

## **Analysis of the Conasauga Group and Basal Sandstone (Upper Cambrian) in the KGS No. 1 Hanson Aggregates Well, Carter County, Kentucky**

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### **ABSTRACT**

The Kentucky Geological Survey No. 1 Hanson Aggregates well was drilled as part of a series of carbon-storage research projects under Kentucky House Bill 1 (2007). The goal of the project was to collect subsurface data on potential deep reservoir rocks and confining strata in eastern Kentucky to better enable future evaluations for carbon storage. Three samples from the Nolichucky Shale and one sample of shale from the Maryville Limestone of the Conasauga Group were analyzed with advanced shale analysis and have matrix permeabilities of  $2.27 \times 10^{-8}$  to  $9.33 \times 10^{-10}$  md, for a mean permeability of  $1.67 \times 10^{-8}$  md. The Nolichucky samples alone have a mean permeability of  $9.2 \times 10^{-9}$  md. Mercury capillary injection pressures were analyzed from three shale samples adjacent to samples collected for shale permeability analysis. The three samples averaged  $3.4 \times 10^{-5}$  Swanson permeability and have a median pore-throat diameter of 0.008 nm. These results indicate that the Nolichucky Shale should be an adequate confining interval for deeper reservoirs. Two deeper sandstones were analyzed as potential reservoirs. The lower part of the Maryville Limestone contains dolomitic sandstones informally termed the “Maryville sandstone” (4,610 to 4,683 ft). Twelve samples have porosities from 2.49 to 17.93 percent, with a mean porosity of 8.71 percent. Although porosities are moderate, permeabilities are mostly low: 0.0003 to 16.4 md, with a mean of 1.81 md. One sample (4,637.9 ft) has a permeability of 16.4 md. If that sample is not included, the other nine samples have a mean permeability of 0.35 md. The Basal Sandstone (4,684.3 to 4,720.9 ft) coarsens upward from Grenville basement. Analysis of 15 samples from the upper sandy part of the interval showed porosities from 2.17 to 17.84 percent, with a mean porosity of 11.27 percent. Permeabilities ranged from 0.007 to 97.8 md, with a mean of 18.52 md. Six samples had permeabilities of less than 1 md. Nine samples had permeabilities of more than 1 md. Five samples from the lower shaly part had porosities ranging from 6.02 to 12.84 percent, with a mean porosity of 8.49 percent. Permeabilities ranged from 0.001 to 7.19 md, but if the 7.19 md sample is excluded, the other four samples have permeabilities of 0.001 to 0.091, with a mean of 0.033 md.