

Reservoir Characteristics of the Bass Islands Dolomite in Otsego Co., Michigan - Results for a Saline Reservoir CO₂ Sequestration Demonstration

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As part of a Phase II plan to understand, test and evaluate the CO₂ sequestration potential for deep saline reservoirs in Michigan, a demonstration test well was planned, drilled and completed in late 2006 in Otsego County, Northern Lower Michigan. The well was drilled to 3630 feet and open hole logged. Selected conventional cores totaling 180 feet were taken in the saline reservoir (Bass Islands), the immediately overlying confining unit (Bois Blanc) and the overlying seal (Amherstberg). Additionally, 24 sidewall cores were taken in several uphole formations. The whole core was drilled for 1-inch P&P plug analyses. Seventy-four horizontal plugs, 12 vertical plugs, 6 whole core and 17 sidewall core plugs were sent to Core Laboratories for routine P&P analyses. Also 15 blue-dyed, epoxy-impregnated thin sections made from selected P&P plugs. The whole core was slabbed for examination and description of lithology, sedimentary structures and facies characteristics. The overlying seal, Amherstberg Fm. is a low porosity, low permeability limestone, highly fossiliferous and densely cemented with calcite and chalcedony. The immediately overlying confining unit, Bois Blanc Fm. is a very cherty limestone and dolostone with moderate porosity and low permeability. Thin sections show abundant microporosity. The target saline reservoir interval, Bass Islands, is a variably porous and permeable dolostone comprised of several tidal flat cyclic packages. It has a gross thickness of 70 feet with the reservoir interval over 40 feet of greater than 10% porosity and permeabilities exceeding 500 md. Average porosity over the entire Bass Islands is 12.5%. Average permeability is 22.4 md. CO₂ injection tests, utilizing the Bass Islands section were completed during February and March 2008.