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866 TRANS.

INTERVIEW RIVER WOLFRAM DEPOSITS

INTRODUCTION

Because of the strategic importance of tungsten minerals, in the present national emergency, (War 1939-45), special attention is given to the field investigation of such deposits as offer possibilities as emergency sources of tungsten. The Interview River wolfram deposits were regarded as sufficient prospective importance to warrant an investigation to determine the potentialities of the most promising occurrences and to outline the procedure that would be required to prospect and develop the various quartz-wolfram veins.

The area investigated is located, approximately seven miles north of the Pieman Heads, on the narrow, button-grass covered coastal plain west of the Norfolk Range, at an elevation of a little over 200 feet above sea level and broken only by the clear cut gorges of the few consequent streams flowing west to the Southern Ocean.

The whole of the area investigated is held under application, for a special prospecting licence of 1,000 acres, by J.J.D. Hood of Hobart.

The Interview River wolfram deposits were first examined by an officer of the Geological Survey of Tasmania in 1901, when G.A. Waller, Assistant Government Geologist visited the area and the results of his investigation are contained in a report entitled "Report on Some Wolfram Sections near Pieman Heads". He referred to the futility of mine-owners asking for reports on their mines without making adequate provision for the unwatering or uncovering of the prospects upon which reports are desired.

In 1910, L.K. Ward, Assistant Government Geologist, visited the area in connection with his examination of the Mount Balfour Mining Field and the report published in connection with this investigation is contained in Geological Survey Bulletin No. 10. Mr. Ward states that, up to the time of his visit, very little work had been done on the lodes, and the condition of the workings was even worse than when Waller visited the area in 1901, for no fresh work had been done since that date. A new discovery of wolframite of good grade was reported to him after returning to office. This is now known as Kenny's workings.

Apart from the early activity shown in the alluvial tin areas, during the working of which the wolfram veins were located, the area has been deserted for nearly 40 years. Mining operations, on a small scale, were undertaken some 50 years ago for wolfram and some ore was exported but the actual amount could not be ascertained. All workings are, at present, inaccessible, therefore it was not possible to determine the nature and behaviour of the veins in depth.

Transport to the area is not easy with existing facilities. Access from Waratah, the nearest town, is by way of road to Corinna, a distance of 41 miles, then 14 miles by motor launch down the Pieman River to the Heads. The last stage, from the Pieman Heads to the Interview River, a distance of approximately seven miles is covered by walking. This track is very uneven on account of the numerous coastal streams. At the present time, there is no certain means of taking a pack-horse from the Pieman to the Interview River and all supplies and stores are packed by manpower.

Such disabilities as these make the prospecting and development of the quartz-wolfram veins both slow and expensive.

GEOLOGY.

The whole of the area examined is occupied by granite rocks of Devonian age. Slates and quartzites, probably of Cambro-Ordovician age outcrop to the south of the area.

The prevalent types of granite represented in the area are normal, medium-grained ones with an occasional porphyritic phase.

There is practically no soil cover above any of the granite. The rock is entirely concealed over almost the whole of the area by the peat cover which is itself shallow and almost wholly composed of vegetable material. Where excavations have been made, there is no great depth of weathering residues although the surface of the granite is usually very soft and friable.

ECONOMIC GEOLOGY.

Vein Type. -

The granite is traversed by numerous quartz-tourmaline veins, some of which have been proved to contain wolfram. The workings have exposed at least nine of these, but owing to the collapsed condition of some of the workings and the fact that the more recent work was not unwatered, it was not possible to examine more than a few veins and thus the number, size, grade etc. cannot be determined with any degree of accuracy. The veins vary in width from a quarter of an inch to an observed maximum of 15 inches although greater widths have been recorded. The maximum observed length of stripped vein was approximately 400 feet in Kenny's workings, but whether the vein was continuous over this length could not be verified. The average width of vein material would be approximately one foot.

The majority of the veins are apparently barren, but may represent barren portions of productive veins, in accordance with the typically irregular distribution of wolfram in such veins.

The productive veins contain wolfram, tourmaline, arsenopyrite, scheelite, mica and felspar in addition to quartz. Griesenization of the wall-rock is common to both productive and apparently barren veins to a varying degree.

Structure of the Veins. -

The structure of the lodes cannot be deciphered satisfactorily with the limited evidence available. However, it appears certain that there are several distinct and approximately parallel veins striking north 25° east ; and yet, the main assemblage of veins appears to have a north-westerly trend. The dips are at high angles, from 80° to 85° generally in a south-easterly direction, but dips of the same magnitude were observed in a north-westerly direction. The width appears to have ranged up to 15 inches, but the average would be approximately eight to ten inches.

Fracture Pattern. -

A study of the fracture-pattern in this area clearly demonstrates the stress-orientation of the rock mass, and indicates that it has been fractured by compressive stresses from a north-easterly and south-westerly direction. The result was the development of two shear directions, one north 10° west and the other north 50° - 60° east, the latter being developed almost to the exclusion of the former, while a third direction of relief was fracturing in the tension direction, which is north 25° - 30° east.

There is no apparent relationship between the productive veins and any one stress direction, for productive veins are developed along the north-east shear direction (Cooney's shaft) and the tension direction (vicinity of 12 foot shaft south of Cooney's).

With a proper appreciation of the stress pattern, it is possible to design a campaign of surface prospecting which will provide the maximum amount of information with a minimum of expenditure.

Grade of Ore. -

The average grade of any of the veins could not be determined by sampling because of the inaccessibility of the workings and the lack of development. As a matter of fact, sampling would not have its usually important results because of the erratic distribution of the wolfram-content.

It is well known, that specimens of wolfram from different deposits differ greatly in chemical composition and even specimens from the same deposit, so that it must be realised that this attempt to indicate the grade of ore available is based, partly on incomplete data and partly on conjecture and, therefore, does not justify much confidence.

The percentage of constituent minerals in the ore was determined by a series of intercept measurements upon a grab sample of vein material. The percentage of voids in the mineral complex was not determined, but an allowance of ten percent was regarded as being a close approximation.

This indicated the following mineralogical composition. Quartz 40.9 per cent; wolfram 27.3 per cent; arsenopyrite 10 per cent; pyrite 9.8 per cent; tourmaline, muscovite etc. 2 per cent, with 10 per cent voids. Therefore, the indicated tonnage factor is 8.5 cubic feet per ton. but as there is only 27.3 per cent wolfram in the ore, the tonnage factor per ton of wolfram is 31 cubic feet. It will be apparent, that in order to prove 500 tons of wolfram available for mining and milling, assuming an average width of six inches, it will be necessary to establish a lineal extension of ore of this grade for distance of 310 feet, with a persistence in depth of 100 feet.

For the purpose of determining the recovery obtainable solely by jig concentration, the grade of concentrate and the impurities for which buyers penalities would be deductable, an investigation was undertaken in the Department of Mines Laboratory, Launceston, in December last, upon a sample supplied by J.J.D. Hood. Mr. Manson, Chief Chemist and Metallurisgt, reports the results of his tests in Investigation 952/42, a summary of which is given below :-

The sample was srushed to pass 8 mesh and was treated in a Denver Laboratory Mineral Jig. The wolfram ore contained a high percentage of wolfram, with minor quantities of scheelite, arsenopyrite, pyrite and a major gangue of quartz. The sample did not contain tin but the writer is of the opinion that that would be the exception rather than the rule, for other samples submitted for analysis contained up to two per cent of tin. The Jig concentrate resulted in a recovery of 83.5 per cent of the tungsten minerals. The concentrate containing 75 per cent WO_3 and 0.35 per cent arsenic.

Penalties are deducted for arsenic in excess of 0.2 per cent and tin in excess of 1.5 per cent.

Quantity of Ore Available

No estimate of the quantity of ore available is possible with the limited ore exposures open for examination.

PROSPECTS

For convenience in the description of the ore occurrences, they will be referred to as the northern prospects in the vicinity of Kenny's workings, on old mineral lease 5120/M, of 80 acres, and the southern prospects, in the vicinity of Cooney's workings on old mineral section 5121/M of 40 acres.

Northern Prospects -

These consist of a series of trenches or underhand stopes cut along the strike of Kenny's vein over a distance of approximately 400 feet. The vein has a strike of north 10° east with an easterly dip of about 82°.

To the south of the creek, a deep trench has been cut in the southern bank for a distance of nearly 50 feet. Blocks of vein quartz, showing tourmaline and muscovite, but no wolfram scattered about, indicated an average width in the vicinity of ten inches, but owing to the collapsed condition of the trench, no observations on the vein, in place, were possible.

To the north of the creek, some 60 feet, a shaft has been sunk, probably 20 to 25 feet. Fifteen feet north of the shaft, an underhand stope over five feet deep in its partly filled condition, has been cut along the vein for fifteen feet. Vein material remaining indicates a width of six inches. Another 80 feet north, the vein has been underhand stoped for a distance of 120 feet. In the north end of the stope the vein has a width of twelve inches. From here the northerly extension is somewhat obscure and, finally finishes abruptly against a joint plane striking south 85° east and dipping north at 80°.

There appears to be three shoots of ore on this line of vein but whether the length of trench is indicative of the length of the shoot or whether the vein was continuous over the length of the trenching could not be established owing to the collapsed condition of all workings.

Southern Prospects -

The most northerly of these workings are the two shafts on the old reward section 5119/M of 80 acres. The eastern shaft of the two had been timbered but the collar sets had been destroyed by bush fires, while the western one has no timbers at all. It is, apparently, in a very soft formation because the sides of the shaft have been picked down and there is no sign of any quartz-wolfram vein. In the eastern shaft, at least fifteen feet deep, there is a small vein of quartz-tourmaline and some wolfram with a maximum observable width of 6 inches. It is striking north 15° east and dips west at 85°.

Some attempt has been made to trace the continuation of this vein to the north by means of trenches. The probable footwall of the vein is exposed in a trench 32 feet north of the shaft but the width of the vein could not be observed.

The direction of the western shaft is north 30° west but the relationship of the direction of the shaft to the formation upon which it was sunk could not be observed.

The main workings in the southern group are situated approximately 24 chains south-south-east of the Reward shaft, on the old mineral section 5121/M of 40 acres. The group of prospects consist of a series of six roughly parallel veins, extending over a width of 90 feet and extending en echelon for nearly 300 feet, although the maximum length exposed on any one vein would not exceed 50 feet, while the observed length of the shoots of ore was only twelve feet. With three other apparently parallel veins exposed in shallow cuts some 250 feet north of Cooney's shaft. Including these veins, the total width of the series of veins is 225 feet with a total length of 500 feet.

The most northerly vein of the six is the one exposed in what is now referred to as Cooney's shaft. J. Cooney and Stanley were granted a sustenance allowance to prospect in this area in 1937. They reported that they had cleaned out this shaft and deepened it to 24 feet. A sample submitted by the prospectors and assayed by the Government Chemist and Metallurgist gave the following result : -

Tungstic Acid	57 per cent.
Tin	2 " "

The following year, Cooney obtained financial backing from Cumming of Burnie to sink the shaft to 45 feet. At the completion of this work a trial parcel of ore, obtained in sinking, was sold with a very unfavourable return and the prospect was abandoned. The shaft was filled with water at the time of my examination and I could not examine the vein at the bottom of the shaft. The vein exposed in the top of the shaft is twelve inches wide and strikes north 45° east with a vertical dip. No wolfram can be observed in vein material at the top of the shaft nor in stripped vein to the north, although a dump of ore extracted in the process of shaft sinking, of probably half a ton in weight, shows wolfram freely in a mixture of sulphides, consisting chiefly of arsenopyrite and pyrite with tourmaline, muscovite and a little feldspar.

The No. 2 vein is exposed in a small shaft, six feet deep, 30 feet south-east of Cooney's shaft. It is parallel to the vein in Cooney's shaft but shows a dip to the north-west of 85°. In the south end of the shaft, the vein is four inches wide and in the north end makes to eight inches and tails out against a joint plane which strikes north 10° west and dips north at 80° The vein is not exposed beyond this and could not be examined until the shaft is cleaned out. The next vein, No. 3 is exposed in a small cut 140 feet south of Cooney's shaft. It is visible only in the end where it is twelve inches wide and consists of quartz with a little tourmaline and muscovite. The strike is north 28° east with a south-easterly dip of 85°. Another 50 feet to the south in the bed of the creek three parallel veins are exposed. The more important are Nos. 5 and 6, approximately three feet apart. These veins are approximately parallel to the No. 3 vein and strike north 25° east, with a vertical dip.

A small shaft has been sunk on the No. 6 vein the southern extremity of the shoot of ore. Waller stated that this shaft was nine feet deep but L. Thomas, who is the foreman of the party at present prospecting the area, claimed it was 14 feet deep, with a six inch vein in the bottom. I have no information

regarding this additional work and owing to the lack of facilities for unwatering the shaft I could not make an examination of the prospects. From this shaft, a trench four feet wide and six feet deep was brought up along the shoot of ore. The total length of this trench is 90 feet, 30 feet of which is north of the shaft. At the north end of the trench they have broken through a distance of three feet to a parallel veing (The No. 5) which makes a shoot of exceptionally high grade wolfram ore over a length of eleven feet, with an average width of four inches. This vein can be traced beyond the lense of ore, in both directions for some distance merely as a track in the granite. A bridge of granite has been left between this cut and the one to the immediate north and the vein can be observed continuing as a mere track from one lense to another.

A series of joints cross the veins in a general westerly direction, sometimes dipping to the north and sometimes to the south but always at a very high angle. Undoubtedly, there is some definite relationship between the joints and the ore shoots, but the exposures are too limited to determine the actual control.

The No. 4 vein is exposed in the western side of the small cut north of the shaft trench. It is much smaller than any of the other veins, and ranges in width from one to three inches, with a length of twelve feet. The strike is north 31^{o} east, with a north-westerly dip of 80^{o}.

With the exception of the two short shoots of ore north of the shaft, none of the veins in this group were available for examination.

CONCLUSIONS AND RECOMMENDATIONS

The veins might be such that small scale mining operations would be possible, but further exploratory work is required to determine their value as potential sources of wolfram.

As outcrops are not prominent, some systematic method of exposing the underlying rock is essential and I recommend surface trenching, which, in effect, is only peat stripping and the most favourable direction for these trenches is north 55^{o} west which is the minimum stress direction, and I suggest that a series of them be cut at 50 foot intervals. This will establish, if there exists a continuity of ore shoot of sufficient length to warrant further development.

It should be realised that the veins are narrow and the shoots are not long and that the possibility of establishing a profitable wolfram-mining industry depends entirely upon the results of future exploratory and developmental work. At present, it can be said that there is no place in the area where wolfram is available for mining and treatment.

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