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Reservoir characterization of the Cardium Formation, Pembina Field in Alberta

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The late Cretaceous Cardium Formation, which existing in the mud shale Colorado Group has the highest hydrocarbon volumes in the Western Canada Sedimentary Basin (WCSB) of Alberta. It represents approximately 20 percent of the hydrocarbons identified in WCSB as initial volume-in-place and as remaining established reserves.

The Cardium Formation is developed from the very west of Alberta to the middle of Alberta in the Western Canada Sedimentary Basin. It comprises muddy, sandy, and conglomeratic clastic that accumulated during the Turonian and Coniacian stage of the Late Cretaceous. It is divided into two lithostratigraphic units, the Pembina River Member below and the Cardium Zone Member above (Krause and Nelson, 1984). The Pembina River Member consists of one or more coarsening-upward sequences that grade from shales to sandstones and then to variably thick conglomerates. The Cardium Zone Member also comprises coarsening-upward sequences, but it contains mainly shales with lesser amounts of fine-grained sandstone and conglomerate.

The formation is arranged in an arcuate strip, approximately one thousand kilometers long, and is mainly distributed in Pembina Field, which contains most of the reserves. The Pembina Field is a giant oil field covering approximately 4000 km². Over 11000 wells have been drilled from shallow Cretaceous reservoirs to Upper

Devonian carbonate reefs. Original oil in place for Pembina-Cardium is estimated at over 1×10^9 m³.

This study evaluates the reservoir characteristics, stratigraphy, facies architecture of Cardium Formation in the Pembina Tight Oil Field by examining the reservoir properties, heterogeneity based on core and petrophysical data. The results can be applied to the future exploration as well as the theoretical direction for tight oil investigations.

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Reference

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