

Identifying Depleted Reservoirs as Pore Space for Energy Storage or Carbon Dioxide Sequestration Through Well Data Analysis

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Abstract

This is part of a student-led analysis and assessment of the Broom Creek and Amsden Formations in the subsurface of the Williston Basin in west-central North Dakota. The Broom Creek Formation has been selected a potential carbon storage unit because of the porosity and permeability of aeolian and nearshore sand facies commonly occurring in the upper part of the formation (which currently functions as a saline aquifer). Project CarbonSAFE was an initiative sponsored by the DOE and local and state agencies and carried out by the EERC. The Broom Creek was eventually selected as having a good potential for carbon storage because of the porosity and permeability of certain facies and because of the nature of overlying and underlying formations which have good characteristics to function as seals (siltstones and anhydrite layers). The Broom Creek has never been exploited as a hydrocarbon reservoir, so the characteristics of the formation were largely unknown. To rectify this lack of knowledge and explore the storage potential of this interval, the EERC supervised the coring of the Broom Creek, the description and analysis of these cores as well as a section of 3D Seismic in Mercer and Oliver Counties in North Dakota (near the potential carbon storage field). The analysis of individual cores combined with analysis of the line of 3D seismic was good for a large-scale assessment of the carbon storage potential of the Broom Creek, but it may fail to recognize and characterize key surfaces that separate genetic packages of facies within the formation. A sequence stratigraphic analysis will recognize these surfaces and allow for a high-resolution constraint on the vertical and lateral distribution of key facies. This may reveal more about the geologic history of this formation and provide more information about potential storage volumes of interval of interest.