Structural Controls of Gold Mineralization on Neepawa Island, Sioux Lookout greenstone belt, northwestern Ontario

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The Sioux Lookout greenstone belt, in the western Wabigoon subprovince, of the Archean Superior Province is dominated by alternating east-northeast trending panels of greenschist facies metavolcanics and metasedimentary units intruded by tonalite, diorite, and gabbro plutons. The study area is situated at the southern edge of the central volcanic belt on Neepawa Island, roughly 12km southeast of Sioux Lookout near the center of Minnitaki Lake. Neepawa Island hosts several historic gold occurrences and is a site of continuous exploration activity. A previously excavated exposure was mapped in detail on an outcrop scale (approximately 30mx20m) for this project. Locally, the exposure hosts intermediate pyroclastic to massive and pillowed mafic units, metamorphosed to the greenschist facies and displaying brittle-ductile deformation. Samples for petrographic and geochemical analysis were collected from the exposure to analyze composition, texture, metamorphism and hydrothermal alteration of the units, as well as microstructural controls on gold mineralization. Microstructures were produced during non-coaxial, progressive deformation. Gold mineralization is observed in association with microfractures and subgrains within deformed quartz veins striking perpendicular to the dominant foliation. Gold mineralization is also observed as inclusions, in microfractures, and along grain boundaries of pyrite. Understanding structural and microstructural controls on gold mineralization, will enhance further exploration in this area.