

## **Structural Control on the Borden Gold Deposit – Chapleau, ON**

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The Borden Gold Property is a multi-million-ounce deposit, located 20 km east of Chapleau, 160 km southwest of Timmins, within the Wawa Subprovince of the Superior Province. Interestingly, it is hosted in upper amphibolite to granulite facies metamorphic rocks at the southern margin of the Kapuskasing Structural Zone. Competent lithons of granulite facies rock appear to be surrounded by more ductile amphibolite facies gneisses and schists, suggesting polymetamorphism with retrograde amphibolite facies metamorphism after granulite facies metamorphism. Competency contrasts between the granulite and retrograde amphibolite facies lithologies created heterogeneous strain, ideal for gold mineralization, during ductile deformation at amphibolite facies metamorphic temperatures. Gold is typically observed in competent rocks with weakly developed foliation and also in competent rocks that are bordered by strongly foliated units. Garnet-biotite geothermometry on unzoned almandine garnets yields temperatures ranging from 579°C to 690°C ±50°C for metamorphism of the garnet-biotite schist. Temperatures increase from the garnet core towards the rim, indicating that garnets equilibrated rapidly during prograde metamorphism from the upper amphibolite to granulite facies. Fieldwork and microstructural analysis have identified a variety of competent lithologies and minerals, which provide low-strain environments for gold mineralization. On the macroscopic scale, the relict granulite facies rock behaves more competently than the retrograde amphibolite facies rock. Competent minerals that provide a low-strain site for fluid transport and gold mineralization include relict orthopyroxene, garnet, pyrite and coarse sillimanite. The protolith of the garnet-biotite schist is inferred to be pelitic based on the presence of aluminous metamorphic minerals. Preliminary results indicate an important relationship between gold mineralization, metamorphism and deformation, and understanding this relationship will benefit exploration and development of the Borden Gold Deposit.