A Metallogenic Study of the High-Grade Martite Ore at Rowley River, North Baffin

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Abstract

Baffinland Iron Mines' Rowley River Prospect is located 120 km ESE of their main Mary River camp. Regional geological mapping has identified high-grade iron ore within high-grade gneisses correlated to Mary River Group (MRG). The MRG forms the northern extension of the central Rae Committee Bay Belt. On north Baffin the MRG is characterized by lower metagreywacke overlain by a BIF-komatiite-quartzite cover sequence. Regionally, the BIF member hosts high-grade magnetite ores, with grades averaging 64 wt % Fe. At Rowley River, an erosional remnant of Mary River BIF, capping a unique topographic plateau, preserves a lenticulated 0-20 m sheet of coarsely granular martite. These martite lenses are characteristically armoured by magnetite. Individual lenses plunge 20 degrees east, suggesting an east-west extensional overprint. Field mapping has differentiated several high-grade metamorphic assemblages. Mixed mafic-felsic orthogneiss overlain by transposed garnetiferous paragniess structurally underlies the BIF unit. Typical banded iron formation, with variable garnet in silica bands, is best preserved on the south margin. However, BIF enveloping massive martite has been predominantly replaced by hematite and coarse porphyroblasts of cordierite-cummingtonite-sillimanite. Coarse textured annite-cordierite schist forms immediately footwall to massive martite. Coarse amphibolite units occurring in the hangingwall may stem from original silicate BIF or komatiite. Preliminary petrography and mineral chemistry has identified granulite to anatectic metamorphic conditions at Rowley River. This investigation will be focused on detailed petrography, bulk rock geochemistry and microprobe mineral analyses to determine the protoliths of the Rowley River units to try to correlate them to traditional MRG stratigraphy. Experimental lab work and high temperature modeling will try to establish the possible conditions under which the high-grade iron-ore formed.