PYROMETASOMATIC DEPOSITS AT PIMA MINE*

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HISTORY

The Pima ore body was discovered in 1950 by the Union Oil Company using magnetic geophysical methods supplemented by resistivity and electromagnetic techniques (Thurmond, Heinricks, and Spaulding, 1954). In 1954 Cyprus Mines Corporation acquired an option on the property and, after a testing program, purchased a three-quarter interest with Union Oil Company retaining a one-quarter interest. At a later date Cyprus sold a quarter interest to Utah Construction Company, retaining management responsibilities. Production began in December, 1956, and the mine is presently operating at a rate of about 4,000 tons per day for a six-day week. Original development was by means of shafts. Open-pit operations began in 1955.

GEOLOGICAL SETTING

The Pima pit (fig. 42B) is located at least 1,500 feet from the nearest bedrock outcrop. The pit is oval shaped, about 1,700 feet long by 1,400 feet wide and at the present time it is about 600 feet deep. Bedrock is exposed below 200 feet of alluvium. At the base of the alluvium, an irregular conglomerate zone lies on the bedrock. This zone is from 0 to 25 feet thick and is composed of igneous and sedimentary rocks cemented by siliceous and calcareous material.

Accurate determination of rock type and identification of recognized stratigraphic units is difficult because of metamorphism and alteration and because the less altered rocks are generally so fine grained that field identification is uncertain and petrographic studies are inconclusive. The rocks fall into three general categories: (1) Carbonate rocks, probably of Paleozoic age; (2) clastic rocks of questionable Cretaceous age; and (3) igneous rocks, probably of Tertiary age.

The carbonate rocks, generally referred to as "hornfels," are the host rock for the main, high-grade ore zone. These rocks have been distinguished as garnet (grossularite) hornfels, diopside hornfels, and tremolite hornfels. Relics of unmetamorphosed limestone and dolomite are present.

The clastic rocks occur above and below the carbonate sequence and are separated from it by faults. The clastic rocks are extremely fine grained and appear to be quartzitic. On the basis of drill core examination and petrographic work, the Pima geologists believe that some of the clastic rocks, generally called "arkosite," may be pyroclastic. The clastic rocks above the carbonate sequence contain widely disseminated sulphides.

Except for the possibly pyroclastic "arkosite," the igneous rocks exposed in the mine are all intrusive and consist of rhyolite, syenite, and quartz monzonite porphyry. The rhyolites and syenites are unmineralized and occur in and above the carbonate series. The bulk of the quartz monzonite porphyry has been intruded into the clastic rocks underlying the carbonate rocks and is weakly mineralized.

*Abstracted from Thurmond, and others (1958).

ORE MINERALIZATION

The Pima ore body is essentially a pyrometasomatic deposit. The main ore zone trends generally east-west and has an average dip of 45° to the south. The zone averages about 200 feet in thickness, and has been developed laterally for 1, 600 feet. Ore values extend into the Banner Mining Company's property to the west. To the east the bedrock is covered by alluvium. The lower limit of the ore zone has not been determined but ore was intersected by drill holes at a vertical depth of 800 feet below the surface. Parallel with and immediately underlying the main ore zone is a persistent breccia zone which is weakly mineralized and extends northeast of the developed ore body.

The high-grade ore is confined to the carbonate rock and contains primary sulphides consisting principally of pyrite and chalcopyrite with minor bornite. Secondary minerals consist of chalcocite, native copper, cuprite, tenorite, and chrysocolla. The chalcopyrite forms local irregular concentrations and tends to favor the garnet hornfels. Oxidation of the ores extends in an erratic fashion to 50 feet below the top of bedrock.

Low-grade disseminated pyrite and chalcopyrite mineralization occurs in the clastic rocks in the hanging wall of the main body and within the footwall breccia. It is this low-grade disseminated mineralization that makes the open-pit operation feasible.