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Mt Pelion - Wolfram Mine
WE Hitchcock

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Mt. Pelion
WOLFRAM MINE
by
WE Hitchcock 27/5/20

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W.E. Hitchcock

27/5/20

27th May 1950

C. Farnbach, Esquire,
FOOTSCRAY.

20-025

Dear Sir,

Following the recent visit to an examination of the Mount Pelion Wolfram Mine in company with yourself and Mr. J.B. Knutsen, I have to report as follows :-

First I would like to state that I have had the benefit of perusal of reports on the mine by Messrs. C.C. Ryan H.B. Deane, A.T. Brown, A.M. Reid, and J.B. Knutsen and of the assistance and information rendered by yourself and Mr. Knutsen.

This, together with my experience extending over the past fourteen years in equipping and working a mine in which the lodes are of the same character and the conditions were somewhat similar, has simplified the work very much.

The mine is reached by road from Staverton Railway Station passing Cethana (P.O. and Telephone Office) at eight miles, Lorinna (P.O. and Store) at 16 miles, the total distance to the mine from Staverton is about 38 miles. The road from Staverton to Cethana (Round Hill Mine) is suitable for and is used for heavy traffic, thence to Lorinna it is, except for a couple of miles, which are on soil, cut in rather steep sidelings on rock, and with repairs and drainage, would carry fairly heavy traffic. From Lorinna to the Mine (22 miles) the road has been constructed mainly in sideling cuttings and is suitable in its present condition for light wheeled traffic. For heavy traffic it would require to be widened and metalled in many places. This would be very necessary before heavy transport is done as, unless under very dry conditions, the haulage of even a few loads would render it quite unfit for the present traffic.

The road traverses along the east bank of the Forth River through belts of Hardwood timber and nearer the mine, Myrtle forest. Viewed from the road there appears to be a large area of timber country which with the increasing demand and scarcity would probably be valuable for milling purposes. Under the present conditions of road transport the cost of conveying this timber to rail would be prohibitive but its existence cannot be ignored as a contributing factor to railway extension or tramway construction.

A considerable area of good basaltic and limestone country exists around Lorinna extending to the Lemon Thyme Creek (four miles).

In places along the road to the mine areas of grass land and of land suitable for grass are seen.

Beyond the mine in the higher levels the country presents very considerable attractions from a tourist point of view.

I mention all this as combined with mining developments the improvement of the road or construction of a tramway may be justified and such work would have a very large bearing on the working of your mine.

The Mine is located on the east bank of the Forth River on the slopes rising to Mount Oakleigh. The elevation at the mine office is approximately 1,200 feet A.S.L. (Vide G.S. Bulletin No. 30 A.M. Reid), and the rainfall based on comparisons, with records at Lorinna and Cradle Valley would be from 60-70 inches per annum. The rainfall in these districts increases very much with elevation.

The country rocks in which the lodes occur are quartzite and quartzschist.

There is abundance of timber near the mine for fuel and mining purposes.

The leases consist of sections Nos. 7777, 7493, 7492, each of 80 acres, No. 7855 of 20 acres and a machinery site of five acres.

The workings are located on Section 7492 and consist of :-

Trenches and Adits on the main or Tunnel Lode.
Trenches and Short Crosscut on Cliff lodes.
Trenches on Waterfall lode.

Prospecting Trench from Cliff lode west towards the main lode.

A small paddock has been sluiced out.

Excavations for a concentrating mill.

Ore bin erected.

Buildings consisting of three camps, smithy and stable.

The timber on hill side along track of proposed pipe line has been felled and burnt off.

A storage dam has been partly excavated and the route of water race has been benched from creek to storage dam.

Dealing first with the main or tunnel lode - This lode has been traced along the surface on a course N. 50 E. for a slope distance of some five hundred feet giving a horizontal distance of 458 feet and a vertical height of approximately 212 feet - the width as showing in trenches is from 12 to 16 inches.

The values as indicated by sampling made by Mr. C.C. Ryan are W 03, 4.66% and Sn .3%.

Further trenching operations were in progress and at the time of my visit the southern continuation had been again located some 40 feet beyond the above measurements.

This lode, in the main adit, has been driven on for 117 feet from opening set, and was, I understand, exposed in the floor of the approach for a further 25 feet making a total length at this level of 142 feet. (It must of course, be understood that this latter 25 feet is only available for extraction from a lower level.)

The lode in the adit has been sampled by Mr. A.T. Brown at 20 feet intervals on roof and floor, the values being 5% W 03 over a width of 12 inches.

Both Mr. Brown and Mr. Ryan have had very considerable experience in sampling and their results may be safely taken as indicating the contents of the lode.

The vertical height from floor of adit, at end, to surface, is approximately 68 feet and the vertical height above adit level to trench at 458 feet is approximately 212 feet.

The underlie of lode is about 65 degrees to 70 degrees to the east giving an increase in backs of nearly 1 in 10. A block of ground has been opened up for an average height of say 37 feet ($\frac{68 + 6}{2}$) and length of 117 feet.

Taking 14 cubic feet of ore, in solid, to equal one ton then $\frac{74 \times 117 \times 1}{2 \times 14}$ equals say 308 tons at 5% W03 containing about 15.4 tons W.0.3.

In breaking ore it would be necessary to break to a width of at least five feet in adit and probably about

3 feet in stopes.

Thus much of the country rock would be, of necessity, included in the mill dirt and the percentage of contents lowered.

Assuming that no waste rock was sorted out the values from drive would, in place of 5% over a width of one foot be say 1% over a width of 5 feet and for the stopes about 1.7% over a width of three feet.

However a certain amount of waste rock would be picked out and the extent to which this sorting would be done should be guided by, in the case of drives, the cost of sorting as against the cost of milling and in the stopes the cost of sorting less the value for filling as against the milling cost. I mention this because the mill results, after allowing for recovery percentage, would be lower than those of the assays of clean ore.

Assuming again no sorting, the tonnages would be from drive $\frac{117 \times 5 \times 7}{14}$ equal 292 tons at one percent W.O.3 and from stopes $\frac{117 \times (37 - 7) \times 3}{14}$ equal 752 tons at 1.7% W.O.3.

Thus the reserves may be said to total approximately 1044 tons containing 15.4 tons W.O.3 and allowing a mill recovery of 80% say 12.4 tons W.O.3.

The value of W.O.3 is somewhat under a cloud just now and may be taken as thirty shillings per unit or £150 per ton for W.O.3 or 12.4 x £150 equals £1860 recoverable from reserves.

To class ore as proved reserves, it is required that it should be exposed on three sides i.e. in this case by trenches, adit and rise to surface - with this class of lode and taking into consideration that the values do not occur in shoots a little latitude may be allowed.

It is unfortunate that more attention has not been given to surface exploration of this lode and especially in a southerly direction.

If the lode continues down to the adit level and of size and value as indicated in trenches above a tonnage of about 10,000 may be expected.

It must be remembered however, that the only date afforded, with regard to this is that from trenching and it is most dangerous to assume tonnage on this although there is no reason to doubt its existence.

Taking the Cloff lode system next.

This as shown in a short crosscut at the highest level, consists of five veins from which samples, taken by Mr. Tuson and assayed by Mr. W.W. Dodd, show the following results :-

<u>CLIFF LODE.</u>						
<u>Samples by Mr. Tuson</u>		<u>Assays by Mr. W.W. Dodd</u>			<u>Equiv.</u>	<u>Original</u>
<u>No.</u>	<u>Width.</u>	<u>Percentage by weight dish concentrates</u>	<u>Assay Value dish concentrates.</u>			<u>ore.</u>
			<u>Sn%</u>	<u>W.O.3%</u>	<u>Sn%</u>	<u>W.O.3%</u>
1.	4 to 5"	5.14	45.2	1.45	2.33	.074
2.	3"	11.54	33.8	7.77	3.90	.089
3.	4 to 9"	24.82	53.4	1.70	13.25	.042
4.	2"	13.86	33.8	1.00	4.68	.014
5.	2"	17.48	23.1	1.77	4.04	.031

Taking average width of No. 1 as 4" and that of No. 3 as 6" the total width would be, in aggregate 17" and the average value in Sn 6.94% and W.O.3 .053%.

The value of No. 3 is high and as its width represents over one-third of the total the average value is lifted by it. It should be noted that Sn. predominates, a reverse position compared with the main lode.

The veins, however, are spread over a width of about 14 feet and as the bulk of this width would be included in the mill dirt if no waste rock was sorted out, the value would be about .69% Sn.

Sampling under the conditions viz. small veins is rather an intricate process and unless very carefully done is unreliable.

However, owing to the very faulted nature of the rock at this point, it would be difficult to mine ore from this particular place and the sampling is not of very much value except to indicate the presence of Sn. oxide which is very easily discernable in the veins, in fact occurs in rich patches.

It is most likely that the veins form parts of a lode which at this point is split and that either in depth or distance or both they will unite into a solid lode. Such is the experience at the S. and M. Mine.

Lower down the hill from the crosscut a vein of about 8" is showing in trenches and cuts - this is apparently the Cliff lode or part of it.

From levels taken by Mr. Knutsen I understand that at the site proposed by Mr. Tuson an adit could be driven at an elevation of 15 feet above the main adit and 60 feet below the crosscut. Whilst it is desirable that an adit on the Cliff lode should be on the same level, plus allowance for tram grades, yet such would involve a fairly long approach through overburden and under the circumstances it is justifiable to drive at the level proposed by Mr. Tuson.

WATERFALL LODGE/ This lode has a width of 8 to 9" and consists largely of arsenical pyrites - an assay by Dr. Dodd gave 2.6% W.O.3 and 0.6 Sn. Arsenical pyrites occurs in all the lodes and it may be that the occurrence in quantity at this point is above normal.

ALLUVIAL. The slopes of the hill are covered with a Detrital deposit containing Sn and W.O.3 - this is not a wash but rather a talus of angular rock fragments containing free mineral together. with that in small veins in the rock fragments.

Where the bedrock is exposed small veins carrying Sn. and W.O.3 are to be seen. The results obtained from the sluicing operations indicate about .5% tin oxide.

Taking Sn at 42/- per unit (Launceston 22/5/20) equal for .5% tin oxide contents about 14/- per ton.

Before any definite valuation can be placed on this deposit much more data is required other than that obtained from the small paddock sluiced - such could be sufficiently obtained by putting down a number of small pits and carefully sampling each. The values could be reasonably arrived at by first measuring the sample and after sieving to remove rock, panning off with dish.

If a mill were in operation a preferable method would be to treat a quantity as a trial.

The apparent value is not high and the margin consequently low in large quantity and under favourable conditions such as cheap handling and power, no doubt it would pay to work.

Sluicing does not appear feasible as the bed rock is very jointy and loose and some little trouble would be entailed in taking up sufficient bottom to include all the mineral which, under the influence of sluicing would find its way into the crevices - such would also be the case if an attempt was made to sluice the deposit to a location for transit to the mill. This deposit presents possibilities and is worthy of systematic exploration. Such work should be under the discretion of the one in charge as it may be found in the earlier stages that deviations are advisable. Tributing is not advisable as a considerable temptation would exist whilst ore was being broken alongside the Tributors' working.

TRENCH FROM CLIFF LODE TOWARDS WEST. This has so far, only disclosed small veins but its extension is quite justified and necessary not only as far as the main lode but across the lease as far as practicable.

WATER POWER. The possible sources for a small power scheme, at a reasonable capital cost, appear to be limited to a creek flowing past the Northern boundary of section 7492 combined with some of the headwaters of Douglas Creek which enters the Forth River about a mile to the North, after the requirements of a water-right for six sluiceheads, held by W. Douglas, are satisfied. It appears quite feasible to divert the waters flowing from the North slopes of Mount Oakleigh and from the 1st and 2nd basins into the creek near the mine, in the first place by cutting a channel from the 2nd basin to divert the waters into the first basin and in turn by cutting a short race from the first basin to convey these waters into the mine creek.

From a general inspection of the catchment and consideration of the rainfall which as the catchment would probably be at least $1\frac{1}{2}$ times that at the mine, I consider that, assuming that Douglas did not require the water, sufficient would be obtained for power for a mill in ordinary seasons for from 9 to 10 months of the year.

As a concentrating mill would require practically as much water for dressing purposes as for power under a head of 400 feet and as there is evidently no other source it would be necessary to provide for this by having the peltons at sufficient elevation to permit of tail water being used for dressing or alternatively, if this interfered too much with the arrangement of the mill to provide means for elevation of the requirements by pumping to a service tank.

In districts such as that under review the experience is that there is plenty of water for most of the year for small schemes even from limited catchment areas. During the past six months the rainfall has been much below normal and a longer stoppage would occur.

The rainfall is usually well distributed from March to December. Briefly if a scheme of say 50 h.p. gross, can stand a period of from two to three months in which running would be stopped, it can be fairly easily obtained and especially under the proposed head of 400 feet.

To provide for continuous running, however, entails storage. Although, in this case, advantage can be taken of the natural basins by constructing dams and thus store large bodies of water, yet it must be remembered that such schemes have their uses for only two or three months in the year and that the capital is in use for the whole of the year.

In such localities as the basins are located (i.e. 4,000 feet elevation) all work is necessarily very costly and even the most liberal estimates are liable to be exceeded.

As an alternative considering that a mill of capacity of four tons per hour was in use - under a head of 400 feet approximately 3,600 cubic feet of water would be required per hour for power to treat 88 cubic feet of ore.

It is manifest that it is cheaper to store ore than water under the circumstances when milling only is concerned.

To store ore, requires that the working cost of the mine must be financed during a period when there is no production from the mill but such is balanced by the asset in ore broken under such conditions and the only risk is the margin which may be affected by fall in prices etc. On the other hand to store water requires capital expenditure from the inception and the cost obtains whether the water is used or not.

For concentrating such ores as occur at this mine and for efficient and economical working a plant having a capacity of about 4 tons per hour is required. A smaller plant of capacity of say 2 tons per hour requires the same number of machines and the only difference is that they are smaller. The labor cost would be nearly the same for both plants and first cost not very much less.

A plant of capacity of 4 tons per hour would treat per week, including stoppages and running down from 160 to 180 tons per week on one shift daily, and would be of ample capacity for this mine, unless developments opened up very much more ore.

Provision has then to be made for storing say 1,500 tons of ore of which if the workings are extensive enough probably $\frac{1}{2}$ can be held in stopes, especially if these are "run out", nearing the dry season and the balance on the surface.

As regards water power for air compression a different proposition is presented.

In this case it is advisable not to install a compressor of less capacity than 400 cubic feet of free air per minute. This would require say 100 gross h.p. (pelton) and provision would require to be made for continuous running on one or two shifts daily throughout the year.

This involves storage to a considerable extent and this is only available at an elevation much above that of the mine. - (4000- 1200 equals 2800 feet). Without a second storage system regulation at this distance would be difficult and the waters would be required to flow continuously from the lower basin throughout the 24 hours. The proposed service dam at the head of the pipe line would serve this purpose if constructed but there is just an element of doubt whether under ordinary construction such a dam would be watertight.

The rock at the proposed site, where showing, is much fractured and would require to be removed, where met with, to a depth of at least one foot below the floor of the dam and replaced by silt. As far as holding water is concerned, such a dam could be made fairly tight, under a head of six feet, if sufficient work were put into it by puddling etc. it becomes, however, a question of cost.

As regards the storage scheme at the basins there is every reason to believe that except in abnormally dry seasons sufficient water could be stored to allow say 50 h.p. to be obtained for eight hours daily and 100 h.p. for 16 hours.

The rainfall at the catchment would at the elevation probably reach 100 inches per annum as against 60 to 70 at the mine. The run off from the catchment would be very rapid that is to say that during rains and thawing of snow the creeks would be in a state of flood and after a day or two of fine weather down to small volumes again.

Considerable caution and investigation is required in entering into these storage schemes mainly in view of the costs which are very difficult to forecast.

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The inducements in favour of water power are very great indeed if only for its simplicity in running but very careful investigation must be made to ascertain whether the interests and amortization on the capital cost would not make it a more expensive proposition compared with suction gas or even steam in a district where fuel is abundant.

GENERAL

I consider that the property presents considerable possibilities. The Main or Tunnel lode, for the short distance driven on and explored, shows what would be payable ore at the Sand Mine and the Cliff lode system is very promising. There are strong possibilities of parallel lodes being located and systematic prospecting and development are fully justified.

There are certainly difficulties in transport and labor, the latter in common with mines and works in more settled districts. The transport difficulties are not worse than those which obtained in the early history of other Tasmanian mines and given satisfactory mine developments, are not insurmountable.

A mistake has been made in regarding the mine to be sufficiently opened up for production purposes even allowing that at least twelve months would be required for erection of plant and installation of power.

Although there is considerable temptation and desire that the mine should at least provide a share of the cost of opening it up, yet such a course would in this case lead to unwise expenditure for the following reasons :-

Apart from power a concentrating mill would cost, erected, at least £3,000 probably more - I might state that in treating this class of ore, after reduction, sizing and separate treatment of each size is very necessary not only to separate the valuable minerals from waste rock and gangue but also from pyrites -

The treatment of Wolfram ores by stamps would lead to considerable sliming and loss and reducing by rock breakers followed by rolls is required.

Concentration by jigs, tables and vanners, should then follow after sizing by trommels or other screens.

As stated earlier a plant of capacity of say 4 tons per hour is the minimum size which, to include the above processes it would be advisable to install and as the development work is not sufficient to employ such a plant for more than a couple of shifts weekly the capital required for it would be to a large extent idle.

If developments were not satisfactory this capital would probably be lost or nearly so, for a considerable portion of the cost of installation would be represented by transport and erection.

On the other hand if a small and indifferent mill were erected it would have to be remodelled if developments proved the mine to be a good one.

The general layout and equipment of a mixed metal mine has to be most carefully considered and planned in order to avoid later on remodelling and alterations and until development work has proved such a layout and equipment to be justified, it is the best policy to carry on operations in as simple a manner as possible.

The same may be said of the Air compressing plant. For a mine of this class a Compressor of capacity of at least

400 cubic feet of free air per minute is the smallest which it is advisable to install, having in view the necessary skilled attendance required for running, and upkeep of it and of rock drills and number of drills.

As the mine is remote from repair shops it would be necessary to provide at least a small machine shop with equipment.

With a lack of skilled labor the plant would be subject to breakages and delays leading to high cost and loss of time.

The Compressor which your Company has at Staverton has, I understand, a capacity of 300 cubic feet of free air and is on the small side. (It appears to be well looked after and there should be no difficulty in disposing of it.

LOCATION OF MILL. As far as the present main adit is concerned the present mill site is fairly suitable. For treating ore from a lower level (which should not be less than 60 feet below the main adit), ore would have to be raised to the Mill.

The high water level of river is approximately 87 feet below the main adit at a point near the north-west corner peg of lease 7492. The river does not appear to have very much fall and it is doubtful whether the safe high water level at the 100 feet contour would be reached in a reasonable distance.

For a mill in which the ore gravitates from bin to lowest floor, without elevators, the minimum height required from lowest floor to top of bin is about 40 feet. Neglecting tram grades the minimum for a lower level and mill would be say 100 feet.

This could be reduced by (a) use of elevators in the mill, (b) raising ore from adit to mill bin and probably under one of the conditions an adit at about 60 feet vertical lower level below the main adit could together with a mill site be obtained. The mill in this case would require to be located near the entrance of this lower adit, i.e. on the flat below the present camp. There are various factors to be considered viz. length of pipe line (if any), the additional head of power water to be obtained, the distance, and method by which the ore from upper levels would require to be conveyed to the mill, the nature of foundation likely to be obtained and the probably distance required to be driven before bedrock is reached in a lower adit.

There is also the question whether, if the waters of Douglass Creek could be secured, the mill should be located near that creek and a tramway constructed to convey the ore from the mine to the mill. This would make the whole of the waters of this catchment available and cut out the cost of deviation.

The cost of the tram, which would be in length about one mile, would obtain together with cost of tramping the ore to the mill. A wooden tram would probably serve the purpose and if well graded so that the loads, of say two tons of ore, could be braked down or easily drawn and empties drawn back by horse, the cost of operating would not be heavy.

At the S and M Mine a truck carrying 120 cubic feet of firewood is sued on a wooden tram, length half mile on grades at steep as 1 in 6. The loaded truck is braked down and empty truck drawn back by a medium draught horse.

The cost of laying tram is approximately £3 per chain including labour and material and the contract price for schuting wood from hill side to tram and tramping to the mine is 2/6d. per ton of 80 cubic feet.

However, the question of mill sites requires more investigation than can be obtained, inter alia, on a brief visit

and given developments in the mine the whole question of mill design, location, power and plant should be put into the hands of a qualified mining engineer to act in conjunction with the manager suggested later on.

The policy I would advise is to continue prospecting and development work until at least 10,000 tons of ore can be safely regarded as developed together with reasonable expectations of continuance. If this happy result be attained then the question of equipment of the mine can be carefully gone into with a degree of security and at the same time considerable assistance in transport, and labor supply, may be looked for.

Alternatively if development do not indicate permanency then a scheme may be evolved to treat the ore in sight with a small plant even with a low efficiency.

FUTURE WORK. The main lode adit should be continued for another 100 feet. If the surface prospecting proves the continuation of the lode in a direction south then another adit 100 feet higher than the present should be started and driven along the lode and connected with the lower by a rise. In the same way provided the low is traced ahead on the surface a third adit should be started 200 feet vertically above the present adit and also connected with No. 2 and so on. The objective being to open up as many working faces (drives) as possible.

For the 100 feet of driving on main lode if a contract at £3 to £3.10.0 per foot can be arranged - contractor to find labor including trucking, explosives and sharpen tools, find and lay wooden rails and sleepers - it would probably be best to accept it.

The ore from this work should be dumped on west side of present dump after logs have been cleared away. It is not necessary to excavate but only to remove any obstructions to shovelling. The waste rock can be picked out when the ore is moved again. After this distance is driven and the adit has reached a distance of 217 feet the end would be about under where the No. 2 adit would start. An adit should be started on the Cliff lode at the location as suggested by Mr. Tuson and driving continued on this lode as long as the width exceeds 8 inches or has a reasonable expectation of doing so. This work could be done on wages by your manager Mr. Tuson and another and it is advisable that they should take advantage of any fine weather to carry out surface prospecting.

Too much stress cannot be laid upon the value at this stage of surface prospecting, not only on the Main, Cliff and Waterfall lodes but throughout the leases. It is regrettable that your previous managers have not been as keen on this point as they might have been. If the main adit was let on contract and the Cliff on wages then only one man would be on wages and the time would be opportune to bring wages into line, with West Coast rates which are, I think, about 11/9 basic 12/9 miners. (Consult Chamber of Mines) Whilst the present rates do not represent a very large increase yet they would obtain if a number of men were employed later on and would then represent a considerable amount.

It would be as well to let Mr. Tuson have a copy of the Agreement recently arrived at by various Companies with A.W.U. with log for West Coast and with instructions to adhere to it. For the present you will have probably to adhere to the present arrangement of paying for cartage of food to wages men. After the Winter months are over if developments continue satisfactory I would suggest that a young live manager with sufficient technical knowledge to do rough surveys and sampling and investigation work be appointed.

For the next six months, after allowing for overhead cost, to carry out the above recommendations it would be necessary to provide, say £30 weekly to cover Tuson's salary, one wages man and two men on contract (see attached slip) and incidentals.

It is necessary to provide a truck of say 11

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cubic feet capacity. I would like to add that before any machinery is purchased that proper plans be obtained of proposed plant and that all purchases be made to suit and so, before it is despatched to the mine all details should be completed and marked for fitting. It is also necessary that all details should be listed so as to avoid loss in transit.

In conclusion I would be glad to furnish any further information in my power and not covered in my report, which has under the circumstances, necessarily been lengthy.

Yours faithfully,

W E Atchcock