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REPORT ON SOME WOLFRAM SECTIONS
NEAR PIEMAN HEADS.

Zeehan, 24th September, 1901.

SIR,

ACTING on your instructions, I left Zeehan on the 8th instant, to examine and report upon certain mineral sections which have been taken up for wolfram in the vicinity of the Pieman Heads, and have now the honour to present the following brief report. The weather was exceptionally rough during the trip, and this, coupled with the shortness of the time at my disposal, prevented me from making any extensive geological observations.

The deposits of wolfram ore are contained in a belt of granite country which runs along the coast for about ten miles north of the Pieman River. The same belt is said to extend southward, with few interruptions, as far as Mount Heemskirk, but as my route to the wolfram sections lay through Waratah, I was not able to examine this country. North of the Pieman, the granite belt is from two to three miles in width, and forms an undulating plain some 200 feet above sea-level. To the east the country rises in rather steep hills of metamorphic sandstones and slates. A little alluvial tin-mining is being carried on in the district, there being at present three men engaged in working the small creeks which traverse the granite belt. In past years a considerable quantity of tin has been won from this district, but as yet it has never been found *in situ*. The tin is both black and grey in colour, and most of it appears to be derived from quartz veins in the granite. Blocks of vein quartz are often met with, carrying quite large crystals of grey tin. Wolfram, except in the vicinity of the recent discovery, is not associated with the alluvial tin.

In the tin wash the miners occasionally find specimens of those remarkable objects—"Obsidian buttons" or "Australites." They consist of an acid natural glass,

and, in shape, very closely resemble a large button. The origin of these buttons is very obscure, but, according to the latest theories on the subject, they are supposed to be meteoric, though even this theory presents many serious difficulties. A terrestrial origin appears to be impossible, on account of the absence of any recent volcanic centre in Australia from which acid lavas have been erupted.

The granite is traversed by very numerous veins of quartz, varying in width from an inch or two up to several feet. These often stand out boldly above the general level of the surface of the granite, and may be traced for considerable distances. The majority of these veins are apparently barren, and are composed of pure white quartz, but others have been found carrying considerable quantities of wolfram, and the latter are much more complex in their mineralogical composition. I am, however, strongly of opinion that there is no sharp line of division to be drawn between the productive and the non-productive veins. Comparing the two extreme types they appear to have little in common, but a careful examination soon reveals many intermediate forms, showing that there is a gradual passing over from the one to the other. This passing over may sometimes be observed on the same vein.

The barren veins consist of pure white quartz, and exhibit little or no alteration of the wall-rock. They are simply fissures in the granite, filled with quartz. The productive veins are also filled fissures, but the filling matter is much more complex; besides quartz there is also present wolframite, scheelite, tourmaline, arseno-pyrite, pyrite, mica, and feldspar, the latter only in small quantities, though often occurring as large well-defined crystals. Where the veins are productive the wall-rock always appears to have undergone a great deal of alteration for some distance on either side of the vein. The feldspar in the original granite has disappeared, and has been replaced by quartz and light-coloured mica. This quartz-mica rock is known as greisen, and is regarded as evidence of pneumatolytic action. It will be unnecessary for me to enter into any lengthy discussion of the pneumatolytic theory in the present report; an account of the theory will be found in the Government Geologist's report on "Some tin mines in

the St. Paul's River Valley," and also in my late report on the "The Ben Lomond Tin Mining District." Suffice it here to say that there are very strong reasons for believing that during the latter stages of the consolidation of certain granite masses, highly heated solutions charged with mineral matter, probably in the form of vapour, of great chemical activity, are expelled from the granite, and pass upwards through any fissures that may be available. These solutions or vapours attack and alter the wall-rock of the fissures, producing greisenisation, and often deposit various metallic ores, either in the fissures themselves, or in the wall-rock which they penetrate. Greisen itself often contains sufficient tin ore to make it of economic value. In Tasmania the Roy's Hill Mine is an instance of such a deposit, and the Mount Rex Mine is a very similar occurrence. In the district under consideration, however, the greisen is apparently barren, the whole of the metallic contents being confined to the fissure vein.

As has already been stated, the productive veins pass over into the non-productive. This takes place by loss, first of wolframite, scheelite, and pyrite, then of tourmaline and mica, and, lastly, of feldspar. The wall-rock alteration also decreases with the decrease of tourmaline. It appears to me very evident that the origin of both sets of veins is one and the same. There are very large areas of country on the West Coast which are traversed by numerous small quartz veins of a similar nature to those described. In the sedimentary rocks these usually run parallel to the stratification, the gradual denudation sets free the quartz which forms a layer of angular gravel all over the surface. This quartz gravel is abundant in the Zeehan mining field, and occurs in large quantities at the Long Plains and Brown's Plains. I believe these veins are identical in origin with those I have described as occurring in the granite, and always point to the presence of this rock in depth.

The sections examined by me for wolfram are charted as follows:—Sections 4943-93M, 5015-93M, 5077-93M, and 5076-93M, all of 80 acres. Sections 4900-93M and 4901-93M, of 40 acres. All the above, as well as several other sections both north and south, are held under mineral lease by E. H. C. Oliphant. Also one other

section, west and adjoining 5077-93M, and south and adjoining 5015-93M, for which E. H. C. Oliphant is applicant.

The sections are situated about a mile to the north of the Interview River, a stream flowing westward into the ocean. The distance north from Pieman Heads is about 7 miles. The pack-track from Reminé to Circular Head passes through the sections.

Several of the sections were worked on a small scale some ten years ago for wolfram, and some ore was exported, but I have been unable to ascertain the quantity. At present the old workings are fallen in, or full of water, and the veins could not be examined *in situ*. From the stone at grass, however, a general idea of the character of the stone can be obtained.

On the northern portion of Section 4943-93M, the most northerly of the sections examined, some old trenches exist, from which a good deal of vein quartz has been obtained; some of the stone carries tourmaline freely, and a little wolfram. It is probable that there are two or three parallel veins at this point, and their width, to judge by the stone at grass, varies from 8 to about 18 inches. The vein walls were evidently greisenised.

Section 4943-93M is south and adjoining the above, but no work has been done upon it. South and adjoining 4943-93M is the vacant section for which E. H. C. Oliphant is applicant. About the centre of this section an old shaft has been sunk, and there are a few tons of quartz at grass carrying some wolfram and tourmaline. This has been spalled up and handpicked, and the greater part of the wolfram taken away. The country-rock is here also greisenised.

South and adjoining the above is Section 4900-93M, 40 acres. In the north-west portion of this section some deep trenches have been sunk, from which a large quantity of quartz has been taken. The quartz carries tourmaline very freely, but I did not notice any wolfram. Five or six chains east of these trenches a shaft has been sunk, from which a good deal of stone has been obtained. Some wolfram has been got, as shown by the heap of seconds produced by spalling up the stone. In this heap I found some nice pieces of wolfram and scheelite, the

latter in crystals. The quartz vein is exposed in the top of the shaft ; it is about 12 inches in thickness and strikes north-east and south-west. Several other old workings exist on the sections, but nothing else of importance has been uncovered.

About 18 months ago a new discovery of wolfram ore was made ; this is situated a little to the north-east of the centre of Section 4900. Several parallel veins have been exposed here in the bed of a small creek. The most important of these are two veins about three feet apart. The strike is a little east of north and the dip vertical, the width of the veins from 8 to 10 inches. Where laid bare in the creek both these veins are said to have carried good wolfram. A small shaft was sunk 9 feet in depth on the southern extremity of the shoot, and from this a trench was brought up 6 feet in depth along the shoot. The total length of this trench is 50 feet, and it is stated that two seams of almost solid wolfram-ore were exposed in the bottom, the width of each being from 8 to 40 inches. The shoot gave out in the north end of the trench. I regret that I was unable to confirm this account by observation. For some reason best known to the prospector who was entrusted with the opening up of the deposit, the trench has been almost entirely filled in, only a few feet at the north end being still open. This, of course, was full of water as well as the shaft, and although every effort was made to unwater the shaft and trench, these efforts were unavailing, owing to the recent rain. The re-opening of the trench would have occupied the two miners employed on the mine for at least a week, and as my time was limited I had to content myself with such conclusions as I could arrive at from the amount of ore obtained from the trench, and from an examination of the stone at grass.

I am told that 16 bags of rich wolfram ore, estimated to weigh one ton, have recently been exported from the mine. This ton of ore represents the first class ore obtained from the trench which is now filled in. There are at present some 6 or 8 tons of second class ore at grass, consisting of quartz, with a good deal of pyrite, arseno-pyrite, and wolfram, and a little scheelite distributed through it, from which, at a liberal estimate, three-quarters of a ton of wolfram ore might be obtained

with adequate dressing machinery. This gives $1\frac{1}{4}$ tons of wolfram from a surface stope 6 feet deep and 50 feet in length. This is a very small quantity considering the trench is supposed to have followed the shoot nearly the whole way. It is, however, possible that the wolfram ore near the surface may have become leached away by surface waters, thus rendering the upper six feet exceptionally poor. This supposition is strengthened by the presence of a little wolfram ochre among the seconds, proving that decomposition of the wolframite has taken place. Even allowing for this I must confess that I find it difficult to believe any large proportion of vein material consists of wolfram ore throughout the whole 50 feet. If the wolfram is only present in bunches through the stone, then I fear the shoot is too short and too small to pay for mining and development.

I understand that the whole shoot of ore has never been examined by a qualified mining expert. I do not doubt that in places the shoot is very rich; indeed, one large piece of ore which was amongst the stone at grass proved the wolfram to be at least 6 or 8 inches in thickness, and nearly solid; but I have no assurance that the wolfram preserves this thickness and richness throughout the 50 feet. Judging by the amount of pyrites present in the stone, I think much of the "metal" in the bottom of the trench must consist of this mineral. However as I did not see the bottom of the trench, I may be mistaken, and I can only recommend the owners of the property to have the trench cleaned out and examined by a reliable authority. If there is, then, still reason to hope the shoot of wolfram ore is a payable one, it will be fair to assume that there are others still undiscovered on the same line of reef. Wolfram ores are notoriously bunchy, and where one rich bunch has been found it is only reasonable to expect others to occur in the vicinity.

Before concluding, I would like to point out the futility of mine-owners asking for Government reports on their mines without making adequate provision for the unwatering or the uncovering of the discoveries upon which reports are desired. There are many cases where the geologist can make a general statement as to the probability or otherwise of mineral deposits occurring in a given belt of country without actually seeing the

deposits *in situ*, but when it is a question of determining whether a known deposit is payable or not, then it is absolutely necessary that he should be able to see the ore in order to determine its extent and its value. In the case in question I have not been able to examine the ore *in situ*, and my conclusions are only based on the amount of ore taken out. This, as I have already stated, is not satisfactory, considering the amount of work done, and unless the wolfram contents are very much richer below the level of the present trench than they have been in the trench, the shoot of ore is not a payable one.

I have the honour to be,

Sir,

Your obedient Servant,

GEORGE A. WALLER,

Assistant Government Geologist.

To W. H. WALLACE, *Esq.*,

Secretary for Mines, Hobart.

