

A Petrographic and Geochemical Investigation of the PGE Potential of the Idefix Gabbro of the Northern Labrador Trough, Quebec

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Abstract

The Idefix Gabbro is a PGE-mineralized component of a metamorphosed, layered, gabbroic sill, located approximately 75km northwest of Kuujjuaq, Quebec. Geologically, it is part of the Montagnais Sills, situated in the Labrador Trough of the Paleoproterozoic New Quebec Orogen, which is part of the larger Southeastern Churchill Province. This study investigates mineralogical and geochemical heterogeneities across the mafic intrusion, and the nature and distribution of mineralization throughout. During the sampling/drilling program conducted by Northern Shield Resources in August of 2013, a traverse was completed across the layered intrusion, with samples collected from one metasedimentary contact to the other. Petrographic and quantitative analysis has been conducted on these samples through the use of transmitted and reflected light microscopy, Scanning Electron Microscopy (SEM), Electron Microprobe (EMP), and whole-rock geochemical assay methods. The greenschist-facies mineral assemblages of the metagabbro suggest that various levels of saussuritization and chloritization have occurred as a result of metamorphism. The presence of hydrothermal fluids related to this metamorphic event may have led to the potential concentration of PGEs/sulfides within the gabbro. Within higher-grade samples, rhodium-dominant hollingworthite PGMs were identified as inclusions within larger sulphide grains of chalcopyrite and violarite. Geochemical trends indicate the occurrence of fractional crystallization and display distinct variation across different sections of the layered metagabbro sill. Related magmatic processes may have led to the concentration of sulfides/PGEs within the metagabbro.