Interpreting Relative Sea Level Curves from Outcrop Logging of the Nikanassin, and Applications to Interpreting the Relative Impacts of Tectonic and Sea Level Change in Jurassic Alberta

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The Jurassic Nikanassin Formation is well exposed in the Grande Cache area. Recent fieldwork involving the collection of sedimentological data through logging was supplemented by utilisation of a handheld gamma ray scintillometer. This allowed the sedimentary character of the succession to be accurately correlated to the gamma ray response. Once this was done, the increased understanding of the relationship between log character and depositional setting in the Nikanassin was used to more accurately interpret gamma ray logs in the subsurface.

The data collected from a series of outcrops in Grande Cache were then assimilated to provide an almost continuous log through the Nikanassin Formation. An interpretation of the depositional settings was made from the sedimentological data, and this was used to generate a relative sea level curve throughout the formation. Data from nearby wells were used to constrain these interpretations and to put them into a three dimensional context. Interpreted depositional settings range from shallow marine progradational sequences, passing up into meandering fluvial and paralic deposits, capped by thick braided river sandstone deposits.

The resulting relative sea level curve was then compared to existing "global" sea level curves, with two purposes in mind. The first was to correlate the extrapolated relative sea level curve with the global curve, to see if there were enough points of correlation to accurately date the Nikanassin Formation deposits. Previous work has come up with a variety of ages for the formation, so this provides a new opportunity to date these paralic and fluvial sediments. Secondly any departures from the global curve may potentially be attributed to local tectonic activity.

Lastly the implications for hydrocarbon potential within the Nikanassin will be explored. It may be possible to use relative lowstands to predict sand development and better tight gas reservoirs, with corresponding seals during highstands. In addition certain depositional settings may be more conducive to reservoir development, or can be mapped out geographically to identify sweet spots in the subsurface. This will be demonstrated through regional correlation panels and maps.