

Regional Tectonic and Petrophysical Study in and Around the Weyburn Oil Field, Southern Saskatchewan

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Abstract

As a part of Phase I of the International Weyburn CO₂ 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 CO₂ in the region?

To achieve this goal, 2000 km of industry-donated seismic reflection data and over 1000 boreholes and related wireline information, as well as a 15 km² 3D seismic volume of the reservoir were analyzed.

Eleven seismically recognizable geologic horizons were mapped from top of the Cretaceous to the basement unconformity.

To date, the integration of seismic and borehole data has led to a better delineation of a number of prominent regional geologic structures. Furthermore this effort also yielded enhanced images of previously known and some newly identified ringfaults.

Porosity and shale content mappings of the reservoir seal were carried out on a combined borehole/wireline and seismic datasets.

Although many small scale structural disturbances have been identified above the reservoir in the Weyburn field, presently it is not possible to establish with certainty, that these faults extend through the regional seal, act as a potential migration path way for CO₂.

The knowledge of the geometry (derived from integrated analysis of the seismic and the borehole data) and the physical/geochemical properties of the rock volume (derived from the well logs and core data) are determined to resolve the above stated uncertainties.

Comment: Some other details of the investigation are presented at the oral session.