Stratigraphy, depositional setting and volcanism of the Letete Formation, southwestern New Brunswick

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The Late Silurian Letete Formation, located on the Mascarene Peninsula of Passamaquoddy Bay, is part of the northeast-trending Mascarene subbelt which makes up the southwest part of the Late Ordovician to Late Silurian Mascarene Group. It is bounded to the north by the St.George Fault, which separates it from the shallowly southeast dipping rocks of the Late Silurian Eastport Formation, and to the south by the Back Bay Fault, separating it from the composite Proterozoic New River belt. The Letete Formation is thought to have been deposited in an extensional back-arc setting, but its relationship to adjacent units, in particular the Eastport Formation, is unknown.

During June to August 2005 we conducted detailed mapping of the felsic tuffs and volcanic and sedimentary members of the Letete Formation, located in the upper to middle part of the Letete. The objective of the field work was to describe the stratigraphy of the Letete Formation in order to determine its depositional environment, paleotectonic setting, relationship to the Eastport Formation, and mineral potential. A ≈4km long section of coastline on the southwest coast of the Mascarene Peninsula, from McNichols Cove to Fraser Beach, was mapped on a bed by bed basis. This section includes the lower part of the Late Silurian Eastport Formation to the north, a previously undivided zone of tuffs and intrusions, and the Early Silurian Letete Formation.

Within the Letete we described a ≈900 m thick section of mafic flows, mafic and felsic tuffs and sedimentary rocks. The upward-facing direction is to the northwest. This section is characterized by dominantly mafic volcanism, but the abundance of felsic volcanism increases upward in the section. The section records an upward-shoaling sequence with at least three phases of subaqueous to subaerial deposition. Shallow level synvolcanic and deeper level coarse-grained mafic sills

intrude the Letete. The coarse-grained sills are associated with disseminated sulphide (Py +Cpy) occurrences.

The mapped part of the Eastport Formation comprises red quartz wackes and felsic and mafic tuffs. The upper part of the Letete and the Lower part of the Eastport are separated by a 200 m thick rhyolite intrusion through which the previously mapped St. George Fault was placed. The lower part of the Eastport Formation is dissected by abundant northeast-trending faults and mafic sills, and only fault slivers of tuffs and red sandstones are present. Similarly, the Letete is characterized by increasing deformation of black siltstones and mafic tuffs and increasing mafic intrusions approaching the rhyolite intrusion. The Eastport Formation contains subaerial to littoral depositional facies, and the Letete Formation is an upward shoaling sequence. Despite the complexities caused by the St. George Fault, the interpretation that the Eastport overlies the Letete is consistent with stratigraphic relationships and isotopic ages.