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Ichnological and Sedimentological Characteristics of Transgressive Surfaces of Erosion in the Viking Formation, Southeast Central Alberta

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ABSTRACT

Substantial marine flooding during Albian time (Cretaceous) lead to the development of transgressive surfaces of erosion (TSEs) in the Viking Formation of southeast central Alberta. The Albian epeiric sea experienced major transgressions and regressions overprinted by higher frequency sea level fluctuations that resulted in a complex depositional history. The TSEs represent erosion during sea level rise and are commonly overlain by a pebble lag, conglomerate or coarse sandstone unit. Some wells contain several discontinuous conglomerate or grit units signifying multiple transgressive events. A major transgression at the end of Viking time resulted in the deposition of a relatively continuous lag demarcating the top of the Viking Formation. This particular erosional surface is the most distinguishable due to its continuous lateral extent across the basin.

The erosional surfaces within the Viking exhibit variable character, and interpreting the significance of such surfaces requires the analysis of the sedimentology, ichnology and stratigraphy. Transgressive lags vary in grain size, thickness, character of underlying contact, and matrix to clast ratio. In some cases, sideritization of a thick zone has taken place beneath the lag, which may represent a significant hiatus associated with the erosional surface. Other lags or grits within the Viking overlay a surface recognized by a Glossifungites ichnofacies that is typified by Skolithos burrows. In some cases, Glossifungites suites are emplaced within a sideritized unit. In instances where the Glossifungites ichnofacies is not present, there is only a sharp, undulatory surface below a transgressive lag.

Insight into Albian sea level fluctuations, the controls that influenced transgressive erosion (tectonics and/or eustasy), and the deposition of lags can be acquired from the documentation of TSEs from the Viking. Mapping of the TSEs provides a framework for the depositional history and assists in predictions of reservoir geometry of the Viking Formation in the subsurface.