

Geological and Geophysical Interpretation of the Rawdon Fault, Rawdon Area, Nova Scotia: Implications for Carboniferous Age Tectonics and Basin Development¹

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The Rawdon Fault (RF) is a regional-scale (ca. 100 km), NE-trending subsidiary fault of the EW-trending Cobequid-Chedabucto Fault System, which marks the boundary of the Meguma and Avalon terranes. The RF locally separates the Rawdon Block, comprising Cambrian-Ordovician metasediments of the Meguma Group to the south, and the Carboniferous Kennetcook Basin strata to the north. Interpretation of seismic and gravity data and drilling in the Rawdon area constrains the RF in this area as steeply dipping, with more than 2 km of apparent dip-slip (south-side-up) offset. A regional Bouguer gravity low in the Kennetcook Basin adjacent to the fault is explained by the rotation to near vertical and thickening of low density evaporites. A wide zone (> 1 km) of fault-related deformation in the Rawdon Block is characterized by rotation and folding (F_2) of bedding and regional cleavage (S_1) from steep to shallow near the fault, bedding-parallel shearing, local development of crenulation cleavage (S_2), south-dipping brittle faults, and NW-trending extensional veins. These structures are kinematically related and indicate northwest

movement, with the RF interpreted as a steep reverse fault. Fault-related folding, of the fault propagation type, explains relative upward rotation of stratigraphy in the footwall (Kennetcook Basin) and downward rotation of bedding and cleavage (S_1) of the Rawdon Block. This geologic model is supported by gravity and magnetic models. The age of faulting is constrained by geological relationships within the Kennetcook Basin including (1) an angular unconformity that separates mid-Westphalian strata deposited on deformed Viséan strata, followed by (2) tilting of the mid-Westphalian and older strata, indicating the latest movement on the fault is post mid-Westphalian. We interpret the compressional character of the RF in the Rawdon area to be similar to the Kennetcook Thrust on the north side of the Kennetcook Basin. This reflects location in a restraining bend (NE segment) of the regional fault system, with contemporaneous strike-slip displacement on EW segments recorded elsewhere. In addition, it may explain the major deformation (including decollement) of the Viséan and older basin fill within the Kennetcook Basin.

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