

Platinum-Group Minerals in the Black Thor Mafic-Ultramafic Intrusive Complex, McFaulds Lake Greenstone Belt, Ontario

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Several styles of Ni-Cu-PGE mineralization occur within the Black Thor Intrusive Complex and PGMs have been characterized in 20 samples from 7 zones containing sulfide mineralization: 2 basal contact zones (AT-12 extension, basal contact), 3 magmatic breccia zones (NW breccia, Unnamed, F2), and 2 stratiform chromite horizons (Black Label, Black Thor). Host rocks include dunite, peridotite, chromitite, and granodiorite (footwall). The PGMs in contact zones are froodite with lesser michenerite, sperrylite, and unidentified Pd-Bi telluride, Pd-Bi-Sb, Rh-Ru-Ir sulfarsenide, Pt-Ir arsenide, and Rh-Ir sulfarsenide. Most PGMs are enclosed within pyrrhotite-pentlandite-chalcopyrite-cubanite, but are also associated with amphibole-chlorite-serpentine and occur along sulfide-silicate boundaries. Euhedral shapes, large grain sizes (>20µm), and the strong association with sulfides suggest a magmatic origin. The PGMs in the brecciated zones are paolovite, sperrylite, michenerite, and Hollingworthite with lesser unidentified Pt-Rh-Os sulfarsenide, Rh-Pt-Pd-Os sulfarsenide, and Rh-Pt-Ir arsenide. Most of the PGM occur within sulfides, some along sulfide-silicate boundaries, and only minor amounts within silicate phases. The associations suggest that they are magmatic, but anhedral habits and occurrences in high strain zones suggest post-magmatic mobilization. The PGMs in Black Label are paolovite associated with chalcopyrite with lesser froodite, michenerite, sperrylite, hollingworthite, and telluropalladinite in both sulfides and silicates. The PGMs in Black Thor are stibiopalladinite, arsenopalladinite, isomertieite, palladoarsenide, and majakite, with lesser sperrylite and polkanovite, all of which are enclosed in silicate phases. Many Pd-bearing PGMs in Black Thor occur in carbonate veins, suggesting that Pd was mobile during carbonate alteration, but the low but uniform abundances of PGEs in both stratiform zones suggest that they were also originally magmatic.