

**Physical Volcanology and Metallogensis of Komatiite-
Associated Ni-Cu-(PGE) Mineralization in the C Zone,
Bannockburn Township, Ontario**

By

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Abstract

The C Zone, located in Bannockburn Township ~30 km west of Matachewan, Ontario, is one of several komatiite-associated Ni-Cu-(PGE) deposits within the 2710-2703 Ma Tisdale assemblage of the Abitibi greenstone belt. The ores, host rocks, and country rocks are superbly exposed over a strike length of 150m in glacially-polished and hydraulically-stripped outcrops, and have been intersected in 53 diamond drill holes. The mineralized zone is up to 2.5m thick and comprises (from base to top) massive to semi-massive, net-textured, and disseminated sulfide facies characterized by a pyrrhotite-pentlandite-chalcopyrite-magnetite assemblage. The massive sulfide zone contains an anastomosing network of dextral and sinistral shears that are oriented broadly subparallel to the contacts with the footwall dacite and hanging-wall andesite. Some contacts with underlying dacites are sheared, but others are scalloped and bordered by skeletal-euhedral Fe-rich chromites and appear to be primary magmatic features. The footwall rocks grade from chloritized dacites within 20-30 cm of the contact into massive and brecciated plagioclase-phyric dacites further away from the contact. The host unit is up to 8m thick and comprises massive olivine porphyritic and ortho- to meso-cumulate komatiite in the eastern and central parts, and a texturally-heterolithic komatiite breccia in the western part of the stripped exposure. The komatiite breccia is composed of subrounded to subangular clasts 1-30 cm in length that exhibit mainly fine (<2 mm) olivine porphyritic or fine (<1 cm) random olivine spinifex textures, within a fine-grained, locally spinifex-textured ultramafic matrix. The absence of evidence for a pyroclastic origin and the presence of a spinifex-textured matrix suggest that the breccia is autoclastic. The hanging-wall rocks are barren differentiated (spinifex/cumulate) komatiite flows (total thickness of the lithostratigraphic package ~22m) and variolitic pillowed andesites (total

thickness >80m). The komatiitic sequence at the C Zone is much thinner than most other sequences within the Tisdale assemblage and its orientation is oblique to the NW-trend of the regional stratigraphy, but all contacts appear conformable and all younging indicators are uniformly to the SSE, suggesting that the local sequence is intact. The C Zone is similar in many respects to other Type I (Kambalda-Type) komatiite-associated Ni-Cu-(PGE) deposits in the AGB, but differs by not being confined within a well developed footwall embayment and in being partly hosted by komatiitic breccias. The C Zone Ni-Cu-(PGE) mineralization is interpreted to be hosted in the eastern part of the stripped area by a thin lava pathway and in the western part by komatiite breccias formed via lateral breakout and roof collapse.

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