Time-space relationships between sediment-hosted gold mineralization and intrusion-related polymetallic mineralization at Kinsley Mountain, Nevada*

Corresponding author: Tyler J. Hill, University of Nevada - Reno, tjhill2@live.com

Co-authors:
John L Muntean, Nevada Bureau of Mines and Geology, University of Nevada - Reno, munteanj@unr.edu
Randy Hannink, Pilot Gold, RHannink@pilotgold.com
Pete Shabestari, Pilot Gold, PShabestari@pilotgold.com

Sediment-hosted gold (SHG) deposits, intrusion-related tungsten skarn and polymetallic vein deposits have been mined from Kinsley Mountain in northeastern Nevada. Pilot Gold Inc. is currently exploring the SHG mineralization, from which Alta Gold produced 138,000 oz of gold from 1995-1999. SHG mineralization is hosted by deformed Cambrian and Ordovician carbonate and siliciclastic rocks. Petrography on samples collected on transects from unmineralized rock to high-grade (>10 g/t Au) mineralization show a change from interbedded fine grained limestone and shale containing calcite, quartz, muscovite, and pyrite to hydrothermal quartz, ferroan dolomite, calcite, and abundant pyrite. Alteration and mineralization is especially strong in boudinaged limestone and sheared shale. Fine grained (<40 microns), hydrothermal pyritohedral pyrite preferentially occurs in the boudins, along shale laminae and cleavage planes, and in small shears. The centers of boudins commonly contain calcite and abundant pyrite, rimmed by quartz without pyrite. Ore-stage pyritohedral pyrite, ferroan dolomite, and calcite are not typically present in ores found in the well-studied Carlin-type deposits in the Carlin trend, Getchell area, Cortez, and Jerritt Canyon.

Within 3 km of the SHG mineralization, a quartz monzonite stock dated at 33.4 Ma (K-Ar date on biotite) intrudes the Cambrian-Ordovician section forming a contact aureole with marble and lesser hornfels. Tungsten was mined from garnet-pyroxene skarn that occurs near the stock contact. Retrograde skarn, composed of tremolite, actinolite, and pyrite, occurs both in the country rocks and intrusions. Polymetallic mineralization associated with quartz veins and gossanous replacements occurs within 1 km of the stock. The stock, ~1.5 km in diameter, is characterized by coarse-grained feldspar, biotite, quartz, with lesser amounts finer-grained hornblende and magnetite. Numerous porphyry dikes radiate outward from the intrusion. The dikes locally contain molybdenite and chalcopyrite that are cut by later pyrite and sericite. The dikes extend into the area of SHG mineralization, where core intercepts show them to have no significant gold (≤129 ppb). However, dikes commonly contain pyrite along with quartz-clay alteration. No major faults occur between the SHG mineralization and the stock, and they occur at approximately the same elevation. Volcanic rocks occur along the flanks of the range, onlapping the Paleozoic rocks in places. They have not been dated. These volcanic rocks are mostly flows ranging from andesite to dacite. They are magnetite-bearing and only weakly altered to chlorite and hematite. If the same age as the intrusions and SHG mineralization, the volcanic rocks will place important constraints on the depth of formation of mineralization at Kinsley.
This ongoing study aims to establish the time-space relationships between styles of mineralization, hydrothermal alteration, intrusions, and structures between the intrusion-related and SHG mineralization through mapping, core logging, petrography, micro-analytical work on pyrites, and geochronology, including Re-Os, U-Pb, $^{40}$Ar/$^{39}$Ar, and apatite fission track dating, of intrusions, volcanic rocks, country rocks, and alteration. These data will help assess whether intrusions exsolved fluids that contributed to the ore fluids, simply provided heat, or are completely unrelated to the SHG mineralization.