Gold mineralization at the Monument Bay project, Stull Lake greenstone belt, Manitoba

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The Monument Bay project consists of economically promising and previously uncharacterized Archean shear-hosted gold-tungsten deposits located approximately 570 km northeast of Winnipeg. The property is located within the Oxford Stull Domain of the Western Superior Province, in the east-west-trending Stull Lake greenstone belt exposed across northeastern Manitoba and northwestern Ontario. The project area comprises three separate deposits: the Twin Lakes, the Mid-East, and the AZ deposits. All three deposits are located along strike of major east-trending, steeply north-dipping shear zones intruded by quartz-feldspar porphyries, which provided an ideal competency contrast for mineralizing fluids. The host metavolcanics and metasediments are pervasively carbonate, sericite, and silica altered and host multiple styles of veining. Gold mineralization occurs in: 1) smoky quartz veins that are locally mineralized; 2) quartz-carbonate-tourmaline veins; and 3) quartz-carbonate-albite-scheelite veins, which represent the main mineralization type at the Twin Lakes deposit. Free gold is observed locally in association with pyrite and arsenopyrite mineralization, and the highest gold grades are associated with scheelite. However, the distribution of gold mineralization across the over 4 km strike length of the deposits and the contribution of refractory gold is not well understood. Using an extensive historical geochemical data set, as well as a suite of ~50 core samples, we will characterize associations between alteration, trace elements, and gold to better understand controls on mineralization at Monument Bay. This will be accomplished using petrography, X-ray diffraction (XRD), and electron microprobe analysis (EPMA). Synchrotron micro X-ray fluorescence (uXRF) mapping will provide *in situ* information about the distribution of trace elements and their association with gold with mineralogical context. This data will constrain the growth history of ore minerals and help determine the composition of mineralizing fluids. Speciation of trace elements important for understanding element mobility can be probed using X-ray absorption near-edge structure (XANES) spectroscopy. XANES will be used to characterize sub-microscopic gold in sulfide phases as either nano-inclusions or refractory gold in the crystal lattice. By applying this suite of conventional and high-resolution geochemical analyses, we will provide a foundation for further investigation of the Monument Bay deposit and potentially elucidate novel geochemical exploration vectors for future exploration in the region.