

The Nickel Deposit at Bon Accord, Barberton, South Africa

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ABSTRACT

The Barberton greenstone belt in the Mpumalanga, RSA, covers an area of some 6 000 km to the southeast of the town of Nelspruit. The Bon Accord (BA) Ni-oxide deposit is located in the southwest of the area. The deposit was initially discovered in the 1920s, but technology of that time could not smelt the extremely Ni-rich material and the ore was abandoned. It was rediscovered during regional Ni exploration by Eland resources Limited (in the 1970s). It has been estimated that about 22.5 t of material was removed in the 1920s.

The host rock consists of ultramafic rocks of the 3.2 Ga Onverwacht Group of the Barberton greenstone belt. The Ni-oxide deposit forms an elliptical body about 0.5 m thick and 20 m wide along its longest axis. It is situated close to a contact between the ultramafic rocks of the Jamestown igneous suite and a siliceous mylonite zone. The BA deposit has a unique mineralogy of rare Ni-rich minerals, such as liebenbergite (olivine), trevorite (spinel), willemsite (talc), nimite (chlorite), and bonaccordite (borate). The levels of Cu and S are both low (<100 ppm), and that of Ni unusually high (>30%), which means that BA differs from other all known Ni deposits chemically.

The aim of this research has been to do a thorough optical microscopic and XRD investigation of unclassified samples of the BA body and surrounding rocks, identifying all minerals in the samples and comparing them with the results obtained from the previous reports. XRF analysis was also done to determine the full suite of major elements (something that was not available before) and some selected trace elements. Owing to the unusual chemistry of the BA material, special adjustments had to be made to the 'normal' sample preparation techniques routinely used for making fusion beads for major element XRF analysis, to prevent the sample from reacting with the Pt crucible.