Paper No. 23-5 Presentation Time: 8:30 AM-5:30 PM

VOLCANO-TECTONIC SETTING OF THE MIDAS EPITHERMAL VEIN DEPOSIT, ELKO COUNTY, NEVADA

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The Ken Snyder mine hosts the largest known high-grade Au-Ag vein deposit associated with the northern Nevada rift (NNR). The deposit consists of a complex of steeply dipping quartz-adularia-calcite-precious metal bonanza veins hosted by volcanic rocks. It belongs to a suite of middle Miocene low-sulfidation, precious metal-rich epithermal systems that formed in syn-volcanic faults during continental extension. The Midas hydrothermal system is hosted by a bimodal assemblage of felsic and mafic volcanic rocks and overlain by unaltered ash-flow tuffs. At 15.6 Ma, volcanism in the Midas area shifted from bimodal magmatism and basin formation to felsic magmatism, folding, and faulting. A wet climate likely coincided with this change, and contributed to a robust paleohydrologic regime. Syn-volcanic folding and faulting of the volcanic edifice created pathways for hydrothermal fluids.

High-grade veins formed in faults throughout the region at 15.4 Ma. Detailed geochronology indicates that the hydrothermal system was active for a maximum of 0.6 my. Nearly synchronous deposition of Se-, Au-, and Ag-rich veins throughout the region suggests that the metals were derived from a single hydrothermal system. The thickest portions of these veins occur in dilatant zones created by left-lateral strike-slip motion along preexisting faults. At approximately the same time as mineralization, rhyolite dikes intruded the volcanic pile. Their source magma chamber likely provided the heat necessary to drive the hydrothermal system. Ages of overlying, unaltered tuffs indicate that the high-grade event persisted for up to 0.36 m.y. Coeval mineralization, faulting, and magmatism suggest that seismic events triggered strike-slip movement along preexisting zones of weakness along the margins of the rift causing upward migration of deep fluids. The newly recognized spatial and temporal relationship between rhyolitic activity and epithermal veins is permissive of magmatic contributions to the hydrothermal system, possibly during tectonic events. Contributions from deeper fluid reservoirs of highly exchanged waters following such events are equally plausible.

Cordilleran Section - 99th Annual (April 1–3, 2003)
General Information for this Meeting Session No. 23--Booth# 31
Cordilleran Ore Deposits: New Perspectives (Posters)
Hotel NH Krystal: La Capilla
8:30 AM-5:30 PM, Wednesday, April 2, 2003