

A Stratigraphic and Petrographic Study of Cretaceous Siliciclastic Rocks in Central Saskatchewan

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Abstract

Large quantities of oil and gas are hosted in Cretaceous siliciclastic rocks in Saskatchewan, with current production mainly in the western part of the Province. No significant hydrocarbons have been discovered in central Saskatchewan. A stratigraphic cross section from western to central Saskatchewan places the Cretaceous strata in a regional sequence stratigraphic context. Following the deposition of the Mannville Group in deltaic environments in the early Albian, central Saskatchewan was dominantly a shelf environment throughout the rest of the Cretaceous, interrupted by four regressive pulses represented by the Viking, Belle Fourche, Carlile and Belly River formations, with a return to non-marine deposition within the Lea Park and Belly River formations. A number of smaller transgressive - regressive cycles were recorded in relation to sea level changes. Lithology and facies characteristics of the Colorado Group in western Saskatchewan are consistent with Cordilleran sources of detrital material and eastward deepening of the western Interior Cretaceous Seaway. In contrast, the westward change from nonmarine to marine influenced Mannville strata in central Saskatchewan indicates a location on the eastern margin of the seaway during early Albian.

The composition of the studied sandstones from the Mannville Group to the Viking, Belle Fourche, Carlile and Belly River formations varies from quartzarenite, subarkosicwacke, sublithwacke to lithic arkose. Porosity values estimated from point counting range from 0-23.5%, with the highest values within Viking sandstones. Compaction and replacement were the main diagenesis in the Mannville Group and dissolution and carbonate cementation are present in Upper Cretaceous marine sandstones.