

Defining District-Scale Alteration Halos at the Goldstrike Mining Complex, Northern Carlin Trend, Nevada

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Carlin-Type Gold Deposits (CTGDs) represent one of the most significant gold deposit types globally, with northeastern Nevada hosting some of the best-known examples. The Nevada Gold Mines Goldstrike complex, spanning from the Betze-Post deposit in the south to the Ren deposit in the north, hosts the largest concentration of CTGDs along the Northern Carlin Trend. Despite decades of study, most genetic models for CTGDs have been developed at the scale of individual deposits, which may not fully capture the broader geochemical variability and complex geological evolution of the Northern Carlin Trend. As a result, the lateral and vertical expression of these ore-forming systems at the district scale remains incompletely characterized. This study evaluates how assemblages of pathfinder elements—including As, Sb, Tl, Hg, S, W, Te, Zn, Bi, Se, and K— and C and O stable isotope signatures vary with increasing distance from high-grade ore zones into more distal, weakly mineralized to non-mineralized areas. In addition, the study investigates how geochemical signatures and alteration patterns vary from proximal to distal, relative to igneous intrusions and major structures. The results will improve our understanding of structural and lithologic controls on gold endowment at the district scale and refine geochemical vectoring tools for CTGD across the Northern Carlin Trend, with potential application to analogous sediment-hosted gold systems globally.