

Wabiskaw Sequence Stratigraphic Architecture in the Chard-Leismer-Kirby Area - Wabiskaw Estuarine Valley Fills

J. Edward Mathison*

Fekete Associates Inc., 2000-540-5th Ave S.W. Calgary, AB T2P 0M2

emathison@fekete.com

ABSTRACT

The Wabiskaw interval in the Chard-Leismer-Kirby area consists of two distinctly separate depositional settings separated by a ravinement surface. Below the ravinement surface, estuarine sediments occupy paleovalleys deeply incised into subjacent McMurray Formation strata. Above the ravinement surface, transgressive lower shoreface to shallow shelf sediments (in the north Chard-Leismer-Kirby area) grade laterally into barrier shoreface deposits in the south.

The planar, regional Wabiskaw unconformity on interfluves passes laterally into paleovalleys incised in excess of 40 metres into underlying strata. Valley form of the various paleovalleys can be accurately delineated by precise correlation of a refined Upper McMurray Formation stratigraphy. The paleovalleys comprise an interconnected paleo-drainage network with a north trending master valley and northeasterly and southeasterly trending tributary valleys. The master valley, along the eastern side of the Chard-Leismer-Kirby region, is a few townships wide. Within the master valley are erosional remnants of McMurray Formation, some in excess of one township in size. The base of the paleovalley system is marked by relatively continuous sands of uniform thickness which allow discrimination from underlying McMurray channel sediments.

Fill of the Wabiskaw paleovalley system is a complex assemblage of estuarine sub-environments including: bayhead deltas, tidally influenced fluvial channels, central basin, flood tidal deltas, back-barrier lagoon and washover fans. Fill of the paleovalley system consists of three phases: initial transgressive phase, vertical aggradation/progradation phase and final transgressive phase. Basal estuarine sands record backstepping of bayhead deltas during a relatively rapid rise in base level. The middle, heterolithic package of estuarine fill accumulated during a still stand or low rate of sea level rise. These sediments record progressive infill of the estuary by aggradational/progradational bayhead delta assemblages. Rooting, commonly preserved at the top of this succession, indicates that much or all of the central basin was converted to a flood plain at the end of this phase. The final episode of estuarine fill is represented by a thin sand-shale package that can be traced throughout the paleovalley and onlaps adjacent interfluves. These backbarrier –lagoon- washover fan - tidal delta sedimentation are preserved during renewed transgression of the Wabiskaw sea. Back barrier sediments are truncated by a ravinement surface that marks the southward translation of the contemporaneous shoreline to a still stand position in the south Leismer Kirby area.