

## **Structural Control of Mineralization at Lac des Iles Mine**

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### **Abstract**

North American Palladium Ltd.'s Lac des Iles mine is located approximately 90 km north of Thunder Bay, Ontario and is the only mine in Canada that is a primary producer of palladium. The mafic Mine Block intrusion that hosts the ore is located in the Wabigoon subprovince north of the regional boundary with the Quetico subprovince, within the Superior province. The property yields evidence for high-temperature deformation in the solid state, indicating that the intrusion is pre- and/or syntectonic, rather than post-tectonic as commonly presumed. The purpose of this MSc thesis project is to discover and examine evidence for high-temperature deformation and assess any controls this deformation may have on the mineralization. Evidence for high-temperature deformation is documented in the North Varitextured rim, Baker zone, Sheriff zone, and Creek zone. From the analysis of structural measurements and field relationships in these areas, two populations of narrow ductile shear zones have been recognized in the North Varitextured rim (NVT), Baker zone, Sheriff zone, and Creek zone. One population has an average orientation of 319/85 (n=30) with a dextral sense of shear, the other population has an average orientation of 058/83 (n=44) with a sinistral shear sense. The NW-striking dextral shear zones are commonly parallel to intrusive features and are variably foliated. The NE-striking sinistral shear zones are discordant to intrusive features. The presence of quartz-carbonate veins within the NE-striking sinistral shear zones may indicate reactivation and/or a local tensile component to stress. The orientation of the intersection lineation between the two populations of ductile shear zones is 81/108. A mutually cross-cutting relationship has been found indicating conjugate formation under the same stress field.