

Wellington Field, Sumner County, Kansas as a Calibration Site for CO₂-EOR in Mississippian Chert and Dolomite Reservoirs and Deep Saline Aquifer CO₂ Sequestration

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The Paleozoic-age Ozark Plateau Aquifer System (OPAS) in southern Kansas is a thick hydrostratigraphic unit centrally located to multiple sources of CO₂ emissions and is considered a prime candidate for geologic CO₂ sequestration. The OPAS in southern Kansas includes a thick (>800 ft) and deeply buried (>3500 ft) saline aquifer consisting of the Cambro-Ordovician Arbuckle Group, Bonnetterre Dolomite, and Lamotte Sandstone overlain by varying thicknesses of Viola Limestone, Simpson Group, Chattanooga Shale, and the carbonate-chert-shale succession of the Osagian-Kinderhookian Mississippian System. The entire OPAS interval (1639 ft) was cored in early 2011 in the BEREXCO Wellington KGS #1-32 well in Wellington Field, Sumner County, KS. An exhaustive set of modern logs and routine and special core analyses have made this borehole a key calibration point for both the field study and a regional 25,000 mi² assessment area.

The greater Arbuckle saline aquifer in the core consists of a 1000 ft thick succession of interbedded dolomudstones, pack-grainstones, autoclastic breccias, and thin shale beds. Porosity and permeability are controlled by predominantly bed-contained fracturing, karst overprinting, interparticle pores and molds modified by late-stage dissolution and cementation. Mississippian pay zone in Wellington Field is an upper tripolitic chert, typical of other Mississippian fields in south-central Kansas. Additional porous dolomitic intervals occur beneath the tripolite. Multicomponent 3D, high resolution gravity and magnetic surveys, and remote sensing are being used with the new well data in Wellington Field to build integrated 3D geocellular geomodels and dynamic modeling to evaluate suitability for CO₂-EOR and CO₂ aquifer sequestration.