

## **Burial Dissolution of Dolostones, Devonian Upper Elk Point Group, Rainbow Basin, Northwest Alberta**

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Widespread dissolution of dolostones created reservoir quality in Keg River/Muskeg pools on the Comet Platform, along the northern margin of the Rainbow Basin. Grains and matrix were dolomitized after incipient pressure solution, and then dissolved to varying degrees. These pools produce from secondary moldic and coarse vuggy pores, often developed in zebra dolomites.

Evidence for dissolution of dolomite, as opposed to the dissolution of calcite during dolomitization, exists at two scales. On a petrographic scale, completely dolomitized grains contain randomly scattered secondary pores, rather than partial molds that selectively occur in the interior of grains. Secondly, calcitic grains in the zone of transition from dolostone to limestone lack micropores of leached origin. Thirdly, replacive and pore-filling saddle dolomite crystals are partially dissolved. Fourthly, dolomite clasts in breccias contain randomly oriented stylolites rotated from a horizontal position, reflecting massive burial dissolution of dolostones. On a regional scale, reservoir quality related to leaching of dolomites in dolostones occurs along fault zones but is absent in otherwise identical dolostones away from the faults. This observation implies that fluid movement along fault zones promoted dolomite dissolution. Reservoir quality was strongly controlled by depositional facies and a fracture/fault system (Hay River Shear Zone) reactivated at least three times during Middle-Late Devonian time.

Dolomite dissolution was closely associated with hydrothermal fluids that emplaced secondary burial anhydrites, as evidenced by dolostone brecciation at the edges of banks of massive anhydrite that occur along fault zones. Hydrogen sulfide generated during Thermochemical Sulfate Reduction also aided dolostone dissolution.