
| 15,700.00                                 | 90.00           | 358.39      | 5,563.00              | 9,473.68     | -484.37      | 9,486.05                | 0.00                  | 0.00                 | 0.00                |  |
| 15,800.00                                 | 90.00           | 358.39      | 5,563.00              | 9,573.64     | -487.17      | 9,586.02                | 0.00                  | 0.00                 | 0.00                |  |
| 15,900.00                                 | 90.00           | 358.39      | 5,563.00              | 9,673.61     | -489.97      | 9,686.00                | 0.00                  | 0.00                 | 0.00                |  |
| 16,000.00                                 | 90.00           | 358.39      | 5,563.00              | 9,773.57     | -492.78      | 9,785.98                | 0.00                  | 0.00                 | 0.00                |  |
| 16,100.00                                 | 90.00           | 358.39      | 5,563.00              | 9,873.53     | -495.58      | 9,885.95                | 0.00                  | 0.00                 | 0.00                |  |
| 16,200.00                                 | 90.00           | 358.39      | 5,563.00              | 9,973.49     | -498.38      | 9,985.93                | 0.00                  | 0.00                 | 0.00                |  |
| 16,300.00                                 | 90.00           | 358.39      | 5,563.00              | 10,073.45    | -501.18      | 10,085.91               | 0.00                  | 0.00                 | 0.00                |  |
| 16,367.23                                 | 90.00           | 358.39      | 5,563.00              | 10,140.66    | -503.07      | 10,153.13               | 0.00                  | 0.00                 | 0.00                |  |
| TD at 16367.23 - PBHL Cottonwood 07M-0634 |                 |             |                       |              |              |                         |                       |                      |                     |  |

| Design Targets   |               |              |            |              |              |                 |                |                  |                   |  |
|--|---------------|--------------|------------|--------------|--------------|-----------------|----------------|------------------|-------------------|--|
| Target Name  | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude         | Longitude         |  |
| - hit/miss target  |               |              |            |              |              |                 |                |                  |                   |  |
| - Shape  |               |              |            |              |              |                 |                |                  |                   |  |
| PBHL Cottonwood 07M-   | 0.00          | 0.00         | 5,563.00   | 10,140.66    | -503.07      | 1,534,252.41    | 3,470,279.81   | 40° 47' 15.160 N | 103° 48' 5.880 W  |  |
| - plan hits target center  |               |              |            |              |              |                 |                |                  |                   |  |
| - Point  |               |              |            |              |              |                 |                |                  |                   |  |
| Pawnee Creek 9-57-18-  | 0.00          | 0.00         | 6,023.00   | -721.29      | -35.25       | 1,523,401.43    | 3,470,955.79   | 40° 45' 27.833 N | 103° 47' 59.798 W |  |
| - plan misses target center by 662.55usft at 5737.74usft MD (5497.94 TVD, -476.84 N, -357.00 E)  |               |              |            |              |              |                 |                |                  |                   |  |
| - Circle (radius 1,550.00)   |               |              |            |              |              |                 |                |                  |                   |  |
| Motis 1-6  | 0.00          | 0.00         | 6,325.00   | 8,295.49     | -73.20       | 1,532,415.83    | 3,470,744.97   | 40° 46' 56.928 N | 103° 48' 0.292 W  |  |
| - plan misses target center by 850.60usft at 14510.75usft MD (5563.00 TVD, 8284.90 N, -451.03 E) |               |              |            |              |              |                 |                |                  |                   |  |
| - Circle (radius 1,550.00)   |               |              |            |              |              |                 |                |                  |                   |  |

| Casing Points         |                       |                           |                      |                    |  |
|-----------------------|-----------------------|---------------------------|----------------------|--------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Name                      | Casing Diameter (in) | Hole Diameter (in) |  |
| 6,028.04              | 5,563.00              | 5 1/2" Marker / 7" Casing | 7.000                | 8.750              |  |



# WOG

## Planning Report

|                  |                         |                                     |                           |
|------------------|-------------------------|-------------------------------------|---------------------------|
| <b>Database:</b> | LandmarkEDM             | <b>Local Co-ordinate Reference:</b> | Well Cottonwood #07M-0634 |
| <b>Company:</b>  | Whiting Petroleum Corp. | <b>TVD Reference:</b>               | KBE @ 4649.00usft         |
| <b>Project:</b>  | Weld County, CO         | <b>MD Reference:</b>                | KBE @ 4649.00usft         |
| <b>Site:</b>     | Sec 7-T9N-R57W          | <b>North Reference:</b>             | True                      |
| <b>Well:</b>     | Cottonwood #07M-0634    | <b>Survey Calculation Method:</b>   | Minimum Curvature         |
| <b>Wellbore:</b> | Hz                      |                                     |                           |
| <b>Design:</b>   | APD                     |                                     |                           |

| Formations            |                       |                       |           |         |                   |  |
|-----------------------|-----------------------|-----------------------|-----------|---------|-------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Name                  | Lithology | Dip (°) | Dip Direction (°) |  |
| 1,212.91              | 1,200.00              | Upper Pierre          |           |         |                   |  |
| 3,579.38              | 3,500.00              | Hygiene               |           |         |                   |  |
| 3,733.71              | 3,650.00              | Lower Pierre          |           |         |                   |  |
| 5,405.42              | 5,282.00              | P200 Marker           |           |         |                   |  |
| 5,434.82              | 5,306.00              | P300 Marker           |           |         |                   |  |
| 5,453.71              | 5,321.00              | P350 Marker           |           |         |                   |  |
| 5,467.86              | 5,332.00              | Sharon Springs        |           |         |                   |  |
| 5,476.99              | 5,339.00              | Niobrara              |           |         |                   |  |
| 5,496.96              | 5,354.00              | Top A Chalk (N100)    |           |         |                   |  |
| 5,538.72              | 5,384.00              | Top A Marl (N200)     |           |         |                   |  |
| 5,548.87              | 5,391.00              | A Marl (N250)         |           |         |                   |  |
| 5,562.19              | 5,400.00              | Top Upper B (N400)    |           |         |                   |  |
| 5,607.41              | 5,429.00              | Base Upper B (N430)   |           |         |                   |  |
| 5,635.94              | 5,446.00              | Top Lower B (N460)    |           |         |                   |  |
| 5,691.33              | 5,476.00              | Base Lower B (N490)   |           |         |                   |  |
| 5,701.37              | 5,481.00              | Top B Marl (N500)     |           |         |                   |  |
| 5,806.99              | 5,525.00              | Top C Chalk (N700)    |           |         |                   |  |
| 5,828.57              | 5,532.00              | Middle C Chalk (N710) |           |         |                   |  |
| 5,885.02              | 5,547.00              | Middle C Marl (N720)  |           |         |                   |  |
| 6,028.04              | 5,563.00              | Lower C Chalk (N730)  |           |         |                   |  |

| Plan Annotations      |                       |                   |              |                    |  |
|-----------------------|-----------------------|-------------------|--------------|--------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              |                    |  |
|                       |                       | +N/-S (usft)      | +E/-W (usft) | Comment            |  |
| 300.00                | 300.00                | 0.00              | 0.00         | Build 2°/100'      |  |
| 980.60                | 974.21                | -73.96            | -31.70       | Hold 13.61° Inc    |  |
| 4,147.63              | 4,052.29              | -759.04           | -325.30      | Drop 2°/100'       |  |
| 4,828.22              | 4,726.50              | -833.00           | -357.00      | Hold Vertical      |  |
| 5,028.22              | 4,926.50              | -833.00           | -357.00      | KOP, Build 9°/100' |  |
| 6,028.04              | 5,563.00              | -196.50           | -357.00      | LP @ 90° Inc, Hold |  |
| 11,115.54             | 5,563.00              | 4,891.00          | -357.00      | Turn 2°/100'       |  |
| 11,195.84             | 5,563.00              | 4,971.29          | -358.13      | End Turn, Hold     |  |
| 16,367.23             | 5,563.00              | 10,140.66         | -503.07      | TD at 16367.23     |  |