Geology, Structure and Mineralization of the mafic and ultramafic rocks: Ore Fault Property, Bird River Greenstone Belt, SE Manitoba

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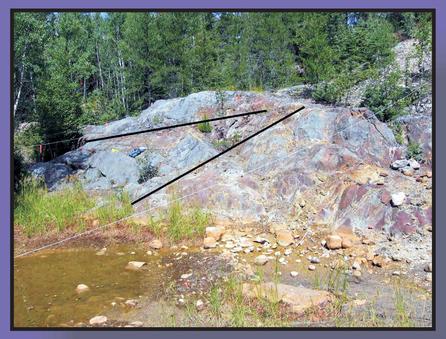
The black lines mark the location of well defined faults in the southern outcrop (looking east).



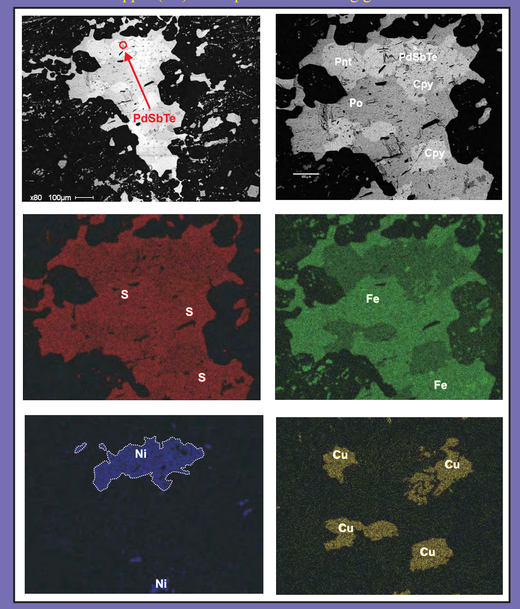
Abstract

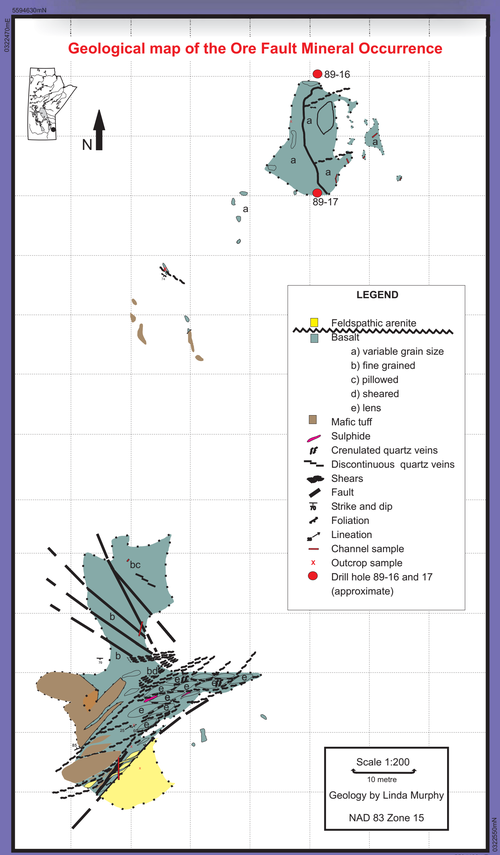
Geological investigations of the Ore Fault mineral occurrence located in the Archean Bird River greenstone belt, southeastern Manitoba show that several northwest-trending faults intersect mineralized komatiitic to tholeiitic basalts and are truncated by an 8 m-wide northeast-trending shear zone. The Ore Fault occurrence is underlain by hydrothermally altered basalt, mafic tuff and feldspathic arenite that experienced multiple deformation episodes and are metamorphosed to lower amphibolite facies. Each of the basaltic rocks has undergone several evolutionary processes that have induced separate sulphide and oxide assemblages that include: Cu-Ni-Po with PGM and Cr, Cu-Zn along with trace amounts of Au, Ag, Pb, Mo, Co, and Ni, and Mag-Py-Ti. The mineral assemblages are in association with:

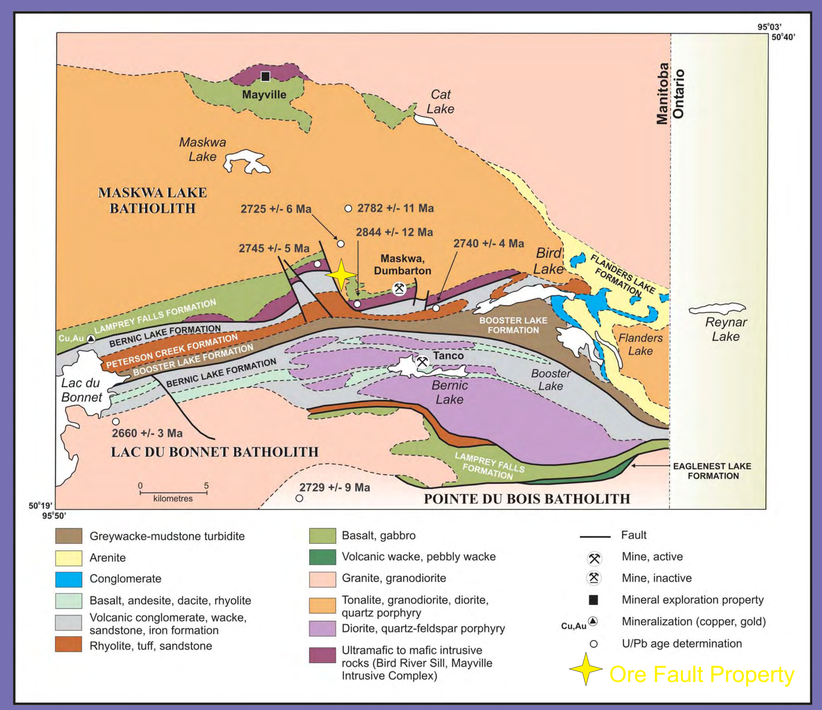
1) fractionation of mafic magma;
2) mixing of magmatic fluids;
3) ascent of hydrothermal fluids; and
4) tectonism.

The deposition of the mafic and ultramafic rocks of the Ore Fault occurred as part of regional processes within the Bird River greenstone belt and are related to island arc subduction (volcanism), plutonic intrusions (Bird River sill and granite batholiths) and subsequent fluid conduits (faulting and shears). Mineralization occurred before and during tectonic deformation that occurred during and after peak metamorphism.

SEM generated photo map of a sulphide grain from the drill core illustrating the interaction of the iron (Fe), sulphur (S), nickel (Ni) and copper (Cu) in the palladium-bearing grain.



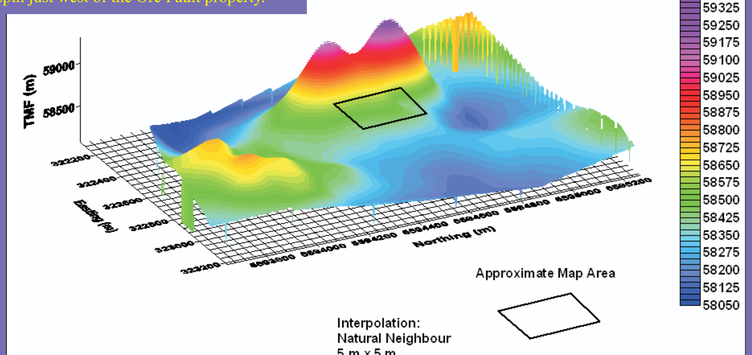


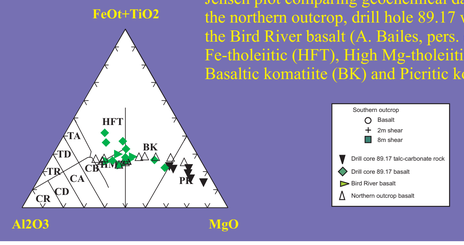


Regional geology of the Bird River greenstone belt, showing the main formations as defined by Cerny et al. (1981), Gilbert (2005) and including the location of the Ore Fault property.

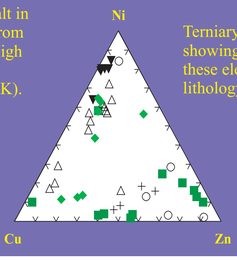
Ore Fault Property: Total Magnetic Field (3-D perspective)

Computer generated from data supplied by North American Palladium, May, 2005. The anomaly appears as a disconnected vertical structure at depth just west of the Ore Fault property.





Jensen plot comparing geochemical data for basalt in the northern outcrop, drill hole 89.17 with data from the Bird River basalt (A. Bailes, pers. comm.). High Fe-tholeiitic (HFT), High Mg-tholeiitic (HMT), Basaltic komatiite (BK) and Picritic komatiite (PK).



Terniary diagram of Ni-Cu-Zn showing the relative distribution these elements within of each lithology of the Ore Fault.

References

Černý, P., Trueman, D.L., Ziehlke, D.V., Goad, B.E. and Paul, J., 1981: The Cat Lake-Winnipeg River and the Wekusko Lake pegmatite fields, Manitoba; Manitoba Department of Energy and Mines, Mineral Resources Division, Economic Geology Report 80-1, 215 p.

Gilbert, H.P., 2005: Geological investigations in the Bird River area, southeastern Manitoba (parts of NTS 52L5N and 6N); in Report of Activities 2005, Manitoba Industry, Economic Development and Mines, Manitoba Geological Survey, p. 125 139.

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