

***A study of the Fisset Brook Formation at Lake Ainslie,
western Cape Breton Island***

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The Fisset Brook Formation is a Carboniferous sequence of volcanic and minor intercalated continental clastic sedimentary rocks. At Lake Ainslie, the study area in western Cape Breton, it nonconformably overlies Precambrian basement and is conformably overlain by clastic sedimentary rocks of Carboniferous Horton Group.

Petrographic, petrochemical and field studies show that the volcanic rocks are bimodal with respect to silica and consist of interlayered rhyolites and basalts. The petrochemical study shows that the basalts are transitional, with both tholeiitic and alkalic characteristics. It also illustrates that the rhyolites could not have been derived from the same source as the basalts

by fractional crystallization or fractional melting. The proposal that the rhyolites are anatectic melts of continental crust is supported by new isotopic data for the Fisset Brook Formation.

Regional implications are evaluated. The model developed involves the activation of faults in response to a middle Carboniferous megashear environment. Related elements are local extension, mantle upwelling and basaltic volcanism, using the faults as conduits to the surface. Thermal energy related to mantle upwelling and basaltic volcanism caused the crustal anatexis to form the rhyolitic magma. Further development of the basin involved the deposition of continental sediments.