

Petrographic, Geochemical, and Sulphur Isotope studies of the Montagnais Gabbro, the Labrador Trough, Canada – Implications for Ni-Cu-PGE Exploration Potential

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The Labrador Trough is a Paleoproterozoic (2.17 to 1.87 Ga) fold and thrust belt straddling the Québec-Labrador boarder. The Labrador Trough comprises the Kaniapiskau Supergroup which was intruded by the Montagnais Gabbro sills (1884 ± 1.6 Ma). The Ni-Cu-PGE potential of Montagnais Gabbro has been recognized since the 1950s, and recent exploration results from the Northern Shield Resources (NSR) Huckleberry Prospect in Québec have highlighted the potential for new discoveries in this underexplored region. Fieldwork was completed in 2017 with lithological samples collected from gabbro sills and sulphide-rich shales within the Howse Lake and the Moss Lake areas, as well as from the Huckleberry prospect, 100 km north along strike in Québec. Whole rock geochemical data, including Pt, Pd and Au assays, were used to quantify Ni-Cu-PGE potential enrichments in the sulphide-rich gabbro samples. In addition, the data were used to assess the potential of these gabbro sills to host economically significant base-metal occurrences. Mineralized gabbro samples from the Howse Lake and Moss Lake areas were analyzed by Scanning Electron Microscope-Mineral Liberation Analyzer (SEM-MLA) to provide detailed petrographic information on sulphide minerals, and to locate and identify platinum group minerals (PGMs) and ascertain their relationship with sulphide and silicate minerals. Secondary Ion Mass Spectrometry (SIMS) techniques were used to determine the sulphur isotope ($\delta^{34}\text{S}$) ratios of pyrrhotite and chalcopyrite within mineralized gabbros and sulphide-rich shales proximal to the gabbro sills, and thus provide insight into the sulphur source and amount of contamination related to the melting of the host shales. Results obtained from the three areas will be compared to determine factors which may have contributed to mineralization, as well as classify the occurrences within a deposit model.