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TYBO DISTRICT

## LOCATION

The Tybo district includes the entire southern Hot Creek Range in eastern Nye County and extends from Warm Springs on the south to Hot Creek Canyon on the north. The mines are located in four widely separated areas along the range that, early in the area's history, were considered separate districts. The Hot Creek section of the district is located on both sides of Hot Creek Canyon in the vicinity of Page Springs. To the south, a string of mines and prospects extends from Mountain View Canyon south through the head of Old Dominion Canyon and on south to Keystone Canyon, a distance of about four miles. To the south another five miles are located the mines at Tybo itself in Tybo Canyon. The fourth area is in the vicinity of M & M Canyon, north of Milk Spring on the south end of the range.

## HISTORY

Thompson and West (1881) describe four separate mining districts within what is now known as the Tybo district. The Hot Creek district, organized in 1866, covered mines from Hot Creek south to Old Dominion Canyon. The Empire district, discovered in 1866, extended from Old Dominion south to the town of Tybo. Tybo district, organized in 1870, took in the southeast portion of the older Empire district. Milk Spring district, adjoining Tybo on the south, was organized in 1867. Stamp mills were constructed at Hot Creek in 1867 and mining continued there until 1868 and then declined. A short period of mining about 1880 produced about \$1 million in ore (Kleinhampl and Ziony, 1984). Mining has been intermittent in this part of the district and production has been very small since the end of the 1880 activity.

Tybo proper was discovered in either 1869 or 1870, the first smelter there was erected in 1874, and, by 1877, Tybo was the second largest producer of lead (next to Eureka, Nevada) in the United States (Kleinhampl and Ziony, 1984). The mine failed in 1879 due to smelting difficulties, and operations ceased. Intermittent mining continued until 1888 or 1891 and attempts were made to reactivate the district in the early 1900's, 1918-1920, and 1925. In 1929, a flotation mill and sulfide smelter were built and the camp operated for the next eight years. After the mill closed in 1937, small-scale leasing operations continued at Tybo until about 1944. Attempts to reopen Tybo were made in the early 1960's and in the 1970's. Total production of the Tybo district is about \$10 million, 1867-1966.

Silver King Mines of Ely, Nevada, have been working at Tybo for the past several years. They have brought electric power into the old camp, and are conducting both underground and surface exploration.

Present activity in the Tybo district, outside of the Tybo mine area, consists of claim staking and drilling in the area of the Break and M & M mercury mines in the south end of the district and operations at the Warm Springs turquoise mine.

Within the last few years, drilling and mining of copper sulfide-bearing skarn ore was done at the Keystone Mine, Keystone Canyon. A large tonnage of what



appears to be fair grade copper ore has been mined and placed on a leach pad at the mouth of the canyon. The purpose of this venture is not entirely clear since copper sulfide ore is not readily treatable by leaching.

#### GEOLOGIC SETTING

The geology of the Tybo district is well described in reports by Ferguson (1933) and Kleinhampl and Ziony (1984). These references should be consulted for details on the areal geology. The following description is abstracted from Kleinhampl and Ziony (1984).

A thick sequence of Paleozoic sedimentary rocks is exposed along the east flank of the Hot Creek Range which includes the Tybo district. These rocks, which host the main silver-bearing ores of the district, are unconformably overlain by Tertiary volcanic rocks on the west and on the south. Carbonate rocks representing almost the entire Paleozoic section from Middle Cambrian to Permian are present in the Tybo district. These carbonate rocks, consisting of about 85% limestone and 15% dolomite make up about three-quarters of the section; shale, argillite, and some quartzite make up the remainder.

Tertiary volcanic and sedimentary rocks lie unconformably on the deformed and tilted Paleozoic strata. The oldest Tertiary rocks are Eocene or Oligocene lavas and welded tuffs, and the youngest are Miocene tuffs and welded tuffs. The rhyodacite dikes (quartz latite dikes of Ferguson, 1933), that host the silver-lead deposits, are Miocene or Oligocene.

The Paleozoic beds in the northern part of the district were folded into a broad, north-trending arch that breaks up into a series of smaller, tighter folds in the vicinity of the Tybo Mine. Ferguson (1933) related north-trending folds at Tybo to the major 2 G fault, the locus of the major silver-lead mineralization in the district.

#### ORE DEPOSITS

Ferguson (1933) described in detail the deposits at the Tybo Mine. Kleinhampl and Ziony (1984) abstracted Ferguson's work and added information on other occurrences in the district. These references should be consulted for details on the deposits; the following summary is taken from them.

At Tybo proper, silver with some gold occurs in an argentiferous lead-zinc sulfide ore that forms tabular veinlike bodies along faults. The ore replaces quartz latite dikes to a large extent and to a lesser extent, limestone (Ferguson, 1933). Silver with tetrahedrite and no gold occurs in the Keystone area, north of Tybo.

At the Tybo Mine, nearly all of the ore was mined from orebodies formed along the north-south trending 2 G fault. Oxidized ores extended to the 300 level and were mined early in the history of the mine. Thereafter, sulfides consisting of pyrite, sphalerite, galena, chalcopryrite, pyrrhotite, and arsenopyrite made up the mineralization. Galena and sphalerite were the only "ore" minerals. The outcropping gossan zones of these deposits are high in manganese oxides.



At the Keystone Mine, at the mouth of Keystone Canyon, little can be seen of the original mine workings as a large open pit has obliterated the surface. Rocks exposed in the pit are thin-bedded limestones and shales that have been fractured and altered at their contact with a granite intrusive body. Replacement ores in a skarn have formed at the contact; massive chalcopyrite, bornite, pyrite, sphalerite, and some galena occur with epidote, quartz, garnite, and diopside in the skarn.

Mineralization at the Mountain View area, south of Mountain View Canyon, consists of very fine grained black sulfides, possibly tetrahedrite, in a silicified breccia which formed along a northwest-trending shear zone in bleached limestone. The old workings here are extensive; they obviously supplied ore first to the arrastre then to the mill-smelter located in the canyon below. This area is mentioned by name only in Thompson and West (1881) but no information on its production or time of operation is known.

To the north of Mountain View, at the eastern mouth of Hot Creek Canyon, open-pit mining was in evidence at the Uncle Sam claim area. Jasperoid with copper oxides, pyrite, and possibly tetrahedrite occurs here along a silicified shear zone in limestone.

At the Page Mine, on the west end of Hot Creek Canyon, antimony mineralization occurs in silicified pods and quartz stringers in argillically altered rhyolite flows and tuffs. The vein system, consisting of parallel veins ranging from 1 inch to 3 feet in thickness, can be traced along strike for more than 1000 feet. Bladed stibnite, with red and yellow antimony oxides, occurs in the quartz stringers.

On the south end of the Hot Creek Range, in the M & M Canyon area, mercury mineralization occurs in highly altered Tertiary welded tuff. At the M & M Mine, orebodies were localized along and beneath an east-west trending low angle structure in the basal portion of the tuff. Mercury mineralization occurred as veinlets and disseminations along the structures. About one mile south of the mercury mines in M & M Canyon, an area has been recently staked for precious metals exploration. Narrow quartz veins occur here in bleached, argillically altered rhyolite.

#### GEOCHEMICAL RELATIONSHIPS

Ore samples taken from mines and prospects in Hot Creek Canyon (Uncle Sam claims and Page Mine area) contained low but anomalous gold values. The Uncle Sam sample contained high silver, the Page Mines samples were very low in silver. All contained high arsenic and antimony and low base metal values.

Samples from Mountain View contained no gold, moderate to high silver, and only moderately anomalous arsenic and antimony. Base metal values were low to moderate. One sample contained low but anomalous cadmium and tin values.

Ore samples taken along the line of mines and prospects extending from Old Dominion Canyon south to Keystone Canyon were generally similar. Little to no gold was found in these samples, silver values were generally high associated with high arsenic, antimony, lead, and copper. Zinc was high in only three samples from this area and highest in a sample of skarn ore from



the Keystone pit. Several samples were moderately to highly anomalous in cadmium; the highest cadmium values came from samples in two localities in Old Dominion Canyon. Anomalous tin values were reported in several samples; the highest was 200 ppm in a skarn sample from Keystone.

Tybo Mine area samples were very similar to those from the Keystone-Old Dominion area with the exception that all Tybo samples contained gold. Gold values ranged from 0.15 ppm to 6.1 ppm with silver values of 70 ppm to 1000 ppm. Arsenic and antimony values were moderate to very high in these samples, as were values for lead and zinc. Copper values were only moderately anomalous. Cadmium values were very high in all but one sample from Tybo and tin values were anomalous in all samples.

Samples from M & M Canyon area on the south end of the district contained no detectable gold, low silver, and low to moderate arsenic and antimony. Copper values were low, lead moderate, and zinc low. Two samples from the area of recent staking to the south of the mercury mines area contained no gold or silver but were higher in arsenic and antimony. Base metal values were low. All samples from this end of the district were moderately high in barium.

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