
The petrogenesis of REE-enriched dykes in the Eastern Cobequid Highlands, Nova Scotia

S. BROUGHM¹, T. MACHATTIE², AND R. COX¹

1. *Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia B3H 4R2* ¶ 2. *Nova Scotia Department of Natural Resources, Mineral Resources Branch, Halifax, Nova Scotia B3J 2T9*

High Field Strength Element (HFSE)-Rare Earth Element (REE)-enriched granite was discovered at the contact zone of the Hart Lake-Byers Lake granite and rhyolite of the Byers Brook Formation in the Debert Lake area, northeastern Cobequid Highlands, Nova Scotia. The HFSE-REE-enriched granite has been found in two types of occurrences. Most prominent are dykes ~1–50 cm wide. The second type occurs in patches 1–25 cm wide in locally-pegmatitic arfvedsonite-bearing granite. Dykes are of two types based on grain size, texture, and geochemistry. Type 1 dykes are medium to coarse grained with ‘granitic texture’, whereas type 2 dykes are fine grained, typically display mineralogical banding, and have noticeably lower silica content and higher HFSE-REE-enrichment. The HFSE-REE-enriched granite is being studied to investigate whether or not a genetic relationship exists between the dykes and the nearby Hart-Lake Byers-Lake A-type granite pluton. Polished thin sections of HFSE-REE-enriched granitic dyke samples were analyzed for modal % of minerals. Quantitative chemical analyses of HFSE-REE-rich mineral phases were then conducted. Type 1 dykes contain ~70–80 vol. % quartz, K-feldspar, albite, and magnetite/hematite, <10% epidote and <5 % zircon, and trace amounts of pyrochlore, sphene, monazite, fergusonite, chevkinite, bastanaesite, allanite, ilmenite, yttrialite, and fluorite. Type 2 dykes show a similar modal mineral assemblage with additional minerals including thorite, talenite, apatite, and calcite. Detailed mapping of the Hart-Lake Byers-Lake pluton from Debert Lake to the mylonite zone of the Rockland Brook Fault was completed in 2012. More than 500 samples were collected, slabbed, and analyzed using a Innovex X-5000 Mobile XRF whole-rock geochemical analyzer. Amphibole compositions in the Hart-Lake Byers-Lake granite and

HFSE-REE-enriched granite will be determined using a JEOL 8200 electron microprobe at Dalhousie University. It is postulated that the HFSE-REE-enriched dykes may have originated from F-rich fluids that segregated from the Hart-Lake Byers-Lake pluton, possibly as a result of fractionation of the granitic melt. The patches may represent localized F-rich areas in an arfvedsonite-rich and HFSE-REE-rich part of the Hart-Lake Bykers-Lake granite.