

Sandstone-coquina lowstand shoreline trends in the Triassic Montney, Doig and Halfway Formations; NE British Columbia, NW Alberta

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Three major shore-parallel clastic wedges have been identified and mapped within the lower and middle Triassic succession in the Peace River area. Stratigraphically, they occur in the middle Montney, Doig and Halfway Formations. Each contains a mixed sandstone-coquina lithology and represents deposition in an upper shoreface setting. Sediments lying stratigraphically between the three wedges are shales and siltstones deposited in a deeper water setting. Each of the wedges subcrops to the northeast internally within the Triassic. They are interpreted as lowstand deposits corresponding to Late Dienerian, Early Anisian and Late Anisian third-order global sea level events. The argillaceous sediments separating the three lowstand deposits represent periods of relative transgression or highstand.

In the middle Montney, pelecypod-brachiopod coquinas prograde basinward up to 45 kilometers from the subcrop edge. The coquinas are well sorted and abraded by wave action; deposition occurred in a wave-dominated upper shoreface setting. Montney sediments above and below the coquinas are siltstones and mudstones deposited in deeper water. A Late Dienerian lowstand was responsible for the basinward deposition of these shallow-water coquinas. The sharp erosional base of the coquina and associated sandstone is interpreted as a regressive surface of erosion caused by wave incision during sea level fall.

A thick accumulation of sandstone and coquina in the Doig Formation has been mapped along a northwest-southeast linear trend. It correlates downdip into the lower portion of the Doig Phosphatic Zone, undergoing a facies transition to shale. Updip, the sandstones erode into earliest Doig and late Montney sediments. An Early Anisian sea level fall brought the shoreline rapidly basinward, exposed Montney sediments to erosion and set up the deposition of a lowstand shoreface succession. The sands were sourced from eroded and reworked Montney sediments. A middle Anisian sea level rise flooded over the Doig lowstand shoreface, depositing the deeper water shales more typical of the Doig Formation.

The Halfway Formation forms a westerly-thickening blanket of sandstone and, locally coquina, over much of the western portion of the study area. Halfway sediments were deposited as a prograding shoreface succession. The Halfway pinches out updip between lower Charlie Lake evaporites/siltstones and Doig marine shales. The updip termination of Halfway sandstones is often attributed to post Halfway erosion. An alternate interpretation is that a late Anisian sea level drop brought the shoreline rapidly basinward to the present Halfway subcrop edge. The Halfway sandstones and coquinas were deposited and preserved during the late stages of sea level fall and the subsequent lowstand. Landward of the Halfway shoreline, Doig Formation shales were subject to subaerial exposure. The erosional base of many Halfway sandstones and coquinas can be interpreted as the regressive surface of erosion associated with the sea-level fall. Following a relatively long period of shoreline progradation at during lowstand, sea level began to rise. A series of Charlie Lake shoreface successions were deposited basinward, with the lower Charlie Lake redbeds and evaporites filling in the landward coastal plain as accommodation space was created. These sediments flooded back over both Halfway and Doig deposits. A series of schematic cross-sections depicts the depositional history of the lower and middle Triassic.