

Enhanced Oil Recovery (EOR) and Geological Carbon Sequestration (GCS) Potential in the Middle Devonian Richfield Member of the Detroit River Group, Michigan Basin, USA, Amanda Wahr and David A. Barnes, Michigan Geological

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The Middle Devonian Richfield Member of the Lucas Formation (Detroit River Group) is an important oil producer in the Michigan Basin. Previous studies indicate that the Richfield Member consists primarily of alternating layers of anhydrite and high porosity low permeability algal laminated dolomite mudstone reservoirs. Anhydrite formation is thicker in younger strata, making the lower, stratigraphically isolated, dolomicrite reservoirs ideal drilling targets (Sullivan, 1985). The Richfield Member occurs in the subsurface across most of the central Michigan Basin and extends to a subcrop in the north, below glacial till, near the Straits of Mackinac. Initial production of the Richfield began in 1939. The Richfield Member is productive in over 30 fields, with cumulative production in excess of 55 Mbbl. Secondary recovery in several larger fields has been very successful. Cumulative oil production during water flooding ranges from 83 percent to 16 percent of cumulative primary production. CO₂ floods are the fastest growing EOR technique in the United States, and Richfield producing fields that were previously water flooded are still receptive to CO₂ flooding. Fields that have yet to be flooded for secondary recovery have higher potential for doubling cumulative production. Dual CO₂/EOR and regional saline reservoir geologic carbon sequestration in the Richfield has great potential in the Michigan Basin. Sequestration of CO₂ in deep saline formations does not produce direct byproducts of value to offset the cost, but it has another advantage. The estimated storage capacity of saline formations is extremely large, and emissions trading around the world is becoming more popular. Given the transitory state of energy today, the Richfield Member shines as a reservoir of various possibilities.