

Company: Anadarko Petroleum Corp.

Well: HSR Gromala 5-7

API: 05-123-15043

Rig Name: Production/Coretech

State/County: Colorado/Weld

Latitude: 40.242, Longitude: -104.713

Directions are relative to True North

VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB=Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/14/2014 / 17:05

Vaughn Energy Services

Henderson, CO

303-853-4976

Levi Sheldon

| 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 | 0.359 | 51.946 | 99.999 | 0.193 | 0.247 | 0.193 | 0.313 | 51.946 | 0.359 |
| 200.000 | 0.369 | 45.529 | 199.997 | 0.611 | 0.723 | 0.611 | 0.947 | 49.768 | 0.042 |
| 300.000 | 0.117 | 13.434 | 299.996 | 0.936 | 0.976 | 0.936 | 1.353 | 46.192 | 0.277 |
| 400.000 | 0.142 | 28.356 | 399.996 | 1.145 | 1.059 | 1.145 | 1.559 | 42.762 | 0.042 |
| 500.000 | 0.137 | 77.211 | 499.996 | 1.281 | 1.234 | 1.281 | 1.779 | 43.949 | 0.116 |
| 600.000 | 0.185 | 13.817 | 599.996 | 1.464 | 1.390 | 1.464 | 2.018 | 43.513 | 0.174 |
| 700.000 | 0.220 | 352.183 | 699.995 | 1.810 | 1.402 | 1.810 | 2.290 | 37.756 | 0.083 |
| 800.000 | 0.375 | 338.344 | 799.994 | 2.305 | 1.255 | 2.305 | 2.624 | 28.572 | 0.170 |
| 900.000 | 0.285 | 353.692 | 899.992 | 2.856 | 1.107 | 2.856 | 3.063 | 21.187 | 0.126 |
| 1000.000 | 0.255 | 343.985 | 999.991 | 3.317 | 1.018 | 3.317 | 3.469 | 17.068 | 0.054 |
| 1100.000 | 0.356 | 0.147 | 1099.989 | 3.841 | 0.958 | 3.841 | 3.959 | 14.000 | 0.132 |
| 1200.000 | 0.405 | 337.956 | 1199.987 | 4.479 | 0.826 | 4.479 | 4.554 | 10.448 | 0.154 |
| 1300.000 | 0.449 | 16.006 | 1299.985 | 5.183 | 0.801 | 5.183 | 5.244 | 8.790 | 0.281 |
| 1400.000 | 0.542 | 17.037 | 1399.981 | 6.011 | 1.048 | 6.011 | 6.102 | 9.889 | 0.093 |
| 1500.000 | 0.448 | 23.013 | 1499.977 | 6.823 | 1.339 | 6.823 | 6.954 | 11.105 | 0.107 |
| 1600.000 | 0.475 | 25.655 | 1599.974 | 7.557 | 1.672 | 7.557 | 7.740 | 12.474 | 0.034 |
| 1700.000 | 0.465 | 24.579 | 1699.971 | 8.300 | 2.020 | 8.300 | 8.542 | 13.679 | 0.014 |
| 1800.000 | 0.429 | 30.508 | 1799.968 | 8.991 | 2.379 | 8.991 | 9.300 | 14.819 | 0.059 |
| 1900.000 | 0.330 | 26.229 | 1899.965 | 9.571 | 2.696 | 9.571 | 9.944 | 15.730 | 0.102 |
| 2000.000 | 0.086 | 33.937 | 1999.965 | 9.892 | 2.865 | 9.892 | 10.299 | 16.153 | 0.245 |
| 2100.000 | 0.116 | 207.204 | 2099.965 | 9.865 | 2.861 | 9.865 | 10.271 | 16.173 | 0.202 |
| 2200.000 | 0.093 | 213.371 | 2199.964 | 9.707 | 2.770 | 9.707 | 10.094 | 15.926 | 0.025 |
| 2300.000 | 0.405 | 205.323 | 2299.963 | 9.319 | 2.574 | 9.319 | 9.668 | 15.439 | 0.313 |
| 2400.000 | 0.653 | 198.647 | 2399.959 | 8.460 | 2.240 | 8.460 | 8.751 | 14.833 | 0.255 |
| 2500.000 | 1.200 | 188.995 | 2499.946 | 6.886 | 1.895 | 6.886 | 7.142 | 15.384 | 0.567 |
| 2600.000 | 1.122 | 202.262 | 2599.925 | 4.946 | 1.360 | 4.946 | 5.129 | 15.375 | 0.279 |
| 2700.000 | 1.153 | 203.381 | 2699.906 | 3.117 | 0.590 | 3.117 | 3.172 | 10.720 | 0.038 |
| 2800.000 | 1.283 | 195.224 | 2799.883 | 1.114 | -0.103 | 1.114 | 1.118 | 354.715 | 0.216 |
| 2900.000 | 1.293 | 193.938 | 2899.858 | -1.062 | -0.669 | -1.062 | 1.255 | 212.203 | 0.031 |
| 3000.000 | 1.263 | 193.677 | 2999.833 | -3.228 | -1.201 | -3.228 | 3.444 | 200.412 | 0.031 |
| 3100.000 | 1.192 | 193.584 | 3099.810 | -5.309 | -1.706 | -5.309 | 5.577 | 197.813 | 0.070 |
| 3200.000 | 1.000 | 160.006 | 3199.793 | -7.141 | -1.652 | -7.141 | 7.330 | 193.024 | 0.659 |
| 3300.000 | 1.081 | 154.892 | 3299.776 | -8.816 | -0.953 | -8.816 | 8.867 | 186.170 | 0.123 |
| 3400.000 | 1.295 | 175.417 | 3399.755 | -10.796 | -0.463 | -10.796 | 10.806 | 182.453 | 0.473 |

| 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 | 1.673 | 196.753 | 3499.722 | -13.321 | -0.793 | -13.321 | 13.345 | 183.407 | 0.663 |
| 3600.000 | 2.003 | 202.560 | 3599.670 | -16.334 | -1.885 | -16.334 | 16.442 | 186.582 | 0.379 |
| 3700.000 | 2.293 | 209.552 | 3699.600 | -19.688 | -3.542 | -19.688 | 20.004 | 190.198 | 0.390 |
| 3800.000 | 2.787 | 227.893 | 3799.503 | -23.059 | -6.332 | -23.059 | 23.912 | 195.356 | 0.945 |
| 3900.000 | 3.236 | 236.812 | 3899.366 | -26.234 | -10.498 | -26.234 | 28.257 | 201.810 | 0.647 |
| 4000.000 | 3.606 | 248.299 | 3999.188 | -28.942 | -15.782 | -28.942 | 32.965 | 208.604 | 0.777 |
| 4100.000 | 3.602 | 247.860 | 4098.991 | -31.288 | -21.613 | -31.288 | 38.027 | 214.636 | 0.028 |
| 4200.000 | 3.607 | 249.251 | 4198.793 | -33.586 | -27.464 | -33.586 | 43.385 | 219.273 | 0.088 |
| 4300.000 | 3.397 | 251.464 | 4298.606 | -35.642 | -33.214 | -35.642 | 48.719 | 222.980 | 0.250 |
| 4400.000 | 3.397 | 265.285 | 4398.432 | -36.828 | -38.976 | -36.828 | 53.623 | 226.623 | 0.817 |
| 4500.000 | 3.322 | 266.067 | 4498.260 | -37.270 | -44.819 | -37.270 | 58.291 | 230.254 | 0.088 |
| 4600.000 | 3.068 | 277.267 | 4598.106 | -37.130 | -50.365 | -37.130 | 62.572 | 233.602 | 0.673 |
| 4700.000 | 2.874 | 277.144 | 4697.971 | -36.480 | -55.507 | -36.480 | 66.422 | 236.687 | 0.194 |
| 4800.000 | 2.266 | 279.084 | 4797.870 | -35.856 | -59.947 | -35.856 | 69.852 | 239.115 | 0.614 |
| 4900.000 | 2.035 | 278.692 | 4897.800 | -35.275 | -63.655 | -35.275 | 72.776 | 241.006 | 0.231 |
| 5000.000 | 1.998 | 281.291 | 4997.738 | -34.666 | -67.119 | -34.666 | 75.543 | 242.685 | 0.099 |
| 5100.000 | 2.064 | 288.978 | 5097.675 | -33.739 | -70.532 | -33.739 | 78.186 | 244.436 | 0.280 |
| 5200.000 | 2.116 | 296.269 | 5197.609 | -32.336 | -73.890 | -32.336 | 80.656 | 246.365 | 0.271 |
| 5300.000 | 1.538 | 299.982 | 5297.558 | -30.849 | -76.708 | -30.849 | 82.678 | 248.092 | 0.589 |
| 5400.000 | 1.061 | 304.659 | 5397.532 | -29.651 | -78.632 | -29.651 | 84.037 | 249.339 | 0.488 |
| 5500.000 | 0.792 | 296.947 | 5497.518 | -28.811 | -80.010 | -28.811 | 85.039 | 250.196 | 0.296 |
| 5600.000 | 0.554 | 326.309 | 5597.512 | -28.096 | -80.894 | -28.096 | 85.634 | 250.847 | 0.412 |
| 5700.000 | 0.572 | 334.992 | 5697.507 | -27.242 | -81.373 | -27.242 | 85.812 | 251.491 | 0.087 |
| 5800.000 | 0.508 | 3.465 | 5797.503 | -26.347 | -81.557 | -26.347 | 85.707 | 252.097 | 0.273 |
| 5900.000 | 0.662 | 32.887 | 5897.498 | -25.419 | -81.217 | -25.419 | 85.101 | 252.621 | 0.332 |
| 6000.000 | 0.673 | 30.436 | 5997.491 | -24.427 | -80.605 | -24.427 | 84.225 | 253.141 | 0.031 |
| 6100.000 | 0.658 | 38.665 | 6097.484 | -23.472 | -79.949 | -23.472 | 83.323 | 253.638 | 0.097 |
| 6200.000 | 0.749 | 47.667 | 6197.477 | -22.584 | -79.107 | -22.584 | 82.268 | 254.067 | 0.143 |
| 6300.000 | 0.506 | 35.006 | 6297.471 | -21.782 | -78.371 | -21.782 | 81.342 | 254.467 | 0.279 |
| 6400.000 | 0.713 | 32.794 | 6397.465 | -20.898 | -77.781 | -20.898 | 80.540 | 254.961 | 0.208 |
| 6500.000 | 0.545 | 17.942 | 6497.459 | -19.923 | -77.298 | -19.923 | 79.824 | 255.547 | 0.233 |
| 6600.000 | 0.879 | 20.415 | 6597.451 | -18.752 | -76.884 | -18.752 | 79.137 | 256.293 | 0.335 |
| 6700.000 | 0.801 | 12.129 | 6697.440 | -17.349 | -76.469 | -17.349 | 78.413 | 257.217 | 0.144 |
| 6800.000 | 0.771 | 3.718 | 6797.431 | -15.995 | -76.279 | -15.995 | 77.938 | 258.157 | 0.119 |
| 6900.000 | 0.820 | 19.212 | 6897.421 | -14.648 | -76.000 | -14.648 | 77.398 | 259.091 | 0.220 |
| 7000.000 | 0.891 | 4.985 | 6997.410 | -13.198 | -75.697 | -13.198 | 76.838 | 260.110 | 0.223 |
| 7100.000 | 0.742 | 355.475 | 7097.400 | -11.778 | -75.680 | -11.778 | 76.591 | 261.154 | 0.200 |
| 7200.000 | 0.687 | 1.089 | 7197.393 | -10.533 | -75.720 | -10.533 | 76.449 | 262.081 | 0.089 |
| 7300.000 | 0.844 | 339.492 | 7297.384 | -9.244 | -75.967 | -9.244 | 76.527 | 263.062 | 0.326 |
| 7400.000 | 1.073 | 350.280 | 7397.370 | -7.630 | -76.383 | -7.630 | 76.763 | 264.295 | 0.291 |
| HORIZONTAL DISPLACEMENT IS 76.763 FEET AT 264.295 DEGREES | | | | | | | | | |