

# **HG Energy, LLC**

Roane County, West Virginia

C McGraw #205

C McGraw #205

Wellbore #1

Design: Wellbore #1

## **Survey Report - Geographic**

27 January, 2015



06/05/2015

Survey Report - Geographic



|                  |                             |                                     |                             |
|------------------|-----------------------------|-------------------------------------|-----------------------------|
| <b>Company:</b>  | HG Energy, LLC              | <b>Local Co-ordinate Reference:</b> | Well C McGraw #205          |
| <b>Project:</b>  | Roane County, West Virginia | <b>TVD Reference:</b>               | well @ 1118.0usft (Yost #2) |
| <b>Site:</b>     | C McGraw #205               | <b>MD Reference:</b>                | well @ 1118.0usft (Yost #2) |
| <b>Well:</b>     | C McGraw #205               | <b>North Reference:</b>             | Grid                        |
| <b>Wellbore:</b> | Wellbore #1                 | <b>Survey Calculation Method:</b>   | Minimum Curvature           |
| <b>Design:</b>   | Wellbore #1                 | <b>Database:</b>                    | EDM Compass                 |

|                    |                               |                      |                |
|--------------------|-------------------------------|----------------------|----------------|
| <b>Project</b>     | Roane County, West Virginia   |                      |                |
| <b>Map System:</b> | Universal Transverse Mercator | <b>System Datum:</b> | Mean Sea Level |
| <b>Geo Datum:</b>  | NAD83 West Virginia - HARN    |                      |                |
| <b>Map Zone:</b>   | Zone 17N (84 W to 78 W)       |                      |                |

|                              |               |                     |                    |                          |                  |
|------------------------------|---------------|---------------------|--------------------|--------------------------|------------------|
| <b>Site</b>                  | C McGraw #205 |                     |                    |                          |                  |
| <b>Site Position:</b>        |               | <b>Northing:</b>    | 14,059,516.71 usft | <b>Latitude:</b>         | 38° 42' 59.200 N |
| <b>From:</b>                 | Lat/Long      | <b>Easting:</b>     | 1,559,302.20 usft  | <b>Longitude:</b>        | 81° 17' 3.800 W  |
| <b>Position Uncertainty:</b> | 0.0 usft      | <b>Slot Radius:</b> | 13-3/16 "          | <b>Grid Convergence:</b> | -0.18 °          |

|                             |               |          |                            |                    |                      |                  |
|-----------------------------|---------------|----------|----------------------------|--------------------|----------------------|------------------|
| <b>Well</b>                 | C McGraw #205 |          |                            |                    |                      |                  |
| <b>Well Position</b>        | +N-S          | 0.0 usft | <b>Northing:</b>           | 14,059,516.71 usft | <b>Latitude:</b>     | 38° 42' 59.200 N |
|                             | +E-W          | 0.0 usft | <b>Easting:</b>            | 1,559,302.20 usft  | <b>Longitude:</b>    | 81° 17' 3.800 W  |
| <b>Position Uncertainty</b> | 0.0 usft      |          | <b>Wellhead Elevation:</b> | 0.0 usft           | <b>Ground Level:</b> | 1,110.0 usft     |

|                  |                   |                    |                        |                      |                            |
|------------------|-------------------|--------------------|------------------------|----------------------|----------------------------|
| <b>Wellbore</b>  | Wellbore #1       |                    |                        |                      |                            |
| <b>Magnetics</b> | <b>Model Name</b> | <b>Sample Date</b> | <b>Declination (°)</b> | <b>Dip Angle (°)</b> | <b>Field Strength (nT)</b> |
|                  | IGRF2010          | 12/23/2014         | -8.02                  | 66.37                | 51,991                     |

|                          |             |                                |                    |                      |                      |
|--------------------------|-------------|--------------------------------|--------------------|----------------------|----------------------|
| <b>Design</b>            | Wellbore #1 |                                |                    |                      |                      |
| <b>Audit Notes:</b>      |             |                                |                    |                      |                      |
| <b>Version:</b>          | 1.0         | <b>Phase:</b>                  | ACTUAL             | <b>Tie On Depth:</b> | 0.0                  |
| <b>Vertical Section:</b> |             | <b>Depth From (TVD) (usft)</b> | <b>+N-S (usft)</b> | <b>+E-W (usft)</b>   | <b>Direction (°)</b> |
|                          |             | 0.0                            | 0.0                | 0.0                  | 172.50               |

|                       |                  |                          |                  |                    |
|-----------------------|------------------|--------------------------|------------------|--------------------|
| <b>Survey Program</b> | Date 1/27/2015   |                          |                  |                    |
| <b>From (usft)</b>    | <b>To (usft)</b> | <b>Survey (Wellbore)</b> | <b>Tool Name</b> | <b>Description</b> |
| 500.0                 | 2,601.0          | MWD SURVEY (Wellbore #1) | MWD default      | MWD - Standard     |

| Measured Depth (usft)                    | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N-S (usft) | +E-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude         | Longitude       |
|--|-----------------|-------------|-----------------------|-------------|-------------|---------------------|--------------------|------------------|-----------------|
| 0.0                                      | 0.00            | 0.00        | 0.0                   | 0.0         | 0.0         | 14,059,516.71       | 1,559,302.20       | 38° 42' 59.200 N | 81° 17' 3.800 W |
| 500.0                                    | 0.00            | 0.00        | 500.0                 | 0.0         | 0.0         | 14,059,516.71       | 1,559,302.20       | 38° 42' 59.200 N | 81° 17' 3.800 W |
| <b>FIRST SURVEY @ 500' MD / 500' TVD</b> |                 |             |                       |             |             |                     |                    |                  |                 |
| 593.0                                    | 0.70            | 118.10      | 593.0                 | -0.3        | 0.5         | 14,059,516.44       | 1,559,302.70       | 38° 42' 59.197 N | 81° 17' 3.794 W |
| 623.0                                    | 0.80            | 112.90      | 623.0                 | -0.4        | 0.9         | 14,059,516.27       | 1,559,303.05       | 38° 42' 59.196 N | 81° 17' 3.789 W |
| 653.0                                    | 0.90            | 148.40      | 653.0                 | -0.7        | 1.2         | 14,059,515.99       | 1,559,303.37       | 38° 42' 59.193 N | 81° 17' 3.785 W |
| 683.0                                    | 1.80            | 179.80      | 683.0                 | -1.4        | 1.3         | 14,059,515.32       | 1,559,303.49       | 38° 42' 59.186 N | 81° 17' 3.784 W |
| 713.0                                    | 2.80            | 186.30      | 713.0                 | -2.6        | 1.2         | 14,059,514.12       | 1,559,303.41       | 38° 42' 59.174 N | 81° 17' 3.785 W |
| 743.0                                    | 3.70            | 186.40      | 742.9                 | -4.3        | 1.0         | 14,059,512.43       | 1,559,303.23       | 38° 42' 59.158 N | 81° 17' 3.787 W |
| 773.0                                    | 4.30            | 180.50      | 772.8                 | -6.4        | 0.9         | 14,059,510.34       | 1,559,303.11       | 38° 42' 59.137 N | 81° 17' 3.788 W |
| 803.0                                    | 5.00            | 180.50      | 802.7                 | -8.8        | 0.9         | 14,059,507.91       | 1,559,303.09       | 38° 42' 59.113 N | 81° 17' 3.788 W |
| 833.0                                    | 5.40            | 176.30      | 832.6                 | -11.5       | 1.0         | 14,059,505.20       | 1,559,303.17       | 38° 42' 59.086 N | 81° 17' 3.787 W |

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Survey Report - Geographic



|                  |                             |                                     |                             |
|------------------|-----------------------------|-------------------------------------|-----------------------------|
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| <b>Project:</b>  | Roane County, West Virginia | <b>TVD Reference:</b>               | well @ 1118.0usft (Yost #2) |
| <b>Site:</b>     | C McGraw #205               | <b>MD Reference:</b>                | well @ 1118.0usft (Yost #2) |
| <b>Well:</b>     | C McGraw #205               | <b>North Reference:</b>             | Grid                        |
| <b>Wellbore:</b> | Wellbore #1                 | <b>Survey Calculation Method:</b>   | Minimum Curvature           |
| <b>Design:</b>   | Wellbore #1                 | <b>Database:</b>                    | EDM Compass                 |

Survey

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N-S (usft) | +E-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude         | Longitude       |
|-----------------------|-----------------|-------------|-----------------------|-------------|-------------|---------------------|--------------------|------------------|-----------------|
| 863.0                 | 6.40            | 174.80      | 862.5                 | -14.6       | 1.2         | 14,059,502.12       | 1,559,303.41       | 38° 42' 59.056 N | 81° 17' 3.784 W |
| 893.0                 | 7.20            | 173.70      | 892.2                 | -18.1       | 1.6         | 14,059,498.59       | 1,559,303.77       | 38° 42' 59.021 N | 81° 17' 3.779 W |
| 923.0                 | 7.70            | 170.40      | 922.0                 | -22.0       | 2.1         | 14,059,494.74       | 1,559,304.31       | 38° 42' 58.983 N | 81° 17' 3.772 W |
| 953.0                 | 8.50            | 169.70      | 951.7                 | -26.1       | 2.8         | 14,059,490.57       | 1,559,305.04       | 38° 42' 58.942 N | 81° 17' 3.763 W |
| 983.0                 | 9.20            | 169.40      | 981.3                 | -30.7       | 3.7         | 14,059,486.04       | 1,559,305.88       | 38° 42' 58.897 N | 81° 17' 3.752 W |
| 1,013.0               | 9.70            | 168.30      | 1,010.9               | -35.5       | 4.6         | 14,059,481.20       | 1,559,306.83       | 38° 42' 58.849 N | 81° 17' 3.740 W |
| 1,043.0               | 10.60           | 170.80      | 1,040.5               | -40.7       | 5.6         | 14,059,476.00       | 1,559,307.78       | 38° 42' 58.798 N | 81° 17' 3.728 W |
| 1,073.0               | 11.30           | 171.50      | 1,069.9               | -46.3       | 6.5         | 14,059,470.37       | 1,559,308.66       | 38° 42' 58.742 N | 81° 17' 3.717 W |
| 1,103.0               | 11.90           | 171.10      | 1,099.3               | -52.3       | 7.4         | 14,059,464.41       | 1,559,309.57       | 38° 42' 58.683 N | 81° 17' 3.705 W |
| 1,133.0               | 12.30           | 170.10      | 1,128.6               | -58.5       | 8.4         | 14,059,458.21       | 1,559,310.60       | 38° 42' 58.622 N | 81° 17' 3.692 W |
| 1,163.0               | 13.00           | 171.50      | 1,157.9               | -65.0       | 9.5         | 14,059,451.72       | 1,559,311.65       | 38° 42' 58.558 N | 81° 17' 3.678 W |
| 1,193.0               | 13.80           | 171.60      | 1,187.1               | -71.9       | 10.5        | 14,059,444.85       | 1,559,312.67       | 38° 42' 58.490 N | 81° 17' 3.665 W |
| 1,223.0               | 14.70           | 171.60      | 1,216.2               | -79.2       | 11.6        | 14,059,437.54       | 1,559,313.75       | 38° 42' 58.417 N | 81° 17' 3.651 W |
| 1,253.0               | 15.70           | 173.10      | 1,245.1               | -87.0       | 12.6        | 14,059,429.74       | 1,559,314.79       | 38° 42' 58.340 N | 81° 17' 3.638 W |
| 1,283.0               | 16.50           | 173.10      | 1,273.9               | -95.2       | 13.6        | 14,059,421.49       | 1,559,315.79       | 38° 42' 58.259 N | 81° 17' 3.625 W |
| 1,313.0               | 17.20           | 173.80      | 1,302.6               | -103.9      | 14.6        | 14,059,412.85       | 1,559,316.78       | 38° 42' 58.173 N | 81° 17' 3.612 W |
| 1,343.0               | 17.80           | 173.40      | 1,331.3               | -112.8      | 15.6        | 14,059,403.88       | 1,559,317.79       | 38° 42' 58.085 N | 81° 17' 3.599 W |
| 1,373.0               | 18.60           | 173.80      | 1,359.8               | -122.1      | 16.6        | 14,059,394.57       | 1,559,318.83       | 38° 42' 57.993 N | 81° 17' 3.585 W |
| 1,403.0               | 19.50           | 174.20      | 1,388.1               | -131.9      | 17.7        | 14,059,384.83       | 1,559,319.86       | 38° 42' 57.896 N | 81° 17' 3.572 W |
| 1,433.0               | 20.70           | 175.00      | 1,416.3               | -142.1      | 18.6        | 14,059,374.57       | 1,559,320.82       | 38° 42' 57.795 N | 81° 17' 3.559 W |
| 1,463.0               | 21.70           | 175.00      | 1,444.3               | -152.9      | 19.6        | 14,059,363.76       | 1,559,321.77       | 38° 42' 57.688 N | 81° 17' 3.547 W |
| 1,493.0               | 22.70           | 176.00      | 1,472.0               | -164.2      | 20.5        | 14,059,352.46       | 1,559,322.66       | 38° 42' 57.576 N | 81° 17' 3.535 W |
| 1,523.0               | 23.80           | 176.10      | 1,499.6               | -176.1      | 21.3        | 14,059,340.65       | 1,559,323.47       | 38° 42' 57.460 N | 81° 17' 3.525 W |
| 1,553.0               | 25.20           | 177.10      | 1,526.9               | -188.5      | 22.0        | 14,059,328.23       | 1,559,324.21       | 38° 42' 57.337 N | 81° 17' 3.515 W |
| 1,583.0               | 26.50           | 177.40      | 1,553.9               | -201.5      | 22.6        | 14,059,315.16       | 1,559,324.83       | 38° 42' 57.208 N | 81° 17' 3.506 W |
| 1,613.0               | 27.70           | 177.20      | 1,580.6               | -215.2      | 23.3        | 14,059,301.51       | 1,559,325.48       | 38° 42' 57.073 N | 81° 17' 3.498 W |
| 1,643.0               | 28.50           | 176.40      | 1,607.1               | -229.3      | 24.1        | 14,059,287.40       | 1,559,326.27       | 38° 42' 56.933 N | 81° 17' 3.487 W |
| 1,673.0               | 29.50           | 175.90      | 1,633.3               | -243.8      | 25.1        | 14,059,272.89       | 1,559,327.25       | 38° 42' 56.790 N | 81° 17' 3.474 W |
| 1,703.0               | 30.60           | 176.30      | 1,659.3               | -258.8      | 26.1        | 14,059,257.91       | 1,559,328.27       | 38° 42' 56.642 N | 81° 17' 3.461 W |
| 1,733.0               | 31.80           | 175.70      | 1,684.9               | -274.3      | 27.2        | 14,059,242.40       | 1,559,329.35       | 38° 42' 56.488 N | 81° 17' 3.446 W |
| 1,763.0               | 33.90           | 175.50      | 1,710.1               | -290.5      | 28.4        | 14,059,226.18       | 1,559,330.60       | 38° 42' 56.328 N | 81° 17' 3.430 W |
| 1,793.0               | 36.60           | 175.50      | 1,734.6               | -307.8      | 29.8        | 14,059,208.92       | 1,559,331.96       | 38° 42' 56.157 N | 81° 17' 3.412 W |
| 1,823.0               | 39.40           | 175.90      | 1,758.3               | -326.2      | 31.1        | 14,059,190.50       | 1,559,333.34       | 38° 42' 55.975 N | 81° 17' 3.394 W |
| 1,853.0               | 41.80           | 175.50      | 1,781.0               | -345.7      | 32.6        | 14,059,171.04       | 1,559,334.81       | 38° 42' 55.783 N | 81° 17' 3.375 W |
| 1,883.0               | 43.90           | 175.30      | 1,803.0               | -366.0      | 34.2        | 14,059,150.70       | 1,559,336.44       | 38° 42' 55.582 N | 81° 17' 3.353 W |
| 1,913.0               | 43.90           | 174.50      | 1,824.7               | -386.7      | 36.1        | 14,059,129.98       | 1,559,338.29       | 38° 42' 55.377 N | 81° 17' 3.329 W |
| 1,943.0               | 44.20           | 174.10      | 1,846.2               | -407.5      | 38.2        | 14,059,109.23       | 1,559,340.37       | 38° 42' 55.172 N | 81° 17' 3.302 W |
| 1,973.0               | 45.10           | 173.80      | 1,867.6               | -428.4      | 40.4        | 14,059,088.26       | 1,559,342.59       | 38° 42' 54.965 N | 81° 17' 3.273 W |
| 2,003.0               | 45.20           | 173.50      | 1,888.7               | -449.6      | 42.7        | 14,059,067.12       | 1,559,344.94       | 38° 42' 54.756 N | 81° 17' 3.243 W |
| 2,033.0               | 45.20           | 173.40      | 1,909.9               | -470.7      | 45.2        | 14,059,045.97       | 1,559,347.37       | 38° 42' 54.547 N | 81° 17' 3.211 W |
| 2,063.0               | 45.80           | 173.50      | 1,930.9               | -492.0      | 47.6        | 14,059,024.72       | 1,559,349.81       | 38° 42' 54.336 N | 81° 17' 3.180 W |
| 2,123.0               | 46.30           | 173.50      | 1,972.5               | -534.9      | 52.5        | 14,058,981.80       | 1,559,354.70       | 38° 42' 53.912 N | 81° 17' 3.116 W |
| 2,153.0               | 44.90           | 172.40      | 1,993.5               | -556.2      | 55.1        | 14,058,960.53       | 1,559,357.33       | 38° 42' 53.702 N | 81° 17' 3.082 W |
| 2,183.0               | 44.60           | 172.00      | 2,014.8               | -577.1      | 58.0        | 14,058,939.60       | 1,559,360.19       | 38° 42' 53.495 N | 81° 17' 3.045 W |
| 2,213.0               | 44.40           | 171.50      | 2,036.2               | -597.9      | 61.0        | 14,058,918.79       | 1,559,363.21       | 38° 42' 53.289 N | 81° 17' 3.006 W |
| 2,243.0               | 44.60           | 171.20      | 2,057.6               | -618.7      | 64.2        | 14,058,898.00       | 1,559,366.37       | 38° 42' 53.084 N | 81° 17' 2.966 W |
| 2,273.0               | 44.90           | 171.90      | 2,078.9               | -639.6      | 67.3        | 14,058,877.11       | 1,559,369.48       | 38° 42' 52.878 N | 81° 17' 2.926 W |
| 2,303.0               | 45.20           | 171.50      | 2,100.1               | -660.6      | 70.3        | 14,058,856.10       | 1,559,372.54       | 38° 42' 52.671 N | 81° 17' 2.886 W |
| 2,333.0               | 45.20           | 171.30      | 2,121.3               | -681.7      | 73.5        | 14,058,835.06       | 1,559,375.73       | 38° 42' 52.463 N | 81° 17' 2.845 W |
| 2,363.0               | 45.40           | 171.80      | 2,142.4               | -702.7      | 76.7        | 14,058,813.96       | 1,559,378.86       | 38° 42' 52.255 N | 81° 17' 2.805 W |
| 2,393.0               | 45.70           | 171.60      | 2,163.4               | -723.9      | 79.8        | 14,058,792.77       | 1,559,381.95       | 38° 42' 52.044 N | 81° 17' 2.765 W |
| 2,423.0               | 46.20           | 171.10      | 2,184.2               | -745.3      | 83.0        | 14,058,771.46       | 1,559,385.19       | 38° 42' 51.833 N | 81° 17' 2.723 W |
| 2,453.0               | 46.20           | 170.80      | 2,205.0               | -766.6      | 86.4        | 14,058,750.07       | 1,559,388.60       | 38° 42' 51.622 N | 81° 17' 2.679 W |
| 2,483.0               | 46.10           | 169.80      | 2,225.8               | -788.0      | 90.0        | 14,058,728.75       | 1,559,392.24       | 38° 42' 51.411 N | 81° 17' 2.633 W |
| 2,513.0               | 48.40           | 170.50      | 2,246.1               | -809.7      | 93.8        | 14,058,707.04       | 1,559,396.01       | 38° 42' 51.197 N | 81° 17' 2.584 W |

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WV Department of Environmental Protection  
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Survey Report - Geographic



|                  |                             |                                     |                             |
|------------------|-----------------------------|-------------------------------------|-----------------------------|
| <b>Company:</b>  | HG Energy, LLC              | <b>Local Co-ordinate Reference:</b> | Well C McGraw #205          |
| <b>Project:</b>  | Roane County, West Virginia | <b>TVD Reference:</b>               | well @ 1118.0usft (Yost #2) |
| <b>Site:</b>     | C McGraw #205               | <b>MD Reference:</b>                | well @ 1118.0usft (Yost #2) |
| <b>Well:</b>     | C McGraw #205               | <b>North Reference:</b>             | Grid                        |
| <b>Wellbore:</b> | Wellbore #1                 | <b>Survey Calculation Method:</b>   | Minimum Curvature           |
| <b>Design:</b>   | Wellbore #1                 | <b>Database:</b>                    | EDM Compass                 |

| Survey                    |                 |             |                       |              |              |                     |                    |                  |                 |
|---------------------------|-----------------|-------------|-----------------------|--------------|--------------|---------------------|--------------------|------------------|-----------------|
| Measured Depth (usft)     | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Map Northing (usft) | Map Easting (usft) | Latitude         | Longitude       |
| 2,601.0                   | 48.40           | 170.50      | 2,304.6               | -874.6       | 104.7        | 14,058,642.14       | 1,559,406.87       | 38° 42' 50.555 N | 81° 17' 2.445 W |
| TD @ 2601' MD / 2305' TVD |                 |             |                       |              |              |                     |                    |                  |                 |

| Design Annotations    |                       |                   |              |                                   |  |
|-----------------------|-----------------------|-------------------|--------------|-----------------------------------|--|
| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates |              | Comment                           |  |
|                       |                       | +N/-S (usft)      | +E/-W (usft) |                                   |  |
| 500.0                 | 500.0                 | 0.0               | 0.0          | FIRST SURVEY @ 500' MD / 500' TVD |  |
| 2,601.0               | 2,304.6               | -874.6            | 104.7        | TD @ 2601' MD / 2305' TVD         |  |

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

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**HG Energy, LLC**  
Roane County, West Virginia  
C McGraw #205  
C McGraw #205  
Wellbore #1

Design: Wellbore #1

## **HG Energy EOW Report**

27 January, 2015





HG Energy EOW Report

**Company:** HG Energy, LLC  
**Project:** Roane County, West Virginia  
**Site:** C McGraw #205  
**Well:** C McGraw #205  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well C McGraw #205  
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**Database:** EDM Compass

**Project:** Roane County, West Virginia  
**Map System:** Universal Transverse Mercator  
**Geo Datum:** NAD83 West Virginia - HARN  
**Map Zone:** Zone 17N (84 W to 78 W)

**System Datum:** Mean Sea Level

**Site:** C McGraw #205  
**Site Position:** Northing: 14,059,516.70 usft Latitude: 38° 42' 59.200 N  
 From: Lat/Long Easting: 1,559,302.19 usft Longitude: 81° 17' 3.800 W  
**Position Uncertainty:** Slot Radius: 0.0 usft Grid Convergence: -0.18 °

**Well:** C McGraw #205  
**Well Position:** +N/-S 0.0 usft Northing: 14,059,516.70 usft Latitude: 38° 42' 59.200 N  
 +E/-W 0.0 usft Easting: 1,559,302.19 usft Longitude: 81° 17' 3.800 W  
**Position Uncertainty:** Wellhead Elevation: 0.0 usft Ground Level: 1,110.0 usft

**Wellbore:** Wellbore #1  
**Magnetics:** Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)  
 IGRF2010 12/23/2014 -8.02 66.37 51,991

**Design:** Wellbore #1  
**Audit Notes:**  
**Version:** 1.0 Phase: ACTUAL Tie On Depth: 0.0  
**Vertical Section:** Depth From (TVD) (usft) +N/-S (usft) +E/-W (usft) Direction (°)  
 0.0 0.0 0.0 172.50

**Survey Program:** Date 1/27/2015  
**From (usft):** 500.0 **To (usft):** 2,601.0 **Survey (Wellbore):** MWD SURVEY (Wellbore #1) **Tool Name:** MWD default **Description:** MWD - Standard



HG Energy EOW Report

Company: HG Energy, LLC  
 Project: Roane County, West Virginia  
 Site: C McGraw #205  
 Well: C McGraw #205  
 Wellbore #1  
 Design: Wellbore #1

Local Co-ordinate Reference: Well C McGraw #205  
 TVD Reference: well @ 1118.0usft (Yost #2)  
 MD Reference: well @ 1118.0usft (Yost #2)  
 North Reference: Grid  
 Survey Calculation Method: Minimum Curvature  
 Database: EDM Compass

| MD (usft)                         | Inc (°) | Azl (azimuth) (°) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | D/Leg (°/100usft) | Closure Distance (usft) | Closure Azimuth (°) |  |
|-----------------------------------|---------|-------------------|------------|------------|------------|---------------|-------------------|-------------------------|---------------------|--|
| 0.0                               | 0.00    | 0.00              | 0.00       | 0.0        | 0.0        | 0.0           | 0.0               | 0.0                     | 0.00                |  |
| 500.0                             | 0.00    | 0.00              | 500.0      | 0.0        | 0.0        | 0.0           | 0.0               | 0.0                     | 0.00                |  |
| FIRST SURVEY @ 500' MD / 500' TVD |         |                   |            |            |            |               |                   |                         |                     |  |
| 593.0                             | 0.70    | 118.10            | 593.0      | -0.3       | 0.5        | 0.3           | 0.75              | 0.6                     | 118.10              |  |
| 623.0                             | 0.80    | 112.90            | 623.0      | -0.4       | 0.9        | 0.5           | 0.40              | 1.0                     | 116.97              |  |
| 653.0                             | 0.90    | 148.40            | 653.0      | -0.7       | 1.2        | 0.9           | 1.76              | 1.4                     | 121.48              |  |
| 683.0                             | 1.80    | 179.80            | 683.0      | -1.4       | 1.3        | 1.5           | 3.78              | 1.9                     | 136.97              |  |
| 713.0                             | 2.80    | 186.30            | 713.0      | -2.6       | 1.2        | 2.7           | 3.44              | 2.9                     | 154.80              |  |
| 743.0                             | 3.70    | 186.40            | 742.9      | -4.3       | 1.0        | 4.4           | 3.00              | 4.4                     | 166.46              |  |
| 773.0                             | 4.30    | 180.50            | 772.8      | -6.4       | 0.9        | 6.4           | 2.42              | 6.4                     | 171.84              |  |
| 803.0                             | 5.00    | 180.50            | 802.7      | -8.8       | 0.9        | 8.8           | 2.33              | 8.8                     | 174.22              |  |
| 833.0                             | 5.40    | 176.30            | 832.6      | -11.5      | 1.0        | 11.5          | 1.84              | 11.6                    | 175.18              |  |
| 863.0                             | 6.40    | 174.80            | 862.5      | -14.6      | 1.2        | 14.6          | 3.37              | 14.6                    | 175.24              |  |
| 893.0                             | 7.20    | 173.70            | 892.2      | -18.1      | 1.6        | 18.2          | 2.70              | 18.2                    | 175.04              |  |
| 923.0                             | 7.70    | 170.40            | 922.0      | -22.0      | 2.1        | 22.1          | 2.19              | 22.1                    | 174.51              |  |
| 953.0                             | 8.50    | 169.70            | 951.7      | -26.1      | 2.8        | 26.3          | 2.69              | 26.3                    | 173.79              |  |
| 983.0                             | 9.20    | 169.40            | 981.3      | -30.7      | 3.7        | 30.9          | 2.34              | 30.9                    | 173.16              |  |
| 1,013.0                           | 9.70    | 168.30            | 1,010.9    | -35.5      | 4.6        | 35.8          | 1.77              | 35.8                    | 172.56              |  |
| 1,043.0                           | 10.60   | 170.80            | 1,040.5    | -40.7      | 5.6        | 41.1          | 3.34              | 41.1                    | 172.18              |  |
| 1,073.0                           | 11.30   | 171.50            | 1,069.9    | -46.3      | 6.5        | 46.8          | 2.38              | 46.8                    | 172.06              |  |
| 1,103.0                           | 11.90   | 171.10            | 1,099.3    | -52.3      | 7.4        | 52.8          | 2.02              | 52.8                    | 171.97              |  |
| 1,133.0                           | 12.30   | 170.10            | 1,128.6    | -58.5      | 8.4        | 59.1          | 1.51              | 59.1                    | 171.82              |  |
| 1,163.0                           | 13.00   | 171.50            | 1,157.9    | -65.0      | 9.5        | 65.7          | 2.55              | 65.7                    | 171.72              |  |
| 1,193.0                           | 13.80   | 171.60            | 1,187.1    | -71.9      | 10.5       | 72.6          | 2.67              | 72.6                    | 171.71              |  |
| 1,223.0                           | 14.70   | 171.60            | 1,216.2    | -79.2      | 11.6       | 80.0          | 3.00              | 80.0                    | 171.70              |  |
| 1,253.0                           | 15.70   | 173.10            | 1,245.1    | -87.0      | 12.6       | 87.9          | 3.58              | 87.9                    | 171.76              |  |
| 1,283.0                           | 16.50   | 173.10            | 1,273.9    | -95.2      | 13.6       | 96.2          | 2.67              | 96.2                    | 171.87              |  |

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HG Energy EOW Report

**Company:** HG Energy, LLC  
**Project:** Roane County, West Virginia  
**Site:** C McGraw #205  
**Well:** C McGraw #205  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well C McGraw #205  
**TVD Reference:** well @ 1118.0usft (Yost #2)  
**MD Reference:** well @ 1118.0usft (Yost #2)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM Compass

| MD (usft) | Inc (°) | Azi (azimuth) | TVD (usft) | N/S (usft) | EW (usft) | V. Sec (usft) | DLeg (°/100usft) | Closure Distance (usft) | Closure Azimuth (°) |
|-----------|---------|---------------|------------|------------|-----------|---------------|------------------|-------------------------|---------------------|
| 1,313.0   | 17.20   | 173.80        | 1,302.6    | -103.9     | 14.6      | 104.9         | 2.43             | 104.9                   | 172.00              |
| 1,343.0   | 17.80   | 173.40        | 1,331.3    | -112.8     | 15.6      | 113.9         | 2.04             | 113.9                   | 172.13              |
| 1,373.0   | 18.60   | 173.80        | 1,359.8    | -122.1     | 16.6      | 123.3         | 2.70             | 123.3                   | 172.24              |
| 1,403.0   | 19.50   | 174.20        | 1,388.1    | -131.9     | 17.7      | 133.1         | 3.03             | 133.1                   | 172.37              |
| 1,433.0   | 20.70   | 175.00        | 1,416.3    | -142.1     | 18.6      | 143.4         | 4.10             | 143.4                   | 172.53              |
| 1,463.0   | 21.70   | 175.00        | 1,444.3    | -152.9     | 19.6      | 154.2         | 3.33             | 154.2                   | 172.71              |
| 1,493.0   | 22.70   | 176.00        | 1,472.0    | -164.2     | 20.5      | 165.5         | 3.56             | 165.5                   | 172.90              |
| 1,523.0   | 23.80   | 176.10        | 1,499.6    | -176.1     | 21.3      | 177.3         | 3.67             | 177.3                   | 173.11              |
| 1,553.0   | 25.20   | 177.10        | 1,526.9    | -188.5     | 22.0      | 189.7         | 4.87             | 189.8                   | 173.34              |
| 1,583.0   | 26.50   | 177.40        | 1,553.9    | -201.5     | 22.6      | 202.8         | 4.36             | 202.8                   | 173.59              |
| 1,613.0   | 27.70   | 177.20        | 1,580.6    | -215.2     | 23.3      | 216.4         | 4.01             | 216.5                   | 173.82              |
| 1,643.0   | 28.50   | 176.40        | 1,607.1    | -229.3     | 24.1      | 230.5         | 2.95             | 230.6                   | 174.01              |
| 1,673.0   | 29.50   | 175.90        | 1,633.3    | -243.8     | 25.1      | 245.0         | 3.43             | 245.1                   | 174.13              |
| 1,703.0   | 30.60   | 176.30        | 1,659.3    | -258.8     | 26.1      | 260.0         | 3.73             | 260.1                   | 174.25              |
| 1,733.0   | 31.80   | 175.70        | 1,684.9    | -274.3     | 27.2      | 275.5         | 4.13             | 275.6                   | 174.35              |
| 1,763.0   | 33.90   | 175.50        | 1,710.1    | -290.5     | 28.4      | 291.8         | 7.01             | 291.9                   | 174.42              |
| 1,793.0   | 36.60   | 175.50        | 1,734.6    | -307.8     | 29.8      | 309.0         | 9.00             | 309.2                   | 174.48              |
| 1,823.0   | 39.40   | 175.90        | 1,758.3    | -326.2     | 31.1      | 327.5         | 9.37             | 327.7                   | 174.55              |
| 1,853.0   | 41.80   | 175.50        | 1,781.0    | -345.7     | 32.6      | 347.0         | 8.05             | 347.2                   | 174.61              |
| 1,883.0   | 43.90   | 175.30        | 1,803.0    | -366.0     | 34.2      | 367.3         | 7.01             | 367.6                   | 174.65              |
| 1,913.0   | 43.90   | 174.50        | 1,824.7    | -386.7     | 36.1      | 388.1         | 1.85             | 388.4                   | 174.67              |
| 1,943.0   | 44.20   | 174.10        | 1,846.2    | -407.5     | 38.2      | 409.0         | 1.36             | 409.3                   | 174.65              |
| 1,973.0   | 45.10   | 173.80        | 1,867.6    | -428.4     | 40.4      | 430.1         | 3.08             | 430.3                   | 174.61              |
| 2,003.0   | 45.20   | 173.50        | 1,888.7    | -449.6     | 42.7      | 451.3         | 0.78             | 451.6                   | 174.57              |
| 2,033.0   | 45.20   | 173.40        | 1,909.9    | -470.7     | 45.2      | 472.6         | 0.24             | 472.9                   | 174.52              |
| 2,063.0   | 45.80   | 173.50        | 1,930.9    | -492.0     | 47.6      | 494.0         | 2.01             | 494.3                   | 174.47              |
| 2,123.0   | 46.30   | 173.50        | 1,972.5    | -534.9     | 52.5      | 537.2         | 0.83             | 537.5                   | 174.39              |

06/05/2015





HG Energy EOW Report

**Company:** HG Energy, LLC  
**Project:** Roane County, West Virginia  
**Site:** C McGraw #205  
**Well:** C McGraw #205  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1

**Local Co-ordinate Reference:** Well C McGraw #205  
**TVD Reference:** well @ 1118.0usft (Yost #2)  
**MD Reference:** well @ 1118.0usft (Yost #2)  
**North Reference:** Grid  
**Survey Calculation Method:** Minimum Curvature  
**Database:** EDM Compass

| MD (usft) | Inc (°) | Azi (azimuth) (°) | TVD (usft) | N/S (usft) | E/W (usft) | V. Sec (usft) | D Leg (°/100usft) | Closure Distance (usft) | Closure Azimuth (°) |
|-----------|---------|-------------------|------------|------------|------------|---------------|-------------------|-------------------------|---------------------|
| 2,153.0   | 44.90   | 172.40            | 1,993.5    | -556.2     | 55.1       | 558.6         | 5.35              | 558.9                   | 174.34              |
| 2,183.0   | 44.60   | 172.00            | 2,014.8    | -577.1     | 58.0       | 579.7         | 1.37              | 580.0                   | 174.26              |
| 2,213.0   | 44.40   | 171.50            | 2,036.2    | -597.9     | 61.0       | 600.8         | 1.35              | 601.0                   | 174.17              |
| 2,243.0   | 44.60   | 171.20            | 2,057.6    | -618.7     | 64.2       | 621.8         | 0.97              | 622.0                   | 174.08              |
| 2,273.0   | 44.90   | 171.90            | 2,078.9    | -639.6     | 67.3       | 642.9         | 1.92              | 643.1                   | 173.99              |
| 2,303.0   | 45.20   | 171.50            | 2,100.1    | -660.6     | 70.3       | 664.1         | 1.37              | 664.3                   | 173.92              |
| 2,333.0   | 45.20   | 171.30            | 2,121.3    | -681.7     | 73.5       | 685.4         | 0.47              | 685.6                   | 173.84              |
| 2,363.0   | 45.40   | 171.80            | 2,142.4    | -702.7     | 76.7       | 706.7         | 1.36              | 706.9                   | 173.77              |
| 2,393.0   | 45.70   | 171.60            | 2,163.4    | -723.9     | 79.8       | 728.2         | 1.11              | 728.3                   | 173.71              |
| 2,423.0   | 46.20   | 171.10            | 2,184.2    | -745.3     | 83.0       | 749.7         | 2.05              | 749.9                   | 173.65              |
| 2,453.0   | 46.20   | 170.80            | 2,205.0    | -766.6     | 86.4       | 771.4         | 0.72              | 771.5                   | 173.57              |
| 2,483.0   | 46.10   | 169.80            | 2,225.8    | -788.0     | 90.0       | 793.0         | 2.43              | 793.1                   | 173.48              |
| 2,513.0   | 48.40   | 170.50            | 2,246.1    | -809.7     | 93.8       | 815.0         | 7.86              | 815.1                   | 173.39              |
| 2,601.0   | 48.40   | 170.50            | 2,304.6    | -874.6     | 104.7      | 880.7         | 0.00              | 880.8                   | 173.17              |

TD @ 2601' MD / 2305' TVD

Design Annotations

| Measured Depth (usft) | Vertical Depth (usft) | +N/S (usft) | Local Coordinates +E/W (usft) | Comment                           |
|-----------------------|-----------------------|-------------|-------------------------------|-----------------------------------|
| 500.0                 | 500.0                 | 0.0         | 0.0                           | FIRST SURVEY @ 500' MD / 500' TVD |
| 2,601.0               | 2,304.6               | -874.6      | 104.7                         | TD @ 2601' MD / 2305' TVD         |

Checked By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

06/05/2015

Company Name: HG Energy, LLC  
 C McGraw #205  
 Roane County, West Virginia  
 Rig: Yost #2  
 Created By: Jerry Arsenault  
 Date: 1/27/2015

C McGraw #205  
 Roane County, West Virginia  
 Q141410 & AM-150068  
 Design #1

DESIGN TARGET DETAILS

| Name                    | TVD    | ±NS   | ±EW  | Northing    | Eastng     | Latitude          | Longitude        |
|-------------------------|--------|-------|------|-------------|------------|-------------------|------------------|
| Target #1 C McGraw #205 | 2170.0 | -73.7 | 95.6 | 14508763.04 | 1553952.78 | 33° 47' 51.848" N | 81° 17' 2.552" W |
| *Plan has target center |        |       |      |             |            |                   |                  |

ANNOTATIONS

| MD     | Itc   | ΔH     | TVD    | ±NS    | ±EW   | Vertical Datum Association      |       |                         |
|--------|-------|--------|--------|--------|-------|---------------------------------|-------|-------------------------|
| 500.0  | 0.00  | 0.00   | 0.00   | 0.0    | 0.0   | FIRST SURVEY @ 500 MD / 500 TVD |       |                         |
| 2501.0 | 45.40 | 170.50 | 2305.6 | -874.6 | 164.7 | 880.7                           | 882.1 | TD @ 2501 MD / 2305 TVD |

PROJECT DETAILS:

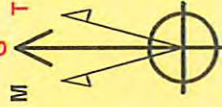
Roane County, West Virginia  
 Geodetic System: Universal Transverse Mercator  
 Datum: NAD83 West Virginia - HARN  
 Ellipsoid: GRS 1980  
 Zone: 17N (84 W to 78 W)  
 System Datum: Mean Sea Level

WELL DETAILS: C McGraw #205

| ±NS | ±EW | Northing   | Eastng     | Ground Level      | Latitude         | Longitude |
|-----|-----|------------|------------|-------------------|------------------|-----------|
| 0.0 | 0.0 | 14509512.0 | -153952.19 | 33° 47' 53.200" N | 81° 17' 3.000" W |           |



Azimuths to Grid North  
 Correction: -7.85°  
 Magnetic Field  
 Strength: 51990.9snT  
 Dip Angle: 66.37°  
 Date: 12/23/2014  
 Model: IGRF2010



# HG Energy

