Perrouty S, Bérubé CL, Lesher CM, Linnen RL, Olivo GR, Wares R, 2014, Structural, mineralogical, geochemical and petrophysical characterization of mafic dykes: a key to define the Canadian Malartic gold deposit footprint, Abstract, Soc Econ Geol, Keystone, USA

The Canadian Malartic gold mine is hosted mainly by clastic metasedimentary rocks of the Pontiac Group, located on the south side of the Cadillac – Larder Lake fault system. On the north side, gold is also locally hosted in Piché Group mafic and ultramafic rocks. With a resource of over 14 Moz of gold (past production and current resources), this epigenetic world-class deposit should have a significant alteration halo, which is currently being investigated by the CMIC-NSERC Exploration Footprint project. Integration of multiple datasets (geological, mineralogical, geochemical, petrophysical, and geophysical) aims to characterize the footprint of the Canadian Malartic deposit and to identify exploration criteria that could be used in other areas of the Superior Province. Numerous mafic dykes cross-cut the Pontiac metasediments and monzodioritic porphyry stocks in the Malartic region. The structural setting constrains their intrusion between the first (regional folding) and second (regional folding and penetrative foliation marked by amphibole, biotite and chlorite mineral alignments) deformation events in the area. The mafic rocks were then affected by mineralization-related alteration (potassic, pyritic, silica and carbonate alterations) before a post-mineralization regional metamorphic event took place (porphyroblasts of amphibole in the mafic dykes and garnet in their host metasediments). Mineralogy of the mafic dykes evolves progressively throughout the footprint of the deposit from a distal (>1.5 km) amphibole-rich composition to a proximal amphibole-biotite-quartz-chlorite-pyrite-carbonate assemblage. Petrophysics and lithogeochemistry of the dykes are consistent with mineralogical observations that indicate decrease in density and MgO content (silica and carbonate alterations) and an increase in K_2O (potassic alteration) with decreasing distance from the gold deposit. Pyritic alteration is associated with a decrease of magnetic susceptibility in the vicinity of the mineralized areas. These preliminary investigations suggest that the mafic dykes, being more reactive to the hydrothermal fluids than the Pontiac metasediments, allow for a better discrimination of the various alteration events that affected the Malartic property. They appear to be a fundamental element in determining the relationships between mafic magmatism, deformation, hydrothermal alteration, and gold mineralization.

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