

Diversifying Favorable Gold Settings in the Meliadine District Through Detailed Geological and Structural Reconstruction of the Wesmeg North Deposit, Nunavut

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The Meliadine gold district (Eastern Nunavut, Canada) represents a major Paleoproterozoic gold system hosted in the Archean Rankin Inlet greenstone belt. Proven and probable reserves (as of December 2025) are at 3.6 Moz Au. Beyond traditional BIF-hosted targets, volcanic-dominated successions are increasingly recognized as major gold hosts in the district. This is the case of the basalt-hosted Wesmeg North deposit, located in the structural footwall of the Lower Fault, which bounds the southern limit of the well-documented BIF-hosted Tiriganiaq deposit in the hanging wall. These deposits display distinct geology and vein geometries as well as contrasting alteration assemblages. As the district's only non-BIF-associated gold system found so far, Wesmeg North offers a key case study for understanding how gold mineralization can form within lithologies previously considered less favorable, thereby significantly broadening regional exploration potential.

The study methodology comprises detailed underground mapping (1:250 scale), structural analyses, drill core description along a cross-section that captures the vertical extent of Wesmeg North, and whole rock geochemistry. Preliminary findings reveal three main insights: 1) the north dipping volcanic package consists of tholeiitic to transitional basalts intruded by an ultramafic sill and a calc-alkaline gabbro sill, which had not been previously mapped; 2) three types of gold-bearing quartz-carbonate $\pm$ tourmaline veins occur within a sericite-iron-carbonate-altered corridor, developed along the margin of a fault zone. This corridor lies within a domain with transitional geochemical affinity relative to the surrounding barren tholeiitic basalt; 3) high-grade laminated veins dip moderately eastward and are at high angle with the north dipping foliation. Importantly, the veins are preferentially developed within the gabbro, suggesting that this competent unit acted as a rheological control.

Results of this ongoing study provide a robust geological framework for the Wesmeg North deposit. It highlights the role of deposit architecture on vein development and ore-forming processes.