

Delineation of Meso-Tidal Estuarine Reservoir Deposits within a Transgressive Systems Tract: Ellerslie Member (Lower Cretaceous), Central Alberta, Canada

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In the Western Canada Sedimentary Basin, the Ellerslie Member remains one of the most extensive and least developed hydrocarbon bearing intervals. Tidal processes controlled sedimentation as the Boreal Sea advanced southward within the Edmonton paleovalley/ria. Tidal flat, estuarine point and sand bar, and paleosoil lithofacies associations are characteristic of the Ellerslie Member within the 2000 km² study area. Tidal flat deposits include bioturbated, interlaminated and interbedded shales and very fine-grained sandstones. Tidal point bar lithofacies associations are dominated by structureless, shale rip-up, and inclined heterolithic stratified fine- to medium-grained sandstones. Sand bar lithofacies associations consist of well-sorted sandstones with 3-D dunes and poor bioturbation, mudstone doublets and sandstone bundles. Pedogenic processes have modified many of these deposits resulting in a range of immature to mature paleosoils. The Ellerslie Member is capped by black shales of the overlying Ostracod Formation, a unit that marks maximum transgression and provides a competent seal.

All lithofacies associations are vertically repeated and result in stacked reservoir horizons. This geometry is indicative of aggradation and progradation within a transgressive systems tract. Point and sand bar sandstones are the most attractive reservoirs, with porosities and k_{max} averaging over 20% and 300 mD in both. Regionally, the tidal sand bars are oriented east/northeast and west/southwest. In contrast, tidal point bar facies have varied trends making them the most challenging, but promising targets. This is highlighted by the 00/6 -1-54-26W4/2 well that was re-completed in 1998 and has since produced 19.5 Bcf of gas, from a 2.5 m pay zone.
