# Noble Energy

**Weld County, CO (NAD 83)**
**Sec. 18-T6N-R64W**
**Foose PC A18-65HN**

**Design: Vaughn ESS & Sperry MWD Survey**

# Sperry Drilling Services

# Final Survey Report

**13 April, 2013**

Well Coordinates: 1,420,992.52 N, 3,252,430.61 E (40°29' 07.73" N, 104°35' 32.93" W)
Ground Level: 4,687.00 ft

| | |
|---|---|
| Local Coordinate Origin: | Centered on Well Foose PC A18-65HN |
| Viewing Datum: | KB=30' @ 4717.00ft (H&P 321) |
| TVDs to System: | N |
| North Reference: | Grid |
| Unit System: | API - US Survey Feet - Custom |

Geodetic Scale Factor Applied
Version: 2003.16 Build: 43I

HALLIBURTON

## Design Report for Foose PC A18-65HN - Vaughn ESS & Sperry MWD Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 403.00 | 1.20 | 322.80 | 402.97 | 3.36 | -2.55 | -2.45 | 0.30 |
| Surveys at 403' & 772' (Vaughn ESS Surveys) | | | | | | | |
| 772.00 | 0.20 | 320.00 | 771.94 | 6.93 | -5.30 | -5.10 | 0.27 |
| Tie On To Vaughn ESS Surveys | | | | | | | |
| 810.00 | 1.02 | 349.88 | 809.94 | 7.32 | -5.40 | -5.19 | 2.24 |
| First MWD Survey | | | | | | | |
| 903.00 | 0.97 | 1.08 | 902.92 | 8.92 | -5.53 | -5.27 | 0.22 |
| 1,182.00 | 1.08 | 13.97 | 1,181.88 | 13.83 | -4.85 | -4.45 | 0.09 |
| 1,274.00 | 1.55 | 13.52 | 1,273.85 | 15.88 | -4.35 | -3.89 | 0.51 |
| 1,366.00 | 1.81 | 4.23 | 1,365.81 | 18.54 | -3.96 | -3.42 | 0.41 |
| 1,458.00 | 2.04 | 352.48 | 1,457.76 | 21.61 | -4.06 | -3.44 | 0.50 |
| 1,553.00 | 1.05 | 250.85 | 1,552.74 | 23.00 | -5.11 | -4.44 | 2.61 |
| 1,648.00 | 0.64 | 232.00 | 1,647.73 | 22.39 | -6.35 | -5.70 | 0.52 |
| 1,838.00 | 0.89 | 263.76 | 1,837.71 | 21.58 | -8.65 | -8.02 | 0.25 |
| 1,932.00 | 0.99 | 221.82 | 1,931.70 | 20.89 | -9.92 | -9.31 | 0.72 |
| 2,217.00 | 0.38 | 293.90 | 2,216.68 | 19.44 | -12.42 | -11.86 | 0.33 |
| 2,312.00 | 0.46 | 319.30 | 2,311.68 | 19.86 | -12.96 | -12.38 | 0.21 |
| 2,406.00 | 1.05 | 293.48 | 2,405.67 | 20.49 | -14.00 | -13.40 | 0.71 |
| 2,501.00 | 1.69 | 177.69 | 2,500.66 | 19.43 | -14.74 | -14.17 | 2.47 |
| 2,691.00 | 1.63 | 205.47 | 2,690.58 | 14.20 | -15.79 | -15.37 | 0.42 |
| 2,786.00 | 2.08 | 206.10 | 2,785.53 | 11.43 | -17.13 | -16.79 | 0.47 |
| 2,881.00 | 2.14 | 200.39 | 2,880.47 | 8.22 | -18.50 | -18.26 | 0.23 |
| 2,976.00 | 2.46 | 193.16 | 2,975.39 | 4.57 | -19.59 | -19.45 | 0.45 |
| 3,071.00 | 1.16 | 94.53 | 3,070.36 | 2.51 | -19.09 | -19.01 | 3.02 |
| 3,261.00 | 0.40 | 84.41 | 3,260.34 | 2.42 | -16.51 | -16.44 | 0.40 |
| 3,356.00 | 0.83 | 38.93 | 3,355.33 | 2.99 | -15.75 | -15.66 | 0.65 |
| 3,545.00 | 1.76 | 24.40 | 3,544.28 | 6.70 | -13.69 | -13.49 | 0.52 |
| 3,640.00 | 2.20 | 45.24 | 3,639.23 | 9.31 | -11.80 | -11.52 | 0.88 |
| 3,735.00 | 0.90 | 305.21 | 3,734.20 | 11.02 | -11.11 | -10.79 | 2.65 |
| 4,020.00 | 1.69 | 298.81 | 4,019.13 | 14.34 | -16.62 | -16.20 | 0.28 |
| 4,115.00 | 1.02 | 269.41 | 4,114.10 | 15.00 | -18.69 | -18.25 | 0.99 |
| 4,209.00 | 1.53 | 228.96 | 4,208.08 | 14.17 | -20.48 | -20.06 | 1.07 |
| 4,304.00 | 1.13 | 210.01 | 4,303.05 | 12.53 | -21.90 | -21.53 | 0.62 |
| 4,399.00 | 1.68 | 253.55 | 4,398.03 | 11.32 | -23.71 | -23.37 | 1.22 |
| 4,494.00 | 0.96 | 238.09 | 4,493.00 | 10.51 | -25.72 | -25.40 | 0.84 |
| 4,589.00 | 0.34 | 113.95 | 4,588.00 | 9.97 | -26.14 | -25.84 | 1.25 |
| 4,684.00 | 0.22 | 107.79 | 4,682.99 | 9.80 | -25.70 | -25.41 | 0.13 |
| 4,874.00 | 2.01 | 231.70 | 4,872.96 | 7.63 | -27.97 | -27.74 | 1.13 |
| 4,968.00 | 1.07 | 198.92 | 4,966.92 | 5.77 | -29.55 | -29.37 | 1.33 |
| 5,063.00 | 0.56 | 13.41 | 5,061.92 | 5.39 | -29.73 | -29.56 | 1.71 |
| 5,158.00 | 0.13 | 200.87 | 5,156.92 | 5.74 | -29.66 | -29.48 | 0.73 |
| 5,253.00 | 0.74 | 294.20 | 5,251.92 | 5.89 | -30.26 | -30.08 | 0.80 |
| 5,348.00 | 0.69 | 297.08 | 5,346.91 | 6.40 | -31.33 | -31.13 | 0.06 |
| 5,632.00 | 0.98 | 228.42 | 5,630.88 | 5.57 | -34.67 | -34.49 | 0.34 |
| 5,727.00 | 1.39 | 196.73 | 5,725.86 | 3.92 | -35.61 | -35.48 | 0.80 |
| 5,822.00 | 1.03 | 199.29 | 5,820.84 | 2.01 | -36.22 | -36.15 | 0.38 |
| 6,063.00 | 0.15 | 214.58 | 6,061.83 | -0.29 | -37.12 | -37.11 | 0.37 |
| 6,126.00 | 0.21 | 155.92 | 6,124.83 | -0.46 | -37.12 | -37.11 | 0.29 |
| 6,202.00 | 2.88 | 98.60 | 6,200.79 | -0.88 | -35.17 | -35.18 | 3.65 |

## Design Report for Foose PC A18-65HN - Vaughn ESS & Sperry MWD Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) |
|---|---|---|---|---|---|---|---|
| 6,250.00 | 8.99 | 95.05 | 6,248.52 | -1.39 | -30.24 | -30.26 | 12.75 |
| 6,297.00 | 11.43 | 92.47 | 6,294.77 | -1.91 | -21.93 | -21.97 | 5.28 |
| 6,345.00 | 13.36 | 89.37 | 6,341.65 | -2.05 | -11.63 | -11.68 | 4.25 |
| 6,391.00 | 16.94 | 91.04 | 6,386.04 | -2.12 | 0.39 | 0.33 | 7.84 |
| 6,439.00 | 20.74 | 92.91 | 6,431.46 | -2.68 | 15.88 | 15.79 | 8.02 |
| 6,486.00 | 24.87 | 89.14 | 6,474.78 | -2.95 | 34.08 | 33.98 | 9.32 |
| 6,534.00 | 28.89 | 85.16 | 6,517.59 | -1.82 | 55.74 | 55.66 | 9.17 |
| 6,581.00 | 34.00 | 86.60 | 6,557.67 | -0.08 | 80.18 | 80.15 | 10.99 |
| 6,629.00 | 38.09 | 88.62 | 6,596.48 | 1.07 | 108.39 | 108.38 | 8.87 |
| 6,676.00 | 40.81 | 87.80 | 6,632.77 | 2.01 | 138.24 | 138.24 | 5.89 |
| 6,724.00 | 44.53 | 87.24 | 6,668.05 | 3.42 | 170.74 | 170.76 | 7.79 |
| 6,771.00 | 47.39 | 86.68 | 6,700.72 | 5.22 | 204.47 | 204.54 | 6.15 |
| 6,819.00 | 50.47 | 87.59 | 6,732.25 | 7.02 | 240.61 | 240.71 | 6.57 |
| 6,866.00 | 54.52 | 87.65 | 6,760.86 | 8.57 | 277.85 | 277.99 | 8.62 |
| 6,914.00 | 58.40 | 88.37 | 6,787.38 | 9.95 | 317.83 | 317.99 | 8.18 |
| 6,961.00 | 61.27 | 89.31 | 6,811.00 | 10.77 | 358.45 | 358.61 | 6.35 |
| 7,009.00 | 65.90 | 89.02 | 6,832.34 | 11.40 | 401.42 | 401.59 | 9.66 |
| 7,055.00 | 70.16 | 89.52 | 6,849.55 | 11.94 | 444.07 | 444.23 | 9.32 |
| 7,103.00 | 74.47 | 89.27 | 6,864.13 | 12.42 | 489.79 | 489.94 | 8.99 |
| 7,150.00 | 78.75 | 87.92 | 6,875.01 | 13.55 | 535.49 | 535.65 | 9.53 |
| 7,189.00 | 81.44 | 86.97 | 6,881.72 | 15.26 | 573.86 | 574.06 | 7.30 |
| 7,243.00 | 84.17 | 87.53 | 6,888.48 | 17.83 | 627.37 | 627.62 | 5.17 |
| 7" Casing Estimated 2501' FSL 2067 'FEL (Not a survey point) | | | | | | | |
| 7,266.00 | 85.34 | 87.76 | 6,890.58 | 18.77 | 650.25 | 650.53 | 5.17 |
| 7,313.00 | 85.43 | 88.04 | 6,894.36 | 20.49 | 697.07 | 697.37 | 0.62 |
| 7,408.00 | 87.69 | 90.22 | 6,900.06 | 21.93 | 791.88 | 792.18 | 3.30 |
| 7,503.00 | 89.41 | 90.70 | 6,902.47 | 21.17 | 886.84 | 887.08 | 1.88 |
| 7,598.00 | 91.45 | 89.51 | 6,901.75 | 20.99 | 981.83 | 982.03 | 2.49 |
| 7,689.00 | 89.57 | 89.63 | 6,900.94 | 21.67 | 1,072.82 | 1,073.00 | 2.07 |
| 7,782.00 | 90.34 | 88.25 | 6,901.02 | 23.40 | 1,165.80 | 1,165.99 | 1.70 |
| 7,873.00 | 89.57 | 90.27 | 6,901.09 | 24.57 | 1,256.79 | 1,256.97 | 2.38 |
| 7,965.00 | 90.25 | 91.05 | 6,901.23 | 23.51 | 1,348.78 | 1,348.90 | 1.12 |
| 8,056.00 | 90.65 | 90.36 | 6,900.52 | 22.39 | 1,439.77 | 1,439.82 | 0.88 |
| 8,150.00 | 91.57 | 90.66 | 6,898.70 | 21.55 | 1,533.75 | 1,533.73 | 1.03 |
| 8,242.00 | 91.02 | 88.46 | 6,896.62 | 22.26 | 1,625.71 | 1,625.68 | 2.46 |
| 8,333.00 | 92.31 | 88.48 | 6,893.97 | 24.69 | 1,716.64 | 1,716.64 | 1.42 |
| 8,426.00 | 91.66 | 87.70 | 6,890.75 | 27.79 | 1,809.53 | 1,809.58 | 1.09 |
| 8,520.00 | 91.17 | 86.74 | 6,888.43 | 32.35 | 1,903.39 | 1,903.53 | 1.15 |
| 8,612.00 | 90.68 | 86.74 | 6,886.94 | 37.58 | 1,995.23 | 1,995.48 | 0.53 |
| 8,705.00 | 88.68 | 90.04 | 6,887.46 | 40.19 | 2,088.18 | 2,088.47 | 4.15 |
| 8,798.00 | 89.29 | 89.40 | 6,889.11 | 40.64 | 2,181.16 | 2,181.42 | 0.95 |
| 8,890.00 | 89.91 | 90.26 | 6,889.75 | 40.92 | 2,273.16 | 2,273.39 | 1.15 |
| 8,982.00 | 90.93 | 89.00 | 6,889.08 | 41.51 | 2,365.15 | 2,365.36 | 1.76 |
| 9,074.00 | 89.94 | 90.07 | 6,888.38 | 42.26 | 2,457.14 | 2,457.34 | 1.58 |
| 9,165.00 | 89.75 | 89.35 | 6,888.63 | 42.72 | 2,548.14 | 2,548.31 | 0.82 |
| 9,260.00 | 89.54 | 88.63 | 6,889.22 | 44.39 | 2,643.12 | 2,643.30 | 0.79 |
| 9,355.00 | 90.03 | 88.92 | 6,889.57 | 46.42 | 2,738.10 | 2,738.30 | 0.60 |
| 9,450.00 | 91.63 | 89.14 | 6,888.20 | 48.03 | 2,833.07 | 2,833.28 | 1.70 |
| 9,545.00 | 91.17 | 89.28 | 6,885.88 | 49.34 | 2,928.03 | 2,928.24 | 0.51 |
| 9,639.00 | 89.04 | 87.46 | 6,885.70 | 52.01 | 3,021.99 | 3,022.23 | 2.98 |
| 9,734.00 | 88.06 | 87.00 | 6,888.11 | 56.60 | 3,116.84 | 3,117.18 | 1.14 |

## Design Report for Foose PC A18-65HN - Vaughn ESS & Sperry MWD Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) |
|---|---|---|---|---|---|---|---|
| 9,829.00 | 89.75 | 87.81 | 6,889.92 | 60.90 | 3,211.72 | 3,212.14 | 1.97 |
| 9,924.00 | 91.17 | 88.98 | 6,889.16 | 63.56 | 3,306.68 | 3,307.14 | 1.94 |
| 10,018.00 | 90.37 | 88.52 | 6,887.90 | 65.61 | 3,400.65 | 3,401.12 | 0.98 |
| 10,113.00 | 91.02 | 88.14 | 6,886.74 | 68.38 | 3,495.60 | 3,496.12 | 0.79 |
| 10,208.00 | 89.01 | 87.78 | 6,886.72 | 71.76 | 3,590.53 | 3,591.11 | 2.15 |
| 10,303.00 | 89.14 | 88.93 | 6,888.25 | 74.49 | 3,685.48 | 3,686.10 | 1.22 |
| 10,398.00 | 90.96 | 89.24 | 6,888.17 | 76.01 | 3,780.46 | 3,781.08 | 1.94 |
| 10,493.00 | 89.82 | 89.19 | 6,887.52 | 77.31 | 3,875.45 | 3,876.07 | 1.20 |
| 10,587.00 | 89.78 | 89.98 | 6,887.85 | 77.99 | 3,969.45 | 3,970.04 | 0.84 |
| 10,682.00 | 90.25 | 89.70 | 6,887.83 | 78.26 | 4,064.45 | 4,065.01 | 0.58 |
| 10,777.00 | 93.15 | 88.78 | 6,885.01 | 79.51 | 4,159.39 | 4,159.95 | 3.20 |
| 10,872.00 | 93.24 | 89.15 | 6,879.71 | 81.23 | 4,254.22 | 4,254.79 | 0.40 |
| 10,967.00 | 92.50 | 89.47 | 6,874.96 | 82.37 | 4,349.10 | 4,349.66 | 0.85 |
| 11,062.00 | 91.63 | 88.87 | 6,871.53 | 83.75 | 4,444.02 | 4,444.59 | 1.11 |
| 11,156.00 | 90.09 | 88.62 | 6,870.12 | 85.80 | 4,537.99 | 4,538.57 | 1.66 |
| 11,251.00 | 89.26 | 87.21 | 6,870.66 | 89.26 | 4,632.92 | 4,633.56 | 1.72 |
| 11,346.00 | 89.04 | 87.41 | 6,872.07 | 93.72 | 4,727.80 | 4,728.54 | 0.31 |
| 11,441.00 | 89.11 | 88.25 | 6,873.60 | 97.32 | 4,822.72 | 4,823.52 | 0.89 |
| 11,536.00 | 90.40 | 89.63 | 6,874.01 | 99.07 | 4,917.70 | 4,918.51 | 1.99 |
| 11,631.00 | 90.19 | 89.81 | 6,873.52 | 99.54 | 5,012.70 | 5,013.48 | 0.29 |
| 11,725.00 | 90.71 | 89.36 | 6,872.78 | 100.22 | 5,106.69 | 5,107.46 | 0.73 |
| 11,820.00 | 91.48 | 88.57 | 6,870.97 | 101.93 | 5,201.66 | 5,202.43 | 1.16 |
| 11,915.00 | 92.71 | 87.20 | 6,867.50 | 105.44 | 5,296.53 | 5,297.36 | 1.94 |
| 12,010.00 | 89.88 | 83.35 | 6,865.35 | 113.26 | 5,391.15 | 5,392.17 | 5.03 |
| 12,105.00 | 90.68 | 86.84 | 6,864.88 | 121.38 | 5,485.79 | 5,487.00 | 3.77 |
| 12,200.00 | 91.42 | 88.49 | 6,863.14 | 125.25 | 5,580.69 | 5,581.98 | 1.90 |
| 12,295.00 | 90.89 | 89.23 | 6,861.23 | 127.14 | 5,675.65 | 5,676.95 | 0.96 |
| 12,390.00 | 91.32 | 89.69 | 6,859.40 | 128.04 | 5,770.63 | 5,771.92 | 0.66 |
| 12,485.00 | 90.28 | 91.18 | 6,858.07 | 127.31 | 5,865.61 | 5,866.84 | 1.91 |
| 12,580.00 | 90.80 | 91.31 | 6,857.17 | 125.25 | 5,960.58 | 5,961.72 | 0.56 |
| 12,674.00 | 90.37 | 90.76 | 6,856.21 | 123.55 | 6,054.56 | 6,055.61 | 0.74 |
| 12,769.00 | 91.48 | 91.64 | 6,854.68 | 121.56 | 6,149.53 | 6,150.47 | 1.49 |
| 12,864.00 | 91.39 | 91.61 | 6,852.30 | 118.87 | 6,244.46 | 6,245.29 | 0.10 |
| 12,959.00 | 93.30 | 92.48 | 6,848.41 | 115.48 | 6,339.31 | 6,340.01 | 2.21 |
| 13,054.00 | 90.56 | 94.48 | 6,845.21 | 109.72 | 6,434.07 | 6,434.56 | 3.57 |
| 13,149.00 | 90.62 | 90.14 | 6,844.24 | 105.89 | 6,528.97 | 6,529.30 | 4.57 |
| 13,244.00 | 90.83 | 88.31 | 6,843.03 | 107.18 | 6,623.95 | 6,624.28 | 1.94 |
| 13,339.00 | 90.18 | 86.93 | 6,842.20 | 111.12 | 6,718.86 | 6,719.26 | 1.61 |
| 13,433.00 | 89.97 | 85.95 | 6,842.07 | 116.96 | 6,812.68 | 6,813.21 | 1.07 |
| 13,528.00 | 89.11 | 86.61 | 6,842.84 | 123.12 | 6,907.47 | 6,908.14 | 1.14 |
| 13,623.00 | 89.72 | 87.04 | 6,843.81 | 128.38 | 7,002.32 | 7,003.11 | 0.79 |
| 13,718.00 | 88.40 | 87.45 | 6,845.36 | 132.95 | 7,097.19 | 7,098.07 | 1.45 |
| 13,794.00 | 89.91 | 87.61 | 6,846.49 | 136.22 | 7,173.11 | 7,174.05 | 2.00 |
| Final MWD Survey | | | | | | | |
| 13,857.00 | 89.91 | 87.61 | 6,846.58 | 138.85 | 7,236.06 | 7,237.05 | 0.00 |
| Estimated BHL 2525 'FSL 792 'FEL - Survey Projection To TD | | | | | | | |

# Design Report for Foose PC A18-65HN - Vaughn ESS & Sperry MWD Survey

## Design Annotations

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates +N/-S (ft) | Local Coordinates +E/-W (ft) | Comment |
|---|---|---|---|---|
| 403.00 | 402.97 | 3.36 | -2.55 | Surveys at 403' & 772' (Vaughn ESS Surveys) |
| 772.00 | 771.94 | 6.93 | -5.30 | Tie On To Vaughn ESS Surveys |
| 810.00 | 809.94 | 7.32 | -5.40 | First MWD Survey |
| 7,243.00 | 6,888.48 | 17.83 | 627.37 | 7" Casing Estimated 2501' FSL 2067 'FEL (Not a survey point) |
| 13,794.00 | 6,846.49 | 136.22 | 7,173.11 | Final MWD Survey |
| 13,857.00 | 6,846.58 | 138.85 | 7,236.06 | Estimated BHL 2525 'FSL 792 'FEL |
| 13,857.00 | 6,846.58 | 138.85 | 7,236.06 | Survey Projection To TD |

## Vertical Section Information

| Angle Type | Target | Azimuth (°) | Origin Type | Origin +N/_S (ft) | Origin +E/-W (ft) | Start TVD (ft) |
|---|---|---|---|---|---|---|
| User | Foose PC A18-65HN_PlanC - Rev0_Drill | 88.34 | Slot | 0.00 | 0.00 | 0.00 |

## Survey tool program

| From (ft) | To (ft) | Survey/Plan | Survey Tool |
|---|---|---|---|
| 403.00 | 772.00 | Vaughn ESS Surveys | EMS |
| 810.00 | 13,857.00 | MWD Surveys | MWD |
| 7,243.00 | 13,857.00 | MWD Surveys | MWD |

## Casing Details

| Measured Depth (ft) | Vertical Depth (ft) | Name | Casing Diameter (") | Hole Diameter (") |
|---|---|---|---|---|
| 7,243.00 | 6,888.48 | 7" | 7 | 7-1/2 |

## Design Report for Foose PC A18-65HN - Vaughn ESS & Sperry MWD Survey

### *Targets*

| Target Name - hit/miss target - Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| Foose PC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,420,992.52 | 3,252,430.61 | 40.48548 | -104.59248 |
| - actual wellpath hits target center | | | | | | | | | |
| - Polygon | | | | | | | | | |
| Point 1 | | | | 2,435.00 | 214.00 | 1,421,206.51 | 3,254,865.53 | | |
| Point 2 | | | | 2,413.00 | 2,870.00 | 1,423,862.42 | 3,254,843.53 | | |
| Point 3 | | | | 5,080.00 | 2,898.00 | 1,423,890.42 | 3,257,510.44 | | |
| Point 4 | | | | 7,758.00 | 2,915.00 | 1,423,907.42 | 3,260,188.34 | | |
| Point 5 | | | | 7,770.00 | 270.00 | 1,421,262.51 | 3,260,200.34 | | |
| Point 6 | | | | 7,784.00 | -2,375.00 | 1,418,617.60 | 3,260,214.34 | | |
| Point 7 | | | | 5,108.00 | -2,403.00 | 1,418,589.61 | 3,257,538.44 | | |
| Point 8 | | | | 2,456.00 | -2,434.00 | 1,418,558.61 | 3,254,886.53 | | |
| Point 9 | | | | 2,435.00 | 214.00 | 1,421,206.51 | 3,254,865.53 | | |
| Foose PC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,420,992.52 | 3,252,430.61 | 40.48548 | -104.59248 |
| - actual wellpath hits target center | | | | | | | | | |
| - Polygon | | | | | | | | | |
| Point 1 | | | | -194.00 | 169.00 | 1,421,161.52 | 3,252,236.62 | | |
| Point 2 | | | | -112.00 | 2,362.00 | 1,423,354.44 | 3,252,318.62 | | |
| Point 3 | | | | 1,953.00 | 2,410.00 | 1,423,402.44 | 3,254,383.55 | | |
| Point 4 | | | | 1,975.00 | 214.00 | 1,421,206.51 | 3,254,405.54 | | |
| Point 5 | | | | 1,996.00 | -1,974.00 | 1,419,018.59 | 3,254,426.54 | | |
| Point 6 | | | | -178.00 | -2,027.00 | 1,418,965.59 | 3,252,252.62 | | |
| Point 7 | | | | -194.00 | 169.00 | 1,421,161.52 | 3,252,236.62 | | |
| Foose PC | 0.00 | 0.00 | 6,846.82 | 220.85 | 7,236.03 | 1,421,213.37 | 3,259,666.39 | 40.48588 | -104.56646 |
| - actual wellpath misses target center by 82.00ft at 13857.00ft MD (6846.58 TVD, 138.85 N, 7236.06 E) | | | | | | | | | |
| - Point | | | | | | | | | |
| Foose PC | 0.00 | 0.00 | 6,846.83 | 135.00 | 7,236.03 | 1,421,127.52 | 3,259,666.39 | 40.48564 | -104.56646 |
| - actual wellpath misses target center by 3.85ft at 13856.81ft MD (6846.58 TVD, 138.84 N, 7235.87 E) | | | | | | | | | |
| - Point | | | | | | | | | |
| Foose PC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,420,992.52 | 3,252,430.61 | 40.48548 | -104.59248 |
| - actual wellpath hits target center | | | | | | | | | |
| - Polygon | | | | | | | | | |
| Point 1 | | | | 2,895.00 | 214.00 | 1,421,206.51 | 3,255,325.51 | | |
| Point 2 | | | | 2,873.00 | 2,410.00 | 1,423,402.44 | 3,255,303.51 | | |
| Point 3 | | | | 5,080.00 | 2,438.00 | 1,423,430.44 | 3,257,510.44 | | |
| Point 4 | | | | 7,298.00 | 2,455.00 | 1,423,447.44 | 3,259,728.36 | | |
| Point 5 | | | | 7,310.00 | 270.00 | 1,421,262.51 | 3,259,740.36 | | |
| Point 6 | | | | 7,324.00 | -1,915.00 | 1,419,077.59 | 3,259,754.36 | | |
| Point 7 | | | | 5,108.00 | -1,943.00 | 1,419,049.59 | 3,257,538.44 | | |
| Point 8 | | | | 2,916.00 | -1,974.00 | 1,419,018.59 | 3,255,346.51 | | |
| Point 9 | | | | 2,895.00 | 214.00 | 1,421,206.51 | 3,255,325.51 | | |
| Foose PC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,420,992.52 | 3,252,430.61 | 40.48548 | -104.59248 |
| - actual wellpath hits target center | | | | | | | | | |
| - Polygon | | | | | | | | | |
| Point 1 | | | | -194.00 | 169.00 | 1,421,161.52 | 3,252,236.62 | | |
| Point 2 | | | | -112.00 | 2,822.00 | 1,423,814.42 | 3,252,318.62 | | |
| Point 3 | | | | 2,413.00 | 2,870.00 | 1,423,862.42 | 3,254,843.53 | | |
| Point 4 | | | | 2,435.00 | 214.00 | 1,421,206.51 | 3,254,865.53 | | |
| Point 5 | | | | 2,456.00 | -2,434.00 | 1,418,558.61 | 3,254,886.53 | | |
| Point 6 | | | | -178.00 | -2,487.00 | 1,418,505.61 | 3,252,252.62 | | |
| Point 7 | | | | -194.00 | 169.00 | 1,421,161.52 | 3,252,236.62 | | |

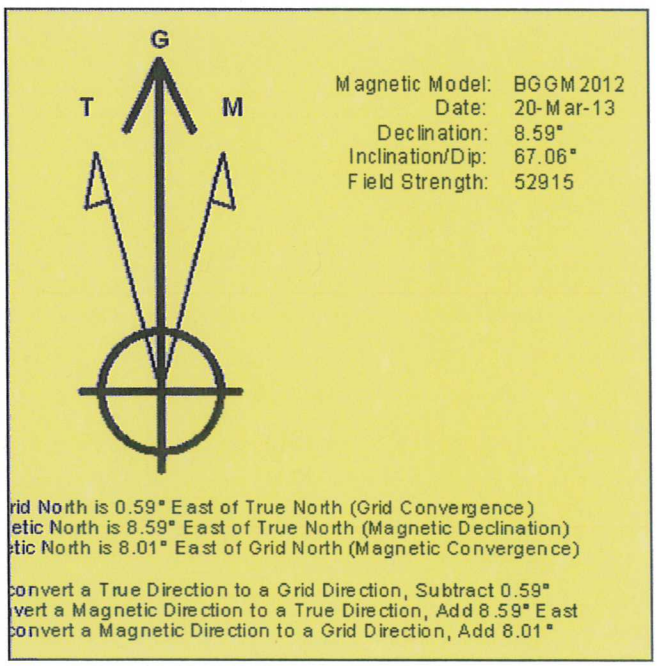
# North Reference Sheet for Sec. 18-T6N-R64W - Foose PC A18-65HN

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.
Vertical Depths are relative to KB=30' @ 4717.00ft (H&P 321). Northing and Easting are relative to Foose PC A18-65HN
Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980
Projection method is Lambert Conformal Conic (2 parallel)
Central Meridian is -105.50000°, Longitude Origin:0 .00000°, Latitude Origin:40.78333°
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996522

Grid Coordinates of Well: 1,420,992.52 ft N, 3,252,430.61 ft E
Geographical Coordinates of Well: 40°29' 07.73" N, 104°35' 32.93" W
Grid Convergence at Surface is: 0.59°

Based upon Minimum Curvature type calculations, at a Measured Depth of 13,857.00ft
the Bottom Hole Displacement is 7,237.39ft in the Direction of 88.90°(Grid).

Magnetic Convergence at surface is: -8.01°(20 Marc h 2013, , BGGM2012)



Project: Weld County, CO (NAD 83)
Site: Sec. 18-T6N-R64W
Well: Foose PC A18-65HN

# Noble Energy

HALLIBURTON
Sperry Drilling

G
T M
Azimuths to Grid North
True North: -0.59°
Magnetic North: 8.01°

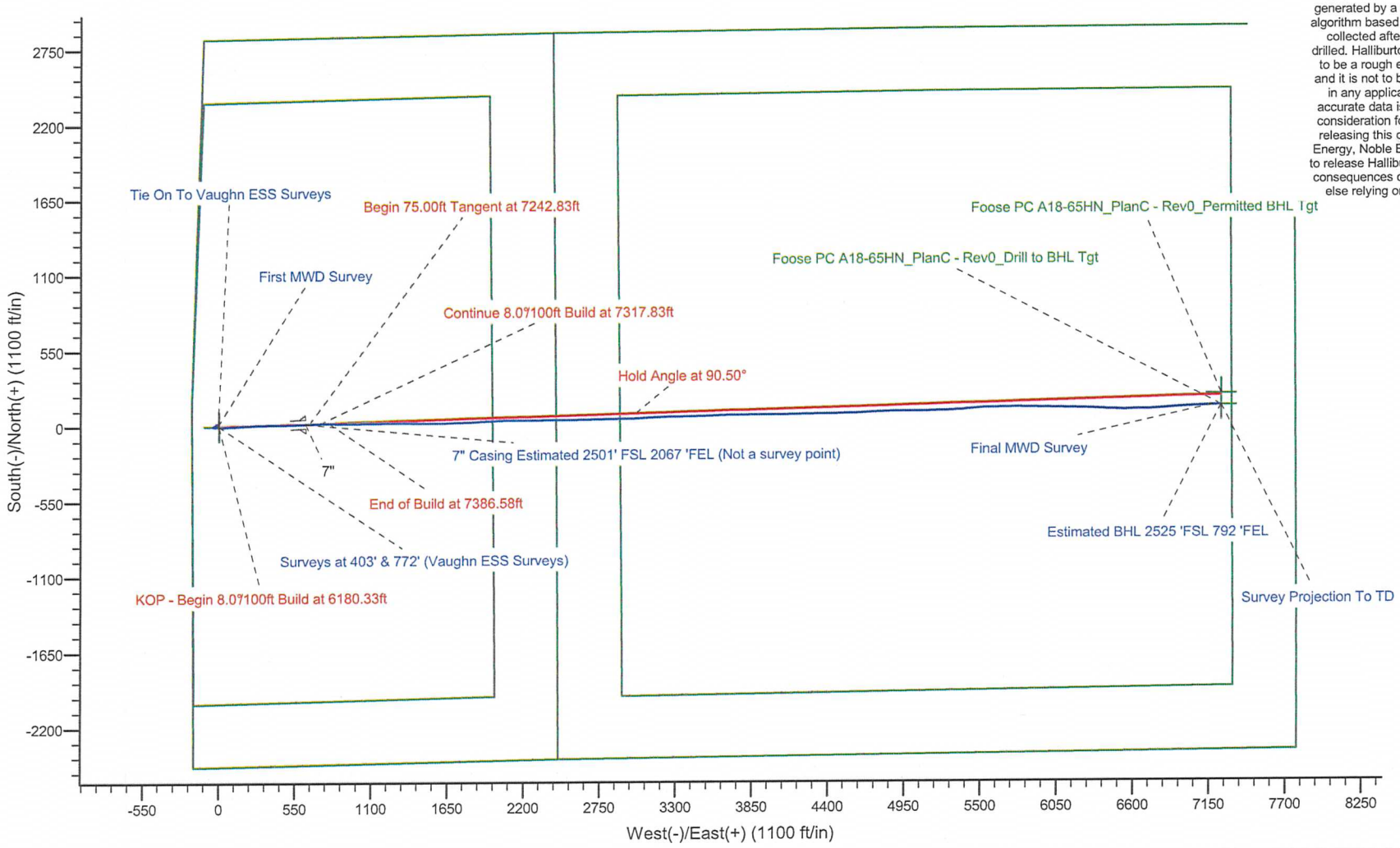
Magnetic Field
Strength: 52914.9snT
Dip Angle: 67.06°
Date: 3/20/2013
Model: BGGM2012

LEGEND

Foose PC A18-65HN, Plan C, Plan C - Rev 0 Proposal V0
Vaughn ESS & Sperry MWD Survey

Permitted BHL: 2600' FSL, 535' FEL

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Foose PC A18-65HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.



Project: Weld County, CO (NAD 83)
Site: Sec. 18-T6N-R64W
Well: Foose PC A18-65HN

# Noble Energy

HALLIBURTON
Sperry Drilling


Azimuths to Grid North
True North: -0.59°
Magnetic North: 8.01°

Magnetic Field
Strength: 52914.9snT
Dip Angle: 67.06°
Date: 3/20/2013
Model: BGGM2012

LEGEND

Foose PC A18-65HN, Plan C, Plan C - Rev 0 Proposal V0
Vaughn ESS & Sperry MWD Survey

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