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Item 19

ORIGIN OF PATHFINDER TRACE-ELEMENT PATTERNS ASSOCIATED WITH GOLD-SILVER MINERALIZATION IN LATE OLIGOCENE VOLCANIC ROCKS, ROUND MOUNTAIN, NYE COUNTY, NEVADA

BERGER,* Byron R., TINGLEY,+ Joseph V., FILIPEK,* Lorraine, and NEIGHBOR,* Joan
*U.S. Geological Survey, Federal Center, MS 973, Denver, CO 80225
+Nevada Bureau of Mines and Geology, Reno, NV 89557

Gold was discovered at Round Mountain, Nye County, Nevada, in 1906, and lode and/or placer deposits have been mined intermittently to the present. The lode deposits occur as stockwork veins and disseminations in the intracaldera part of a late Oligocene rhyolite ash-flow tuff (26.1±0.8 m.y. old). A K/Ar age on adularia indicates that mineralization took place about 25.2±0.8 m.y. ago.

The deposit is interpreted to be the result of convective hydrothermal fluids above an intrusive rhyolitic(?) body. The fluids probably vented as hot springs. The fluids ascended along swarms of high-angle joints to form a disseminated, blanket-like deposit in the lower, nonwelded portion of the tuff, vein deposits in the welded, central portion of the tuff, and silification in the upper nonwelded portion of the tuff and overlying water-laid tuffs and epiclastic volcanic rocks. Intermittent boiling brecciated the welded tuff in pipe-like zones and along flat dilated joints that consequently dip into the pipe-like breccias.

Alteration zoning from the top to the base of the ash-flow sheet is silification, quartz-mixed layer phyllosilicate-pyrite, and quartz-muscovite-pyrite. Alteration due to acid-leaching is superimposed on the above alteration zones in the areas of pipe-like brecciation, resulting in alunite veins, massive seams of kaolinite, and argillic alteration of feldspars in the rock matrix. K/Ar ages on the alunite average 10 m.y. old, suggesting that the acid-leaching may be supergene; and may have resulted from the oxidation of abundant pyrite in the breccias.

Gold and silver are associated with arsenic, antimony, thallium, mercury, and fluorine in the primary system. The altered area as a whole is anomalous in molybdenum, tungsten, tellurium, and tin. The concentration of gold shows a positive correlation with the concentration of silver, arsenic, and iron in the quartz-adularia veins and pipe-like breccias. Thallium, antimony, and fluorine are enriched in the breccias but do not correlate well with gold. Manganese was mobile during the boiling, and is highly enriched around the breccias where it is associated with anomalous silver, thallium, zinc, beryllium, and molybdenum. The acid-leaching depleted or enriched areas in certain elements, changing the geochemical associations. Gold still correlates with silver, but the gold/silver ratio increases from about 1.2 - 2.3 to about 1.9 - 9.0. Arsenic and antimony are pervasive and present in higher average concentrations than before the leaching. Arsenic shows no linear relationship with gold. Iron, manganese, and calcium are depleted.

Data from composited, rotary drill-hole samples reflect the broad alteration patterns and sequences in contrast to the vein samples, which reflect details of the ore-forming processes along the veins. Associations discerned from vein samples may not be readily applied to the interpretation of associations found in composited drill samples.