

Subsurface Lithostratigraphy of the Cambro-Ordovician Knox Group in Illinois; Regional Correlation of Potential Reservoirs and Seals for CO₂ Sequestration

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As part of a US DOE-funded project, detailed subsurface lithostratigraphic evaluation of the Cambro-Ordovician strata is being conducted in the Illinois Basin to better understand the potential reservoirs and seals for CO₂ storage of the Knox Group. Deep wells penetrating the Knox Group were selected for detailed petrographic examination of well cuttings and available cores. The preliminary results obtained from this ongoing study along with outcrop data, have provided important information regarding the lithologic variations in the Knox Group in the Illinois subsurface.

In the north and central part of Illinois, the Cambro-Ordovician Knox Group (300-1500 feet thick) is subdivided into alternating carbonate-dominated and siliciclastic-dominated units. The carbonate units, from base to top, include the Cambrian Franconia Formation, Potosi Dolomite, Eminence Formation, and the Ordovician Oneota and Shakopee Dolomites. The siliciclastic units include the Cambrian Eau Claire Formation, Galesville and Ironton Sandstones, Davis Member of the Franconia Formation, Momence Member of the Eminence Formation, and the Ordovician Gunter and New Richmond Sandstones. The siliciclastics thin southward, where in the southern and deeper part of the Illinois Basin, the Knox Group is composed dominantly of dolomite with thin shale beds. In this area, the Knox Group thickens to over 6000 feet and the formations are not easily differentiated. The integrated approach using detailed petrographic examination has identified lithostratigraphic and lithofacies variations within the Knox Group that aid in determining the best reservoir and sealing units in the Knox for potential carbon sequestration.