

The Sawyer Lake iron-ore deposit, western Labrador: Potential for future high-grade iron-ore deposits in the Labrador Trough

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The Sawyer Lake deposit, located about 65 km southwest of Schefferville, is a new type of high-grade iron deposit that differs markedly from other deposits in the northern Labrador Trough. The deposit was initially discovered in the 1930s and sporadic exploration since then has defined a significant iron-ore resource with up to 12 million tonnes of high-grade iron ore (>60% Fe). The main ore zone at the Sawyer Lake deposit is located in the lower Sokoman Formation, below a thick sequence of volcanic rocks of the Nimish Formation. The ore forms a stratiform orebody with a saddle-reef morphology and consists of hard, massive to weakly banded high-grade hematite, containing >90% fine-grained, microplaty hematite and minor microgranular quartz. The hard hematite ore is commonly brecciated, containing angular fragments of hematite in a quartz and hematite matrix. Brecciation is associated with the collapse of hematite into open spaces created by the leaching of silica. The high-grade hematite orebody is surrounded by oxidized iron formation consisting of alternating hematite and cherty bands, and displays abundant evidence for the remobilization of hematite and quartz, and secondary hematite enrichment.

In contrast to high-grade Direct Shipping Ore deposits in the Schefferville area, no evidence of supergene enrichment has been recorded at the Sawyer Lake deposit, and syndiagenetic iron enrichment is also considered unlikely. Macroscopic and petrographic studies and comparisons with other high-grade hematite deposits worldwide indicate that enrichment is related to hypogene processes, in which hydrothermal fluids leached silica and precipitated secondary hematite. Preliminary isotopic and geochemical analyses are also consistent with a hypogene enrichment model. Although the source of hydrothermal fluids is unknown, they may be related to dewatering of underlying shales during the Hudsonian orogeny or circulation of basinal brines during regional-scale thrusting.