



Well: Van Winkle N-17 HU (slot F)
Site: Van Winkle
Project: Marshall County, West Virginia NAD83 UTM 17N
Design: rev5
Rig: Nabors B28
 DESIGN TARGET DETAILS

SECTION DETAILS

| Sec | MD | Inc | Azi | TVD | +N-S | +E-W | Dleg | TFace | Vsect | Annotation |
|-----|----------|-------|---------|----------|----------|----------|------|--------------|---------|----------------------------------|
| 1 | 4427.00 | 8.18 | 231.470 | 4412.40 | -185.07 | -192.75 | 0.00 | 0.00 | -33.02 | Survey @ 4427.00 MD 4412.40 TVD |
| 2 | 6575.46 | 8.18 | 231.470 | 6539.00 | -375.49 | -431.88 | 0.00 | 0.00 | -42.58 | KOP Begin 2°/100' build/turn |
| 3 | 7026.09 | 16.75 | 217.753 | 6978.68 | -446.97 | -496.86 | 2.00 | -25.87 | -60.99 | Begin 16.75° tangent |
| 4 | 10229.42 | 16.75 | 217.753 | 10046.02 | -1177.07 | -1062.23 | 0.00 | 0.00 | -307.91 | Begin 6°/100' build/turn |
| 5 | 11135.75 | 50.00 | 316.372 | 10831.08 | -1016.87 | -1408.09 | 6.00 | 111.30 | 27.35 | Begin 8°/100' build/turn |
| 6 | 11671.92 | 91.00 | 330.157 | 11007.01 | -616.86 | -1696.78 | 8.00 | 20.49 | 520.59 | Begin 91.00° lateral |
| 7 | 26074.99 | 91.00 | 330.157 | 10755.00 | 11874.35 | -8862.99 | 0.00 | 0.0014817.32 | | PBHL/TD 26074.99 MD 10755.00 TVD |

| Name | TVD | +N-S | +E-W | Northing | Easting | Latitude | Longitude |
|--|----------|----------|----------|--------------|-------------|--------------|---------------|
| Van Winkle N-17HU PBHL r5 | 10755.00 | 11874.35 | -8862.99 | 14447283.276 | 1717135.399 | 39.814169000 | -80.758356000 |
| - plan hits target center | | | | | | | |
| Van Winkle N-17HU LP r5 | 11007.00 | -616.86 | -1696.78 | 14447283.276 | 1717135.399 | 39.779809000 | -80.732969000 |
| - plan misses target center by 0.03ft at 11671.91ft MD (11007.01 TVD, -616.87 N, -1696.78 E) | | | | | | | |

ANNOTATIONS SURVEYS

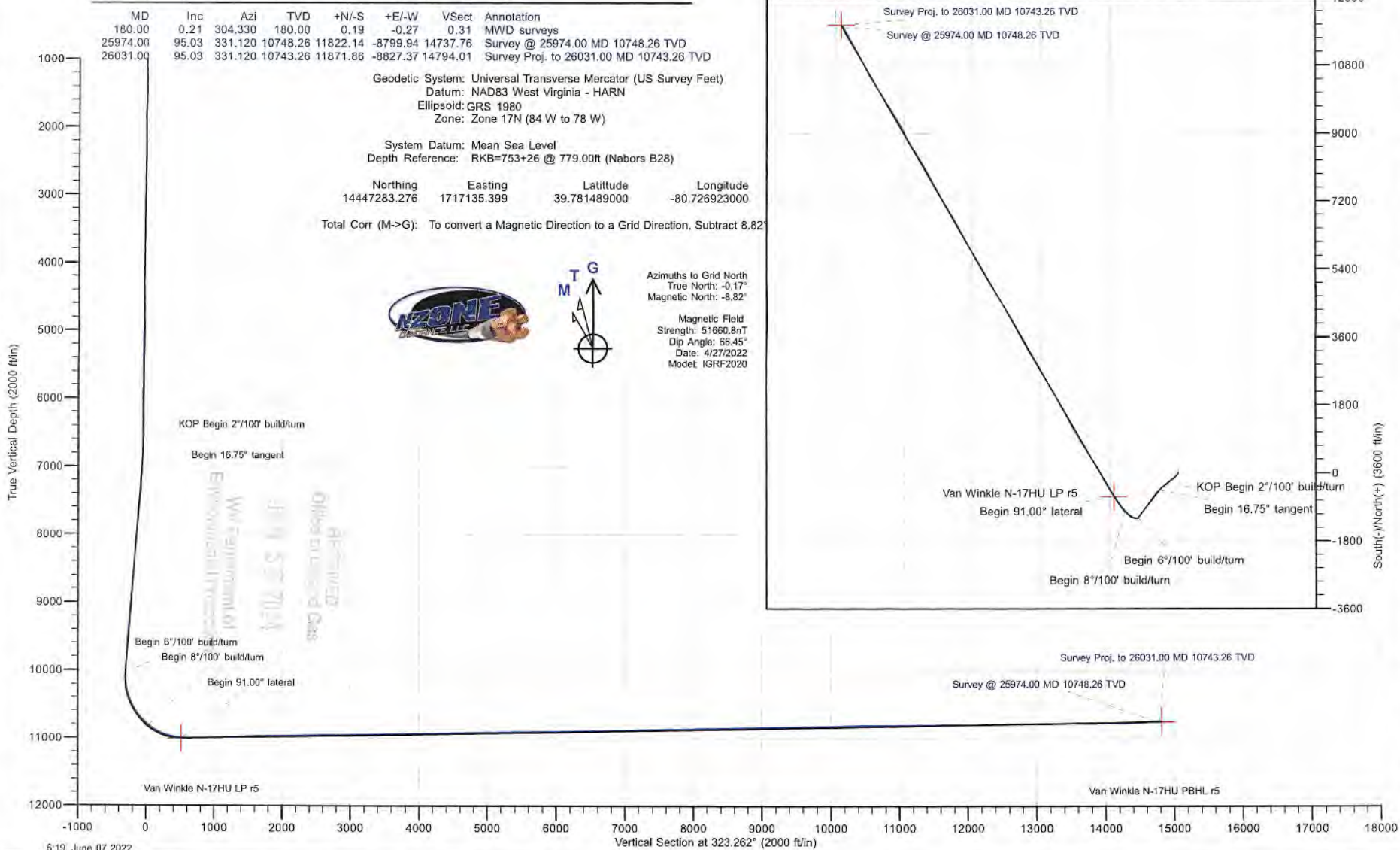
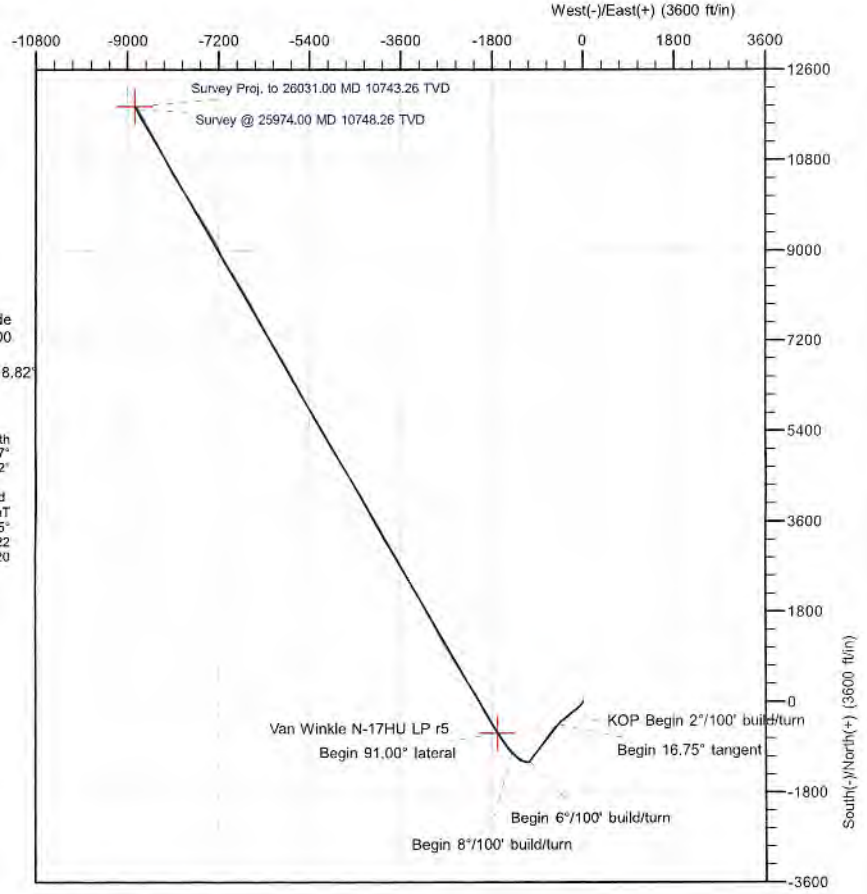
| MD | Inc | Azi | TVD | +N-S | +E-W | Vsect | Annotation |
|----------|-------|---------|----------|----------|----------|----------|--|
| 180.00 | 0.21 | 304.330 | 180.00 | 0.19 | -0.27 | 0.31 | MWD surveys |
| 25974.00 | 95.03 | 331.120 | 10748.26 | 11822.14 | -8799.94 | 14737.76 | Survey @ 25974.00 MD 10748.26 TVD |
| 26031.00 | 95.03 | 331.120 | 10743.26 | 11871.86 | -8827.37 | 14794.01 | Survey Proj. to 26031.00 MD 10743.26 TVD |

Geodetic System: Universal Transverse Mercator (US Survey Feet)
 Datum: NAD83 West Virginia - HARN
 Ellipsoid: GRS 1980
 Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level
 Depth Reference: RKB=753+26 @ 779.00ft (Nabors B28)

| Northing | Easting | Latitude | Longitude |
|--------------|-------------|--------------|---------------|
| 14447283.276 | 1717135.399 | 39.781489000 | -80.726923000 |

Total Corr (M->G): To convert a Magnetic Direction to a Grid Direction, Subtract 8.82°





Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

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|--------------------|--|----------------------|----------------|
| Project | Marshall County, West Virginia NAD83 UTM 17N | | |
| Map System: | Universal Transverse Mercator (US Survey Feet) | System Datum: | Mean Sea Level |
| Geo Datum: | NAD83 West Virginia - HARN | | |
| Map Zone: | Zone 17N (84 W to 78 W) | | |

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|------------------------------|------------|---------------------|---------------------|-------------------|---------------|
| Site | Van Winkle | | | | |
| Site Position: | | Northing: | 14,447,369.493 usft | Latitude: | 39.781725330 |
| From: | Lat/Long | Easting: | 1,717,188.440 usft | Longitude: | -80.726733270 |
| Position Uncertainty: | 0.00 ft | Slot Radius: | 13-3/16 " | | |

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|-----------------------------|-----------------------------|---------|----------------------------|---------------------|----------------------|---------------|
| Well | Van Winkle N-17 HU (slot F) | | | | | |
| Well Position | +N/-S | 0.00 ft | Northing: | 14,447,283.276 usft | Latitude: | 39.781489000 |
| | +E/-W | 0.00 ft | Easting: | 1,717,135.399 usft | Longitude: | -80.726923000 |
| Position Uncertainty | 0.00 ft | | Wellhead Elevation: | ft | Ground Level: | 753.00 ft |
| Grid Convergence: | 0.17 ° | | | | | |

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|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | Original Hole | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2020 | 4/27/2022 | -8.65 | 66.45 | 51,660.81903639 |

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|--------------------------|------------------------------|-------------------|-------------------|----------------------|------|
| Design | Surveys Original Hole | | | | |
| Audit Notes: | | | | | |
| Version: | 1.0 | Phase: | ACTUAL | Tie On Depth: | 0.00 |
| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) | |
| | 0.00 | 0.00 | 0.00 | 323.262 | |

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|-----------------------|----------------|-----------------------------------|------------------|--------------------|--|
| Survey Program | Date 6/7/2022 | | | | |
| From (ft) | To (ft) | Survey (Wellbore) | Tool Name | Description | |
| 180.00 | 518.00 | MWD surf (Original Hole) | MWD | MWD - Standard | |
| 539.00 | 2,181.00 | MWD int (Original Hole) | MWD | MWD - Standard | |
| 2,245.00 | 10,041.00 | MWD 2245-10041 MD (Original Hole) | MWD | MWD - Standard | |
| 10,082.00 | 25,974.00 | MWD (Original Hole) | MWD | MWD - Standard | |
| 26,031.00 | 26,031.00 | Projection (Original Hole) | MWD | MWD - Standard | |

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|----------------------------|------------------------|--------------------|----------------------------|-------------------|-------------------|------------------------------|------------------------------|-----------------------------|----------------------------|--|
| Survey | | | | | | | | | | |
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | |
| 0.00 | 0.00 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 180.00 | 0.21 | 304.330 | 180.00 | 0.19 | -0.27 | 0.31 | 0.12 | 0.12 | 0.00 | |
| MWD surveys | | | | | | | | | | |
| 209.00 | 0.19 | 286.270 | 209.00 | 0.23 | -0.36 | 0.40 | 0.23 | -0.07 | -62.28 | |
| 239.00 | 0.16 | 257.040 | 239.00 | 0.23 | -0.45 | 0.46 | 0.31 | -0.10 | -97.43 | |
| 269.00 | 0.15 | 224.860 | 269.00 | 0.20 | -0.52 | 0.47 | 0.29 | -0.03 | -107.27 | |



Survey Report



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|------------------|--|-------------------------------------|------------------------------------|
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| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 299.00 | 0.00 | 242.290 | 299.00 | 0.17 | -0.55 | 0.46 | 0.50 | -0.50 | 0.00 |
| 329.00 | 0.14 | 271.210 | 329.00 | 0.17 | -0.58 | 0.49 | 0.47 | 0.47 | 0.00 |
| 361.00 | 0.15 | 257.880 | 361.00 | 0.16 | -0.66 | 0.53 | 0.11 | 0.03 | -41.66 |
| 392.00 | 0.20 | 204.820 | 392.00 | 0.10 | -0.73 | 0.52 | 0.52 | 0.16 | -171.16 |
| 423.00 | 0.21 | 176.600 | 423.00 | 0.00 | -0.75 | 0.44 | 0.32 | 0.03 | -91.03 |
| 455.00 | 0.34 | 183.470 | 455.00 | -0.16 | -0.75 | 0.32 | 0.42 | 0.41 | 21.47 |
| 486.00 | 0.22 | 204.350 | 486.00 | -0.30 | -0.78 | 0.22 | 0.50 | -0.39 | 67.35 |
| 518.00 | 0.44 | 184.670 | 518.00 | -0.48 | -0.81 | 0.10 | 0.76 | 0.69 | -61.50 |
| 539.00 | 0.52 | 208.350 | 539.00 | -0.64 | -0.87 | 0.00 | 1.01 | 0.38 | 112.76 |
| 570.00 | 0.34 | 173.880 | 570.00 | -0.86 | -0.92 | -0.14 | 0.99 | -0.58 | -111.19 |
| 602.00 | 0.23 | 181.800 | 602.00 | -1.02 | -0.91 | -0.27 | 0.36 | -0.34 | 24.75 |
| 633.00 | 0.15 | 278.550 | 633.00 | -1.07 | -0.96 | -0.29 | 0.93 | -0.26 | 312.10 |
| 665.00 | 0.31 | 178.990 | 665.00 | -1.15 | -1.00 | -0.33 | 1.14 | 0.50 | -311.13 |
| 697.00 | 0.42 | 179.650 | 696.99 | -1.36 | -0.99 | -0.49 | 0.34 | 0.34 | 2.06 |
| 728.00 | 0.50 | 170.390 | 727.99 | -1.60 | -0.97 | -0.71 | 0.35 | 0.26 | -29.87 |
| 760.00 | 0.55 | 171.000 | 759.99 | -1.89 | -0.92 | -0.97 | 0.16 | 0.16 | 1.91 |
| 792.00 | 0.58 | 167.850 | 791.99 | -2.20 | -0.87 | -1.25 | 0.13 | 0.09 | -9.84 |
| 823.00 | 0.64 | 186.230 | 822.99 | -2.53 | -0.85 | -1.52 | 0.66 | 0.19 | 59.29 |
| 855.00 | 0.58 | 187.140 | 854.99 | -2.87 | -0.89 | -1.77 | 0.19 | -0.19 | 2.84 |
| 886.00 | 0.48 | 173.110 | 885.99 | -3.15 | -0.89 | -1.99 | 0.53 | -0.32 | -45.26 |
| 918.00 | 0.46 | 179.360 | 917.98 | -3.41 | -0.88 | -2.21 | 0.17 | -0.06 | 19.53 |
| 950.00 | 0.45 | 214.860 | 949.98 | -3.65 | -0.95 | -2.36 | 0.87 | -0.03 | 110.94 |
| 982.00 | 0.32 | 234.770 | 981.98 | -3.80 | -1.09 | -2.39 | 0.58 | -0.41 | 62.22 |
| 1,014.00 | 0.42 | 244.270 | 1,013.98 | -3.90 | -1.27 | -2.37 | 0.37 | 0.31 | 29.69 |
| 1,045.00 | 0.54 | 266.480 | 1,044.98 | -3.96 | -1.52 | -2.27 | 0.71 | 0.39 | 71.65 |
| 1,077.00 | 0.73 | 294.410 | 1,076.98 | -3.89 | -1.85 | -2.00 | 1.12 | 0.59 | 87.28 |
| 1,108.00 | 0.77 | 309.380 | 1,107.98 | -3.67 | -2.20 | -1.63 | 0.64 | 0.13 | 48.29 |
| 1,140.00 | 0.95 | 312.950 | 1,139.97 | -3.36 | -2.56 | -1.16 | 0.59 | 0.56 | 11.16 |
| 1,172.00 | 1.11 | 311.660 | 1,171.97 | -2.97 | -2.98 | -0.60 | 0.51 | 0.50 | -4.03 |
| 1,204.00 | 1.10 | 305.790 | 1,203.96 | -2.58 | -3.46 | 0.00 | 0.35 | -0.03 | -18.34 |
| 1,236.00 | 1.18 | 297.380 | 1,235.96 | -2.25 | -4.00 | 0.59 | 0.58 | 0.25 | -26.28 |
| 1,267.00 | 1.08 | 287.070 | 1,266.95 | -2.02 | -4.57 | 1.11 | 0.73 | -0.32 | -33.26 |
| 1,299.00 | 1.05 | 267.820 | 1,298.94 | -1.94 | -5.15 | 1.52 | 1.12 | -0.09 | -60.16 |
| 1,331.00 | 0.85 | 242.780 | 1,330.94 | -2.06 | -5.65 | 1.73 | 1.42 | -0.63 | -78.25 |
| 1,362.00 | 1.07 | 217.480 | 1,361.94 | -2.40 | -6.03 | 1.69 | 1.52 | 0.71 | -81.61 |
| 1,394.00 | 1.33 | 205.930 | 1,393.93 | -2.97 | -6.38 | 1.44 | 1.11 | 0.81 | -36.09 |
| 1,426.00 | 1.77 | 201.270 | 1,425.92 | -3.76 | -6.72 | 1.00 | 1.43 | 1.38 | -14.56 |
| 1,457.00 | 1.99 | 201.170 | 1,456.90 | -4.71 | -7.09 | 0.46 | 0.71 | 0.71 | -0.32 |
| 1,488.00 | 2.47 | 198.890 | 1,487.88 | -5.84 | -7.50 | -0.20 | 1.57 | 1.55 | -7.35 |
| 1,520.00 | 2.95 | 197.530 | 1,519.84 | -7.28 | -7.97 | -1.07 | 1.51 | 1.50 | -4.25 |
| 1,552.00 | 3.40 | 194.970 | 1,551.79 | -8.98 | -8.46 | -2.14 | 1.47 | 1.41 | -8.00 |
| 1,582.00 | 3.55 | 200.070 | 1,581.74 | -10.72 | -9.01 | -3.20 | 1.14 | 0.50 | 17.00 |
| 1,614.00 | 3.39 | 196.800 | 1,613.68 | -12.55 | -9.62 | -4.30 | 0.80 | -0.50 | -10.22 |
| 1,646.00 | 3.45 | 201.290 | 1,645.62 | -14.35 | -10.25 | -5.37 | 0.86 | 0.19 | 14.03 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
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| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Survey | | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|--|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | |
| 1,678.00 | 3.50 | 202.590 | 1,677.56 | -16.15 | -10.97 | -6.38 | 0.29 | 0.16 | 4.06 | |
| 1,709.00 | 3.30 | 205.780 | 1,708.51 | -17.83 | -11.72 | -7.28 | 0.89 | -0.65 | 10.29 | |
| 1,741.00 | 3.24 | 205.740 | 1,740.46 | -19.47 | -12.52 | -8.12 | 0.19 | -0.19 | -0.13 | |
| 1,773.00 | 3.08 | 204.920 | 1,772.41 | -21.07 | -13.27 | -8.95 | 0.52 | -0.50 | -2.56 | |
| 1,804.00 | 2.89 | 208.690 | 1,803.36 | -22.51 | -14.00 | -9.67 | 0.88 | -0.61 | 12.16 | |
| 1,836.00 | 2.80 | 207.110 | 1,835.33 | -23.91 | -14.74 | -10.35 | 0.37 | -0.28 | -4.94 | |
| 1,867.00 | 2.62 | 218.260 | 1,866.29 | -25.14 | -15.52 | -10.86 | 1.79 | -0.58 | 35.97 | |
| 1,898.00 | 2.50 | 224.590 | 1,897.26 | -26.18 | -16.44 | -11.15 | 0.99 | -0.39 | 20.42 | |
| 1,929.00 | 2.52 | 232.920 | 1,928.23 | -27.07 | -17.46 | -11.25 | 1.18 | 0.06 | 26.87 | |
| 1,960.00 | 2.58 | 239.660 | 1,959.20 | -27.84 | -18.60 | -11.18 | 0.99 | 0.19 | 21.74 | |
| 1,992.00 | 2.61 | 242.700 | 1,991.17 | -28.53 | -19.87 | -10.98 | 0.44 | 0.09 | 9.50 | |
| 2,023.00 | 2.55 | 245.720 | 2,022.14 | -29.14 | -21.13 | -10.72 | 0.48 | -0.19 | 9.74 | |
| 2,055.00 | 2.63 | 246.030 | 2,054.10 | -29.73 | -22.45 | -10.40 | 0.25 | 0.25 | 0.97 | |
| 2,087.00 | 2.60 | 247.440 | 2,086.07 | -30.31 | -23.79 | -10.06 | 0.22 | -0.09 | 4.41 | |
| 2,118.00 | 2.41 | 241.730 | 2,117.04 | -30.89 | -25.01 | -9.79 | 1.01 | -0.61 | -18.42 | |
| 2,150.00 | 2.41 | 238.790 | 2,149.01 | -31.56 | -26.18 | -9.63 | 0.39 | 0.00 | -9.19 | |
| 2,181.00 | 2.29 | 236.430 | 2,179.99 | -32.24 | -27.25 | -9.53 | 0.50 | -0.39 | -7.61 | |
| 2,245.00 | 2.22 | 239.120 | 2,243.94 | -33.58 | -29.38 | -9.33 | 0.20 | -0.11 | 4.20 | |
| 2,277.00 | 2.22 | 248.020 | 2,275.91 | -34.13 | -30.49 | -9.11 | 1.08 | 0.00 | 27.81 | |
| 2,309.00 | 2.22 | 239.680 | 2,307.89 | -34.67 | -31.60 | -8.89 | 1.01 | 0.00 | -26.06 | |
| 2,341.00 | 2.40 | 225.830 | 2,339.86 | -35.45 | -32.61 | -8.90 | 1.83 | 0.56 | -43.28 | |
| 2,372.00 | 2.62 | 214.970 | 2,370.83 | -36.49 | -33.49 | -9.21 | 1.69 | 0.71 | -35.03 | |
| 2,403.00 | 2.93 | 212.260 | 2,401.80 | -37.74 | -34.31 | -9.72 | 1.09 | 1.00 | -8.74 | |
| 2,434.00 | 3.08 | 210.150 | 2,432.75 | -39.13 | -35.16 | -10.33 | 0.60 | 0.48 | -6.81 | |
| 2,466.00 | 3.22 | 210.490 | 2,464.71 | -40.65 | -36.04 | -11.01 | 0.44 | 0.44 | 1.06 | |
| 2,498.00 | 3.20 | 208.700 | 2,496.66 | -42.20 | -36.93 | -11.73 | 0.32 | -0.06 | -5.59 | |
| 2,529.00 | 3.18 | 210.080 | 2,527.61 | -43.71 | -37.78 | -12.43 | 0.26 | -0.06 | 4.45 | |
| 2,561.00 | 3.22 | 211.020 | 2,559.56 | -45.24 | -38.68 | -13.12 | 0.21 | 0.13 | 2.94 | |
| 2,593.00 | 3.20 | 212.620 | 2,591.51 | -46.77 | -39.63 | -13.77 | 0.29 | -0.06 | 5.00 | |
| 2,624.00 | 3.24 | 215.520 | 2,622.46 | -48.21 | -40.60 | -14.35 | 0.54 | 0.13 | 9.35 | |
| 2,656.00 | 3.16 | 213.990 | 2,654.41 | -49.68 | -41.62 | -14.91 | 0.37 | -0.25 | -4.78 | |
| 2,688.00 | 3.09 | 215.610 | 2,686.36 | -51.11 | -42.62 | -15.47 | 0.35 | -0.22 | 5.06 | |
| 2,719.00 | 3.20 | 219.420 | 2,717.31 | -52.46 | -43.65 | -15.93 | 0.76 | 0.35 | 12.29 | |
| 2,751.00 | 3.05 | 218.000 | 2,749.27 | -53.82 | -44.74 | -16.36 | 0.53 | -0.47 | -4.44 | |
| 2,782.00 | 3.15 | 221.410 | 2,780.22 | -55.11 | -45.82 | -16.76 | 0.68 | 0.32 | 11.00 | |
| 2,813.00 | 3.20 | 221.450 | 2,811.17 | -56.39 | -46.95 | -17.11 | 0.16 | 0.16 | 0.13 | |
| 2,845.00 | 3.18 | 224.200 | 2,843.12 | -57.70 | -48.16 | -17.43 | 0.48 | -0.06 | 8.59 | |
| 2,877.00 | 3.23 | 223.670 | 2,875.07 | -58.99 | -49.40 | -17.72 | 0.18 | 0.16 | -1.66 | |
| 2,909.00 | 3.35 | 225.100 | 2,907.02 | -60.30 | -50.69 | -18.00 | 0.45 | 0.38 | 4.47 | |
| 2,939.00 | 3.46 | 227.180 | 2,936.97 | -61.53 | -51.97 | -18.22 | 0.55 | 0.37 | 6.93 | |
| 2,971.00 | 3.87 | 225.650 | 2,968.90 | -62.94 | -53.45 | -18.47 | 1.32 | 1.28 | -4.78 | |
| 3,003.00 | 4.41 | 223.930 | 3,000.82 | -64.58 | -55.08 | -18.81 | 1.73 | 1.69 | -5.38 | |
| 3,034.00 | 4.89 | 222.050 | 3,031.72 | -66.42 | -56.79 | -19.26 | 1.62 | 1.55 | -6.06 | |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
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| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
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| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 3,066.00 | 5.22 | 222.360 | 3,063.59 | -68.51 | -58.68 | -19.80 | 1.03 | 1.03 | 0.97 |
| 3,097.00 | 5.42 | 222.220 | 3,094.46 | -70.64 | -60.62 | -20.35 | 0.65 | 0.65 | -0.45 |
| 3,129.00 | 5.60 | 221.920 | 3,126.31 | -72.92 | -62.68 | -20.95 | 0.57 | 0.56 | -0.94 |
| 3,161.00 | 5.49 | 223.300 | 3,158.16 | -75.20 | -64.77 | -21.52 | 0.54 | -0.34 | 4.31 |
| 3,191.00 | 4.53 | 225.660 | 3,188.05 | -77.07 | -66.60 | -21.92 | 3.27 | -3.20 | 7.87 |
| 3,223.00 | 4.20 | 227.120 | 3,219.95 | -78.75 | -68.36 | -22.22 | 1.09 | -1.03 | 4.56 |
| 3,255.00 | 3.87 | 228.790 | 3,251.87 | -80.26 | -70.04 | -22.43 | 1.09 | -1.03 | 5.22 |
| 3,286.00 | 4.22 | 226.280 | 3,282.80 | -81.74 | -71.65 | -22.65 | 1.27 | 1.13 | -8.10 |
| 3,318.00 | 4.95 | 223.150 | 3,314.69 | -83.56 | -73.44 | -23.03 | 2.41 | 2.28 | -9.78 |
| 3,349.00 | 5.62 | 222.690 | 3,345.56 | -85.65 | -75.39 | -23.54 | 2.17 | 2.16 | -1.48 |
| 3,381.00 | 6.24 | 221.640 | 3,377.39 | -88.10 | -77.60 | -24.18 | 1.97 | 1.94 | -3.28 |
| 3,412.00 | 7.27 | 224.100 | 3,408.18 | -90.77 | -80.09 | -24.83 | 3.45 | 3.32 | 7.94 |
| 3,444.00 | 8.32 | 225.500 | 3,439.88 | -93.84 | -83.15 | -25.47 | 3.33 | 3.28 | 4.38 |
| 3,476.00 | 8.97 | 226.810 | 3,471.52 | -97.17 | -86.62 | -26.06 | 2.12 | 2.03 | 4.09 |
| 3,508.00 | 9.12 | 228.060 | 3,503.12 | -100.58 | -90.32 | -26.57 | 0.77 | 0.47 | 3.91 |
| 3,540.00 | 9.10 | 227.630 | 3,534.71 | -103.98 | -94.08 | -27.05 | 0.22 | -0.06 | -1.34 |
| 3,604.00 | 9.04 | 227.330 | 3,597.91 | -110.80 | -101.52 | -28.07 | 0.12 | -0.09 | -0.47 |
| 3,635.00 | 8.95 | 225.960 | 3,628.53 | -114.12 | -105.04 | -28.63 | 0.75 | -0.29 | -4.42 |
| 3,667.00 | 8.65 | 227.190 | 3,660.16 | -117.49 | -108.60 | -29.20 | 1.11 | -0.94 | 3.84 |
| 3,699.00 | 7.50 | 227.430 | 3,691.84 | -120.54 | -111.90 | -29.66 | 3.60 | -3.59 | 0.75 |
| 3,731.00 | 6.90 | 227.400 | 3,723.59 | -123.25 | -114.85 | -30.07 | 1.88 | -1.88 | -0.09 |
| 3,763.00 | 6.86 | 229.520 | 3,755.36 | -125.79 | -117.72 | -30.39 | 0.80 | -0.13 | 6.63 |
| 3,794.00 | 7.24 | 231.960 | 3,786.12 | -128.20 | -120.67 | -30.56 | 1.56 | 1.23 | 7.87 |
| 3,826.00 | 7.89 | 233.230 | 3,817.84 | -130.75 | -124.01 | -30.61 | 2.10 | 2.03 | 3.97 |
| 3,858.00 | 8.27 | 232.890 | 3,849.52 | -133.46 | -127.61 | -30.62 | 1.20 | 1.19 | -1.06 |
| 3,889.00 | 8.39 | 232.570 | 3,880.20 | -136.18 | -131.18 | -30.66 | 0.41 | 0.39 | -1.03 |
| 3,921.00 | 8.33 | 231.420 | 3,911.86 | -139.04 | -134.85 | -30.77 | 0.56 | -0.19 | -3.59 |
| 3,985.00 | 8.02 | 229.520 | 3,975.21 | -144.83 | -141.87 | -31.21 | 0.64 | -0.48 | -2.97 |
| 4,017.00 | 8.27 | 228.980 | 4,006.88 | -147.79 | -145.30 | -31.52 | 0.82 | 0.78 | -1.69 |
| 4,048.00 | 8.65 | 228.690 | 4,037.55 | -150.79 | -148.74 | -31.88 | 1.23 | 1.23 | -0.94 |
| 4,080.00 | 8.70 | 228.200 | 4,069.18 | -154.00 | -152.35 | -32.28 | 0.28 | 0.16 | -1.53 |
| 4,111.00 | 8.75 | 227.650 | 4,099.82 | -157.15 | -155.84 | -32.72 | 0.31 | 0.16 | -1.77 |
| 4,143.00 | 9.08 | 226.710 | 4,131.44 | -160.52 | -159.48 | -33.25 | 1.13 | 1.03 | -2.94 |
| 4,174.00 | 9.14 | 229.750 | 4,162.04 | -163.79 | -163.14 | -33.68 | 1.56 | 0.19 | 9.81 |
| 4,206.00 | 8.57 | 234.740 | 4,193.66 | -166.80 | -167.02 | -33.77 | 2.99 | -1.78 | 15.59 |
| 4,237.00 | 8.37 | 236.240 | 4,224.33 | -169.39 | -170.78 | -33.59 | 0.96 | -0.65 | 4.84 |
| 4,269.00 | 8.18 | 236.640 | 4,255.99 | -171.94 | -174.62 | -33.34 | 0.62 | -0.59 | 1.25 |
| 4,300.00 | 8.09 | 235.770 | 4,286.68 | -174.38 | -178.27 | -33.11 | 0.49 | -0.29 | -2.81 |
| 4,332.00 | 8.12 | 234.610 | 4,318.36 | -176.95 | -181.97 | -32.96 | 0.52 | 0.09 | -3.63 |
| 4,364.00 | 8.21 | 233.550 | 4,350.04 | -179.62 | -185.65 | -32.90 | 0.55 | 0.28 | -3.31 |
| 4,395.00 | 8.14 | 232.430 | 4,380.72 | -182.27 | -189.17 | -32.92 | 0.56 | -0.23 | -3.61 |
| 4,427.00 | 8.18 | 231.470 | 4,412.40 | -185.07 | -192.75 | -33.02 | 0.44 | 0.13 | -3.00 |
| 4,438.00 | 8.16 | 231.530 | 4,423.29 | -186.04 | -193.97 | -33.07 | 0.20 | -0.18 | 0.55 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 4,532.00 | 8.71 | 229.060 | 4,516.27 | -194.86 | -204.57 | -33.79 | 0.70 | 0.59 | -2.63 |
| 4,626.00 | 9.16 | 227.070 | 4,609.13 | -204.62 | -215.43 | -35.12 | 0.58 | 0.48 | -2.12 |
| 4,717.00 | 8.76 | 228.980 | 4,699.02 | -214.10 | -225.96 | -36.42 | 0.55 | -0.44 | 2.10 |
| 4,812.00 | 8.55 | 231.080 | 4,792.94 | -223.28 | -236.91 | -37.23 | 0.40 | -0.22 | 2.21 |
| 4,906.00 | 9.53 | 229.560 | 4,885.77 | -232.72 | -248.27 | -38.00 | 1.07 | 1.04 | -1.62 |
| 5,000.00 | 10.25 | 227.300 | 4,978.37 | -243.44 | -260.34 | -39.37 | 0.87 | 0.77 | -2.40 |
| 5,093.00 | 8.90 | 223.700 | 5,070.07 | -254.25 | -271.39 | -41.42 | 1.59 | -1.45 | -3.87 |
| 5,185.00 | 6.88 | 227.530 | 5,161.20 | -263.12 | -280.37 | -43.16 | 2.27 | -2.20 | 4.16 |
| 5,279.00 | 7.32 | 232.400 | 5,254.48 | -270.58 | -289.27 | -43.81 | 0.79 | 0.47 | 5.18 |
| 5,372.00 | 8.77 | 230.430 | 5,346.56 | -278.71 | -299.43 | -44.25 | 1.59 | 1.56 | -2.12 |
| 5,466.00 | 8.28 | 229.220 | 5,439.52 | -287.69 | -310.08 | -45.08 | 0.56 | -0.52 | -1.29 |
| 5,560.00 | 7.51 | 232.430 | 5,532.63 | -295.86 | -320.07 | -45.65 | 0.94 | -0.82 | 3.41 |
| 5,654.00 | 7.94 | 234.510 | 5,625.78 | -303.38 | -330.23 | -45.59 | 0.55 | 0.46 | 2.21 |
| 5,748.00 | 9.29 | 233.240 | 5,718.72 | -311.69 | -341.59 | -45.46 | 1.45 | 1.44 | -1.35 |
| 5,842.00 | 9.12 | 230.160 | 5,811.51 | -321.00 | -353.39 | -45.86 | 0.55 | -0.18 | -3.28 |
| 5,936.00 | 8.04 | 226.200 | 5,904.45 | -330.32 | -363.86 | -47.07 | 1.31 | -1.15 | -4.21 |
| 6,029.00 | 6.87 | 229.600 | 5,996.67 | -338.43 | -372.79 | -48.23 | 1.34 | -1.26 | 3.66 |
| 6,122.00 | 6.92 | 232.900 | 6,088.99 | -345.41 | -381.49 | -48.62 | 0.43 | 0.05 | 3.55 |
| 6,215.00 | 6.55 | 232.420 | 6,181.35 | -352.03 | -390.16 | -48.73 | 0.40 | -0.40 | -0.52 |
| 6,309.00 | 7.45 | 235.190 | 6,274.65 | -358.78 | -399.42 | -48.61 | 1.02 | 0.96 | 2.95 |
| 6,401.00 | 9.00 | 237.900 | 6,365.70 | -366.01 | -410.41 | -47.82 | 1.74 | 1.68 | 2.95 |
| 6,494.00 | 10.15 | 237.530 | 6,457.40 | -374.27 | -423.49 | -46.63 | 1.24 | 1.24 | -0.40 |
| 6,588.00 | 11.51 | 234.730 | 6,549.73 | -384.13 | -438.13 | -45.77 | 1.55 | 1.45 | -2.98 |
| 6,683.00 | 12.61 | 230.080 | 6,642.63 | -396.26 | -453.82 | -46.10 | 1.54 | 1.16 | -4.89 |
| 6,777.00 | 13.78 | 223.660 | 6,734.15 | -410.95 | -469.42 | -48.54 | 1.99 | 1.24 | -6.83 |
| 6,870.00 | 14.44 | 218.470 | 6,824.35 | -428.04 | -484.28 | -53.35 | 1.53 | 0.71 | -5.58 |
| 6,964.00 | 14.17 | 217.540 | 6,915.44 | -446.34 | -498.59 | -59.46 | 0.38 | -0.29 | -0.99 |
| 7,057.00 | 13.74 | 221.880 | 7,005.69 | -463.59 | -512.90 | -64.72 | 1.22 | -0.46 | 4.67 |
| 7,151.00 | 14.38 | 226.730 | 7,096.88 | -479.90 | -528.85 | -68.25 | 1.43 | 0.68 | 5.16 |
| 7,245.00 | 16.40 | 227.050 | 7,187.51 | -496.94 | -547.06 | -71.02 | 2.15 | 2.15 | 0.34 |
| 7,340.00 | 18.64 | 222.660 | 7,278.10 | -517.25 | -567.17 | -75.26 | 2.74 | 2.36 | -4.62 |
| 7,434.00 | 18.33 | 217.850 | 7,367.25 | -539.97 | -586.42 | -81.96 | 1.66 | -0.33 | -5.12 |
| 7,527.00 | 18.45 | 214.920 | 7,455.50 | -563.58 | -603.82 | -90.47 | 1.00 | 0.13 | -3.15 |
| 7,621.00 | 16.76 | 212.380 | 7,545.10 | -587.23 | -619.59 | -99.99 | 1.97 | -1.80 | -2.70 |
| 7,714.00 | 15.68 | 213.500 | 7,634.40 | -609.03 | -633.71 | -109.02 | 1.21 | -1.16 | 1.20 |
| 7,807.00 | 15.51 | 218.410 | 7,723.98 | -629.26 | -648.37 | -116.45 | 1.43 | -0.18 | 5.28 |
| 7,900.00 | 15.79 | 217.940 | 7,813.53 | -648.98 | -663.88 | -122.98 | 0.33 | 0.30 | -0.51 |
| 7,991.00 | 15.87 | 216.320 | 7,901.08 | -668.77 | -678.86 | -129.88 | 0.49 | 0.09 | -1.78 |
| 8,084.00 | 15.95 | 215.360 | 7,990.52 | -689.44 | -693.78 | -137.51 | 0.30 | 0.09 | -1.03 |
| 8,178.00 | 16.20 | 211.650 | 8,080.84 | -711.13 | -708.14 | -146.31 | 1.12 | 0.27 | -3.95 |
| 8,272.00 | 15.54 | 216.160 | 8,171.26 | -732.46 | -722.45 | -154.85 | 1.49 | -0.70 | 4.80 |
| 8,365.00 | 15.44 | 217.010 | 8,260.89 | -752.41 | -737.25 | -161.98 | 0.27 | -0.11 | 0.91 |
| 8,458.00 | 16.92 | 216.430 | 8,350.20 | -773.18 | -752.74 | -169.36 | 1.60 | 1.59 | -0.62 |
| 8,551.00 | 17.96 | 216.860 | 8,438.92 | -795.54 | -769.38 | -177.33 | 1.13 | 1.12 | 0.46 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 8,645.00 | 18.89 | 217.600 | 8,528.10 | -819.19 | -787.36 | -185.53 | 1.02 | 0.99 | 0.79 |
| 8,738.00 | 17.46 | 216.540 | 8,616.46 | -842.33 | -804.85 | -193.61 | 1.58 | -1.54 | -1.14 |
| 8,832.00 | 17.24 | 215.260 | 8,706.19 | -865.04 | -821.29 | -201.97 | 0.47 | -0.23 | -1.36 |
| 8,925.00 | 17.94 | 213.040 | 8,794.84 | -888.30 | -837.06 | -211.18 | 1.04 | 0.75 | -2.39 |
| 9,019.00 | 17.69 | 213.600 | 8,884.33 | -912.33 | -852.85 | -220.99 | 0.32 | -0.27 | 0.60 |
| 9,111.00 | 16.30 | 217.250 | 8,972.31 | -934.25 | -868.40 | -229.26 | 1.90 | -1.51 | 3.97 |
| 9,204.00 | 15.85 | 218.920 | 9,061.68 | -954.52 | -884.28 | -236.00 | 0.69 | -0.48 | 1.80 |
| 9,297.00 | 15.31 | 218.440 | 9,151.26 | -974.02 | -899.89 | -242.29 | 0.60 | -0.58 | -0.52 |
| 9,389.00 | 15.15 | 218.090 | 9,240.03 | -992.99 | -914.86 | -248.54 | 0.20 | -0.17 | -0.38 |
| 9,482.00 | 15.19 | 219.200 | 9,329.79 | -1,012.00 | -930.06 | -254.68 | 0.32 | 0.04 | 1.19 |
| 9,574.00 | 15.72 | 219.100 | 9,418.46 | -1,031.01 | -945.54 | -260.86 | 0.58 | 0.58 | -0.11 |
| 9,668.00 | 16.60 | 219.990 | 9,508.75 | -1,051.18 | -962.20 | -266.86 | 0.97 | 0.94 | 0.95 |
| 9,761.00 | 16.74 | 218.860 | 9,597.84 | -1,071.79 | -979.14 | -273.24 | 0.38 | 0.15 | -1.22 |
| 9,855.00 | 15.50 | 217.800 | 9,688.14 | -1,092.26 | -995.33 | -279.96 | 1.36 | -1.32 | -1.13 |
| 9,948.00 | 14.12 | 216.640 | 9,778.05 | -1,111.18 | -1,009.72 | -286.52 | 1.52 | -1.48 | -1.25 |
| 10,041.00 | 13.52 | 216.490 | 9,868.36 | -1,129.02 | -1,022.95 | -292.90 | 0.65 | -0.65 | -0.16 |
| 10,082.00 | 13.83 | 216.620 | 9,908.19 | -1,136.81 | -1,028.73 | -295.68 | 0.76 | 0.76 | 0.32 |
| 10,173.00 | 17.81 | 219.800 | 9,995.73 | -1,156.24 | -1,044.13 | -302.04 | 4.47 | 4.37 | 3.49 |
| 10,198.00 | 17.81 | 219.930 | 10,019.53 | -1,162.10 | -1,049.03 | -303.81 | 0.16 | 0.00 | 0.52 |
| 10,266.00 | 18.07 | 231.650 | 10,084.25 | -1,176.63 | -1,063.98 | -306.51 | 5.31 | 0.38 | 17.24 |
| 10,313.00 | 18.07 | 243.590 | 10,128.95 | -1,184.39 | -1,076.23 | -305.41 | 7.87 | 0.00 | 25.40 |
| 10,360.00 | 17.99 | 252.850 | 10,173.65 | -1,189.78 | -1,089.70 | -301.67 | 6.09 | -0.17 | 19.70 |
| 10,407.00 | 18.07 | 263.200 | 10,218.35 | -1,192.78 | -1,103.87 | -295.59 | 6.81 | 0.17 | 22.02 |
| 10,455.00 | 18.21 | 271.310 | 10,263.97 | -1,193.49 | -1,118.76 | -287.26 | 5.26 | 0.29 | 16.90 |
| 10,502.00 | 18.56 | 278.760 | 10,308.58 | -1,192.19 | -1,133.50 | -277.39 | 5.05 | 0.74 | 15.85 |
| 10,549.00 | 19.53 | 284.840 | 10,353.01 | -1,189.03 | -1,148.49 | -265.90 | 4.70 | 2.06 | 12.94 |
| 10,597.00 | 21.48 | 289.070 | 10,397.97 | -1,184.11 | -1,164.55 | -252.34 | 5.10 | 4.06 | 8.81 |
| 10,642.00 | 24.44 | 291.490 | 10,439.40 | -1,178.00 | -1,181.01 | -237.61 | 6.90 | 6.58 | 5.38 |
| 10,689.00 | 28.10 | 294.620 | 10,481.54 | -1,169.83 | -1,200.12 | -219.62 | 8.32 | 7.79 | 6.66 |
| 10,737.00 | 30.84 | 298.190 | 10,523.33 | -1,159.30 | -1,221.25 | -198.55 | 6.78 | 5.71 | 7.44 |
| 10,784.00 | 32.70 | 301.100 | 10,563.29 | -1,147.05 | -1,242.74 | -175.88 | 5.13 | 3.96 | 6.19 |
| 10,831.00 | 34.56 | 303.700 | 10,602.42 | -1,133.10 | -1,264.71 | -151.56 | 5.00 | 3.96 | 5.53 |
| 10,878.00 | 37.30 | 307.450 | 10,640.48 | -1,117.03 | -1,287.11 | -125.29 | 7.47 | 5.83 | 7.98 |
| 10,926.00 | 40.12 | 310.790 | 10,677.94 | -1,098.08 | -1,310.37 | -96.18 | 7.31 | 5.88 | 6.96 |
| 10,973.00 | 43.22 | 314.540 | 10,713.05 | -1,076.89 | -1,333.32 | -65.48 | 8.46 | 6.60 | 7.98 |
| 11,019.00 | 45.47 | 316.700 | 10,745.94 | -1,053.91 | -1,355.79 | -33.62 | 5.89 | 4.89 | 4.70 |
| 11,066.00 | 47.81 | 318.020 | 10,778.21 | -1,028.77 | -1,378.93 | 0.37 | 5.38 | 4.98 | 2.81 |
| 11,114.00 | 50.38 | 318.900 | 10,809.64 | -1,001.61 | -1,402.98 | 36.52 | 5.53 | 5.35 | 1.83 |
| 11,161.00 | 54.22 | 320.220 | 10,838.38 | -973.31 | -1,427.09 | 73.62 | 8.47 | 8.17 | 2.81 |
| 11,208.00 | 57.45 | 320.970 | 10,864.77 | -943.26 | -1,451.77 | 112.46 | 7.00 | 6.87 | 1.60 |
| 11,255.00 | 60.10 | 320.530 | 10,889.13 | -912.14 | -1,477.20 | 152.61 | 5.69 | 5.64 | -0.94 |
| 11,303.00 | 63.15 | 320.530 | 10,911.94 | -879.54 | -1,504.04 | 194.79 | 6.35 | 6.35 | 0.00 |
| 11,350.00 | 67.08 | 322.030 | 10,931.71 | -846.28 | -1,530.70 | 237.39 | 8.85 | 8.36 | 3.19 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 11,397.00 | 70.70 | 323.350 | 10,948.64 | -811.41 | -1,557.26 | 281.23 | 8.14 | 7.70 | 2.81 |
| 11,444.00 | 73.49 | 324.760 | 10,963.09 | -775.21 | -1,583.51 | 325.94 | 6.59 | 5.94 | 3.00 |
| 11,491.00 | 76.23 | 326.090 | 10,975.36 | -737.85 | -1,609.25 | 371.27 | 6.44 | 5.83 | 2.83 |
| 11,538.00 | 78.79 | 327.060 | 10,985.53 | -699.56 | -1,634.52 | 417.08 | 5.81 | 5.45 | 2.06 |
| 11,586.00 | 81.04 | 327.890 | 10,993.93 | -659.71 | -1,659.93 | 464.21 | 4.99 | 4.69 | 1.73 |
| 11,633.00 | 83.69 | 328.860 | 11,000.18 | -620.05 | -1,684.35 | 510.60 | 6.00 | 5.64 | 2.06 |
| 11,681.00 | 87.76 | 329.880 | 11,003.75 | -578.87 | -1,708.73 | 558.18 | 8.74 | 8.48 | 2.13 |
| 11,728.00 | 90.94 | 328.860 | 11,004.29 | -538.44 | -1,732.67 | 604.91 | 7.11 | 6.77 | -2.17 |
| 11,776.00 | 91.52 | 329.830 | 11,003.26 | -497.16 | -1,757.14 | 652.62 | 2.35 | 1.21 | 2.02 |
| 11,869.00 | 91.91 | 329.880 | 11,000.47 | -416.77 | -1,803.83 | 744.97 | 0.42 | 0.42 | 0.05 |
| 11,964.00 | 91.87 | 329.040 | 10,997.34 | -334.99 | -1,852.07 | 839.36 | 0.88 | -0.04 | -0.88 |
| 12,058.00 | 91.87 | 330.400 | 10,994.27 | -253.86 | -1,899.44 | 932.71 | 1.45 | 0.00 | 1.45 |
| 12,152.00 | 91.96 | 327.760 | 10,991.13 | -173.27 | -1,947.71 | 1,026.17 | 2.81 | 0.10 | -2.81 |
| 12,247.00 | 91.96 | 330.890 | 10,987.88 | -91.62 | -1,996.14 | 1,120.57 | 3.29 | 0.00 | 3.29 |
| 12,342.00 | 91.91 | 328.770 | 10,984.67 | -9.55 | -2,043.86 | 1,214.89 | 2.23 | -0.05 | -2.23 |
| 12,436.00 | 91.91 | 330.230 | 10,981.54 | 71.40 | -2,091.54 | 1,308.28 | 1.55 | 0.00 | 1.55 |
| 12,531.00 | 91.65 | 328.330 | 10,978.59 | 153.03 | -2,140.04 | 1,402.70 | 2.02 | -0.27 | -2.00 |
| 12,625.00 | 91.43 | 329.610 | 10,976.06 | 233.54 | -2,188.48 | 1,496.20 | 1.38 | -0.23 | 1.36 |
| 12,719.00 | 91.38 | 330.270 | 10,973.76 | 314.88 | -2,235.55 | 1,589.53 | 0.70 | -0.05 | 0.70 |
| 12,814.00 | 90.94 | 328.510 | 10,971.83 | 396.62 | -2,283.91 | 1,683.97 | 1.91 | -0.46 | -1.85 |
| 12,909.00 | 90.90 | 330.140 | 10,970.31 | 478.31 | -2,332.37 | 1,778.42 | 1.72 | -0.04 | 1.72 |
| 13,003.00 | 91.03 | 328.110 | 10,968.72 | 558.98 | -2,380.60 | 1,871.91 | 2.16 | 0.14 | -2.16 |
| 13,098.00 | 91.07 | 329.610 | 10,966.98 | 640.27 | -2,429.72 | 1,966.44 | 1.58 | 0.04 | 1.58 |
| 13,192.00 | 91.07 | 330.230 | 10,965.23 | 721.60 | -2,476.82 | 2,059.79 | 0.66 | 0.00 | 0.66 |
| 13,286.00 | 91.03 | 329.080 | 10,963.51 | 802.70 | -2,524.30 | 2,153.19 | 1.22 | -0.04 | -1.22 |
| 13,381.00 | 91.12 | 330.890 | 10,961.72 | 884.95 | -2,571.81 | 2,247.51 | 1.91 | 0.09 | 1.91 |
| 13,476.00 | 90.94 | 328.640 | 10,960.02 | 967.00 | -2,619.64 | 2,341.88 | 2.38 | -0.19 | -2.37 |
| 13,570.00 | 90.99 | 329.960 | 10,958.43 | 1,047.82 | -2,667.62 | 2,435.34 | 1.41 | 0.05 | 1.40 |
| 13,665.00 | 90.41 | 329.700 | 10,957.27 | 1,129.94 | -2,715.36 | 2,529.71 | 0.67 | -0.61 | -0.27 |
| 13,758.00 | 90.54 | 330.620 | 10,956.50 | 1,210.61 | -2,761.64 | 2,622.04 | 1.00 | 0.14 | 0.99 |
| 13,853.00 | 90.37 | 331.200 | 10,955.75 | 1,293.62 | -2,807.82 | 2,716.19 | 0.64 | -0.18 | 0.61 |
| 13,948.00 | 90.99 | 329.390 | 10,954.62 | 1,376.13 | -2,854.89 | 2,810.46 | 2.01 | 0.65 | -1.91 |
| 14,042.00 | 91.03 | 330.760 | 10,952.96 | 1,457.58 | -2,901.78 | 2,903.78 | 1.46 | 0.04 | 1.46 |
| 14,137.00 | 91.03 | 330.050 | 10,951.25 | 1,540.17 | -2,948.69 | 2,998.03 | 0.75 | 0.00 | -0.75 |
| 14,231.00 | 90.94 | 331.770 | 10,949.64 | 1,622.30 | -2,994.38 | 3,091.18 | 1.83 | -0.10 | 1.83 |
| 14,326.00 | 91.07 | 329.480 | 10,947.97 | 1,705.07 | -3,040.97 | 3,185.37 | 2.41 | 0.14 | -2.41 |
| 14,420.00 | 91.07 | 332.210 | 10,946.22 | 1,787.14 | -3,086.75 | 3,278.52 | 2.90 | 0.00 | 2.90 |
| 14,515.00 | 90.85 | 328.550 | 10,944.62 | 1,869.70 | -3,133.69 | 3,372.76 | 3.86 | -0.23 | -3.85 |
| 14,609.00 | 90.90 | 333.090 | 10,943.19 | 1,951.74 | -3,179.50 | 3,465.91 | 4.83 | 0.05 | 4.83 |
| 14,703.00 | 91.07 | 331.460 | 10,941.57 | 2,034.93 | -3,223.23 | 3,558.73 | 1.74 | 0.18 | -1.73 |
| 14,797.00 | 90.85 | 331.860 | 10,940.00 | 2,117.65 | -3,267.84 | 3,651.71 | 0.49 | -0.23 | 0.43 |
| 14,891.00 | 90.68 | 330.980 | 10,938.74 | 2,200.19 | -3,312.81 | 3,744.75 | 0.95 | -0.18 | -0.94 |
| 14,986.00 | 90.85 | 331.900 | 10,937.47 | 2,283.62 | -3,358.22 | 3,838.78 | 0.98 | 0.18 | 0.97 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 15,080.00 | 90.94 | 329.190 | 10,936.00 | 2,365.45 | -3,404.43 | 3,932.00 | 2.88 | 0.10 | -2.88 |
| 15,175.00 | 91.43 | 330.890 | 10,934.04 | 2,447.74 | -3,451.86 | 4,026.31 | 1.86 | 0.52 | 1.79 |
| 15,269.00 | 91.30 | 331.590 | 10,931.80 | 2,530.12 | -3,497.08 | 4,119.37 | 0.76 | -0.14 | 0.74 |
| 15,363.00 | 91.30 | 330.620 | 10,929.67 | 2,612.39 | -3,542.49 | 4,212.47 | 1.03 | 0.00 | -1.03 |
| 15,458.00 | 91.21 | 330.320 | 10,927.59 | 2,695.03 | -3,589.30 | 4,306.70 | 0.33 | -0.09 | -0.32 |
| 15,552.00 | 91.38 | 331.110 | 10,925.46 | 2,777.00 | -3,635.27 | 4,399.88 | 0.86 | 0.18 | 0.84 |
| 15,647.00 | 91.25 | 330.850 | 10,923.28 | 2,860.05 | -3,681.34 | 4,493.99 | 0.31 | -0.14 | -0.27 |
| 15,742.00 | 91.16 | 331.240 | 10,921.28 | 2,943.15 | -3,727.32 | 4,588.10 | 0.42 | -0.09 | 0.41 |
| 15,836.00 | 90.85 | 331.810 | 10,919.64 | 3,025.77 | -3,772.13 | 4,681.11 | 0.69 | -0.33 | 0.61 |
| 15,931.00 | 91.25 | 331.110 | 10,917.89 | 3,109.21 | -3,817.51 | 4,775.12 | 0.85 | 0.42 | -0.74 |
| 16,026.00 | 90.59 | 330.320 | 10,916.37 | 3,192.06 | -3,863.97 | 4,869.30 | 1.08 | -0.69 | -0.83 |
| 16,121.00 | 91.34 | 330.450 | 10,914.77 | 3,274.64 | -3,910.91 | 4,963.56 | 0.80 | 0.79 | 0.14 |
| 16,216.00 | 90.99 | 330.400 | 10,912.84 | 3,357.24 | -3,957.79 | 5,057.79 | 0.37 | -0.37 | -0.05 |
| 16,310.00 | 91.03 | 330.670 | 10,911.18 | 3,439.07 | -4,004.02 | 5,151.02 | 0.29 | 0.04 | 0.29 |
| 16,410.00 | 91.07 | 330.140 | 10,909.35 | 3,526.01 | -4,053.40 | 5,250.23 | 0.53 | 0.04 | -0.53 |
| 16,504.00 | 91.03 | 330.320 | 10,907.63 | 3,607.59 | -4,100.07 | 5,343.52 | 0.20 | -0.04 | 0.19 |
| 16,599.00 | 90.81 | 329.790 | 10,906.10 | 3,689.90 | -4,147.48 | 5,437.84 | 0.60 | -0.23 | -0.56 |
| 16,692.00 | 90.81 | 329.610 | 10,904.79 | 3,770.18 | -4,194.40 | 5,530.25 | 0.19 | 0.00 | -0.19 |
| 16,787.00 | 90.50 | 329.130 | 10,903.70 | 3,851.92 | -4,242.80 | 5,624.70 | 0.60 | -0.33 | -0.51 |
| 16,880.00 | 90.94 | 330.050 | 10,902.53 | 3,932.12 | -4,289.87 | 5,717.12 | 1.10 | 0.47 | 0.99 |
| 16,974.00 | 90.90 | 329.210 | 10,901.02 | 4,013.21 | -4,337.38 | 5,810.53 | 0.89 | -0.04 | -0.89 |
| 17,068.00 | 91.07 | 328.950 | 10,899.41 | 4,093.84 | -4,385.68 | 5,904.03 | 0.33 | 0.18 | -0.28 |
| 17,162.00 | 90.99 | 329.170 | 10,897.72 | 4,174.45 | -4,434.00 | 5,997.54 | 0.25 | -0.09 | 0.23 |
| 17,256.00 | 91.07 | 329.170 | 10,896.03 | 4,255.16 | -4,482.17 | 6,091.02 | 0.09 | 0.09 | 0.00 |
| 17,350.00 | 90.90 | 329.390 | 10,894.41 | 4,335.95 | -4,530.18 | 6,184.49 | 0.30 | -0.18 | 0.23 |
| 17,444.00 | 90.94 | 326.390 | 10,892.90 | 4,415.55 | -4,580.13 | 6,278.16 | 3.19 | 0.04 | -3.19 |
| 17,538.00 | 90.94 | 330.010 | 10,891.36 | 4,495.42 | -4,629.65 | 6,371.79 | 3.85 | 0.00 | 3.85 |
| 17,632.00 | 90.99 | 328.020 | 10,889.78 | 4,575.99 | -4,678.03 | 6,465.29 | 2.12 | 0.05 | -2.12 |
| 17,726.00 | 90.94 | 329.570 | 10,888.19 | 4,656.38 | -4,726.73 | 6,558.84 | 1.65 | -0.05 | 1.65 |
| 17,820.00 | 91.07 | 329.480 | 10,886.54 | 4,737.38 | -4,774.39 | 6,652.26 | 0.17 | 0.14 | -0.10 |
| 17,914.00 | 91.07 | 330.180 | 10,884.79 | 4,818.63 | -4,821.63 | 6,745.63 | 0.74 | 0.00 | 0.74 |
| 18,009.00 | 91.07 | 329.740 | 10,883.01 | 4,900.86 | -4,869.17 | 6,839.97 | 0.46 | 0.00 | -0.46 |
| 18,103.00 | 90.99 | 329.430 | 10,881.32 | 4,981.91 | -4,916.75 | 6,933.38 | 0.34 | -0.09 | -0.33 |
| 18,197.00 | 90.90 | 328.640 | 10,879.77 | 5,062.50 | -4,965.11 | 7,026.89 | 0.85 | -0.10 | -0.84 |
| 18,291.00 | 91.43 | 329.480 | 10,877.86 | 5,143.10 | -5,013.43 | 7,120.39 | 1.06 | 0.56 | 0.89 |
| 18,385.00 | 91.47 | 329.170 | 10,875.48 | 5,223.93 | -5,061.37 | 7,213.83 | 0.33 | 0.04 | -0.33 |
| 18,478.00 | 91.56 | 330.450 | 10,873.02 | 5,304.28 | -5,108.12 | 7,306.19 | 1.38 | 0.10 | 1.38 |
| 18,572.00 | 91.52 | 329.080 | 10,870.50 | 5,385.46 | -5,155.44 | 7,399.55 | 1.46 | -0.04 | -1.46 |
| 18,667.00 | 91.38 | 330.540 | 10,868.09 | 5,467.55 | -5,203.19 | 7,493.90 | 1.54 | -0.15 | 1.54 |
| 18,760.00 | 91.47 | 329.700 | 10,865.78 | 5,548.16 | -5,249.51 | 7,586.20 | 0.91 | 0.10 | -0.90 |
| 18,854.00 | 91.47 | 331.200 | 10,863.37 | 5,629.90 | -5,295.85 | 7,679.43 | 1.60 | 0.00 | 1.60 |
| 18,948.00 | 91.43 | 332.610 | 10,860.99 | 5,712.80 | -5,340.10 | 7,772.33 | 1.50 | -0.04 | 1.50 |
| 19,040.00 | 91.38 | 330.270 | 10,858.74 | 5,793.58 | -5,384.07 | 7,863.36 | 2.54 | -0.05 | -2.54 |
| 19,134.00 | 91.38 | 331.590 | 10,856.47 | 5,875.71 | -5,429.73 | 7,956.49 | 1.40 | 0.00 | 1.40 |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Survey | | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|-----------|-----------|-----------------------|-----------------------|----------------------|---------------------|--|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N-S (ft) | +E-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) | |
| 19,227.00 | 91.43 | 332.080 | 10,854.19 | 5,957.67 | -5,473.61 | 8,048.43 | 0.53 | 0.05 | 0.53 | |
| 19,321.00 | 91.38 | 331.110 | 10,851.89 | 6,040.33 | -5,518.31 | 8,141.40 | 1.03 | -0.05 | -1.03 | |
| 19,415.00 | 91.21 | 332.030 | 10,849.76 | 6,122.97 | -5,563.05 | 8,234.39 | 1.00 | -0.18 | 0.98 | |
| 19,509.00 | 90.99 | 331.590 | 10,847.96 | 6,205.80 | -5,607.45 | 8,327.33 | 0.52 | -0.23 | -0.47 | |
| 19,602.00 | 91.25 | 331.680 | 10,846.14 | 6,287.62 | -5,651.63 | 8,419.32 | 0.30 | 0.28 | 0.10 | |
| 19,696.00 | 91.30 | 331.200 | 10,844.05 | 6,370.16 | -5,696.55 | 8,512.34 | 0.51 | 0.05 | -0.51 | |
| 19,791.00 | 90.85 | 332.300 | 10,842.27 | 6,453.83 | -5,741.51 | 8,606.29 | 1.25 | -0.47 | 1.16 | |
| 19,884.00 | 90.85 | 330.670 | 10,840.89 | 6,535.54 | -5,785.90 | 8,698.32 | 1.75 | 0.00 | -1.75 | |
| 19,977.00 | 90.59 | 329.080 | 10,839.72 | 6,615.97 | -5,832.57 | 8,790.69 | 1.73 | -0.28 | -1.71 | |
| 20,071.00 | 90.81 | 330.270 | 10,838.57 | 6,697.10 | -5,880.03 | 8,884.09 | 1.29 | 0.23 | 1.27 | |
| 20,164.00 | 90.68 | 331.370 | 10,837.36 | 6,778.29 | -5,925.37 | 8,976.27 | 1.19 | -0.14 | 1.18 | |
| 20,258.00 | 90.72 | 327.890 | 10,836.21 | 6,859.37 | -5,972.88 | 9,069.67 | 3.70 | 0.04 | -3.70 | |
| 20,351.00 | 90.77 | 328.200 | 10,835.00 | 6,938.27 | -6,022.10 | 9,162.34 | 0.34 | 0.05 | 0.33 | |
| 20,445.00 | 90.72 | 328.690 | 10,833.78 | 7,018.37 | -6,071.28 | 9,255.95 | 0.52 | -0.05 | 0.52 | |
| 20,538.00 | 90.72 | 330.230 | 10,832.61 | 7,098.46 | -6,118.54 | 9,348.39 | 1.66 | 0.00 | 1.66 | |
| 20,632.00 | 90.77 | 331.070 | 10,831.39 | 7,180.38 | -6,164.61 | 9,441.60 | 0.90 | 0.05 | 0.89 | |
| 20,725.00 | 90.68 | 328.550 | 10,830.21 | 7,260.76 | -6,211.36 | 9,533.98 | 2.71 | -0.10 | -2.71 | |
| 20,817.00 | 91.16 | 331.950 | 10,828.73 | 7,340.61 | -6,257.00 | 9,625.27 | 3.73 | 0.52 | 3.70 | |
| 20,911.00 | 91.16 | 328.730 | 10,826.83 | 7,422.26 | -6,303.50 | 9,718.53 | 3.42 | 0.00 | -3.43 | |
| 21,004.00 | 91.25 | 331.150 | 10,824.87 | 7,502.73 | -6,350.08 | 9,810.87 | 2.60 | 0.10 | 2.60 | |
| 21,099.00 | 91.43 | 330.580 | 10,822.65 | 7,585.69 | -6,396.31 | 9,905.01 | 0.63 | 0.19 | -0.60 | |
| 21,192.00 | 91.52 | 330.850 | 10,820.26 | 7,666.78 | -6,441.79 | 9,997.19 | 0.31 | 0.10 | 0.29 | |
| 21,286.00 | 91.78 | 331.590 | 10,817.55 | 7,749.13 | -6,487.03 | 10,090.25 | 0.83 | 0.28 | 0.79 | |
| 21,380.00 | 92.18 | 331.070 | 10,814.30 | 7,831.56 | -6,532.10 | 10,183.26 | 0.70 | 0.43 | -0.55 | |
| 21,426.00 | 92.49 | 331.460 | 10,812.43 | 7,871.86 | -6,554.20 | 10,228.77 | 1.08 | 0.67 | 0.85 | |
| 21,474.00 | 92.71 | 331.590 | 10,810.25 | 7,914.01 | -6,577.06 | 10,276.23 | 0.53 | 0.46 | 0.27 | |
| 21,550.00 | 91.03 | 330.780 | 10,807.77 | 7,980.56 | -6,613.67 | 10,351.46 | 2.45 | -2.21 | -1.07 | |
| 21,643.00 | 90.15 | 331.400 | 10,806.81 | 8,061.96 | -6,658.62 | 10,443.59 | 1.16 | -0.95 | 0.67 | |
| 21,736.00 | 90.46 | 331.050 | 10,806.32 | 8,143.48 | -6,703.39 | 10,535.69 | 0.50 | 0.33 | -0.38 | |
| 21,830.00 | 89.98 | 329.640 | 10,805.96 | 8,225.16 | -6,749.90 | 10,628.97 | 1.58 | -0.51 | -1.50 | |
| 21,922.00 | 90.51 | 329.730 | 10,805.57 | 8,304.58 | -6,796.33 | 10,720.39 | 0.58 | 0.58 | 0.10 | |
| 22,015.00 | 89.58 | 329.030 | 10,805.49 | 8,384.61 | -6,843.70 | 10,812.86 | 1.25 | -1.00 | -0.75 | |
| 22,109.00 | 89.98 | 328.760 | 10,805.85 | 8,465.10 | -6,892.26 | 10,906.40 | 0.51 | 0.43 | -0.29 | |
| 22,204.00 | 90.42 | 327.880 | 10,805.52 | 8,545.94 | -6,942.15 | 11,001.03 | 1.04 | 0.46 | -0.93 | |
| 22,298.00 | 90.29 | 327.710 | 10,804.94 | 8,625.48 | -6,992.25 | 11,094.73 | 0.23 | -0.14 | -0.18 | |
| 22,391.00 | 91.16 | 329.900 | 10,803.76 | 8,705.02 | -7,040.41 | 11,187.29 | 2.53 | 0.94 | 2.35 | |
| 22,485.00 | 90.20 | 329.640 | 10,802.65 | 8,786.23 | -7,087.73 | 11,280.67 | 1.06 | -1.02 | -0.28 | |
| 22,578.00 | 91.21 | 332.450 | 10,801.50 | 8,867.59 | -7,132.75 | 11,372.80 | 3.21 | 1.09 | 3.02 | |
| 22,672.00 | 90.46 | 333.860 | 10,800.13 | 8,951.45 | -7,175.19 | 11,465.39 | 1.70 | -0.80 | 1.50 | |
| 22,766.00 | 90.20 | 335.440 | 10,799.59 | 9,036.39 | -7,215.44 | 11,557.53 | 1.70 | -0.28 | 1.68 | |
| 22,860.00 | 89.67 | 333.330 | 10,799.70 | 9,121.15 | -7,256.07 | 11,649.76 | 2.31 | -0.56 | -2.24 | |
| 22,955.00 | 89.49 | 331.310 | 10,800.39 | 9,205.27 | -7,300.20 | 11,743.57 | 2.13 | -0.19 | -2.13 | |
| 23,047.00 | 89.76 | 329.380 | 10,801.00 | 9,285.21 | -7,345.72 | 11,834.86 | 2.12 | 0.29 | -2.10 | |



Survey Report



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|---------------------|
| 23,142.00 | 89.71 | 327.710 | 10,801.44 | 9,366.25 | -7,395.29 | 11,929.45 | 1.76 | -0.05 | -1.76 |
| 23,235.00 | 90.33 | 327.530 | 10,801.40 | 9,444.79 | -7,445.09 | 12,022.18 | 0.69 | 0.67 | -0.19 |
| 23,328.00 | 91.25 | 327.270 | 10,800.12 | 9,523.13 | -7,495.19 | 12,114.93 | 1.03 | 0.99 | -0.28 |
| 23,421.00 | 90.77 | 328.410 | 10,798.48 | 9,601.84 | -7,544.68 | 12,207.62 | 1.33 | -0.52 | 1.23 |
| 23,515.00 | 91.30 | 328.150 | 10,796.78 | 9,681.79 | -7,594.10 | 12,301.24 | 0.63 | 0.56 | -0.28 |
| 23,609.00 | 90.68 | 328.500 | 10,795.16 | 9,761.78 | -7,643.45 | 12,394.86 | 0.76 | -0.66 | 0.37 |
| 23,702.00 | 90.15 | 328.760 | 10,794.49 | 9,841.18 | -7,691.86 | 12,487.45 | 0.63 | -0.57 | 0.28 |
| 23,796.00 | 90.90 | 328.850 | 10,793.62 | 9,921.58 | -7,740.55 | 12,581.01 | 0.80 | 0.80 | 0.10 |
| 23,889.00 | 91.56 | 328.670 | 10,791.63 | 10,001.08 | -7,788.77 | 12,673.56 | 0.74 | 0.71 | -0.19 |
| 23,982.00 | 90.73 | 329.030 | 10,789.77 | 10,080.65 | -7,836.86 | 12,766.10 | 0.97 | -0.89 | 0.39 |
| 24,075.00 | 91.21 | 327.270 | 10,788.20 | 10,159.64 | -7,885.93 | 12,858.74 | 1.96 | 0.52 | -1.89 |
| 24,169.00 | 90.29 | 327.180 | 10,786.97 | 10,238.66 | -7,936.81 | 12,952.51 | 0.98 | -0.98 | -0.10 |
| 24,263.00 | 90.81 | 327.880 | 10,786.06 | 10,317.96 | -7,987.27 | 13,046.24 | 0.93 | 0.55 | 0.74 |
| 24,356.00 | 90.81 | 329.380 | 10,784.75 | 10,397.36 | -8,035.68 | 13,138.82 | 1.61 | 0.00 | 1.61 |
| 24,449.00 | 90.42 | 331.050 | 10,783.75 | 10,478.07 | -8,081.87 | 13,231.13 | 1.84 | -0.42 | 1.80 |
| 24,543.00 | 91.52 | 330.870 | 10,782.16 | 10,560.24 | -8,127.50 | 13,324.27 | 1.19 | 1.17 | -0.19 |
| 24,636.00 | 91.16 | 332.370 | 10,779.98 | 10,642.03 | -8,171.69 | 13,416.25 | 1.66 | -0.39 | 1.61 |
| 24,729.00 | 90.42 | 332.810 | 10,778.70 | 10,724.58 | -8,214.49 | 13,508.01 | 0.93 | -0.80 | 0.47 |
| 24,821.00 | 90.42 | 333.070 | 10,778.03 | 10,806.51 | -8,256.35 | 13,598.70 | 0.28 | 0.00 | 0.28 |
| 24,914.00 | 90.64 | 333.070 | 10,777.17 | 10,889.42 | -8,298.46 | 13,690.34 | 0.24 | 0.24 | 0.00 |
| 25,007.00 | 91.47 | 333.330 | 10,775.45 | 10,972.42 | -8,340.39 | 13,781.93 | 0.94 | 0.89 | 0.28 |
| 25,099.00 | 89.85 | 333.510 | 10,774.39 | 11,054.69 | -8,381.55 | 13,872.47 | 1.77 | -1.76 | 0.20 |
| 25,192.00 | 89.58 | 332.720 | 10,774.86 | 11,137.63 | -8,423.60 | 13,964.10 | 0.90 | -0.29 | -0.85 |
| 25,286.00 | 89.32 | 330.870 | 10,775.76 | 11,220.46 | -8,468.03 | 14,057.05 | 1.99 | -0.28 | -1.97 |
| 25,379.00 | 90.46 | 331.310 | 10,775.94 | 11,301.87 | -8,512.98 | 14,149.18 | 1.31 | 1.23 | 0.47 |
| 25,472.00 | 90.90 | 330.730 | 10,774.83 | 11,383.22 | -8,558.04 | 14,241.33 | 0.78 | 0.47 | -0.62 |
| 25,565.00 | 91.56 | 331.130 | 10,772.84 | 11,464.49 | -8,603.22 | 14,333.47 | 0.83 | 0.71 | 0.43 |
| 25,659.00 | 92.49 | 331.350 | 10,769.52 | 11,546.84 | -8,648.41 | 14,426.50 | 1.02 | 0.99 | 0.23 |
| 25,752.00 | 93.22 | 331.220 | 10,764.88 | 11,628.30 | -8,693.04 | 14,518.48 | 0.80 | 0.78 | -0.14 |
| 25,846.00 | 94.24 | 331.010 | 10,758.77 | 11,710.43 | -8,738.35 | 14,611.40 | 1.11 | 1.09 | -0.22 |
| 25,940.00 | 94.97 | 331.220 | 10,751.22 | 11,792.47 | -8,783.61 | 14,704.22 | 0.81 | 0.78 | 0.22 |
| 25,974.00 | 95.03 | 331.120 | 10,748.26 | 11,822.14 | -8,799.94 | 14,737.76 | 0.34 | 0.18 | -0.29 |
| Survey @ 25974.00 MD 10748.26 TVD | | | | | | | | | |
| 26,031.00 | 95.03 | 331.120 | 10,743.26 | 11,871.86 | -8,827.37 | 14,794.01 | 0.00 | 0.00 | 0.00 |
| Survey Proj. to 26031.00 MD 10743.26 TVD | | | | | | | | | |

Design Annotations

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates | | Comment |
|---------------------|---------------------|-------------------|------------|--|
| | | +N/-S (ft) | +E/-W (ft) | |
| 180.00 | 180.00 | 0.19 | -0.27 | MWD surveys |
| 25,974.00 | 10,748.26 | 11,822.14 | -8,799.94 | Survey @ 25974.00 MD 10748.26 TVD |
| 26,031.00 | 10,743.26 | 11,871.86 | -8,827.37 | Survey Proj. to 26031.00 MD 10743.26 TVD |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| | | | |
|--------------------|--|----------------------|----------------|
| Project | Marshall County, West Virginia NAD83 UTM 17N | | |
| Map System: | Universal Transverse Mercator (US Survey Feet) | System Datum: | Mean Sea Level |
| Geo Datum: | NAD83 West Virginia - HARN | | |
| Map Zone: | Zone 17N (84 W to 78 W) | | |

| | | | | | |
|------------------------------|------------|---------------------|---------------------|--------------------------|---------------|
| Site | Van Winkle | | | | |
| Site Position: | | Northing: | 14,447,369.493 usft | Latitude: | 39.781725330 |
| From: | Lat/Long | Easting: | 1,717,188.440 usft | Longitude: | -80.726733270 |
| Position Uncertainty: | 0.00 ft | Slot Radius: | 13-3/16 " | Grid Convergence: | 0.17 ° |

| | | | | | | |
|-----------------------------|-----------------------------|---------|----------------------------|---------------------|----------------------|---------------|
| Well | Van Winkle N-17 HU (slot F) | | | | | |
| Well Position | +N/-S | 0.00 ft | Northing: | 14,447,283.276 usft | Latitude: | 39.781489000 |
| | +E/-W | 0.00 ft | Easting: | 1,717,135.399 usft | Longitude: | -80.726923000 |
| Position Uncertainty | | 0.00 ft | Wellhead Elevation: | ft | Ground Level: | 753.00 ft |

| | | | | | |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| Wellbore | Original Hole | | | | |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
| | IGRF2020 | 4/27/2022 | -8.65 | 66.45 | 51,660.81903639 |

| | | | | | |
|--------------------------|------------------------------|-------------------|-------------------|----------------------|---------|
| Design | Surveys Original Hole | | | | |
| Audit Notes: | | | | | |
| Version: | 1.0 | Phase: | ACTUAL | Tie On Depth: | 0.00 |
| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) | |
| | 0.00 | 0.00 | 0.00 | | 323.262 |

| | | | | | |
|-----------------------|----------------|-----------------------------------|------------------|--------------------|--|
| Survey Program | Date 6/7/2022 | | | | |
| From (ft) | To (ft) | Survey (Wellbore) | Tool Name | Description | |
| 180.00 | 518.00 | MWD surf (Original Hole) | MWD | MWD - Standard | |
| 539.00 | 2,181.00 | MWD int (Original Hole) | MWD | MWD - Standard | |
| 2,245.00 | 10,041.00 | MWD 2245-10041 MD (Original Hole) | MWD | MWD - Standard | |
| 10,082.00 | 25,974.00 | MWD (Original Hole) | MWD | MWD - Standard | |
| 26,031.00 | 26,031.00 | Projection (Original Hole) | MWD | MWD - Standard | |

| | | | | | | | | | | |
|----------------------------|------------------------|--------------------|----------------------------|-------------------|-------------------|----------------------------|---------------------------|-----------------|------------------|--|
| Survey | | | | | | | | | | |
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude | |
| 0.00 | 0.00 | 0.000 | 0.00 | 0.00 | 0.00 | 14,447,283.276 | 1,717,135.399 | 39.781489000 | -80.726923000 | |
| 180.00 | 0.21 | 304.330 | 180.00 | 0.19 | -0.27 | 14,447,283.462 | 1,717,135.127 | 39.781489513 | -80.726923968 | |
| MWD surveys | | | | | | | | | | |
| 209.00 | 0.19 | 286.270 | 209.00 | 0.23 | -0.36 | 14,447,283.506 | 1,717,135.037 | 39.781489633 | -80.726924288 | |
| 239.00 | 0.16 | 257.040 | 239.00 | 0.23 | -0.45 | 14,447,283.510 | 1,717,134.948 | 39.781489647 | -80.726924603 | |
| 269.00 | 0.15 | 224.860 | 269.00 | 0.20 | -0.52 | 14,447,283.473 | 1,717,134.880 | 39.781489545 | -80.726924847 | |
| 299.00 | 0.00 | 242.290 | 299.00 | 0.17 | -0.55 | 14,447,283.445 | 1,717,134.852 | 39.781489469 | -80.726924946 | |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 329.00 | 0.14 | 271.210 | 329.00 | 0.17 | -0.58 | 14,447,283.446 | 1,717,134.815 | 39.781489471 | -80.726925077 |
| 361.00 | 0.15 | 257.880 | 361.00 | 0.16 | -0.66 | 14,447,283.438 | 1,717,134.735 | 39.781489450 | -80.726925362 |
| 392.00 | 0.20 | 204.820 | 392.00 | 0.10 | -0.73 | 14,447,283.380 | 1,717,134.673 | 39.781489292 | -80.726925584 |
| 423.00 | 0.21 | 176.600 | 423.00 | 0.00 | -0.75 | 14,447,283.274 | 1,717,134.654 | 39.781489002 | -80.726925654 |
| 455.00 | 0.34 | 183.470 | 455.00 | -0.16 | -0.75 | 14,447,283.121 | 1,717,134.651 | 39.781488581 | -80.726925664 |
| 486.00 | 0.22 | 204.350 | 486.00 | -0.30 | -0.78 | 14,447,282.975 | 1,717,134.621 | 39.781488180 | -80.726925773 |
| 518.00 | 0.44 | 184.670 | 518.00 | -0.48 | -0.81 | 14,447,282.797 | 1,717,134.586 | 39.781487690 | -80.726925900 |
| 539.00 | 0.52 | 208.350 | 539.00 | -0.64 | -0.87 | 14,447,282.632 | 1,717,134.534 | 39.781487240 | -80.726926087 |
| 570.00 | 0.34 | 173.880 | 570.00 | -0.86 | -0.92 | 14,447,282.417 | 1,717,134.477 | 39.781486649 | -80.726926292 |
| 602.00 | 0.23 | 181.800 | 602.00 | -1.02 | -0.91 | 14,447,282.259 | 1,717,134.485 | 39.781486213 | -80.726926265 |
| 633.00 | 0.15 | 278.550 | 633.00 | -1.07 | -0.96 | 14,447,282.202 | 1,717,134.443 | 39.781486059 | -80.726926415 |
| 665.00 | 0.31 | 178.990 | 665.00 | -1.15 | -1.00 | 14,447,282.122 | 1,717,134.403 | 39.781485839 | -80.726926558 |
| 697.00 | 0.42 | 179.650 | 696.99 | -1.36 | -0.99 | 14,447,281.918 | 1,717,134.405 | 39.781485279 | -80.726926552 |
| 728.00 | 0.50 | 170.390 | 727.99 | -1.60 | -0.97 | 14,447,281.671 | 1,717,134.429 | 39.781484601 | -80.726926472 |
| 760.00 | 0.55 | 171.000 | 759.99 | -1.89 | -0.92 | 14,447,281.382 | 1,717,134.476 | 39.781483806 | -80.726926307 |
| 792.00 | 0.58 | 167.850 | 791.99 | -2.20 | -0.87 | 14,447,281.072 | 1,717,134.534 | 39.781482954 | -80.726926103 |
| 823.00 | 0.64 | 186.230 | 822.99 | -2.53 | -0.85 | 14,447,280.746 | 1,717,134.548 | 39.781482060 | -80.726926056 |
| 855.00 | 0.58 | 187.140 | 854.99 | -2.87 | -0.89 | 14,447,280.408 | 1,717,134.509 | 39.781481131 | -80.726926200 |
| 886.00 | 0.48 | 173.110 | 885.99 | -3.15 | -0.89 | 14,447,280.123 | 1,717,134.505 | 39.781480349 | -80.726926217 |
| 918.00 | 0.46 | 179.360 | 917.98 | -3.41 | -0.88 | 14,447,279.862 | 1,717,134.522 | 39.781479631 | -80.726926158 |
| 950.00 | 0.45 | 214.860 | 949.98 | -3.65 | -0.95 | 14,447,279.630 | 1,717,134.452 | 39.781478996 | -80.726926411 |
| 982.00 | 0.32 | 234.770 | 981.98 | -3.80 | -1.09 | 14,447,279.476 | 1,717,134.307 | 39.781478572 | -80.726926928 |
| 1,014.00 | 0.42 | 244.270 | 1,013.98 | -3.90 | -1.27 | 14,447,279.373 | 1,717,134.129 | 39.781478292 | -80.726927565 |
| 1,045.00 | 0.54 | 266.480 | 1,044.98 | -3.96 | -1.52 | 14,447,279.315 | 1,717,133.880 | 39.781478134 | -80.726928449 |
| 1,077.00 | 0.73 | 294.410 | 1,076.98 | -3.89 | -1.85 | 14,447,279.390 | 1,717,133.544 | 39.781478343 | -80.726929645 |
| 1,108.00 | 0.77 | 309.380 | 1,107.98 | -3.67 | -2.20 | 14,447,279.604 | 1,717,133.203 | 39.781478933 | -80.726930856 |
| 1,140.00 | 0.95 | 312.950 | 1,139.97 | -3.36 | -2.56 | 14,447,279.921 | 1,717,132.843 | 39.781479807 | -80.726932135 |
| 1,172.00 | 1.11 | 311.660 | 1,171.97 | -2.97 | -2.98 | 14,447,280.308 | 1,717,132.417 | 39.781480873 | -80.726933646 |
| 1,204.00 | 1.10 | 305.790 | 1,203.96 | -2.58 | -3.46 | 14,447,280.693 | 1,717,131.937 | 39.781481936 | -80.726935353 |
| 1,236.00 | 1.18 | 297.380 | 1,235.96 | -2.25 | -4.00 | 14,447,281.024 | 1,717,131.395 | 39.781482850 | -80.726937278 |
| 1,267.00 | 1.08 | 287.070 | 1,266.95 | -2.02 | -4.57 | 14,447,281.257 | 1,717,130.832 | 39.781483493 | -80.726939278 |
| 1,299.00 | 1.05 | 267.820 | 1,298.94 | -1.94 | -5.15 | 14,447,281.334 | 1,717,130.251 | 39.781483711 | -80.726941346 |
| 1,331.00 | 0.85 | 242.780 | 1,330.94 | -2.06 | -5.65 | 14,447,281.215 | 1,717,129.747 | 39.781483386 | -80.726943142 |
| 1,362.00 | 1.07 | 217.480 | 1,361.94 | -2.40 | -6.03 | 14,447,280.880 | 1,717,129.366 | 39.781482470 | -80.726944500 |
| 1,394.00 | 1.33 | 205.930 | 1,393.93 | -2.97 | -6.38 | 14,447,280.309 | 1,717,129.022 | 39.781480904 | -80.726945731 |
| 1,426.00 | 1.77 | 201.270 | 1,425.92 | -3.76 | -6.72 | 14,447,279.514 | 1,717,128.680 | 39.781478725 | -80.726946956 |
| 1,457.00 | 1.99 | 201.170 | 1,456.90 | -4.71 | -7.09 | 14,447,278.566 | 1,717,128.312 | 39.781476124 | -80.726948276 |
| 1,488.00 | 2.47 | 198.890 | 1,487.88 | -5.84 | -7.50 | 14,447,277.432 | 1,717,127.902 | 39.781473014 | -80.726949750 |
| 1,520.00 | 2.95 | 197.530 | 1,519.84 | -7.28 | -7.97 | 14,447,275.995 | 1,717,127.430 | 39.781469070 | -80.726951443 |
| 1,552.00 | 3.40 | 194.970 | 1,551.79 | -8.98 | -8.46 | 14,447,274.293 | 1,717,126.937 | 39.781464400 | -80.726953217 |
| 1,582.00 | 3.55 | 200.070 | 1,581.74 | -10.72 | -9.01 | 14,447,272.561 | 1,717,126.389 | 39.781459649 | -80.726955188 |
| 1,614.00 | 3.39 | 196.800 | 1,613.68 | -12.55 | -9.62 | 14,447,270.725 | 1,717,125.775 | 39.781454611 | -80.726957392 |
| 1,646.00 | 3.45 | 201.290 | 1,645.62 | -14.35 | -10.25 | 14,447,268.922 | 1,717,125.152 | 39.781449665 | -80.726959629 |
| 1,678.00 | 3.50 | 202.590 | 1,677.56 | -16.15 | -10.97 | 14,447,267.123 | 1,717,124.427 | 39.781444731 | -80.726962229 |
| 1,709.00 | 3.30 | 205.780 | 1,708.51 | -17.83 | -11.72 | 14,447,265.446 | 1,717,123.676 | 39.781440131 | -80.726964922 |
| 1,741.00 | 3.24 | 205.740 | 1,740.46 | -19.47 | -12.52 | 14,447,263.802 | 1,717,122.883 | 39.781435623 | -80.726967763 |
| 1,773.00 | 3.08 | 204.920 | 1,772.41 | -21.07 | -13.27 | 14,447,262.208 | 1,717,122.128 | 39.781431251 | -80.726970468 |
| 1,804.00 | 2.89 | 208.690 | 1,803.36 | -22.51 | -14.00 | 14,447,260.767 | 1,717,121.402 | 39.781427300 | -80.726973068 |
| 1,836.00 | 2.80 | 207.110 | 1,835.33 | -23.91 | -14.74 | 14,447,259.363 | 1,717,120.658 | 39.781423453 | -80.726975729 |
| 1,867.00 | 2.62 | 218.260 | 1,866.29 | -25.14 | -15.52 | 14,447,258.133 | 1,717,119.874 | 39.781420080 | -80.726978533 |
| 1,898.00 | 2.50 | 224.590 | 1,897.26 | -26.18 | -16.44 | 14,447,257.095 | 1,717,118.961 | 39.781417238 | -80.726981795 |
| 1,929.00 | 2.52 | 232.920 | 1,928.23 | -27.07 | -17.46 | 14,447,256.203 | 1,717,117.943 | 39.781414796 | -80.726985429 |
| 1,960.00 | 2.58 | 239.660 | 1,959.20 | -27.84 | -18.60 | 14,447,255.439 | 1,717,116.797 | 39.781412709 | -80.726989516 |
| 1,992.00 | 2.61 | 242.700 | 1,991.17 | -28.53 | -19.87 | 14,447,254.742 | 1,717,115.528 | 39.781410803 | -80.726994041 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 2,023.00 | 2.55 | 245.720 | 2,022.14 | -29.14 | -21.13 | 14,447,254.134 | 1,717,114.272 | 39.781409145 | -80.726998517 |
| 2,055.00 | 2.63 | 246.030 | 2,054.10 | -29.73 | -22.45 | 14,447,253.543 | 1,717,112.952 | 39.781407634 | -80.727003221 |
| 2,087.00 | 2.60 | 247.440 | 2,086.07 | -30.31 | -23.79 | 14,447,252.967 | 1,717,111.611 | 39.781405961 | -80.727008001 |
| 2,118.00 | 2.41 | 241.730 | 2,117.04 | -30.89 | -25.01 | 14,447,252.388 | 1,717,110.388 | 39.781404383 | -80.727012362 |
| 2,150.00 | 2.41 | 238.790 | 2,149.01 | -31.56 | -26.18 | 14,447,251.721 | 1,717,109.220 | 39.781402560 | -80.727016526 |
| 2,181.00 | 2.29 | 236.430 | 2,179.99 | -32.24 | -27.25 | 14,447,251.041 | 1,717,108.146 | 39.781400701 | -80.727020355 |
| 2,245.00 | 2.22 | 239.120 | 2,243.94 | -33.58 | -29.38 | 14,447,249.697 | 1,717,106.017 | 39.781397030 | -80.727027948 |
| 2,277.00 | 2.22 | 248.020 | 2,275.91 | -34.13 | -30.49 | 14,447,249.147 | 1,717,104.910 | 39.781395528 | -80.727031893 |
| 2,309.00 | 2.22 | 239.680 | 2,307.89 | -34.67 | -31.60 | 14,447,248.602 | 1,717,103.800 | 39.781394041 | -80.727035849 |
| 2,341.00 | 2.40 | 225.830 | 2,339.86 | -35.45 | -32.61 | 14,447,247.823 | 1,717,102.785 | 39.781391908 | -80.727039473 |
| 2,372.00 | 2.62 | 214.970 | 2,370.83 | -36.49 | -33.49 | 14,447,246.790 | 1,717,101.913 | 39.781389079 | -80.727042586 |
| 2,403.00 | 2.93 | 212.260 | 2,401.80 | -37.74 | -34.31 | 14,447,245.539 | 1,717,101.084 | 39.781385652 | -80.727045551 |
| 2,434.00 | 3.08 | 210.150 | 2,432.75 | -39.13 | -35.16 | 14,447,244.149 | 1,717,100.243 | 39.781381841 | -80.727048560 |
| 2,466.00 | 3.22 | 210.490 | 2,464.71 | -40.65 | -36.04 | 14,447,242.631 | 1,717,099.355 | 39.781377680 | -80.727051736 |
| 2,498.00 | 3.20 | 208.700 | 2,496.66 | -42.20 | -36.93 | 14,447,241.073 | 1,717,098.470 | 39.781373409 | -80.727054903 |
| 2,529.00 | 3.18 | 210.080 | 2,527.61 | -43.71 | -37.78 | 14,447,239.570 | 1,717,097.624 | 39.781369289 | -80.727057932 |
| 2,561.00 | 3.22 | 211.020 | 2,559.56 | -45.24 | -38.68 | 14,447,238.032 | 1,717,096.716 | 39.781365072 | -80.727061181 |
| 2,593.00 | 3.20 | 212.620 | 2,591.51 | -46.77 | -39.63 | 14,447,236.510 | 1,717,095.771 | 39.781360899 | -80.727064560 |
| 2,624.00 | 3.24 | 215.520 | 2,622.46 | -48.21 | -40.60 | 14,447,235.068 | 1,717,094.796 | 39.781356947 | -80.727068047 |
| 2,656.00 | 3.16 | 213.990 | 2,654.41 | -49.68 | -41.62 | 14,447,233.601 | 1,717,093.777 | 39.781352926 | -80.727071688 |
| 2,688.00 | 3.09 | 215.610 | 2,686.36 | -51.11 | -42.62 | 14,447,232.168 | 1,717,092.782 | 39.781349001 | -80.727075246 |
| 2,719.00 | 3.20 | 219.420 | 2,717.31 | -52.46 | -43.65 | 14,447,230.820 | 1,717,091.746 | 39.781345308 | -80.727078948 |
| 2,751.00 | 3.05 | 218.000 | 2,749.27 | -53.82 | -44.74 | 14,447,229.460 | 1,717,090.655 | 39.781341580 | -80.727082847 |
| 2,782.00 | 3.15 | 221.410 | 2,780.22 | -55.11 | -45.82 | 14,447,228.171 | 1,717,089.584 | 39.781338050 | -80.727086674 |
| 2,813.00 | 3.20 | 221.450 | 2,811.17 | -56.39 | -46.95 | 14,447,226.884 | 1,717,088.448 | 39.781334524 | -80.727090732 |
| 2,845.00 | 3.18 | 224.200 | 2,843.12 | -57.70 | -48.16 | 14,447,225.578 | 1,717,087.238 | 39.781330949 | -80.727095053 |
| 2,877.00 | 3.23 | 223.670 | 2,875.07 | -58.99 | -49.40 | 14,447,224.290 | 1,717,086.996 | 39.781327421 | -80.727099485 |
| 2,909.00 | 3.35 | 225.100 | 2,907.02 | -60.30 | -50.69 | 14,447,222.978 | 1,717,084.712 | 39.781323828 | -80.727104072 |
| 2,939.00 | 3.46 | 227.180 | 2,936.97 | -61.53 | -51.97 | 14,447,221.743 | 1,717,083.427 | 39.781320450 | -80.727108659 |
| 2,971.00 | 3.87 | 225.650 | 2,968.90 | -62.94 | -53.45 | 14,447,220.332 | 1,717,081.946 | 39.781316587 | -80.727113944 |
| 3,003.00 | 4.41 | 223.930 | 3,000.82 | -64.58 | -55.08 | 14,447,218.691 | 1,717,080.321 | 39.781312094 | -80.727119748 |
| 3,034.00 | 4.89 | 222.050 | 3,031.72 | -66.42 | -56.79 | 14,447,216.852 | 1,717,078.609 | 39.781307057 | -80.727125862 |
| 3,066.00 | 5.22 | 222.360 | 3,063.59 | -68.51 | -58.68 | 14,447,214.763 | 1,717,076.714 | 39.781301337 | -80.727132627 |
| 3,097.00 | 5.42 | 222.220 | 3,094.46 | -70.64 | -60.62 | 14,447,212.637 | 1,717,074.780 | 39.781295514 | -80.727139534 |
| 3,129.00 | 5.60 | 221.920 | 3,126.31 | -72.92 | -62.68 | 14,447,210.356 | 1,717,072.722 | 39.781289267 | -80.727146886 |
| 3,161.00 | 5.49 | 223.300 | 3,158.16 | -75.20 | -64.77 | 14,447,208.080 | 1,717,070.629 | 39.781283035 | -80.727154360 |
| 3,191.00 | 4.53 | 225.660 | 3,188.05 | -77.07 | -66.60 | 14,447,206.208 | 1,717,068.797 | 39.781277908 | -80.727160900 |
| 3,223.00 | 4.20 | 227.120 | 3,219.95 | -78.75 | -68.36 | 14,447,204.527 | 1,717,067.035 | 39.781273307 | -80.727167192 |
| 3,255.00 | 3.87 | 228.790 | 3,251.87 | -80.26 | -70.04 | 14,447,203.019 | 1,717,065.364 | 39.781269177 | -80.727173156 |
| 3,286.00 | 4.22 | 226.280 | 3,282.80 | -81.74 | -71.65 | 14,447,201.541 | 1,717,063.752 | 39.781265133 | -80.727178908 |
| 3,318.00 | 4.95 | 223.150 | 3,314.69 | -83.56 | -73.44 | 14,447,199.720 | 1,717,061.957 | 39.781260147 | -80.727185317 |
| 3,349.00 | 5.62 | 222.690 | 3,345.56 | -85.65 | -75.39 | 14,447,197.629 | 1,717,060.013 | 39.781254420 | -80.727192259 |
| 3,381.00 | 6.24 | 221.640 | 3,377.39 | -88.10 | -77.60 | 14,447,195.177 | 1,717,057.795 | 39.781247706 | -80.727200180 |
| 3,412.00 | 7.27 | 224.100 | 3,408.18 | -90.77 | -80.09 | 14,447,192.509 | 1,717,055.311 | 39.781240401 | -80.727209052 |
| 3,444.00 | 8.32 | 225.500 | 3,439.88 | -93.84 | -83.15 | 14,447,189.433 | 1,717,052.250 | 39.781231977 | -80.727219979 |
| 3,476.00 | 8.97 | 226.810 | 3,471.52 | -97.17 | -86.62 | 14,447,186.102 | 1,717,048.780 | 39.781222860 | -80.727232367 |
| 3,508.00 | 9.12 | 228.060 | 3,503.12 | -100.58 | -90.32 | 14,447,182.700 | 1,717,045.075 | 39.781213547 | -80.727245592 |
| 3,540.00 | 9.10 | 227.630 | 3,534.71 | -103.98 | -94.08 | 14,447,179.300 | 1,717,041.319 | 39.781204240 | -80.727258998 |
| 3,604.00 | 9.04 | 227.330 | 3,597.91 | -110.80 | -101.52 | 14,447,172.481 | 1,717,033.883 | 39.781185577 | -80.727285540 |
| 3,635.00 | 8.95 | 225.960 | 3,628.53 | -114.12 | -105.04 | 14,447,169.154 | 1,717,030.359 | 39.781176470 | -80.727298120 |
| 3,667.00 | 8.65 | 227.190 | 3,660.16 | -117.49 | -108.60 | 14,447,165.788 | 1,717,026.804 | 39.781167256 | -80.727310809 |
| 3,699.00 | 7.50 | 227.430 | 3,691.84 | -120.54 | -111.90 | 14,447,162.740 | 1,717,023.501 | 39.781158913 | -80.727322600 |
| 3,731.00 | 6.90 | 227.400 | 3,723.59 | -123.25 | -114.85 | 14,447,160.026 | 1,717,020.548 | 39.781151485 | -80.727333141 |
| 3,763.00 | 6.86 | 229.520 | 3,755.36 | -125.79 | -117.72 | 14,447,157.485 | 1,717,017.679 | 39.781144528 | -80.727343378 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Survey | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
| 3,794.00 | 7.24 | 231.960 | 3,786.12 | -128.20 | -120.67 | 14,447,155.079 | 1,717,014.732 | 39.781137946 | -80.727353893 |
| 3,826.00 | 7.89 | 233.230 | 3,817.84 | -130.75 | -124.01 | 14,447,152.522 | 1,717,011.385 | 39.781130951 | -80.727365836 |
| 3,858.00 | 8.27 | 232.890 | 3,849.52 | -133.46 | -127.61 | 14,447,149.818 | 1,717,007.790 | 39.781123558 | -80.727378660 |
| 3,889.00 | 8.39 | 232.570 | 3,880.20 | -136.18 | -131.18 | 14,447,147.099 | 1,717,004.216 | 39.781116118 | -80.727391410 |
| 3,921.00 | 8.33 | 231.420 | 3,911.86 | -139.04 | -134.85 | 14,447,144.234 | 1,717,000.550 | 39.781108282 | -80.727404490 |
| 3,985.00 | 8.02 | 229.520 | 3,975.21 | -144.83 | -141.87 | 14,447,138.445 | 1,716,993.530 | 39.781092442 | -80.727429540 |
| 4,017.00 | 8.27 | 228.980 | 4,006.88 | -147.79 | -145.30 | 14,447,135.485 | 1,716,990.096 | 39.781084343 | -80.727441796 |
| 4,048.00 | 8.65 | 228.690 | 4,037.55 | -150.79 | -148.74 | 14,447,132.483 | 1,716,986.663 | 39.781076127 | -80.727454049 |
| 4,080.00 | 8.70 | 228.200 | 4,069.18 | -154.00 | -152.35 | 14,447,129.281 | 1,716,983.051 | 39.781067364 | -80.727466939 |
| 4,111.00 | 8.75 | 227.650 | 4,099.82 | -157.15 | -155.84 | 14,447,126.130 | 1,716,979.561 | 39.781058740 | -80.727479397 |
| 4,143.00 | 9.08 | 226.710 | 4,131.44 | -160.52 | -159.48 | 14,447,122.759 | 1,716,975.924 | 39.781049512 | -80.727492378 |
| 4,174.00 | 9.14 | 229.750 | 4,162.04 | -163.79 | -163.14 | 14,447,119.491 | 1,716,972.264 | 39.781040568 | -80.727505440 |
| 4,206.00 | 8.57 | 234.740 | 4,193.66 | -166.80 | -167.02 | 14,447,116.473 | 1,716,968.378 | 39.781032310 | -80.727519307 |
| 4,237.00 | 8.37 | 236.240 | 4,224.33 | -169.39 | -170.78 | 14,447,113.885 | 1,716,964.616 | 39.781025236 | -80.727532725 |
| 4,269.00 | 8.18 | 236.640 | 4,255.99 | -171.94 | -174.62 | 14,447,111.339 | 1,716,960.778 | 39.781018276 | -80.727546412 |
| 4,300.00 | 8.09 | 235.770 | 4,286.68 | -174.38 | -178.27 | 14,447,108.899 | 1,716,957.133 | 39.781011606 | -80.727559414 |
| 4,332.00 | 8.12 | 234.610 | 4,318.36 | -176.95 | -181.97 | 14,447,106.324 | 1,716,953.429 | 39.781004564 | -80.727572626 |
| 4,364.00 | 8.21 | 233.550 | 4,350.04 | -179.62 | -185.65 | 14,447,103.658 | 1,716,949.748 | 39.780997273 | -80.727585754 |
| 4,395.00 | 8.14 | 232.430 | 4,380.72 | -182.27 | -189.17 | 14,447,101.004 | 1,716,946.228 | 39.780990016 | -80.727598312 |
| 4,427.00 | 8.18 | 231.470 | 4,412.40 | -185.07 | -192.75 | 14,447,098.205 | 1,716,942.652 | 39.780982358 | -80.727611073 |
| 4,438.00 | 8.16 | 231.530 | 4,423.29 | -186.04 | -193.97 | 14,447,097.232 | 1,716,941.428 | 39.780979695 | -80.727615438 |
| 4,532.00 | 8.71 | 229.060 | 4,516.27 | -194.86 | -204.57 | 14,447,088.418 | 1,716,930.829 | 39.780955579 | -80.727653261 |
| 4,626.00 | 9.16 | 227.070 | 4,609.13 | -204.62 | -215.43 | 14,447,078.658 | 1,716,919.974 | 39.780928866 | -80.727692003 |
| 4,717.00 | 8.76 | 228.980 | 4,699.02 | -214.10 | -225.96 | 14,447,069.177 | 1,716,909.443 | 39.780902915 | -80.727729591 |
| 4,812.00 | 8.55 | 231.080 | 4,792.94 | -223.28 | -236.91 | 14,447,059.992 | 1,716,898.490 | 39.780877784 | -80.727768674 |
| 4,906.00 | 9.53 | 229.560 | 4,885.77 | -232.72 | -248.27 | 14,447,050.555 | 1,716,887.131 | 39.780851961 | -80.727809208 |
| 5,000.00 | 10.25 | 227.300 | 4,978.37 | -243.44 | -260.34 | 14,447,039.835 | 1,716,875.062 | 39.780822623 | -80.727852282 |
| 5,093.00 | 8.90 | 223.700 | 5,070.07 | -254.25 | -271.39 | 14,447,029.022 | 1,716,864.010 | 39.780793020 | -80.727891737 |
| 5,185.00 | 6.88 | 227.530 | 5,161.20 | -263.12 | -280.37 | 14,447,020.156 | 1,716,855.028 | 39.780768745 | -80.727923804 |
| 5,279.00 | 7.32 | 232.400 | 5,254.48 | -270.58 | -289.27 | 14,447,012.700 | 1,716,846.130 | 39.780748345 | -80.727955555 |
| 5,372.00 | 8.77 | 230.430 | 5,346.56 | -278.71 | -299.43 | 14,447,004.569 | 1,716,835.971 | 39.780726098 | -80.727991805 |
| 5,466.00 | 8.28 | 229.220 | 5,439.52 | -287.69 | -310.08 | 14,446,995.583 | 1,716,825.322 | 39.780701509 | -80.728029807 |
| 5,560.00 | 7.51 | 232.430 | 5,532.63 | -295.86 | -320.07 | 14,446,987.416 | 1,716,815.327 | 39.780679165 | -80.728065468 |
| 5,654.00 | 7.94 | 234.510 | 5,625.78 | -303.38 | -330.23 | 14,446,979.902 | 1,716,805.172 | 39.780658612 | -80.728101696 |
| 5,748.00 | 9.29 | 233.240 | 5,718.72 | -311.69 | -341.59 | 14,446,971.591 | 1,716,793.807 | 39.780635885 | -80.728142239 |
| 5,842.00 | 9.12 | 230.160 | 5,811.51 | -321.00 | -353.39 | 14,446,962.278 | 1,716,782.008 | 39.780610406 | -80.728184335 |
| 5,936.00 | 8.04 | 226.200 | 5,904.45 | -330.32 | -363.86 | 14,446,952.955 | 1,716,771.543 | 39.780584891 | -80.728221685 |
| 6,029.00 | 6.87 | 229.600 | 5,996.67 | -338.43 | -372.79 | 14,446,944.848 | 1,716,762.613 | 39.780562702 | -80.728253559 |
| 6,122.00 | 6.92 | 232.900 | 6,088.99 | -345.41 | -381.49 | 14,446,937.864 | 1,716,753.908 | 39.780543593 | -80.728284616 |
| 6,215.00 | 6.55 | 232.420 | 6,181.35 | -352.03 | -390.16 | 14,446,931.250 | 1,716,745.236 | 39.780525500 | -80.728315555 |
| 6,309.00 | 7.45 | 235.190 | 6,274.65 | -358.78 | -399.42 | 14,446,924.501 | 1,716,735.984 | 39.780507044 | -80.728348561 |
| 6,401.00 | 9.00 | 237.900 | 6,365.70 | -366.01 | -410.41 | 14,446,917.272 | 1,716,724.990 | 39.780487282 | -80.728387769 |
| 6,494.00 | 10.15 | 237.530 | 6,457.40 | -374.27 | -423.49 | 14,446,909.007 | 1,716,711.914 | 39.780464693 | -80.728434401 |
| 6,588.00 | 11.51 | 234.730 | 6,549.73 | -384.13 | -438.13 | 14,446,899.144 | 1,716,697.269 | 39.780437730 | -80.728486636 |
| 6,683.00 | 12.61 | 230.080 | 6,642.63 | -396.26 | -453.82 | 14,446,887.016 | 1,716,681.576 | 39.780404554 | -80.728542621 |
| 6,777.00 | 13.78 | 223.660 | 6,734.15 | -410.95 | -469.42 | 14,446,872.331 | 1,716,665.977 | 39.780364355 | -80.728598304 |
| 6,870.00 | 14.44 | 218.470 | 6,824.35 | -428.04 | -484.28 | 14,446,855.239 | 1,716,651.116 | 39.780317539 | -80.728651384 |
| 6,964.00 | 14.17 | 217.540 | 6,915.44 | -446.34 | -498.59 | 14,446,836.940 | 1,716,636.814 | 39.780267403 | -80.728702487 |
| 7,057.00 | 13.74 | 221.880 | 7,005.69 | -463.59 | -512.90 | 14,446,819.690 | 1,716,622.505 | 39.780220150 | -80.728753605 |
| 7,151.00 | 14.38 | 226.730 | 7,096.88 | -479.90 | -528.85 | 14,446,803.377 | 1,716,606.553 | 39.780175482 | -80.728810560 |
| 7,245.00 | 16.40 | 227.050 | 7,187.51 | -496.94 | -547.06 | 14,446,786.333 | 1,716,588.339 | 39.780128826 | -80.728875574 |
| 7,340.00 | 18.64 | 222.660 | 7,278.10 | -517.25 | -567.17 | 14,446,766.027 | 1,716,568.231 | 39.780073227 | -80.728947363 |
| 7,434.00 | 18.33 | 217.850 | 7,367.25 | -539.97 | -586.42 | 14,446,743.307 | 1,716,548.980 | 39.780010993 | -80.729016127 |
| 7,527.00 | 18.45 | 214.920 | 7,455.50 | -563.58 | -603.82 | 14,446,719.693 | 1,716,531.583 | 39.779946286 | -80.729078305 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 7,621.00 | 16.76 | 212.380 | 7,545.10 | -587.23 | -619.59 | 14,446,696.048 | 1,716,515.809 | 39.779881484 | -80.729134704 |
| 7,714.00 | 15.68 | 213.500 | 7,634.40 | -609.03 | -633.71 | 14,446,674.244 | 1,716,501.691 | 39.779821721 | -80.729185189 |
| 7,807.00 | 15.51 | 218.410 | 7,723.98 | -629.26 | -648.37 | 14,446,654.020 | 1,716,487.029 | 39.779766302 | -80.729237594 |
| 7,900.00 | 15.79 | 217.940 | 7,813.53 | -648.98 | -663.88 | 14,446,634.298 | 1,716,471.524 | 39.779712268 | -80.729292994 |
| 7,991.00 | 15.87 | 216.320 | 7,901.08 | -668.77 | -678.86 | 14,446,614.508 | 1,716,456.542 | 39.779658045 | -80.729346532 |
| 8,084.00 | 15.95 | 215.360 | 7,990.52 | -689.44 | -693.78 | 14,446,593.842 | 1,716,441.616 | 39.779601414 | -80.729399882 |
| 8,178.00 | 16.20 | 211.650 | 8,080.84 | -711.13 | -708.14 | 14,446,572.146 | 1,716,427.261 | 39.779541950 | -80.729451210 |
| 8,272.00 | 15.54 | 216.160 | 8,171.26 | -732.46 | -722.45 | 14,446,550.816 | 1,716,412.950 | 39.779483492 | -80.729502377 |
| 8,365.00 | 15.44 | 217.010 | 8,260.89 | -752.41 | -737.25 | 14,446,530.873 | 1,716,398.147 | 39.779428844 | -80.729555278 |
| 8,458.00 | 16.92 | 216.430 | 8,350.20 | -773.18 | -752.74 | 14,446,510.097 | 1,716,382.658 | 39.779371918 | -80.729610633 |
| 8,551.00 | 17.96 | 216.860 | 8,438.92 | -795.54 | -769.38 | 14,446,487.736 | 1,716,366.020 | 39.779310646 | -80.729670093 |
| 8,645.00 | 18.89 | 217.600 | 8,528.10 | -819.19 | -787.36 | 14,446,464.084 | 1,716,348.041 | 39.779245841 | -80.729734337 |
| 8,738.00 | 17.46 | 216.540 | 8,616.46 | -842.33 | -804.85 | 14,446,440.946 | 1,716,330.548 | 39.779182442 | -80.729796849 |
| 8,832.00 | 17.24 | 215.260 | 8,706.19 | -865.04 | -821.29 | 14,446,418.242 | 1,716,314.111 | 39.779120226 | -80.729855599 |
| 8,925.00 | 17.94 | 213.040 | 8,794.84 | -888.30 | -837.06 | 14,446,394.981 | 1,716,298.345 | 39.779056477 | -80.729911962 |
| 9,019.00 | 17.69 | 213.600 | 8,884.33 | -912.33 | -852.85 | 14,446,370.950 | 1,716,282.549 | 39.778990611 | -80.729968445 |
| 9,111.00 | 16.30 | 217.250 | 8,972.31 | -934.25 | -868.40 | 14,446,349.029 | 1,716,266.998 | 39.778930539 | -80.730024031 |
| 9,204.00 | 15.85 | 218.920 | 9,061.68 | -954.52 | -884.28 | 14,446,328.759 | 1,716,251.119 | 39.778875004 | -80.730080765 |
| 9,297.00 | 15.31 | 218.440 | 9,151.26 | -974.02 | -899.89 | 14,446,309.261 | 1,716,235.507 | 39.778821587 | -80.730136541 |
| 9,389.00 | 15.15 | 218.090 | 9,240.03 | -992.99 | -914.86 | 14,446,290.286 | 1,716,220.540 | 39.778769600 | -80.730190017 |
| 9,482.00 | 15.19 | 219.200 | 9,329.79 | -1,012.00 | -930.06 | 14,446,271.280 | 1,716,205.342 | 39.778717529 | -80.730244313 |
| 9,574.00 | 15.72 | 219.100 | 9,418.46 | -1,031.01 | -945.54 | 14,446,252.267 | 1,716,189.864 | 39.778665444 | -80.730296608 |
| 9,668.00 | 16.60 | 219.990 | 9,508.75 | -1,051.18 | -962.20 | 14,446,232.097 | 1,716,173.204 | 39.778610189 | -80.730359123 |
| 9,761.00 | 16.74 | 218.860 | 9,597.84 | -1,071.79 | -979.14 | 14,446,211.490 | 1,716,156.263 | 39.778553736 | -80.730419640 |
| 9,855.00 | 15.50 | 217.800 | 9,688.14 | -1,092.26 | -995.33 | 14,446,191.023 | 1,716,140.071 | 39.778497663 | -80.730477493 |
| 9,948.00 | 14.12 | 216.640 | 9,778.05 | -1,111.18 | -1,009.72 | 14,446,172.101 | 1,716,125.684 | 39.778445817 | -80.730528902 |
| 10,041.00 | 13.52 | 216.490 | 9,868.36 | -1,129.02 | -1,022.95 | 14,446,154.259 | 1,716,112.449 | 39.778396927 | -80.730576199 |
| 10,082.00 | 13.83 | 216.620 | 9,908.19 | -1,136.81 | -1,028.73 | 14,446,146.473 | 1,716,106.676 | 39.778375592 | -80.730596831 |
| 10,173.00 | 17.81 | 219.800 | 9,995.73 | -1,156.24 | -1,044.13 | 14,446,127.043 | 1,716,091.274 | 39.778322360 | -80.730651860 |
| 10,198.00 | 17.81 | 219.930 | 10,019.53 | -1,162.10 | -1,049.03 | 14,446,121.174 | 1,716,086.372 | 39.778306282 | -80.730693658 |
| 10,266.00 | 18.07 | 231.650 | 10,084.25 | -1,176.63 | -1,063.98 | 14,446,106.651 | 1,716,071.422 | 39.778266522 | -80.730722736 |
| 10,313.00 | 18.07 | 243.590 | 10,128.95 | -1,184.39 | -1,076.23 | 14,446,098.884 | 1,716,059.173 | 39.778245292 | -80.730766416 |
| 10,360.00 | 17.99 | 252.850 | 10,173.65 | -1,189.78 | -1,089.70 | 14,446,093.500 | 1,716,045.706 | 39.778230618 | -80.730814405 |
| 10,407.00 | 18.07 | 263.200 | 10,218.35 | -1,192.78 | -1,103.87 | 14,446,090.496 | 1,716,031.529 | 39.778222486 | -80.730864896 |
| 10,455.00 | 18.21 | 271.310 | 10,263.97 | -1,193.49 | -1,118.76 | 14,446,089.786 | 1,716,016.637 | 39.778206558 | -80.730917909 |
| 10,502.00 | 18.56 | 278.760 | 10,308.58 | -1,192.19 | -1,133.50 | 14,446,091.093 | 1,716,001.900 | 39.778224370 | -80.730970347 |
| 10,549.00 | 19.53 | 284.840 | 10,353.01 | -1,189.03 | -1,148.49 | 14,446,094.245 | 1,715,986.912 | 39.778233149 | -80.731023661 |
| 10,597.00 | 21.48 | 289.070 | 10,397.97 | -1,184.11 | -1,164.55 | 14,446,099.172 | 1,715,970.848 | 39.778246812 | -80.731080784 |
| 10,642.00 | 24.44 | 291.490 | 10,439.40 | -1,178.00 | -1,181.01 | 14,446,105.276 | 1,715,954.395 | 39.778263710 | -80.731139279 |
| 10,689.00 | 28.10 | 294.620 | 10,481.54 | -1,169.83 | -1,200.12 | 14,446,113.452 | 1,715,935.278 | 39.778286322 | -80.731207233 |
| 10,737.00 | 30.84 | 298.190 | 10,523.33 | -1,159.30 | -1,221.25 | 14,446,123.976 | 1,715,914.152 | 39.778315399 | -80.731282315 |
| 10,784.00 | 32.70 | 301.100 | 10,563.29 | -1,147.05 | -1,242.74 | 14,446,136.227 | 1,715,892.660 | 39.778349219 | -80.731358680 |
| 10,831.00 | 34.56 | 303.700 | 10,602.42 | -1,133.10 | -1,264.71 | 14,446,150.183 | 1,715,870.694 | 39.778387727 | -80.731436708 |
| 10,878.00 | 37.30 | 307.450 | 10,640.48 | -1,117.03 | -1,287.11 | 14,446,166.244 | 1,715,848.291 | 39.778432019 | -80.731516275 |
| 10,926.00 | 40.12 | 310.790 | 10,677.94 | -1,098.08 | -1,310.37 | 14,446,185.197 | 1,715,825.029 | 39.778484260 | -80.731598870 |
| 10,973.00 | 43.22 | 314.540 | 10,713.05 | -1,076.89 | -1,333.32 | 14,446,206.386 | 1,715,802.084 | 39.778542640 | -80.731680309 |
| 11,019.00 | 45.47 | 316.700 | 10,745.94 | -1,053.91 | -1,355.79 | 14,446,229.370 | 1,715,779.609 | 39.778605946 | -80.731760600 |
| 11,066.00 | 47.81 | 318.020 | 10,778.21 | -1,028.77 | -1,378.93 | 14,446,254.510 | 1,715,756.470 | 39.778675177 | -80.731842151 |
| 11,114.00 | 50.38 | 318.900 | 10,809.64 | -1,001.61 | -1,402.98 | 14,446,281.664 | 1,715,732.419 | 39.778749949 | -80.731927466 |
| 11,161.00 | 54.22 | 320.220 | 10,838.38 | -973.31 | -1,427.09 | 14,446,309.968 | 1,715,708.311 | 39.778827876 | -80.732012971 |
| 11,208.00 | 57.45 | 320.970 | 10,864.77 | -943.26 | -1,451.77 | 14,446,340.015 | 1,715,683.632 | 39.778910597 | -80.732100491 |
| 11,255.00 | 60.10 | 320.530 | 10,889.13 | -912.14 | -1,477.20 | 14,446,371.135 | 1,715,658.203 | 39.779006269 | -80.732190668 |
| 11,303.00 | 63.15 | 320.530 | 10,911.94 | -879.54 | -1,504.04 | 14,446,403.733 | 1,715,631.360 | 39.779086013 | -80.732285864 |
| 11,350.00 | 67.08 | 322.030 | 10,931.71 | -846.28 | -1,530.70 | 14,446,436.996 | 1,715,604.703 | 39.779177581 | -80.732380388 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Survey | | | | | | | | | |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
| 11,397.00 | 70.70 | 323.350 | 10,948.64 | -811.41 | -1,557.26 | 14,446,471.867 | 1,715,578.137 | 39.779273563 | -80.732474574 |
| 11,444.00 | 73.49 | 324.760 | 10,963.09 | -775.21 | -1,583.51 | 14,446,508.072 | 1,715,551.891 | 39.779373207 | -80.732567607 |
| 11,491.00 | 76.23 | 326.090 | 10,975.36 | -737.85 | -1,609.25 | 14,446,545.425 | 1,715,526.151 | 39.779476000 | -80.732658827 |
| 11,538.00 | 78.79 | 327.060 | 10,985.53 | -699.56 | -1,634.52 | 14,446,583.721 | 1,715,500.878 | 39.779581377 | -80.732748375 |
| 11,586.00 | 81.04 | 327.890 | 10,993.93 | -659.71 | -1,659.93 | 14,446,623.565 | 1,715,475.472 | 39.779691007 | -80.732838381 |
| 11,633.00 | 83.69 | 328.860 | 11,000.18 | -620.05 | -1,684.35 | 14,446,663.227 | 1,715,451.049 | 39.779800130 | -80.732924889 |
| 11,681.00 | 87.76 | 329.880 | 11,003.75 | -578.87 | -1,708.73 | 14,446,704.406 | 1,715,426.668 | 39.779913419 | -80.733011232 |
| 11,728.00 | 90.94 | 328.860 | 11,004.29 | -538.44 | -1,732.67 | 14,446,744.840 | 1,715,402.727 | 39.780024657 | -80.733096018 |
| 11,776.00 | 91.52 | 329.830 | 11,003.26 | -497.16 | -1,757.14 | 14,446,786.122 | 1,715,378.259 | 39.780138228 | -80.733182669 |
| 11,869.00 | 91.91 | 329.880 | 11,000.47 | -416.77 | -1,803.83 | 14,446,866.508 | 1,715,331.577 | 39.780359372 | -80.733347977 |
| 11,964.00 | 91.87 | 329.040 | 10,997.34 | -334.99 | -1,852.07 | 14,446,948.283 | 1,715,283.330 | 39.780584344 | -80.733518837 |
| 12,058.00 | 91.87 | 330.400 | 10,994.27 | -253.86 | -1,899.44 | 14,447,029.414 | 1,715,235.959 | 39.780807537 | -80.733686589 |
| 12,152.00 | 91.96 | 327.760 | 10,991.13 | -173.27 | -1,947.71 | 14,447,110.003 | 1,715,187.690 | 39.781029250 | -80.733857546 |
| 12,247.00 | 91.96 | 330.890 | 10,987.88 | -91.62 | -1,996.14 | 14,447,191.652 | 1,715,139.258 | 39.781253875 | -80.734029070 |
| 12,342.00 | 91.91 | 328.770 | 10,984.67 | -9.55 | -2,043.86 | 14,447,273.731 | 1,715,091.544 | 39.781479676 | -80.734198036 |
| 12,436.00 | 91.91 | 330.230 | 10,981.54 | 71.40 | -2,091.54 | 14,447,354.677 | 1,715,043.864 | 39.781702364 | -80.734366897 |
| 12,531.00 | 91.65 | 328.330 | 10,978.59 | 153.03 | -2,140.04 | 14,447,436.302 | 1,714,995.359 | 39.781926924 | -80.734538684 |
| 12,625.00 | 91.43 | 329.610 | 10,976.06 | 233.54 | -2,188.48 | 14,447,516.820 | 1,714,946.922 | 39.782148441 | -80.734710243 |
| 12,719.00 | 91.38 | 330.270 | 10,973.76 | 314.88 | -2,235.55 | 14,447,598.152 | 1,714,899.851 | 39.782372184 | -80.734876932 |
| 12,814.00 | 90.94 | 328.510 | 10,971.83 | 396.62 | -2,283.91 | 14,447,679.894 | 1,714,851.490 | 39.782597061 | -80.735048212 |
| 12,909.00 | 90.90 | 330.140 | 10,970.31 | 478.31 | -2,332.37 | 14,447,761.587 | 1,714,803.032 | 39.782821807 | -80.735219837 |
| 13,003.00 | 91.03 | 328.110 | 10,968.72 | 558.98 | -2,380.60 | 14,447,842.251 | 1,714,754.804 | 39.783043722 | -80.735390656 |
| 13,098.00 | 91.07 | 329.610 | 10,966.98 | 640.27 | -2,429.72 | 14,447,923.546 | 1,714,705.686 | 39.783267378 | -80.735564636 |
| 13,192.00 | 91.07 | 330.230 | 10,965.23 | 721.60 | -2,476.82 | 14,448,004.871 | 1,714,658.581 | 39.783491103 | -80.735731453 |
| 13,286.00 | 91.03 | 329.080 | 10,963.51 | 802.70 | -2,524.30 | 14,448,085.978 | 1,714,611.101 | 39.783714228 | -80.735899609 |
| 13,381.00 | 91.12 | 330.890 | 10,961.72 | 884.95 | -2,571.81 | 14,448,168.220 | 1,714,563.590 | 39.783940471 | -80.736067864 |
| 13,476.00 | 90.94 | 328.640 | 10,960.02 | 967.00 | -2,619.64 | 14,448,250.278 | 1,714,515.764 | 39.784166212 | -80.736237243 |
| 13,570.00 | 90.99 | 329.960 | 10,958.43 | 1,047.82 | -2,667.62 | 14,448,331.091 | 1,714,467.781 | 39.784388533 | -80.736407195 |
| 13,665.00 | 90.41 | 329.700 | 10,957.27 | 1,129.94 | -2,715.36 | 14,448,413.215 | 1,714,420.041 | 39.784614454 | -80.736576268 |
| 13,758.00 | 90.54 | 330.620 | 10,956.50 | 1,210.61 | -2,761.64 | 14,448,493.881 | 1,714,373.768 | 39.784836359 | -80.736740136 |
| 13,853.00 | 90.37 | 331.200 | 10,955.75 | 1,293.62 | -2,807.82 | 14,448,576.895 | 1,714,327.582 | 39.785064708 | -80.736903669 |
| 13,948.00 | 90.99 | 329.390 | 10,954.62 | 1,376.13 | -2,854.89 | 14,448,659.401 | 1,714,280.512 | 39.785291672 | -80.737070358 |
| 14,042.00 | 91.03 | 330.760 | 10,952.96 | 1,457.58 | -2,901.78 | 14,448,740.854 | 1,714,233.627 | 39.785515742 | -80.737236359 |
| 14,137.00 | 91.03 | 330.050 | 10,951.25 | 1,540.17 | -2,948.69 | 14,448,823.446 | 1,714,186.718 | 39.785742939 | -80.737402517 |
| 14,231.00 | 90.94 | 331.770 | 10,949.64 | 1,622.30 | -2,994.38 | 14,448,905.573 | 1,714,141.025 | 39.785968850 | -80.737564309 |
| 14,326.00 | 91.07 | 329.480 | 10,947.97 | 1,705.07 | -3,040.97 | 14,448,988.340 | 1,714,094.436 | 39.786196526 | -80.737729288 |
| 14,420.00 | 91.07 | 332.210 | 10,946.22 | 1,787.14 | -3,086.75 | 14,449,070.409 | 1,714,048.654 | 39.786422276 | -80.737891401 |
| 14,515.00 | 90.85 | 328.550 | 10,944.62 | 1,869.70 | -3,133.69 | 14,449,152.968 | 1,714,001.715 | 39.786649384 | -80.738057628 |
| 14,609.00 | 90.90 | 333.090 | 10,943.19 | 1,951.74 | -3,179.50 | 14,449,235.008 | 1,713,955.903 | 39.786875054 | -80.738221985 |
| 14,703.00 | 91.07 | 331.460 | 10,941.57 | 2,034.93 | -3,223.23 | 14,449,318.201 | 1,713,912.179 | 39.787103874 | -80.738374630 |
| 14,797.00 | 90.85 | 331.860 | 10,940.00 | 2,117.65 | -3,267.84 | 14,449,400.922 | 1,713,867.564 | 39.787331408 | -80.738532589 |
| 14,891.00 | 90.88 | 330.980 | 10,938.74 | 2,200.19 | -3,312.81 | 14,449,483.460 | 1,713,822.600 | 39.787558439 | -80.738691789 |
| 14,986.00 | 90.85 | 331.900 | 10,937.47 | 2,283.62 | -3,358.22 | 14,449,566.892 | 1,713,777.187 | 39.787787929 | -80.738852581 |
| 15,080.00 | 90.94 | 329.190 | 10,936.00 | 2,366.45 | -3,404.43 | 14,449,648.724 | 1,713,730.974 | 39.788013031 | -80.739016240 |
| 15,175.00 | 91.43 | 330.890 | 10,934.04 | 2,447.74 | -3,451.86 | 14,449,731.008 | 1,713,683.543 | 39.788239386 | -80.739184228 |
| 15,269.00 | 91.30 | 331.590 | 10,931.80 | 2,530.12 | -3,497.08 | 14,449,813.388 | 1,713,638.329 | 39.788465985 | -80.739344326 |
| 15,363.00 | 91.30 | 330.620 | 10,929.67 | 2,612.39 | -3,542.49 | 14,449,895.664 | 1,713,592.920 | 39.788692298 | -80.739505120 |
| 15,458.00 | 91.21 | 330.320 | 10,927.59 | 2,695.03 | -3,589.30 | 14,449,978.303 | 1,713,546.108 | 39.788919621 | -80.739670906 |
| 15,552.00 | 91.38 | 331.110 | 10,925.46 | 2,777.00 | -3,635.27 | 14,450,060.268 | 1,713,500.140 | 39.789145085 | -80.739833696 |
| 15,647.00 | 91.25 | 330.850 | 10,923.28 | 2,860.05 | -3,681.34 | 14,450,143.318 | 1,713,454.066 | 39.789373532 | -80.739996852 |
| 15,742.00 | 91.16 | 331.240 | 10,921.28 | 2,943.15 | -3,727.32 | 14,450,226.425 | 1,713,408.085 | 39.789602130 | -80.740159678 |
| 15,836.00 | 90.85 | 331.810 | 10,919.64 | 3,025.77 | -3,772.13 | 14,450,309.040 | 1,713,363.275 | 39.789829370 | -80.740318341 |
| 15,931.00 | 91.25 | 331.110 | 10,917.89 | 3,109.21 | -3,817.51 | 14,450,392.481 | 1,713,317.895 | 39.790058883 | -80.740479026 |
| 16,026.00 | 90.59 | 330.320 | 10,916.37 | 3,192.06 | -3,863.97 | 14,450,475.327 | 1,713,271.432 | 39.790286772 | -80.740643573 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 16,121.00 | 91.34 | 330.450 | 10,914.77 | 3,274.64 | -3,910.91 | 14,450,557.905 | 1,713,224.493 | 39.790513924 | -80.740809819 |
| 16,216.00 | 90.99 | 330.400 | 10,912.84 | 3,357.24 | -3,957.79 | 14,450,640.510 | 1,713,177.614 | 39.790741152 | -80.740975851 |
| 16,310.00 | 91.03 | 330.670 | 10,911.18 | 3,439.07 | -4,004.02 | 14,450,722.339 | 1,713,131.384 | 39.790966243 | -80.741139584 |
| 16,410.00 | 91.07 | 330.140 | 10,909.35 | 3,526.01 | -4,053.40 | 14,450,809.277 | 1,713,082.006 | 39.791205392 | -80.741314471 |
| 16,504.00 | 91.03 | 330.320 | 10,907.63 | 3,607.59 | -4,100.07 | 14,450,890.858 | 1,713,035.341 | 39.791429804 | -80.741479756 |
| 16,599.00 | 90.81 | 329.790 | 10,906.10 | 3,689.90 | -4,147.48 | 14,450,973.165 | 1,712,987.926 | 39.791656216 | -80.741647704 |
| 16,692.00 | 90.81 | 329.610 | 10,904.79 | 3,770.18 | -4,194.40 | 14,451,053.452 | 1,712,941.010 | 39.791877078 | -80.741813899 |
| 16,787.00 | 90.50 | 329.130 | 10,903.70 | 3,851.92 | -4,242.80 | 14,451,135.191 | 1,712,892.612 | 39.792101939 | -80.741985356 |
| 16,880.00 | 90.94 | 330.050 | 10,902.53 | 3,932.12 | -4,289.87 | 14,451,215.389 | 1,712,845.541 | 39.792322557 | -80.742152104 |
| 16,974.00 | 90.90 | 329.210 | 10,901.02 | 4,013.21 | -4,337.38 | 14,451,296.479 | 1,712,798.023 | 39.792545627 | -80.742320437 |
| 17,068.00 | 91.07 | 328.950 | 10,899.41 | 4,093.84 | -4,385.68 | 14,451,377.108 | 1,712,749.729 | 39.792767437 | -80.742491536 |
| 17,162.00 | 90.99 | 329.170 | 10,897.72 | 4,174.45 | -4,434.00 | 14,451,457.719 | 1,712,701.408 | 39.792989198 | -80.742662735 |
| 17,256.00 | 91.07 | 329.170 | 10,896.03 | 4,255.16 | -4,482.17 | 14,451,538.423 | 1,712,653.241 | 39.793211212 | -80.742833383 |
| 17,350.00 | 90.90 | 329.390 | 10,894.41 | 4,335.95 | -4,530.18 | 14,451,619.220 | 1,712,605.229 | 39.793433481 | -80.743003481 |
| 17,444.00 | 90.94 | 326.390 | 10,892.90 | 4,415.55 | -4,580.13 | 14,451,698.822 | 1,712,555.276 | 39.793652481 | -80.743180503 |
| 17,538.00 | 90.94 | 330.010 | 10,891.36 | 4,495.42 | -4,629.65 | 14,451,778.687 | 1,712,505.757 | 39.793872203 | -80.743355978 |
| 17,632.00 | 90.99 | 328.020 | 10,889.78 | 4,575.99 | -4,678.03 | 14,451,859.258 | 1,712,457.374 | 39.794093852 | -80.743527403 |
| 17,726.00 | 90.94 | 329.570 | 10,888.19 | 4,656.38 | -4,726.73 | 14,451,939.644 | 1,712,408.681 | 39.794314997 | -80.743699934 |
| 17,820.00 | 91.07 | 329.480 | 10,886.54 | 4,737.38 | -4,774.39 | 14,452,020.645 | 1,712,361.016 | 39.794537822 | -80.743868803 |
| 17,914.00 | 91.07 | 330.180 | 10,884.79 | 4,818.63 | -4,821.63 | 14,452,101.897 | 1,712,313.783 | 39.794761332 | -80.744036129 |
| 18,009.00 | 91.07 | 329.740 | 10,883.01 | 4,900.86 | -4,869.17 | 14,452,184.122 | 1,712,266.234 | 39.794987515 | -80.744204572 |
| 18,103.00 | 90.99 | 329.430 | 10,881.32 | 4,981.91 | -4,916.75 | 14,452,265.172 | 1,712,218.653 | 39.795210474 | -80.744373141 |
| 18,197.00 | 90.90 | 328.640 | 10,879.77 | 5,062.50 | -4,965.11 | 14,452,345.764 | 1,712,170.296 | 39.795432179 | -80.744544480 |
| 18,291.00 | 91.43 | 329.480 | 10,877.86 | 5,143.10 | -5,013.43 | 14,452,426.370 | 1,712,121.978 | 39.795653924 | -80.744715683 |
| 18,385.00 | 91.47 | 329.170 | 10,875.48 | 5,223.93 | -5,061.37 | 14,452,507.191 | 1,712,074.037 | 39.795876254 | -80.744885537 |
| 18,478.00 | 91.56 | 330.450 | 10,873.02 | 5,304.28 | -5,108.12 | 14,452,587.547 | 1,712,027.288 | 39.796097298 | -80.745051158 |
| 18,572.00 | 91.52 | 329.080 | 10,870.50 | 5,385.46 | -5,155.44 | 14,452,668.728 | 1,711,979.973 | 39.796320614 | -80.745218786 |
| 18,667.00 | 91.38 | 330.540 | 10,868.09 | 5,467.55 | -5,203.19 | 14,452,750.814 | 1,711,932.217 | 39.796546416 | -80.745387975 |
| 18,760.00 | 91.47 | 329.700 | 10,865.78 | 5,548.16 | -5,249.51 | 14,452,831.426 | 1,711,885.900 | 39.796768159 | -80.745552054 |
| 18,854.00 | 91.47 | 331.200 | 10,863.37 | 5,629.90 | -5,295.85 | 14,452,913.169 | 1,711,839.558 | 39.796993010 | -80.745716217 |
| 18,948.00 | 91.43 | 332.610 | 10,860.99 | 5,712.80 | -5,340.10 | 14,452,996.064 | 1,711,795.305 | 39.797221006 | -80.745872928 |
| 19,040.00 | 91.38 | 330.270 | 10,858.74 | 5,793.58 | -5,384.07 | 14,453,076.839 | 1,711,751.339 | 39.797443178 | -80.746028644 |
| 19,134.00 | 91.38 | 331.590 | 10,856.47 | 5,875.71 | -5,429.73 | 14,453,158.972 | 1,711,705.680 | 39.797669092 | -80.746190369 |
| 19,227.00 | 91.43 | 332.080 | 10,854.19 | 5,957.67 | -5,473.61 | 14,453,240.935 | 1,711,661.797 | 39.797894526 | -80.746345780 |
| 19,321.00 | 91.38 | 331.110 | 10,851.89 | 6,040.33 | -5,518.31 | 14,453,323.592 | 1,711,617.095 | 39.798121871 | -80.746504097 |
| 19,415.00 | 91.21 | 332.030 | 10,849.76 | 6,122.97 | -5,563.05 | 14,453,406.233 | 1,711,572.355 | 39.798349174 | -80.746662551 |
| 19,509.00 | 90.99 | 331.590 | 10,847.96 | 6,205.80 | -5,607.45 | 14,453,489.069 | 1,711,527.958 | 39.798577004 | -80.746819783 |
| 19,602.00 | 91.25 | 331.680 | 10,846.14 | 6,287.62 | -5,651.63 | 14,453,570.887 | 1,711,483.784 | 39.798802042 | -80.746976234 |
| 19,696.00 | 91.30 | 331.200 | 10,844.05 | 6,370.16 | -5,696.55 | 14,453,653.428 | 1,711,438.855 | 39.799029070 | -80.747135362 |
| 19,791.00 | 90.85 | 332.300 | 10,842.27 | 6,453.83 | -5,741.51 | 14,453,737.097 | 1,711,393.899 | 39.799259194 | -80.747294581 |
| 19,884.00 | 90.85 | 330.670 | 10,840.89 | 6,535.54 | -5,785.90 | 14,453,818.803 | 1,711,349.508 | 39.799483925 | -80.747451806 |
| 19,977.00 | 90.59 | 329.080 | 10,839.72 | 6,615.97 | -5,832.57 | 14,453,899.233 | 1,711,302.838 | 39.799705167 | -80.747617162 |
| 20,071.00 | 90.81 | 330.270 | 10,838.57 | 6,697.10 | -5,880.03 | 14,453,980.363 | 1,711,255.381 | 39.799928341 | -80.747785310 |
| 20,164.00 | 90.68 | 331.370 | 10,837.36 | 6,778.29 | -5,925.37 | 14,454,061.553 | 1,711,210.044 | 39.800151659 | -80.747945916 |
| 20,258.00 | 90.72 | 327.890 | 10,836.21 | 6,859.37 | -5,972.88 | 14,454,142.635 | 1,711,162.530 | 39.800374700 | -80.748114271 |
| 20,351.00 | 90.77 | 328.200 | 10,835.00 | 6,938.27 | -6,022.10 | 14,454,221.535 | 1,711,113.314 | 39.800591761 | -80.748288711 |
| 20,445.00 | 90.72 | 328.690 | 10,833.78 | 7,018.37 | -6,071.28 | 14,454,301.629 | 1,711,064.126 | 39.800812099 | -80.748463036 |
| 20,538.00 | 90.72 | 330.230 | 10,832.61 | 7,098.46 | -6,118.54 | 14,454,381.719 | 1,711,016.874 | 39.801032411 | -80.748630472 |
| 20,632.00 | 90.77 | 331.070 | 10,831.39 | 7,180.38 | -6,164.61 | 14,454,463.645 | 1,710,970.805 | 39.801257758 | -80.748793679 |
| 20,725.00 | 90.68 | 328.550 | 10,830.21 | 7,260.76 | -6,211.36 | 14,454,544.018 | 1,710,924.046 | 39.801478842 | -80.748959360 |
| 20,817.00 | 91.16 | 331.950 | 10,828.73 | 7,340.61 | -6,257.00 | 14,454,623.870 | 1,710,878.407 | 39.801698487 | -80.749121059 |
| 20,911.00 | 91.16 | 328.730 | 10,826.83 | 7,422.26 | -6,303.50 | 14,454,705.526 | 1,710,831.907 | 39.801923094 | -80.749285808 |
| 21,004.00 | 91.25 | 331.150 | 10,824.87 | 7,502.73 | -6,350.08 | 14,454,785.994 | 1,710,785.336 | 39.802144438 | -80.749450819 |
| 21,099.00 | 91.43 | 330.580 | 10,822.65 | 7,585.69 | -6,396.31 | 14,454,868.951 | 1,710,739.096 | 39.802372614 | -80.749614629 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2622 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---------------------|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 21,192.00 | 91.52 | 330.850 | 10,820.26 | 7,666.78 | -6,441.79 | 14,454,950.038 | 1,710,693.620 | 39.802595650 | -80.749775739 |
| 21,286.00 | 91.78 | 331.590 | 10,817.55 | 7,749.13 | -6,487.03 | 14,455,032.391 | 1,710,648.383 | 39.802822162 | -80.749935987 |
| 21,380.00 | 92.18 | 331.070 | 10,814.30 | 7,831.56 | -6,532.10 | 14,455,114.817 | 1,710,603.313 | 39.803048870 | -80.750095642 |
| 21,426.00 | 92.49 | 331.460 | 10,812.43 | 7,871.86 | -6,554.20 | 14,455,155.118 | 1,710,581.216 | 39.803159718 | -80.750173917 |
| 21,474.00 | 92.71 | 331.590 | 10,810.25 | 7,914.01 | -6,577.06 | 14,455,197.268 | 1,710,558.355 | 39.803275647 | -80.750254898 |
| 21,550.00 | 91.03 | 330.780 | 10,807.77 | 7,980.56 | -6,613.67 | 14,455,263.819 | 1,710,521.745 | 39.803458694 | -80.750384587 |
| 21,643.00 | 90.15 | 331.400 | 10,806.81 | 8,061.96 | -6,658.62 | 14,455,345.224 | 1,710,476.789 | 39.803682597 | -80.750543849 |
| 21,736.00 | 90.46 | 331.050 | 10,806.32 | 8,143.48 | -6,703.39 | 14,455,426.738 | 1,710,432.022 | 39.803906799 | -80.750702436 |
| 21,830.00 | 89.98 | 329.640 | 10,805.96 | 8,225.16 | -6,749.90 | 14,455,508.423 | 1,710,385.515 | 39.804131483 | -80.750867219 |
| 21,922.00 | 90.51 | 329.730 | 10,805.57 | 8,304.58 | -6,796.33 | 14,455,587.842 | 1,710,339.078 | 39.804349943 | -80.751031774 |
| 22,015.00 | 89.58 | 329.030 | 10,805.49 | 8,384.61 | -6,843.70 | 14,455,667.873 | 1,710,291.710 | 39.804570091 | -80.751199640 |
| 22,109.00 | 89.98 | 328.760 | 10,805.85 | 8,465.10 | -6,892.26 | 14,455,748.357 | 1,710,243.150 | 39.804791491 | -80.751371750 |
| 22,204.00 | 90.42 | 327.880 | 10,805.52 | 8,545.94 | -6,942.15 | 14,455,829.200 | 1,710,193.259 | 39.805013887 | -80.751548592 |
| 22,298.00 | 90.29 | 327.710 | 10,804.94 | 8,625.48 | -6,992.25 | 14,455,908.736 | 1,710,143.163 | 39.805232695 | -80.751726181 |
| 22,391.00 | 91.16 | 329.900 | 10,803.76 | 8,705.02 | -7,040.41 | 14,455,988.277 | 1,710,095.001 | 39.805451502 | -80.751896885 |
| 22,485.00 | 90.20 | 329.640 | 10,802.65 | 8,786.23 | -7,087.73 | 14,456,069.487 | 1,710,047.678 | 39.805674886 | -80.752064583 |
| 22,578.00 | 91.21 | 332.450 | 10,801.50 | 8,867.59 | -7,132.75 | 14,456,150.846 | 1,710,002.663 | 39.805898663 | -80.752224065 |
| 22,672.00 | 90.46 | 333.860 | 10,800.13 | 8,951.45 | -7,175.19 | 14,456,234.704 | 1,709,960.221 | 39.806129281 | -80.752374363 |
| 22,766.00 | 90.20 | 335.440 | 10,799.59 | 9,036.39 | -7,215.44 | 14,456,319.649 | 1,709,919.977 | 39.806362866 | -80.752516822 |
| 22,860.00 | 89.67 | 333.330 | 10,799.70 | 9,121.15 | -7,256.07 | 14,456,404.405 | 1,709,879.342 | 39.806595937 | -80.752660680 |
| 22,955.00 | 89.49 | 331.310 | 10,800.39 | 9,205.27 | -7,300.20 | 14,456,488.526 | 1,709,835.215 | 39.806827290 | -80.752816976 |
| 23,047.00 | 89.76 | 329.380 | 10,801.00 | 9,285.21 | -7,345.72 | 14,456,568.470 | 1,709,789.698 | 39.807047183 | -80.752978262 |
| 23,142.00 | 89.71 | 327.710 | 10,801.44 | 9,366.25 | -7,395.29 | 14,456,649.506 | 1,709,740.127 | 39.807270104 | -80.753153977 |
| 23,235.00 | 90.33 | 327.530 | 10,801.40 | 9,444.79 | -7,445.09 | 14,456,728.045 | 1,709,690.323 | 39.807486170 | -80.753330546 |
| 23,328.00 | 91.25 | 327.270 | 10,800.12 | 9,523.13 | -7,495.19 | 14,456,806.385 | 1,709,640.223 | 39.807701690 | -80.753508173 |
| 23,421.00 | 90.77 | 328.410 | 10,798.48 | 9,601.84 | -7,544.68 | 14,456,885.101 | 1,709,590.729 | 39.807918241 | -80.753683638 |
| 23,515.00 | 91.30 | 328.150 | 10,796.78 | 9,681.79 | -7,594.10 | 14,456,965.047 | 1,709,541.315 | 39.808138165 | -80.753858807 |
| 23,609.00 | 90.68 | 328.500 | 10,795.16 | 9,761.78 | -7,643.45 | 14,457,045.032 | 1,709,491.963 | 39.808358198 | -80.754033755 |
| 23,702.00 | 90.15 | 328.760 | 10,794.49 | 9,841.18 | -7,691.86 | 14,457,124.435 | 1,709,443.553 | 39.808576624 | -80.754205360 |
| 23,796.00 | 90.90 | 328.850 | 10,793.62 | 9,921.58 | -7,740.55 | 14,457,204.839 | 1,709,394.868 | 39.808797803 | -80.754377933 |
| 23,889.00 | 91.56 | 328.670 | 10,791.63 | 10,001.08 | -7,788.77 | 14,457,284.336 | 1,709,346.647 | 39.809016483 | -80.754548862 |
| 23,982.00 | 90.73 | 329.030 | 10,789.77 | 10,080.65 | -7,836.86 | 14,457,363.910 | 1,709,298.550 | 39.809235376 | -80.754719351 |
| 24,075.00 | 91.21 | 327.270 | 10,788.20 | 10,159.64 | -7,885.93 | 14,457,442.892 | 1,709,249.484 | 39.809452652 | -80.754893300 |
| 24,169.00 | 90.29 | 327.180 | 10,786.97 | 10,238.66 | -7,936.81 | 14,457,521.920 | 1,709,198.603 | 39.809670065 | -80.755067310 |
| 24,263.00 | 90.81 | 327.880 | 10,786.06 | 10,317.96 | -7,987.27 | 14,457,601.220 | 1,709,148.141 | 39.809888224 | -80.755242626 |
| 24,356.00 | 90.81 | 329.380 | 10,784.75 | 10,397.36 | -8,035.68 | 14,457,680.616 | 1,709,099.735 | 39.810106627 | -80.755424222 |
| 24,449.00 | 90.42 | 331.050 | 10,783.75 | 10,478.07 | -8,081.87 | 14,457,761.322 | 1,709,053.542 | 39.810328615 | -80.755587926 |
| 24,543.00 | 91.52 | 330.870 | 10,782.16 | 10,560.24 | -8,127.50 | 14,457,843.491 | 1,709,007.920 | 39.810554615 | -80.755749584 |
| 24,636.00 | 91.16 | 332.370 | 10,779.98 | 10,642.03 | -8,171.69 | 14,457,925.289 | 1,708,963.729 | 39.810779584 | -80.755906150 |
| 24,729.00 | 90.42 | 332.810 | 10,778.70 | 10,724.58 | -8,214.49 | 14,458,007.840 | 1,708,920.921 | 39.811006610 | -80.756057786 |
| 24,821.00 | 90.42 | 333.070 | 10,778.03 | 10,806.51 | -8,256.35 | 14,458,089.766 | 1,708,879.069 | 39.811231914 | -80.756206023 |
| 24,914.00 | 90.64 | 333.070 | 10,777.17 | 10,889.42 | -8,298.46 | 14,458,172.677 | 1,708,836.951 | 39.811459925 | -80.756355200 |
| 25,007.00 | 91.47 | 333.330 | 10,775.45 | 10,972.42 | -8,340.39 | 14,458,255.673 | 1,708,795.027 | 39.811688165 | -80.756503686 |
| 25,099.00 | 89.85 | 333.510 | 10,774.39 | 11,054.69 | -8,381.55 | 14,458,337.941 | 1,708,753.866 | 39.811914402 | -80.756649463 |
| 25,192.00 | 89.58 | 332.720 | 10,774.86 | 11,137.63 | -8,423.60 | 14,458,420.887 | 1,708,711.812 | 39.812142508 | -80.756798413 |
| 25,286.00 | 89.32 | 330.870 | 10,775.76 | 11,220.46 | -8,468.03 | 14,458,503.718 | 1,708,667.389 | 39.812370315 | -80.756955802 |
| 25,379.00 | 90.46 | 331.310 | 10,775.94 | 11,301.87 | -8,512.98 | 14,458,585.127 | 1,708,622.431 | 39.812598219 | -80.757115113 |
| 25,472.00 | 90.90 | 330.730 | 10,774.83 | 11,383.22 | -8,558.04 | 14,458,666.476 | 1,708,577.376 | 39.812817960 | -80.757274771 |
| 25,565.00 | 91.56 | 331.130 | 10,772.84 | 11,464.49 | -8,603.22 | 14,458,747.741 | 1,708,532.200 | 39.813041471 | -80.757434859 |
| 25,659.00 | 92.49 | 331.350 | 10,769.52 | 11,546.84 | -8,648.41 | 14,458,830.093 | 1,708,487.001 | 39.813267966 | -80.757595019 |
| 25,752.00 | 93.22 | 331.220 | 10,764.88 | 11,628.30 | -8,693.04 | 14,458,911.553 | 1,708,442.375 | 39.813492011 | -80.757753151 |
| 25,846.00 | 94.24 | 331.010 | 10,758.77 | 11,710.43 | -8,738.35 | 14,458,993.683 | 1,708,397.065 | 39.813717898 | -80.757913712 |
| 25,940.00 | 94.97 | 331.220 | 10,751.22 | 11,792.47 | -8,783.61 | 14,459,075.722 | 1,708,351.805 | 39.813943534 | -80.758074097 |



Survey Report - Geographic



| | | | |
|------------------|--|-------------------------------------|------------------------------------|
| Company: | Tug Hill Operating LLC | Local Co-ordinate Reference: | Well Van Winkle N-17 HU (slot F) |
| Project: | Marshall County, West Virginia NAD83 UTM 17N | TVD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Site: | Van Winkle | MD Reference: | RKB=753+26 @ 779.00ft (Nabors B28) |
| Well: | Van Winkle N-17 HU (slot F) | North Reference: | Grid |
| Wellbore: | Original Hole | Survey Calculation Method: | Minimum Curvature |
| Design: | Surveys Original Hole | Database: | DB_Feb2822 |

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Map Northing (usft) | Map Easting (usft) | Latitude | Longitude |
|---|-----------------|-------------|---------------------|------------|------------|---------------------|--------------------|--------------|---------------|
| 25,974.00 | 95.03 | 331.120 | 10,748.26 | 11,822.14 | -8,799.94 | 14,459,105.395 | 1,708,335.472 | 39.814025144 | -80.758131975 |
| Survey @ 25974.00 MD 10748.26 TVD | | | | | | | | | |
| 26,031.00 | 95.03 | 331.120 | 10,743.26 | 11,871.86 | -8,827.37 | 14,459,155.114 | 1,708,308.049 | 39.814161888 | -80.758229155 |
| Survey Proj. to 26031.00 MD 10743.26 TVD | | | | | | | | | |

| Measured Depth (ft) | Vertical Depth (ft) | Local Coordinates | | Comment |
|---------------------|---------------------|-------------------|------------|--|
| | | +N/-S (ft) | +E/-W (ft) | |
| 180.00 | 180.00 | 0.19 | -0.27 | MWD surveys |
| 25,974.00 | 10,748.26 | 11,822.14 | -8,799.94 | Survey @ 25974.00 MD 10748.26 TVD |
| 26,031.00 | 10,743.26 | 11,871.86 | -8,827.37 | Survey Proj. to 26031.00 MD 10743.26 TVD |

Checked By: _____ Approved By: _____ Date: _____