

**THE GEOLOGY OF A PORTION OF THE
SOUTH-CENTRAL CAPE BRETON HIGHLANDS
(PART OF NTS MAP SHEET 11K/07),
VICTORIA AND INVERNESS COUNTIES,
NOVA SCOTIA**

by

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ABSTRACT

The south-central Cape Breton Highlands were mapped (1:10 000 scale) in 1991 and this mapped area occurs at a boundary between two tectonostratigraphic zones, the Aspy Terrane and the Bras d'Or Terrane. The Aspy Terrane includes a variety of moderately to highly metamorphosed Silurian or older stratified rocks and Late Devonian and older granitic to tonalitic plutonic units. The Bras d'Or Terrane includes Precambrian (Hadrynian) metasedimentary and metavolcanic rocks intruded by mainly Late Hadrynian to Cambrian intrusive rocks (diorite, tonalite, granite and granodiorite).

The mapped area is underlain by a diverse group of metamorphic, metavolcanic and plutonic rocks which record a complex geological history. The oldest unit, the Precambrian North Branch Baddeck River leucotonalite, is a fault-bounded and variably deformed pluton. The McMillan Flowage formation is an elongated unit mainly underlying the eastern portion of this area. It is postulated to be Hadrynian in age and, therefore, one of the oldest units. The McMillan Flowage formation flanks both sides of the variably deformed Kathy Road dioritic suite. The west-central unit of the McMillan Flowage formation, bordering the western foliated margin of the Kathy Road dioritic suite, is strongly deformed volcanoclastic schist and gneiss, indicating extensive ductile deformation followed by brittle deformation.

The Kathy Road dioritic suite, a late Precambrian to Cambrian intrusion, is the most extensive unit in the mapped area. This unit has invoked interest in the recent past by exploration companies because gold occurrences have been found in its strongly foliated portions. This work occurred immediately north of the area that was mapped during this study and has identified numerous auriferous quartz-hematite-pyrite ± galena ± calcite veins hosted by complex massive to gneissic intrusive rocks cut by shear fractures, brittle shear zones and brittle-ductile shear zones. The dioritic suite of the mapped area is a variably foliated hornblende-biotite diorite with well-foliated horizons, locally resembling amphibolite and gneiss.

The westernmost portion of the mapped area is underlain by four different lithologies of the Jumping Brook metamorphic suite, a low- to medium-grade suite of amphibolite and schist of undetermined age. The gneissic Pleasant Bay complex (First Fork Brook (para)gneiss) underlies a small area of the west-central study area. A sequence of low-grade metavolcanic and minor metasedimentary rocks (the Sarach Brook metamorphic suite), which is exposed in the south-central portion of the mapped area, has a determined age of 433±7/-4 Ma (U-Pb, zircon, Dunning et al., 1990). This unit separates West Branch North River monzogranite from West Branch North River granodiorite. These

generally unfoliated Devonian granitic rocks have been dated at 399.6 ± 4.6 Ma (Rb-Sr whole rock, O'Beirne-Ryan and Jamieson, 1986) and 385 ± 5 Ma and 381 ± 5 Ma ($^{40}\text{Ar}/^{39}\text{Ar}$, biotite, Reynolds et al., 1989) and are the youngest units in the study area.

Several phases of both ductile and brittle deformation are recorded in the rocks. Ductile shear has produced zones of mylonitic texture, generally in the southern portion of the mapped area and related to a north-northeastward-trending, moderately westward dipping shear zone, the Southern Highlands shear zone. This shear zone, 1.5 km wide at its widest point, extensively deformed the Sarach Brook metamorphic suite and is characterized by mylonitic and chloritic schist. The shear zone has only affected a narrow zone along the margin of the West Branch North River monzogranite and granodiorite, suggesting that there was pre- and post-granitic movement along this shear zone.

The Eastern Highlands shear zone, a zone speculated by some to represent a boundary between the Aspy and Bras d'Or Terranes of Cape Breton Island, occurs in the central portion of the mapped area and is manifested by variable deformation within the Kathy Road dioritic suite, intensive deformation (both ductile and brittle) in the marginal phase of the McMillan Flowage formation, and by strong deformation within and bounding faults of the North Branch Baddeck River leucotonalite.