



Company: Noble Energy
Rig: Production/VES
API # 05-123-21906

Date: 7/24/2013
Surveyor: Nick Kula

VS: 0.000
Lat : 40.20239

Long: -104.658

Well: Ritchey H 27-4
Location: Weld County, Colorado
North Reference: GRID
Convergence: Grid North is .54 Degrees East of T

Declination: 8.51
Depth Reference: Ground Level

Elevation: 4810'

Total Depth as Drilled: 7301'

Lat & Long obtained by handheld GPS at wellhead

HA Gyro Survey Calculations

| Depth | Inc | AzG | N/-S | E/-W | TVD | DL | VS | CD | Cbrg |
|----------|-------|---------|---------|---------|----------|-------|---------|--------|---------|
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 100.000 | 0.549 | 38.378 | 0.375 | 0.297 | 99.998 | 0.549 | 0.375 | 0.479 | 38.378 |
| 200.000 | 0.224 | 121.076 | 0.650 | 0.762 | 199.997 | 0.566 | 0.650 | 1.002 | 49.562 |
| 300.000 | 0.302 | 356.020 | 0.811 | 0.912 | 299.996 | 0.468 | 0.811 | 1.221 | 48.344 |
| 400.000 | 0.438 | 304.577 | 1.291 | 0.579 | 399.994 | 0.344 | 1.291 | 1.415 | 24.147 |
| 500.000 | 0.324 | 247.122 | 1.398 | 0.003 | 499.992 | 0.380 | 1.398 | 1.398 | 0.143 |
| 600.000 | 0.391 | 307.536 | 1.496 | -0.527 | 599.991 | 0.364 | 1.496 | 1.587 | 340.581 |
| 700.000 | 0.310 | 183.325 | 1.434 | -0.814 | 699.990 | 0.621 | 1.434 | 1.649 | 330.421 |
| 800.000 | 0.376 | 247.713 | 1.039 | -1.133 | 799.988 | 0.370 | 1.039 | 1.537 | 312.525 |
| 900.000 | 0.663 | 200.267 | 0.372 | -1.637 | 899.985 | 0.494 | 0.372 | 1.679 | 282.795 |
| 1000.000 | 0.369 | 193.845 | -0.484 | -1.914 | 999.980 | 0.300 | -0.484 | 1.975 | 255.822 |
| 1100.000 | 0.452 | 231.418 | -1.042 | -2.300 | 1099.978 | 0.276 | -1.042 | 2.525 | 245.623 |
| 1200.000 | 0.175 | 230.737 | -1.385 | -2.727 | 1199.976 | 0.277 | -1.385 | 3.058 | 243.073 |
| 1300.000 | 0.334 | 187.260 | -1.771 | -2.882 | 1299.975 | 0.240 | -1.771 | 3.382 | 238.426 |
| 1400.000 | 0.320 | 188.754 | -2.337 | -2.961 | 1399.974 | 0.017 | -2.337 | 3.772 | 231.722 |
| 1500.000 | 0.289 | 253.097 | -2.686 | -3.245 | 1499.973 | 0.326 | -2.686 | 4.213 | 230.385 |
| 1600.000 | 0.303 | 203.882 | -3.001 | -3.594 | 1599.971 | 0.247 | -3.001 | 4.682 | 230.135 |
| 1700.000 | 0.418 | 239.860 | -3.426 | -4.016 | 1699.970 | 0.248 | -3.426 | 5.279 | 229.534 |
| 1800.000 | 0.536 | 218.801 | -3.974 | -4.625 | 1799.966 | 0.210 | -3.974 | 6.097 | 229.329 |
| 1900.000 | 0.867 | 226.045 | -4.863 | -5.463 | 1899.959 | 0.342 | -4.863 | 7.314 | 228.320 |
| 2000.000 | 0.608 | 219.411 | -5.799 | -6.344 | 1999.950 | 0.272 | -5.799 | 8.595 | 227.572 |
| 2100.000 | 0.912 | 232.576 | -6.693 | -7.314 | 2099.941 | 0.349 | -6.693 | 9.914 | 227.538 |
| 2200.000 | 1.050 | 243.794 | -7.581 | -8.768 | 2199.927 | 0.236 | -7.581 | 11.591 | 229.152 |
| 2300.000 | 0.908 | 245.889 | -8.310 | -10.314 | 2299.912 | 0.147 | -8.310 | 13.245 | 231.141 |
| 2400.000 | 0.982 | 257.098 | -8.825 | -11.872 | 2399.899 | 0.199 | -8.825 | 14.793 | 233.376 |
| 2500.000 | 0.867 | 239.684 | -9.398 | -13.361 | 2499.886 | 0.302 | -9.398 | 16.335 | 234.878 |
| 2600.000 | 0.642 | 248.472 | -9.985 | -14.535 | 2599.877 | 0.252 | -9.985 | 17.635 | 235.512 |
| 2700.000 | 0.484 | 258.993 | -10.272 | -15.471 | 2699.872 | 0.188 | -10.272 | 18.571 | 236.419 |
| 2800.000 | 0.398 | 346.871 | -10.014 | -15.965 | 2799.870 | 0.616 | -10.014 | 18.846 | 237.903 |
| 2900.000 | 0.422 | 300.246 | -9.490 | -16.363 | 2899.868 | 0.325 | -9.490 | 18.915 | 239.887 |
| 3000.000 | 0.605 | 278.532 | -9.226 | -17.203 | 2999.864 | 0.264 | -9.226 | 19.521 | 241.795 |
| 3100.000 | 0.439 | 305.520 | -8.925 | -18.037 | 3099.860 | 0.292 | -8.925 | 20.124 | 243.672 |
| 3200.000 | 0.631 | 310.750 | -8.344 | -18.766 | 3199.856 | 0.198 | -8.344 | 20.537 | 246.029 |
| 3300.000 | 1.363 | 339.719 | -6.869 | -19.595 | 3299.840 | 0.867 | -6.869 | 20.764 | 250.683 |
| 3400.000 | 1.731 | 357.393 | -4.244 | -20.076 | 3399.804 | 0.599 | -4.244 | 20.519 | 258.064 |

| | | | | | | | | | |
|----------|-------|---------|--------|---------|----------|-------|--------|--------|---------|
| 3500.000 | 1.629 | 350.023 | -1.334 | -20.391 | 3499.761 | 0.239 | -1.334 | 20.434 | 266.256 |
| 3600.000 | 0.905 | 342.896 | 0.821 | -20.870 | 3599.736 | 0.740 | 0.821 | 20.886 | 272.253 |
| 3700.000 | 0.635 | 330.574 | 2.059 | -21.374 | 3699.727 | 0.316 | 2.059 | 21.473 | 275.502 |
| 3800.000 | 0.361 | 321.243 | 2.787 | -21.844 | 3799.723 | 0.284 | 2.787 | 22.021 | 277.272 |
| 3900.000 | 0.767 | 316.523 | 3.519 | -22.502 | 3899.718 | 0.407 | 3.519 | 22.775 | 278.888 |
| 4000.000 | 0.483 | 289.959 | 4.148 | -23.358 | 3999.712 | 0.399 | 4.148 | 23.723 | 280.070 |
| 4100.000 | 0.497 | 283.070 | 4.390 | -24.176 | 4099.709 | 0.061 | 4.390 | 24.572 | 280.291 |
| 4200.000 | 0.553 | 255.585 | 4.368 | -25.067 | 4199.705 | 0.256 | 4.368 | 25.445 | 279.884 |
| 4300.000 | 1.051 | 221.358 | 3.559 | -26.140 | 4299.695 | 0.670 | 3.559 | 26.382 | 277.754 |
| 4400.000 | 0.932 | 236.877 | 2.427 | -27.427 | 4399.680 | 0.292 | 2.427 | 27.535 | 275.056 |
| 4500.000 | 0.904 | 242.984 | 1.624 | -28.812 | 4499.667 | 0.102 | 1.624 | 28.857 | 273.226 |
| 4600.000 | 1.254 | 235.877 | 0.652 | -30.421 | 4599.650 | 0.373 | 0.652 | 30.427 | 271.227 |
| 4700.000 | 1.363 | 232.687 | -0.683 | -32.272 | 4699.624 | 0.131 | -0.683 | 32.279 | 268.787 |
| 4800.000 | 1.168 | 225.215 | -2.122 | -33.942 | 4799.599 | 0.255 | -2.122 | 34.008 | 266.422 |
| 4900.000 | 0.918 | 246.580 | -3.158 | -35.400 | 4899.583 | 0.458 | -3.158 | 35.541 | 264.902 |
| 5000.000 | 0.519 | 266.316 | -3.506 | -36.587 | 4999.575 | 0.464 | -3.506 | 36.754 | 264.526 |
| 5100.000 | 0.653 | 295.751 | -3.287 | -37.552 | 5099.570 | 0.325 | -3.287 | 37.695 | 264.997 |
| 5200.000 | 0.449 | 307.181 | -2.803 | -38.377 | 5199.565 | 0.230 | -2.803 | 38.480 | 265.823 |
| 5300.000 | 0.728 | 326.994 | -2.033 | -39.036 | 5299.560 | 0.341 | -2.033 | 39.089 | 267.018 |
| 5400.000 | 0.861 | 341.660 | -0.788 | -39.618 | 5399.550 | 0.242 | -0.788 | 39.626 | 268.861 |
| 5500.000 | 0.675 | 345.990 | 0.497 | -39.997 | 5499.541 | 0.195 | 0.497 | 40.000 | 270.712 |
| 5600.000 | 0.782 | 308.451 | 1.493 | -40.674 | 5599.534 | 0.480 | 1.493 | 40.701 | 272.102 |
| 5700.000 | 0.219 | 320.819 | 2.065 | -41.329 | 5699.530 | 0.570 | 2.065 | 41.381 | 272.860 |
| 5800.000 | 0.062 | 260.081 | 2.204 | -41.504 | 5799.529 | 0.196 | 2.204 | 41.562 | 273.039 |
| 5900.000 | 0.327 | 319.912 | 2.412 | -41.741 | 5899.529 | 0.300 | 2.412 | 41.811 | 273.308 |
| 6000.000 | 0.808 | 294.645 | 2.925 | -42.565 | 5999.524 | 0.531 | 2.925 | 42.666 | 273.931 |
| 6100.000 | 1.080 | 314.879 | 3.883 | -43.874 | 6099.510 | 0.426 | 3.883 | 44.045 | 275.058 |
| 6200.000 | 0.936 | 315.544 | 5.131 | -45.114 | 6199.495 | 0.144 | 5.131 | 45.404 | 276.489 |
| 6300.000 | 1.399 | 323.179 | 6.692 | -46.417 | 6299.474 | 0.487 | 6.692 | 46.897 | 278.203 |
| 6400.000 | 1.513 | 304.146 | 8.410 | -48.241 | 6399.442 | 0.494 | 8.410 | 48.969 | 279.889 |
| 6500.000 | 1.692 | 319.885 | 10.280 | -50.285 | 6499.404 | 0.473 | 10.280 | 51.325 | 281.554 |
| 6600.000 | 1.511 | 318.059 | 12.390 | -52.118 | 6599.364 | 0.188 | 12.390 | 53.570 | 283.373 |
| 6700.000 | 1.586 | 332.218 | 14.595 | -53.644 | 6699.328 | 0.389 | 14.595 | 55.594 | 285.220 |
| 6800.000 | 1.778 | 340.921 | 17.286 | -54.796 | 6799.285 | 0.319 | 17.286 | 57.458 | 287.508 |
| 6900.000 | 1.861 | 349.431 | 20.347 | -55.601 | 6899.235 | 0.282 | 20.347 | 59.207 | 290.100 |
| 7000.000 | 2.113 | 351.427 | 23.766 | -56.173 | 6999.175 | 0.262 | 23.766 | 60.994 | 292.932 |
| 7100.000 | 2.751 | 354.946 | 27.980 | -56.660 | 7099.084 | 0.655 | 27.980 | 63.192 | 296.281 |

True North