

MINERALOGY AND CHEMISTRY OF CRETACEOUS SHALES IN SOUTHEASTERN SASKATCHEWAN

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Approximately 470 samples of shale, taken at 1.5 m intervals from two potash-shaft pilot cores were analyzed, providing a continuous stratigraphic record of shale chemistry and mineralogy through the entire 400 m thick Cretaceous succession in southeastern Saskatchewan. The elements Si, Al, Mg, K, Ca, Fe, Rb and Sr were determined by X-ray fluorescence and their quantities used to adjust the proportions of minerals determined by X-ray diffractometry. Chemical composition of the shales is directly related to the stratigraphy, with Si, Al, Fe, and Rb being depleted in the calcareous Niobrara/Favel strata, whereas Ca and Sr are enriched, as would be expected. Shales in the arenaceous Swan River/Mannville strata tend to be enriched in Si and depleted in Al, Mg and Sr.

Corresponding changes are also reflected in the mineralogy of the shales, with calcite and pyrite becoming relatively abundant in Niobrara/Favel strata, and quartz and kaolinite constituting higher percentages of the shales in the Swan River/Mannville. The suite of clay minerals present in each stratigraphic unit varies between boreholes, suggesting a mixing of clay minerals, probably from eastern and western sources.