Distinguishing between porphyry and volcaniclastic units from the Hebert-Brent gold showing, Yellowknife Greenstone Belt, Northwest Territories, Canada

Sarah C. Speight, David R. Lentz, and Chris R.M. McFarlane

Department of Earth Sciences, University of New Brunswick, P.O. Box 4400, Fredericton, New Brunswick E3B 5A3, Canada

<sarah.gordon185@gmail.com>

The Yellowknife Greenstone Belt (YGB) is located within the western part of the Archean Slave craton, Northwest Territories, Canada. This study is focused on the local geology of the Hebert-Brent gold showing, which is part of the Barney Deformation Corridor. The showing consists of replacement-style gold mineralization hosted in massive to pillowed, bleached mafic volcanic flows that are intruded by variably altered feldspar-quartz and quartz-feldspar porphyries. Due to the complicated metamorphic and deformation history of the YGB, questions remain as to the origin of these units. To shed some light on these porphyries, eight drill core samples were examined petrographically.

Transmitted and reflected light petrography was used in conjunction with micro-X-Ray Fluorescence to characterize the overall mineralogy, alteration and textural variations of each thin section. The original description of the eight porphyry samples had seven identified as feldspar-quartz porphyries and one as a quartz-feldspar porphyry. The overall mineralogy consists of phenocrysts of quartz, minor relict amphibole, and sericitized twinned plagioclase set in a crypto- to microcrystalline groundmass of muscovite, quartz, calcite, pyrite, and Ti-oxides. Samples are variably mineralized with arsenopyrite, chalcopyrite, and sphalerite. The samples were all evaluated for possible plutonic or pyroclastic textures to indicate the origin of the porphyries. Recrystallization textures were most often observed, including muscovite pseudomorphed after prismatic feldspar, quartz subgrain development along quartz grain boundaries, and quartz with undulose extinction. Variably sized (fine to coarse) spherical and amoeboid-shaped quartz grains, typically with embayed and scalloped margins, were found in most samples, as well as broken/ dislocated quartz grains. It is possible that these textures represent fragmentation of the quartz grains due to changes in pressure; gases that became trapped during one level of emplacement may have burst during a decompression event. Of particular interest were the spherulites observed in one feldspar-quartz porphyry sample, a devitrification texture that is indicative of volcanic rather than plutonic origin. The microanalytical techniques and textural observations will hopefully clarify the discussion regarding the various porphyries at the Hebert-Brent gold showing. The focus of this study was mineral and textural identification, although limited at this stage due to the microcrystalline nature of the groundmass/matrix. Future work will be aimed at identifying growth patterns in quartz phenocrysts and the identification of the very fine- silicates, sulphides, and oxides that were observed.

Atlantic Geology, 2017, Volume 53
Atlantic Geoscience Society Abstracts – 43rd Colloquium & Annual General Meeting 2017
doi: 10.4138/atlgeol.2017.006