SCOOP THE CUB REPORTER — A Story with Several Good Points to it — By "Hop"

GEOLOGY OF TUNGSTEN DEPOSITS

HOW AN EASY TEST FOR THIS MINERAL MAY BE MADE IN THE FIELD

Owing to the enormous price of tungsten at present and the discovery of this mineral at a number of places within striking distance of Tonopah, the Bonanza republishes the so-called prospector's test for this substance, one that any one can use, to determine the presence of tungsten, although of course, it does not give any clew to the percentage contained. The sample should be pulverized in a mortar and panned, the tungsten having a greater specific gravity than the gangue rock. It is then placed in a saucer (a metallic container will not serve) and a little hydrochloric acid poured over it. Later particles of tin or zinc are added. The tin may be obtained by scraping a can. If the solution turns blue it is indicative of the presence of tungsten. The blue color continues for about 24 hours, when the solution turns brown. Zinc shavings or zinc dust obtained from a cyanide works may be conveniently carried and used instead of tin.

The following article by J. J. Runner in the Mining and Scientific Press contains much useful information regarding tungsten:

Although relatively a rare metal, tungsten is, contrary to popular opinion, widely distributed in nature. It is known to occur, although not in commercially important quantities in 19 of our state and in Alaska.

Tungsten occurs chiefly as the tungstates of iron and maganese, or of calcium, in the minerals feberite, wolframite, hubnerite, and scheelite. The difference between the first three of these minerals is of scientific rather than technical value; hence they will be discussed together.

Ferberite, wolframite and hubnerite form an isomorphous series. When the mineral is pure or contains only a small percentage of manganese, it is called ferberite. Hubnerite may contain a small percentage of iron. For wolframite the ratio of iron to manganese is more nearly 1:1 than in either of the other two.

The minerals of this series vary from dark brown in the varieties high in manganese to nearly black in the ones rich in iron. The streaks are dark-reddish brown to brownish-black The common forms are tabular masses, hisseminated grains, and in columnar crystals. Cleavage is perfect in one direction at right angles to the direction of elongation in the tabular forms. The hardness is about that of ordinary glass, the hardest being those rich in manganese. Specific gravitiy about 6. Most specimens are varieties high in iron being the heaviest. Lustres are sub-metallic. Among minerals frequently mistaken for the minerals of the wolframite series are hematite, magnetite, graphite, columbite, and cassiterite. The first three may be readily distinguished by their inferior weight and the last two by their inferior cleavage.

Scheelite, the tungsten of lime, occurs in double-ended square pyramids and in massive forms. In color it is white, pale yellow, pale brown, greenish, or reddish. Its lustre is vitreous; the cleavage fairly good in four directions; the hardness is about 5 or less than that of ordinary glass; specific gravity about6. Most specimens are translucent or transparent. It may be distinguished from the other minerals resembling it in color by its superior weight.

Other minerals of tungsten are:

Cupro-tungstite, tungstate of copper. Cupro-scheelite, tungstate of copper and calcium. Stolzite, tungstate of lead. Powellite, tungstate and molybdate of calcium. Tungstite, oxide of tungsten. Meymacite, hydrous oxide of tungsten.

The world's commercially important deposits of tungsten are almost confined to the following five modes of occurrence: (1) quartz veins; (2) pegbatite dikes and tin-stone veins; (3) placers; (4) contact zones on the borders of intrusive igneous rocks; and (5) replacement deposits. Of these the first three are far the most important.

Among rocks, granite, granite gneiss, and their fine-grained equivalents, are by far the most common associates of tungsten deposits. In come cases the orebodies lie wholly within these rocks, in other cases they extend into slate, quartzite or other rocks at the side, but in a majority of cases igneous rocks of the acidic type are to be found near-by. This applies with equal truth to each of the five types of occurrence. Tungsten deposits are usually in or in close proximity to metamorphic rocks also, such as slate, schist, quartzite, or crystalline limestone, for the very intrusion of the granite itself has in many cases brought about the metamorphism.

The mineral associates of tungsten also are well defined and characteristic. It is commonly accompanied by one or more of the following: quartz, muscovite, cassiterite, topaz, tourmaline, flourite, beryl, biotite, bismuth, molybedenite, pyrite, arseno-pyrite, chalcopyrite, galena, sphalerite, gold, silver and graphite. In the ore bodies the tungsten minerals may occur finely disseminated and scattered through the gangue; they may occur in masses of various sizes up to a weight of many pounds, irregularly distributed throughout the orebody, or they may appear as crystals lining cavities. Many veins exhibit a banded structure with the tungsten minerals concentrated in definite layers, especially along the vein-walls.

Some interesting characteristics of a few of the commercially important deposits are as follows:

Those of Boulder county, Colorado, the principal source of tungsten in the United States, lie on the eastern slope of the Front range of the Rocky Mountains, about 30 miles northwest of Denver. The veins are narrow fissures in granite and in porphyry dikes, accompanied in places by breccia. The ore-mineral is ferberite, finely disseminated through quartz or lining cavities. The deposits have been opened to a depth of 600 feet and are said to show no signs of improvement.

Second in importance among American occurrenees are the deposits of Atolia, in San Bernardino county, California. Here the ore-mineral is scheelite, in seams and veins varying from thin stringers to widths of four feet, in grano-diorite and schist. The gangue consists of quattz, calcite, and crushed country-rock. The ore is at present being mined down to 600 feet.

In the Dragoon mountains of Arizona hubnerite occurs in vertical quartz veins in granite, with a little muscovite and flourite. The hubnerite occurs distributed through the quartz in tabular masses, some reported to weight 500 lbs., and in layers along the vein-walls. In the Arivaca district of the same state, hubnerite occurs in tabular masses and blade-like crystals in gold-bearing quartz veins.

In White Pine county, Nevada, hubnerite and scheelite occur in quartz veins occupying fault-fissures, associated with fluorite, pyrite, muscovite, and minerals of copper, lead, zinc, and silver. The veins range from thin stringers to thicknesses of 11 to 12 feet; some are very rich.

In the northern Black Hills of South Dakota depositis of wolframite lie in the Cambrian dolomite, associated with the flat-lying masses of refractory silicious ores, north of Lead and on the divide between Yellow and Whitewood creeks southeast of Lead. The wolframite appears in flat, horizontal, but irregular masses, and in many places seems to form a rim around the silicious ore-shoots, except on the under side. In other places it is found in thin stringers. Its mineral associates are pyrite, fluorite, barite and occasionally gypsum.

Near the granite area of Harney Peak in the southern Black Hills, wolframite exists in pegmatite. Similar occurrences have been found near Tinton in the Nigger Hill district. In the southern hills also, quartz veins bearing wolframite, tourmaline, muscovite, and graphite are being worked for their tungsten content. The veins dip steeply, cut across the bedding of the slate for the most part, in lenticular masses from a rew inches to 2 or 3 feet wide. The wolframite is inter-grown with quartz in tabular masses in places estimated to weigh 8 or 10 pounds. Many of the veins show a branding parallel with the walls.

In Burma and the Shan states, which have become the world's greatest producers of tungsten, the ore is wolframite, found in nodules and granules in alluvial deposits. The parents lodes lie at the northwest extension of the granite backbone of the Malay Peninsula, which farther south has furnished the great tin deposits of the Malay states. In these lodes the wolframite is associated with quartz and tin-stone. At present mining is confined to the placers.

In Portugal, which ranks third as a producer, wolframite is accompanied by scheelite and tungstite, in veins and stockworks, with cassiterite, pyrite, chalco-pyrite, arseno-pyrite, and often mica, tourmaline and fluorite.

In Cornwall, greenstone and slates have been introduced by granite, and these in turn by dikes of quartz-porphyry. The mineral-bearing lodes are for the most part parallel with the dikes, and in many places occupy fault-fissures. Impregnations of country-rock along the lodes are common. Within the lodes the ore is irregularly distributed in bunches and pipe-like masses. The ore mineral is chiefly wolframite, with which is found cassiterite, pyrite, arseno-pyrite, chalco-pyrite, quartz, feldspar and tourmaline. Locally, ores of nickel, cobalt, lead, zinc, and uranium are found in the higher levels, while antimony, bismuth and molybdenum have been produced in commercial quantities. The wolframite follows contacts between granite and slate.

In Spain deposits of wolframite are found in quartz veins with scheelite, cassiterite, mica, rutile, and feldspar cutting gneiss and gneissic granite, and in alluvial deposits derived therefrom.

In Bolivia wolframite is found in veins associated with cassiterite, bismuth, copper and silver.

In Peru hubnerite occurs in veins following contacts of granite with slate and quartzite.

In Queensland and New South Wales wolframite occurs in quartz veins, in greisen, and in placers with chlorite, muscovite, biotite, topaz, fluorite, beryl, cassiterite, and bismuth and molybdenum minerals. The production of these two Australian states is of considerable importance.

The persistence of tungsten deposits in depth and the maintenance of metal-content are questions of vital importance. Unfortunately but few deposits have been developed sufficiently to determine their true nature, so that we have not enough data upon which to base definite conclusions.

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