Type and nature of sulphides in the Whistle-Parkin Offset Dyke, Sudbury impact structure, Ontario, Canada

Alain J. Murphy and John G. Spray
Department of Geology, University of New Brunswick, Fredericton, NB E3B 5A3

The Whistle-Parkin Offset Dyke System is located in the northeast corner of the 1.85 Ga Sudbury impact structure. It strikes north-northeast and extends up to 15 km from the SIC (Sudbury Igneous Complex). The Whistle portion of the Offset Dyke is connected to the SIC via a 350 m wide embayment, in which the INCO Whistle mine is located, and narrows to a width of 10–30 m away from the SIC. The Whistle portion of the dyke extends for ~1.5 km, and is then offset by a ~2 km sinistral fault. The Parkin portion appears north west of the truncated Whistle portion and strikes north-north-eastwards. It maintains a thickness of 20–40 m, becoming thinner at the more distal end.

In the Whistle-Parkin segment rock types can be split into embayment and offset varieties. The lithologies of the Whistle embayment consist of norite, gabbronorite, and gabbro of the Sudbury Sublayer. The lithologies of the actual offset consist of Radial Breccia, Mafic Sulphide Bearing Breccia (MSBB), Inclusion Quartz Diorite (IQD), and inclusion free Quartz Diorite (QD).

The sulphides in the Whistle-Parkin Dyke vary depending on their location within the dyke. The Whistle embayment sulphides are predominantly pyrrhotite and pentlandite. The Whistle dyke sulphides become enriched in Cu with chalcopyrite, pyrite, pyrrhotite, and millerite. Traces of violarite, sphalerite, galena, marcasite, arsenopyrite, and bravoite have also been noted. Sulphides in the Parkin dyke are chalcopyrite, pyrrhotite, and minor pentlandite. The sulphides are found in most of the rock types in the dyke system. They range from blebby sulphides in the Quartz Diorite to massive inclusion-bearing sulphides in the Sudbury Sublayer lithologies.