Stratiform Carbonate Breccias of the Grosmont Formation, Alberta

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Carbonate breccias are a common occurrence in the upper Grosmont Formation of northeast Alberta. They range from crackle breccias (clast supported with little matrix content) to mosaic breccias (clast supported with high matrix content) to matrix dominated breccias. The latter two types are the most common. At Saleski (T84-85, R 19W4) all clasts and most matrix material are dolomite. Breccia intervals are up to 12m thick and are largely confined to specific stratigraphic intervals that are depositional facies controlled.

The Grosmont has been subjected to fresh water influx and leaching during early Cretaceous exposure and erosion which lead to the formation of breccia zones. CT scan images of Grosmont cores reveal an evolutionary process of breccia development commencing with a very densely fractured dolomite with low matrix porosity. Leaching along fracture surfaces produced porosity development that penetrated the rock fabric and caused a gradual disaggregation of the affected strata. Where this process reached its culmination it resulted in the complete disintegration of the original rock fabric yielding a lithology dominated by fine unconsolidated dolomite sediment saturated by bitumen with a few floating dolomite clasts.

FMI images of a breccia-prone Grosmont interval from three closely spaced wells show thickness variations of up to three meters that can be related to the amount of brecciation of the rock fabric. More highly brecciated units have undergone increased compaction and are consequently modestly thinner. Isopach mapping of the affected beds suggest that the degree of brecciation increases in an eastward direction towards the Grosmont subcrop margin.

The nature of the breccia formation mechanism has economic implications. The ERCB has estimated that the Grosmont contains 318 billion barrels of bitumen. Laricina Energy has acquired a significant land position at Saleski (T84-85, R 19-20W4) with its partner OSUM Oil Sands Corp. seeking to commercially extract this resource. Because the breccia prone units have the best porosity and permeability, knowledge about their nature and distribution is critical in reservoir modeling and simulation exercises.