

Company: Anadarko Petroleum Corp.
 Well/API: Ballantine #4-30A/05-123-20764
 Tool Type: North Seeking Rate Gyro
 Rig Name: Production/ CoreTech
 County/State: Weld County / Colorado
 Latitude: 40.115, Longitude: -105.054
 Directions are relative to True North
 VS-Azi: 0.000 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = GL Elevation = 4990 ft

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: run2-01-de_01.ut

Minimum Curvature Method

Report Date/Time: 1/29/2015 / 12:12

Lat/Long Obtained By Handheld GPS At Wellhead

Handheld GPS Reference: NAD83/Device Error: ±9 Feet

VES Survey International - Henderson CO

Jay Hinman

303-853-4976

| 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 | 0.260 | 152.791 | 100.000 | -0.202 | 0.104 | -0.202 | 0.227 | 152.791 | 0.260 |
| 200.000 | 0.278 | 226.239 | 199.999 | -0.571 | 0.033 | -0.571 | 0.572 | 176.728 | 0.322 |
| 300.000 | 0.617 | 242.939 | 299.996 | -0.984 | -0.622 | -0.984 | 1.164 | 212.298 | 0.360 |
| 400.000 | 0.609 | 250.252 | 399.990 | -1.409 | -1.602 | -1.409 | 2.133 | 228.673 | 0.079 |
| 500.000 | 0.686 | 269.869 | 499.984 | -1.590 | -2.701 | -1.590 | 3.134 | 239.517 | 0.233 |
| 600.000 | 0.666 | 289.252 | 599.977 | -1.400 | -3.847 | -1.400 | 4.094 | 250.009 | 0.228 |
| 700.000 | 1.462 | 313.459 | 699.959 | -0.331 | -5.322 | -0.331 | 5.332 | 266.446 | 0.898 |
| 800.000 | 2.361 | 315.620 | 799.903 | 2.020 | -7.689 | 2.020 | 7.950 | 284.716 | 0.902 |
| 900.000 | 2.283 | 316.203 | 899.820 | 4.929 | -10.508 | 4.929 | 11.607 | 295.131 | 0.082 |
| 1000.000 | 2.473 | 315.402 | 999.734 | 7.903 | -13.401 | 7.903 | 15.558 | 300.529 | 0.193 |
| 1100.000 | 2.418 | 312.937 | 1099.643 | 10.876 | -16.460 | 10.876 | 19.729 | 303.454 | 0.119 |
| 1200.000 | 2.298 | 298.112 | 1199.560 | 13.258 | -19.773 | 13.258 | 23.806 | 303.841 | 0.620 |
| 1300.000 | 2.326 | 302.500 | 1299.478 | 15.293 | -23.253 | 15.293 | 27.831 | 303.331 | 0.179 |
| 1400.000 | 2.081 | 298.440 | 1399.404 | 17.248 | -26.561 | 17.248 | 31.670 | 302.998 | 0.291 |
| 1500.000 | 2.213 | 301.573 | 1499.334 | 19.123 | -29.802 | 19.123 | 35.410 | 302.687 | 0.177 |
| 1600.000 | 2.133 | 292.510 | 1599.262 | 20.846 | -33.166 | 20.846 | 39.173 | 302.151 | 0.353 |
| 1700.000 | 1.681 | 300.159 | 1699.207 | 22.295 | -36.153 | 22.295 | 42.475 | 301.662 | 0.518 |
| 1800.000 | 1.755 | 308.456 | 1799.162 | 23.984 | -38.620 | 23.984 | 45.461 | 301.842 | 0.259 |
| 1900.000 | 1.646 | 307.205 | 1899.118 | 25.805 | -40.962 | 25.805 | 48.413 | 302.210 | 0.115 |
| 2000.000 | 1.819 | 306.626 | 1999.072 | 27.620 | -43.380 | 27.620 | 51.426 | 302.485 | 0.174 |
| 2100.000 | 2.167 | 307.949 | 2099.012 | 29.729 | -46.144 | 29.729 | 54.892 | 302.793 | 0.351 |
| 2200.000 | 1.725 | 313.549 | 2198.954 | 31.929 | -48.726 | 31.929 | 58.255 | 303.236 | 0.480 |
| 2300.000 | 1.322 | 295.579 | 2298.919 | 33.464 | -50.857 | 33.464 | 60.880 | 303.345 | 0.620 |
| 2400.000 | 1.027 | 276.132 | 2398.898 | 34.058 | -52.789 | 34.058 | 62.822 | 302.829 | 0.492 |
| 2500.000 | 1.382 | 270.508 | 2498.876 | 34.164 | -54.886 | 34.164 | 64.650 | 301.901 | 0.374 |
| 2600.000 | 1.656 | 248.954 | 2598.842 | 33.656 | -57.440 | 33.656 | 66.574 | 300.367 | 0.629 |
| 2700.000 | 1.732 | 241.829 | 2698.798 | 32.424 | -60.121 | 32.424 | 68.307 | 298.338 | 0.224 |
| 2800.000 | 1.821 | 235.309 | 2798.750 | 30.806 | -62.760 | 30.806 | 69.913 | 296.144 | 0.221 |
| 2900.000 | 1.424 | 226.933 | 2898.710 | 29.053 | -64.974 | 29.053 | 71.174 | 294.091 | 0.461 |
| 3000.000 | 1.215 | 219.336 | 2998.683 | 27.384 | -66.555 | 27.384 | 71.968 | 292.365 | 0.272 |
| 3100.000 | 0.883 | 228.350 | 3098.666 | 26.051 | -67.803 | 26.051 | 72.635 | 291.018 | 0.370 |
| 3200.000 | 0.928 | 257.054 | 3198.655 | 25.358 | -69.168 | 25.358 | 73.670 | 290.133 | 0.451 |
| 3300.000 | 0.861 | 239.380 | 3298.642 | 24.793 | -70.604 | 24.793 | 74.831 | 289.349 | 0.283 |

| 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 |
|---|----------------------|---------------------------|-----------|------------|------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3400.000 | 0.739 | 260.214 | 3398.633 | 24.301 | -71.887 | 24.301 | 75.883 | 288.677 | 0.313 |
| 3500.000 | 0.920 | 279.118 | 3498.623 | 24.318 | -73.316 | 24.318 | 77.244 | 288.350 | 0.326 |
| 3600.000 | 1.175 | 277.496 | 3598.606 | 24.579 | -75.126 | 24.579 | 79.044 | 288.117 | 0.256 |
| 3700.000 | 1.139 | 278.150 | 3698.585 | 24.854 | -77.126 | 24.854 | 81.031 | 287.862 | 0.039 |
| 3800.000 | 1.324 | 279.446 | 3798.562 | 25.184 | -79.249 | 25.184 | 83.154 | 287.630 | 0.188 |
| 3900.000 | 1.640 | 268.563 | 3898.529 | 25.338 | -81.819 | 25.338 | 85.652 | 287.207 | 0.422 |
| 4000.000 | 1.437 | 278.186 | 3998.493 | 25.481 | -84.490 | 25.481 | 88.249 | 286.782 | 0.328 |
| 4100.000 | 1.958 | 266.286 | 4098.449 | 25.549 | -87.436 | 25.549 | 91.092 | 286.288 | 0.627 |
| 4200.000 | 2.065 | 268.677 | 4198.387 | 25.396 | -90.942 | 25.396 | 94.422 | 285.603 | 0.136 |
| 4300.000 | 1.804 | 260.124 | 4298.331 | 25.085 | -94.294 | 25.085 | 97.574 | 284.897 | 0.389 |
| 4400.000 | 2.115 | 263.522 | 4398.272 | 24.607 | -97.678 | 24.607 | 100.730 | 284.139 | 0.332 |
| 4500.000 | 2.186 | 261.421 | 4498.202 | 24.114 | -101.397 | 24.114 | 104.225 | 283.377 | 0.106 |
| 4600.000 | 2.089 | 250.069 | 4598.132 | 23.208 | -104.996 | 23.208 | 107.531 | 282.464 | 0.434 |
| 4700.000 | 1.938 | 244.494 | 4698.071 | 21.859 | -108.236 | 21.859 | 110.421 | 281.418 | 0.247 |
| 4800.000 | 2.282 | 251.175 | 4798.003 | 20.488 | -111.647 | 20.488 | 113.511 | 280.398 | 0.422 |
| 4900.000 | 1.850 | 243.438 | 4897.938 | 19.124 | -114.975 | 19.124 | 116.554 | 279.444 | 0.514 |
| 5000.000 | 1.883 | 249.035 | 4997.885 | 17.814 | -117.953 | 17.814 | 119.291 | 278.588 | 0.185 |
| 5100.000 | 1.713 | 261.712 | 5097.836 | 17.011 | -120.966 | 17.011 | 122.157 | 278.005 | 0.432 |
| 5200.000 | 1.278 | 256.598 | 5197.802 | 16.537 | -123.530 | 16.537 | 124.632 | 277.625 | 0.455 |
| 5300.000 | 1.381 | 272.659 | 5297.775 | 16.335 | -125.818 | 16.335 | 126.874 | 277.397 | 0.385 |
| 5400.000 | 1.047 | 279.849 | 5397.753 | 16.547 | -127.922 | 16.547 | 128.988 | 277.370 | 0.367 |
| 5500.000 | 0.769 | 287.633 | 5497.740 | 16.906 | -129.462 | 16.906 | 130.561 | 277.440 | 0.303 |
| 5600.000 | 0.628 | 274.506 | 5597.733 | 17.153 | -130.648 | 17.153 | 131.769 | 277.480 | 0.213 |
| 5700.000 | 0.506 | 309.117 | 5697.728 | 17.474 | -131.537 | 17.474 | 132.692 | 277.567 | 0.357 |
| 5800.000 | 0.536 | 328.948 | 5797.724 | 18.153 | -132.120 | 18.153 | 133.362 | 277.824 | 0.182 |
| 5900.000 | 1.389 | 326.937 | 5897.709 | 19.570 | -133.023 | 19.570 | 134.455 | 278.369 | 0.854 |
| 6000.000 | 1.713 | 322.061 | 5997.672 | 21.765 | -134.603 | 21.765 | 136.351 | 279.185 | 0.350 |
| 6100.000 | 2.294 | 323.551 | 6097.611 | 24.553 | -136.711 | 24.553 | 138.899 | 280.182 | 0.583 |
| 6200.000 | 1.589 | 303.394 | 6197.554 | 26.927 | -139.058 | 26.927 | 141.641 | 280.959 | 0.971 |
| 6300.000 | 0.877 | 285.933 | 6297.530 | 27.900 | -140.952 | 27.900 | 143.687 | 281.196 | 0.797 |
| 6400.000 | 1.306 | 308.914 | 6397.512 | 28.826 | -142.575 | 28.826 | 145.460 | 281.430 | 0.605 |
| 6500.000 | 1.192 | 342.012 | 6497.490 | 30.532 | -143.783 | 30.532 | 146.989 | 281.988 | 0.720 |
| 6600.000 | 1.227 | 15.698 | 6597.469 | 32.552 | -143.815 | 32.552 | 147.453 | 282.754 | 0.702 |
| 6700.000 | 1.066 | 31.109 | 6697.449 | 34.379 | -143.044 | 34.379 | 147.118 | 283.514 | 0.346 |
| 6800.000 | 1.693 | 28.046 | 6797.420 | 36.479 | -141.869 | 36.479 | 146.484 | 284.420 | 0.631 |
| 6900.000 | 1.091 | 26.739 | 6897.390 | 38.633 | -140.746 | 38.633 | 145.952 | 285.349 | 0.603 |
| 7000.000 | 1.648 | 23.560 | 6997.361 | 40.802 | -139.743 | 40.802 | 145.578 | 286.277 | 0.562 |
| 7100.000 | 1.421 | 3.926 | 7097.325 | 43.357 | -139.083 | 43.357 | 145.684 | 287.314 | 0.569 |
| 7200.000 | 1.618 | 24.553 | 7197.291 | 45.878 | -138.412 | 45.878 | 145.817 | 288.338 | 0.578 |
| 7300.000 | 2.059 | 44.216 | 7297.240 | 48.450 | -136.572 | 48.450 | 144.911 | 289.533 | 0.764 |
| 7400.000 | 2.254 | 68.126 | 7397.171 | 50.471 | -133.494 | 50.471 | 142.716 | 290.710 | 0.913 |
| 7500.000 | 1.960 | 91.442 | 7497.105 | 51.161 | -129.959 | 51.161 | 139.667 | 291.488 | 0.899 |
| 7600.000 | 2.143 | 114.653 | 7597.043 | 50.338 | -126.550 | 50.338 | 136.194 | 291.691 | 0.845 |
| 7700.000 | 2.614 | 98.103 | 7696.958 | 49.236 | -122.593 | 49.236 | 132.110 | 291.882 | 0.828 |
| 7800.000 | 2.608 | 85.928 | 7796.855 | 49.076 | -118.066 | 49.076 | 127.859 | 292.571 | 0.554 |
| 7900.000 | 1.700 | 83.613 | 7896.783 | 49.403 | -114.322 | 49.403 | 124.540 | 293.371 | 0.912 |
| HORIZONTAL DISPLACEMENT IS 124.540 FEET AT 293.371 DEGREES | | | | | | | | | |