Characterizing mineralization styles in the hanging wall and footwall of the Mitchell Thrust Fault, Mitchell deposit, KSM, British Columbia

NE Cookson, R Linnen

Faculty of Earth Science, University of Western Ontario, London, Ontario

Seabridge Gold's KSM Project in northern British Columbia is a grouping of Au-Cu-Mo-Ag deposits that are derived from multi-phase porphyritic intrusions associated with Jurassic arc volcanism. The shallow north-dipping Mitchell Thrust Fault (MTF) appears to offset the top portion of the Mitchell zone, one of the four main deposits on the property. Although the Mitchell deposit has been drilled and delineated over the past decade, drilling in 2015 revealed a previously undiscovered copper mineralization in the hanging wall of the MTF. This discovery provides the potential to delineate an additional ore zone, sparking new interest in the hanging wall of the MTF, which was previously designated as barren. Comparing the Cu and Au mineralization in the hanging wall and the footwall zones of the MTF provides insight into the mineralization styles within the Mitchell deposit. Petrography and sulfide geochemistry of drill core samples from both mineralized zones are combined to characterize the Cu and Au mineralization and related alteration facies. The hanging wall of the MTF contains only Cu mineralization that is associated with magnetite-rich potassic alteration and weak hematization of the host rocks. The potassic alteration is characterized by K-spar+biot+qtz+py+cpy+act. The footwall contains Cu-Au mineralization that is also associated with potassic alteration in the host rocks, however, the rocks contain abundant chlorite and have lower magnetite contents than in the hanging wall zone. The Au grades in the footwall correlate to quartz stockwork, silicification and breccia zones. The sulfide textures of the two zones are significantly varied. In the hanging wall, pyrite occurs as coliform (1 to 5 mm across) and subhedral grains. In the footwall, pyrite is disseminated as 0.1 to 1 mm subhedral grains that occur within quartz veins and silicified zones. Mineralization in the hanging wall, which was juxtaposed on top of the Mitchell footwall zone through local thrust faulting, reflects a different style and, potentially, age of Cu mineralization.