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### **Ordovician Tectonic Dolostones in Central Kentucky: Analogs for Trenton-Black River Reservoirs in the Appalachian Basin**

Discrete dolostone bodies occur within outcrops of Upper and Middle Ordovician limestones in central Kentucky. These dolostone bodies are spatially related to the Kentucky River Fault Zone, and the Jephtha Knob cryptoexplosive structure. They have been interpreted as products of hydrothermal fluids that moved along fault and fracture conduits. The dolostone bodies are analogs to subsurface tectonic dolostone gas reservoirs in the equivalent Trenton and Black River Groups in New York. Research has involved interpretation of the timing, structural control, and origin of dolostones. Outcrop data from Kentucky will be linked to cores, logs, cuttings, and production data from active Trenton-Black River fields in New York.

Petrographic work has established a paragenetic sequence, and geochemical work in progress on the dolostones includes trace element, stable isotope, and fluid inclusion analyses. Two of the larger dolostone bodies will be cored to allow vertical trends in dolomite geochemistry to be documented.

High-resolution seismic reflection data and ground penetrating radar (GPR) profiles have been used to image the 3-dimensional geometry of the dolostone bodies. In addition to traditional P-wave imaging techniques, S-wave energy (SH mode) has been used. Experience has indicated that although S-waves commonly have frequencies only one-half to one-third that of P-waves, the P-waves have velocities 5 to 10 times higher than S-waves. Consequently, we estimate that resolution can be improved by a factor of 2 to 3 through the use of S-waves. This is a very important attribute when considering subtle structural detail (i.e., 1 to 3 m).