

National Assessment of Oil and Gas Fact Sheet

Assessment of Undiscovered Oil and Gas Resources of the Appalachian Basin Province, 2002

Using a geology-based assessment methodology, the U.S. Geological Survey estimated a mean of 70.2 trillion cubic feet of undiscovered natural gas, a mean of 54 million barrels of undiscovered oil, and a mean of 872 million barrels of undiscovered natural gas liquids in the Appalachian Basin Province.

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas potential of the Appalachian Basin Province (fig. 1). The USGS Appalachian Basin Province for this assessment includes parts of New York, Pennsylvania, Ohio, Maryland, West Virginia, Virginia, Kentucky, Tennessee, Georgia, and Alabama. The assessment of the Appalachian Basin Province is based on the geologic elements of each total petroleum system (TPS) defined in the province, including hydrocarbon source rocks (source rock maturation, and hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation and timing). Using this geologic framework, the USGS defined 6 total petroleum systems (TPS) and 26 assessment units (AU) within these TPS, and quantitatively estimated the undiscovered oil and gas resources within 21 of the 26 AU (table 1).

Resource Summary

The USGS assessed undiscovered conventional oil and gas and undiscovered continuous (unconventional) gas. The USGS estimated a mean of 70.2 trillion cubic feet of gas (TCFG), a mean of 54 million barrels of oil (MMBO), and a mean of 872 million barrels of total natural gas liquids (MMBNGL). Most (94 percent, or 65.9 TCFG) of the undiscovered gas resource is continuous and distributed in three total petroleum systems: Utica-Lower Paleozoic TPS (26.8 TCFG); Devonian Shale-Middle and Upper Paleozoic TPS (30.7 TCFG), and Carboniferous Coal-bed Gas TPS (8.4 TCFG) (table 1). Coal-bed gas accounts for about 12.7 percent of the total undiscovered continuous gas in the Appalachian Basin Province. Several coal-bed gas assessment units were identified but not quantitatively assessed for this study (table 1). The remainder of the undiscovered gas is in conventional oil and gas accumulations (4.3 TCFG).



Figure 1. Appalachian Basin Province.

The USGS assessed a mean of 54 million barrels (MMB) of undiscovered oil in the Appalachian Basin Province. The Utica-Lower Paleozoic TPS is estimated to contain a mean of about 47 MMB of conventional oil, or about 86 percent of all undiscovered oil. The Devonian Shale-Middle and Upper Paleozoic TPS contains a mean of 7.5 MMBO, or about 14 percent of the undiscovered oil (table 1).

For Further Information

Supporting geologic studies of total petroleum systems and assessment units, and the methodology used in the Appalachian Basin Province assessment are in progress. Assessment results are available at the USGS Central Energy Team website at <http://energy.cr.usgs.gov/oilgas/noga>.

Appalachian Basin Province Assessment Team

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Table 1. Appalachian Basin Province Assessment Results.

[MMBO, million barrels of oil; BCFG, billion cubic feet of gas; MMBNGL, million barrels of natural gas liquids. Results shown are fully risked estimates. For gas fields, all liquids are included under the NGL (natural gas liquids) category. F95 denotes a 95 percent chance of at least the amount tabulated. Other fractiles are defined similarly. Fractiles are additive under the assumption of perfect positive correlation. TPS is Total Petroleum System. AU is Assessment Unit. CBG is coal-bed gas. Shading indicates not applicable]

| | Total Petroleum Systems (TPS) and Assessment Units (AU) | Field type | Total undiscovered resources | | | | | | | | | | | | |
|--|---|----------------------------------|------------------------------|--------------|---------------|---------------|------------------|------------------|-------------------|------------------|-----------------|---------------|-----------------|---------------|--------------|
| | | | Oil (MMBO) | | | | Gas (BCFG) | | | | NGL (MMBNGL) | | | | |
| | | | F95 | F50 | F5 | Mean | F95 | F50 | F5 | Mean | F95 | F50 | F5 | Mean | |
| Conventional Oil and Gas Resources | Conasauga-Rome/Conasauga TPS | | | | | | | | | | | | | | |
| | Rome Trough AU | Gas | | | | | 173.02 | 583.57 | 1,165.61 | 615.60 | 0.97 | 3.40 | 7.42 | 3.70 | |
| | Sevier-Knox/Trenton TPS | | | | | | | | | | | | | | |
| | Lower Paleozoic Carbonates AU | Not quantitatively assessed | | | | | | | | | | | | | |
| | Utica-Lower Paleozoic TPS | | | | | | | | | | | | | | |
| | Lower Paleozoic Carbonates in Thrust Belt AU | Gas | | | | | 38.61 | 253.95 | 725.60 | 301.90 | 0.37 | 2.46 | 7.55 | 3.02 | |
| | Knox Unconformity AU | Oil | 11.70 | 29.55 | 51.65 | 30.44 | 53.49 | 143.31 | 279.60 | 152.33 | 0.50 | 1.40 | 2.99 | 1.53 | |
| | | Gas | | | | | 150.76 | 404.67 | 749.87 | 421.61 | 1.39 | 3.92 | 8.04 | 4.21 | |
| | Black River-Trenton Hydrothermal Dolomite AU | Oil | 3.14 | 13.96 | 37.19 | 16.29 | 14.55 | 67.73 | 195.06 | 81.48 | 0.14 | 0.66 | 2.03 | 0.82 | |
| | | Gas | | | | | 575.13 | 1,740.48 | 3,388.28 | 1,837.22 | 5.37 | 16.92 | 36.10 | 18.33 | |
| | Lockport Dolomite AU | Gas | | | | | 60.23 | 191.77 | 403.71 | 207.49 | 0.56 | 1.86 | 4.30 | 2.08 | |
| | Devonian Shale-Middle and Upper Paleozoic TPS | | | | | | | | | | | | | | |
| | Oriskany Sandstone-Structural AU | Gas | | | | | 120.07 | 357.92 | 735.78 | 386.46 | 0.67 | 2.09 | 4.71 | 2.31 | |
| | Oriskany Sandstone-Stratigraphic AU | Gas | | | | | 19.60 | 60.57 | 126.66 | 65.45 | 0.15 | 0.47 | 1.08 | 0.52 | |
| | Greenbrier Limestone AU | Oil | 0.78 | 2.25 | 4.74 | 2.45 | 1.11 | 3.30 | 7.48 | 3.67 | 0.04 | 0.13 | 0.31 | 0.15 | |
| | | Gas | | | | | 30.67 | 112.86 | 255.29 | 124.82 | 0.28 | 1.10 | 2.72 | 1.25 | |
| | Mississippian Sandstone AU | Oil | 1.61 | 4.63 | 10.09 | 5.08 | 2.20 | 6.73 | 16.06 | 7.62 | 0.08 | 0.26 | 0.68 | 0.31 | |
| | | Gas | | | | | 20.47 | 94.58 | 227.06 | 105.31 | 0.19 | 0.92 | 2.40 | 1.05 | |
| | Total Conventional Resources | | | 17.23 | 50.39 | 103.67 | 54.26 | 1,259.91 | 4,021.44 | 8,276.06 | 4,310.96 | 10.71 | 35.59 | 80.33 | 39.28 |
| | Continuous Oil and Gas Resources | Utica-Lower Paleozoic TPS | | | | | | | | | | | | | |
| Clinton-Medina Basin Center AU | | Gas | | | | | 6,149.33 | 10,310.89 | 17,288.78 | 10,832.70 | 54.65 | 101.03 | 186.77 | 108.33 | |
| Clinton-Medina Transitional Northeast AU | | Gas | | | | | 573.25 | 1,397.79 | 3,408.33 | 1,618.85 | 5.29 | 13.70 | 35.46 | 16.19 | |
| Clinton-Medina Transitional AU | | Gas | | | | | 8,986.25 | 11,627.12 | 15,044.10 | 11,770.64 | 89.78 | 136.71 | 208.17 | 141.25 | |
| Tuscarora Basin Center AU | | Gas | | | | | 949.07 | 2,274.63 | 5,451.60 | 2,619.59 | 3.50 | 8.91 | 22.71 | 10.48 | |
| Devonian Shale-Middle and Upper Paleozoic TPS | | | | | | | | | | | | | | | |
| Greater Big Sandy AU | | Gas | | | | | 3,877.33 | 6,089.06 | 9,562.42 | 6,322.67 | 34.06 | 59.66 | 104.50 | 63.23 | |
| Northwestern Ohio Shale AU | | Gas | | | | | 1,453.59 | 2,511.40 | 4,338.99 | 2,654.07 | 25.95 | 49.21 | 93.32 | 53.08 | |
| Devonian Siltstone and Shale AU | | Gas | | | | | 829.34 | 1,253.46 | 1,894.48 | 1,293.61 | 17.35 | 29.48 | 50.08 | 31.05 | |
| Marcellus Shale AU | | Gas | | | | | 821.83 | 1,736.12 | 3,667.59 | 1,925.18 | 4.50 | 10.21 | 23.14 | 11.55 | |
| Catskill Sandstones and Siltstones AU | | Gas | | | | | 6,843.68 | 11,222.04 | 18,401.55 | 11,740.93 | 121.19 | 219.91 | 399.03 | 234.82 | |
| Berea Sandstone AU | | Gas | | | | | 2,464.14 | 5,905.11 | 14,151.13 | 6,800.38 | 54.51 | 138.86 | 353.71 | 163.21 | |
| Carboniferous Coal-bed Gas TPS | | | | | | | | | | | | | | | |
| Pocahontas Basin AU | | CBG | | | | | 2,929.57 | 3,552.81 | 4,308.64 | 3,577.32 | 0.00 | 0.00 | 0.00 | 0.00 | |
| East Dunkard (Folded) AU | | CBG | | | | | 2,748.71 | 4,593.61 | 7,676.78 | 4,823.03 | 0.00 | 0.00 | 0.00 | 0.00 | |
| West Dunkard (Unfolded) AU | | CBG | Not quantitatively assessed | | | | | | | | | | | | |
| Central Appalachian Shelf AU | | CBG | Not quantitatively assessed | | | | | | | | | | | | |
| Appalachian Anthracite and Semi-Anthracite AU | | CBG | Not quantitatively assessed | | | | | | | | | | | | |
| Pottsville Coal-bed Gas TPS | | | | | | | | | | | | | | | |
| Cahaba Basin AU | | CBG | Not quantitatively assessed | | | | | | | | | | | | |
| Total Continuous Resources | | | 0.00 | 0.00 | 0.00 | 0.00 | 38,626.09 | 62,474.04 | 105,194.39 | 65,978.97 | 410.78 | 767.68 | 1,476.89 | 833.19 | |
| Total Undiscovered Oil and Gas Resources | | | 17.23 | 50.39 | 103.67 | 54.26 | 39,886.00 | 66,495.48 | 113,470.45 | 70,289.93 | 421.49 | 803.27 | 1,557.22 | 872.47 | |