

Using Multi-element Geochemistry Data to Infer Structural Architecture and Stratigraphic Controls on Au Mineralisation at the Osgood Mountain Project, Nevada

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The Osgood Mountain Project is situated within the Getchell Trend of north-central Nevada, a premier corridor for Carlin-type gold mineralization and host to the world-class Turquoise Ridge and Twin Creeks deposits. Unlike the NNW to NW striking Carlin and Battle Mountain-Eureka trends, the Getchell Trend follows a NNE-alignment and is spatially associated with a Cretaceous intrusive. Despite high gold endowment, defining favorable stratigraphic horizons is challenging due to intense hydrothermal alteration and complex polyphase deformation of the Paleozoic stratigraphy, which frequently obscures primary lithologies.

Mineralization in the Getchell District is concentrated at two critical interfaces: i) the contact between Cambrian Preble Formation (ductile phyllites/shales) and Ordovician Comus Formation (brittle carbonates/basalts), and ii) the interface where the Comus Formation is in thrust contact with Ordovician Valmy Formation (siliceous). These contacts represent major rheological and chemical contrasts that focus fluid flow and gold precipitation.

We utilized 4-acid digest ICP-MS multi-element geochemical data from drill core to develop a robust litho-geochemical classification framework. Immobile trace-elements were used to define key, structurally controlled stratigraphic units that generate trap sites for mineralisation at the Preble-Comus and Valmy-Comus interfaces. These chemo-stratigraphic markers allow for the mapping of facies changes favorable for gold mineralisation. Often these units do not display clear textural or mineralogical differences and remain undifferentiated during core logging. Our method to define such interfaces demonstrates how leveraging geochemical data sets to infer stratigraphy provides insights into the structural architecture controlling ore formation processes in the Getchell Trend.

Modelling of such features, which are strong controls on mineralisation, can shorten the time to discovery and add value through more detailed geometallurgical models for both ore and waste material. This effective tool for identifying favorable host rocks has been applied to other carbonate hosted ore deposits, including Carbonate Replacement Deposits.