Tungsten as a potential geochemical pathfinder of Malartic-type gold deposits in surficial till

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Indicator minerals and geochemical pathfinders other than gold are needed to trace elusive deposits in surficial sediments in gold districts. This is because gold may have multiple sources in these regions, making it difficult to fingerprint individual sources. Gold grains may also sometimes be too fine (<10 µm) to be picked by standard techniques. The Canadian Malartic deposit in Quebec hosts a large-tonnage, low-grade gold deposit in an established gold district, and it is this deposit that is being used as a case study to develop these new exploration techniques. The deposit contains tungsten-rich rutile, which appears to be associated with gold-bearing metasedimentary rocks. Gold grains in Malartic are too fine to be effective indicators, but tungsten in the area is considered a potentially reliable tracer of the Canadian Malartic deposit in the local till. As a first test, 18 surface till samples and 25 Pionjar drill samples were collected around Malartic. The silt and clay fractions were separated and analyzed for major and trace elements by ICP-MS following partial and total digestion, respectively, as well as for gold following Pb fire assay preconcentration. Rutile and gold grains were also picked from 0.25-0.50 mm and <0.25 mm size fractions. Results, thus far, show anomalous tungsten concentrations (4.5 to 11.2 ppm W) in the till matrix down-ice of Malartic relative to the surrounding areas (0.4 to 3.2 ppm W), as well as discrepancies with the spatial patterns of gold and rutile grain counts, which may indicate different source(s) for the sand-size gold/rutile grains. More samples are being processed to refine background/anomalous tungsten levels and to better define the overall dispersal patterns. Rutile grains are also being analyzed by electron probe methods, and techniques to work on smaller grain size fractions are being tested. CMIC-NSERC Exploration Footprints Network Contribution 124.