PYROMETASOMATIC DEPOSITS AT THE MINERAL HILL AND DAISY MINES

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INTRODUCTION

The lode mining claims at the Mineral Hill property were originally located about 1882 by the Emperor Copper Mining Company which developed the deposit but was forced to close by the decline in the copper market in 1884. Subsequently, the mine was worked intermittently by six other companies until it was acquired by the Banner Mining Company in 1951. The Banner Mining Company rehabilitated and sampled the mine workings and developed new ore reserves.

A second ore body was located by geophysical methods and explored by drilling about 3,000 feet east of the Mineral Hill inclined shaft. In 1953 the Daisy shaft was sunk to develop this ore body from which both oxide and sulphide copper ores have been extracted. A 400-ton concentrator was erected and put in operation in June, 1954.

GEOLOGICAL SETTING

The major part of the mineralization in the Mineral Hill mine has occurred along the eastward-trending Mineral Hill thrust fault which can be traced along its strike for more than one mile (fig. 44). This fault, which dips 35° to 50° south, predates the primary mineralization and cuts Paleozoic limestone and other rocks. Several intrusive bodies that are related to the mineralization were emplaced along the fault prior to sulphide mineralization. These masses are pyritic but carry very low metal values.

Several post-primary mineral shear zones are associated with the Mineral Hill thrust fault. Generally these shear zones strike north and are nearly vertical; a few, however, have steep easterly dips. Some of the shear zones show lateral displacement up to several hundreds of feet. Supergene mineralization has occurred to shallow depths along several of these shear zones.

Open breccia is encountered underground in the footwall of the ore bodies where post-ore thrusting has brecciated the competent hornfels (Lacy, 28).

ORE MINERALIZATION

Ore bodies along the Mineral Hill fault occur sporadically and are very irregular in shape. Ore occurs as pyrometasomatic-type deposits and as manto replacements and the pyrometasomatic deposits are the larger and richer. The ore occurs most frequently as chalcopyrite after garnetized limestone close to igneous contacts. It also occurs as replacements of thin layers of limestone between beds of hornfels in the Naco formation, and of limestone at the contact between Permian and Cretaceous (?) formations.

The primary ore minerals are principally chalcopyrite with minor bornite and varying amounts of pyrite, sphalerite, and galena. Magnetite is present close to the igneous intrusions. Small quantities of scheelite and molybdenite are dispersed through the ore bodies, generally in the footwall near intrusive contacts.

A distinct zonal arrangement of the hypogene ore minerals exists underground in the Mineral Hill mine and, even more pronouncedly, in the Daisy mine. In both mines an igneous intrusive in the footwall appears to be responsible for the mineralization. The paragenetic sequence and spatial position outward from the igneous mass consists of magnetite, pyrite, chalcopyrite, bornite, sphalerite, and galena. The zones interfinger as depicted in the generalized north-south section of the ore bodies shown in figure 41C. The magnetite zones have aided in the discovery of several hidden ore bodies by geophysical methods.

OXIDATION AND ENRICHMENT

In the Mineral and Daisy mines chrysocolla and minor quantities of tenorite, azurite, and malachite form the ore minerals in the oxide zone. Several fine specimens of azurite crystals the size of hens' eggs have been found. Native copper and silver, wulfenite, and smithsonite are also present in small quantities.

The enriched zone is relatively thin. The reactive limestone in the footwall apparently fixed the copper values in the oxide zone and prevented appreciable enrichment. Along the fault, however, chrysocolla occurs in veins that reach several feet in width and extend to a depth of several hundred feet below the present surface. The general grade of the supergene ores, which carry chalcocite and cuprite, is considerably higher than that of the deeper hypogene ores and suggests that they resulted from the leaching from an overlying gossan. The leached zone above the Mineral Hill and the Daisy mines, however, has been largely removed by erosion and reaches a thickness of a few tens of feet at only a few places.

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