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REMNANT COLLOFORM PYRITE AT THE HAILE GOLD DEPOSIT, SOUTH CAROLINA: A TEXTURAL KEY TO GENESIS

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Abstract

Auriferous iron sulfide-bearing deposits of the Carolina slate belt have distinctive mineralogical and textural features—traits that provide a basis to construct models of ore deposition. Our identification of paragenetically early types of pyrite, especially remnant colloform, crustiform, and layered growth textures of pyrite containing electrum and pyrrhotite, establishes unequivocally that gold mineralization was coeval with deposition of host rocks and not solely related to Paleozoic tectonic events. Ore horizons at the Haile deposit, South Carolina, contain many remnants of early pyrite: (1) fine-grained cubic pyrite disseminated along bedding; (2) fine-grained spongy, rounded masses of pyrite that may envelop or drape over pyrite cubes; (3) fragments of botryoidally and crustiform layered pyrite, and (4) pyritic infilling of vesicles and pumice. Detailed mineral chemistry by petrography, microprobe, SEM, and EDS analysis of replaced pumice and colloform structures containing both arsenic compositional banding and electrum points to coeval deposition of gold and the volcanic host rocks and, thus, confirms a syngenetic origin for the gold deposits.

Early pyrite textures are present in other major deposits of the Carolina slate belt, such as Ridgeway and Barite Hill, and these provide strong evidence for models whereby the sulfide ores formed prior to tectonism. The role of Paleozoic metamorphism was to remobilize and concentrate gold and other minerals in structurally prepared sites. Recognizing the significance of paragenetically early pyrite and gold textures can play an important role in distinguishing sulfide ores that form in volcanic and sedimentary environments from those formed solely by metamorphic processes. Exploration strategies applied to the Carolina slate belt and correlative rocks in the eastern United States in the Avalonian basement will benefit from using syngenetic models for gold mineralization.