Stratiform Carbonate Breccias of the Grosmont Formation, Alberta

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The Grosmont D member in Twp 85 Rge19W4 contains a depositional sequence of bedded, laminated, massive and brecciated dolostone that varies between 8 and 12 metres thick - Unit 6 of Hopkins and Barrett (2008). Within Unit 6, four distinct bed sets can be correlated on logs over an area of 100 square kilometres reflecting inherent stratiform differences in composition and brecciation.

Principal fabrics in thin sections are dolograinstone consisting of coated composite grains with isopachous dolomite cements; dolopackstone and dolowackestone represented by mosaics of fine- and coarse-crystalline dolomite; and dolomudstone with massive to laminated fine-crystalline dolomite mosaics and variable accessory amounts of clay minerals and quartz. Secondary porosity, recognized from oversize pores and crystal truncations, is widespread and variable. Total porosity ranges up to 45%. When oil is removed from the most porous samples, the dolostone is friable or the samples disaggregate. Under the scanning electron microscope the ragged margins of dolomite crystals and intracrystalline pores indicates a high degree of dissolution. Etching along crystallographic boundaries ultimately results in degradation and disaggregation of dolomite crystals and reduces crystal size. Twelve samples of friable dolomite were analyzed for carbon and oxygen stable isotope ratios and these data were incorporated into the interpretation.

Core and FMI logs indicate that changes in thickness of Unit 6 occur where bedded, laminated or massive dolostones grade laterally into breccias, or where brecciation has been most intense. Variations in thickness are interpreted to be the result of intrastratal dissolution and chemical compaction of individual beds. Rarely, entire bed sets have been lost by dissolution. Stable isotope values are compatible with Devonian evaporite dolomite partially equilibrating with later descending meteoric or ascending thermal water. Stratigraphic evidence favours dolomite dissolution by meteoric water that entered the Grosmont subcrop during one or more phases of teleogenetic exposure.

Similar breccias elsewhere in the Grosmont D member have been interpreted as evaporite dissolution collapse breccias. In the study area, however, the evidence suggests that dissolution of evaporitic minerals did not play a role in breccia creation.