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Potential Ordovician Hydrocarbon Plays in the Cumberland Plateau of Tennessee and Southern Kentucky: Finding a Needle in a Haystack?

The hydrocarbon potential of the Cumberland Plateau has been explored for over a century with most discoveries to date being small oil or gas fields in Mississippian limestone reservoirs sourced by the Devonian-Mississippian Chattanooga Shale. The underlying Knox and Middle-Upper Ordovician (Stones River or Black River Group, and Nashville or Trenton Group) carbonate rocks, however, have only been cursorily explored, with only minimal success in Tennessee. The historic success of the Rose Hill field in southwest Virginia, other fields in Middle Ordovician rocks farther northeast, and the recent development of the Swan Creek field in the Knox and Middle Ordovician rocks in northeastern Tennessee indicate there is greater potential in the Middle and Upper Ordovician rocks beneath the Cumberland Plateau. The source of these hydrocarbons is the Ordovician rocks (gas chromatography by R. Burruss, USGS). Deformed zones related to previously unmapped blind faults and décollements may locally enhance an otherwise primarily porosity-dominated province. Research currently underway intends to identify markers (other than the known K-bentonites) in geophysical logs that will permit detailed resolution of units in the Stones River and Nashville Groups. These units have been mapped in surface exposures on the Nashville dome and in the western Valley and Ridge, as well as in the Sequatchie anticline that dissects the central and southern Plateau in Tennessee. Such resolution will provide new opportunities to better understand the structure and reservoir characteristics in the subsurface beneath the Plateau and Eastern Highland Rim of East Tennessee and southern Kentucky.