

## **A Metallogenic Study of High-Grade Iron Ores on North Baffin Island in the “Granulite Facies” Domain South of the Central Borden Fault Zone**

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Baffinland Iron Mines' Rowley River prospect and Cockburn River prospects are located 120 km and 100 km east-southeast, respectively, of the main Mary River camp. Regional geological mapping has identified high-grade iron ore within high-grade gneisses correlated to the Mary River Group. The Mary River Group forms the northern extension of the central Rae Committee Bay belt. On north Baffin, the Mary River Group is characterized by lower metagraywacke overlain by a banded iron formation (BIF)-komatiite-quartzite cover sequence. Regionally, the BIF member hosts high-grade magnetite ores, with grades averaging 65 wt % Fe.

At Rowley River, an erosional remnant of Mary River BIF, capping a unique topographic plateau, preserves a lenticulated 0- to 20-m sheet of coarsely granular martite approximately 700 m long. These martite lenses are characteristically armored by magnetite. Individual lenses plunge 20° east, with boudinaged morphology, suggesting an east-west extensional overprint. Field mapping has differentiated several high-grade metamorphic assemblages. Mixed mafic-felsic orthogneiss overlain by transposed garnetiferous paragneiss 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-cumingtonite-sillimanite. Coarse-textured annite-cordierite schist forms immediate footwall to massive martite. Coarse amphibolite units occurring in the hanging wall may stem from original silicate BIF or komatiite. Preliminary petrography and mineral chemistry have identified granulite to anatexitic metamorphic conditions at Rowley River. A possible extension to the prospect has been found across the river; however, poor surface exposure will require the use of geophysics for delineation.

At Cockburn River, Mary River Group stratigraphy is preserved at surface in east and west zones. The east zone is a 25-m-thick panel of steel gray, sugary-textured specularite preserved in hornblende-biotite amphibolitic and tonalitic gneisses. Pods of massive granular martite armored by magnetite occur in fold noses. The largest of these pods is crosscut by pegmatite, with martite transitioning to magnetite toward pegmatite contacts. The west zone is a much larger domain of preserved Mary River Group. An early generation, south-closing syncline is defined by well-developed BIF and hornblende gneiss. High-grade pods of massive martite and magnetite are exposed along the base of the BIF, and are locally associated with komatiite and coarse-grained grunerite units.

This investigation is focused on detailed petrography, bulk-rock geochemistry, and microprobe mineral analyses to determine the protoliths of the host-rock units to try to correlate them to traditional Mary River Group stratigraphy. U-Pb dating is being used to establish the timing of ore formation and correlate it to regional metamorphic events. P-T modeling is being used to establish the P-T-t paths of the prospects. Creating a geologic fingerprint of these prospects will aid in the prospecting of new terrain for DSO on North Baffin in the future.