A petrochemical analysis of the Little Falls Member of the Nepisiguit Falls Formation, Bathurst Mining Camp, northern New Brunswick

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The major, trace, and rare-earth element composition of 17 samples of felsic tuffaceous rocks from two cliff sections near Little Falls, New Brunswick, was determined. Felsic tuffaceous rocks at Little Falls, located 1.4 km below Tetagouche Falls on the Tetagouche River, have been divided into two units, a lower lithic tuff and an upper crystal tuff, based on their pe-

trography and chemistry. The lithic tuff unit is characterized by greenish grey, medium- to fine-grained, bedded, ash tuff with pumice and shale rip up clasts. Thicker sections of this unit contain rare, angular quartz grains. The crystal tuff unit is characterized by a medium grey, coarse-grained tuff, with thick sections characterized by abundant (75%) rhyolitic clasts and angular quartz phenoclasts. These rocks are exposed in two cliff sections that constitute the reference section for the Little Falls Member of the Nepisiguit Falls Formation, part of the Ordovician Tetagouche Group.

In the lower lithic (n = 15) and upper crystal (n = 2) tuff, the SiO_2 contents range from 66 to 78 wt. %, with one particular sample enriched in Mn (7.2 wt. %) and Fe (4.6 wt. %). Zr/TiO_2 versus Nb/Y plots show both units have signatures typical of the average Nepisiguit Falls Formation. Using these trace-element discriminants, the lithic tuff plots in the rhyodacite field, whereas the crystal tuff plots in dacitic field consistent with TiO_2 abundance and SiO_2 contents. The lithic tuff shares similar average Zr/Ti values (0.075) to average Nepisiguit Falls Formation tuff (0.079), whereas the crystal tuff Zr/Ti values (0.03) are lower. However, REE profiles of lithic tuff exhibit higher heavy REE signatures than average Nepisiguit Falls rocks in the type area, indicating that this came from a different volcanic system.

REE plots of the lithic tuff show a pronounced negative Eu/Eu* in both the lithic tuff (0.40) and upper crystal tuff unit (0.48). The Ce/Ce* values for lower crystal tuff unit are slightly positive (1.03 – 1.07), the lower crystal tuff unit has a negative value (0.4), and the upper crystal tuff unit has positive value (1.4). The lower part of the crystal tuff unit has Fe and Mn enrichment, and a pronounced negative Ce anomaly indicating that it has experienced mixing with a distal exhalite, which is possibly correlative to the Brunswick Horizon.