



Company: NOBLE ENERGY
 Well: BORN-SITZMAN 01
 Location: NE/NE SEC.27-T4N-R64W
 Rig Name: LIGHTNING WIRE
 State/County: COLORADO/WELD
 Latitude: 40.29
 GRID North is 0.63 Degrees East of True North
 VS-Azi: 0.00 Degrees



FIELD COPY ONLY (NOT DEFINITIVE)

Service Company : VAUGHN ENERGY SERVICES

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: born-01-01.ut
 Minimum Curvature Method
 Report Date/Time: 2/24/2011 / 20:03

VAUGHN ENERGY SERVICES
 CORPUS CHRISTI, TX
 800-606-4976
 SURVEYOR: CORY ALBERT

| 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 | 0.22 | 301.13 | 100.00 | 0.10 | -0.17 | 0.10 | 0.19 | 301.13 | 0.22 |
| 200.00 | 0.29 | 308.20 | 200.00 | 0.36 | -0.53 | 0.36 | 0.64 | 303.95 | 0.08 |
| 300.00 | 0.29 | 304.39 | 300.00 | 0.66 | -0.95 | 0.66 | 1.15 | 304.99 | 0.02 |
| 400.00 | 0.31 | 307.79 | 400.00 | 0.97 | -1.37 | 0.97 | 1.68 | 305.35 | 0.02 |
| 500.00 | 0.69 | 326.20 | 499.99 | 1.64 | -1.92 | 1.64 | 2.52 | 310.51 | 0.42 |
| 600.00 | 0.69 | 326.33 | 599.98 | 2.64 | -2.59 | 2.64 | 3.70 | 315.61 | 0.00 |
| 700.00 | 0.74 | 332.67 | 699.98 | 3.72 | -3.22 | 3.72 | 4.92 | 319.12 | 0.09 |
| 800.00 | 0.69 | 327.39 | 799.97 | 4.80 | -3.84 | 4.80 | 6.15 | 321.34 | 0.08 |
| 900.00 | 0.63 | 321.57 | 899.96 | 5.74 | -4.51 | 5.74 | 7.30 | 321.85 | 0.09 |
| 1000.00 | 0.56 | 312.26 | 999.96 | 6.50 | -5.21 | 6.50 | 8.33 | 321.27 | 0.12 |
| 1100.00 | 0.56 | 304.65 | 1099.95 | 7.11 | -5.98 | 7.11 | 9.29 | 319.93 | 0.07 |
| 1200.00 | 0.55 | 302.98 | 1199.95 | 7.65 | -6.79 | 7.65 | 10.23 | 318.42 | 0.02 |
| 1300.00 | 0.51 | 321.37 | 1299.94 | 8.26 | -7.47 | 8.26 | 11.13 | 317.88 | 0.17 |
| 1400.00 | 0.28 | 325.98 | 1399.94 | 8.81 | -7.88 | 8.81 | 11.82 | 318.17 | 0.23 |
| 1500.00 | 0.32 | 354.00 | 1499.94 | 9.28 | -8.05 | 9.28 | 12.28 | 319.08 | 0.15 |
| 1600.00 | 0.08 | 244.75 | 1599.94 | 9.53 | -8.14 | 9.53 | 12.53 | 319.51 | 0.35 |
| 1700.00 | 0.15 | 127.92 | 1699.94 | 9.42 | -8.10 | 9.42 | 12.42 | 319.32 | 0.20 |
| 1800.00 | 0.22 | 150.96 | 1799.94 | 9.17 | -7.90 | 9.17 | 12.10 | 319.26 | 0.10 |
| 1900.00 | 0.27 | 149.69 | 1899.94 | 8.80 | -7.69 | 8.80 | 11.68 | 318.86 | 0.04 |
| 2000.00 | 0.24 | 91.18 | 1999.94 | 8.59 | -7.36 | 8.59 | 11.31 | 319.43 | 0.25 |
| 2100.00 | 0.36 | 64.62 | 2099.94 | 8.72 | -6.86 | 8.72 | 11.10 | 321.83 | 0.18 |
| 2200.00 | 0.40 | 53.20 | 2199.93 | 9.06 | -6.30 | 9.06 | 11.04 | 325.22 | 0.08 |
| 2300.00 | 0.46 | 27.79 | 2299.93 | 9.63 | -5.83 | 9.63 | 11.26 | 328.79 | 0.20 |
| 2400.00 | 0.54 | 355.52 | 2399.93 | 10.45 | -5.68 | 10.45 | 11.90 | 331.47 | 0.29 |
| 2500.00 | 0.58 | 346.14 | 2499.92 | 11.41 | -5.84 | 11.41 | 12.82 | 332.90 | 0.10 |
| 2600.00 | 0.57 | 341.19 | 2599.92 | 12.38 | -6.12 | 12.38 | 13.81 | 333.68 | 0.05 |
| 2700.00 | 0.46 | 324.35 | 2699.91 | 13.17 | -6.52 | 13.17 | 14.70 | 333.68 | 0.19 |
| 2800.00 | 0.51 | 304.30 | 2799.91 | 13.75 | -7.12 | 13.75 | 15.49 | 332.63 | 0.18 |
| 2900.00 | 0.47 | 259.35 | 2899.91 | 13.93 | -7.89 | 13.93 | 16.01 | 330.48 | 0.38 |
| 3000.00 | 0.67 | 253.90 | 2999.90 | 13.69 | -8.85 | 13.69 | 16.30 | 327.13 | 0.21 |
| 3100.00 | 0.75 | 246.71 | 3099.89 | 13.27 | -10.01 | 13.27 | 16.62 | 322.98 | 0.12 |
| 3200.00 | 0.90 | 247.54 | 3199.88 | 12.71 | -11.34 | 12.71 | 17.03 | 318.27 | 0.15 |
| 3300.00 | 0.93 | 244.29 | 3299.87 | 12.06 | -12.80 | 12.06 | 17.58 | 313.29 | 0.06 |
| 3400.00 | 0.99 | 259.29 | 3399.86 | 11.54 | -14.39 | 11.54 | 18.44 | 308.74 | 0.26 |
| 3500.00 | 1.07 | 260.18 | 3499.84 | 11.22 | -16.16 | 11.22 | 19.68 | 304.77 | 0.08 |
| 3600.00 | 1.09 | 255.95 | 3599.82 | 10.83 | -18.01 | 10.83 | 21.02 | 301.02 | 0.08 |

| 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 |
|--|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 3700.00 | 1.22 | 252.41 | 3699.80 | 10.28 | -19.95 | 10.28 | 22.44 | 297.25 | 0.15 |
| 3800.00 | 1.05 | 248.17 | 3799.78 | 9.61 | -21.82 | 9.61 | 23.84 | 293.78 | 0.19 |
| 3900.00 | 1.01 | 239.38 | 3899.77 | 8.82 | -23.43 | 8.82 | 25.03 | 290.64 | 0.16 |
| 4000.00 | 1.04 | 241.20 | 3999.75 | 7.94 | -24.98 | 7.94 | 26.21 | 287.62 | 0.04 |
| 4100.00 | 0.83 | 232.04 | 4099.74 | 7.05 | -26.35 | 7.05 | 27.28 | 284.98 | 0.26 |
| 4200.00 | 0.84 | 236.21 | 4199.73 | 6.20 | -27.53 | 6.20 | 28.22 | 282.69 | 0.06 |
| 4300.00 | 0.99 | 234.46 | 4299.71 | 5.29 | -28.84 | 5.29 | 29.32 | 280.40 | 0.15 |
| 4400.00 | 0.62 | 238.57 | 4399.70 | 4.51 | -30.00 | 4.51 | 30.34 | 278.55 | 0.37 |
| 4500.00 | 0.71 | 236.44 | 4499.70 | 3.88 | -30.98 | 3.88 | 31.23 | 277.14 | 0.09 |
| 4600.00 | 0.82 | 245.70 | 4599.69 | 3.25 | -32.15 | 3.25 | 32.32 | 275.76 | 0.16 |
| 4700.00 | 0.81 | 246.91 | 4699.68 | 2.68 | -33.45 | 2.68 | 33.56 | 274.57 | 0.02 |
| 4800.00 | 0.82 | 242.11 | 4799.67 | 2.07 | -34.73 | 2.07 | 34.79 | 273.40 | 0.07 |
| 4900.00 | 0.79 | 254.80 | 4899.66 | 1.55 | -36.03 | 1.55 | 36.06 | 272.47 | 0.18 |
| 5000.00 | 0.77 | 259.98 | 4999.65 | 1.25 | -37.35 | 1.25 | 37.37 | 271.92 | 0.07 |
| 5100.00 | 0.68 | 258.81 | 5099.64 | 1.02 | -38.59 | 1.02 | 38.60 | 271.52 | 0.09 |
| 5200.00 | 0.73 | 243.61 | 5199.63 | 0.63 | -39.74 | 0.63 | 39.75 | 270.90 | 0.19 |
| 5300.00 | 0.74 | 235.82 | 5299.63 | -0.02 | -40.84 | -0.02 | 40.84 | 269.98 | 0.10 |
| 5400.00 | 0.55 | 216.45 | 5399.62 | -0.76 | -41.65 | -0.76 | 41.66 | 268.95 | 0.29 |
| 5500.00 | 0.41 | 210.10 | 5499.62 | -1.46 | -42.12 | -1.46 | 42.14 | 268.02 | 0.14 |
| 5600.00 | 0.70 | 213.83 | 5599.61 | -2.28 | -42.64 | -2.28 | 42.70 | 266.94 | 0.29 |
| 5700.00 | 0.79 | 213.80 | 5699.60 | -3.36 | -43.36 | -3.36 | 43.49 | 265.57 | 0.09 |
| 5800.00 | 0.71 | 211.37 | 5799.59 | -4.46 | -44.07 | -4.46 | 44.30 | 264.22 | 0.09 |
| 5900.00 | 0.92 | 222.02 | 5899.58 | -5.58 | -44.93 | -5.58 | 45.27 | 262.92 | 0.26 |
| 6000.00 | 0.97 | 238.74 | 5999.57 | -6.62 | -46.19 | -6.62 | 46.66 | 261.84 | 0.28 |
| 6100.00 | 0.85 | 243.44 | 6099.56 | -7.39 | -47.58 | -7.39 | 48.15 | 261.17 | 0.14 |
| 6200.00 | 1.10 | 256.27 | 6199.54 | -7.95 | -49.17 | -7.95 | 49.81 | 260.81 | 0.33 |
| 6300.00 | 0.73 | 243.71 | 6299.53 | -8.46 | -50.67 | -8.46 | 51.38 | 260.52 | 0.42 |
| 6400.00 | 0.25 | 137.29 | 6399.53 | -8.90 | -51.10 | -8.90 | 51.87 | 260.12 | 0.84 |
| 6500.00 | 0.79 | 116.41 | 6499.52 | -9.37 | -50.33 | -9.37 | 51.19 | 259.45 | 0.57 |
| 6600.00 | 1.42 | 145.39 | 6599.50 | -10.70 | -49.00 | -10.70 | 50.16 | 257.68 | 0.82 |
| 6700.00 | 2.16 | 174.07 | 6699.46 | -13.59 | -48.10 | -13.59 | 49.99 | 254.22 | 1.14 |
| 6784.00 | 2.15 | 174.32 | 6783.40 | -16.73 | -47.78 | -16.73 | 50.63 | 250.70 | 0.01 |
| HORIZONTAL DISPLACEMENT IS 50.63 FEET AT 250.70 DEGREES | | | | | | | | | |