

# IMPACTS OF RESERVOIR HETEROGENEITY ON SUPERCRITICAL CO<sub>2</sub>-ROCK-BRINE INTERACTIONS IN A CARBONATE RESERVOIR: AN EXPERIMENTAL APPROACH

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Due to its influence on fluid migration, reservoir heterogeneity is an issue that not only has implications for oil and gas exploration and production operations, but for carbon capture, utilization, and storage (CCUS) as well. This project seeks to assess the impact of small-scale reservoir heterogeneity on CO<sub>2</sub>—brine—rock interactions in the Upper Devonian Duperow Formation of north-central Montana, the target injection reservoir for the Big Sky Carbon Sequestration Partnership's Kevin Dome CO<sub>2</sub> injection project. Core plugs from this formation have been drilled from 5 different depth intervals, which were selected to be representative of potential target injection zones in the formation. These rocks are dominantly dolomite with minor amounts of calcite, anhydrite, gypsum, and quartz. Propped or closed fractures are present throughout most of the plug segments. Porosity ranges from 6.12%-14.80% and permeability ranges from 2.55-53.10 mD at a confining pressure of 1100 psi. Triplicate batch reactions will be performed in Parr reaction vessels on core plug segments (1.5 cm long and 2.5 cm in diameter) saturated in synthetic brine in presence of pure CO<sub>2</sub> at simulated reservoir P-T conditions (1100 psi and 60°C) for two-week periods. Integration of pre- and post-reaction brine chemistry, optical petrography, optical cathodoluminescence, powder XRD, two-dimensional and three-dimensional magnetic resonance imaging of pore and fracture networks, and porosity and permeability measurements will contribute to reservoir characterization and facilitate prediction of changes that will occur in the subsurface.

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