

VES

VAUGHN ENERGY SERVICES

Company: Noble Energy
 Lease/Well: Spike State GWS C / 24-6
 Location: S-24 T-4N R-64W
 Rig Name: Production
 State/County: Colorado / Weld County
 Latitude: 40.30, Longitude: -104.50
 GRID North is 0.65 Degrees East of True North
 VS-Azi: 0.00 Degrees

GTI

GYRO TECHNOLOGIES, INC

FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = Ground Level

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: outrun_ed.ut

Minimum Curvature Method

Report Date/Time: 4/20/2011 / 15:25

Vaughn Energy Services

Denver, CO

720-215-1841

Robert Davis

| 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 | 0.18 | 17.87 | 100.00 | 0.15 | 0.05 | 0.15 | 0.16 | 17.87 | 0.18 |
| 200.00 | 0.21 | 29.09 | 200.00 | 0.47 | 0.19 | 0.47 | 0.50 | 21.99 | 0.05 |
| 300.00 | 0.30 | 17.54 | 300.00 | 0.88 | 0.36 | 0.88 | 0.95 | 22.16 | 0.10 |
| 400.00 | 0.17 | 16.00 | 400.00 | 1.26 | 0.48 | 1.26 | 1.35 | 20.60 | 0.13 |
| 500.00 | 0.06 | 318.80 | 500.00 | 1.44 | 0.48 | 1.44 | 1.52 | 18.44 | 0.15 |
| 600.00 | 0.25 | 356.28 | 600.00 | 1.70 | 0.43 | 1.70 | 1.76 | 14.28 | 0.21 |
| 700.00 | 0.27 | 347.87 | 700.00 | 2.15 | 0.37 | 2.15 | 2.19 | 9.73 | 0.04 |
| 800.00 | 0.41 | 351.59 | 799.99 | 2.74 | 0.27 | 2.74 | 2.75 | 5.58 | 0.14 |
| 900.00 | 0.53 | 336.23 | 899.99 | 3.51 | 0.03 | 3.51 | 3.51 | 0.50 | 0.17 |
| 1000.00 | 0.56 | 295.64 | 999.99 | 4.14 | -0.60 | 4.14 | 4.18 | 351.78 | 0.38 |
| 1100.00 | 0.27 | 301.05 | 1099.98 | 4.48 | -1.25 | 4.48 | 4.65 | 344.45 | 0.29 |
| 1200.00 | 0.21 | 309.34 | 1199.98 | 4.72 | -1.59 | 4.72 | 4.98 | 341.33 | 0.07 |
| 1300.00 | 0.48 | 269.65 | 1299.98 | 4.83 | -2.16 | 4.83 | 5.29 | 335.96 | 0.34 |
| 1400.00 | 0.27 | 314.76 | 1399.98 | 5.00 | -2.74 | 5.00 | 5.70 | 331.25 | 0.35 |
| 1500.00 | 0.48 | 289.01 | 1499.98 | 5.30 | -3.30 | 5.30 | 6.24 | 328.07 | 0.26 |
| 1600.00 | 0.44 | 292.11 | 1599.97 | 5.58 | -4.05 | 5.58 | 6.89 | 324.03 | 0.05 |
| 1700.00 | 0.45 | 287.72 | 1699.97 | 5.84 | -4.78 | 5.84 | 7.54 | 320.74 | 0.04 |
| 1800.00 | 0.31 | 292.91 | 1799.97 | 6.07 | -5.39 | 6.07 | 8.12 | 318.35 | 0.14 |
| 1900.00 | 0.73 | 248.67 | 1899.96 | 5.94 | -6.23 | 5.94 | 8.61 | 313.61 | 0.55 |
| 2000.00 | 0.95 | 265.74 | 1999.95 | 5.65 | -7.65 | 5.65 | 9.51 | 306.43 | 0.33 |
| 2100.00 | 1.29 | 267.31 | 2099.93 | 5.53 | -9.59 | 5.53 | 11.08 | 299.97 | 0.34 |
| 2200.00 | 1.60 | 269.58 | 2199.90 | 5.47 | -12.11 | 5.47 | 13.29 | 294.30 | 0.32 |
| 2300.00 | 1.93 | 264.44 | 2299.86 | 5.30 | -15.19 | 5.30 | 16.08 | 289.22 | 0.36 |
| 2400.00 | 2.40 | 266.18 | 2399.78 | 4.99 | -18.95 | 4.99 | 19.59 | 284.76 | 0.48 |
| 2500.00 | 2.70 | 273.67 | 2499.69 | 5.00 | -23.39 | 5.00 | 23.92 | 282.08 | 0.45 |
| 2600.00 | 3.14 | 267.46 | 2599.56 | 5.03 | -28.48 | 5.03 | 28.92 | 280.03 | 0.54 |
| 2700.00 | 3.23 | 273.70 | 2699.40 | 5.10 | -34.03 | 5.10 | 34.41 | 278.52 | 0.36 |
| 2800.00 | 3.38 | 268.14 | 2799.23 | 5.18 | -39.79 | 5.18 | 40.13 | 277.42 | 0.35 |
| 2900.00 | 4.28 | 276.44 | 2899.01 | 5.50 | -46.45 | 5.50 | 46.77 | 276.76 | 1.05 |
| 3000.00 | 3.55 | 283.18 | 2998.78 | 6.63 | -53.17 | 6.63 | 53.58 | 277.11 | 0.86 |
| 3100.00 | 2.70 | 288.31 | 3098.63 | 8.08 | -58.42 | 8.08 | 58.98 | 277.87 | 0.89 |
| 3200.00 | 1.79 | 295.14 | 3198.55 | 9.48 | -62.08 | 9.48 | 62.80 | 278.68 | 0.95 |
| 3300.00 | 0.97 | 312.75 | 3298.52 | 10.72 | -64.11 | 10.72 | 65.00 | 279.49 | 0.92 |
| 3400.00 | 0.01 | 183.62 | 3398.52 | 11.28 | -64.73 | 11.28 | 65.71 | 279.89 | 0.97 |

| 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 | 0.84 | 154.99 | 3498.51 | 10.61 | -64.42 | 10.61 | 65.29 | 279.35 | 0.83 |
| 3600.00 | 1.05 | 162.92 | 3598.50 | 9.07 | -63.84 | 9.07 | 64.48 | 278.08 | 0.24 |
| 3700.00 | 1.04 | 162.47 | 3698.48 | 7.33 | -63.30 | 7.33 | 63.72 | 276.60 | 0.01 |
| 3800.00 | 0.77 | 154.82 | 3798.47 | 5.86 | -62.74 | 5.86 | 63.01 | 275.33 | 0.30 |
| 3900.00 | 0.75 | 112.07 | 3898.46 | 5.00 | -61.85 | 5.00 | 62.05 | 274.63 | 0.55 |
| 4000.00 | 1.14 | 113.67 | 3998.45 | 4.36 | -60.33 | 4.36 | 60.49 | 274.13 | 0.40 |
| 4100.00 | 1.44 | 140.00 | 4098.42 | 3.00 | -58.62 | 3.00 | 58.69 | 272.93 | 0.65 |
| 4200.00 | 1.36 | 161.26 | 4198.39 | 0.92 | -57.43 | 0.92 | 57.44 | 270.91 | 0.52 |
| 4300.00 | 0.88 | 174.33 | 4298.37 | -0.97 | -56.97 | -0.97 | 56.98 | 269.02 | 0.54 |
| 4400.00 | 0.44 | 182.99 | 4398.37 | -2.12 | -56.92 | -2.12 | 56.96 | 267.87 | 0.44 |
| 4500.00 | 0.54 | 327.37 | 4498.37 | -2.11 | -57.19 | -2.11 | 57.23 | 267.89 | 0.93 |
| 4600.00 | 1.43 | 347.91 | 4598.35 | -0.50 | -57.70 | -0.50 | 57.70 | 269.50 | 0.94 |
| 4700.00 | 2.32 | 357.62 | 4698.30 | 2.74 | -58.05 | 2.74 | 58.11 | 272.70 | 0.95 |
| 4800.00 | 3.30 | 0.41 | 4798.18 | 7.64 | -58.11 | 7.64 | 58.61 | 277.49 | 0.98 |
| 4900.00 | 3.02 | 2.17 | 4898.02 | 13.15 | -57.99 | 13.15 | 59.46 | 282.77 | 0.30 |
| 5000.00 | 2.38 | 10.83 | 4997.91 | 17.82 | -57.50 | 17.82 | 60.20 | 287.22 | 0.75 |
| 5100.00 | 2.14 | 15.74 | 5097.83 | 21.65 | -56.60 | 21.65 | 60.60 | 290.94 | 0.31 |
| 5200.00 | 1.86 | 23.76 | 5197.77 | 24.94 | -55.44 | 24.94 | 60.79 | 294.22 | 0.39 |
| 5300.00 | 1.69 | 27.86 | 5297.73 | 27.72 | -54.10 | 27.72 | 60.79 | 297.13 | 0.22 |
| 5400.00 | 1.50 | 44.03 | 5397.69 | 29.97 | -52.50 | 29.97 | 60.45 | 299.71 | 0.49 |
| 5500.00 | 1.66 | 59.34 | 5497.65 | 31.64 | -50.35 | 31.64 | 59.47 | 302.15 | 0.45 |
| 5600.00 | 1.84 | 76.68 | 5597.60 | 32.75 | -47.54 | 32.75 | 57.73 | 304.57 | 0.56 |
| 5700.00 | 2.33 | 92.20 | 5697.54 | 33.05 | -43.94 | 33.05 | 54.98 | 306.95 | 0.74 |
| 5800.00 | 3.19 | 100.36 | 5797.42 | 32.47 | -39.18 | 32.47 | 50.88 | 309.65 | 0.95 |
| 5900.00 | 2.78 | 116.51 | 5897.29 | 30.89 | -34.27 | 30.89 | 46.14 | 312.03 | 0.93 |
| 6000.00 | 2.10 | 125.52 | 5997.20 | 28.74 | -30.61 | 28.74 | 41.99 | 313.19 | 0.78 |
| 6100.00 | 1.55 | 131.34 | 6097.15 | 26.78 | -28.11 | 26.78 | 38.82 | 313.62 | 0.58 |
| 6200.00 | 1.25 | 145.90 | 6197.12 | 24.99 | -26.48 | 24.99 | 36.41 | 313.34 | 0.47 |
| 6300.00 | 0.91 | 157.30 | 6297.10 | 23.36 | -25.57 | 23.36 | 34.63 | 312.42 | 0.40 |
| 6400.00 | 0.79 | 170.00 | 6397.09 | 21.95 | -25.14 | 21.95 | 33.37 | 311.12 | 0.22 |
| 6500.00 | 0.71 | 187.98 | 6497.08 | 20.65 | -25.11 | 20.65 | 32.51 | 309.43 | 0.25 |
| 6600.00 | 0.29 | 193.84 | 6597.08 | 19.78 | -25.25 | 19.78 | 32.08 | 308.07 | 0.42 |
| 6700.00 | 0.27 | 221.41 | 6697.07 | 19.36 | -25.47 | 19.36 | 31.99 | 307.23 | 0.14 |
| 6780.00 | 0.46 | 212.78 | 6777.07 | 18.94 | -25.77 | 18.94 | 31.99 | 306.32 | 0.24 |
| HORIZONTAL DISPLACEMENT IS 31.99 FEET AT 306.32 DEGREES | | | | | | | | | |