

REPORT ON FEDERATION TIN MINES LIMITED
SOUTH HEEMSKIRK.

INTRODUCTION.

At various periods during the past thirty years examinations by officers of the Mines Department have been made and reports furnished on this property. These include:-

1. Examination and report by the late W. H. Twelvetrees, 1900
2. Examination and report by the late G. A. Waller, 1902
3. Examination and report by Lawry Waterhouse, B. E., 1913-1914
4. Systematic sampling of the mine by A. G. S. Moreton under direction of the Hartwell Conder A.R.S.M., M.A. then State Mining Engineer, 1914.
5. Examination and report by Loftus Hills, M.B.E., D.Sc., 1920.

The information and data supplied respectively by these officers embraces all matters pertaining to the geographical position, physiography, geology, estimated quantity of ore, tin content of the ore bodies, water supply and general prospects of the property.

During the long period covering the time of discovery of the field to the present day considerable quantities of Tin Oxide have been won from the Mine both in the form of alluvial tin and from the result of crushing lode material.

All efforts to carry on productive work in the past have been under very disadvantageous circumstances, and, in consequence, a continuity of operations on a satisfactory basis was impracticable.

In past years a considerable amount of capital has been spent in various directions on the property in the way of developing the ore bodies and in providing plant for power and ore treatment. All such efforts have been unsuccessful.

Some few years ago a Company was formed in Australia for the purpose of providing capital to work the mine on a large scale basis. The amount of money raised proved to be insufficient to carry the work through and in consequence operations were abandoned.

About 2½ years ago further capital was raised in England and a new Company formed to take over the assets of the former Company. Active work was commenced in March of last year under the supervision of Mr. J. H. Jeffers, the Company's Engineer, who came from England for that purpose.

During July, 1927 a commencement was made with the construction of a Hydro-Electric Power Scheme which has since been completed at a cost of £20,000. The erection of concentrating plant and aerial ropeway for ore transport purposes was then proceeded with and completed about a month ago.

The total expenditure of the present Company, according to official figures supplied, is Fifty five thousand five hundred and sixty seven pounds (£55,567).

The Mine, concentrating plant and power plant have now been brought to a stage to enable productive work to be proceeded with without further expenditure in constructional work.

The writer witnessed trial runs with various units of the crushing and concentrating plant, also the aerial ropeway.

TRANSPORT

On commencing operations, the first obstacle confronting the Company's Engineer was the question of transport of heavy machinery from the terminus of the Government narrow gauge railway at Comstock to the Mine, a distance of 11 miles. The route had formerly been used as a road and had been converted into a wooden tramway, which proved to be inadequate. The wooden rails were removed by the Company, the road gravelled, repaired generally and made suitable for transport of heavy material by motor lorries.

The reconstruction of the road was completed in June last year, the total cost to the Company being £3,000. The Public Works Department assisted to the extent of £600. That section of the road between Zeehan and the terminus of the Comstock Railway was also reconditioned and rendered suitable for heavy motor traffic.

PLANT AND MACHINERY

The following includes a list of the various essential works carried out by the Company in the way of mine equipment preparatory to productive operations:-

Hydro-Electric Power Scheme - Water for this is obtained from the Cumberland Dam situated on the Mine leases. Catchment Area 3 square miles. Average depth of water 8 feet approximately Depth at outlet 19 feet.

Outlet through 22 in. diameter mild steel rivetted pipe line controlled by sluice valve.

Head race to pipe line 59½ chains in length including 15 chains of wooden flume, remainder rock cutting and earth excavation.

Pipe-line - Forebay of reinforced concrete. Intake is provided with silt discharge, grizzly and screens.

Total length of columns 1960 feet. Vertical Head 760 feet. The pipes which are flanged are constructed of mild steel welded plate. Bottom section 14 in. diameter ⅝" plate and graded up to 18" diameter of 3/16" plate. The column is held in position by 9 reinforced concrete anchors, with expansion joints (8) behind each. Any section of column can be removed if desired. Column is supported on concrete blocks and substantial wooden trestling.

Power Station - This consists of one 700 Brake Horse Power latest type Boving Pelton Turbine. Speed 1,000 R.P.M. Governed by Boving patent oil pressure Governor.

The Pelton Wheel is direct coupled to 563 K.V.A. British, Thompson Houston Alternator generating 6,600 volts, 3 phase, 50 cycles. Complete Switch Board, high tension and low tension controlling outgoing mains, one to mine workings and one to concentrating plant. The reticulation of the low tension is to convenient points for use. The foundations for power plant consist of reinforced concrete, housing of wood frame building covered with G.C. iron. Building is provided with I section girders for overhead crawl and hoisting appliances.

Incline steel tramway runs parallel with pipe column and is indispensable for transport purposes, it is provided with an electrically driven winch and connects with steel tramway extending for half a mile in the direction of the mine workings. A small auxiliary power plant consisting of 1 Petters Crude Oil Engine connected with 25 K.W. Generator serves as a stand by. It was used for power during constructional operations and is separately housed. All transmission lines and transformed stations are complete. Voltages for power 415 for lighting 230. Transmission lines are designed for double the present station capacity. Pipe column is of sufficient diameter for duplication of present generating set. Provision for a second take off has been made. The Power plant is automatically controlled.

Crushing and Concentrating Plant. - This consists of 1 Jacques No. 5 Gyrotory Crusher capacity 40 tons per hour reduced to pass through 2" ring. Stone from crusher delivered to mill hopper by conveyor belt. Crusher is driven by 50 H.P. Electric Motor.

1 No. 54 Marcy Ball Mill of latest type mechanically fed from mill hopper, rated capacity 200 tons per day. This mill is operated by a 50 H.P. G.E. Motor through Morse chain drive. It is fitted with patent centre feed and scoop feed combination.

This is the first instance in Tasmania where the stamp battery has been discarded in tin dressing plants for the modern and efficient Ball Mill.

Mill discharges to 1-6' x 3' Leahy vibrating screen which controls crushing, oversize from screen returned to mill by bucket elevator. Concentrating plant is equipped with the latest type griding pans, sand pumps, classifiers, concentrating tables, etc. Flooring of mill building is constructed of concrete, all foundations for heavy machinery are of substantially reinforced concrete. The mill building is provided with a substation control room in mill. Adjacent to mill building is one 250 K.V.A. Transformer station.

Separate electrical motors are provided for the various crushing and concentrating sections of the plant.

The Mill building is constructed of heavy wooden framing covered with G.C. Iron.

ORE TRANSPORTATION

An aerial ropeway of the mono-cable system has been constructed to connect what is known as the "Black Face" at the Mine Workings with the milling plant.

The distance between Terminals is 3800 feet. It is of the latest design made in Australia by Ropeways Ltd., having a rated capacity of 25 tons per hour with 22 skips each to carry 6 cwt. of stone.

With additional skips deliveries could be increased to 30 tons per hour.

The steep mountain side over which the Ropeway has been constructed is extremely rough. The Rope bearers are supported on steel towers resting on concrete foundations. A very effective design of tension gear is constructed at the lower terminal at the unloading station at the Mill end. The ore is delivered to a bin of 200 tons capacity which is provided with loading chutes for convenience of trucking to Crusher.

The Ropeway owing to steep inclination is self-acting, but for convenience of control is geared by spur and pinions and belting to one 15 H.P. Electric Motor. The loading station is situated in a position that will command deliveries of ore from the Lower Level tunnel at the "Black Face" mine workings. At this station a storage hopper of 200 tons capacity is constructed. Present deliveries of ore will be obtained from the 85 ft. level at the Black Face. Ore from this level to loading station hopper is delivered by means of a self-acting double track tramway.

MINE WORKINGS

The Mine workings are situated at various points somewhat remote from each other. There are twelve known lodes on the leases in a more or less developed state and they carry varying quantities of tin ore. Particulars of the estimated quantity of ore in these lodes and the tin ore contents have been supplied by officers referred to and need not be repeated here.

Since the date of Dr. Loftus Hill's report very little developmental work has been carried out excepting at the Black Face.

The Aerial ropeway has been placed for the specific purpose of obtaining supplies from this face. The immediate future of the Mine will depend upon the results obtained from mining operations on this particular lode. On the commencement of productive work preparations can be made to provide transport facilities from other known sources of payable stone.

The former incline haulage track which runs roughly parallel with the aerial ropeway could with small expense be re-laid with steel rails and provided with necessary equipment to deliver stone to the unloading station of the Mine ropeway hopper.

The lode formations which the ground tramway was designed to connect with could not be conveniently served by the Aerial ropeway, hence the advantage of having a means to augment ore supplies obtained from other sources.

ORE BODIES

Black Face Lode - In the foregoing it is stated that the immediate future of the Mine will depend upon the results obtained from the treatment of stone mined from the Black Face Lode, that is without incurring further expenditure other than on productive operations. Under the circumstances it is unnecessary to here refer in detail to other sources of ore on the Mine seeing that the Black Face lode is the only one at which deliveries

for milling can be obtained without additional constructional work.

Subsequent to the last official report on this ore body, by Loftus Hills, D.Sc., a considerable amount of developmental work has been carried out by the Company.

Taking the surface at Munro shaft as a datum level, the level from the top of the ore bin at the Aerial ropeway loading station is 220ft. below the former. At this point a tunnel has been driven in the direction of the Black Face lode but is not sufficiently advanced to reach it.

The next level is driven at a point on the lode 115 feet below datum, the vertical dimensions being proved to be nearly double it was at the time Dr. Hills made his report.

At a vertical depth 85 feet below datum, a tunnel driven under the floor of No. 1 open face on the Black Face lode is connected with the latter by a rise. No. 1. open cut level is 50 feet below datum.

In early days of the field it is authentically recorded that 720 tons of stone treated in the old stamp battery from No. 1. open cut of the Black Face yielded 12 tons 18 cwt. 22 lbs. of high grade tin concentrates, which is equivalent to an average of 1 per cent. of metallic tin in the crude ore. This face at present shows a width of over 20 feet of ore of similar grade to that removed.

No. 2 open cut is situated at the entrance of the 85 ft. tunnel level, a massive face of ore is exposed here, the outcrop of the lode rising 30 to 40 feet above. This face is within a few yards of the loading hopper of the self-acting tramway.

ORE RESERVES

The estimation of ore reserves made by Dr. Loftus Hills in 1920 have not been materially altered excepting in respect to the Black Face lode to which a considerable accession of what may be termed proved ore has been made. The writer in making the examination to which this report refers confined attention to the Black Face only.

To systematically sample this ore body would occupy more time than the object of the present examination demands.

There is sufficient ore in sight which can be mined by open face methods to keep the plant crushing to full capacity for at least a year providing the ore body maintains its width to the 115 ft. level. From indications showing there is not reason to doubt that it will persist below the 220 ft. tunnel level.

From a number of crushing and vanning tests made by the writer from samples of ore taken from points where exposed in the workings well payable prospects of tin were obtained. The estimated tin content of 0.7 per cent. made by officers of the Company should be exceeded in actual treatment.

ORE TREATMENT

The Marcy Ball Mill installed at the plant is designed to treat 200 tons of ore per day. To commence with half that quantity would be a fair amount to handle until the various concentrating units are adjusted to full working capacity.

The ore of the Black Face Lode consists of quartz tourmaline the latter is to great extent softened, which obscuring the quartz gives the stone a dark appearance. Tourmaline in that form is readily carried off in concentration, the quartz matrix also being of low specific gravity which with the absence of any heavy constituent in the ore, renders it an ideal class of stone for the separation of the relatively heavy particles of tin oxide it contains.

The tin ore in the Black Face lode is well distributed through the stone although enrichments in the softer portions of the ore body are not uncommon. The tin oxide occurs in fine crystal form and in colour resembles chocolate.

Assuming that the plant treats on an average 100 tons of ore per day, basing the recoverable tin content at 0.7 per cent. metallic tin, the daily yield would be 18 cwt. of tin oxide of an approximate net value of £100. The total cost of mining, transportation and treatment should not exceed 10/- per ton, with open face methods of mining which it is possible to adopt to the greatest advantage on the Black Face lode to a considerable depth below the outcrop.

WATER SUPPLY

Particulars of the capacity of the Cumberland Dam have been referred to in the foregoing. So far as power is concerned the Company is fortunately situated. The storage capacity of the dam is sufficient to ensure a full supply for all purposes throughout the year. For dressing purposes at the mill site, present requirements can be obtained from streams flowing from the higher ground nearby. For the dry season provision has been made by the construction of a water race from Packers Creek to a point below the mill site from which it will then be raised to tank at mill by an electrically driven centrifugal pump.

PRODUCTIVE OPERATIONS

The Company recently reached a stage in which productive work could be commenced, but owing to exhaustion of funds with which to carry on, suspended all work pending arrangements being made for further capital.

Every reasonable facility has been provided by the Company for convenience of the employees. Camp accommodation is arranged for 120 men. The camps are substantially built wooden structures with G.C. iron roofing and are situated at various points on the mine to suit the convenience of the workmen.

There are two residences for officials, also a boarding house conducted under the supervision of the Company.

The mine is provided with two stores which are well stocked with necessary mining tools, etc.

Fitters, blacksmiths and carpenters shops have been built and are provided with latest equipment in the way of mechanical and hand tools and appliances.

For transportation the Company possesses one 6 wheel Carrier Lorry, 2 one ton Ford trucks, one private motor car, 4 horses and harness.

FINANCIAL POSITION OF COMPANY

The appended schedule of costs of the various works and amount paid in wages was supplied by officers of the Company.

The Company some months ago exhausted its funds and a sum of £22,000 was raised by the issue of debentures for that amount in addition a further sum of £3,000 is owing to sundry local creditors.

The Company in addition to the expenditure on the Federation Mine, purchased an adjacent property for the sum of £3,000. On this a 5 head stamp battery was erected and a limited tonnage of ore treated with satisfactory results. Unfortunately the quantity of payable ore was very limited and following a brief period of activity operations ceased. If the Company had not been compelled to incur the heavy expenditure on the Trial Harbour road from Zeehan and confined its operations solely to the Federation Mine, the amount of capital expended in the district would have been sufficient to carry through to the productive stage.

CONCLUSION

The Company holds eleven mineral leases totalling 548 acres and eight water rights totalling 74 sluiceheads.

The temporary cessation of operations following the completion of constructional work at the Mine with the consequent addition of a large number of men to the ranks of the unemployed is a severe blow to the district. It will be noted that during the brief period the Company has been carrying on operations in the district the sum of £26,225. 7.10d. has been distributed in wages.

In addition to the disbursement of such a large amount of money in wages in a brief period, the advent of the Company has been the direct means of affording the residents of Zeehan district an outlet by road to the seaside, a much needed utility which is availed of to the fullest extent during the summer and autumn months of the year. There is every probability of this road being used in the future as a connecting link from Corinna and Waratah to the Main Road system of the State.

The future success of tin lode mining in Tasmania will depend to a great extent on the result of the operations of the Federation Company. In addition to the more modern crushing appliances new and improved ore dressing appliances have been installed.

The Power Scheme completed by the Company is certainly a great asset to the district and should eventually prove the means whereby other mines will become established in the neighbourhood. The want of cheap and continuous power has been a factor which has

greatly retarded progress in this part of the western mining fields.

A number of men are remaining in the vicinity of the field awaiting a resumption of work.

The Company will no doubt by some means raise sufficient capital to enable productive work to be commenced. To carry this into effect would cause considerable delay and expense in keeping the plant from deteriorating through idleness.

The present situation of the Company is somewhat unusual. It possesses a complete modern plant, including power, crushing and concentrating units and transport facilities. It has used all present available capital in constructional work, all preparations are complete to start productive operations without delay, but it has not sufficient money in hand to carry on until returns on ore production can be realised on, to continue work.

All that now remains to be done is to employ the necessary labour to supervise and conduct the various operations when money to pay wages, etc. is forthcoming.

The prospects at the Mine are sufficiently encouraging to venture the opinion that with the commencement of operations a good margin of profit over and above working expenses will result.

Taking all circumstances into consideration, the writer is of the opinion that this is an instance where the Government would be justified in extending assistance to the Company to enable it to commence productive operations without further delay.

I wish to record my appreciation and thanks to the Company's engineer, Mr. J. H. Jeffers for information placed at my disposal and assistance rendered, also to other officers of the Company.

J. G. Scott
STATE MINING ENGINEER.

Mines Department,
Hobart.

28th September, 1928.

FEDERATION TIN MINES LTD.PARTICULARS OF EXPENDITURE.POWER -

Power station	£5115.	6. 7		
Pipe Line	5252.	9.11		
Haulage	2680.	8. 2		
Diesel set	763.	15. 6		
Cumberland Race	1333.	11. 9		
Transmission Lines	2011.	17. 2		
Battery Sub-station (material only)	496.	10. 0		
Miscellaneous Electrical Plant (A.G. E.)	2346.	16. 9	£20,090.	15.10

AERIAL ROPEWAY -

The amount does not include 10% due on £3760.3.5. or engineers or erectors fees account for which are not to hand

5290. 9. 0 5,290. 9. 0

MAIN MILLING PLANT -

6577. 2. 4. 6,577. 2. 4

CONSTRUCTIONAL WORK, BLACK FACE (Mine)

697. 5. 9 697. 5. 9

MINE DEVELOPMENT -

3935. 8. 5 3,935. 8. 5

GENERAL TRANSPORT -

362. 18.10 362. 18. 10

SUNDRIES - Including horses, tools, repairs, renewals etc.

5246. 1.11 5,246. 1.11

EXPENSES IN CONNECTION PLANT -

2434. 4. 1 2,434. 4. 1

BUILDING AND CONSTRUCTION -

2389. 14. 6 2,389. 14. 6

ROAD CONSTRUCTION - Including Government grant

3662. 11. 8 3,662. 11. 8

MECHANICAL TRANSPORT, LORRIES ETC.

2500. 7. 8 2,500, 7. 8

WAGES, RILEY & GREY AREA -

1814. 15. 4 1,814. 15. 4

AMOUNT PAID FOR RILEY-GREY LEASE

3000. 0. 0. 3,000. 0. 0

TOTAL

£55,567. 11. 3

Wages paid amount to £26,225. 7. 10.