Transgressive – Regressive (T-R) Sequence Analysis And Coal Depositional Environments Associated With The Bearpaw Succession, Central-Southern Alberta

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ABSTRACT
Regional outcrop-subsurface correlation of the Bearpaw Formation and its pre- and post- transgressive events documents multiple cycles of marine deposition associated with the Bearpaw Sea in south-central Alberta.

The pre- Bearpaw Formation transgressive event is regionally mappable as a part of the Dinosaur Park Formation, upper Belly River Group. Three subsequent transgressive Bearpaw events, also regionally mappable, are included within the lower part of the Horseshoe Canyon Formation, Edmonton Group. The major Bearpaw transgressive pulse bounded by the overlying Horseshoe Canyon Formation and underlying the Dinosaur Park Formation is an arbitrary litho-stratigraphic separation identified as the Bearpaw Formation in south Alberta. This stratigraphic separation represents a partial image of the Bearpaw Sea dynamics in the province. Sequence stratigraphic analysis enables the integration of all the mappable marine cycles associated with the Dinosaur Park Formation - Lower Horseshoe Canyon Formation stratigraphic interval in one 2nd-order transgressive-regressive sequence made up of five regional 3rd-order sequences including the pre-, post-, and Bearpaw Formation s.s.

Analysis of the third-order Bearpaw sequences assisted in the identification of systematic variations in coal sedimetology and the environmental conditions that generated packages of coal seams with distinct distribution and compositional characteristics. Eleven successive depositional environments were identified and mapped within the study area. Their genetic relationships, geometry and morphologic characteristics were compared with similar present-day depositional systems. The entire succession can be integrated in a complex association of coastal and deltaic depositional sub-environments that contains the Lethbridge and Drumheller coal zones.

A key component of this study is the significant volume of coal information obtained from logs and outcrops. This was successfully interpreted and correlated into a consistent coal-bearing depositional model based on all five regionally mappable transgressive-regressive Bearpaw sequences.