High-Grade Gold Controls and Spatial Chemical Zonation at The Snip North Prospect of The Iskut Project, Canada

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The Iskut project, in northwestern British Columbia, Canada, lies within the Intermountane Belt, formed by the convergence of the Pacific and North American plates. This subduction-related setting has led to intense magmatic activity, faulting, and folding. The area comprises a Triassic-Jurassic volcano-sedimentary sequence of siltstones, sandstones, and basalts, intruded by Cretaceous monzodiorites and younger intrusive bodies associated with hydrothermal processes. At the Snip North prospect, multiple vein systems cut across all lithologies, defining at least three stages of mineralization. The first stage consists of pyrite, quartz, chalcopyrite, and carbonate veins. The second and most economically significant stage hosts the highest concentrations of gold and copper, along with sphalerite, galena, quartz, and carbonates in veins with white mica halos. The final stage comprises late pyrite and quartz veins with minor chalcopyrite. At greater depths, veins with secondary biotite halos are linked to pervasive biotite alteration in the host rock, and quartz-monzodiorite intrusions at depths exceeding 1 km are associated with high molybdenum concentrations. Geochemical analysis by u-XRF reveals that copper is not solely associated with sulfides but also appears disseminated in the host rock, requiring further study to determine whether it represents an additional mineralization stage. Additionally, high concentrations of magnetite, with localized hematite zones, indicate variations in oxidation conditions during hydrothermal events. The overprinting of secondary biotite alteration by white mica alteration suggests a shift in hydrothermal conditions, influencing the development of higher-grade mineralized veins. These findings highlight the complexity of the deposit and the need for further research, including Re-Os and Ar-Ar dating, to refine the mineralization timeline. A better understanding of non-sulfide copper mineralization will enhance exploration strategies and resource evaluation at Snip North.