

Tectonic Influence on the Preservation of Middle Triassic Halfway Formation Shoreface Reservoirs

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The Middle Triassic Halfway Formation, located within west-central Alberta, consists of a diverse suite of siliciclastic and bioclastic deposits within upper/lower shoreface and tidal channel facies associations. A detailed sedimentological study of the Halfway Formation within the Elmworth and Wapiti fields has identified evidence of syn-sedimentary tectonic influence on shoreface reservoirs; identifiable in core from 1) firmground/hardground surfaces reflective of shallow marine erosion and sediment compaction/cementation; 2) pronounced soft-sediment deformation features attributed to dewatering through pore-water evacuation and/or cyclic shock; and 3) Anhydrite filled fractures attributed to post-depositional tectonic reactivation. These features combined with a detailed analysis of their spatial distribution, are key to the interpretation of tectonically influenced sedimentation during Halfway Formation deposition within the study area.

It is believed that the physical expression of this tectonism has resulted in, northwest-southwest trending, shore-parallel normal faulting which has resulted in the preferential preservation and/or overthickening of shoreface facies associations and reservoir trends. The origin of this tectonic stress is thought to be propagated from the reactivation and structural inversion of faults associated with the development of the Peace River Arch and subsequent Peace River Embayment.

These findings suggest that existing Halfway Formation reservoir architectural models may be overly simplistic and potentially inaccurate. Any detailed sequence stratigraphic reconstruction within the study area must take into account that the Halfway Formation is a product of both tectonics and sedimentation and thus does not fit neatly into normative stratigraphic models.