

77

REPORT ON THE GENERAL ASPECTS OF THE Mt ZEEHAN SILVER MINES

4 August 1889

John Provis

Pressland House,

Hobart,

4th August, 1889.

Sir,

Herewith I have the honor to hand you my Report on the general aspects of the Mount Zeehan Silver Mines, and the results of my examinations as to the best methods of treating the ores from those mines.

I have purposely considered the prospects of the district from a general point of view, without particularizing any one property.

In the selection of a smelting centre, I have carefully considered the advantages possessed by each locality before arriving at any conclusion.

I trust that the remarks expressed in the latter part of my Report will lead to greater activity in the development of the mines, and that before long the Mount Zeehan District will prove an important contributor to the industry and wealth of your Colony.

I have the honor to be,

Sir,

Your obedient Servant,

(sd) JOHN PROVIS.

The Honourable,

The Minister of Lands and Works,

HOBART.

77

3/7

GOVERNMENT GEOLOGIST

REPORT.

The silver mining district of Mount Zeehan is -- situated on the West Coast of Tasmania, and is known to extend over an area of 38.5 square miles on the north side of the mount of the same name.

The physical aspect of the country is mountainous, but is less rugged and broken in the immediate vicinity of the mines.

The hills are densely covered in timber, with a -- heavy and almost impenetrable undergrowth, but in places are open patches covered with the button-grass everywhere prevalent on the West Coast.

In the creeks and gullies between the hills are perennial streams of fresh water, and throughout the whole district wood and water exist in great abundance for all mining and smelting necessities.

Geology - The rocks traversed by the silver-bearing veins are of the Silurian age, and composed mainly of slates and schists, in which are occasional dykes of quartzite and boulders or masses of a siliceous ironstone, often passing into a brown ferruginous quartz. Resting on these slates is a deposit of white granular quartzite in the form of coarse gravel and fragments.

The slates are in the vicinity of the mineral-bearing veins, frequently soft and friable, and lose their slaty texture. They are also coloured from brownish yellow to deep brown from the masses of ironstone they enclose.

The general course of the mineral-bearing veins or lodes is N.23° W. There are also several cross-veins, and a few of considerable size, which run about N.30° E.

The cross-veins are more commonly found in the flats between the hills, and several of the smaller veins -- occurring in different parts of the district in various directions will probably prove on further development to be branches and feeders of the larger veins.

The width of these veins vary very considerably, the smaller ones only averaging a few inches, while the larger lodes open out in places to 8 feet or 10 feet in width.

Nearly all these veins carry galena ore right from the surface, which is of good quality. I saw several -- places where the galena ore crops out at the surface, and could be traced for some distance along the surface.

The larger veins can be traced for a long distance at surface; one or two being traced continuously for upwards of a mile in length.

I noticed that those veins which run west of north appear more prominent and masterly than those whose bearing is east of north.

The vein formation is principally clayey and -- siliceous ironstone, with gozzan and galena. I have also found the following minerals occurring in these veins; viz., Zinc Blende, Iron Pyrites, Cerusite, Anglesite, Native Silver (in one instance), Calcite, Barite, and

4/7

Quartz With some of the galena is also mixed small quantities of antimony.

The width of the galena ore exposed varies from 4 inches to 4 feet. I carefully measured a large number of the workings, and found that the average width of galena was 10 inches. Two measurements averaged 18 inches in width, while in another place (under water at the time of my visit) the manager states that the galena ore was 4 feet in thickness. This was afterwards corroborated by an independent statement from another source.

I very much regret that so many of the deeper workings were under water during my stay in the district and could not be examined, as I should like to have made an estimate of the total quantity of ore already exposed in the district, but with the meagre details at my disposal this is impossible.

The whole of this galena ore carries silver in payable quantities.

I made a very large number of assays, and find that the smaller veins in the centre of the field are richer than the larger ones. The following are the actual assay results obtained from eighteen samples of fairly clean ore obtained from different veins. Fractions of ounces have been purposely omitted, as the samples are only intended to convey a general idea of the silver contents of the galena :-

No. 1 yielded 43 oza. silver per ton					
2	"	88	"	"	"
3	"	100	"	"	"
4	"	84	"	"	"
5	"	32	"	"	"
6	"	102	"	"	"
7	"	120	"	"	"
8	"	152	"	"	"
9	"	44	"	"	"
10	"	57	"	"	"
11	"	96	"	"	"
12	"	64	"	"	"
13	"	132	"	"	"
14	"	156	"	"	"
15	"	64	"	"	"
16	"	52	"	"	"
17	"	27	"	"	"
18	"	26	"	"	"

Average result of eighteen samples being 79.9 ounces silver, and 65 per cent. lead. Six samples of poor and dirty ore yielded the following results :-

No. 1 yielded 16 oza. per ton				
2	"	12	"	"
3	"	12	"	"
4	"	14	"	"
5	"	31	"	"
6	"	23	"	"

This class of ore will require further treatment before smelting. The gangue, however, is light, and may be easily removed by jigging.

Taking into consideration the whole of the Mount Zeehan ores smelted at Dry Creek, as well as the assays made on the field by myself, I estimate the average value of the clean or first-class galena ore to be 60 per cent. lead and 65 oza silver per ton. This, according to the Dry Creek Company's tariff, is worth £11. 9. 0 per ton at Dry Creek, after

deducting smelting charges and losses, but without including the freight charges to Adelaide, which, in consequence of the dangerous shipping at Trial Bay, are exceptionally heavy.

There are now about 400 tons of ore broken and lying around the different claims in the district.

Treatment of the Ores - Upon the economic treatment of these ores will depend the whole future of the field.

As far as present developments show, the only class of silver ores found is argentiferous galena; but it is quite probable that in the outlying portions of the district, and near the higher spurs and ridges, other classes of ores will eventually be discovered.

In silver-mining, even where large deposits of ore occur it has generally been found more advantageous to smelt all the ores at one common centre than for each mine to have its own smelting establishment. This is particularly applicable to the Mount Zeehan District, as none of the veins are very large. Moreover, successful smelting requires scientific supervision and skilled labour only attainable by years of special study and training.

Another important advantage in smelting at one common centre is that ores of different character and chemical -- composition can be suitably mixed in such proportions as would be conducive to economy in costs of smelting and losses by volatilization and rich slags.

The establishment of such works would be of immense - help to the district, as the mining companies could then concentrate their whole attention and capital to the development of their properties, and obtain the full value of their ore in cash every week.

The selection of a suitable locality will depend upon the following conditions, viz :-

- I. Easy accessibility and cheap freights from the mines.
- II. Cheap and constant supply of fuel.
- III. Suitable and cheap fixtures fluxes and water supply
- IV. Cheap delivery of smelted bullion to the market.

I have assumed that the labour conditions are nearly equal between those centres likely to be suitable for smelting the Zeehan ores.

The difficulties attending cheap smelting at the mines would be the scarcity of suitable fluxes, and the extra expense of conveying the silver-lead bullion to the coast, as the conveyance of fluxes to Mount Zeehan and bringing the bullion down to the coast would form a greater bulk than the conveyance of the raw ore to the coast, while the cost of fuel (if charcoal was used) would be about equal in both -- places. The cost of coke would be very considerably dearer at Mount Zeehan than at the coast.

If the line of railway now under consideration between Strahan and Mount Zeehan be constructed, I consider that Strahan, being the natural outlet for the district, will, from its accessibility, and from the fact that supplies of fluxes are obtainable within easy distance, prove the most advantageous site as a smelting centre for the Mount Zeehan Field. In arriving at this opinion I have very carefully

6/7

considered the claims of Hobart and Launceston as well as Mount Zeehan, and given due weight to the advantages possessed by each place.

On the banks of the Gordon River there is a very good limestone, which could be delivered at Strahan at a moderate cost. Ironstone may also be procured from Macquarie Harbour while on the banks of the Gordon and King Rivers, and on the shores of Macquarie Harbour, the forests of peppermint, -- myrtles, and other varieties of gums, will, with the manuka (ti-tree) and another tree locally known as cheesewood, supply charcoal of a fair quality. Water transit being available, all necessary supplies for smelting operations should be laid down at Strahan at a moderate cost.

Before arriving at this conclusion, I made several assays of the various ironstone outcrops at Mount Zeehan in order to ascertain whether they carried sufficient silver to pay for smelting. I found that the general average was from 2 ozs. to 3 ozs. although a few samples ranged from 4 ozs. to 8 ozs. silver per ton. The ironstone is also too poor in iron, and contains too much silica to be useful as a flux, although small quantities may be procured by careful sorting which is of good quality. The sorting would, of course, add considerably to the expense.

Hobart, as a smelting centre, has many advantages. In the neighbourhood of Sorell deposits of iron ore of fairly good quality exist. An analysis of three samples kindly made by Mr. Ward, the Government Analyst, showed :-

	i.	ii.	iii.
Peroxide of iron	61.4	70.0	74.3
Insoluble residue, chiefly silica	26.4	15.3	9.0

Sample No. iii would prove the most suitable as a flux. This iron ore could be laid down at Hobart very cheaply.

The limestone in the district is not nearly so good for smelting purposes as that on the Gordon River, but will serve fairly well for galena ores, although it will be found -- expensive to use when the silver ores contain a considerable amount of silica and alumina.

New South Wales coke and English coke could also be -- delivered at nearly the same price as is paid in Adelaide. I have no knowledge of any foundry coke being made from Tasmanian coals. Being a port of call for ocean steamers, satisfactory arrangements could probably be made for shipping the silver-lead bullion to Adelaide or Europe to be refined. These advantages are, however, considerably reduced when the difference between the freight on raw ores and silver-lead -- bullion is taken into account, as the current rates of freight between Strahan and Hobart are comparatively high; consequently it will be more advantageous to smelt at Strahan and ship the bullion to Hobart than to ship the very much larger quantity of raw ore from Strahan. Launceston is less favourably situated than Hobart, as bullion going to Adelaide or Europe would have to be transhipped to Melbourne. It is more distant from Strahan than Hobart, and at present there is only a fortnightly service between the two ports.

The actual cost of smelting at Strahan would largely depend on the quantity produced by the mines. Charcoal should be procurable at 42/6 to 47/6 per ton; New South Wales coke would probably cost about 60/- and best English foundry coke 72/6 per ton.

Until the mines are opened up and a regular output maintained, it will probably cost 60/- per ton, but when the supply is sufficient to keep a works in constant operation,

7/7

it could be done cheaper. It will not be possible at present to smelt as cheaply as at Dry Creek, because English coke can be laid down cheaper there, and the refined lead and silver sent to the various European, Indian, and China markets on better terms.

Present Aspects and future Prospects of the Mines -
Owing to the very small amount of work done, and the very superficial character of the workings, I regret that I am unable to arrive at any estimate as to the total quantity and value of ore now exposed in the district. In four of the claims the lodes are being systematically proved and the properties developed in a miner-like manner; but at the time of my visit there were only sixty or seventy miners on the whole field, and most of the claims were idle and the workings flooded with water.

Of course, the difficulties always attendant on the development of a new district will, in a large measure, account for the very slow progress made and the languid state of affairs now existing. The high rates of freight and the uncertain communication by steamer have also been contributing causes which have retarded the progress of the field, and this matter is not likely to improve much while the miserable apology for a harbour at Remine serves as the outlet for the district.

The surface prospects are undoubtedly good, and many of them justify the expenditure of the capital necessary to prove them.

The veins hitherto discovered are small, yet the ore is of good quality, and, as far as the work has been done, the prospects of several of the claims are decidedly encouraging for the future.

With railway communication established to Strahan, it is quite certain that the surface ores can be worked profitably; and should the veins hold good in depth several of the properties ought to pay well. I am also of opinion that further discoveries will yet be made.

I cannot too strongly urge upon your Government the great importance of stimulating the mining companies into greater activity as soon as it is decided to construct the railway, if this be done. In many instances the difficulties have been unduly magnified, and there is not the amount of work done for the money expended that I expected to find.

If mining companies will begin in earnest and work -- their properties, and the Government construct the railway, the establishment of a smelting works at Strahan may be safely relied on.

(signed) JOHN PROVIS, F.C.S.

4th August, 1889.