

# 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 ( $1884 \pm 1.6$  Ma). The Ni–Cu–PGE potential of the Montagnais Gabbro has been recognized since the 1950s. 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 and 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 possible Ni–Cu–PGE 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 Analysis (SEM-MLA) to provide detailed petrographic information on sulphide minerals, to locate and identify platinum group minerals (PGMs), and to ascertain their relationship with sulphide and silicate minerals. Secondary Ion Mass Spectrometry (SIMS) microanalyses were used to determine the stable S-isotopic ( $\delta^{34}\text{S}$ ) ratios of pyrrhotite and chalcopyrite within the mineralized gabbros and sulphide-rich shales proximal to the gabbro sills. Thus, the S-isotopic data provide insight into the S 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 the mineralization, as well as to classify the occurrences within a deposit model.