

Unraveling the Stratigraphy of the Oriskany Sandstone: A Necessity in Assessing Its Site-Specific Carbon Sequestration Potential

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The Lower Devonian Oriskany Sandstone is considered a carbon sequestration target in the Appalachian basin due to its widespread distribution, favorable reservoir characteristics, and depth. The lithology of this saline aquifer, however, varies regionally, particularly in distal parts of the basin. This complicates stratigraphic interpretations of the Oriskany Sandstone and adjacent Bois Blanc Formation and Helderberg Group rocks. For this reason, the Midwest Regional Carbon Sequestration Partnership (MRCSP) has recommended detailed site assessments when evaluating the sequestration potential of the Oriskany Sandstone at a given injection site. The Oriskany Sandstone is a very fine to coarse-grained, monocrystalline quartz arenite. In many parts of the basin, however, the unit is considered a sandy limestone with abundant carbonate grains and cement. The Oriskany was deposited in several shallow-marine and paralic environments, and has been derived from numerous clastic sources. The formation is thickest in the structurally complex Ridge and Valley province, thins toward the northern and western basin margins, and is even absent in other parts of the basin (i.e., the “no-sand area” of northwestern Pennsylvania). We have evaluated the Oriskany Sandstone throughout the central Appalachian basin to characterize relationships among its lithology, reservoir characteristics, and potential carbon dioxide storage capacity. Oriskany samples collected from 15 wells represent regional variations in depositional and diagenetic environments, as well as structural alteration of the rocks, all of which have impacted this reservoir’s porosity and permeability. Geophysical log analyses provide additional petrophysical data for localities where sample or core data are absent.