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Spectral and Geochemical Evaluation of Mineralized Structures in Sedimentary Hosted Au Deposits, Marigold Mine, Battle Mountain District, Nevada

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The Marigold Mine is located at the northern end of Nevada's Battle Mountain–Eureka trend, also known as the Battle Mountain mining district. The mine consists of a cluster of sedimentary rock–hosted disseminated gold deposits that align along a N–S structural corridor in the north-central sector of the district. Oxide ore, dominantly hosted in the Ordovician Valmy Quartzite, is the primary source of gold; however, lesser tonnages with higher grades are present in the Pennsylvanian–Permian Antler Peak Limestone of the Antler Overlap Sequence. As of December 2024, Marigold has produced more than 5 Moz of gold since beginning operations in 1989. Despite being hosted in an unconventional host rock, the Marigold deposits exhibit similar structural controls and a geochemical fingerprint (As, Sb, Hg, Tl) characteristic of Carlin-type gold deposits. Prominent alteration is rarely visible and is highly variable; however, mineralized structures exposed in the oxide zone exhibit mixtures of very fine-grained carbonates and white micas tightly confined to the damage zones of steeply dipping faults. Airborne and ground-based results corroborate a longward shifted 2200 nm position in white micas at Marigold (2213 nm and 2211 nm), representing an atypical spectral signature in the context of hydrothermal alteration within the district. However, at the pit scale, hyperspectral results indicate a shortward shift in the 2200 nm position of white micas with proximity to mineralized structures and elevated concentrations of pathfinder elements. This contribution summarizes spectral and geochemical results from five transects crossing mineralized structures at Marigold.