

Stratigraphic Controls on Diagenetic Pathways in the St. Peter Sandstone, Michigan Basin: *An Investigation into Reservoir Quality Prediction for Carbon Sequestration*

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The Middle Ordovician St. Peter Sandstone in the Michigan Basin is a target for carbon sequestration and geologic storage. This marine sandstone ranges in thickness from regional pinch-outs to greater than 1000 feet, and has 3 distinct lithofacies. The uppermost facies contains zones of porosity and good reservoir quality. Because of the mostly uniform detrital composition, diagenesis plays a leading role in reservoir quality development. The distribution of diagenetic regimes is believed to result from depositional setting and related geologic processes, including variations in sediment accumulation rate. The purpose of this study is to test stratigraphic controls on the formation of early marine cements. These early cements preserve intergranular pore space available for late diagenetic processes including decementation by preventing the precipitation of quartz overgrowths. This stratigraphic/diagenetic model is evaluated using wire-line logs, for assessing regionally variable reservoir quality. The study includes the analysis of conventional core (n=71), thin sections, and wire-line logs to better constrain an understanding of the lateral and vertical distribution of diagenetic pathways.