

Abstract

The Virgilina District, which occurs in the Carolina Slate Belt of Virginia and North Carolina, produced over 300,000 tons of copper and significant amounts of silver and gold between 1852 and 1916. A detailed examination of the ore and gangue mineralization from the district reveals that the ores display two stages of hypogene deposition and a significant phase of supergene alteration.

Hypogene mineralization, in decreasing order of abundance, consists of bornite, chalcocite/djurleite, anilite, digenite, hematite, chalcopyrite, pyrite, magnetite, ilmenite, rutile, hessite and gold (fineness 850). Supergene mineralization, in decreasing order of abundance, is malachite, covellite, cuprite, digenite, hematite, chalcopyrite, chalcocite/djurleite, azurite, spionkopite, and yarrowite. This represents the first reported occurrence of djurleite, anilite, hessite, spionkopite and yarrowite in the area.

Lamellar intergrowths of anilite and djurleite on their close-packed planes, symplectitic intergrowths of bornite and chalcocite/djurleite, and gradational transitions from anilite to digenite were determined to have formed by secondary hypogene reactions that removed iron and sulfur from the bornite and increased the copper:sulfur ratio, which shifted the Cu - S binary phases towards copper and produced the described textures and intergrowths.

The nature of the source of the ore fluids and the timing of the mineralization are not known precisely. Fragments of wall rock contained within the veins with the schistosity at an angle to the regional schistosity constrain the veins to be post-Taconic, and the metals are likely derived in part from the metamorphosed mafic volcanics in the area.