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Ages and geochemistry of magmatic hydrothermal alunites in the Goldfield district, Esmeralda Co., Nevada

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Clermont mine, Goldfield district, Nevada

This open-file report consists of a poster with the above title that was displayed May 15-18 at the Geological Society of Nevada Symposium “Window to the World” in Sparks, Nevada. The abstract to the poster was published in the Symposium Program with Abstracts.

The Goldfield district, Esmeralda County, Nevada, produced 4.2 Moz Au, 1.5 Moz Ag, and 3,800 tons Cu during the early part of the twentieth century. Production was derived from a small proportion of numerous silicified, sub-linear fissures, or ledges, within a 100+ km^2 area of altered Miocene volcanic and pre-Tertiary rocks. Ledges that contain most ore consist of microcrystalline quartz that replaced andesites and rhyolites, and internal breccias with multiple generations of clasts encrusted and replaced by gold, pyrite, and a large number of Cu-As-Sb-Au-Ag-Bi-Sn-Te-Se minerals (e.g., enargite-luzonite, famatinite, goldfieldite, bismuthinite, and calaverite), minor sphalerite, galena, and chalcopyrite, alunite, kaolinite, dickite, and pyrophyllite. Ledges are flanked by broad selvages of altered andesite consisting of proximal to distal quartz±alunite±kaolinite+pyrite, quartz+kaolinite+K-mica+pyrite, montmorillonite+pyrite, and, calcite+chlorite±, respectively.

The purpose of this investigation was to determine if $^{40}Ar/^{39}Ar$ ages, chemical compositions, and stable isotope compositions of magmatic hydrothermal alunites throughout the Goldfield district are useful in distinguishing mineralized ledges. Although alunites differ in age and composition, no single characteristic uniquely separates alunites in mineralized ledges in the main district from those associated with no known mineralization. However, mineralized ledge alunites are ~20.3 to 19.8 Ma, and have relatively homogeneous K/Na/Ca compositions, whereas alunites from smaller deposits and unmineralized ledges may be older or younger, and have more variable K/Na/Ca compositions. In addition, disequilibrium sulfur isotope (alunite-pyrite) temperatures at Preble Mountain contrast with sulfur isotope temperatures in main district mineralized ledges that are broadly similar to fluid inclusion homogenization temperatures.

For questions about this report contact Peter Vikre (pvikre@usgs.gov).
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