



Company/Rig: Noble Energy/ CoreTech  
WELL/API#: Wells Ranch 32-33/05-123-23488  
DECLINATION: 8.18 Degrees  
TD AS DRILLED: 6997 Feet  
COUNTY/STATE: Weld/Colorado  
VS-Azi: 0.000 Degrees  
Latitude: 40.44428, Longitude: -104.43909  
Grid Convergence Applied = -0.69 degs (NAD 27)  
Grid North = True North -0.69 degs



DEPTH REFERENCE : RKB=GL/ ELEVATION= 4796 Feet

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro\_run01-01-de\_01.ut

Minimum Curvature Method

Report Date/Time: 5/12/2015 / 10:22

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: Sean Bratt

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 0.000                   | 0.000                | 0.000                     | 0.000     | 0.000       | 0.000       | 0.000                     | 0.000                     | 0.000                       | ****                          |
| 100.000                 | 0.793                | 25.134                    | 99.997    | 0.626       | 0.294       | 0.626                     | 0.692                     | 25.134                      | 0.793                         |
| 200.000                 | 0.558                | 355.621                   | 199.990   | 1.739       | 0.551       | 1.739                     | 1.824                     | 17.570                      | 0.412                         |
| 300.000                 | 0.845                | 18.034                    | 299.983   | 2.926       | 0.742       | 2.926                     | 3.018                     | 14.224                      | 0.392                         |
| 400.000                 | 0.093                | 109.633                   | 399.979   | 3.600       | 1.046       | 3.600                     | 3.749                     | 16.205                      | 0.853                         |
| 500.000                 | 0.186                | 271.034                   | 499.979   | 3.576       | 0.960       | 3.576                     | 3.702                     | 15.024                      | 0.276                         |
| 600.000                 | 0.361                | 308.668                   | 599.978   | 3.776       | 0.551       | 3.776                     | 3.816                     | 8.304                       | 0.242                         |
| 700.000                 | 0.387                | 12.054                    | 699.976   | 4.302       | 0.376       | 4.302                     | 4.319                     | 4.988                       | 0.393                         |
| 800.000                 | 0.264                | 35.806                    | 799.974   | 4.819       | 0.581       | 4.819                     | 4.854                     | 6.871                       | 0.180                         |
| 900.000                 | 0.300                | 40.039                    | 899.973   | 5.206       | 0.884       | 5.206                     | 5.280                     | 9.633                       | 0.041                         |
| 1000.000                | 0.289                | 253.987                   | 999.973   | 5.337       | 0.810       | 5.337                     | 5.398                     | 8.627                       | 0.563                         |
| 1100.000                | 0.285                | 235.700                   | 1099.971  | 5.127       | 0.362       | 5.127                     | 5.140                     | 4.039                       | 0.091                         |
| 1200.000                | 0.319                | 300.587                   | 1199.970  | 5.128       | -0.083      | 5.128                     | 5.129                     | 359.076                     | 0.325                         |
| 1300.000                | 0.308                | 280.237                   | 1299.969  | 5.318       | -0.586      | 5.318                     | 5.350                     | 353.709                     | 0.111                         |
| 1400.000                | 0.239                | 239.876                   | 1399.968  | 5.261       | -1.031      | 5.261                     | 5.361                     | 348.914                     | 0.199                         |
| 1500.000                | 0.251                | 231.180                   | 1499.967  | 5.019       | -1.382      | 5.019                     | 5.206                     | 344.608                     | 0.039                         |
| 1600.000                | 0.203                | 168.754                   | 1599.966  | 4.708       | -1.518      | 4.708                     | 4.947                     | 342.133                     | 0.239                         |
| 1700.000                | 0.296                | 311.761                   | 1699.966  | 4.706       | -1.676      | 4.706                     | 4.996                     | 340.403                     | 0.474                         |
| 1800.000                | 0.581                | 293.160                   | 1799.963  | 5.077       | -2.334      | 5.077                     | 5.588                     | 335.314                     | 0.315                         |

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1900.000                | 0.221                | 13.038                    | 1899.961  | 5.465       | -2.756      | 5.465                     | 6.120                     | 333.236                     | 0.584                         |
| 2000.000                | 0.653                | 15.229                    | 1999.958  | 6.203       | -2.563      | 6.203                     | 6.711                     | 337.552                     | 0.432                         |
| 2100.000                | 0.470                | 24.263                    | 2099.953  | 7.127       | -2.244      | 7.127                     | 7.472                     | 342.522                     | 0.203                         |
| 2200.000                | 0.564                | 355.024                   | 2199.949  | 7.992       | -2.118      | 7.992                     | 8.268                     | 345.156                     | 0.277                         |
| 2300.000                | 0.275                | 42.268                    | 2299.946  | 8.660       | -2.000      | 8.660                     | 8.888                     | 346.997                     | 0.428                         |
| 2400.000                | 0.797                | 81.394                    | 2399.942  | 8.942       | -1.151      | 8.942                     | 9.015                     | 352.666                     | 0.609                         |
| 2500.000                | 1.585                | 83.892                    | 2499.920  | 9.193       | 0.912       | 9.193                     | 9.238                     | 5.667                       | 0.789                         |
| 2600.000                | 1.739                | 82.690                    | 2599.877  | 9.533       | 3.793       | 9.533                     | 10.260                    | 21.694                      | 0.158                         |
| 2700.000                | 1.537                | 88.163                    | 2699.837  | 9.769       | 6.638       | 9.769                     | 11.811                    | 34.194                      | 0.256                         |
| 2800.000                | 1.408                | 90.906                    | 2799.804  | 9.793       | 9.206       | 9.793                     | 13.441                    | 43.232                      | 0.146                         |
| 2900.000                | 1.541                | 87.118                    | 2899.770  | 9.841       | 11.778      | 9.841                     | 15.348                    | 50.120                      | 0.165                         |
| 3000.000                | 1.458                | 87.147                    | 2999.736  | 9.972       | 14.391      | 9.972                     | 17.509                    | 55.282                      | 0.084                         |
| 3100.000                | 1.670                | 99.137                    | 3099.699  | 9.804       | 17.100      | 9.804                     | 19.711                    | 60.174                      | 0.389                         |
| 3200.000                | 1.240                | 99.542                    | 3199.667  | 9.393       | 19.606      | 9.393                     | 21.740                    | 64.401                      | 0.430                         |
| 3300.000                | 1.309                | 107.497                   | 3299.642  | 8.870       | 21.763      | 8.870                     | 23.501                    | 67.825                      | 0.190                         |
| 3400.000                | 1.128                | 116.720                   | 3399.619  | 8.084       | 23.732      | 8.084                     | 25.071                    | 71.189                      | 0.266                         |
| 3500.000                | 0.610                | 160.746                   | 3499.609  | 7.139       | 24.787      | 7.139                     | 25.794                    | 73.934                      | 0.809                         |
| 3600.000                | 1.212                | 167.319                   | 3599.595  | 5.604       | 25.195      | 5.604                     | 25.810                    | 77.461                      | 0.610                         |
| 3700.000                | 1.385                | 164.160                   | 3699.570  | 3.409       | 25.757      | 3.409                     | 25.982                    | 82.461                      | 0.187                         |
| 3800.000                | 1.358                | 176.648                   | 3799.541  | 1.063       | 26.156      | 1.063                     | 26.178                    | 87.673                      | 0.300                         |
| 3900.000                | 1.123                | 178.979                   | 3899.518  | -1.100      | 26.243      | -1.100                    | 26.266                    | 92.400                      | 0.240                         |
| 4000.000                | 1.242                | 164.588                   | 3999.497  | -3.125      | 26.548      | -3.125                    | 26.732                    | 96.713                      | 0.319                         |
| 4100.000                | 0.811                | 189.135                   | 4099.481  | -4.868      | 26.724      | -4.868                    | 27.164                    | 100.324                     | 0.607                         |
| 4200.000                | 0.666                | 157.996                   | 4199.473  | -6.105      | 26.829      | -6.105                    | 27.515                    | 102.820                     | 0.420                         |
| 4300.000                | 0.464                | 157.186                   | 4299.468  | -7.017      | 27.204      | -7.017                    | 28.094                    | 104.463                     | 0.202                         |
| 4400.000                | 0.470                | 73.571                    | 4399.466  | -7.274      | 27.754      | -7.274                    | 28.691                    | 104.686                     | 0.622                         |
| 4500.000                | 0.655                | 69.215                    | 4499.461  | -6.955      | 28.682      | -6.955                    | 29.513                    | 103.630                     | 0.190                         |
| 4600.000                | 0.413                | 70.442                    | 4599.456  | -6.631      | 29.556      | -6.631                    | 30.291                    | 102.645                     | 0.242                         |
| 4700.000                | 0.362                | 60.965                    | 4699.454  | -6.357      | 30.172      | -6.357                    | 30.835                    | 101.898                     | 0.082                         |
| 4800.000                | 0.122                | 29.890                    | 4799.453  | -6.111      | 30.502      | -6.111                    | 31.108                    | 101.330                     | 0.265                         |
| 4900.000                | 0.193                | 10.020                    | 4899.453  | -5.852      | 30.584      | -5.852                    | 31.139                    | 100.833                     | 0.089                         |
| 5000.000                | 0.463                | 3.711                     | 4999.451  | -5.283      | 30.640      | -5.283                    | 31.092                    | 99.783                      | 0.271                         |
| 5100.000                | 0.582                | 349.397                   | 5099.447  | -4.381      | 30.573      | -4.381                    | 30.885                    | 98.155                      | 0.176                         |
| 5200.000                | 0.810                | 307.175                   | 5199.440  | -3.454      | 29.916      | -3.454                    | 30.115                    | 96.587                      | 0.544                         |
| 5300.000                | 0.809                | 329.051                   | 5299.430  | -2.422      | 28.990      | -2.422                    | 29.091                    | 94.776                      | 0.307                         |
| 5400.000                | 0.873                | 293.555                   | 5399.420  | -1.512      | 27.928      | -1.512                    | 27.969                    | 93.099                      | 0.516                         |
| 5500.000                | 0.908                | 298.189                   | 5499.408  | -0.833      | 26.531      | -0.833                    | 26.544                    | 91.798                      | 0.080                         |
| 5600.000                | 0.549                | 242.449                   | 5599.401  | -0.680      | 25.408      | -0.680                    | 25.417                    | 91.533                      | 0.751                         |
| 5700.000                | 0.596                | 189.593                   | 5699.397  | -1.415      | 24.897      | -1.415                    | 24.937                    | 93.252                      | 0.511                         |
| 5800.000                | 1.044                | 166.572                   | 5799.387  | -2.814      | 25.022      | -2.814                    | 25.180                    | 96.416                      | 0.547                         |

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 5900.000                | 1.986                | 159.108                   | 5899.351  | -5.319      | 25.852      | -5.319                    | 26.393                    | 101.627                     | 0.961                         |
| 6000.000                | 3.777                | 152.140                   | 5999.220  | -9.850      | 28.009      | -9.850                    | 29.691                    | 109.376                     | 1.821                         |
| 6100.000                | 1.863                | 170.418                   | 6099.096  | -14.365     | 29.819      | -14.365                   | 33.099                    | 115.722                     | 2.091                         |
| 6200.000                | 1.273                | 226.257                   | 6199.064  | -16.736     | 29.287      | -16.736                   | 33.731                    | 119.745                     | 1.558                         |
| 6300.000                | 1.595                | 255.532                   | 6299.034  | -17.851     | 27.137      | -17.851                   | 32.482                    | 123.337                     | 0.789                         |
| 6400.000                | 1.928                | 284.708                   | 6398.988  | -17.772     | 24.163      | -17.772                   | 29.994                    | 126.335                     | 0.944                         |
| 6500.000                | 1.902                | 307.299                   | 6498.934  | -16.339     | 21.216      | -16.339                   | 26.778                    | 127.601                     | 0.750                         |
| 6600.000                | 1.847                | 314.300                   | 6598.880  | -14.208     | 18.743      | -14.208                   | 23.520                    | 127.165                     | 0.235                         |
| 6700.000                | 1.205                | 330.809                   | 6698.845  | -12.165     | 17.077      | -12.165                   | 20.967                    | 125.465                     | 0.771                         |