Miocene Low-Sulfidation Epithermal Deposits of the Colorado Extensional Corridor, USA

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Abstract:
The Colorado River Extensional Corridor is a 70- to 100-km-wide zone of crustal extension that extends ~200 km from southern Nevada into Arizona. Extension broadly coincided with the shift of the western margin of North America from a convergent to a transform plate boundary. Volcanism commenced at ~22 Ma at Oatman and subsequently swept north, reaching the Lake Mead area at ~12 Ma.

Castle Mountain is the largest low-sulfidation epithermal deposit within the Colorado River Extensional Corridor. The lower section of the host stratigraphy of this low-grade, large-tonnage deposit is composed of trachybasalt and trachyandesite flows and related autobreccia. The bulk of the resource is hosted in volcanic rocks that formed during a period of intense felsic volcanism, which resulted in the deposition of thick aprons of massive to poorly sorted tuff breccia surrounding rhyolite lava flows and domes. Vertical breccia bodies, interpreted to represent phreatic eruption deposits, are spatially associated with these rhyolite centers. In contrast, other deposits in the Colorado River Extensional Corridor are characterized by high-grade veins. The Searchlight district is a relatively small but historically significant producer. Ongoing exploration in the historic Katherine district has resulted in high-grade intercepts at the historic Tyro mine and further south at the former Arabian mine. Present-day mining in the Oatman district focuses on the Moss vein that is hosted by both the Peach Spring Tuff and a monzonite intrusion that postdates deposition of the densely welded trachyte ignimbrite.

The nature of low-sulfidation epithermal deposits in the Colorado River Extensional Corridor is strongly influenced by both volcanological and rheological factors. High-grade precious metal ores primarily formed in competent rocks, where rapid flash vaporization of hydrothermal liquids led to the deposition of silica and ore minerals under far-from-equilibrium conditions.