

# Whiting Oil and Gas Corporation

Weld County, CO

Sec. 21-T10N-R58W

Razor 21B-2809A

Plan D

Design: Actual Field Surveys

## Sperry Drilling Services

### Standard Report

07 January, 2014

Well Coordinates: 1,549,445.14 N, 3,451,527.30 E (40° 49' 48.73" N, 103° 52' 05.99" W)

Ground Level: 4,837.30 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Razor 21B-2809A

KB 22 ft @ 4859.30usft (Frontier 26)

N

True

API - US Survey Feet - Custom

## HALLIBURTON

**Design Report for Razor 21B-2809A - Actual Field Surveys**

| Measured Depth (usft)                      | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|--|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 0.00                                       | 0.00            | 0.00        | 0.00                  | 0.00         | 0.00         | 0.00                    | 0.00                    |
| 166.00                                     | 0.16            | 23.09       | 166.00                | 0.21         | 0.09         | -0.22                   | 0.10                    |
| <b>First Sperry MWD Survey @ 166.00 ft</b> |                 |             |                       |              |              |                         |                         |
| 258.00                                     | 0.35            | 58.44       | 258.00                | 0.48         | 0.38         | -0.50                   | 0.26                    |
| 350.00                                     | 0.02            | 157.62      | 350.00                | 0.61         | 0.63         | -0.64                   | 0.38                    |
| 441.00                                     | 0.04            | 234.69      | 441.00                | 0.58         | 0.61         | -0.61                   | 0.04                    |
| 533.00                                     | 0.02            | 234.97      | 533.00                | 0.55         | 0.57         | -0.58                   | 0.02                    |
| 625.00                                     | 0.14            | 245.11      | 625.00                | 0.49         | 0.45         | -0.52                   | 0.13                    |
| 656.00                                     | 0.39            | 200.21      | 656.00                | 0.38         | 0.38         | -0.40                   | 0.99                    |
| 686.00                                     | 0.56            | 205.11      | 686.00                | 0.15         | 0.28         | -0.16                   | 0.58                    |
| 717.00                                     | 1.23            | 204.08      | 716.99                | -0.29        | 0.08         | 0.29                    | 2.16                    |
| 747.00                                     | 1.48            | 217.64      | 746.98                | -0.89        | -0.28        | 0.90                    | 1.35                    |
| 778.00                                     | 1.98            | 210.48      | 777.97                | -1.67        | -0.80        | 1.71                    | 1.75                    |
| 808.00                                     | 2.20            | 212.07      | 807.95                | -2.61        | -1.37        | 2.67                    | 0.76                    |
| 839.00                                     | 2.73            | 211.39      | 838.92                | -3.74        | -2.07        | 3.84                    | 1.71                    |
| 870.00                                     | 3.29            | 208.58      | 869.88                | -5.15        | -2.88        | 5.29                    | 1.87                    |
| 900.00                                     | 3.65            | 208.86      | 899.82                | -6.74        | -3.75        | 6.92                    | 1.20                    |
| 992.00                                     | 4.07            | 209.27      | 991.61                | -12.16       | -6.76        | 12.48                   | 0.46                    |
| 1,084.00                                   | 3.51            | 213.35      | 1,083.41              | -17.36       | -9.91        | 17.83                   | 0.68                    |
| 1,179.00                                   | 3.69            | 215.40      | 1,178.23              | -22.28       | -13.28       | 22.91                   | 0.23                    |
| 1,274.00                                   | 4.09            | 219.47      | 1,273.01              | -27.38       | -17.20       | 28.20                   | 0.51                    |
| 1,369.00                                   | 4.02            | 217.08      | 1,367.77              | -32.66       | -21.36       | 33.68                   | 0.19                    |
| 1,465.00                                   | 4.09            | 207.42      | 1,463.53              | -38.38       | -24.97       | 39.57                   | 0.71                    |
| 1,560.00                                   | 3.73            | 213.09      | 1,558.31              | -43.98       | -28.21       | 45.32                   | 0.56                    |
| 1,589.00                                   | 3.69            | 210.64      | 1,587.25              | -45.57       | -29.21       | 46.96                   | 0.56                    |
| 1,668.00                                   | 3.53            | 219.32      | 1,666.09              | -49.64       | -32.04       | 51.17                   | 0.72                    |
| 1,729.00                                   | 5.01            | 210.15      | 1,726.92              | -53.39       | -34.57       | 55.05                   | 2.66                    |
| 1,820.00                                   | 4.70            | 190.32      | 1,817.60              | -60.50       | -37.23       | 62.27                   | 1.87                    |
| 1,911.00                                   | 4.39            | 196.47      | 1,908.32              | -67.51       | -38.89       | 69.35                   | 0.63                    |
| 2,002.00                                   | 4.29            | 188.54      | 1,999.06              | -74.21       | -40.38       | 76.13                   | 0.67                    |
| 2,093.00                                   | 4.15            | 188.89      | 2,089.81              | -80.83       | -41.40       | 82.79                   | 0.16                    |
| 2,185.00                                   | 4.50            | 183.55      | 2,181.55              | -87.72       | -42.13       | 89.71                   | 0.58                    |
| 2,276.00                                   | 4.32            | 207.45      | 2,272.29              | -94.33       | -43.94       | 96.39                   | 2.01                    |
| 2,368.00                                   | 4.34            | 206.17      | 2,364.02              | -100.53      | -47.07       | 102.74                  | 0.11                    |
| 2,460.00                                   | 4.08            | 211.55      | 2,455.78              | -106.44      | -50.32       | 108.81                  | 0.51                    |
| 2,551.00                                   | 3.62            | 215.85      | 2,546.57              | -111.53      | -53.69       | 114.06                  | 0.60                    |
| 2,642.00                                   | 3.87            | 214.13      | 2,637.38              | -116.40      | -57.10       | 119.09                  | 0.30                    |
| 2,734.00                                   | 4.25            | 216.39      | 2,729.14              | -121.71      | -60.86       | 124.58                  | 0.45                    |
| 2,825.00                                   | 3.39            | 187.25      | 2,819.95              | -127.10      | -63.20       | 130.08                  | 2.30                    |
| 2,917.00                                   | 3.68            | 202.23      | 2,911.78              | -132.53      | -64.66       | 135.58                  | 1.05                    |
| 3,009.00                                   | 3.80            | 190.59      | 3,003.58              | -138.26      | -66.34       | 141.38                  | 0.83                    |
| 3,100.00                                   | 3.25            | 192.82      | 3,094.41              | -143.74      | -67.47       | 146.91                  | 0.62                    |
| 3,191.00                                   | 3.01            | 195.20      | 3,185.27              | -148.56      | -68.67       | 151.78                  | 0.30                    |
| 3,282.00                                   | 3.15            | 185.51      | 3,276.14              | -153.35      | -69.53       | 156.62                  | 0.59                    |
| 3,374.00                                   | 4.78            | 180.91      | 3,367.92              | -159.70      | -69.84       | 162.97                  | 1.80                    |
| 3,465.00                                   | 5.10            | 189.56      | 3,458.58              | -167.48      | -70.57       | 170.78                  | 0.89                    |
| 3,557.00                                   | 4.56            | 212.62      | 3,550.26              | -174.59      | -73.22       | 178.01                  | 2.17                    |
| 3,648.00                                   | 4.55            | 213.93      | 3,640.98              | -180.64      | -77.18       | 184.25                  | 0.11                    |
| 3,740.00                                   | 4.98            | 218.35      | 3,732.66              | -186.80      | -81.70       | 190.62                  | 0.61                    |
| 3,831.00                                   | 4.54            | 207.70      | 3,823.35              | -193.08      | -85.82       | 197.11                  | 1.08                    |

**Design Report for Razor 21B-2809A - Actual Field Surveys**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 3,922.00              | 4.32            | 208.66      | 3,914.07              | -199.28      | -89.14       | 203.46                  | 0.26                    |
| 4,013.00              | 4.42            | 204.69      | 4,004.81              | -205.47      | -92.25       | 209.80                  | 0.35                    |
| 4,105.00              | 3.71            | 195.57      | 4,096.58              | -211.56      | -94.53       | 215.99                  | 1.04                    |
| 4,196.00              | 4.61            | 198.52      | 4,187.34              | -217.86      | -96.48       | 222.39                  | 1.02                    |
| 4,288.00              | 4.57            | 203.67      | 4,279.04              | -224.73      | -99.13       | 229.37                  | 0.45                    |
| 4,379.00              | 3.53            | 214.52      | 4,369.82              | -230.36      | -102.17      | 235.14                  | 1.41                    |
| 4,471.00              | 2.53            | 233.78      | 4,461.69              | -233.89      | -105.41      | 238.83                  | 1.54                    |
| 4,563.00              | 1.98            | 338.30      | 4,553.65              | -233.61      | -107.64      | 238.67                  | 3.89                    |
| 4,653.00              | 1.74            | 106.53      | 4,643.63              | -232.56      | -106.90      | 237.58                  | 3.72                    |
| 4,748.00              | 0.65            | 78.26       | 4,738.60              | -232.86      | -104.99      | 237.78                  | 1.27                    |
| 4,843.00              | 0.89            | 81.52       | 4,833.60              | -232.64      | -103.74      | 237.50                  | 0.26                    |
| 4,938.00              | 0.33            | 17.70       | 4,928.59              | -232.27      | -102.92      | 237.09                  | 0.84                    |
| 5,033.00              | 0.39            | 270.69      | 5,023.59              | -232.00      | -103.16      | 236.84                  | 0.61                    |
| 5,128.00              | 0.78            | 258.71      | 5,118.58              | -232.13      | -104.12      | 237.01                  | 0.43                    |
| 5,191.00              | 1.10            | 242.14      | 5,181.58              | -232.49      | -105.08      | 237.42                  | 0.66                    |
| 5,223.00              | 3.70            | 198.86      | 5,213.55              | -233.61      | -105.68      | 238.57                  | 9.36                    |
| 5,255.00              | 7.76            | 188.57      | 5,245.38              | -236.73      | -106.34      | 241.72                  | 13.04                   |
| 5,286.00              | 11.59           | 187.73      | 5,275.93              | -241.89      | -107.07      | 246.90                  | 12.36                   |
| 5,318.00              | 14.68           | 188.88      | 5,307.09              | -249.08      | -108.13      | 254.14                  | 9.69                    |
| 5,350.00              | 16.50           | 190.49      | 5,337.91              | -257.55      | -109.58      | 262.68                  | 5.85                    |
| 5,381.00              | 17.88           | 191.02      | 5,367.53              | -266.55      | -111.29      | 271.75                  | 4.48                    |
| 5,413.00              | 20.21           | 191.90      | 5,397.78              | -276.79      | -113.37      | 282.07                  | 7.34                    |
| 5,445.00              | 20.15           | 189.29      | 5,427.81              | -287.63      | -115.40      | 293.01                  | 2.82                    |
| 5,476.00              | 22.25           | 189.15      | 5,456.71              | -298.70      | -117.20      | 304.15                  | 6.78                    |
| 5,508.00              | 27.01           | 191.01      | 5,485.79              | -311.82      | -119.55      | 317.37                  | 15.07                   |
| 5,539.00              | 30.63           | 193.15      | 5,512.95              | -326.43      | -122.69      | 332.12                  | 12.14                   |
| 5,571.00              | 34.24           | 192.23      | 5,539.95              | -343.17      | -126.45      | 349.02                  | 11.39                   |
| 5,603.00              | 36.98           | 191.87      | 5,565.97              | -361.39      | -130.34      | 367.41                  | 8.59                    |
| 5,634.00              | 41.36           | 195.73      | 5,590.00              | -380.38      | -135.04      | 386.62                  | 16.16                   |
| 5,666.00              | 46.12           | 199.11      | 5,613.11              | -401.47      | -141.69      | 408.01                  | 16.57                   |
| 5,698.00              | 48.20           | 203.39      | 5,634.88              | -423.33      | -150.20      | 430.26                  | 11.76                   |
| 5,729.00              | 48.45           | 204.77      | 5,655.49              | -444.46      | -159.65      | 451.84                  | 3.42                    |
| 5,761.00              | 49.44           | 204.81      | 5,676.51              | -466.37      | -169.76      | 474.22                  | 3.10                    |
| 5,792.00              | 54.57           | 203.64      | 5,695.58              | -488.64      | -179.78      | 496.97                  | 16.81                   |
| 5,824.00              | 60.13           | 202.58      | 5,712.84              | -513.42      | -190.34      | 522.24                  | 17.60                   |
| 5,856.00              | 65.94           | 201.62      | 5,727.35              | -539.84      | -201.06      | 549.15                  | 18.35                   |
| 5,887.00              | 69.87           | 199.52      | 5,739.01              | -566.72      | -211.14      | 576.51                  | 14.15                   |
| 5,919.00              | 72.32           | 199.10      | 5,749.37              | -595.29      | -221.15      | 605.54                  | 7.76                    |
| 5,950.00              | 73.77           | 197.88      | 5,758.41              | -623.41      | -230.55      | 634.09                  | 6.00                    |
| 5,982.00              | 76.09           | 197.75      | 5,766.73              | -652.83      | -240.01      | 663.94                  | 7.26                    |
| 6,014.00              | 80.68           | 197.24      | 5,773.17              | -682.72      | -249.43      | 694.26                  | 14.43                   |
| 6,045.00              | 83.33           | 196.67      | 5,777.48              | -712.08      | -258.38      | 724.03                  | 8.74                    |
| 6,077.00              | 84.88           | 196.13      | 5,780.77              | -742.61      | -267.36      | 754.97                  | 5.13                    |
| 6,115.00              | 85.99           | 196.57      | 5,783.80              | -778.96      | -278.03      | 791.80                  | 3.14                    |
| 6,216.00              | 91.11           | 196.27      | 5,786.35              | -875.78      | -306.56      | 889.92                  | 5.08                    |
| 6,311.00              | 90.96           | 194.44      | 5,784.63              | -967.37      | -331.71      | 982.64                  | 1.93                    |
| 6,406.00              | 89.10           | 190.89      | 5,784.58              | -1,060.04    | -352.53      | 1,076.23                | 4.22                    |
| 6,501.00              | 88.86           | 188.15      | 5,786.28              | -1,153.70    | -368.24      | 1,170.56                | 2.89                    |
| 6,596.00              | 90.05           | 186.15      | 5,787.18              | -1,247.95    | -380.06      | 1,265.29                | 2.45                    |
| 6,691.00              | 90.65           | 185.39      | 5,786.60              | -1,342.47    | -389.62      | 1,360.16                | 1.02                    |
| 6,786.00              | 89.57           | 184.38      | 5,786.42              | -1,437.12    | -397.71      | 1,455.10                | 1.56                    |

**Design Report for Razor 21B-2809A - Actual Field Surveys**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 6,881.00              | 89.89           | 182.75      | 5,786.86              | -1,531.93    | -403.61      | 1,550.08                | 1.75                    |
| 6,913.00              | 90.74           | 182.61      | 5,786.69              | -1,563.90    | -405.11      | 1,582.08                | 2.69                    |
| 6,945.00              | 90.68           | 180.66      | 5,786.29              | -1,595.88    | -406.02      | 1,614.07                | 6.10                    |
| 6,976.00              | 89.40           | 179.80      | 5,786.27              | -1,626.88    | -406.15      | 1,645.04                | 4.97                    |
| 7,008.00              | 88.64           | 178.96      | 5,786.82              | -1,658.87    | -405.80      | 1,676.97                | 3.54                    |
| 7,040.00              | 88.05           | 177.69      | 5,787.74              | -1,690.84    | -404.86      | 1,708.86                | 4.37                    |
| 7,071.00              | 88.76           | 176.79      | 5,788.60              | -1,721.80    | -403.37      | 1,739.70                | 3.70                    |
| 7,103.00              | 88.67           | 175.92      | 5,789.32              | -1,753.72    | -401.34      | 1,771.49                | 2.73                    |
| 7,134.00              | 88.67           | 175.84      | 5,790.04              | -1,784.63    | -399.11      | 1,802.25                | 0.26                    |
| 7,166.00              | 88.64           | 175.44      | 5,790.79              | -1,816.53    | -396.68      | 1,833.99                | 1.25                    |
| 7,198.00              | 89.28           | 176.20      | 5,791.37              | -1,848.44    | -394.35      | 1,865.74                | 3.10                    |
| 7,229.00              | 89.79           | 176.47      | 5,791.63              | -1,879.38    | -392.37      | 1,896.54                | 1.86                    |
| 7,261.00              | 89.97           | 176.65      | 5,791.69              | -1,911.32    | -390.45      | 1,928.35                | 0.80                    |
| 7,293.00              | 90.59           | 176.76      | 5,791.54              | -1,943.27    | -388.61      | 1,960.16                | 1.97                    |
| 7,324.00              | 91.56           | 176.77      | 5,790.95              | -1,974.21    | -386.86      | 1,990.98                | 3.13                    |
| 7,356.00              | 92.38           | 177.79      | 5,789.85              | -2,006.16    | -385.34      | 2,022.81                | 4.09                    |
| 7,387.00              | 91.22           | 180.02      | 5,788.88              | -2,037.13    | -384.75      | 2,053.72                | 8.11                    |
| 7,419.00              | 89.97           | 181.06      | 5,788.55              | -2,069.13    | -385.05      | 2,085.69                | 5.08                    |
| 7,451.00              | 88.33           | 180.83      | 5,789.02              | -2,101.12    | -385.58      | 2,117.67                | 5.18                    |
| 7,482.00              | 89.23           | 180.13      | 5,789.68              | -2,132.11    | -385.84      | 2,148.64                | 3.68                    |
| 7,514.00              | 89.41           | 180.24      | 5,790.06              | -2,164.11    | -385.94      | 2,180.60                | 0.66                    |
| 7,546.00              | 90.22           | 179.61      | 5,790.17              | -2,196.11    | -385.90      | 2,212.56                | 3.21                    |
| 7,577.00              | 90.26           | 179.27      | 5,790.04              | -2,227.11    | -385.60      | 2,243.50                | 1.10                    |
| 7,609.00              | 90.46           | 178.99      | 5,789.84              | -2,259.10    | -385.11      | 2,275.44                | 1.08                    |
| 7,641.00              | 89.95           | 178.01      | 5,789.72              | -2,291.09    | -384.27      | 2,307.34                | 3.45                    |
| 7,673.00              | 90.58           | 177.98      | 5,789.57              | -2,323.07    | -383.15      | 2,339.23                | 1.97                    |
| 7,705.00              | 91.51           | 178.84      | 5,788.99              | -2,355.05    | -382.26      | 2,371.13                | 3.96                    |
| 7,736.00              | 91.57           | 180.52      | 5,788.16              | -2,386.04    | -382.09      | 2,402.07                | 5.42                    |
| 7,767.00              | 90.71           | 179.29      | 5,787.54              | -2,417.03    | -382.04      | 2,433.02                | 4.84                    |
| 7,797.00              | 89.01           | 179.56      | 5,787.61              | -2,447.03    | -381.74      | 2,462.96                | 5.74                    |
| 7,828.00              | 89.29           | 180.20      | 5,788.07              | -2,478.03    | -381.67      | 2,493.92                | 2.25                    |
| 7,859.00              | 90.34           | 179.75      | 5,788.17              | -2,509.02    | -381.66      | 2,524.88                | 3.69                    |
| 7,889.00              | 90.55           | 179.49      | 5,787.94              | -2,539.02    | -381.46      | 2,554.83                | 1.11                    |
| 7,920.00              | 91.05           | 179.42      | 5,787.51              | -2,570.02    | -381.17      | 2,585.77                | 1.63                    |
| 7,951.00              | 92.07           | 180.26      | 5,786.66              | -2,601.01    | -381.08      | 2,616.72                | 4.26                    |
| 7,981.00              | 90.43           | 179.13      | 5,786.01              | -2,631.00    | -380.92      | 2,646.66                | 6.64                    |
| 8,012.00              | 89.75           | 180.07      | 5,785.96              | -2,662.00    | -380.70      | 2,677.61                | 3.74                    |
| 8,042.00              | 90.68           | 181.22      | 5,785.85              | -2,691.99    | -381.04      | 2,707.59                | 4.93                    |
| 8,103.00              | 88.98           | 180.69      | 5,786.03              | -2,752.98    | -382.06      | 2,768.56                | 2.92                    |
| 8,163.00              | 90.31           | 180.84      | 5,786.40              | -2,812.97    | -382.86      | 2,828.51                | 2.23                    |
| 8,224.00              | 89.08           | 179.50      | 5,786.72              | -2,873.97    | -383.04      | 2,889.44                | 2.98                    |
| 8,285.00              | 89.69           | 179.46      | 5,787.38              | -2,934.96    | -382.49      | 2,950.33                | 1.00                    |
| 8,346.00              | 89.66           | 178.18      | 5,787.73              | -2,995.95    | -381.23      | 3,011.18                | 2.10                    |
| 8,407.00              | 89.86           | 178.34      | 5,787.98              | -3,056.92    | -379.38      | 3,071.99                | 0.42                    |
| 8,468.00              | 89.97           | 178.63      | 5,788.07              | -3,117.90    | -377.77      | 3,132.81                | 0.51                    |
| 8,529.00              | 90.81           | 179.21      | 5,787.66              | -3,178.89    | -376.62      | 3,193.66                | 1.67                    |
| 8,590.00              | 89.72           | 179.82      | 5,787.37              | -3,239.88    | -376.10      | 3,254.56                | 2.05                    |
| 8,651.00              | 90.25           | 181.25      | 5,787.39              | -3,300.88    | -376.67      | 3,315.51                | 2.50                    |
| 8,712.00              | 90.33           | 179.98      | 5,787.08              | -3,361.87    | -377.32      | 3,376.46                | 2.09                    |
| 8,773.00              | 90.26           | 180.03      | 5,786.77              | -3,422.87    | -377.33      | 3,437.38                | 0.14                    |

**Design Report for Razor 21B-2809A - Actual Field Surveys**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 8,834.00              | 90.40           | 179.23      | 5,786.42              | -3,483.87    | -376.94      | 3,498.29                | 1.33                    |
| 8,894.00              | 90.86           | 178.39      | 5,785.76              | -3,543.85    | -375.69      | 3,558.13                | 1.60                    |
| 8,954.00              | 89.07           | 178.45      | 5,785.79              | -3,603.82    | -374.04      | 3,617.95                | 2.99                    |
| 9,015.00              | 89.35           | 179.81      | 5,786.63              | -3,664.81    | -373.11      | 3,678.82                | 2.28                    |
| 9,076.00              | 89.88           | 180.61      | 5,787.04              | -3,725.81    | -373.33      | 3,739.75                | 1.57                    |
| 9,137.00              | 90.62           | 181.18      | 5,786.78              | -3,786.80    | -374.29      | 3,800.71                | 1.53                    |
| 9,198.00              | 90.11           | 181.07      | 5,786.39              | -3,847.79    | -375.48      | 3,861.68                | 0.86                    |
| 9,259.00              | 92.59           | 180.79      | 5,784.95              | -3,908.76    | -376.47      | 3,922.63                | 4.09                    |
| 9,321.00              | 93.30           | 179.95      | 5,781.77              | -3,970.67    | -376.87      | 3,984.49                | 1.77                    |
| 9,382.00              | 92.54           | 181.45      | 5,778.66              | -4,031.59    | -377.62      | 4,045.36                | 2.75                    |
| 9,442.00              | 91.23           | 182.96      | 5,776.68              | -4,091.51    | -379.93      | 4,105.32                | 3.33                    |
| 9,502.00              | 90.51           | 182.68      | 5,775.77              | -4,151.43    | -382.88      | 4,165.32                | 1.29                    |
| 9,563.00              | 89.72           | 181.14      | 5,775.65              | -4,212.39    | -384.91      | 4,226.31                | 2.84                    |
| 9,624.00              | 90.90           | 180.66      | 5,775.32              | -4,273.38    | -385.87      | 4,287.27                | 2.09                    |
| 9,684.00              | 91.78           | 180.43      | 5,773.92              | -4,333.36    | -386.44      | 4,347.20                | 1.52                    |
| 9,745.00              | 89.94           | 179.01      | 5,773.00              | -4,394.35    | -386.14      | 4,408.10                | 3.81                    |
| 9,807.00              | 87.97           | 178.07      | 5,774.13              | -4,456.31    | -384.56      | 4,469.91                | 3.52                    |
| 9,868.00              | 89.26           | 179.78      | 5,775.61              | -4,517.28    | -383.42      | 4,530.75                | 3.51                    |
| 9,929.00              | 90.66           | 180.39      | 5,775.65              | -4,578.28    | -383.51      | 4,591.68                | 2.50                    |
| 9,990.00              | 89.20           | 179.75      | 5,775.73              | -4,639.28    | -383.58      | 4,652.60                | 2.61                    |
| 10,051.00             | 88.81           | 178.62      | 5,776.78              | -4,700.26    | -382.71      | 4,713.47                | 1.96                    |
| 10,112.00             | 89.12           | 179.53      | 5,777.89              | -4,761.24    | -381.73      | 4,774.32                | 1.58                    |
| 10,173.00             | 90.23           | 179.91      | 5,778.23              | -4,822.24    | -381.43      | 4,835.23                | 1.92                    |
| 10,233.00             | 91.02           | 180.37      | 5,777.58              | -4,882.24    | -381.58      | 4,895.16                | 1.52                    |
| 10,294.00             | 90.83           | 180.74      | 5,776.59              | -4,943.23    | -382.17      | 4,956.10                | 0.68                    |
| 10,355.00             | 89.66           | 180.94      | 5,776.33              | -5,004.22    | -383.06      | 5,017.06                | 1.95                    |
| 10,416.00             | 90.82           | 182.06      | 5,776.08              | -5,065.19    | -384.66      | 5,078.05                | 2.64                    |
| 10,477.00             | 90.91           | 181.93      | 5,775.16              | -5,126.15    | -386.78      | 5,139.03                | 0.26                    |
| 10,539.00             | 89.14           | 181.65      | 5,775.13              | -5,188.12    | -388.72      | 5,201.02                | 2.89                    |
| 10,600.00             | 88.49           | 181.15      | 5,776.39              | -5,249.09    | -390.21      | 5,261.99                | 1.34                    |
| 10,661.00             | 88.24           | 179.66      | 5,778.13              | -5,310.06    | -390.64      | 5,322.90                | 2.48                    |
| 10,722.00             | 89.32           | 178.43      | 5,779.43              | -5,371.03    | -389.62      | 5,383.75                | 2.68                    |
| 10,783.00             | 90.59           | 178.96      | 5,779.48              | -5,432.02    | -388.24      | 5,444.59                | 2.26                    |
| 10,843.00             | 90.86           | 178.53      | 5,778.72              | -5,492.00    | -386.92      | 5,504.43                | 0.85                    |
| 10,904.00             | 90.06           | 179.02      | 5,778.23              | -5,552.98    | -385.62      | 5,565.28                | 1.54                    |
| 10,965.00             | 89.69           | 178.12      | 5,778.36              | -5,613.96    | -384.10      | 5,626.11                | 1.60                    |
| 11,026.00             | 90.49           | 178.66      | 5,778.27              | -5,674.93    | -382.38      | 5,686.92                | 1.58                    |
| 11,087.00             | 90.77           | 178.89      | 5,777.60              | -5,735.92    | -381.08      | 5,747.76                | 0.59                    |
| 11,148.00             | 90.25           | 179.53      | 5,777.05              | -5,796.91    | -380.24      | 5,808.64                | 1.35                    |
| 11,210.00             | 89.11           | 179.26      | 5,777.40              | -5,858.90    | -379.58      | 5,870.52                | 1.89                    |
| 11,270.00             | 88.12           | 180.30      | 5,778.85              | -5,918.88    | -379.35      | 5,930.42                | 2.39                    |
| 11,331.00             | 87.78           | 180.18      | 5,781.03              | -5,979.84    | -379.61      | 5,991.32                | 0.59                    |
| 11,392.00             | 87.62           | 180.18      | 5,783.48              | -6,040.79    | -379.80      | 6,052.20                | 0.26                    |
| 11,453.00             | 87.71           | 181.03      | 5,785.96              | -6,101.74    | -380.44      | 6,113.10                | 1.40                    |
| 11,514.00             | 87.53           | 181.39      | 5,788.50              | -6,162.67    | -381.73      | 6,174.03                | 0.66                    |
| 11,574.00             | 87.50           | 181.25      | 5,791.10              | -6,222.60    | -383.11      | 6,233.95                | 0.24                    |
| 11,635.00             | 87.90           | 181.44      | 5,793.55              | -6,283.53    | -384.54      | 6,294.88                | 0.73                    |
| 11,696.00             | 88.89           | 180.30      | 5,795.26              | -6,344.50    | -385.47      | 6,355.82                | 2.47                    |
| 11,757.00             | 89.93           | 180.77      | 5,795.88              | -6,405.50    | -386.04      | 6,416.76                | 1.87                    |
| 11,818.00             | 90.12           | 180.40      | 5,795.86              | -6,466.49    | -386.66      | 6,477.71                | 0.68                    |
| 11,879.00             | 88.15           | 178.03      | 5,796.78              | -6,527.47    | -385.82      | 6,538.58                | 5.05                    |

**Design Report for Razor 21B-2809A - Actual Field Surveys**

| Measured Depth (usft)                               | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) |
|---|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|
| 11,940.00   | 89.63           | 179.14      | 5,797.96              | -6,588.44    | -384.32      | 6,599.39                | 3.03                    |
| 12,032.00   | 88.97           | 179.03      | 5,799.08              | -6,680.42    | -382.85      | 6,691.19                | 0.73                    |
| 12,124.00   | 89.08           | 178.97      | 5,800.65              | -6,772.39    | -381.24      | 6,782.97                | 0.14                    |
| 12,215.00   | 89.78           | 178.14      | 5,801.55              | -6,863.36    | -378.95      | 6,873.71                | 1.19                    |
| 12,245.00   | 89.41           | 178.00      | 5,801.77              | -6,893.34    | -377.94      | 6,903.60                | 1.32                    |
| 12,275.00   | 89.14           | 177.89      | 5,802.15              | -6,923.32    | -376.86      | 6,933.49                | 0.97                    |
| 12,306.00   | 89.35           | 177.94      | 5,802.55              | -6,954.29    | -375.73      | 6,964.37                | 0.70                    |
| 12,336.00   | 90.05           | 178.68      | 5,802.71              | -6,984.28    | -374.85      | 6,994.28                | 3.40                    |
| 12,366.00   | 89.99           | 179.43      | 5,802.70              | -7,014.28    | -374.36      | 7,024.21                | 2.51                    |
| 12,396.00   | 89.11           | 179.09      | 5,802.94              | -7,044.27    | -373.97      | 7,054.15                | 3.14                    |
| 12,426.00   | 90.12           | 181.03      | 5,803.14              | -7,074.27    | -374.00      | 7,084.11                | 7.29                    |
| 12,457.00   | 89.65           | 179.48      | 5,803.20              | -7,105.27    | -374.14      | 7,115.08                | 5.22                    |
| 12,488.00   | 88.43           | 178.79      | 5,803.72              | -7,136.26    | -373.67      | 7,146.01                | 4.52                    |
| 12,519.00   | 88.36           | 178.88      | 5,804.59              | -7,167.24    | -373.04      | 7,176.92                | 0.37                    |
| 12,551.00   | 88.83           | 179.26      | 5,805.37              | -7,199.23    | -372.52      | 7,208.84                | 1.89                    |
| 12,583.00   | 89.26           | 179.17      | 5,805.91              | -7,231.22    | -372.08      | 7,240.78                | 1.37                    |
| 12,614.00   | 89.12           | 179.20      | 5,806.34              | -7,262.21    | -371.64      | 7,271.71                | 0.46                    |
| 12,646.00   | 89.14           | 178.90      | 5,806.83              | -7,294.21    | -371.11      | 7,303.64                | 0.94                    |
| 12,678.00   | 90.89           | 179.88      | 5,806.82              | -7,326.20    | -370.77      | 7,335.58                | 6.27                    |
| 12,709.00   | 90.89           | 180.15      | 5,806.34              | -7,357.20    | -370.78      | 7,366.53                | 0.87                    |
| 12,743.00   | 90.74           | 179.11      | 5,805.86              | -7,391.19    | -370.56      | 7,400.48                | 3.09                    |
| <b>Final Sperry MWD Survey @ 12743.00 ft</b>        |                 |             |                       |              |              |                         |                         |
| 12,791.00   | 90.74           | 179.11      | 5,805.24              | -7,439.18    | -369.81      | 7,448.37                | 0.00                    |
| <b>Straight Line Projection to TD @ 12791.00 ft</b> |                 |             |                       |              |              |                         |                         |

**Design Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              | Comment                                      |
|-----------------------|-----------------------|-------------------|--------------|--|
|                       |                       | +N/-S (usft)      | +E/-W (usft) |  |
| 166.00                | 166.00                | 0.21              | 0.09         | First Sperry MWD Survey @ 166.00 ft          |
| 12,743.00             | 5,805.86              | -7,391.19         | -370.56      | Final Sperry MWD Survey @ 12743.00 ft        |
| 12,791.00             | 5,805.24              | -7,439.18         | -369.81      | Straight Line Projection to TD @ 12791.00 ft |

**Vertical Section Information**

| Angle Type | Target               | Azimuth (°) | Origin Type | Origin       |              | Start TVD (usft) |
|------------|----------------------|-------------|-------------|--------------|--------------|------------------|
|            |                      |             |             | +N/_S (usft) | +E/-W (usft) |                  |
| TD         | No Target (Freehand) | 182.85      | Slot        | 0.00         | 0.00         | 0.00             |

**Survey tool program**

| From (usft) | To (usft) | Survey/Plan                         | Survey Tool     |
|-------------|-----------|-------------------------------------|-----------------|
| 166.00      | 1,589.00  | Surface_Sperry MWD Surveys          | MWD+IFR1+MS+sag |
| 1,668.00    | 6,115.00  | Vertical & Build_Sperry MWD Surveys | MWD+IFR1+MS+sag |
| 6,216.00    | 12,791.00 | Lateral_Sperry MWD Surveys          | MWD+IFR1+MS+sag |

**Design Report for Razor 21B-2809A - Actual Field Surveys****Casing Details**

| Measured Depth (usft) | Vertical Depth (usft) | Name | Casing Diameter (") | Hole Diameter (") |
|-----------------------|-----------------------|------|---------------------|-------------------|
| 1,600.00              | 9 5/8"                |      | 9-5/8               | 13-1/2            |

**Wellbore Targets**

| Target Name<br>- hit/miss target<br>- Shape   | Dip Angle (°) | Dip Dir. (°) | TVD (usft) | +N/-S (usft) | +E/-W (usft) | Northing (usft) | Easting (usft) | Latitude         | Longitude         |
|---|---------------|--------------|------------|--------------|--------------|-----------------|----------------|------------------|-------------------|
| Razor 21B-2809A_SB  | 0.00          | 0.00         | 0.00       | 0.02         | 0.00         | 1,549,445.15    | 3,451,527.30   | 40° 49' 48.731 N | 103° 52' 5.992 W  |
| - actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)                |               |              |            |              |              |                 |                |                  |                   |
| - Polygon   |               |              |            |              |              |                 |                |                  |                   |
| Point 1   |               |              |            | 0.00         | -4,922.47    | 1,955.21        | 1,544,559.45   | 3,453,572.77     |                   |
| Point 2   |               |              |            | 0.00         | -10,125.74   | 2,034.28        | 1,539,358.48   | 3,453,747.56     |                   |
| Point 3   |               |              |            | 0.00         | -10,132.55   | -3,067.51       | 1,539,257.80   | 3,448,646.72     |                   |
| Point 4   |               |              |            | 0.00         | -4,932.60    | -3,129.94       | 1,544,455.76   | 3,448,488.62     |                   |
| Point 5   |               |              |            | 0.00         | 164.37       | -3,191.52       | 1,549,550.77   | 3,448,333.27     |                   |
| Point 6   |               |              |            | 0.00         | 268.44       | 1,909.66        | 1,549,748.69   | 3,453,431.71     |                   |
| Point 7   |               |              |            | 0.00         | -4,922.47    | 1,955.21        | 1,544,559.45   | 3,453,572.77     |                   |
| Razor 21B-2809A_SL  | 0.00          | 0.00         | 0.00       | 0.02         | 0.00         | 1,549,445.15    | 3,451,527.30   | 40° 49' 48.731 N | 103° 52' 5.992 W  |
| - actual wellpath misses target center by 0.02usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)                |               |              |            |              |              |                 |                |                  |                   |
| - Polygon   |               |              |            |              |              |                 |                |                  |                   |
| Point 1   |               |              |            | 0.00         | -4,932.55    | -3,229.94       | 1,544,453.97   | 3,448,388.64     |                   |
| Point 2   |               |              |            | 0.00         | -4,906.52    | -584.32         | 1,544,528.67   | 3,451,033.35     |                   |
| Point 3   |               |              |            | 0.00         | -4,922.47    | 2,055.21        | 1,544,561.29   | 3,453,672.75     |                   |
| Point 4   |               |              |            | 0.00         | -10,225.74   | 2,134.28        | 1,539,260.33   | 3,453,849.39     |                   |
| Point 5   |               |              |            | 0.00         | -10,232.55   | -3,167.51       | 1,539,155.97   | 3,448,548.58     |                   |
| Point 6   |               |              |            | 0.00         | -4,932.55    | -3,229.94       | 1,544,453.97   | 3,448,388.64     |                   |
| Point 7   |               |              |            | 0.00         | 264.37       | -3,291.52       | 1,549,648.92   | 3,448,231.45     |                   |
| Point 8   |               |              |            | 0.00         | 368.44       | 2,009.66        | 1,549,850.51   | 3,453,529.86     |                   |
| Point 9   |               |              |            | 0.00         | -4,922.47    | 2,055.21        | 1,544,561.29   | 3,453,672.75     |                   |
| Point 10  |               |              |            | 0.00         | -4,906.52    | -584.32         | 1,544,528.67   | 3,451,033.35     |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,775.00   | -4,736.74    | -381.19      | 1,544,702.15    | 3,451,233.33   | 40° 49' 1.927 N  | 103° 52' 10.949 W |
| - actual wellpath misses target center by 2.61usft at 10087.46usft MD (5777.48 TVD, -4736.70 N, -382.01 E)  |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,775.00   | -5,487.71    | -381.19      | 1,543,951.30    | 3,451,247.15   | 40° 48' 54.507 N | 103° 52' 10.949 W |
| - actual wellpath misses target center by 6.96usft at 10838.88usft MD (5778.78 TVD, -5487.88 N, -387.03 E)  |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,785.00   | -5,988.36    | -381.19      | 1,543,450.73    | 3,451,256.36   | 40° 48' 49.560 N | 103° 52' 10.949 W |
| - actual wellpath misses target center by 3.95usft at 11339.67usft MD (5781.37 TVD, -5988.51 N, -379.63 E)  |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,785.00   | -7,478.00    | -381.19      | 1,541,961.33    | 3,451,283.77   | 40° 48' 34.841 N | 103° 52' 10.949 W |
| - actual wellpath misses target center by 45.23usft at 12791.00usft MD (5805.24 TVD, -7439.18 N, -369.81 E) |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,787.00   | -1,983.17    | -381.19      | 1,547,455.28    | 3,451,182.66   | 40° 49' 29.135 N | 103° 52' 10.950 W |
| - actual wellpath misses target center by 6.35usft at 7333.34usft MD (5790.68 TVD, -1983.54 N, -386.36 E)   |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A WP:   | 0.00          | 0.00         | 5,787.00   | -3,485.11    | -381.19      | 1,545,953.58    | 3,451,210.30   | 40° 49' 14.294 N | 103° 52' 10.950 W |
| - actual wellpath misses target center by 4.31usft at 8835.14usft MD (5786.41 TVD, -3485.01 N, -376.92 E)   |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A CSC   | 0.00          | 0.00         | 5,787.00   | -825.00      | -300.00      | 1,548,614.75    | 3,451,242.53   | 40° 49' 40.579 N | 103° 52' 9.894 W  |
| - actual wellpath misses target center by 8.04usft at 6165.45usft MD (5786.20 TVD, -827.28 N, -292.33 E)    |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |
| Razor 21B-2809A_Re:   | 0.00          | 0.00         | 5,788.00   | -7,478.00    | -381.19      | 1,541,961.33    | 3,451,283.77   | 40° 48' 34.841 N | 103° 52' 10.949 W |
| - actual wellpath misses target center by 43.96usft at 12791.00usft MD (5805.24 TVD, -7439.18 N, -369.81 E) |               |              |            |              |              |                 |                |                  |                   |
| - Point   |               |              |            |              |              |                 |                |                  |                   |

## Design Report for Razor 21B-2809A - Actual Field Surveys

### Directional Difficulty Index

|                                    |                |                               |                                     |
|------------------------------------|----------------|-------------------------------|-------------------------------------|
| Average Dogleg over Survey:        | 2.23 °/100usft | Maximum Dogleg over Survey:   | 18.35 °/100usft at 5,856.00<br>usft |
| Net Tortosity applicable to Plans: | 0.95 °/100usft | Directional Difficulty Index: | 6.676                               |

### Audit Info



# North Reference Sheet for Sec. 21-T10N-R58W - Razor 21B-2809A - Plan D

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to KB 22 ft @ 4859.30usft (Frontier 26). Northing and Easting are relative to Razor 21B-2809A

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 1.00000794

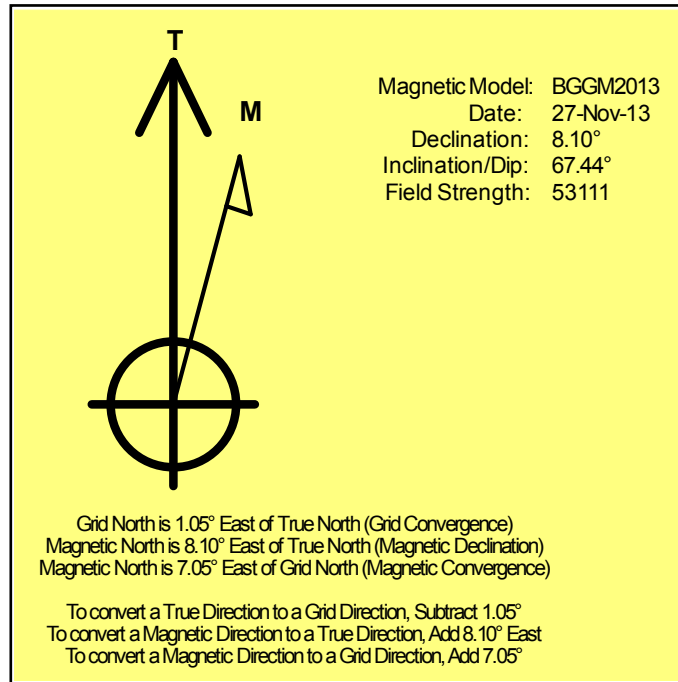
Grid Coordinates of Well: 1,549,445.14 usft N, 3,451,527.30 usft E

Geographical Coordinates of Well: 40° 49' 48.73" N, 103° 52' 05.99" W

Grid Convergence at Surface is: 1.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,791.00usft  
the Bottom Hole Displacement is 7,448.37usft in the Direction of 182.85° ( True).

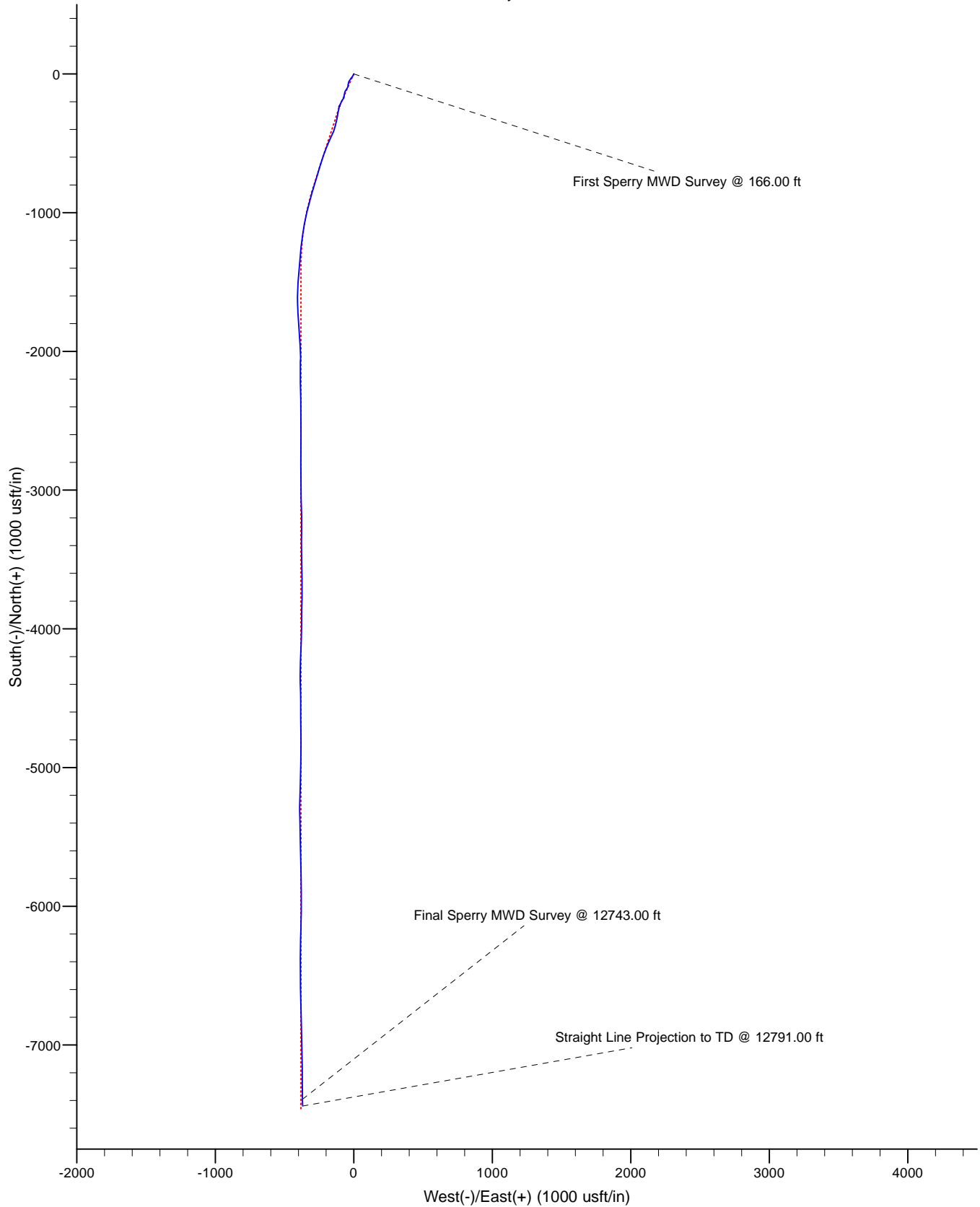
Magnetic Convergence at surface is: -7.05° (27 November 2013, , BGGM2013)



# Whiting Oil and Gas Corporation

## LEGEND

- Razor 21B-2809A, Plan B
- Actual Field Surveys



# Whiting Oil and Gas Corporation

