PYROMETASOMATIC DEPOSITS AT SAN XAVIER MINE

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HISTORY

The lead-zinc-silver deposits of the San Xavier mining district were among the earliest of Arizona's lead-silver producers. They were known and worked by the Jesuits and early Spaniards prior to 1875. Production from the San Xavier mine has been sporadic -- under Col. C. P. Sykes from 1880 to 1893, the Empire Zinc Company from 1912 to 1918, and the Eagle-Picher Mining and Smelting Company from 1943 to 1955. Since 1955, it was first leased and then optioned to the MacFarland & Hullinger Company. Production during the past few years has averaged about 100 tons a day.

GEOLOGICAL SETTING

The principal geological feature in the vicinity of the San Xavier mine is a series of arcuate thrust faults dipping 20° to 55° to the south (fig. 44). These faults are cut by north- to east-trending vertical tear faults. In the western part of the mine area, a wedge of Paleozoic limestone, forming West San Xavier Hill, lies between coarse-grained Precambrian granite on the north and Cretaceous (?) arkose to the south. In the eastern section of the area, which includes Helmet Peak, the Cretaceous (?) sequence lies on both sides of the wedge of Paleozoic limestone which is folded into a tight southwest-plunging anticline. The limestone in the Helmet Peak area appears to have been, at least in part, thrust over the Cretaceous (?) sediments. Limestone klippen are found east and south of the peak. Tertiary granite and andesite plutons that intrude the Cretaceous (?) beds are located immediately south of the mine area.

Within the mine, low-angle thrust faults that dip 15° to 20° south are parallel to the arcuate thrust faults that dip 20° to 55° south and offset them to the north.

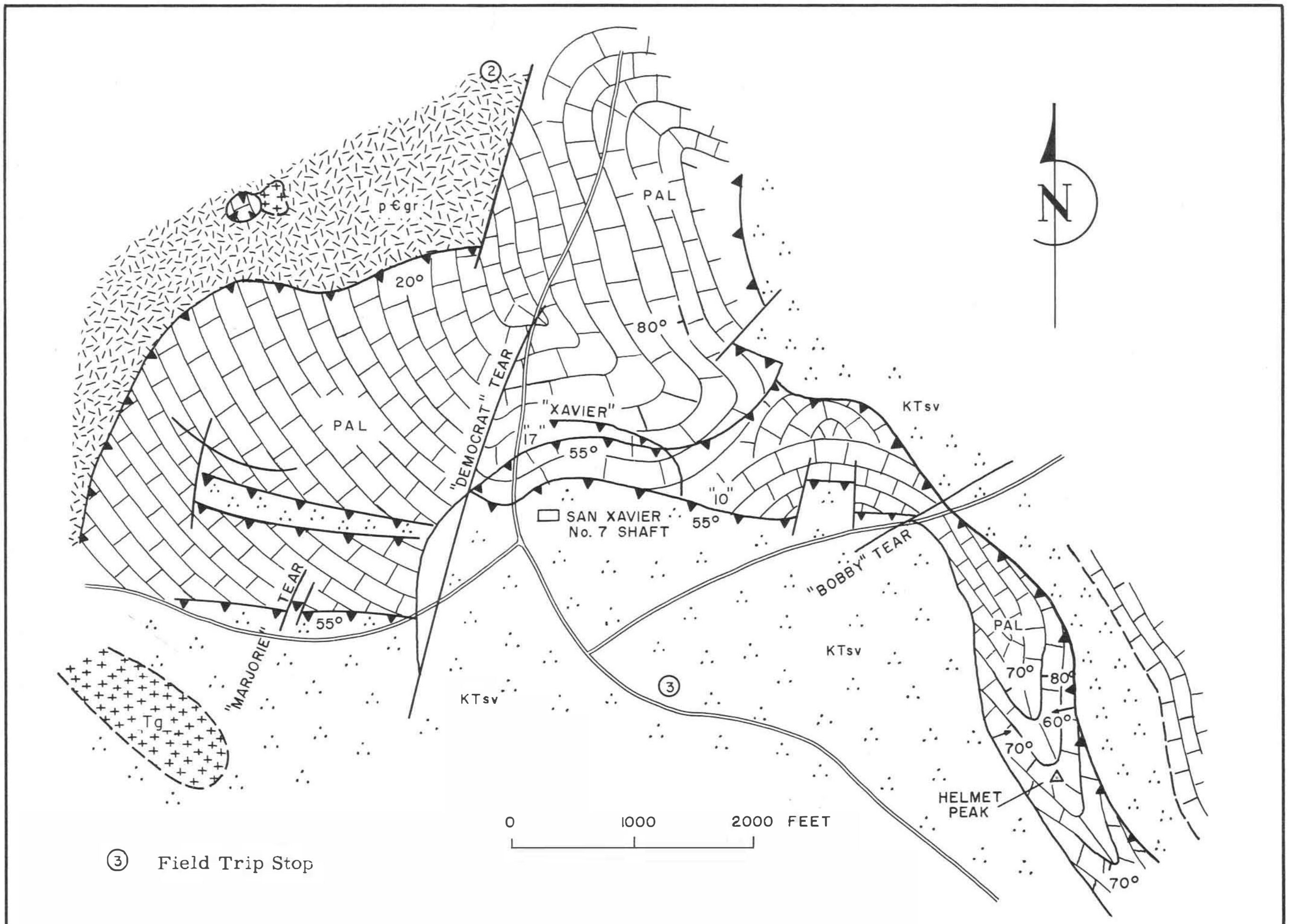
ORE MINERALIZATION

Ore in the San Xavier mine is composed principally of lead and zinc with substantial values in copper and silver. The ore is characteristic of pyrometasomatic deposits although it cannot be related directly to contacts with any known intrusive body.

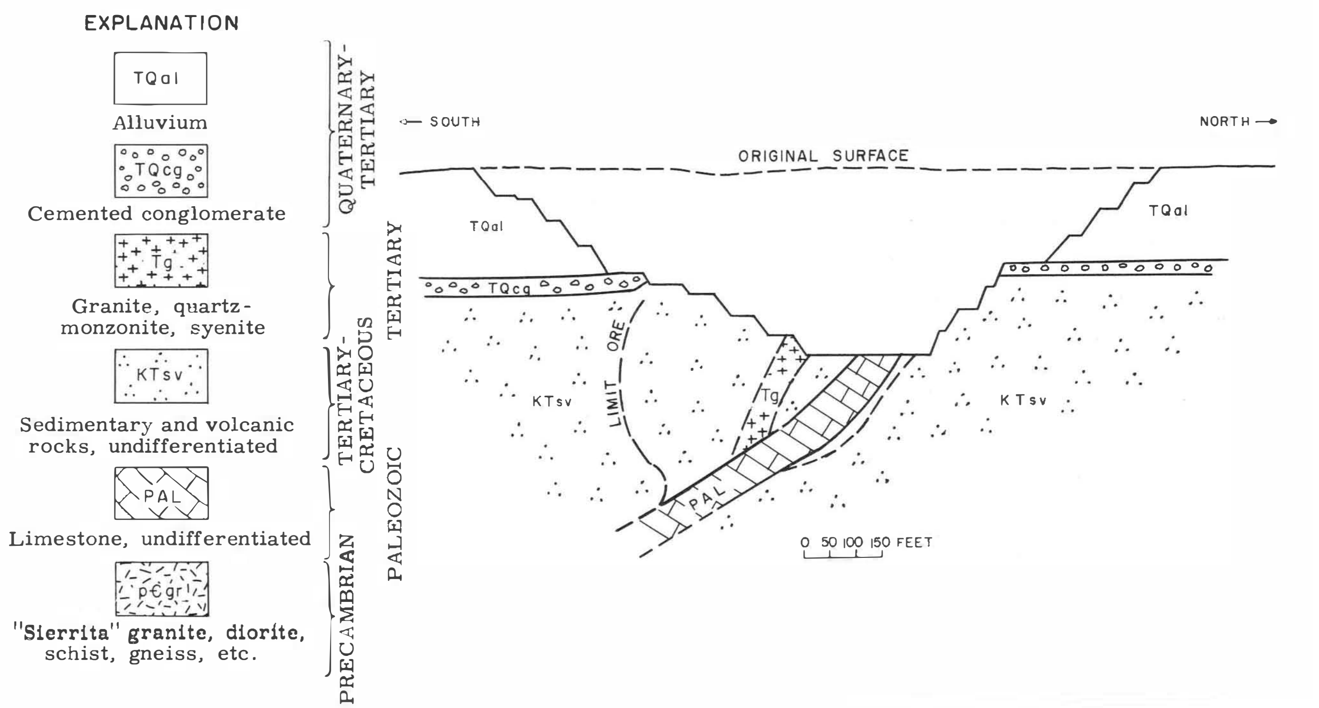
Developed ore bodies are of two types -- steeply dipping pipes and flat-lying ore shoots. The pipe deposits are localized principally in breccia zones along the intersections made by the "No. 10" and "No. 17" faults (fig. 42A) with tear faults, and the flat-lying ore shoots occur at the intersection of the steeper thrust faults with the flat thrusts. Ore mineralization has replaced the brecciated zones within the Paleozoic limestone, particularly where earlier metamorphism had converted the limestone to a hedenbergite tactite. Ore bodies have been developed to a depth of 900 feet below the surface and drill holes indicate that the mineralization continues below this level.

Galena, sphalerite, and chalcopyrite constitute the principal ore minerals and are usually accompanied by specularite, magnetite, pyrite, calcite, and quartz. The minerals are closely associated with and replace silicates such as hedenbergite, garnet, and chlorite.

Although locally sulphides are encountered at depths of 30 feet below the surface, the oxidized zone extends irregularly to depths of about 400 feet below the surface. This depth corresponds closely with the surface of the water table in the mine. The usual assemblage of oxides, sulphates, and carbonates of lead and copper are found in the oxidized zone.



A. Generalized geologic map of the vicinity of the San Xavier mine.



B. Diagrammatic geologic cross section through the Pima mine pit.

FIGURE 42. Generalized geologic map of the San Xavier mine and diagrammatic cross section of the Pima mine pit, East Sierrita area (fig. 44), Arizona.