

Revising the 2006 USGS Assessment of In-Place Oil Shale Resources of Devonian-Mississippian Black Shales in the Eastern United States

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The U.S. Geological Survey (USGS) is revising the 2006 assessment of 189 billion barrels of surface-mineable oil-in-place in the Devonian-Mississippian black shales in the eastern United States, which was published as part of a study on world oil-shale deposits (Dyini, 2006). The 2006 USGS assessment was based on earlier work by Matthews and others (1980) who estimated the area, average thickness, and average oil yield for the most organic-rich shales in each of six states (Alabama, Indiana, Kentucky, Michigan, Ohio, and Tennessee) that lie near the outcrop belt and could be surface mined.

Advances in technology since 1980 suggest that in-situ retorting processes may be applicable for oil shale development in the eastern U.S., and thus, this new USGS assessment will examine organic-rich shale to a depth of 6,000 feet. The areal extent of the Antrim Shale in the Michigan Basin; the New Albany Shale in the Illinois Basin; and the Sunbury Shale, Cleveland Member and Huron Member of the Ohio Shale, Rhinestreet Shale Member of the West Falls Formation, Marcellus Shale, and Chattanooga Shale in the Appalachian Basin that has a low thermal maturity (below the oil window and into the lower part of the oil window, i.e., vitrinite reflectance values of less than 1.0) will be considered in this assessment.

The Fischer assay method is a standard method used to measure the potential oil yield of oil shale. Publicly available Fischer assay oil yield and total organic carbon data, primarily from core and cuttings, will be used in this assessment. In some cases, oil yield will be calculated from total organic carbon data. Although the highest Fischer assay oil yield values exceed 15 gallons of oil per ton of shale (GPT) in a few shale samples in the Michigan, Illinois, and Appalachian Basins, and thin (20-30 feet thick) rich zones may have an average oil yield of 10-12 GPT, most shale samples have an oil yield of less than 10 GPT. In each assessed formation, zones with a low oil yield (less than approximately 5 GPT) will be included because in-situ retort methods will probably involve large volumes of rock and not discriminate by oil yield richness grade. Thickness, Fischer assay oil yield, and density of the shale will be interpolated between map location data points to refine the calculations of shale volume and the estimate of in-place oil shale resources of the Devonian-Mississippian black shales of the eastern U.S. It is possible that some black shales in the Appalachian Basin will not be assessed either due to a small areal extent that has a low thermal maturity or due to a paucity of data. Preliminary results suggest that the in-place oil shale resources in this assessment will be considerably larger than the previous 2006 assessment, due largely to the increased area and greater depths of included shales.