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**First results of the Guitard Brook gold occurrence study,  
Elmtree Inlier, northeastern New Brunswick**

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Late orogenic shear zone-hosted epigenetic gold mineralization at Guitard Brook occurs within Ordovician (~465 Ma) ophiolitic rocks of the Fournier Group in the Elmtree Inlier (EI). These rocks were obducted in an accretionary prism that formed during closure of the Iapetus II ocean basin (~435–440 Ma). Mineralization at Guitard Brook has been traced for 400 m along a NW-SE strike, over a maximum width of 200 m, and to a vertical depth of 300 m. The best intersection reported is 15.5 m grading 1.2 g/t Au; with, mineralization open at depth. Mineralization consists of auriferous arsenopyrite-pyrrhotite ± pyrite veins with minor galena and sphalerite occurring within a hydrothermally altered zone that is localized in and overprints a high strain zone within a sequence of allochthonous, altered mafic volcanic flows or gabbroic intrusions of the Black Point Gabbro.

The Guitard Brook samples show, in the Zr-Nb-Y diagram, a more calc-alkalic signature with transitional back-arc basin/plate-marginal to ocean basin setting like the Ordovician Bathurst Subzone rocks. Compared to those, the Guitard Brook rocks have a more N-MORB profile with low Zr/Y and low K and Nb values (Zr-Nb-Y diagram) and an affinity to ocean floor/mid ocean ridge basalts (Zr-Ti-Y and Zr-Ti-Sr diagrams). The REE demonstrate a similar flat pattern like the Ordovician rocks with Sr and Nb depletion, whereas the Silurian rocks show Nb, Nd, and Ta enrichment.

The silicification (early proximal and late distal) is followed by sericitization and saussuritization of the feldspars, which is generally overprinted by chloritization. The sulphide veins are surrounded by later carbonate alteration, which masks the primary gabbroic textures, resulting in fine-grained massive homogeneous, pale-coloured rocks and cross-cutting veins. Elevated granophile element contents, i.e. Sn, W, Mo, Pb etc., suggest a granitic affinity. The Antinouri Lake Granite ( $372 \pm 2$  Ma) crops out 9 km west of Guitard Brook and is the closest felsic intrusion to the study area. Although contoured gravity data suggests that the intrusion may occur at depth in the vicinity of Guitard Brook there is no direct evidence of felsic intrusion or contact metamorphism.

Lithochemical analysis of altered host rocks show that the majority of basalt samples fall within the subalkaline andesite/basalt field, whereas the majority of the gabbros fall within the subalkaline basalt field on the Zr/TiO<sub>2</sub> vs. Nb/Y diagram. On the Ti-Zr-Sr diagram most samples fall close to the Ti-Zr tie line with atypically low Sr contents, which is interpreted to be a function of feldspar destructive hydrothermal alteration related to As-Au mineralization, which is more likely related to or derived from felsic magmatic fluids rather than from the host mafic sequence. Firstly, the mafic rocks lose Na<sub>2</sub>O and gain K<sub>2</sub>O, whereas the later alterations show a loss in K<sub>2</sub>O and a gain FeO and MgO.

Bulk sulphide and sulphide separate samples from the Guitard Brook mineralization have  $\delta^{34}\text{S}$  values that range between 2.6 and 10.3‰ (median  $\delta^{34}\text{S} = 4.27$  and mean =  $4.59 \pm 1.5$ ‰). The narrow range in  $\delta^{34}\text{S}$  is similar to the nearby West Gabbro Zone gold deposit (located 5 km west of Guitard Brook), that has  $\delta^{34}\text{S}$  values ranging between 1.1–9.8‰ (mean  $4.75 \pm 2.8$ ‰). The similarity in  $\delta^{34}\text{S}$  from these two Au occurrences suggests the possibility of a single source for the sulphide-Au mineralization in the Elmtree Inlier.