COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1943/60

SCHEELITE IN THE PHOENIX MINE, FROGMORE, N.S.W.

by

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15928/65

DEPARTMENT OF SUPPLY AND SHIPPING.

Mineral Resources Survey Branch.

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Report No. 1943/60.

The available reef exposures were examined under ultra-violet light on September 28th-29th by N. H. Fisher and C. L. Knight, together with Mr. F. N. Hanlon of the New South Wales Geological Survey.

Surface.

The veins comprising the main vein system - main vein, back vein and north-east vein, (see plan accompanying report C. St. J. Mulholland) - were found to be stoped out right to surface or else gouged from the surface down. No reef was exposed except at one place in a costean at the extreme south end of the "back" vein, which branches off the main vein in the footwall side. Quartz on dumps from other costeans in this section contained no scheelite or wolfram and the one reef exposure was also barren.

In exposures of the western vein, which contains very little wolfram, only two specks of scheelite could be found.

No. 2 Level.

The main vein had been stoped out above the level and consequently could not be examined.

A stope on the back vein about 20 feet above the level was examined. The vein was found to be barren for the most part, except for one section near the northern end of the stope, which contained a little scheelite, equivalent to not more than 0.5% WO_3. Practically no wolfram was seen in this section.

No. 3 Level.

The main vein could only be examined at the extreme southern end, where it is represented by small stringers which carry up to one per cent of scheelite.

Stoping was in progress on the back vein just above the south end of this level and scheelite was observed to be distributed erratically along the vein, mainly as small areas scattered along the walls, but in places making into massive bunches of nearly solid scheelite. The impression gained was that the average scheelite content might be equal to between 1% and 2% WO_3.

A narrow vein is exposed in a drive off a cross-cut opposite the main shaft, 20 feet from the footwall of the main vein. Values here seemed to be better than in the back vein at the south end, probably averaging over 2% WO_3 as scheelite.

No. 5 Level.

At the south end of the level, the vein was exposed for 60 feet, but was nowhere more than 6 inches wide in this section. The grade of the ore appeared to be about 1% WO_3 almost entirely as scheelite.

North of the main shaft the vein was exposed from 120 feet past the shaft cross-cut to the end of the level at 410 feet. For the first part of this distance it is split into two veins. The hangingwall vein gradually plays out and the footwall streak becomes the main vein. Scheelite occurs mostly along the walls of the veins, and its distribution along the veins generally is patchy, but as far as the winze, at 265 feet from the shaft cross-cut, the average value appears to be in the vicinity of 3% WO_3. Past the winze there is a noticeable drop in both scheelite content and width of ore and the average value seems to be less than 1% WO_3. In the winze below the level, the vein was exposed from 12 feet to 28 feet depth. The average value of the ore was estimated, both in situ and from the dump on surface, at 0.5% WO_3. The vein alternately bulges and pinches. The wider sections were for the most part barren, but good patches of scheelite were seen near the narrow sections in the upper portion of the exposed vein. Very little wolfram was seen in the main vein either in the winze or on the level.

A parallel vein on the footwall side of the main vein, probably corresponding to the vein exposed in a similar position on the No. 3 level, is showing in the main shaft cross-cut and in a drive off the long west cross-cut which was put out to test the western vein but which was not driven far enough to reach its objective. In the main cross-cut the vein is disturbed by faults, and is split into several branches, each of which contains some scheelite. The average value of the vein in a short drive to the north is probably between 2% and 3% WO_3.

In the drive off the long west cross-cut, the vein averages just under six inches in width and the scheelite content was the highest observed anywhere in the mine, certainly better than 3 per cent WO_3. At 90 feet from the cross-cut this vein is reduced to a very thin leader and finally to a mere fissure in the face.

Mode of Occurrence of Scheelite.

The scheelite is usually coarsely crystalline and greyish in colour. It fluoresces a whitish-blue, indicating that the scheelite contains about .5% of molybdenum. It occurs ~~in~~ in the quartz along one or both walls, in places cutting across and forming large segregations. The best grade ore is not found where the reef is widest, in fact, the more massive lenses of quartz contain very little scheelite. The grade of the ore tends to be better near the ends of the bulges, or in the narrower sections of the veins.

The scheelite as a rule occurs in the form of irregular crystallisations without definite crystal boundaries. In a number of cases an elongate or tabular habit was noticed, very suggestive of replacement of blades of wolfram. In the few cases where wolfram was seen associated with the scheelite, the latter had obviously formed at the expense of the wolfram, replacing it along the edges of the crystals and cutting across in tiny irregular veins. One such occurrence was noted on the No. 5 level. As this level is entirely below the limit of oxidation, the alteration of wolfram to scheelite must be a primary process.

The primary nature of all of the scheelite in the No. 5 (320 ft.) level is apparent and a similar origin for the scheelite of the upper levels is indicated by the vertical distribution of the two tungsten minerals in the main vein. From the surface to 100 ft. the ratio of scheelite to wolfram is reported by a former manager to have been, at most, one to three, and this ratio is reported to have increased at deeper levels to about 3 to 2. This could not be verified during the present

examination owing to the complete removal by stoping of the main vein from the No. 5 level (320 ft.) to the surface, but at the latter level scheelite outweighs wolfram by at least 4 to 1. It seems most unlikely, therefore, that any significant proportion of the scheelite mined in the upper levels in the oxidation zone was formed as a result of weathering of wolfram. The scheelite seen in the back vein on the Nos. 2 and 3 levels, differed in no way from the primary scheelite of the No. 5 level.

In the unweathered ore of the No. 5 level a little chalcopyrite, pyrite, traces of molybdenite and a little calcite were associated with the scheelite.

Tailings Dumps.

Three types of tailings were examined - (1) tailings from treatment of ore from the present workings, (2) tailings from previous workings and (3) tailings from re-treatment of previous tailings. The mill was not in operation at the time of our visit so the various stages of the process could not be examined with the light. Scheelite slimes were noticed on the dump from present operations.

The scheelite content of all the tailings examined was low, probably less than 0.2% WO_3. The main dump showed a mechanical concentration of scheelite on the surface, but the average amount contained in the various cross-sections exposed was small.

16th October, 1943.
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