

Company: Anadarko Petroleum Corp
Lease/Well: McWhinney VanDewater /1
API#: 05-069-05075
Rig Name: Production/Canary
State/County: Colorado/Larimer
Latitude: 40.409, Longitude: -104.986
Directions are relative to True North
VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 5/29/2014 / 16:19

Vaughn Energy Services
Henderson CO.
303-853-4976
Jason Kinchelow

| 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 | 1.849 | 16.434 | 99.983 | 1.548 | 0.456 | 1.548 | 1.614 | 16.434 | 1.849 |
| 200.000 | 1.569 | 16.697 | 199.938 | 4.406 | 1.306 | 4.406 | 4.596 | 16.512 | 0.281 |
| 300.000 | 1.335 | 7.238 | 299.906 | 6.873 | 1.846 | 6.873 | 7.117 | 15.036 | 0.334 |
| 400.000 | 1.166 | 7.296 | 399.882 | 9.038 | 2.122 | 9.038 | 9.284 | 13.215 | 0.169 |
| 500.000 | 0.904 | 356.707 | 499.866 | 10.835 | 2.206 | 10.835 | 11.057 | 11.509 | 0.324 |
| 600.000 | 0.727 | 352.596 | 599.856 | 12.251 | 2.079 | 12.251 | 12.426 | 9.632 | 0.186 |
| 700.000 | 0.637 | 347.412 | 699.849 | 13.423 | 1.876 | 13.423 | 13.554 | 7.957 | 0.109 |
| 800.000 | 0.697 | 320.862 | 799.842 | 14.438 | 1.371 | 14.438 | 14.503 | 5.424 | 0.312 |
| 900.000 | 0.836 | 303.985 | 899.833 | 15.318 | 0.382 | 15.318 | 15.322 | 1.428 | 0.264 |
| 1000.000 | 0.871 | 285.207 | 999.822 | 15.925 | -0.957 | 15.925 | 15.954 | 356.562 | 0.281 |
| 1100.000 | 1.174 | 279.612 | 1099.806 | 16.295 | -2.700 | 16.295 | 16.518 | 350.591 | 0.318 |
| 1200.000 | 1.160 | 274.126 | 1199.786 | 16.539 | -4.720 | 16.539 | 17.200 | 344.072 | 0.113 |
| 1300.000 | 1.433 | 270.651 | 1299.760 | 16.626 | -6.980 | 16.626 | 18.032 | 337.226 | 0.284 |
| 1400.000 | 1.566 | 273.492 | 1399.726 | 16.724 | -9.595 | 16.724 | 19.281 | 330.157 | 0.153 |
| 1500.000 | 1.278 | 277.680 | 1499.695 | 16.956 | -12.064 | 16.956 | 20.810 | 324.568 | 0.306 |
| 1600.000 | 1.694 | 279.438 | 1599.661 | 17.348 | -14.628 | 17.348 | 22.692 | 319.861 | 0.418 |
| 1700.000 | 1.431 | 291.973 | 1699.624 | 18.057 | -17.245 | 18.057 | 24.969 | 316.319 | 0.430 |
| 1800.000 | 1.717 | 281.043 | 1799.586 | 18.812 | -19.873 | 18.812 | 27.365 | 313.428 | 0.413 |
| 1900.000 | 1.593 | 288.192 | 1899.545 | 19.533 | -22.664 | 19.533 | 29.920 | 310.755 | 0.241 |
| 2000.000 | 1.846 | 299.604 | 1999.500 | 20.762 | -25.385 | 20.762 | 32.794 | 309.279 | 0.425 |
| 2100.000 | 1.942 | 290.231 | 2099.445 | 22.144 | -28.375 | 22.144 | 35.993 | 307.968 | 0.324 |
| 2200.000 | 1.982 | 294.326 | 2199.387 | 23.442 | -31.541 | 23.442 | 39.299 | 306.621 | 0.146 |
| 2300.000 | 2.121 | 290.350 | 2299.323 | 24.798 | -34.853 | 24.798 | 42.775 | 305.433 | 0.199 |
| 2400.000 | 2.055 | 288.632 | 2399.256 | 26.015 | -38.287 | 26.015 | 46.289 | 304.195 | 0.091 |
| 2500.000 | 2.154 | 286.297 | 2499.189 | 27.115 | -41.790 | 27.115 | 49.816 | 302.977 | 0.131 |
| 2600.000 | 2.130 | 281.156 | 2599.119 | 28.002 | -45.417 | 28.002 | 53.355 | 301.656 | 0.194 |
| 2700.000 | 2.115 | 282.917 | 2699.051 | 28.774 | -49.038 | 28.774 | 56.857 | 300.403 | 0.067 |
| 2800.000 | 2.229 | 289.380 | 2798.979 | 29.832 | -52.672 | 29.832 | 60.533 | 299.526 | 0.270 |
| 2900.000 | 2.332 | 288.686 | 2898.900 | 31.129 | -56.434 | 31.129 | 64.450 | 298.881 | 0.107 |
| 3000.000 | 2.444 | 295.815 | 2998.813 | 32.709 | -60.280 | 32.709 | 68.583 | 298.485 | 0.317 |
| 3100.000 | 2.484 | 294.991 | 3098.721 | 34.553 | -64.163 | 34.553 | 72.876 | 298.303 | 0.053 |
| 3200.000 | 2.359 | 307.736 | 3198.632 | 36.728 | -67.755 | 36.728 | 77.069 | 298.461 | 0.551 |
| 3300.000 | 2.571 | 307.278 | 3298.539 | 39.346 | -71.167 | 39.346 | 81.319 | 298.937 | 0.213 |
| 3400.000 | 2.530 | 314.998 | 3398.441 | 42.265 | -74.512 | 42.265 | 85.664 | 299.563 | 0.346 |

| 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3500.000 | 2.685 | 310.480 | 3498.337 | 45.345 | -77.854 | 45.345 | 90.097 | 300.218 | 0.258 |
| 3600.000 | 2.645 | 306.262 | 3598.229 | 48.230 | -81.496 | 48.230 | 94.698 | 300.618 | 0.200 |
| 3700.000 | 2.394 | 305.570 | 3698.132 | 50.810 | -85.055 | 50.810 | 99.076 | 300.853 | 0.253 |
| 3800.000 | 2.521 | 298.827 | 3798.041 | 53.085 | -88.680 | 53.085 | 103.355 | 300.905 | 0.315 |
| 3900.000 | 2.021 | 295.527 | 3897.962 | 54.906 | -92.198 | 54.906 | 107.308 | 300.775 | 0.517 |
| 4000.000 | 1.933 | 289.693 | 3997.902 | 56.234 | -95.377 | 56.234 | 110.721 | 300.523 | 0.219 |
| 4100.000 | 2.285 | 289.908 | 4097.835 | 57.481 | -98.840 | 57.481 | 114.339 | 300.180 | 0.351 |
| 4200.000 | 2.707 | 296.526 | 4197.740 | 59.214 | -102.827 | 59.214 | 118.658 | 299.936 | 0.510 |
| 4300.000 | 2.827 | 295.748 | 4297.623 | 61.340 | -107.161 | 61.340 | 123.475 | 299.787 | 0.126 |
| 4400.000 | 2.726 | 296.304 | 4397.506 | 63.465 | -111.513 | 63.465 | 128.308 | 299.645 | 0.104 |
| 4500.000 | 2.388 | 304.033 | 4497.406 | 65.685 | -115.371 | 65.685 | 132.759 | 299.654 | 0.482 |
| 4600.000 | 2.317 | 306.358 | 4597.322 | 68.049 | -118.726 | 68.049 | 136.845 | 299.820 | 0.119 |
| 4700.000 | 2.264 | 305.302 | 4697.242 | 70.389 | -121.966 | 70.389 | 140.820 | 299.990 | 0.068 |
| 4800.000 | 1.954 | 307.413 | 4797.174 | 72.566 | -124.932 | 72.566 | 144.478 | 300.150 | 0.320 |
| 4900.000 | 1.825 | 306.434 | 4897.120 | 74.548 | -127.567 | 74.548 | 147.752 | 300.301 | 0.133 |
| 5000.000 | 1.709 | 308.722 | 4997.072 | 76.426 | -130.012 | 76.426 | 150.811 | 300.449 | 0.136 |
| 5100.000 | 1.608 | 308.688 | 5097.030 | 78.236 | -132.271 | 78.236 | 153.676 | 300.604 | 0.100 |
| 5200.000 | 1.188 | 306.675 | 5197.000 | 79.733 | -134.198 | 79.733 | 156.097 | 300.716 | 0.423 |
| 5300.000 | 0.934 | 315.995 | 5296.983 | 80.938 | -135.595 | 80.938 | 157.915 | 300.833 | 0.306 |
| 5400.000 | 0.889 | 285.016 | 5396.971 | 81.725 | -136.911 | 81.725 | 159.448 | 300.834 | 0.489 |
| 5500.000 | 0.664 | 282.076 | 5496.962 | 82.048 | -138.227 | 82.048 | 160.744 | 300.692 | 0.228 |
| 5600.000 | 0.839 | 292.179 | 5596.953 | 82.445 | -139.472 | 82.445 | 162.018 | 300.588 | 0.219 |
| 5700.000 | 0.820 | 276.536 | 5696.943 | 82.803 | -140.861 | 82.803 | 163.396 | 300.449 | 0.227 |
| 5800.000 | 0.807 | 276.485 | 5796.933 | 82.964 | -142.271 | 82.964 | 164.694 | 300.248 | 0.013 |
| 5900.000 | 0.390 | 287.316 | 5896.927 | 83.145 | -143.295 | 83.145 | 165.670 | 300.124 | 0.430 |
| 6000.000 | 0.510 | 347.085 | 5996.925 | 83.680 | -143.720 | 83.680 | 166.306 | 300.210 | 0.460 |
| 6100.000 | 0.572 | 47.958 | 6096.921 | 84.448 | -143.449 | 84.448 | 166.460 | 300.485 | 0.551 |
| 6200.000 | 0.372 | 74.487 | 6196.918 | 84.869 | -142.765 | 84.869 | 166.086 | 300.730 | 0.291 |
| 6300.000 | 0.102 | 141.404 | 6296.917 | 84.886 | -142.396 | 84.886 | 165.778 | 300.800 | 0.345 |
| 6400.000 | 0.582 | 255.954 | 6396.915 | 84.694 | -142.834 | 84.694 | 166.056 | 300.666 | 0.631 |
| 6500.000 | 0.924 | 272.639 | 6496.906 | 84.608 | -144.131 | 84.608 | 167.130 | 300.414 | 0.402 |
| 6600.000 | 1.407 | 274.547 | 6596.886 | 84.742 | -146.161 | 84.742 | 168.950 | 300.105 | 0.485 |
| 6700.000 | 1.660 | 271.903 | 6696.850 | 84.887 | -148.833 | 84.887 | 171.339 | 299.698 | 0.263 |
| 6800.000 | 2.211 | 271.968 | 6796.792 | 85.002 | -152.209 | 85.002 | 174.335 | 299.181 | 0.551 |
| 6900.000 | 2.281 | 272.225 | 6896.715 | 85.145 | -156.125 | 85.145 | 177.833 | 298.607 | 0.070 |
| 7000.000 | 1.707 | 281.713 | 6996.655 | 85.525 | -159.572 | 85.525 | 181.046 | 298.190 | 0.660 |
| 7100.000 | 0.878 | 283.920 | 7096.628 | 86.012 | -161.774 | 86.012 | 183.218 | 297.999 | 0.831 |
| 7200.000 | 0.871 | 264.760 | 7196.617 | 86.127 | -163.275 | 86.127 | 184.598 | 297.811 | 0.291 |
| 7300.000 | 0.934 | 245.002 | 7296.605 | 85.713 | -164.770 | 85.713 | 185.731 | 297.483 | 0.316 |
| 7400.000 | 0.940 | 242.799 | 7396.591 | 84.994 | -166.238 | 84.994 | 186.706 | 297.080 | 0.037 |
| 7500.000 | 0.965 | 247.902 | 7496.578 | 84.302 | -167.748 | 84.302 | 187.740 | 296.682 | 0.088 |
| 7600.000 | 1.033 | 219.097 | 7596.563 | 83.285 | -169.098 | 83.285 | 188.495 | 296.221 | 0.501 |
| 7700.000 | 1.170 | 215.897 | 7696.544 | 81.758 | -170.265 | 81.758 | 188.877 | 295.650 | 0.150 |
| 7800.000 | 1.351 | 216.940 | 7796.520 | 79.989 | -171.572 | 79.989 | 189.302 | 294.995 | 0.183 |
| 7900.000 | 1.182 | 211.760 | 7896.496 | 78.169 | -172.824 | 78.169 | 189.680 | 294.338 | 0.204 |
| 8000.000 | 1.185 | 218.188 | 7996.474 | 76.480 | -174.006 | 76.480 | 190.071 | 293.727 | 0.133 |
| 8100.000 | 1.322 | 213.254 | 8096.451 | 74.702 | -175.278 | 74.702 | 190.533 | 293.083 | 0.175 |
| 8200.000 | 1.303 | 215.881 | 8196.424 | 72.816 | -176.577 | 72.816 | 191.002 | 292.410 | 0.063 |
| 8300.000 | 1.489 | 218.554 | 8296.395 | 70.878 | -178.054 | 70.878 | 191.642 | 291.706 | 0.197 |
| 8400.000 | 1.327 | 223.226 | 8396.364 | 69.017 | -179.657 | 69.017 | 192.458 | 291.015 | 0.198 |
| 8500.000 | 1.243 | 224.823 | 8496.339 | 67.404 | -181.215 | 67.404 | 193.345 | 290.403 | 0.092 |
| 8600.000 | 1.211 | 224.034 | 8596.316 | 65.875 | -182.714 | 65.875 | 194.227 | 289.826 | 0.036 |
| 8700.000 | 1.319 | 228.062 | 8696.292 | 64.346 | -184.305 | 64.346 | 195.214 | 289.246 | 0.139 |
| 8800.000 | 1.311 | 223.069 | 8796.266 | 62.742 | -185.942 | 62.742 | 196.242 | 288.646 | 0.115 |
| 8900.000 | 1.490 | 195.768 | 8896.237 | 60.654 | -187.076 | 60.654 | 196.663 | 287.964 | 0.684 |

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|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|

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|---|--|--|--|--|--|--|--|--|--|
| HORIZONTAL DISPLACEMENT IS 196.663 FEET AT 287.964 DEGREES | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|