



Company/Rig: Noble Energy/CoreTech
WELL: Jurgens 8-1
DECLINATION: 8.32
TD AS DRILLED: 6804'
COUNTY/STATE: Weld/Colorado
Latitude: 40.412, Longitude: -104.567
GRID North is 0.600 Degrees East of True North
VS-Azi: 0.000 Degrees



DEPTH REFERENCE : RKB=Surface Elevation=4586'

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 10/2/2014 / 13:37

Lat & Long Obtained By Handheld GPS At Wellhead

North Reference: Grid

Henderson, Co.

303-853-4976

Surveyor: Mark Simmons

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | TVD FT | +N/-S FT | +E/-W FT | Vertical Section FT | Closure Distance FT | Closure Direction Deg | Dogleg Severity Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | **** |
| 100.000 | 0.230 | 38.638 | 100.000 | 0.157 | 0.125 | 0.157 | 0.200 | 38.638 | 0.230 |
| 200.000 | 0.440 | 35.431 | 199.998 | 0.626 | 0.473 | 0.626 | 0.784 | 37.068 | 0.211 |
| 300.000 | 0.380 | 54.716 | 299.995 | 1.131 | 0.966 | 1.131 | 1.487 | 40.522 | 0.150 |
| 400.000 | 0.194 | 5.592 | 399.994 | 1.491 | 1.254 | 1.491 | 1.948 | 40.061 | 0.293 |
| 500.000 | 0.423 | 35.727 | 499.993 | 1.959 | 1.486 | 1.959 | 2.459 | 37.175 | 0.273 |
| 600.000 | 0.364 | 55.304 | 599.990 | 2.440 | 1.963 | 2.440 | 3.131 | 38.815 | 0.146 |
| 700.000 | 0.160 | 43.537 | 699.989 | 2.722 | 2.320 | 2.722 | 3.577 | 40.445 | 0.211 |
| 800.000 | 0.127 | 356.935 | 799.989 | 2.934 | 2.410 | 2.934 | 3.797 | 39.404 | 0.117 |
| 900.000 | 0.042 | 356.479 | 899.989 | 3.081 | 2.402 | 3.081 | 3.907 | 37.939 | 0.086 |
| 1000.000 | 0.271 | 81.555 | 999.989 | 3.152 | 2.633 | 3.152 | 4.107 | 39.876 | 0.270 |
| 1100.000 | 0.146 | 188.437 | 1099.988 | 3.061 | 2.848 | 3.061 | 4.181 | 42.942 | 0.343 |
| 1200.000 | 0.148 | 268.301 | 1199.988 | 2.931 | 2.700 | 2.931 | 3.985 | 42.656 | 0.189 |
| 1300.000 | 0.240 | 82.511 | 1299.988 | 2.954 | 2.778 | 2.954 | 4.055 | 43.240 | 0.388 |
| 1400.000 | 0.232 | 118.848 | 1399.987 | 2.884 | 3.162 | 2.884 | 4.280 | 47.638 | 0.147 |
| 1500.000 | 0.178 | 116.520 | 1499.986 | 2.717 | 3.479 | 2.717 | 4.414 | 52.008 | 0.054 |
| 1600.000 | 0.284 | 143.439 | 1599.986 | 2.449 | 3.765 | 2.449 | 4.491 | 56.963 | 0.149 |
| 1700.000 | 0.349 | 2.038 | 1699.985 | 2.554 | 3.923 | 2.554 | 4.682 | 56.934 | 0.598 |
| 1800.000 | 0.547 | 347.642 | 1799.982 | 3.325 | 3.832 | 3.325 | 5.074 | 49.054 | 0.225 |
| 1900.000 | 0.607 | 350.281 | 1899.977 | 4.313 | 3.641 | 4.313 | 5.644 | 40.167 | 0.066 |

| Measured Depth FT | Incl Angle Deg | Drift Direction Deg | TVD FT | +N/-S FT | +E/-W FT | Vertical Section FT | Closure Distance FT | Closure Direction Deg | Dogleg Severity Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 2000.000 | 0.670 | 357.442 | 1999.971 | 5.420 | 3.525 | 5.420 | 6.465 | 33.040 | 0.101 |
| 2100.000 | 1.352 | 349.362 | 2099.954 | 7.163 | 3.281 | 7.163 | 7.879 | 24.611 | 0.695 |
| 2200.000 | 1.104 | 9.374 | 2199.932 | 9.273 | 3.220 | 9.273 | 9.816 | 19.151 | 0.492 |
| 2300.000 | 1.194 | 348.183 | 2299.912 | 11.243 | 3.164 | 11.243 | 11.680 | 15.716 | 0.432 |
| 2400.000 | 0.737 | 13.717 | 2399.898 | 12.888 | 3.103 | 12.888 | 13.256 | 13.536 | 0.617 |
| 2500.000 | 1.324 | 39.665 | 2499.882 | 14.403 | 3.993 | 14.403 | 14.946 | 15.495 | 0.736 |
| 2600.000 | 1.336 | 8.870 | 2599.856 | 16.444 | 4.910 | 16.444 | 17.161 | 16.626 | 0.706 |
| 2700.000 | 0.931 | 10.968 | 2699.837 | 18.393 | 5.245 | 18.393 | 19.126 | 15.915 | 0.407 |
| 2800.000 | 1.417 | 17.262 | 2799.815 | 20.370 | 5.766 | 20.370 | 21.171 | 15.804 | 0.502 |
| 2900.000 | 1.590 | 28.031 | 2899.781 | 22.775 | 6.785 | 22.775 | 23.764 | 16.588 | 0.331 |
| 3000.000 | 1.160 | 55.319 | 2999.753 | 24.576 | 8.269 | 24.576 | 25.930 | 18.597 | 0.771 |
| 3100.000 | 1.173 | 83.457 | 3099.733 | 25.269 | 10.119 | 25.269 | 27.219 | 21.823 | 0.567 |
| 3200.000 | 0.809 | 67.063 | 3199.718 | 25.660 | 11.786 | 25.660 | 28.237 | 24.669 | 0.458 |
| 3300.000 | 0.238 | 66.905 | 3299.714 | 26.017 | 12.626 | 26.017 | 28.919 | 25.888 | 0.571 |
| 3400.000 | 0.574 | 282.100 | 3399.712 | 26.203 | 12.327 | 26.203 | 28.958 | 25.195 | 0.780 |
| 3500.000 | 1.032 | 239.690 | 3499.703 | 25.853 | 11.060 | 25.853 | 28.120 | 23.161 | 0.721 |
| 3600.000 | 0.976 | 237.484 | 3599.688 | 24.941 | 9.564 | 24.941 | 26.712 | 20.980 | 0.069 |
| 3700.000 | 1.408 | 255.255 | 3699.666 | 24.170 | 7.658 | 24.170 | 25.354 | 17.579 | 0.564 |
| 3800.000 | 1.168 | 266.609 | 3799.641 | 23.797 | 5.452 | 23.797 | 24.414 | 12.903 | 0.350 |
| 3900.000 | 1.220 | 275.926 | 3899.619 | 23.847 | 3.375 | 23.847 | 24.085 | 8.056 | 0.201 |
| 4000.000 | 1.065 | 288.926 | 3999.600 | 24.258 | 1.438 | 24.258 | 24.301 | 3.391 | 0.301 |
| 4100.000 | 0.558 | 303.091 | 4099.589 | 24.825 | 0.151 | 24.825 | 24.826 | 0.347 | 0.541 |
| 4200.000 | 0.181 | 240.397 | 4199.587 | 25.013 | -0.395 | 25.013 | 25.016 | 359.096 | 0.501 |
| 4300.000 | 0.249 | 294.814 | 4299.587 | 25.027 | -0.729 | 25.027 | 25.037 | 358.331 | 0.206 |
| 4400.000 | 0.244 | 296.149 | 4399.586 | 25.212 | -1.118 | 25.212 | 25.237 | 357.461 | 0.008 |
| 4500.000 | 0.498 | 282.897 | 4499.584 | 25.402 | -1.732 | 25.402 | 25.461 | 356.099 | 0.267 |
| 4600.000 | 0.489 | 287.670 | 4599.580 | 25.629 | -2.562 | 25.629 | 25.757 | 354.290 | 0.042 |
| 4700.000 | 1.174 | 262.191 | 4699.569 | 25.619 | -3.984 | 25.619 | 25.927 | 351.161 | 0.763 |
| 4800.000 | 1.006 | 237.039 | 4799.551 | 25.002 | -5.736 | 25.002 | 25.652 | 347.079 | 0.502 |
| 4900.000 | 0.509 | 191.662 | 4899.543 | 24.090 | -6.562 | 24.090 | 24.967 | 344.763 | 0.742 |
| 5000.000 | 0.691 | 230.742 | 4999.538 | 23.273 | -7.119 | 23.273 | 24.337 | 342.991 | 0.437 |
| 5100.000 | 0.447 | 220.855 | 5099.533 | 22.596 | -7.842 | 22.596 | 23.918 | 340.861 | 0.262 |
| 5200.000 | 0.529 | 162.541 | 5199.530 | 21.860 | -7.958 | 21.860 | 23.264 | 339.996 | 0.481 |
| 5300.000 | 0.359 | 89.971 | 5299.528 | 21.420 | -7.507 | 21.420 | 22.698 | 340.687 | 0.543 |
| 5400.000 | 0.761 | 114.610 | 5399.523 | 21.144 | -6.590 | 21.144 | 22.147 | 342.690 | 0.460 |
| 5500.000 | 0.915 | 70.582 | 5499.513 | 21.133 | -5.233 | 21.133 | 21.771 | 346.093 | 0.644 |
| 5600.000 | 0.982 | 94.301 | 5599.500 | 21.334 | -3.625 | 21.334 | 21.640 | 350.358 | 0.395 |
| 5700.000 | 1.332 | 115.401 | 5699.480 | 20.771 | -1.720 | 20.771 | 20.842 | 355.267 | 0.545 |
| 5800.000 | 1.386 | 122.898 | 5799.452 | 19.616 | 0.345 | 19.616 | 19.619 | 1.009 | 0.186 |
| 5900.000 | 1.276 | 135.895 | 5899.425 | 18.160 | 2.135 | 18.160 | 18.285 | 6.707 | 0.320 |

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|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 6000.000 | 0.910 | 143.694 | 5999.406 | 16.720 | 3.380 | 16.720 | 17.059 | 11.430 | 0.394 |
| 6100.000 | 0.616 | 135.062 | 6099.398 | 15.700 | 4.230 | 15.700 | 16.260 | 15.081 | 0.315 |
| 6200.000 | 1.013 | 150.390 | 6199.387 | 14.550 | 5.047 | 14.550 | 15.401 | 19.130 | 0.450 |
| 6300.000 | 0.928 | 134.556 | 6299.373 | 13.213 | 6.061 | 13.213 | 14.537 | 24.642 | 0.280 |
| 6400.000 | 0.987 | 124.514 | 6399.359 | 12.157 | 7.348 | 12.157 | 14.205 | 31.152 | 0.178 |
| 6500.000 | 1.311 | 119.723 | 6499.339 | 11.101 | 9.052 | 11.101 | 14.324 | 39.195 | 0.338 |
| 6600.000 | 1.473 | 135.659 | 6599.310 | 9.614 | 10.945 | 9.614 | 14.568 | 48.703 | 0.418 |
| 6700.000 | 1.693 | 149.898 | 6699.272 | 7.417 | 12.584 | 7.417 | 14.607 | 59.485 | 0.449 |