Geological Characterization of Ni-Cu Sulfide Bearing Mafic Dyke, Tantato Domain

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The Tantato Domain of the Rae Province is a granulite facies section of Archean crust in northern Saskatchewan. The domain is dominated by garnetiferous granitic orthogneiss, psammopelitic gneiss, garnet-bearing anatectic granite, and mafic granulite. All of these units, with the exception of the intrusive mafic granulite, are deformed by D_1 structures. The mylonitic S_1 foliation is gneissic to migmatitic. Mafic granulite dykes were emplaced following D1 and are locally observed to cross-cut these early fabric elements. All units were deformed by a D_2 combined stretching and intersection lineation that plunges shallowly to moderately to the west-southwest and east-northeast. F_3 folds are characterized by open to close interlimb angles and axial planes that dip moderately to steeply to the northeast or southwest. D_4 deformation created F_4 folds that are open to close with moderately to steeply dipping northeast or southwest axial planes. In the Tantato Domain, mafic and ultramafic dykes are injected into metasedimentary units and are host to magmatic nickel-copper sulphide deposits. The deposits span an approximately 150 km segment of crust adjacent to the Snowbird tectonic zone. The largest of the mineralized dykes in the upper deck is the Axis Lake showing. Numerous other showings such as the Currie, Tantato, and Father Lakes showings, as well as numerous uneconomic showings occur throughout the domain, including in the area of interest for this study. The same style of mineralization observed in the upper deck of the Tantato is seen in the Thye Lake Nickel King in the Northwest Territories and nickel-copper occurrences in the Dodge Domain. Outcrop scale mapping was undertaken to characterize in detail the lithologies, sub-units, and deformation events affecting the units. The layered nature of the dykes indicates a long cooling period allowing fractionation within the melt. Standard nickel-copper system forms are observed including disseminated, brecciated, matrix, type sulphides. Continuing study aims to determine timing and extent of mineralization, observe the presence or absence of textures indicating remobilization of sulphides and their constraints on relative timing of deformation, and provide a complete petrographic analysis of each unit found within the study area.