

Structural Analysis and Petrographic Observations of Orogenic Gold Mineralization at the 3Aces Prospect in the Hyland Valley, SE Yukon, Canada

Kathryn Chehowy¹, Ben Frieman¹, Adam Coulter², Richard Goldfarb¹

¹Center to Advance the Science of Exploration to Reclamation in Mining, Colorado School of Mines, Golden,, United States, ²Seabridge Gold, Toronto,, Canada

Orogenic gold occurrences are rare and poorly understood within the margin of ancestral North America and thus landward of all peri-cratonic terranes in the Canadian Cordillera. The 3Aces prospect in Hyland Valley in SE Yukon is hosted by Neoproterozoic-Cambrian Hyland Group metasediments of the Selwyn basin, which underwent Jurassic-Cretaceous regional fold-and-thrust belt formation during outboard accretion of the Intermontane terranes. Fieldwork was conducted within the 'Central Core' area, where well-exposed outcrops preserve a series of gold-bearing quartz veins. Four distinct mineralization styles were recognized: planar veins, irregular stockworks, massive to podiform quartz bodies, and shear veins. Statistical and kinematic analysis of structural orientations define major fault groups. The dominant fault population is steeply-dipping, NW-trending, and commonly displays dextral strike-slip kinematics, while a subordinate group forms a conjugate orientation with sinistral kinematics. These faults cross-cut mineralized bodies and are likely strands of the regionally extensive Upper Hyland fault system. Other faults include an earlier set of reverse faults and a later set of normal faults. These delineate an east-directed contractional event and late, post-collisional extension. Samples of podiform quartz bodies from the 'Ace of Spades' area preserve leafy, coarse-grained gold on the margins of phyllite clasts. In general, the planar quartz veins and stockworks are sulfide-poor. Regardless of mineralization style, pyrite and arsenopyrite are the dominant sulfides, with lesser pyrrhotite, galena, chalcopyrite, and sphalerite. Matrix quartz is commonly coarse-grained and polygonal, displaying deformation lamellae and subgrain rotation recrystallization textures. Taken together, these observations suggest high-grade gold precipitated during a series of fluid pulses, with locally significant variations in the vein style relating to first-order controls imparted by thrust faults and/or fold geometries. Ongoing work seeks to define vein paragenesis, with preliminary observations indicating that gold is most closely associated with podiform and planar vein styles.