

# **Integrated Tectonic and Petrophysical Investigation of the Williston Basin Sediments in and around the Weyburn CO<sub>2</sub> Sequestration Reservoir**

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## Abstract/Excerpt

As a part of Phase I of the International Weyburn CO<sub>2</sub> Sequestration Project, regional seismic investigations have been conducted around a 100 km radius of the reservoir in Southern Saskatchewan. The objective is to answer the following question: Do the tectonic, petrophysical and rheological properties of the sedimentary fill guarantee the permanent storage (~10000 years) of CO<sub>2</sub> in the region?

Eleven seismically recognizable geologic (structural) horizons were mapped from top of the Cretaceous to the basement unconformity. These are: 2nd White Specs, Lower Colorado, Manville, Upper Watrous, Lower Watrous top, Lower Watrous bottom /top of Midale/, Bakken, Prairie Evaporite, Winnipegosis, Winnipeg, Deadwood and Precambrian.

An integrated analysis of these structural horizons over 100 seismic sections was used to map the regional structural setting of the sedimentary fill and the top of the Precambrian (Fig. 2). By establishing a correlation between the basement structures and the disturbances in the sedimentary column, the influences of deep epirogenic movements on the development of the investigated part of the basin has been determined.

To date, the integration of seismic and borehole data has led to a better delineation of a number of prominent regional geologic structures (e.g. Roncott Anticlinorium, Missouri Coteau, Elbow-Hummingbird Monoclinial Flexure, Brockton-Froid-Fromberg Fault zone and the Nesson Arch. Furthermore this effort also yielded enhanced images of previously known and some newly identified ring-faults.