Reservoir Characterization and Lithostratigraphic Division of the Mount Simon Sandstone: Implications for Estimations of Geologic Sequestration Storage Capacity.

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The Upper Cambrian Mount Simon Sandstone has significant potential for carbon sequestration in the Midwest region of the United States, but its internal stratigraphy remains poorly understood. Petrophysical heterogeneities controlled by the changes in lithologic character complicate the process of estimating the storage capacity of this reservoir. Gamma-ray logs from wells in the Midwest region were interpreted to define three subunits within the Mount Simon Sandstone. 1) An upper unit that has relatively high gamma-ray values (>75 API), owing to the admixture of argillaceous material. In northern Indiana, this upper unit can be further subdivided into an upper sand unit and a lower shale unit, which may serve as a secondary seal below argillaceous horizons in the overlying Eau Claire Formation (Cambrian). 2) A middle unit defined by lower gamma-ray values (<75 API) that result from a cleaner quartzose sandstone and potentially constitutes the main reservoir and flow unit within the formation. The gamma-ray values of this unit also display the lowest amount of vertical variability through the section. 3) A lowermost unit defined by gamma-ray values that progressively increase with depth to the base of the formation (>75 API). This downward increase is due to the increased nonquartz fraction in the formation as the top of the Precambrian basement is approached. Results from this new assessment of storage capacity that considers only the middle unit within the Mount Simon Sandstone are generally larger when compared with previous assessments, because improvements in geologic characterization allowed for use of higher values of the efficiency factor.