The Lac des Iles palladium deposits: Products of a structurally-controlled magmatic breccia system

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The Pd-rich magmatic sulfide deposits within the Archean Lac des Iles (LDI) Intrusive Complex are distinguished from most other platinum group metal (PGM) deposits by: 1) persistently high Pd:Pt ratios (>10:1) that increase with increasing Pd grade; 2) high Pd tenors of 100 to >1,000 ppm in the sulfide fraction, resulting in high Pd grades in concentrate; 3) strong spatial association with interpreted mantle-tapping feeder faults; 4) deposition within magmatic breccia bodies that display a wide range in size, geometry, rock types and texture; and, 5) association of peak Pd grades with hydrously altered noritic rocks.

The significant thickness and typical sub-vertical orientation of the LDI deposits makes them amenable to extraction using bulk underground mining methods. The company recently converted the Offset underground mine from long-hole stoping to sub-level shrinkage mining resulting in more reliable production, increased ore recoveries, and lower production costs.

Despite many unique characteristics, LDI's Pd deposits are believed to have crystallized from geochemically similar parent magmas to those that produced the world's greatest PGM accumulations in the Bushveld Complex, South Africa. Palladium mineralization is concentrated with disseminated, magmatic sulfides in, and adjacent to, a major north-striking regional fault. It exhibits significant thickening within interpreted dilatant zones created at the intersection of this interpreted primary feeder structure and cross-cutting, pre- to syn-magmatic faults. Mineralization is also partly focused along the contact between older, barren units in the complex and the noritic host rocks.

A majority of the historical and current mineral resources at LDI are contained within the Roby and Offset zone deposits. Both zones display a similar bimodal geology and Pd grade distribution encapsulated in the formation of a higher-grade, magnesium-enriched and intensely altered hangingwall subzone and a less altered, more leucocratic and lower grade footwall subzone. Typical Pd grades in the hangingwall subzone average 4-5 g/t Pd but locally exceed 10 g/t over several metres. The footwall subzone features multiple, several metre-thick intervals of higher average palladium grade in the 2-5 g/t range and a gradual decline in average Pd grade toward the footwall contact with the basement rocks.

Future exploration success at LDI and on the company's significant greenfields property portfolio should arise from sustained investment into the detection and delineation of Pd-rich magmatic sulfides in feeder structures and vertically-oriented, norite-hosted magmatic breccia bodies.