1908 4930 0012 file Tungsten Dist 3-41 Item 12

TUNGSTEN DEPOSITS IN THE SNAKE RANGE, WHITE PINE COUNTY, EASTERN NEVADA.

By F. B. WEEKS.

INTRODUCTION.

A brief description of the tungsten deposits in the Snake Range, eastern Nevada, was published by the writer (2)[a] in 1901, and in 1902 F. D. Smith (6) published an account of the occurrence and development of the prospects. In October, 1907, the writer made a more detailed study of the development at this locality and the character and occurrence of the ore deposition.

SITUATION.

In 1900 a mining district was formed under the name Tungsten mining district, embracing several square miles along the western slope of the Snake Range south of Wheeler Peak (locally known as Jeff Davis Peak). This range as an orographic feature begins about 25 miles south of this locality and extends northward from its southern limit about 135 miles between latitude 38° and 40°. It includes the Deep Creek or Ibanpah Range and the group of connecting hills known as "Kern Mountains." This is one of the most extensive and prominent ranges between the Wasatch and the Sierra Nevada. Its highest point, Wheeler Peak, reaches an elevation of 12,000 feet. (See fig. 5, p. 118.) In the area of the tungsten prospects the surface of the mountain slope is dissected by several wide, shallow gulches which are dry except when occupied by melting snow or storm waters. There are several small springs, but at present the water sinks in the gulch gravels.

The region is about 45 miles southeast of the nearest railroad at Ely, Nev. This road—the Nevada Northern—is 140 miles long and connects with the Southern Pacific Railroad at Cobre, Nev. The wagon road to Ely is an excellent mountain road which crosses the

[a] Numbers in parenthesis refer to corresponding numbers in "List of recent publications" at end of this paper.

Weeks, F. B., 1908, Tungsten deposits in the Snake Range, White Pine county, eastern Nevada: U S Geol. Survey Bull 340, Part 1, p. 263-270, 1 fig.

Schell Creek Range (see map, fig. 5) over a comparatively low pass with no very steep grades. Prior to September, 1906, the outlet to the railroad was via Osceola over the Snake Range to Newhouse, Utah, a distance of 100 miles.

GEOLOGY.

The rocks of the region are granites, which may be in part the oldest rocks; Cambrian argillites, quartzites, shales, and limestones, and an intrusive granite porphyry which is younger than any of the sedimentaries. Within the Tungsten mining district the only rocks exposed are the granite porphyry and the quartzites and argillites.

The granite porphyry ranges from fine to coarse in texture and from light to dark gray and red in color. It occupies the lower part of the mountain slope and forms a portion of a considerable mass which extends to the northeast for several miles and is exposed on the eastern side of the range. There seem to be slight indications of deformation within the eruptive mass, and contact metamorphism is developed only to a limited extent. Apparently the intrusion took place since the formation of the mountain range. In general character and mode of occurrence this intrusion of granite porphyry resembles many intrusive masses in other parts of Utah and Nevada. Some of these are known to be post-Carboniferous and they may be of much more recent occurrence.

The base of the sedimentary rocks is not exposed in the Tungsten mining district. Only a small area of purplish argillite is exposed in the northwest corner of the district, overlain by 100 to 200 feet of quartzite. The quartzites are gray, blue, and purple, the gray quartzite forming the larger part of the series. The strata are cut by many quartz veinlets which are probably of secondary origin, formed during the silicification of the original sandstone. The rocks are fine grained and the alteration by silicification is very complete. In thickness the beds range from a few inches to 2 feet. The argillite is a compact purple rock in rather thick layers. In this area it is little altered, but in other parts of this region the process of metamorphism has progressed much farther and the rock has been called "silvery slate."

GEOLOGIC STRUCTURE.

The Snake Range in this region is a quaquaversal dome, having its center near Wheeler Peak. Subsequent to the uplift there was an intrusion of a considerable mass of igneous rocks that tilted the beds to a high angle in some parts of the region and displaced them in others. The steep southerly dips in Wheeler Peak and the high ridges to the south flatten to 25° in the Tungsten district. North

of Wheeler Peak the fold has been broken by several northeast-southwest faults of considerable displacement, the beds having a northeast-southwest strike and dipping 45° NW.

In the area shown on the map the metamorphism and deformation which accompanied the intrusion are not so extensive as in other parts of the region.

VEINS.

GENERAL DESCRIPTION.

The veins carrying the tungsten ore are not vertical, but pitch to the northwest or southeast at varying angles, ranging from 55° to 75°, the general direction being northeast and southwest. The actual outcrop is usually limited to a few feet. From the close proximity of some of the veins it might be considered that they are branches from a main vein, but neither outcrops nor underground workings have shown this to be the case. In some places the vein splits into several narrow veins separated by the country rock. Their occurrence is irregular and from the débris it appears probable that there are veins now covered by "slide rock." In width they range from a few inches to 3 feet. The composition of the vein material is essentially quartz and hübnerite, with here and there a little fluorite, pyrite, and scheelite. The quartz is compact and contains no pores, vugs, or honeycombed areas. A few assays have been made which show the presence of gold and silver, but the amount is small and no attempt has been made to recover it. Well-defined walls are of common occurrence, but they are not persistent.

OCCURRENCE OF THE TUNGSTEN ORES.

The hübnerite occurs irregularly through the vein material. In some places there has been a concentration of the ore near the walls. Hübnerite crystals, varying in size and completely surrounding the quartz crystals, and also quartz crystals inclosing the hübnerite, are abundant. The greater part of the ore is disseminated in fine grains through the quartz or in irregular massive bodies. Where the veins pinch to a few inches in width the hübnerite occurs in thin stringers or is interlaminated with the quartz. No wolframite has yet been determined from this region. In 1901 Dr. W. F. Hillebrand made a qualitative test of two or three specimens from the principal vein which showed the ore to be hübnerite. Scheelite has been found very sparsely disseminated in zones which appear to indicate shearing. It occurs in small flakes instead of the usual granular or massive forms.

EXTENT OF MINERALIZATION.

There appears to be a general consensus of opinion among prospectors and others interested in tungsten deposits that these ore-bearing veins do not extend in depth. No workings have thus far been put down which determine this point. It may be true that some, possibly most, of the individual veins do not extend to great depths. In considering the question of depth, however, it should be remembered that in this region the intrusive mass is a part of a magma of unknown depth, which has been forced through a considerable thickness of sedimentary strata. In the area under discussion erosion has removed at least 300 feet from the upper part of the principal vein. In the light of present knowledge of veins of this kind it seems probable that there may be ore-bearing veins within the igneous mass which have not yet been exposed by erosion.

ORIGIN OF THE VEINS.

The magma which intruded the sedimentary strata probably cooled entirely beneath the surface and is now exposed by erosion as a body of granite porphyry. Before complete consolidation the magma was subjected to strains which produced cracks and fissures. These fissures, varying in width and vertical extent, were distributed irregularly through a portion of the rock, but in the main strike in a nearly uniform direction. The latest phase of consolidation consisted in the deposition of the fissure filling by magmatic waters carrying in solution silica and a small amount of certain rare metals.

MINING DEVELOPMENTS.

About 30 claims have been located within the Tungsten mining district, and at present all of them are controlled by the Tungsten Mining and Milling Company.

The principal underground workings are on the Hub claim (No. 1 on map, fig. 13). Tunnel No. 1 (fig. 13) is 225 feet in length, and the face is 125 feet below the surface, which forms the deepest working on any of the veins. At 150 feet from the mouth of the tunnel an upraise has been made to join an incline from the surface. In this tunnel nearly all the various features described under the headings "Veins" and "Occurrence of the tungsten ore" are exhibited. The vein ranges from a few inches to 3 feet in width, strikes N. 68° E., and dips 65° NW. Present developments show that this is the largest and most prominently mineralized vein in the region. Tunnel No. 2 is about 125 feet vertically above No. 1 and is 59 feet in length. This portion of the vein is split into four parts, separated by the granite porphyry. There is about 18 inches of streaky ore in the face of this tunnel. Shaft No. 1 is 37 feet in depth. Near

the surface the vein is pinched, but about midway of the shaft it is about 3 feet wide. Shaft No. 2 shows the vein about 30 inches in width, with a small amount of ore. In the face of the tunnel near shaft No. 2 the vein is 24 inches wide, with ore in streaks.

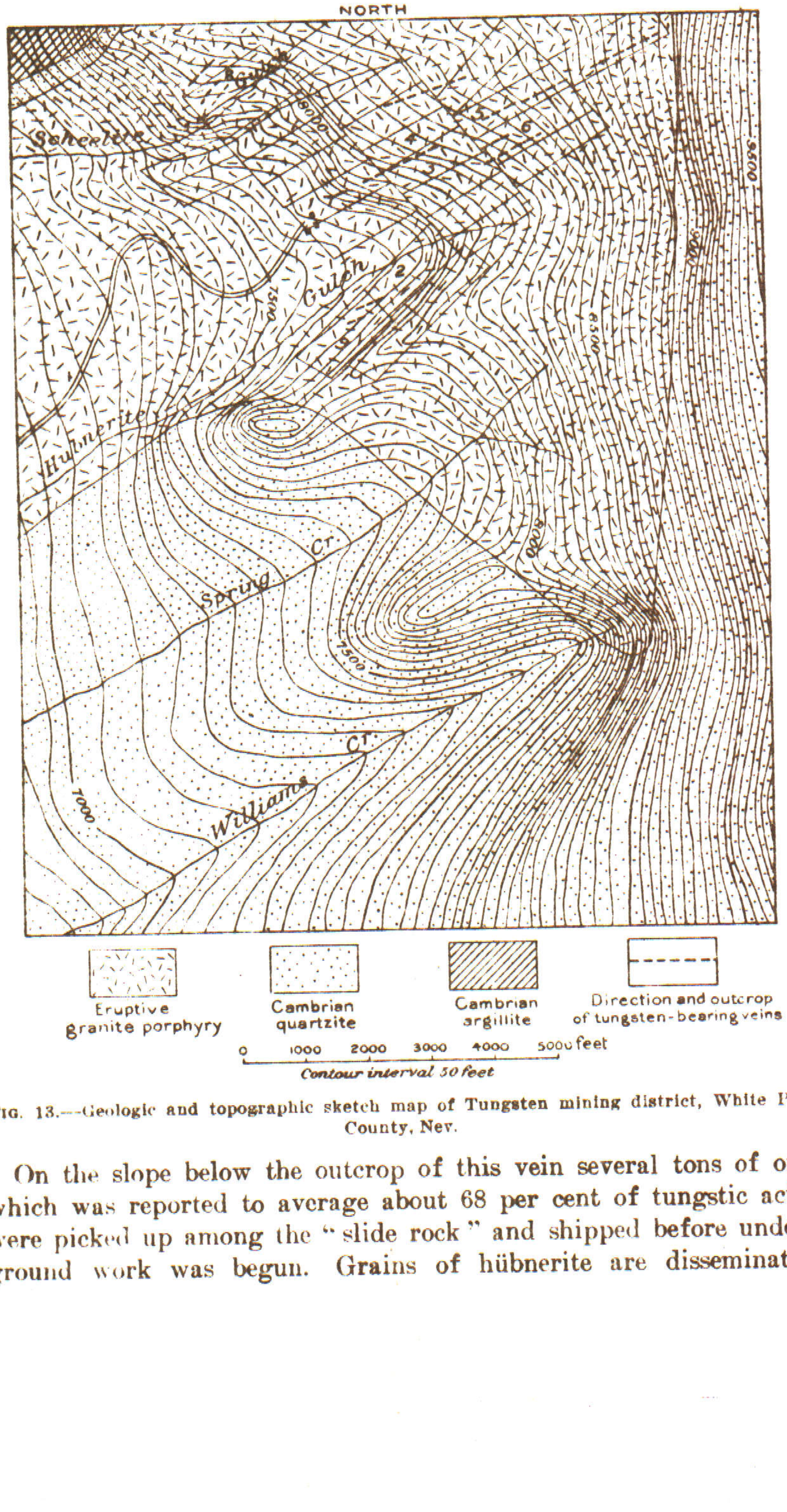

FIG. 13.—Geologic and topographic sketch map of Tungsten mining district, White Pine County, Nev.

On the slope below the outcrop of this vein several tons of ore, which was reported to average about 68 per cent of tungstic acid, were picked up among the "slide rock" and shipped before underground work was begun. Grains of hübnerite are disseminated

through the finer material of the slope and the bottoms of the gulches. Considerable ore has also been gathered from time to time and added to the dumps.

The development work on the Tungsten claim (No. 3 on map) consists of two tunnels and a shaft. On the Wolframite and Great Eastern claims (Nos. 4 and 5 on map) are several small trenches exposing narrow veins with ore. On the Eagle claim (No. 7 on map), just below the contact of the granite porphyry and quartzite, the vein is exposed in a trench, standing nearly vertical and striking N. 40° E. Hübnerite with a small amount of scheelite is found here. In the quartzite débris it was found that small veinlets of quartz penetrate the quartzite, a few of them carrying a little hübnerite. It is probable that this ore occurs near the contact zone. The region is said to have been thoroughly prospected and very little material of this kind has been found in the quartzite, which therefore seems unlikely to yield a deposit of commercial importance.

In the Side Issue claim (No. 2 on map), on the south side of Hübnerite Gulch, a mineralized vein is exposed in a 10-foot cut pitching 80° S. and striking N. 45° E. On the lower side of the cut the vein is 2 feet wide and it is said that from this place a piece of solid hübnerite was taken weighing 114 pounds. On the upper side of the cut the vein is split into two 6-inch veins separated by 4 feet of granite porphyry. In the bottom of the gulch these veins have pinched to a thickness of 3 inches each. The country rock is a coarse-grained, light-colored porphyry which, it is said, can be worked more easily than the rock in other parts of the district.

On the Tungstic claim (No. 9 on map) is a 4-foot vein striking N. 65° E. which shows very little ore. About 50 feet above is a 3-foot quartz vein in which no ore was seen.

In the ridge west and a little north of the Hub claim a hübnerite-bearing vein is exposed in several places. Several small veins appear to extend in a direction about N. 60° E.

The Star claim (No. 8 on map) is developed by a tunnel 32 feet long in which the vein ranges from 6 inches to 2 feet in thickness, pitching 55° SE. and striking N. 30° E. In this tunnel scheelite associated with hübnerite occurs in larger quantity than in any other known locality in the district. About 55 feet and 70 feet south of this vein are two hübnerite-bearing veins striking N. 42° E. The country rock is granite porphyry of a more pronounced reddish color than in other parts of the area. A short distance north of the tunnel a 1-foot vein striking N. 42° E. and showing considerable hübnerite is exposed in a shallow trench.

METHODS OF MINING.

The vein material is exceedingly hard and difficult to mine. Drills quickly become dulled and the rock does not shoot well. The work is all done by hand labor and tunneling is said to cost nearly $30 per running foot. At present it would appear advisable to develop the vein by open cuts at different levels with a steel-lined shoot on the surface on each side—one to care for the waste and the other for the ore. A much larger amount of material would be dislodged by each shot than when confined in a tunnel or shaft. There would be no expense for hoisting and there would always be good light for sorting. In handling the material care should be taken to save the fines, as a considerable part of the hübnerite occurs in grains disseminated through the quartz. The scheelite also is likely to be thrown away in the waste on account of its general resemblance to quartz.

On account of the large percentage of waste a considerable amount of hand sorting is necessary. After crushing, the hübnerite is easily separated from the quartz. A hand-made jig, operated by horsepower, was used and afterwards replaced by a 5-horsepower gasoline engine.

SUMMARY.

The occurrence and character of the vein material vary so much within a few feet that the depth and width of the veins and the amount of hübnerite can not be estimated. Nature has, however, done much to assist in determining the other factors which affect the commercial value of these deposits. Several springs of small flow occur at a considerable elevation above the natural location for a concentrating plant and their combined flow would be sufficient for milling purposes. Williams Creek has an estimated flow of 700 cubic feet per minute and would furnish power to generate electricity for a mill and drilling purposes. There is still sufficient timber on the higher mountain slopes to furnish mine timbers. The lower slopes are covered in spots with mountain mahogany, which makes a good domestic fuel. There are ranches in the valley which could furnish general supplies. Railroad facilities are now at a considerable distance, but surveys have been made for a railroad to connect Ely with southwestern Nevada and Salt Lake to the northeast. One of these surveyed lines crosses the Schell Creek Range into Spring Valley opposite Osceola, about 20 miles north of the Tungsten mining district.

RECENT PUBLICATIONS RELATING TO THE OCCURRENCE OF TUNGSTEN ORES IN THE UNITED STATES.

1. Trans. Am. Inst. Min. Eng., vol. 28, 1899, pp. 543-546. Arizona
2. Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 6, 1901, pp. 319-320.
3. Mineral Resources U. S. for 1900, U. S. Geol. Survey, 1901, pp. 257-259.
4. Bull. South Dakota Geol. Survey No. 3, 1902.
5. Bull. South Dakota Geol. Survey No. 6, 1902.
6. Eng. and Min. Jour., vol. 73, 1902, pp. 304-305.
7. Mineral Resources U. S. for 1903, U. S. Geol. Survey, 1904, pp. 304-307.
8. Eng. and Min. Jour., vol. 78, 1904, p. 268. Ariz.
9. Min. Reporter, vol. 50, 1904, p. 217. So. Dak.
10. Econ. Geology, vol. 2, 1907, pp. 453-463. Colo.
11. Eng. and Min. Jour., vol. 83, 1907, pp. 951-952. Colo.