Hybridized Ultramafic Rocks in the Black Label Hybrid Zone of the 2.7 Ga Black Thor Intrusive Complex, McFaulds Lake Greenstone Belt, Ontario, Canada

C.S. Spath III[1], C.M. Lesher[1], and M.G. Houlé[2,1]

1Mineral Exploration Research Centre, Department of Earth Sciences, Goodman School of Mines, Laurentian University, Sudbury, Ontario P3E 2C6
2Geological Survey of Canada, Earth Sciences Sector, Natural Resources Canada, Québec City, Québec G1K 9A9

The Black Thor Intrusive Complex (BTIC) is a sill-shaped, semi-conformable, layered intrusion that is composed primarily of dunite, lherzolite, Ol websterite, websterite, and chromitite overlain by lesser mela- to leucogabbro, and anorthosite. After emplacement but before complete crystallization, a Late Websterite Intrusion (LWI) reactivated the feeder conduit and transected the basal part of the BTIC, including the Black Label chromitite horizon. Detailed core logging shows that the injection of LWI magma leads to the incorporation of inclusions and production of a 1-10m thick marginal zone of heterogeneous, interfingering brecciation defined as the Black Label Hybrid Zone (BLHZ). The BLHZ contains dunite/lherzolite/chromitite enclaves of variable sizes (1-50 cm) with subangular to amoeboidal geometries, sharp to diffuse contacts, and significant amounts of disseminated to patchy net-textured Fe-Ni-Cu-(PGE) sulfide mineralization. The core of LWI is typically an inclusion-free, medium-grained, Opx-rich adcumulate with accessory Chr or Ol, however, inclusion-rich intervals of the LWI contain more Ol and Chr produced by disaggregation and partial assimilation of ultramafic units. There are two types of interclastic hybrid groundmass, one containing xenocrystic Ol and one containing xenocrystic Chr+Ol of varying proportions. Geochemical signatures of the hybrid rocks reflect the partial assimilation and brecciation of dunite/lherzolite/ chromitite sequences and addition of Ol+Chr in hybrid rocks. Similar Th-U-Nb-Ta-LREE patterns suggest that the LWI is related to the remainder of the BTIC, presumably representing a more fractionated magma from deeper in the system. Further characterization of the hybrid rocks and inclusion variability is in progress and will help to establish the range and variability of processes involved within the BLHZ, and their influence on the nature and distribution of brecciated chromitite and associated Fe-Ni-Cu-(PGE) sulfide mineralization.