

Survey Calculation Program

Chesapeake Operating Inc.
Craig Bessinger 10H
Upshur Co, WV

M.W.D. OPERATOR: T. Parrilla/D. Scruggs

DIRECTIONAL DRILLERS: A. Palmer/S. McCune

Magnetic Declination: -9.00

Job #: 4320

Minimum Curvature Calculation

Vertical Section 165.0

97-3672

| No. | Survey Depth | INC | AZM | TVD | N-S | E-W | Vertical Section | DLS/ 100 |
|-----|-----------------|-------|--------|---------|---------|--------|---------------------|-------------|
| Tie | 6838 | 10.50 | 45.20 | 6767.37 | 625.32 | 466.38 | -483.31 | 6.90 |
| 1 | 6865 | 8.70 | 49.30 | 6793.99 | 628.39 | 469.67 | -485.41 | 7.13 |
| 2 | 6896 | 8.40 | 77.60 | 6824.66 | 630.40 | 473.66 | -486.33 | 13.47 |
| 3 | 6927 | 12.30 | 101.00 | 6855.16 | 630.26 | 479.12 | -484.78 | 18.26 |
| 4 | 6959 | 15.80 | 113.40 | 6886.21 | 627.88 | 486.47 | -480.57 | 14.37 |
| 5 | 6991 | 18.70 | 127.50 | 6916.78 | 623.02 | 494.54 | -473.79 | 15.84 |
| 6 | 7023 | 20.20 | 139.70 | 6946.96 | 615.68 | 502.19 | -464.72 | 13.50 |
| 7 | 7054 | 21.90 | 153.60 | 6975.91 | 606.41 | 508.23 | -454.21 | 16.97 |
| 8 | 7086 | 24.00 | 161.70 | 7005.39 | 594.88 | 512.93 | -441.86 | 11.84 |
| 9 | 7117 | 27.40 | 167.80 | 7033.32 | 581.92 | 516.41 | -428.43 | 13.88 |
| 10 | 7148 | 31.20 | 169.10 | 7060.35 | 567.06 | 519.44 | -413.30 | 12.43 |
| 11 | 7180 | 35.40 | 167.40 | 7087.09 | 549.87 | 523.03 | -395.76 | 13.44 |
| 12 | 7212 | 38.90 | 165.40 | 7112.59 | 531.09 | 527.59 | -376.45 | 11.57 |
| 13 | 7244 | 43.60 | 163.40 | 7136.65 | 510.78 | 533.28 | -355.36 | 15.25 |
| 14 | 7276 | 48.00 | 162.90 | 7158.95 | 488.83 | 539.93 | -332.43 | 13.80 |
| 15 | 7308 | 53.10 | 163.10 | 7179.28 | 465.21 | 547.15 | -307.75 | 15.94 |
| 16 | 7339 | 57.80 | 164.20 | 7196.85 | 440.72 | 554.33 | -282.23 | 15.44 |
| 17 | 7371 | 63.00 | 164.30 | 7212.65 | 413.95 | 561.88 | -254.42 | 16.25 |
| 18 | 7403 | 66.20 | 164.10 | 7226.38 | 386.13 | 569.75 | -225.52 | 10.02 |
| 19 | 7435 | 68.40 | 164.10 | 7238.73 | 357.74 | 577.83 | -196.00 | 6.88 |
| 20 | 7466 | 70.20 | 163.50 | 7249.68 | 329.90 | 585.92 | -167.01 | 6.08 |
| 21 | 7498 | 72.20 | 163.20 | 7259.99 | 300.88 | 594.60 | -136.73 | 6.31 |
| 22 | 7530 | 73.80 | 162.10 | 7269.35 | 271.67 | 603.73 | -106.16 | 5.98 |
| 23 | 7561 | 75.40 | 161.90 | 7277.58 | 243.25 | 612.97 | -76.31 | 5.20 |
| 24 | 7592 | 78.10 | 160.60 | 7284.69 | 214.68 | 622.67 | -46.20 | 9.62 |
| 25 | 7623 | 80.70 | 160.40 | 7290.39 | 185.96 | 632.84 | -15.83 | 8.41 |
| 26 | 7655 | 82.60 | 160.70 | 7295.04 | 156.10 | 643.38 | 15.73 | 6.01 |
| 27 | 7687 | 85.00 | 161.40 | 7298.49 | 126.02 | 653.71 | 47.47 | 7.81 |
| 28 | 7717 | 87.40 | 162.80 | 7300.48 | 97.54 | 662.91 | 77.36 | 9.26 |
| 29 | 7749 | 89.40 | 163.10 | 7301.37 | 66.96 | 672.29 | 109.33 | 6.32 |
| 30 | 7781 | 89.40 | 163.70 | 7301.71 | 36.29 | 681.43 | 141.31 | 1.87 |
| 31 | 7844 | 90.50 | 164.10 | 7301.76 | -24.24 | 698.90 | 204.30 | 1.86 |
| 32 | 7908 | 92.30 | 165.20 | 7300.20 | -85.93 | 715.83 | 268.28 | 3.30 |
| 33 | 7969 | 91.50 | 165.00 | 7298.18 | -144.85 | 731.51 | 329.24 | 1.35 |
| 34 | 8032 | 90.90 | 163.30 | 7296.86 | -205.44 | 748.71 | 392.22 | 2.86 |
| 35 | 8096 | 90.20 | 162.60 | 7296.24 | -266.62 | 767.48 | 456.17 | 1.55 |
| 36 | 8159 | 91.30 | 163.30 | 7295.42 | -326.85 | 785.95 | 519.13 | 2.07 |
| 37 | 8223 | 91.70 | 163.80 | 7293.74 | -388.20 | 804.06 | 583.08 | 1.00 |

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|-----|-----------------|-------|--------|---------|----------|---------|---------------------|-------------|
| 38 | 8288 | 89.40 | 164.10 | 7293.12 | -450.66 | 822.03 | 648.07 | 3.57 |
| 39 | 8350 | 90.00 | 164.40 | 7293.44 | -510.33 | 838.86 | 710.06 | 1.08 |
| 40 | 8413 | 89.30 | 163.40 | 7293.83 | -570.86 | 856.33 | 773.04 | 1.94 |
| 41 | 8476 | 89.10 | 163.70 | 7294.71 | -631.28 | 874.17 | 836.02 | 0.57 |
| 42 | 8539 | 90.40 | 164.50 | 7294.98 | -691.86 | 891.43 | 899.01 | 2.42 |
| 43 | 8602 | 90.40 | 164.30 | 7294.54 | -752.54 | 908.37 | 962.00 | 0.32 |
| 44 | 8665 | 91.10 | 164.90 | 7293.72 | -813.27 | 925.10 | 1025.00 | 1.46 |
| 45 | 8729 | 91.40 | 164.60 | 7292.32 | -875.01 | 941.93 | 1088.98 | 0.66 |
| 46 | 8857 | 91.40 | 165.70 | 7289.20 | -998.69 | 974.72 | 1216.94 | 0.86 |
| 47 | 8984 | 90.20 | 163.90 | 7287.42 | -1121.23 | 1008.02 | 1343.92 | 1.70 |
| 48 | 9110 | 90.20 | 163.60 | 7286.98 | -1242.19 | 1043.27 | 1469.89 | 0.24 |
| 49 | 9237 | 92.20 | 167.00 | 7284.32 | -1364.99 | 1075.49 | 1596.83 | 3.11 |
| 50 | 9365 | 90.70 | 167.90 | 7281.08 | -1489.88 | 1103.29 | 1724.67 | 1.37 |
| 51 | 9492 | 90.60 | 168.30 | 7279.64 | -1614.15 | 1129.48 | 1851.48 | 0.32 |
| 52 | 9620 | 91.10 | 168.00 | 7277.74 | -1739.40 | 1155.76 | 1979.27 | 0.46 |
| 53 | 9747 | 90.80 | 166.80 | 7275.64 | -1863.32 | 1183.46 | 2106.14 | 0.97 |
| 54 | 9874 | 91.30 | 166.60 | 7273.31 | -1986.90 | 1212.67 | 2233.06 | 0.42 |
| 55 | 10001 | 90.40 | 164.90 | 7271.43 | -2109.97 | 1243.93 | 2360.03 | 1.51 |
| 56 | 10126 | 91.00 | 164.10 | 7269.90 | -2230.41 | 1277.33 | 2485.01 | 0.80 |
| 57 | 10252 | 90.90 | 163.90 | 7267.81 | -2351.52 | 1312.06 | 2610.98 | 0.18 |
| 58 | 10376 | 89.90 | 164.00 | 7266.94 | -2470.68 | 1346.34 | 2734.95 | 0.81 |
| 59 | 10499 | 88.90 | 162.30 | 7268.23 | -2588.39 | 1381.99 | 2857.87 | 1.60 |
| 60 | 10623 | 90.90 | 163.40 | 7268.45 | -2706.86 | 1418.55 | 2981.78 | 1.84 |
| 61 | 10748 | 90.60 | 164.90 | 7266.81 | -2827.10 | 1452.69 | 3106.75 | 1.22 |
| 62 | 10872 | 88.60 | 165.80 | 7267.68 | -2947.06 | 1484.04 | 3230.74 | 1.77 |
| 63 | 10996 | 89.10 | 165.80 | 7270.17 | -3067.24 | 1514.46 | 3354.70 | 0.40 |
| 64 | 11120 | 90.20 | 165.80 | 7270.92 | -3187.45 | 1544.87 | 3478.68 | 0.89 |
| 65 | 11244 | 91.20 | 165.30 | 7269.41 | -3307.52 | 1575.81 | 3602.67 | 0.90 |
| 66 | 11368 | 93.10 | 166.10 | 7264.76 | -3427.58 | 1606.42 | 3726.56 | 1.66 |
| 67 | 11491 | 89.90 | 164.10 | 7261.54 | -3546.38 | 1638.03 | 3849.50 | 3.07 |
| 68 | 11615 | 90.50 | 164.20 | 7261.11 | -3665.67 | 1671.90 | 3973.48 | 0.49 |
| 69 | 11738 | 90.50 | 163.60 | 7260.03 | -3783.84 | 1706.01 | 4096.45 | 0.49 |
| 70 | 11862 | 89.50 | 161.40 | 7260.03 | -3902.09 | 1743.29 | 4220.33 | 1.95 |
| 71 | 11985 | 90.90 | 161.20 | 7259.60 | -4018.59 | 1782.72 | 4343.07 | 1.15 |
| 72 | 12109 | 93.30 | 162.60 | 7255.06 | -4136.37 | 1821.22 | 4466.79 | 2.24 |
| 73 | 12233 | 93.50 | 162.30 | 7247.70 | -4254.39 | 1858.54 | 4590.45 | 0.29 |
| 74 | 12357 | 92.00 | 162.80 | 7241.76 | -4372.54 | 1895.68 | 4714.19 | 1.27 |
| 75 | 12481 | 91.50 | 164.10 | 7237.97 | -4491.35 | 1930.99 | 4838.08 | 1.12 |

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| 76 | 12603 | 89.80 | 165.90 | 7236.58 | -4609.17 | 1962.56 | 4960.07 | 2.03 |
| 77 | 12728 | 92.30 | 167.30 | 7234.29 | -4730.74 | 1991.52 | 5084.98 | 2.29 |
| 78 | 12851 | 93.00 | 166.90 | 7228.61 | -4850.50 | 2018.95 | 5207.77 | 0.66 |
| 79 | 12975 | 91.60 | 166.90 | 7223.63 | -4971.17 | 2047.03 | 5331.60 | 1.13 |
| 80 | 13097 | 90.90 | 166.40 | 7220.97 | -5089.85 | 2075.19 | 5453.52 | 0.71 |
| PTB | 13143 | 90.90 | 166.40 | 7220.25 | -5134.55 | 2086.01 | 5499.50 | 0.00 |

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