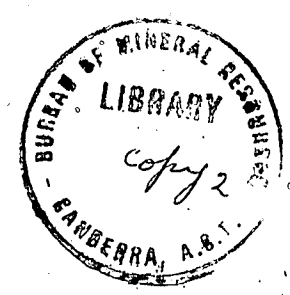


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REPORT 1942/6

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1942/6

MONTANA SILVER-LEAD MINE,

ZEEHAN, TASMANIA.

13 MAY 1942

The Montana Mine is situated about 2 miles to the north-west of the township of Zeehan, with which it is connected by road. Zeehan is connected with Burnie by the Emu Bay Railway, and with Strahan by the Tasmanian Government Railway.

The outcrop of a galena lode was discovered about 1886 by a Government prospecting party operating under the direction of the Mines Department, Tasmania. In 1937 a company known as the Montana Western Extended Silver-Lead N.L. was formed. In 1938 the company was reconstructed as the Montana Silver-Lead N.L.

During 1937 the shallow adit of the prospecting operations was extended by the Company, and later in the year a main shaft was sunk to 112 feet and the No. 1 level opened out at 100 feet depth. Some 50-tons of ore were sent to the Farrell Mining Company at Tullah for flotation tests. In 1938 driving and cross cutting was continued at the No. 1 level. Some 81-tons of ore were sent to the Farrell Mining Company for test and is stated to have contained 16.3-tons of lead and 1,921.6 ozs. of silver. In 1939 a winding plant was installed and the main shaft was sunk to a depth of probably 300 feet. A level was opened at 150 feet. In 1940 a milling plant was erected and electrification of the mine and milling works was completed. A limited amount of development work was carried out, but was stopped by the end of the year. Owing to electrical and mechanical difficulties only 852-tons of ore were treated. The ore yield 123.6-tons of concentrate stated to contain 79,838-tons of lead and 9,488-ozs. of silver. In 1941 work was devoted to milling of the ore on the surface and the Company reports that it was completed by the 12th February, 1941, and that 1,900-tons of ore yielded 225.25 tons of concentrate.

A copy of a report by Dr. H. Herman, B.C.E., M.M.E., D.Sc., (written about the time of the closing of the mine) is attached and records the position at the mine at that time.

It is obvious that a considerable amount of development work was conducted at the No.1 level and a small amount at the No.2 level. The total amount of ore treated, however, appears to have amounted to approximately 2,120-tons. Treatment of 1,900-tons at the company's mill yielded 225.25-tons of lead concentrate. The 123.6-tons of concentrates produced in 1940 contained 79,838-tons of lead and 9,488-ozs. of silver. The concentrate produced in 1941 contained 66-tons of lead. It would appear that the mill was erected before any appreciable ore reserves were developed and that apart from a few trial runs and the treatment of the ore raised to the surface, the mill has not operated continuously.

The Company has incurred two mortgages - the first of £2,800 to the Hydro-Electricity Commission and the second of £2,588 to the Tasmanian Government. There still remains 10½ pence per share uncalled, but this would not be forthcoming under present conditions. The mine shut down in February, 1940, on account of the low price of concentrates.

The position at the time of our visit was that there were no defined ore reserves, the shaft, 280 feet deep, was full of water and the practically unused concentrating plant was idle and deteriorating by exposure to the weather. The Company has a caretaker on the lease and claims that the difficulty of marketing

concentrates prohibits the working of the mine. However, in view of the exhaustion of available capital and the very limited ore reserve position, it is evident that the affairs of the Company were badly handled and that the erection of the concentrator was not warranted.

The Tasmanian Government is anxious for the resumption of operations at this mine as it would generally assist the township of Zeehan. The Company has informed the Tasmanian Government that six months' development work would be necessary to develop sufficient ore for the mill, and that an amount of £10,000 and a labour force of 50 men would have to be supplied by the Government for the work. It must be pointed out that many of the men resident in Zeehan who desire employment at Montana Mine are already employed in the Renison Bell field, and a daily bus service transports workers from Zeehan to Renison Bell.

Mining and milling plant on the lease comprise -

- Boiler and winding plant
- Type 40 Ingersoll Rand air compressor driven by 100 h.p. motor
- Eight rockdrills and necessary fittings
- One Pomona H4L pump
- 12" x 10" Jaw crusher
- 14" gyratory crusher and 6' x 3' vibrating screen
- Two steel ore bins about 25 tons capacity each.
- 6' x 3' tube mill with drag classifier
- One 4-cell Fagergren flotation unit pumps
- One 4-ft. Oliver disc filter and pumps
- Auxiliary pumps, piping and electrical equipment.

The mine is connected to the State Hydro-Electric power system.

A plant of this type is too valuable to be lying idle and can only be used for the re-opening of the mine, or transfer to mines producing minerals urgently required for war purposes. As regards re-opening of the mine a long unwatering and developmental programme must be carried out before any sustained production would be possible.

In view of the fact that an increased lead production can be obtained from other operating mines without expenditure of capital and diversion of manpower, it is recommended that no action be taken in regard to the re-opening of the mine, and that the plant be made available for the increased production of urgently required minerals elsewhere. The only justification for the re-opening of this mine would be if lead production is required in excess of the absolute maximum output of present operating mines.

(M.A. Mawby)
MEMBER, MINERALS COMMITTEE.

(P.B. Nye)
ASSISTANT GEOLOGICAL ADVISER.

21st April, 1942.

APPENDIX

DR. HERMAN'S REPORT ON MONTANA MINE

6/7
12 MAY 1942

"Albany"
8 Redan Street,
St. Kilda, S.2.

25th November, 1940

Mr. F.H. Tadgell,
(Messrs. Dickenson & Tadgell),
Manager, Montana Silver-Lead N.L.,
44-46 Queen Street,
MELBOURNE, C.1.

Dear Sir,

1. Pursuant to your letter to me of the 22nd ultimo, in which you conveyed to me the request of your board that I should furnish a report on the mine, and surface plant and machinery, I have visited Zeehan, inspected the mine mill and other plant, and conferred with the General Manager (Mr. Cornell).

2. I have assumed that it was not the desire of the board that I should spend much time on the geological features of the mine, which have already been described by Mr. Blake, Acting Government Geologist of Tasmania, in his report of 9/11/38; and that its paramount requirement is a discussion of the economic outlook for the undertaking.

THE MINE

3. Mr. Blake's general conclusions (page 6 of his report) were that three more or less parallel north-east trending lodes had been opened to some extent in the underground workings; that the Clarke lode (on which the levels have been mainly driven) was then the only one of importance; that in it two sporadic oreshoots, 100 ft. and 160 ft. respectively in length, had been partly opened up; and that they consisted of milling ore with minor quantities of first class ore, of which small tonnages only had been developed at that date; the deepest workings were at the 100 ft. level of the main shaft. He recommended certain developmental work at that level, and sinking of the shaft a further 200 ft.

4. I have not attempted to check and amplify the mine reports on the extent and ore-carrying values of the Clarke and other lode formations. This would take weeks of my time, with the assistance of at least two miners; much assay work, and, generally, be a costly business. I think the main objectives of this report may be reached by a shorter route.

5. At the present time the shaft is down about 300 ft. A level has been driven and other development work done at the 150 ft. level. A crosscut east is being driven at the 27A ft. (bottom) level to intersect the lode formation or formations at that depth.

6. The report of the then Mine Manager (Mr. W.C. Bentley) for the year ended 28/2/39 describes 1003 ft. of development, during the period, at the 100 ft. level. On this work Mr. Blake estimated the

average width of the lode (presumably for an aggregate length of 260') at probably about 3'.

7. The report of the General Manager (Mr. H. Cornell) for the year ended 29/2/40 (but evidently covering operations to 18/6/40) says that at the 150 ft. level in the south drive (on the Clarke lode) the lode varies from 5' to 1' wide for 145 ft. from the main crosscut, averaging 2' 6". In the North level to 124 ft. "the lode varied from 4" to 18" in width. Values were variable from splashes of galena to low-grade milling ore". From 87 ft. to 124 ft. "the formation steadily increased to 2' width of milling ore".

8. I have compared the summaries in (7) above with the widths and general descriptions of the lode in the Manager's weekly reports. I think a fair summary of them is that the south level showed, for a length of 125 ft., an average width of 2' milling ore; and the north level 4' of milling ore for the first 15 feet, beyond which, to 124 ft., the records indicate only occasional patches of ore, which should be discarded in estimating milling ore available. The milling ore at the 150 ft. level, between 145 ft. north of the crosscut and 124 feet south, may be reckoned, from the Manager's reports, as 140 feet long and a little over 2' wide.

9. Following the work referred to in section 7, the north drive has been extended to 153 feet from the crosscut without showing any improvement; the south level has apparently not been appreciably extended. Here I may mention that I am unable to check these measurements as I should like to do, because there has not been any addition to the data on the mine plan for the last 18 months.

10. The sporadic occurrence of ore values in the silver-lead formations of Zeehan is well known. Consequently an estimate of prospective ore based on work at the levels must be accepted with some reservation. Nevertheless, the records of the adit level and the 100 ft. and 150 ft. levels are, in my opinion, the best basis at present available on which to construct a view of the Montana mine prospects.

11. Of these three levels, that at 100 ft. is the most fully developed. If the ore bodies proved in it be taken as an average to be expected of lower levels, there would be, allowing for the flat underlay, about 10,000 tons of milling ore (with a little picked ore) for each 100 ft. of sinking. The ore proved at the 150 ft. level represents only about 3500 to 4000 tons for 100 ft. deep, but it is clear that at this level sufficient work has not been done to ascertain whether there is or is not a diminution in the average size of the ore bodies at the 100 ft. level. Neither may the adit level be taken as a guide to expectations below the 100 ft. level.

12. Systematic sampling and assaying of the orebodies as they were developed would have given full knowledge of their mineral contents. In the absence of that information the milling results to date may be taken as a guide; and these show, approximately, that about 6 tons of crude ore have yielded 1 ton of concentrates containing about 63% of lead, 11% of zinc, and 50 ozs. of silver.

13. The mine equipment seems adequate for present needs. Poppet legs, compressor, mine pump and drilling machines are apparently in good working order and reliable. The winding plant is doing all that is required of it, but both winch and boiler would probably have to be replaced if the mine should, in due course, develop into a regular and substantial producer. Mine plant buildings will later also require some overhaul. They are a poor lot, badly

built of old stuff and badly laid out. They will do for the present.

14. On the evidence available when it was located, the shaft site may have seemed to be a good one. But the main lode formation has apparently a flat underlay, and crosscuts to the lode at lower levels will probably be long and costly. A solution of this difficulty might in due course be to continue the shaft as an inclined one; but the alignment of the major axis of the shaft is not favourable to this course if the ore bodies in depth maintain their present approximate positions relative to that of the shaft.

THE MILL

15. The mill is substantially built and contains some good plant. Its position is, I think, an unnecessarily cramped one. It seems as though there was a strong desire to have it very close to the shaft - which is not important; with the result that the advantage of ample natural fall - which is important - has been missed.

16. Originally designed as a dry crushing plant, the mill has suffered somewhat in its layout and convenience owing to additions and adjustments involved in converting it to wet crushing. The main units of the mill and its present method of operation are indicated on the flowsheet at the end of this report.

17. Satisfactory operation of the mill is hampered by the following major disabilities -

- a. It operates on one shift only (8 a.m. to 4 p.m.). It takes about half an hour both to start and stop it. In such a plant, adjustments of feed, flow and generally obtaining even working often takes hours. Consequently, of the 7 hours of actual operation, it is possible that satisfactory conditions exist for a few hours only - possibly not at all. Next day this inefficient routine must be repeated. Even with an ore and mill of which operators have had much experience the aim should be to work continuously for at least 6 days a week; or alternatively, to have only one stoppage each week.
- b. Means have not been provided for proper control. There is no assayer and no assay plant. Hence the continuous check of head and tail values and character of the ore as it enters and leaves the various units of the plant cannot be made. The General Manager occasionally sends samples to the Tasmanian Mines Department at Launceston; and gets results perhaps a fortnight later, by which time they are ancient history, and of little use. The only routine tests that are being made are panning every hour or two the tails flowing to the slum dam. Even these tails are not properly sampled. (I have sketched for the manager a quite satisfactory continuous sampler that can be made at the mine for a few pounds).

18. The function of the Montana mill, treating its present crude ore, is to strike the best economic product subject to

- a. Leaving small lead and silver values in the tail.
- b. Eliminating zinc above 7% in the concentrate.

This objective calls for much thought and experiment in operation.

Today

- c. The tail losses are not known
- d. The lead content of the concentrate is low, and possibly may be considerably increased.
- e. The zinc content, at 11%, involves serious penalties for smelting, and possibly may be considerably reduced.
- f. The fineness to which the ore should be ground in the ball mill to make possible the improvements indicated in (c) and (d) and (e) has not been ascertained.

Other matters calling for attention are -

- g. Discharge from the crude ore bin to the jaw crusher is difficult and consumes too much labour.
 - h. The ball mill apparently requires finer feed to obtain a satisfactory throughput (say, 3 to 4 tons an hour, dependent on the hardness of the ore) and at the same time to grind fine enough to let the flotation unit do satisfactory work. This has led to a closer setting of the gyrex crusher, which now passes less than $2\frac{1}{2}$ tons an hour.
 - i. Even if facilities were at hand, it is not practicable to satisfactorily sample the cleaner cell of the flotation unit.
 - j. The drag classifier is not properly discharging its oversize to the ball mill. (The Manager and I have agreed on a slight alteration which may remedy most of this difficulty).
 - k. The bucket elevator, which is not enclosed, is spilling much of its feed (product from the gyrex and water) and making a dirty mess of the mill adjacent to it. It takes a boy at 7/- a day (who may later have to be a man at double the cost) full time to clean up this spillage, which has to be barrowed and shovelled into the ball mill feed.
 - l. There is insufficient grade in the chute from the cone classifier to the ball mill, and in the pipe from the ball mill to the flotation units.
 - m. Some motors and pumps are in pits difficult of access for attention.
19. I have above recited some of the defects of layout and operation of the mill because they are, in the aggregate, of importance. But I do not wish it to be thought that these defects are fundamental. Quite likely a pair of rolls between the gyrex crusher and the ball mill would enable the latter to attain satisfactory capacity and at the same time produce pulp of proper fineness. A separate flotation cleaner cell or cells may be necessary. Mechanical discharge from the crude ore bin, from a sloping bottom, would probably much reduce labour at present used and give more even feed to the jaw crusher. The cone classifier does not function well, but with further experience may be made to do so. I would like these comments to be regarded as illustrations only.

GENERAL

20. The manager's mine office consists of a very small room,

drab, unfurnished, and depressing. He has practically no accommodation for plans, papers or books. The room is used also as a part store and tool room. Men come in and out with tools, which are left for safer custody than can be found elsewhere. Every day the manager takes a large suit case, filled with mine books and papers, into Zeehan with him, and brings it back next morning. It must be difficult for him to retain an orderly mind, his self respect, and the respect of his men, when subjected to such conditions.

There is no proper accommodation for small (and valuable) stores, and no method of checking their ingoing and outgoing. I regard it as an urgent, if small, matter to provide something better both for the Manager's office and a store, and recommend that he be given immediate authority to expend £80 to £100 on the installation of a lined office and store in the building already partly completed for a store, repair shop and smithy. I have arranged with Mr. Cornell the general lines on which this work should be done.

21. I have discussed also with Mr. Cornell the lines on which the cost sheets recently supplied to him can be adapted to present both to him and the company's head office a rational picture of how expenditure at the mine is distributed.

22. If the insurance on plant is not subject to average, a sum of £1,000, or £1,500 at the outside, should be sufficient. Even in a bad bush fire, which would provide the worst conditions, it is inconceivable that more than a small proportion of the valuable plant at the mine and mill would be destroyed.

FUTURE WORK

23. At the 100 ft. level the development footage, exclusive of stoping, has aggregated, as nearly as I can estimate, about 1200. Of this, 1008 ft. was driven during the year ended 28.2.39, and cost £5,455/18/-, exclusive of head office administration. During the year ended 29.2.40 the shaft was sunk 200 ft.; other development was 572'. Allowing for a little stoping that was done, and that a foot of shaft costs about five times as much as a foot of driving, crosscutting or rising, the total development for the period was equivalent to about 1600 ft. and cost £6,867/6/11, exclusive of head office administration. The average cost for the earlier year was about £5/8/- per foot; for the later about £4/6/-. The average for the two years was about £4/15/- per foot.

24. For each 100 ft. sink below 300', with crosscuts prospectively lengthening rapidly at successive levels, development apart from stoping will probably entail 100 ft. of shaft sinking, and 1400 ft. of other work; and the cost thereof will probably be about £9,000, exclusive of head office costs. If there should be 10,000 tons of 3 ft. lode for each 100 ft. of sinking (section 11), the cost of stoping it out and delivery to the mill (estimated from figures given to me by Mr. Cornish, deputy mine manager), allowing for the filling of stopes and assuming mine overheads to be wholly charged to development, might be 25/- to 30/- per ton, or £12,500 to £15,000. Thus the total costs of developing and extracting 10,000 tons of ore in one year would approximate to £23,000 at the mine or to £25,000, including head office expenses - roughly, £2/10/- per ton. The cost of milling has yet to be ascertained by experience, but provisionally may be taken at 10/- per ton of ore milled, bringing the cost of mining and milling to about £3 per ton. At the present ratio of 6 tons ore to 1 of concentrates (section 12) the latter would cost £18 at the mine.

25. Concentrates already sold have been worth only about £8 at the mine; but, if they were marketed under pre-war conditions, and not subject to the heavy duty levied by U.S.A., they would probably be worth £18 at the mine.
26. It is clear from section 24 that it does not pay at present to stop and mill ore standing in the mine, and that the decision of the board to stop stoping for the present is wise.
27. The mill is treating barely 20 tons a day, at which rate, working one shift, it may take about 100 days of actual operations (say, 4 months) to deal with the ore at grass, estimated at about 2000 tons. I doubt the advisability of spending money on mill alterations (except minor ones) or additions until such a course should be warranted by
- Favourable results at the 300 ft. level at least
 - Much more favourable marketing conditions than now exist.
 - Better knowledge of the defects of the mill. This can be obtained only by regarding it at present as a pilot plant. Close observance of its operation is desirable over an extended period by an experienced millman. He should be equipped with an assay laboratory on the mine; or at least make constant use of the assay laboratory made available to the company by the Tasmanian Mines Department at the Zeehan School of Mines.
28. I asked Mr. Cornell if he were willing to postpone his tendered resignation until a successor is found, and he replied in the affirmative. As it seems that a long period will elapse after the ore at grass has been treated before the mill will again be operated a reduction in mine management costs should be sought soon by having only a manager competent to attend to the mine. Mr. Cornell, even if willing to stay on after milling is finished, has, I understand, not the necessary mine manager's certificate to continue without Cornish; and Cornish has a permit for operation with 12 men only, and apparently not a full certificate. Whether Cornish would be satisfactory in full charge I cannot judge; I do not know enough of his history.

SUMMARY

29. Whether the mine will, in due course, be profitable depends-
- Principally on developments at the 300-ft. and lower levels; and on
 - Better marketing conditions for concentrates
30. The course to pursue, pending favourable outcome of the events cited in section 29, should be, I think, -
- Complete milling of ore at grass
 - Concurrently to get all the experience of the mill's operation and defects practicable under the existing adverse conditions. This, of course, depends on Mr. Cornell.
 - It is not worth while appointing a new high-class manager, who would have nothing to do after a few months, except look after a few men underground.

- d. When milling of ore at grass has been completed (possibly before if a combined mining and milling man with manager's certificate can be obtained for \$10 or £12 per week), let Mr. Cornell's resignation become effective (I think he would really be glad to leave at any time) and continue with a mining supervisor only.
- e. Proceed immediately with office and store as described in section 20.

31. I should be pleased to attend a board meeting to elucidate, as well as I am able, any matters arising out of this report.

Yours faithfully,

(sgd.) H. HERMAN, B.C.E., M.M.E.,
D.Sc., M.Aust. I.M.M.

Consulting Engineer.

FLOW SHEET OF MILL OF MONTANA SILVER-LEAD N.L.:

ZEEHAN, TASMANIA.

