Indicator minerals of the Meliadine orogenic gold deposit in till samples, Nunavut, Canada

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The Meliadine deposit is located in the Archean Rankin Inlet greenstone belt, about 25 kilometres north of Rankin Inlet, in the Kivalliq region of Nunavut (Canada). The bedrock is composed of greenschist facies metamorphosed sedimentary rocks, which include Banded Iron Formations (BIF) and greywackes, interbedded with mafic volcanic rocks. Auriferous mineralization is distributed along or spatially associated with the NW-SE 80 km long Pyke Fault. Sulfide rich mesothermal quartz veins are hosted in iron formations intercalated with mafic volcanic rocks, where gold is disseminated in the BIF and quartz-carbonate veins. Eighteen drill holes were sampled to document the potential indicator minerals from Meliadine deposit and from the Mustang showing. Eleven of the rock samples were also submitted for electric-pulse disaggregation (EPD) to optimise the extraction of potential indicator minerals. As Meliadine deposit stretches along the ice flow direction, the Mustang showing was selected to be the site of till sampling in order to reduce contamination from up-ice deposits. Seven till samples were collected parallel to the direction of iceflow along a 2 km transect. Two samples are located up-ice, the others up to 1 km down-ice in the dispersion train. The composition of magnetite, tourmaline, scheelite, arsenopyrite, and galena has been investigated through electron probe micro-analyser (EPMA) and laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). The chemical compositions of these potential indicator minerals from the deposits are compared with the composition of grains extracted from the seven till samples. Magnetite grains from till samples bears the BIF fingerprint, richer in Al, as well as the fingerprints of magmatic, hydrothermal and metamorphic sources with a higher content in V. However, magnetite grains derived from mineralized BIF cannot be discriminated from non-mineralized BIF through the chemical composition. Tourmaline, which is only present in mafic hosted quartz-carbonate veins is characterised by a single flat rare earth elements (REE) pattern with a positive europium anomaly and is only found in tourmaline in grains from till samples down ice of the showing. The REE pattern of the scheelite found at the showing, bell-shaped with a negative europium anomaly, is also present in some till samples in the dispersion train. The presence of higher concentration of gold grains in till samples that also contain scheelite and tourmaline grains with the chemical fingerprint of the gold deposits suggests the presence of another mineralised zone between 600 and 1000 m down ice of the showing.