



COMPANY/RIG: Noble Energy/Production/CoreTech
WELL/API: Robb-PM F 15-7/05-123-14055
DECLINATION: 8.34
TD AS DRILLED: 7130
COUNTY/STATE: Weld/Colorado
VS-Azi: 0.000 Degrees
Latitude: 40.40055, Longitude: -104.64678
Grid North = True North -0.55 degs (NAD 27)
Grid Convergence Applied = -0.55 degs



DEPTH REFERENCE : RKB = GL Elevation = 4624

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyrosurvey.ut

Minimum Curvature Method

Report Date/Time: 8/24/2015 / 13:26

LAT & LONG OBTAINED BY HANDHELD GPS AT WELLHEAD

NORTH REFERENCE: GRID

HENDERSON, COLORADO

303-853-4976

Surveyor: JUSTIN WILLIAMS

| 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 | 0.502 | 289.917 | 99.999 | 0.149 | -0.412 | 0.149 | 0.438 | 289.917 | 0.502 |
| 200.000 | 0.118 | 182.491 | 199.997 | 0.196 | -0.828 | 0.196 | 0.851 | 283.308 | 0.549 |
| 300.000 | 0.438 | 244.425 | 299.996 | -0.072 | -1.177 | -0.072 | 1.179 | 266.518 | 0.396 |
| 400.000 | 0.127 | 43.861 | 399.996 | -0.156 | -1.444 | -0.156 | 1.453 | 263.818 | 0.559 |
| 500.000 | 0.502 | 285.663 | 499.994 | 0.042 | -1.789 | 0.042 | 1.790 | 271.341 | 0.573 |
| 600.000 | 0.496 | 269.611 | 599.991 | 0.157 | -2.644 | 0.157 | 2.649 | 273.403 | 0.140 |
| 700.000 | 0.081 | 81.569 | 699.989 | 0.165 | -3.007 | 0.165 | 3.012 | 273.134 | 0.577 |
| 800.000 | 0.493 | 287.285 | 799.988 | 0.303 | -3.348 | 0.303 | 3.362 | 275.169 | 0.567 |
| 900.000 | 0.396 | 255.668 | 899.986 | 0.345 | -4.093 | 0.345 | 4.108 | 274.821 | 0.260 |
| 1000.000 | 0.188 | 197.228 | 999.984 | 0.103 | -4.477 | 0.103 | 4.478 | 271.313 | 0.338 |
| 1100.000 | 0.193 | 340.122 | 1099.984 | 0.104 | -4.583 | 0.104 | 4.584 | 271.296 | 0.361 |
| 1200.000 | 0.367 | 315.485 | 1199.983 | 0.490 | -4.864 | 0.490 | 4.889 | 275.757 | 0.208 |
| 1300.000 | 0.081 | 295.914 | 1299.982 | 0.750 | -5.153 | 0.750 | 5.207 | 278.279 | 0.292 |
| 1400.000 | 0.066 | 242.859 | 1399.982 | 0.754 | -5.268 | 0.754 | 5.321 | 278.149 | 0.067 |
| 1500.000 | 0.344 | 224.186 | 1499.981 | 0.513 | -5.528 | 0.513 | 5.552 | 275.299 | 0.282 |
| 1600.000 | 0.275 | 308.604 | 1599.980 | 0.447 | -5.925 | 0.447 | 5.942 | 274.318 | 0.419 |
| 1700.000 | 0.250 | 282.804 | 1699.979 | 0.645 | -6.325 | 0.645 | 6.358 | 275.826 | 0.120 |
| 1800.000 | 0.357 | 105.103 | 1799.979 | 0.613 | -6.237 | 0.613 | 6.268 | 275.610 | 0.607 |

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|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1900.000 | 0.432 | 115.755 | 1899.976 | 0.368 | -5.597 | 0.368 | 5.609 | 273.759 | 0.105 |
| 2000.000 | 0.473 | 67.625 | 1999.974 | 0.361 | -4.876 | 0.361 | 4.890 | 274.233 | 0.371 |
| 2100.000 | 0.448 | 65.650 | 2099.970 | 0.679 | -4.139 | 0.679 | 4.194 | 279.317 | 0.029 |
| 2200.000 | 0.532 | 67.589 | 2199.967 | 1.017 | -3.354 | 1.017 | 3.505 | 286.871 | 0.086 |
| 2300.000 | 0.589 | 33.703 | 2299.962 | 1.622 | -2.639 | 1.622 | 3.098 | 301.570 | 0.331 |
| 2400.000 | 1.079 | 2.773 | 2399.952 | 2.990 | -2.308 | 2.990 | 3.777 | 322.329 | 0.649 |
| 2500.000 | 1.202 | 356.545 | 2499.932 | 4.977 | -2.326 | 4.977 | 5.494 | 334.950 | 0.174 |
| 2600.000 | 1.115 | 348.178 | 2599.912 | 6.976 | -2.589 | 6.976 | 7.441 | 339.641 | 0.190 |
| 2700.000 | 1.120 | 11.877 | 2699.893 | 8.884 | -2.587 | 8.884 | 9.253 | 343.767 | 0.459 |
| 2800.000 | 0.980 | 20.246 | 2799.876 | 10.643 | -2.090 | 10.643 | 10.846 | 348.892 | 0.207 |
| 2900.000 | 0.938 | 21.389 | 2899.862 | 12.207 | -1.495 | 12.207 | 12.299 | 353.017 | 0.046 |
| 3000.000 | 1.138 | 35.798 | 2999.846 | 13.775 | -0.616 | 13.775 | 13.789 | 357.440 | 0.328 |
| 3100.000 | 1.214 | 38.238 | 3099.825 | 15.413 | 0.621 | 15.413 | 15.425 | 2.307 | 0.091 |
| 3200.000 | 1.223 | 58.875 | 3199.803 | 16.796 | 2.190 | 16.796 | 16.939 | 7.429 | 0.437 |
| 3300.000 | 1.171 | 65.359 | 3299.781 | 17.774 | 4.032 | 17.774 | 18.225 | 12.780 | 0.145 |
| 3400.000 | 0.936 | 100.049 | 3399.765 | 18.057 | 5.765 | 18.057 | 18.955 | 17.705 | 0.667 |
| 3500.000 | 1.045 | 137.298 | 3499.751 | 17.244 | 7.188 | 17.244 | 18.682 | 22.627 | 0.641 |
| 3600.000 | 0.801 | 178.876 | 3599.739 | 15.875 | 7.820 | 15.875 | 17.697 | 26.224 | 0.694 |
| 3700.000 | 0.746 | 181.305 | 3699.730 | 14.525 | 7.819 | 14.525 | 16.496 | 28.293 | 0.064 |
| 3800.000 | 0.538 | 175.481 | 3799.724 | 13.406 | 7.841 | 13.406 | 15.530 | 30.323 | 0.218 |
| 3900.000 | 1.042 | 163.761 | 3899.714 | 12.064 | 8.132 | 12.064 | 14.549 | 33.984 | 0.527 |
| 4000.000 | 0.603 | 185.646 | 3999.704 | 10.667 | 8.335 | 10.667 | 13.537 | 38.004 | 0.533 |
| 4100.000 | 0.286 | 167.678 | 4099.701 | 9.900 | 8.337 | 9.900 | 12.942 | 40.101 | 0.342 |
| 4200.000 | 0.660 | 40.793 | 4199.698 | 10.092 | 8.766 | 10.092 | 13.367 | 40.979 | 0.863 |
| 4300.000 | 0.634 | 359.692 | 4299.693 | 11.081 | 9.139 | 11.081 | 14.363 | 39.516 | 0.455 |
| 4400.000 | 0.566 | 30.458 | 4399.687 | 12.059 | 9.387 | 12.059 | 15.282 | 37.897 | 0.325 |
| 4500.000 | 0.225 | 50.093 | 4499.685 | 12.610 | 9.787 | 12.610 | 15.963 | 37.816 | 0.362 |
| 4600.000 | 0.419 | 129.364 | 4599.684 | 12.504 | 10.221 | 12.504 | 16.150 | 39.262 | 0.437 |
| 4700.000 | 0.256 | 99.674 | 4699.682 | 12.235 | 10.723 | 12.235 | 16.269 | 41.233 | 0.234 |
| 4800.000 | 0.406 | 136.971 | 4799.680 | 11.939 | 11.185 | 11.939 | 16.360 | 43.132 | 0.255 |
| 4900.000 | 0.433 | 109.836 | 4899.678 | 11.552 | 11.781 | 11.552 | 16.500 | 45.563 | 0.198 |
| 5000.000 | 0.723 | 105.951 | 4999.673 | 11.251 | 12.743 | 11.251 | 16.999 | 48.559 | 0.292 |
| 5100.000 | 0.464 | 119.454 | 5099.667 | 10.878 | 13.702 | 10.878 | 17.495 | 51.554 | 0.292 |
| 5200.000 | 1.095 | 113.265 | 5199.657 | 10.301 | 14.933 | 10.301 | 18.141 | 55.401 | 0.636 |
| 5300.000 | 0.315 | 95.640 | 5299.649 | 9.897 | 16.084 | 9.897 | 18.885 | 58.396 | 0.801 |
| 5400.000 | 0.179 | 164.162 | 5399.648 | 9.719 | 16.401 | 9.719 | 19.064 | 59.349 | 0.300 |
| 5500.000 | 0.958 | 146.799 | 5499.643 | 8.869 | 16.901 | 8.869 | 19.087 | 62.311 | 0.789 |
| 5600.000 | 0.398 | 150.627 | 5599.635 | 7.867 | 17.529 | 7.867 | 19.214 | 65.830 | 0.561 |
| 5700.000 | 0.794 | 99.709 | 5699.630 | 7.447 | 18.382 | 7.447 | 19.834 | 67.945 | 0.624 |
| 5800.000 | 0.724 | 111.388 | 5799.622 | 7.100 | 19.653 | 7.100 | 20.896 | 70.135 | 0.169 |

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|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 5900.000 | 0.550 | 61.599 | 5899.616 | 7.098 | 20.662 | 7.098 | 21.848 | 71.041 | 0.559 |
| 6000.000 | 0.737 | 56.354 | 5999.610 | 7.683 | 21.620 | 7.683 | 22.944 | 70.437 | 0.197 |
| 6100.000 | 0.434 | 93.719 | 6099.605 | 8.015 | 22.533 | 8.015 | 23.916 | 70.420 | 0.473 |
| 6200.000 | 0.047 | 50.491 | 6199.604 | 8.016 | 22.942 | 8.016 | 24.302 | 70.740 | 0.401 |
| 6300.000 | 0.402 | 107.912 | 6299.603 | 7.934 | 23.308 | 7.934 | 24.621 | 71.201 | 0.379 |
| 6400.000 | 0.447 | 103.823 | 6399.600 | 7.733 | 24.021 | 7.733 | 25.235 | 72.155 | 0.054 |
| 6500.000 | 0.255 | 47.882 | 6499.598 | 7.789 | 24.565 | 7.789 | 25.770 | 72.407 | 0.371 |
| 6600.000 | 0.313 | 312.299 | 6599.598 | 8.122 | 24.528 | 8.122 | 25.838 | 71.678 | 0.423 |
| 6700.000 | 0.250 | 329.795 | 6699.596 | 8.494 | 24.217 | 8.494 | 25.663 | 70.671 | 0.106 |
| 6800.000 | 0.787 | 289.905 | 6799.592 | 8.916 | 23.462 | 8.916 | 25.099 | 69.192 | 0.616 |
| 6900.000 | 1.496 | 278.520 | 6899.572 | 9.343 | 21.526 | 9.343 | 23.466 | 66.537 | 0.741 |