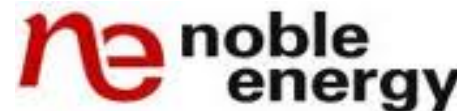




Company: Noble Energy
 Lease/Well: Hettinger / D30-4
 API: 05-123-17343
 Rig Name: Production/Lightning Wireline
 State/County: Colorado/Weld
 Latitude: 40.20, Longitude: -104.60
 GRID North is 0.58 Degrees East of True North
 VS-Azi: 0.00 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB=Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: msgyro_run01-01_ed.ut

Minimum Curvature Method

Report Date/Time: 5/31/2012 / 18:07

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 |
|-------------------------|----------------------|---------------------------|-----------|------------|------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | **** |
| 100.00 | 0.36 | 352.64 | 100.00 | 0.31 | -0.04 | 0.31 | 0.31 | 352.64 | 0.36 |
| 200.00 | 0.27 | 337.58 | 200.00 | 0.83 | -0.17 | 0.83 | 0.85 | 348.56 | 0.12 |
| 300.00 | 0.19 | 322.54 | 300.00 | 1.17 | -0.36 | 1.17 | 1.23 | 343.12 | 0.10 |
| 400.00 | 0.20 | 352.97 | 400.00 | 1.48 | -0.48 | 1.48 | 1.56 | 342.10 | 0.10 |
| 500.00 | 0.16 | 6.12 | 500.00 | 1.80 | -0.49 | 1.80 | 1.86 | 344.90 | 0.06 |
| 600.00 | 0.23 | 50.79 | 600.00 | 2.06 | -0.32 | 2.06 | 2.09 | 351.29 | 0.16 |
| 700.00 | 0.27 | 67.97 | 699.99 | 2.28 | 0.06 | 2.28 | 2.28 | 1.45 | 0.09 |
| 800.00 | 0.30 | 92.52 | 799.99 | 2.35 | 0.54 | 2.35 | 2.42 | 12.87 | 0.12 |
| 900.00 | 0.29 | 95.87 | 899.99 | 2.32 | 1.05 | 2.32 | 2.54 | 24.32 | 0.02 |
| 1000.00 | 0.23 | 108.47 | 999.99 | 2.23 | 1.48 | 2.23 | 2.68 | 33.66 | 0.08 |
| 1100.00 | 0.22 | 114.05 | 1099.99 | 2.09 | 1.84 | 2.09 | 2.79 | 41.42 | 0.02 |
| 1200.00 | 0.14 | 302.97 | 1199.99 | 2.08 | 1.91 | 2.08 | 2.83 | 42.63 | 0.35 |
| 1300.00 | 0.33 | 111.71 | 1299.99 | 2.04 | 2.08 | 2.04 | 2.91 | 45.57 | 0.47 |
| 1400.00 | 0.26 | 213.07 | 1399.99 | 1.75 | 2.23 | 1.75 | 2.83 | 51.89 | 0.46 |
| 1500.00 | 0.19 | 34.76 | 1499.99 | 1.69 | 2.20 | 1.69 | 2.77 | 52.38 | 0.44 |
| 1600.00 | 0.11 | 46.33 | 1599.99 | 1.90 | 2.36 | 1.90 | 3.03 | 51.24 | 0.08 |
| 1700.00 | 0.12 | 76.44 | 1699.99 | 1.99 | 2.54 | 1.99 | 3.22 | 51.92 | 0.06 |
| 1800.00 | 0.30 | 220.32 | 1799.99 | 1.82 | 2.48 | 1.82 | 3.07 | 53.74 | 0.40 |
| 1900.00 | 0.33 | 340.76 | 1899.99 | 1.89 | 2.21 | 1.89 | 2.91 | 49.43 | 0.55 |
| 2000.00 | 0.33 | 6.96 | 1999.99 | 2.45 | 2.15 | 2.45 | 3.26 | 41.21 | 0.15 |
| 2100.00 | 0.46 | 8.38 | 2099.98 | 3.13 | 2.24 | 3.13 | 3.85 | 35.59 | 0.13 |
| 2200.00 | 0.37 | 36.60 | 2199.98 | 3.79 | 2.49 | 3.79 | 4.53 | 33.36 | 0.22 |
| 2300.00 | 0.53 | 26.01 | 2299.98 | 4.46 | 2.89 | 4.46 | 5.31 | 32.92 | 0.18 |
| 2400.00 | 0.88 | 47.01 | 2399.97 | 5.39 | 3.65 | 5.39 | 6.51 | 34.08 | 0.43 |
| 2500.00 | 1.08 | 32.17 | 2499.96 | 6.72 | 4.72 | 6.72 | 8.21 | 35.07 | 0.32 |
| 2600.00 | 1.31 | 39.43 | 2599.93 | 8.40 | 5.94 | 8.40 | 10.29 | 35.28 | 0.27 |
| 2700.00 | 0.78 | 17.48 | 2699.92 | 9.93 | 6.87 | 9.93 | 12.08 | 34.68 | 0.65 |
| 2800.00 | 1.22 | 27.40 | 2799.90 | 11.53 | 7.57 | 11.53 | 13.80 | 33.28 | 0.47 |
| 2900.00 | 2.15 | 36.99 | 2899.86 | 13.98 | 9.19 | 13.98 | 16.73 | 33.32 | 0.96 |
| 3000.00 | 1.55 | 55.28 | 2999.81 | 16.25 | 11.43 | 16.25 | 19.87 | 35.13 | 0.83 |
| 3100.00 | 1.05 | 43.42 | 3099.78 | 17.69 | 13.18 | 17.69 | 22.06 | 36.69 | 0.57 |
| 3200.00 | 0.40 | 347.00 | 3199.77 | 18.70 | 13.73 | 18.70 | 23.20 | 36.29 | 0.90 |
| 3300.00 | 1.37 | 358.83 | 3299.76 | 20.23 | 13.63 | 20.23 | 24.39 | 33.96 | 0.98 |
| 3400.00 | 0.76 | 325.18 | 3399.74 | 21.97 | 13.22 | 21.97 | 25.65 | 31.04 | 0.85 |

| 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 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3500.00 | 0.87 | 329.98 | 3499.73 | 23.18 | 12.46 | 23.18 | 26.32 | 28.27 | 0.13 |
| 3600.00 | 0.90 | 355.51 | 3599.72 | 24.62 | 12.02 | 24.62 | 27.40 | 26.03 | 0.39 |
| 3700.00 | 1.32 | 324.97 | 3699.70 | 26.34 | 11.30 | 26.34 | 28.66 | 23.22 | 0.71 |
| 3800.00 | 1.04 | 356.55 | 3799.68 | 28.18 | 10.59 | 28.18 | 30.11 | 20.59 | 0.69 |
| 3900.00 | 0.90 | 353.32 | 3899.67 | 29.86 | 10.44 | 29.86 | 31.64 | 19.27 | 0.15 |
| 4000.00 | 1.08 | 356.47 | 3999.65 | 31.58 | 10.29 | 31.58 | 33.21 | 18.05 | 0.19 |
| 4100.00 | 0.91 | 359.73 | 4099.64 | 33.31 | 10.23 | 33.31 | 34.85 | 17.07 | 0.17 |
| 4200.00 | 0.82 | 345.94 | 4199.63 | 34.81 | 10.05 | 34.81 | 36.23 | 16.11 | 0.23 |
| 4300.00 | 0.76 | 352.50 | 4299.62 | 36.16 | 9.79 | 36.16 | 37.46 | 15.16 | 0.11 |
| 4400.00 | 0.83 | 344.08 | 4399.61 | 37.51 | 9.51 | 37.51 | 38.70 | 14.22 | 0.14 |
| 4500.00 | 0.91 | 335.77 | 4499.60 | 38.93 | 8.99 | 38.93 | 39.96 | 13.00 | 0.15 |
| 4600.00 | 1.12 | 327.56 | 4599.58 | 40.48 | 8.14 | 40.48 | 41.29 | 11.37 | 0.26 |
| 4700.00 | 1.26 | 312.66 | 4699.56 | 42.05 | 6.80 | 42.05 | 42.60 | 9.19 | 0.34 |
| 4800.00 | 1.36 | 306.71 | 4799.53 | 43.50 | 5.04 | 43.50 | 43.79 | 6.61 | 0.17 |
| 4900.00 | 1.37 | 303.48 | 4899.50 | 44.87 | 3.09 | 44.87 | 44.98 | 3.94 | 0.08 |
| 5000.00 | 1.35 | 302.40 | 4999.48 | 46.17 | 1.10 | 46.17 | 46.18 | 1.36 | 0.03 |
| 5100.00 | 1.56 | 338.04 | 5099.45 | 48.06 | -0.41 | 48.06 | 48.06 | 359.52 | 0.91 |
| 5200.00 | 1.76 | 313.84 | 5199.41 | 50.38 | -2.02 | 50.38 | 50.42 | 357.70 | 0.72 |
| 5300.00 | 1.58 | 302.08 | 5299.36 | 52.18 | -4.30 | 52.18 | 52.35 | 355.29 | 0.39 |
| 5400.00 | 1.33 | 334.25 | 5399.33 | 53.96 | -5.97 | 53.96 | 54.29 | 353.68 | 0.84 |
| 5500.00 | 0.96 | 21.29 | 5499.31 | 55.79 | -6.17 | 55.79 | 56.13 | 353.69 | 0.98 |
| 5600.00 | 1.35 | 28.22 | 5599.29 | 57.61 | -5.31 | 57.61 | 57.85 | 354.73 | 0.41 |
| 5700.00 | 1.59 | 26.83 | 5699.26 | 59.88 | -4.13 | 59.88 | 60.02 | 356.06 | 0.25 |
| 5800.00 | 1.80 | 1.34 | 5799.22 | 62.69 | -3.46 | 62.69 | 62.78 | 356.84 | 0.77 |
| 5900.00 | 1.49 | 7.38 | 5899.18 | 65.54 | -3.26 | 65.54 | 65.62 | 357.15 | 0.35 |
| 6000.00 | 2.08 | 18.34 | 5999.13 | 68.55 | -2.52 | 68.55 | 68.60 | 357.89 | 0.68 |
| 6100.00 | 1.31 | 34.23 | 6099.08 | 71.22 | -1.31 | 71.22 | 71.23 | 358.95 | 0.89 |
| 6200.00 | 0.89 | 64.38 | 6199.07 | 72.50 | 0.04 | 72.50 | 72.50 | 0.03 | 0.70 |
| 6300.00 | 0.50 | 57.70 | 6299.06 | 73.07 | 1.11 | 73.07 | 73.08 | 0.87 | 0.40 |
| 6400.00 | 1.18 | 62.72 | 6399.05 | 73.78 | 2.39 | 73.78 | 73.82 | 1.86 | 0.69 |
| 6500.00 | 1.29 | 62.82 | 6499.02 | 74.76 | 4.31 | 74.76 | 74.89 | 3.30 | 0.10 |
| 6600.00 | 1.46 | 69.26 | 6599.00 | 75.72 | 6.49 | 75.72 | 76.00 | 4.90 | 0.23 |
| 6700.00 | 1.79 | 72.83 | 6698.96 | 76.64 | 9.17 | 76.64 | 77.18 | 6.82 | 0.35 |
| 6800.00 | 2.06 | 76.50 | 6798.90 | 77.52 | 12.41 | 77.52 | 78.50 | 9.10 | 0.30 |
| 6900.00 | 1.33 | 89.28 | 6898.85 | 77.95 | 15.32 | 77.95 | 79.44 | 11.12 | 0.82 |
| 7000.00 | 0.99 | 110.26 | 6998.83 | 77.67 | 17.29 | 77.67 | 79.57 | 12.55 | 0.54 |
| 7100.00 | 0.92 | 127.15 | 7098.82 | 76.88 | 18.74 | 76.88 | 79.13 | 13.70 | 0.29 |
| 7160.00 | 0.62 | 139.99 | 7158.82 | 76.34 | 19.34 | 76.34 | 78.75 | 14.21 | 0.58 |

HORIZONTAL DISPLACEMENT IS
78.75 FEET AT 14.21 DEGREES