



Company: Noble Energy  
Well: Lundvall J 18-6  
API#: 05-123-22966  
Rig Name: Production / Lightning  
Location: Weld County, Colorado  
Latitude: 40.398, Longitude: -104.826  
GRID North is 0.440 Degrees East of True North  
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: inrun\_ed.ut

Minimum Curvature Method

Report Date/Time: 9/10/2012 / 12:14

Vaughn Energy Services  
Henderson, CO  
303-853-4976  
Robert Davis

| 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                 | 0.602                | 7.545                     | 99.998    | 0.521      | 0.069      | 0.521                     | 0.526                     | 7.545                       | 0.602                         |
| 200.000                 | 0.337                | 48.060                    | 199.995   | 1.238      | 0.357      | 1.238                     | 1.289                     | 16.062                      | 0.410                         |
| 300.000                 | 0.525                | 318.580                   | 299.993   | 1.778      | 0.272      | 1.778                     | 1.799                     | 8.690                       | 0.621                         |
| 400.000                 | 0.512                | 306.327                   | 399.989   | 2.387      | -0.392     | 2.387                     | 2.419                     | 350.684                     | 0.111                         |
| 500.000                 | 1.131                | 233.233                   | 499.980   | 2.061      | -1.542     | 2.061                     | 2.574                     | 323.191                     | 1.097                         |
| 600.000                 | 1.167                | 232.351                   | 599.960   | 0.848      | -3.139     | 0.848                     | 3.252                     | 285.120                     | 0.040                         |
| 700.000                 | 1.182                | 226.058                   | 699.939   | -0.490     | -4.688     | -0.490                    | 4.713                     | 264.037                     | 0.130                         |
| 800.000                 | 0.816                | 251.655                   | 799.924   | -1.430     | -6.107     | -1.430                    | 6.272                     | 256.824                     | 0.568                         |
| 900.000                 | 0.777                | 226.618                   | 899.915   | -2.120     | -7.276     | -2.120                    | 7.579                     | 253.757                     | 0.348                         |
| 1000.000                | 1.223                | 260.001                   | 999.900   | -2.771     | -8.820     | -2.771                    | 9.245                     | 252.559                     | 0.716                         |
| 1100.000                | 0.702                | 261.941                   | 1099.886  | -3.042     | -10.478    | -3.042                    | 10.911                    | 253.809                     | 0.522                         |
| 1200.000                | 1.239                | 333.309                   | 1199.874  | -2.162     | -11.570    | -2.162                    | 11.771                    | 259.415                     | 1.213                         |
| 1300.000                | 4.228                | 11.274                    | 1299.755  | 2.420      | -11.335    | 2.420                     | 11.591                    | 282.051                     | 3.339                         |
| 1400.000                | 6.103                | 18.745                    | 1399.345  | 11.070     | -8.906     | 11.070                    | 14.208                    | 321.182                     | 1.989                         |
| 1500.000                | 6.805                | 15.404                    | 1498.711  | 21.816     | -5.624     | 21.816                    | 22.529                    | 345.545                     | 0.796                         |
| 1600.000                | 8.819                | 11.105                    | 1597.779  | 35.051     | -2.573     | 35.051                    | 35.146                    | 355.801                     | 2.095                         |
| 1700.000                | 9.990                | 12.623                    | 1696.433  | 51.038     | 0.799      | 51.038                    | 51.045                    | 0.897                       | 1.197                         |
| 1800.000                | 12.155               | 15.613                    | 1794.566  | 69.644     | 5.529      | 69.644                    | 69.863                    | 4.539                       | 2.239                         |
| 1900.000                | 14.348               | 14.303                    | 1891.898  | 91.793     | 11.424     | 91.793                    | 92.501                    | 7.094                       | 2.213                         |
| 2000.000                | 16.030               | 16.801                    | 1988.402  | 117.019    | 18.476     | 117.019                   | 118.469                   | 8.972                       | 1.804                         |
| 2100.000                | 17.664               | 15.538                    | 2084.108  | 144.855    | 26.532     | 144.855                   | 147.265                   | 10.379                      | 1.674                         |
| 2200.000                | 20.253               | 11.425                    | 2178.680  | 176.444    | 34.026     | 176.444                   | 179.695                   | 10.915                      | 2.912                         |
| 2300.000                | 20.936               | 10.301                    | 2272.289  | 210.988    | 40.649     | 210.988                   | 214.868                   | 10.905                      | 0.789                         |
| 2400.000                | 20.434               | 9.932                     | 2365.842  | 245.761    | 46.855     | 245.761                   | 250.188                   | 10.794                      | 0.518                         |
| 2500.000                | 21.065               | 9.909                     | 2459.356  | 280.660    | 52.958     | 280.660                   | 285.613                   | 10.686                      | 0.631                         |
| 2600.000                | 21.856               | 10.000                    | 2552.422  | 316.695    | 59.284     | 316.695                   | 322.196                   | 10.603                      | 0.792                         |
| 2700.000                | 21.312               | 8.013                     | 2645.410  | 353.022    | 65.049     | 353.022                   | 358.965                   | 10.440                      | 0.911                         |
| 2800.000                | 22.621               | 10.645                    | 2738.151  | 389.920    | 71.135     | 389.920                   | 396.356                   | 10.339                      | 1.638                         |
| 2900.000                | 23.633               | 10.324                    | 2830.114  | 428.541    | 78.280     | 428.541                   | 435.632                   | 10.352                      | 1.020                         |
| 3000.000                | 22.769               | 11.455                    | 2922.026  | 467.227    | 85.716     | 467.227                   | 475.025                   | 10.396                      | 0.972                         |
| 3100.000                | 21.277               | 10.529                    | 3014.727  | 504.034    | 92.875     | 504.034                   | 512.519                   | 10.440                      | 1.532                         |
| 3200.000                | 21.955               | 7.466                     | 3107.696  | 540.410    | 98.620     | 540.410                   | 549.335                   | 10.342                      | 1.317                         |
| 3300.000                | 21.100               | 10.280                    | 3200.722  | 576.658    | 104.261    | 576.658                   | 586.007                   | 10.248                      | 1.341                         |
| 3400.000                | 20.460               | 12.579                    | 3294.218  | 611.428    | 111.280    | 611.428                   | 621.472                   | 10.315                      | 1.036                         |

| 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 |
|---|----------------------|---------------------------|-----------|------------|------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3500.000  | 20.967               | 12.925                    | 3387.754  | 645.924    | 119.088    | 645.924                   | 656.811                   | 10.446                      | 0.521                         |
| 3600.000  | 20.309               | 12.971                    | 3481.336  | 680.274    | 126.986    | 680.274                   | 692.025                   | 10.574                      | 0.658                         |
| 3700.000  | 20.350               | 7.973                     | 3575.114  | 714.407    | 133.293    | 714.407                   | 726.736                   | 10.569                      | 1.736                         |
| 3800.000  | 20.047               | 9.893                     | 3668.965  | 748.512    | 138.649    | 748.512                   | 761.245                   | 10.494                      | 0.729                         |
| 3900.000  | 20.722               | 10.395                    | 3762.703  | 782.799    | 144.786    | 782.799                   | 796.076                   | 10.479                      | 0.697                         |
| 4000.000  | 22.327               | 14.162                    | 3855.730  | 818.621    | 152.627    | 818.621                   | 832.728                   | 10.561                      | 2.118                         |
| 4100.000  | 22.794               | 12.426                    | 3948.078  | 855.956    | 161.442    | 855.956                   | 871.048                   | 10.681                      | 0.813                         |
| 4200.000  | 22.760               | 9.088                     | 4040.284  | 893.975    | 168.666    | 893.975                   | 909.747                   | 10.684                      | 1.293                         |
| 4300.000  | 22.151               | 11.241                    | 4132.703  | 931.568    | 175.397    | 931.568                   | 947.936                   | 10.663                      | 1.023                         |
| 4400.000  | 20.452               | 10.347                    | 4225.868  | 967.249    | 182.210    | 967.249                   | 984.262                   | 10.668                      | 1.730                         |
| 4500.000  | 20.458               | 9.281                     | 4319.563  | 1001.684   | 188.166    | 1001.684                  | 1019.204                  | 10.639                      | 0.372                         |
| 4600.000  | 21.080               | 7.889                     | 4413.065  | 1036.745   | 193.453    | 1036.745                  | 1054.640                  | 10.570                      | 0.794                         |
| 4700.000  | 20.978               | 11.375                    | 4506.408  | 1072.109   | 199.453    | 1072.109                  | 1090.504                  | 10.539                      | 1.255                         |
| 4800.000  | 22.729               | 10.625                    | 4599.218  | 1108.649   | 206.546    | 1108.649                  | 1127.725                  | 10.553                      | 1.773                         |
| 4900.000  | 21.377               | 7.529                     | 4691.903  | 1145.707   | 212.496    | 1145.707                  | 1165.247                  | 10.507                      | 1.783                         |
| 5000.000  | 18.982               | 8.174                     | 4785.758  | 1179.878   | 217.197    | 1179.878                  | 1199.703                  | 10.430                      | 2.405                         |
| 5100.000  | 17.262               | 9.296                     | 4880.794  | 1210.622   | 221.907    | 1210.622                  | 1230.791                  | 10.387                      | 1.754                         |
| 5200.000  | 15.904               | 10.228                    | 4976.633  | 1238.749   | 226.737    | 1238.749                  | 1259.329                  | 10.372                      | 1.384                         |
| 5300.000  | 13.366               | 10.232                    | 5073.380  | 1263.612   | 231.224    | 1263.612                  | 1284.593                  | 10.370                      | 2.538                         |
| 5400.000  | 10.107               | 12.093                    | 5171.277  | 1283.572   | 235.116    | 1283.572                  | 1304.928                  | 10.380                      | 3.280                         |
| 5500.000  | 7.578                | 9.177                     | 5270.081  | 1298.664   | 238.007    | 1298.664                  | 1320.294                  | 10.385                      | 2.568                         |
| 5600.000  | 5.505                | 9.539                     | 5369.424  | 1309.905   | 239.853    | 1309.905                  | 1331.684                  | 10.376                      | 2.074                         |
| 5700.000  | 3.519                | 14.901                    | 5469.110  | 1317.601   | 241.437    | 1317.601                  | 1339.539                  | 10.384                      | 2.028                         |
| 5800.000  | 1.746                | 0.211                     | 5569.001  | 1322.091   | 242.232    | 1322.091                  | 1344.099                  | 10.383                      | 1.882                         |
| 5900.000  | 1.500                | 4.713                     | 5668.961  | 1324.919   | 242.345    | 1324.919                  | 1346.901                  | 10.366                      | 0.277                         |
| 6000.000  | 1.477                | 22.096                    | 5768.928  | 1327.418   | 242.938    | 1327.418                  | 1349.465                  | 10.371                      | 0.450                         |
| 6100.000  | 0.501                | 60.334                    | 5868.913  | 1328.828   | 243.802    | 1328.828                  | 1351.008                  | 10.397                      | 1.127                         |
| 6200.000  | 0.340                | 348.379                   | 5968.910  | 1329.335   | 244.122    | 1329.335                  | 1351.564                  | 10.406                      | 0.511                         |
| 6300.000  | 0.471                | 342.085                   | 6068.908  | 1330.016   | 243.936    | 1330.016                  | 1352.201                  | 10.393                      | 0.138                         |
| 6400.000  | 0.486                | 41.123                    | 6168.905  | 1330.727   | 244.088    | 1330.727                  | 1352.927                  | 10.394                      | 0.472                         |
| 6500.000  | 0.544                | 331.378                   | 6268.902  | 1331.463   | 244.139    | 1331.463                  | 1353.661                  | 10.390                      | 0.591                         |
| 6600.000  | 0.511                | 313.632                   | 6368.898  | 1332.188   | 243.589    | 1332.188                  | 1354.275                  | 10.362                      | 0.166                         |
| 6700.000  | 0.599                | 355.237                   | 6468.893  | 1333.016   | 243.223    | 1333.016                  | 1355.023                  | 10.340                      | 0.402                         |
| 6800.000  | 0.709                | 327.094                   | 6568.887  | 1334.056   | 242.844    | 1334.056                  | 1355.979                  | 10.317                      | 0.336                         |
| 6900.000  | 0.431                | 13.507                    | 6668.883  | 1334.941   | 242.595    | 1334.941                  | 1356.805                  | 10.300                      | 0.517                         |
| 7000.000  | 0.687                | 308.737                   | 6768.879  | 1335.682   | 242.215    | 1335.682                  | 1357.466                  | 10.278                      | 0.637                         |
| 7100.000  | 0.654                | 316.292                   | 6868.872  | 1336.470   | 241.353    | 1336.470                  | 1358.088                  | 10.237                      | 0.094                         |
| 7200.000  | 0.143                | 118.131                   | 6968.870  | 1336.824   | 241.069    | 1336.824                  | 1358.386                  | 10.222                      | 0.791                         |
| 7300.000  | 0.284                | 10.946                    | 7068.869  | 1337.008   | 241.226    | 1337.008                  | 1358.595                  | 10.227                      | 0.354                         |
| 7400.000  | 0.748                | 288.783                   | 7168.866  | 1337.462   | 240.655    | 1337.462                  | 1358.940                  | 10.200                      | 0.763                         |
| 7500.000  | 0.341                | 270.525                   | 7268.861  | 1337.674   | 239.740    | 1337.674                  | 1358.988                  | 10.161                      | 0.437                         |
| 7600.000  | 0.694                | 50.200                    | 7368.859  | 1338.065   | 239.908    | 1338.065                  | 1359.402                  | 10.165                      | 0.979                         |
| HORIZONTAL DISPLACEMENT IS<br>1359.402 FEET AT 10.165 DEGREES |                      |                           |           |            |            |                           |                           |                             |                               |