Small amounts of wolframite (or huebnerite) and scheelite are present in the silver-bearing veins of Tonopah. Bastin and Laney[1]

[1] Bastin, E. S., and Laney, F. B., The genesis of the ores at Tonopah, Nevada: U. S. Geol. Survey Prof. Paper 104, p. 19, 1918.

observed wolframite on the 300-foot level of the Valley View mine and the 1,000-foot level of the Tonopah Belmont mine, in south crosscut 1044. According to them, the wolframite was deposited after most of

the silver mineralization. Nolan[1] dates the silver mineralization as

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[1] Nolan, T. B., Underground geology of the Tonopah mining district, (Nevada,) Univ. ~~of~~ Nevada) Bull., vol. 29, no. 5, 49 p., 1935.

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middle Miocene.

Tonopah Pegleg

Scheelite occurs adjacent to a granite stock on the Tonopah Pegleg claims, located 7.2 miles north of Tonopah in the San Antonio Mountains, approximately in sec. 36, T. 4 N., R. 42 E., Tonopah quadrangle. Two tactite bodies, each about 30 feet wide and 70 feet long, are separated by 60 feet of marble. The WO_3 content is estimated at less than 0.5 percent. The granite contact dips beneath the tactite at a low angle.

Such a transition from areas consisting mainly of carbonate with small amounts of galena and argentite to areas consisting of mainly galena and argentite with scattered patches of carbonate is shown in Plate VII, *A*. Transitions into areas consisting mainly of chalcopyrite were noted in other specimens. These transitions, as well as the matrical position of the carbonate-sulphide aggregates, indicate that they were deposited for the most part contemporaneously with the larger areas of galena and chalcopyrite. As already stated, a few grains of electrum occur in some of these aggregates.

WOLFRAMITE.

The tungstate of iron and manganese has been noted at a number of localities in the mines at Tonopah. The writers are not completely informed as to all its occurrences, but it was noted by them in the Belmont vein and in a small vein in the Valley View mine.

In the Valley View mine, on the 300-foot level, quartz and wolframite form a small vein as much as 4 inches wide, lying well within the footwall of the Valley View vein. Its relations to the silver veins are not shown.

In the Belmont vein as exposed on the 1,000-foot level of the Tonopah Belmont mine, in south crosscut 1044, wolframite is very abundant and its relation to the silver ore is well exhibited. The silver ore at this locality consists mainly of quartz and an intergrowth of quartz and ferruginous rhodochrosite of the sort described on page 18, through which aggregates of very finely divided sulphides are distributed. Fractures traversing this ore are partly or completely filled with crystalline quartz, with which wolframite is so intimately intergrown as to leave no doubt that the quartz and wolframite are strictly contemporaneous. Wolframite is also intercrystallized with quartz that lines vugs in quartzose parts of the ore.

So far as the writers are aware wolframite has nowhere been established as a mineral of supergene deposition. The wolframite at Tonopah is believed to have been deposited from ascending silica bearing waters after the deposition of most of the silver ores and after these ores had undergone some fracturing.

BETA HYPOGENE MINERALS.

GENERAL FEATURES.

Certain minerals and mineral aggregates of the Tonopah ores are formed by the replacement of earlier ore minerals rather than by direct replacement of the wall rock or of the products of its hydrothermal alteration. The criteria by which those deposits that replace earlier ore minerals may be recognized in these ores are here briefly summarized. Some of the deposits are believed to be hypogene and others supergene, and the criteria for distinguishing between them are discussed on pages 24 and 42.

The textural relation of the replacing minerals of greatest diagnostic value is their

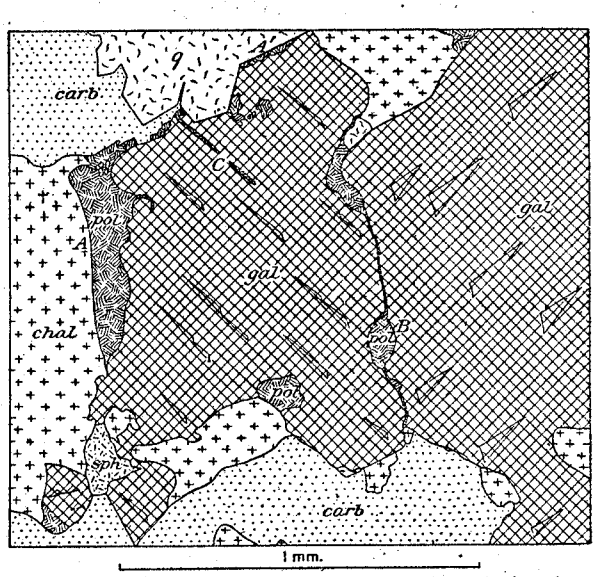

FIGURE 6.—Replacement of galena (*gal*) by polybasite (*pol*) along its contacts with other minerals (as at *A* and *A'*), along contacts between two differently oriented galena crystals (as at *B*), and along galena cleavages (as at *C*). Rims of an earlier replacement product like those shown in figure 14 are invariably present between polybasite and galena but are too narrow to be shown on this scale. *q*, Quartz; *carb*, carbonate; *chal*, chalcopyrite; *sph*, sphalerite. Camera lucida drawing from polished surface of ore from Favorite vein, Tonopah Belmont mine. Depth uncertain.

localization at places that were obviously channels of easy access for mineralizing solutions. Situations particularly favorable for the replacement of hypogene ore minerals by other ore minerals are the following:

1. Contacts between hypogene minerals of different species, at least one of which was replaceable under the then existing conditions. In such situations the replacing minerals