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MARIPOSA MINE
ZEEHAN, TASMANIA

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INTRODUCTION   527002

The progress of testing of the Mariposa Mine, in
the West Coast Districts of Tasmania, has been described
in periodical reports, and a complete background has
been supplied in special reports dated January 31st,
1951, and March 27th, 1951.

At the conclusion of the boring programme,
involving 2,751 feet of diamond drilling, it was decided
to abandon the option. The results obtained had not
been completely discouraging, but were nevertheless
considered inadequate to justify either extensive
further investigation or the exercising of the option.

To complete the records, and to set forth in
detail the reasons justifying the foregoing action,
the accompanying report is presented. It consists
of an analysis of the results of the drilling, and
estimates of the probable cost and profit figures
which would be experienced in operating the mine; the
report has been prepared by Mr. W.J. Cadwallender.
From the report it will be seen that while the tonnage
and grade of ore indicated by the drilling were not
far from what was expected, two special features
militate against the prospect. The first is the
unexpectedly prominent nature of the ground water,
which in the light of recent experience at the
nearby Oceana Mine could considerably increase capital
and operating costs. The second factor is that since
the testing of the prospect was begun, the power
situation in Tasmania has rapidly deteriorated. Twelve
months ago, there was every justification for expecting
that cheap hydro-electric power would be available
in liberal quantity and at low cost. Since then,
however, the supply position has greatly deteriorated,
and even well established customers are being rationed.
Thus, the provision of power from an independent plant
at the Mariposa Mine would be necessary, and would be
an unexpected capital expense. The availability of
ample hydro-electric power again in Tasmania is not
likely for some years, and certainly not until years
of abnormally heavy rainfall occur to counterbalance
the recent scarcity.

The Mariposa investigation cost approximately
£4,460, or slightly less than the estimate of £4,800.

Melbourne.
17th December, 1951.

THE MARIPOSA MINE, ZEEHAN, TASMANIA.

This report is presented as an addendum to the reports by Dr. M.D. Garretty, dated January 31st, 1951 and March 27th, 1951. The facts presented and recommendations made are based upon the information obtained from the recently completed diamond drilling campaign in which four holes were bored for a total footage of 2,751.

Summary of Drilling Results:

Details of ore intersections and ore reserve calculations are given in Appendix "A" where it will be noted, allowance has been made for overbreak and wallrock contamination.

The two drill holes in the centre of the field, No. 1 and No. 12, intersected ore of stopable grade. No. 1 hole revealed a grade of 10.7% Pb, 4.8 oz. Ag, 3.4% Zn, over a stoping width of six feet and was the best intersection obtained. No. 12 hole revealed ore containing 5.6% Pb, 1.6 oz. Ag, and 0.6% Zn, over a stoping width of 6½ feet. This grade is 1.7% Pb, below the general average for all holes, and as it is the deepest intersection, it cannot be regarded as encouraging.

Drill hole No. 2 at the north end of the known ore occurrence, encountered ore containing 4.1% Pb, 0.9 oz. Ag, 0.7% Zn, over a stoping width of 3½ feet. This intersection was made 200 feet below North Broken Hill Ltd. Drill Hole No. 4.

Drill hole No. 3 was drilled at the south end of the ore body, and although the lode channel was intersected, no ore was disclosed.

The weighted average grade and width of Holes no's 1, 2, and 12, are 7.4% Pb, 4.3 oz. Ag, 1.5% Zn, and 64 inches respectively and thus very closely follow the averages of 7.3% Pb, 3.8 oz. Ag, 1.2% Zn, over a width of 69.5 inches as obtained from the holes drilled by North Broken Hill Ltd. This fact in itself seems to offer encouragement and appears to show a maintenance of the original values. However, it must be emphasised that the southern hole, No. 3 failed to reveal ore and that the northern hole, No. 2 showed a considerable decrease in value, also the deepest intersection No. 12, was below average grade. These facts indicate that there is a probable decrease in grade at depth and possibly a decrease in the northern and southern limits of the ore-body.

Possible Ore Reserves:

Ore reserve calculations are given in Appendix "A".

The ore reserve calculations have been based on the diamond drilling results, and the limit of possible ore is indicated in Fig. 1.

The possible tonnage and grade of ore available is as follows:-

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Block	Width	Tonnage	% Pb	Grade oz. Ag	% Zn
A	69.5"	60,000	7.3	3.8	1.2
B	64"	39,300	7.4	4.3	1.5
Total	67"	99,300	7.3	4.0	1.5

Mining Considerations:

Facts revealed by the recent drill holes indicate that it would be necessary to allow for an increase in capital expenditure over that estimated in the previous reports. Each of the four holes drilled made very strong water at the surface. The water in Hole No. 12 rose to a height of four feet above the stand pipe when the rods were withdrawn. This indicates that a considerable increase would be necessary in regard to expenditure on pumping equipment together with the attendant increase in power installation and consumption. Heavy increase in the in-flow of water would adversely affect mining costs, and although full facts upon which estimates could be based are unavailable. It is considered that a contingent cost of at least 20/- per ton should be added to the early estimates of total costs.

Since the previous reports were presented the position as regards the availability of electric power from the Hydro-Electric Commission has deteriorated and severe power rationing has been introduced in Tasmania. The present outlook for new power consumers is poor, and it appears that a number of years will elapse before appreciable improvement is felt.

The capital estimate presented assumed that electric power would be available at the Mariposa mine, and the total estimated cost of installation for a 400 H.P. unit was £10,630.

The increase in pumping power required could easily be of the order of 300 H.P. and it would thus be wise to make provision for the installation of a 800 H.P. Diesel Electric Unit, which would cost approximately £40,000 excluding buildings etc., which would absorb another £2,000. The pumping equipment in itself could amount to another £15,000 and the net increase in capital costs would thus be of the order of £47,500.

Recoverable Value:

In the report dated 27th March, 1951, three different metal prices were considered in making an economic study of the ore values. In this case only the upper of those values is considered, i.e. a realised lead price of £A90 per ton of lead in concentrates.

The mill recovery is accepted as 95% for lead and 90% for silver and the recoverable value per ton is thus:-

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Lead:

    7.3 x 95/100 x 90 x 20   =   125/-

Silver:

    4.0 x 90/100 x 5.5   =   20/-

                        Total   145/-

        The recoverable value must provide for mining,
milling, development and administrative costs. The ore
available would thus provide the following working profit:-

Tonnage		99,300 tons
Recoverable value per ton		145/-
Probable Costs per ton as estimated	100/-	
Contingent pumping costs	20/-	
		120/-
Working Profit Margin		25/-
Total Working Profit		£124,100

        The available profit without considering purchase
of mine, exploration and taxation would thus be:-

Total Working Profit		£124,100
As estimated	£100,000	
Additional power and pumping commitments	47,500	
	£147,500	
Less possible salvage value	70,000	
	77,000	
Available profit		£47,100

Recommendation:

        A profit margin of £47,100 excluding purchase
consideration, exploration and taxation, and spread over
a period of 4 to 5 years is considered insufficient to
warrant the expenditure of £157,500 necessary to equip
the mine. This capital outlay would be increased by the
amount necessary for initial mine development, but this
sum has been allowed for in calculating the working costs.

        It is recommended that no further action be
taken in regard to the Mariposa Mine.

                                W.J. Cadwallader.

Melbourne.
10th December, 1951.

DETAILS OF GRADE AND WIDTH CALCULATIONS.

Fuller details of drill core loggings are given in the earlier report, and the following calculations refer only to the ore intersections quoted as a guide to possible widths and grade.

D.D.4 — Depressed 45°

From	To	T.W.	Grade			Product		
316'	317'8"	14"	10.3	1.3	0.4	144	18.2	4.2
317'8"	320'6"	24"	2.3	1.7	2.4	55	41	57
Overbreak Allowance		10"	-	-	-	-	-	-
Weighted Average		48"	4.2	1.2	1.3	199	59	61

D.D.5 — Depressed 35°

From	To	T.W.	Grade			Product		
194'	198	39"	5.4	2.3	1.7	210	90	66.3
198'	200'6"	23"	15.8	2.3	3.7	395	57	92.6
Overbreak Allowance		6"	-	-	-	-	-	-
Weighted Average		70"	8.7	2.1	2.3	605	147	159

D.D.6 — Depressed 45°

From	To	T.W.	Grade			Product		
277'	280'	26"	5.7	3.0	1.0	148	78	26
280'	283'	25"	3.0	1.1.	0.4	75	27	10
283'	284'	7"	12.5	2.8	1.1	87.5	19.6	7.7
Overbreak Allowance		6"	-	-	-	-	-	-
Weighted Average		64"	4.8	1.9	0.7	300.5	124.6	43.7

D.D.7 — Depressed 45°

From	To	T.W.	Grade			Product
231'	234'6"	30"	13.8	2.4	1.5	
Overbreak Allowance		6"	-	-	-	
Weighted Average		36"	10.5	2.8	1.2	

D.D.8 — Depressed 45°

From	To	T.W.	Grade			Product		
241'	245'	34"	7.5	9.2	0.7	254	312	23
245'	249'	34"	3.2	1.1	0.8	128	37	27
249'	252'	26"	3.0	1.2	0.8	78	31	21
252'	254'	17"	21.0	6.8	3.8	357	116	65
254'	256'	17"	5.5	1.0	0.4	94	17	7
256'	257'	8"	6.2	2.0	0.8	50	16	6
Overbreak All.		6"	-	-	-	-	-	-
Weighted Av.		142"	6.8	3.7	1.1	961	529	149

Values over cavities accepted as the same as proceding assay.

<u>D.D.9</u>   Depressed 45°

<u>Southern Orebody.</u>

<u>From</u>	<u>To</u>	<u>T.W.</u>		<u>Grade</u>			<u>Product</u>	
106'3"	167'9"	13"	5.5	1.5	8.7	71	19.5	113
Overbreak Allowance		17"	-	-	-	-	-	-
Weighted Average		30"	2.4	0.6	3.8	71	19.5	113

<u>Main Orebody.</u>

<u>From</u>	<u>To</u>	<u>T.W.</u>		<u>Grade</u>			<u>Product</u>	
211'	214'6"	30"	3.6	1.0	1.2	108	30	36
214'6"	215'11"	12"	21.0	5.2	1.1	252	62	13
Overbreak Allowance		6"	0.7	0.3	0.6	4	2	4
Weighted Average		48"	7.6	2.0	1.1	364	94	53

<u>D.D.10</u>   Depressed 45°

<u>Southern Orebody.</u>

<u>From</u>	<u>To</u>	<u>T.W.</u>		<u>Grade</u>		<u>Product</u>
156'	157'	8.5"	12.2	2.5	3.7	
157'	160'	25.5"				
160'	160'9"	6"	4.5	0.9	2.3	
Overbreak Allowance		6"	-	-	-	
		46"	7.2	15	5.2	

As the cavity represents the greater portion of the intersection the grade in this case has been taken as the arithmetic mean and adjusted for overbreak.

<u>D.D.11</u>   Depressed 45°

<u>From</u>	<u>To</u>	<u>T.W.</u>		<u>Grade</u>			<u>Product</u>	
375'6"	379'	30"	3.0	2.0	0.4	90	60	12
379'	382'	35"	17.7	20.6	0.9	618	720	32
382'	383'	8"	8.7	3.2	5.0	70	25	40
Overbreak Allowance		6"	-	-	-	-	-	-
		79"	9.9	10.1	1.1	778	805	84

Values over cavities taken as those for proceding section.

REPORT ON

THE MARIPOSA MINE

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Summary and Conclusions:

The Mariposa property on the West Coast of Tasmania is held by C. Loftus Hills, who previously gave North Broken Hill Ltd. an option. The option was not exercised.

The following report on the property is in part a compilation of material from previously existing records. For instance, the drilling information is obtained from North Broken Hill Ltd. reports, which became available to the vendor on the termination of the option. The geophysical date in an appendix are taken from the draft of a report by the Bureau of Mineral Resources.

The historical section of the report has been compiled in large measure from researches into old records and newspapers by Dr. Hills, the material has been checked personally by myself. The cost estimates appearing in the appendix have been prepared by Mr. Cadwallader.

As a background to considering a lead mine in the Zeehan district, it is well to remember that for the whole of the active life of the field lead was at a very low price. The average price was in the vicinity of £13.00 per ton. Since the returning charge per ton of lead, even when it fell after the establishment of the Smelters at Zeehan, was £7.0.0, very little margin of profit could be obtained even on the richest ore. There was no encouragement for development, or the search for new ore shoots. Only the richest ore could be mined.

The Mariposa Mine has already been sufficiently tested by the drive on the 140 ft. level, and by diamond drilling, to establish the existence of a limited tonnage of profitable ore. It is also clear that there is every prospect for a continuation of the ore beyond the drill hole intersections. Moreover, there is the possibility of larger ore shoots of a different character being present, but, as yet, undiscovered; there is here a clear analogy to the Oceana Mine at Zeehan.

Possibly as much as 8,000 ft. of diamond drilling might be necessary to establish clearly a sufficient tonnage of ore to repay capital with a handsome margin of profit. However, it is considered that 2,000 ft. of diamond drilling would be sufficient either to eliminate the property from further consideration, or to provide ample encouragement and justification for undertaking the remainder of the drilling.

It is recommended that the option position be tightened up, and that a programme of 2,000 ft. of diamond drilling be commenced. It is considered that £4,800 will cover all preliminary investigations, the cost of the diamond drilling mentioned, and subsequent appraisal.

Situation and Access:

The Mariposa property is situated 5½ miles south-east of the Zeehan Railway Station. It is 6 miles almost due east of the Oceana Mine.

Access to it is via the Zeehan-Queenstown
road. At 10 miles from Zeehan along this road is the
present end of the old Mariposa Tram which used to run
from Oceana Siding to Dundas via the Mariposa. The
formation is good but some of the rails have recently
been taken up. At ¾ mile from the road the old branch
line to the Mariposa workings leaves the main tram.
The bridge across the Mariposa Creek is down but the
formation is intact and has recently been cleared of
scrub to the mine. The length of this branch line is
40 chains.

Alternatively, access can be made from Oceana
Siding along the tram formation but one bridge is down.
The distance by this route is 6 miles.

History:

The Mariposa lode was discovered early in
1891 as a bold outcrop standing 10 feet above the
general surface level. Subsequent search along the
line of strike succeeded in finding both northern and
southern extension which become known as the Alamade,
Martini and South Novada.

In 1892 work was proceeding on all four
properties, but the awkward relationship of lode to
lease boundaries acted as a deterrent to all four
companies as in apparent from the accompany lease plan.

By May 1893 the Mariposa Shaft had been sunk
to 144 feet and an east crosscut driven 50 feet at the
140 ft. level. Driving on the lode at this period
seems to have been limited to 4 feet southwards. As
the lode did not show any width of solid galena work
was abandoned. While this work was going on the
Alamada and Martini drove adits to cut the lode and
sank shallow winzes in addition to considerable
trenching.

In 1896 the Mariposa Company re-opened the
mine and incorporated both Alameda and Martini in its
holdings. The pumping and winding plant installed in
1892 had been retained and was used for driving at the
140 ft. level northwards into the old Alameda ground.
The distance driven was 435 feet. This was reported
at the half-yearly meeting held in November 1897, the
mine manager (Peter Irvine) reporting:-

> "Five crosscuts had been put into the lode at
> intervals of 40 ft. to 100 ft., proving the
> width to be 5 ft to 13 ft. of milling ore,
> and Mr. Irvine added in his report that enough
> had been done in the mine to prove it to be
> second to none on the Zeehan and Dundas fields.
> As regards future operations, he advised that
> the shafts be sunk to a deeper level and driven
> into the lode. He had no fear of the result.
> The balance sheet was read and showed expenditure
> to be £1,493.17.9, there being a credit of
> £230.3.3." (1)

At the half-yearly meeting in April 1899 the

(1) Z. & D. Herald 4.11.1897.

credit balance was £95.3.3. At that time all the
ore at grass had been sold to the newly established
Zeehan Smelters. Negotiations were in progress for
introduction of new capital. These efforts failed
and the company ceased operations.

In 1909 K. Borley secured the area, relaid
the tramway with wooden rails and produced several
parcels of oxidised ore from the near-surface and
sold them to the Smelters. He had 200 tons ready to
send to the Smelters when Twelvetrees visited the
mine in August 1909. It is doubtful whether any
further work was done and it may be accepted that the
property has lain idle since that date.

Montgomery reported on the area in 1893.
There is nothing by Waller concerning it. Twelvetrees'
account in Bulletin No. 8 is very meagre.

Output and Profit:

There has been no stoping at the 140 ft. level.
Whatever output there has been has come from the
developmental driving and crosscutting plus what has
been secured from open-cuttings on the outcrop.

The Mariposa Company built up an ore-pile of
about 1,000 tons of milling ore which was sold as such
to the Zeehan Smelters. Montgomery in 1893 reports
that the Mariposa Company had extracted a total of 215
tons from the winze and surface excavations before
driving was started at the 140 ft. level. The same
authority gives 80 tons as the Alameda output with
20 or 30 tons from the Martini.

Twelvetrees mentions 200 tons as having been
mined and stacked by K. Borley at the time of his visit.
The same authority gives "the average content of the
parcels smelted" as Pb. 33%, Ag. 17 ozs. Whether this
refers to Borley's parcels only or to all output from
the Mariposa is uncertain.

It would seem therefore that the total output
can be put down in round figures as 2,000 tons.

In regard to profit it is certain that the
Mariposa Company paid no dividends, but on the contrary
expended all its funds both capital and revenue. It is
not known whether Borley made any profit and it is
unlikely that he did in view of the initial expenditure
on reconditioning the tramway.

Geological Environment:

Country Rock

The host rock of the Mariposa Lode is
limestone. This is the same limestone as at the Oceana,
Austral etc. at Zeehan. The only difference is that
the dip of the limestone bed is definitely westwards,
it being situated on the eastern limb of the Zeehan
syncline.

The ore occurrences within this limestone bed
so far penetrated at the Mariposa are found in the
extreme western (i.e. the stratigraphically top) portion

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immediately under the Crotty Sandstones. The experience
in the Alameda adit seems to have demonstrated that the
mineralisation does not extend upwards into these
sandstones which form a ridge on the western side of
the Mariposa limestone flat which is of the normal
1,000 feet width so often repeated at Zeehan.

The description given by Montgomery in 1893
of the sinking of the Mariposa Shaft shows that the
"black pug" of Zeehan is repeated here to some extent.
This is what he said:-

"In sinking first 25 feet of sandstone were passed
through, then soft black sand and mud full of
pyrites and nodules of galena to 95ft. after which
hard blue limestone came in ....
When sinking the shaft in the limestone a heavy
burst of water occurred, and mud and 'slurry' with
it; on pumping this out, a subsidence took place
on the hill side above the engine house ....
The black soft stuff passed through in the shaft
may be really portion of the limestone from which
the calcareous matter has been dissolved out". (2)

On 4th March 1892 the Z. & D. Herald has
the following account written by their Special Reporter:-

"The Mariposa main shaft is in lode material, the
eastern side being in black pug and the western
in pug mixed with gossan veins, occasionally
showed carbonate ore. The eastern portion of the
pug yields occasional slugs of fine-grained clean
galena, which is seemingly of better quality than
that obtained from the surface outcrop".

"On the South Nevada 10 chains south of the Mariposa
outcrop .... the tunnel from the bottom of the
cutting ought to have reached the lode by this time
at a depth of 20 ft. below the outcrop shown in the
cutting, but the face of the tunnel is at present
still in a black pug (probably derived from a
manganese limestone) which is highly mineralised
but, so far, shows no resemblance to the original
lode material".

It would seem therefore that there is 'black
pug' down to about 95 feet at which depth hard limestone
occurs.

No data are available as to the dip of the
limestone although it is quite definitely westwards.
However, both to the north and south of the Mariposa
are extensive quarries in the overlying beds within
this eastern limb of the Zeehan Syncline. These are free
from any complications of hill-creep and show a westerly
dip of 60°. It is most probable therefore that the
Mariposa limestone has a similar dip although it may
be steepened by the proximity of the Long Fault a few
chains to the east of the bottom of the limestone formation.

Relation to Regional Geology:

The relationship of the Mariposa Mine
to mineralisation in the Zeehan district as a whole

(2) A Montgomery "Report on Progress of Mineral
     Fields of the County of Montagu" - 20th May, 1893.

has become fairly clear during the last year or two, as a result of regional geological studies. It is known that the limestone is a favourable rock type for the lead deposits, and that ore deposits are localised in the limestone by structural influences. The environment of the Mariposa Mine is favourable. It occurs within the limestone, it is within the belt of lead since surrounding Zeehan, and the limestone is at the Mariposa Mine under the influence of a strong shear zone similar to those which are thought to be important at the Oceana Mine, the Spray Mine and others.

The Lodes:

Exploration and development of the area has been very limited. Attention has been confined to the Mariposa lode. Interpretation of the old records of development is difficult, but the support of the recent diamond drilling has been most helpful in the Mariposa Mine proper.

There being so little development it is difficult to establish completely proved length. Nevertheless it is clear that exposures on the direct strike line were worked in the Alameda, Mariposa, Martini and South Nevada. This indicates a length of approximately 2,500 ft.

The diamond drilling programme has confirmed an essentially continuous ore occurrence over a length of 460 ft. The main ore body occurs over the whole of this distance, and the average true width of the drill intersections was 5.6 ft. This ore body weakens at the southern end of the area but is strong at the northern end.

The foregoing is consistent with information on length and width obtained from old newspaper reports. Where the east crosscut first hit the lode the width was only 2 ft., widening to 4 ft. in the short south drive. In the north drive the width disclosed varied from 5 ft to 13 ft. Twelvetrees in 1909 summed this up as proving an average width of 8 to 9 feet. (3)

In 1893 Montgomery saw the material being mined. He thus describes it:-

> "The lode is about 8 feet wide, composed of oxide of iron, and a good deal of galena, the oxide of iron often carries much carbonate of lead. In the Mariposa ground a winze was sunk to 23 feet on the lode, which was found to consist of galena, carbonate and oxide of lead and iron oxide all the way down, showing the superficial oxidation of the vein stuff to have gone down some little distance". (4)

(3) W.H. Twelvetrees, Geol. Surv. Tas. Bull.
           No. 8. p. 154.

(4) A. Montgomery Loc. cit. p. 27.

The same authority in the same place refers
to 70 feet vertical extent in the Mariposa Shaft of
"mud full of pyrites and galena". Describing the lode
where out by the east crosscut at the 140 ft. level
he says:-

"There was not much clean galena in it at this
point, but most of the ore would be worth
conentrating, the gangue is siderite, dolomite
and calcite".

This primary ore is typical replacement ore
in limestone.

As previously pointed out 'black pug' adjacent
to the more solid lode carries the masses and slugs of
galena which characterise it in so many places.

The primary ore carried galena as the valuable
consituent. Sphalerite is present in amount subordinate
to the galena and sporadically distributed. The gangue
minerals are siderite and calcite. It is uncertain
whether silicification occurs but certain specimens on
the dump would indicate that it can be expected.

Apparently no concentrations of solid galena
were disclosed in the exploration work. As this was a
'sine qua non' in the 1890's the failure to go ahead
is accounted for. 'Milling ore' is repeatedly referred
to as the characteristic of the ore disclosed, but there
is no precise information as to actual values.
Twelvetrees refers to the average of all ore sold as
Pb. 33%, Ag. 17 ozs. This would be the ore as mixed
without concentration but probably some delective mining.
It is quite clear, however, that all ore mined was sold
as there is none on the dumps.

Montgomery gives a bulk assay across the lode
in the surface workings as Pb. 36%, Ag. 26 ozs. He also
gives the first assays in the bottom level as Pb. 65%,
Ag. 12-13 ozs. This of course would be selected specimens
of galena to ascertain the Pb:Ag ratio and Montgomery
goes on to say that later on a higher ratio was obtained.
Peter Irvine, a reliable type of mine manager of the
period, refers to the total ore obtained in driving at
the 140 ft. level as 'good milling ore'.

Eight holes were drilled by North Broken Hill
Limited to test the Mariposa ore body. These are
numbered N.B.H. Numbers 4 to 11 inclusive. All holes
were drilled from the limestone flat, in a westerly
direction. In all drill holes the recovery of core
was very good in the limestone on both sides of the
ore body. However, recoveries within and close to
the ore body were approximately 50% only; this was
due apparently to the existence of open cavities within
the ore body, and to the decomposition of the limestone
to "black pug" along the channels provided by the shear
zone. Diamond drill holes No. 8, 9 and 10 were stopped
by this badly caving ground immediately beyond the ore
body.

Details of diamond drilling are to be found
in the appendix. The diamond drilling programme proved
the existence of an essentially vertical ore body
460 ft. long with an average width of about 5.6 ft., and
average assay values of 9.2% Pb., 4.7 ozs. Ag., 1.7% Zn.
In is to be noted that much of this zinc was contributed
by two individual ore intersections.

At the southern end, a second ore body
appears on the eastern side of the main body. This
is narrow (1 to 2 feet) and is characterised by an
abnormally high zinc to lead ratio.

Mine Workings:

The Mariposa never drove an adit, contenting
themselves with two open-cuttings on the lode and
sinking the main shaft to 144 feet.

The Martini, however, did no more than drive
an adit southwards just inside their western boundary
which separated them from the Mariposa. That adit
apparently had a total length of 350 feet.

At the Alamada apart from the open-cutting
on the lode near the southern boundary adjoining the
Mariposa, and adit was driven westwards into the hill
about 250 feet north of the open-cuttings. The lode
was passed through just inside the portal and consisted
of boulders of gossan.

About 1 chain south of the northern boundary
of the South Nevada an open cut showed the lode to be
12 feet wide. An adit 200 feet south of this excavation
penetrated limestone carrying galena, which was sunk
on for 30 feet with good results.

Apart from the 30 ft. winze just mentioned
there is only one shaft - the Mariposa Shaft. No
information is available as to the dimensions of the
shaft, but the mine plan indicates that it is about
9' x 5'. In was sunk to 144 feet and the level opened
out at 140 ft. leaving a well of 4 feet.

The east crosscut at the 140 ft. level is
50 feet in length. In addition there are six short
crosscuts across the lode, the longest of which is
20 feet.

Making northwards from the plat is a semi-
circular drive crosscut 100 ft. in length which
explored the hanging-wall country to some extent, but
with what results are not known.

The main drive started where the east crosscut
cut the lode but the plan shows it ending at 50 feet
north, the continuation along the lode northwards being
via a drive from the northern portion of the semi-circular
crosscut. The total length of the drive along the lode
is 435 feet.

Discussion of Possibilities:

Diamond drilling and the records of early
underground work both lead to the conclusion that there
is an apparently continuous ore occurrence over a length
of at least 460 feet. The interpretation of the diamond
drilling suggests that there may be a cross-fault
displacing the lode near the south end, between D.D.H.
No. 9 and D.D.H. No. 10. The diamond drilling results
indicate an average true width of 5.6 ft., with an
arithmetical average grade of 9.2% lead, 4.7 ozs. silver
per ton and 1.7% zinc. The individual widths range from
2.6 feet to 12 feet. It should be noted that the diamond
drill holes intersected cavities of appreciable width
within the lode, and these have been excluded in the
computation of grade.

The deepest intersection of the lode was
attained by D.D.H. No. 11, which showed a true width
of 6 feet, and an average grade of 13.9% Pb. This is
rather better than the average of the other drill holes.

The view formerly prevailed among non-technical
men and unfortunately, among some technical men, that the
ore bodies of the Zeehan field were by their nature
limited to very shallow depths. It was considered that
there was no chance of finding payable lead ore below
a few hundred feet from the surface, illustrated by the
fact that workings below that depth had shown the ore
shoots to pass into "barron siderite". The important
facts are that very low lead prices ruled over the whole
of the life of the Zeehan field, and even the richest
ore provided quite a narrow margin of profit. Accordingly,
there was no incentive to carry out exploratory development
commensurate with the size of the ore shoots. The
consequence was that scores of mines were abandoned after
passing from the outcropping ore shoot into the envelope
of siderite. The position was exactly parallel with
passing out of a payable gold shoot into the envelope
of unpayable quartz, with the difference that the Zeehan
miner would not recognise that shoots could exist in
length or depth along the vein, but not outcrop.

Another well established view concerning the
Zeehan field was that the only ore bodies which existed
were small in all dimensions and would pay to work only
if very rich. It is true that no records were available
suggesting that consideration had ever been given to
mining larger ore bodies, or even that evidence had been
found for their existence. Nevertheless, the geological
evidence suggests the likelihood that appreciably larger
ore bodies may exist in the limestone in favourable
circumstances.

In my report to North Broken Hill Ltd. and
Broken Hill South Ltd. dated July 26th, 1946, it was
maintained, firstly, that ore shoots would not be limited
to a zone near the surface, and secondly, that there was
a sound case for investigating the possible occurrence
of larger ore bodies within the limestone.

Drilling was commenced under my recommendation
and general direction, and my report of January 15th,
1947 shows that Drill Hole No. 1 passed through a very
wide zone of mineralization, and had to be abandoned for
mechanical reasons in mineralised limestone at a depth
of 316 ft. One section of ore encountered showed a
true width of 38 ft. with an average grade of 3.5% lead,
0.7 ozs. silver per ton and 0.6% zinc. The reality of
the larger ore shoots was thus established and confirmed
by later work at the Austral Mine. Diamond Drill Hole
No. 2 intersected rich lead ore at a greater depth than
any previous profitable mining operation on the field,
and thus established the principle that ore occurrence
was not arbitrarily limited to shallow depths. This
drill hole obtained a true width of 15.4 ft. assaying
28.7% Pb., 10.4 ozs. Ag., per ton and 1.3% Zn. Of
the foregoing width 10.3 ft. averaged 41.7% Pb. and
15.4 ozs. Ag. per ton.

Exactly similar conditions obtain to-day at
the Mariposa Mine. We have a known ore position which
is insufficient to justify the establishment of an
operating mine, even on a small scale. However, we have
the possibility that additional drilling may disclose

(a) an extension of the known ore to a sufficient extent to enable a profitable mining operation to be commenced, ore (b) the existence of a larger irregular shoot of low grade ore, sufficient to alter the complexion of the prospect.

Geophysical work has been carried out at the Mariposa Mine and Appendix "C" is a copy of a draft of a report by R.P. Loh, of the Commonwealth Bureau of Mineral Resources. The findings support the view that more ore exists along the known lode channel at Mariposa than has yet been disclosed by development or drilling.

In Appendix "B" of this report will be found some notes by Mr. W.J. Cadwallader relating to probable costs of operation on the known lode at the Mariposa Mine. He concludes that the total cost of development, ore extraction, treatment, administration and general should not exceed £5.0.0 per ton. The net recoverable value per ton of ore (from which only the mine costs have to be deducted) ranges from approximately 110/- with lead at £65.0.0 per ton, to 180/- with lead at £105.0.0 per ton.

From the foregoing and from other figures in Appendix "B", it is clear that not a great addition to the ore position would be necessary to establish a profitable mine.

Possibly as much as 8,000 ft. of diamond drilling might be necessary to thoroughly establish the ore position to a depth of 500 ft. However, it is considered that 2,000 ft. of drilling should be sufficient to enable a clear decision to be made as to whether the mine should be abandoned or is worthy of serious development. This 2,000 ft. of drilling, with associated sampling and reports, was the basis of the estimated maximum cost for testing of £4,800, given in my letter of December 15th, 1950.

The budget of diamond drilling just referred to will allow, with a margin for contingencies and possibly another drill hole for three diamond drill hole intersections of the lode at the three points shown with a cross on the accompanying longitudinal section of the mine. These are at a depth of 450 ft. below the surface. It is not very material which hole is drilled first, although it is suggested that the middle one be drilled first, followed by the northern and then the southern.

Tenure of Rights:

An informal option is held over the property by the writer. The holder of the Lease Application is C. Loftus-Hills - the vendor of the property now held by Zeehan Mines Pty. Ltd. The terms of the option which I hold, and am prepared to transfer to Mt. Isa Mines Ltd. under the general arrangement described in my letter of December 15th, 1950, are as follows:-

(a) Purchase price £10,000.

(b) Royalty of $\frac{5}{8}$% of the value of ore produced.

(c) The right to subscribe to 5% of shares issued for public subscription, at par.

(d)   A free option for the period necessary
to test the property, provided bona fide
work is carried out.   It is intended by
the vendor that the option under these
terms would extend for a year, and up to
two years if desired, subject to bona fide
testing.

It is desirable that some more rigid
arrangement be instituted, and it is suggested that
I should negotiate a formal option with the vendor
on terms suitable to yourself, and assign the option
to Mt. Isa Mines Ltd.   It is suggested that the
Company may wish to have items (b) and (c) replaced,
or perhaps compounded for by a somewhat increased
purchase price.   With your approval, and subject
to your instructions in this regard, negotiations
will be opened with the vendor to arrange a firm
option.   Diamond drilling could them proceed.

Dr. M.D. Garretty,

Melbourne.
31st January, 1951.

APPENDIX   "A"

DIAMOND DRILLING DETAILS

(From North Broken Hill Ltd. Records)

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SUMMARY OF DIAMOND DRILLING

Hole No.	Ore inter- sections	True Width	ASSAYS			Vert Depth of inter- section.
			Pb	Ag.	Zn/	
No.4	316' - 320'6"	3.5 ft.	5.3	1.6	1.7	225'
No.5	194' - 200'6"	5.5 ft.	9.4	2.3	2.5	113'
No.6	277' - 284'	4.0 ft.	5.5	2.2	0.8	170'
No.7	231' - 234'6"	2.6 ft.	13.8	3.4	1.5	170'
No.8	241' - 257'	12 ft.	8.3	3.2	1.7	180'
No.9	166'3"- 167'9"	1.2ft.	5.5	1.5	8.7	120'
	211' - 2.5'11"	4.0ft	8.8	2.3	1.8	145'
No.10	134'3"- 135'6"	0.8ft.	12.3	3.7	14.4	92'
	156'3"- 160'9"	3.0ft.	8.3	1.5	3.0	110'
	193' - 194'	o.7ft.	16.1	2.4	0.7	130'
No.11	375'6"- 383'	6.0ft.	13.9	13.9	1.9	240

--

JO. 019.

NORTH BROKEN HILL LIMITED.

MARIPOSA D.D.   N.B.H. No.4

Bearing 244°   Depression - 45°

From	To	Run	Description	Assays Pb	Ag	Zn
0	52	52	No recovery			
52	216	164	Grey 1st. Specks galena at 111			
216	305'8"	89'8"	Dark grey 1st.			
315'8"	307'8"	2	Grey 1st.Cream Calcite Specks galena	Nil	0.2	0.1
307'8"	309'8"	2	Low grade ore	3.4	0.7	0.3
309'8"	312'4"	2'8"	Grey 1st.Specks galena	Nil	o.2	0.1
312'4"	316'	3'8"	" " " "	Nil	0.2	0.2
316'	317'8"	1'8"	Medium grade ore	10.3	1.3	0.4
317'8"	320'6"	2'10"	Low grade ore	2.3	1.7	2.4
320'6"	346'	25'6"	Grey 1st.,large cavities.			
346'	352'	6'	Dark grey 1st.			

Core Recovery: 76%

Recovery in ore: 97%

MARIPOSA D.D.   N.B.H. No.5

Bearing 245°   Depression - 35°

From	To.	Run	Description	Assays. Pb	Ag	Zn
0	15	15	No recovery			
15	166	151	Light grey and grey 1st. 1st.banded and mottled.			
166	177	11	Smooth grey 1st.Specks pyrite and galena			
177	194	17	Grey 1st.			
194	198	4	Low grade ore	5.4	2.3	1.7
198	200'6"	2'6"	High grade ore	15.8	2.3	3.7
200'6"	240	39'6"	Grey 1st. Specks galena at 240			
240	249	9	Brecciated 1st.white calcite			
249	251	2	Grey 1st.			

Core Recovery:84%.   Recovery in ore: 100%

020

MARIPOSA

D.D. N.B.H. NO. 6

Bearing 243°   Depression -45°

From	To	Run	Description	Assays.		
				Pb	Ag	Zn
0	10	10	No recovery			
10	62	52	Grey and dark grey lst.			
62	67	5	Finely banded dark grey lst.			
67	179	112	Grey and dark grey lst. Galena in calcite veinlet at 148			
179	180	1	Light grey mottled lst.			
180	277	97	Grey lst.			
277	280	3	Low grade ore	5.7	3.0	1.0
280	283	3	" " "	3.0	1.1	0.4
283	284	1	High grade ore	12.5	2.8	1.1
284	365	81	Grey and dark grey lst. Specks galena 325-334.			
			Core Recovery : 91%			
			Recovery in Ore : 37%			

MARIPOSA

D.D. N.B.H No.7

Bearing 243°   Depression-45°

From	To	Run	Description	Assays.		
				Pb	Ag	Zn
0	10	10	No recovery			
10	66	56	Grey and dark grey fossiliferous lst.			
66	102	36	Grey and dark grey lst.			
102	106	4	Light grey lst.			
106	231	125	Grey lst.			
231	234'6"	3'6"	High grade ore	13.8	3.4	1.5
234'6"	241	6'6"	lst. replaced by white calcite. Specks galena			
241	247	6	Cavity			
247	251	4	Low grade ore	0.8	0.3	0.6
			Core recovery: 90%			
			Recovery in Ore (231' ─ 251'): 55%			

MARIPOSA

D.D.   N.B.H.   No.8

Bearing 245°   Depression -45°

From	To	Run	Description	Assays Pb	ag	Zn
0	11	11	No recovery			
11	76	65	Grey and light grey lst.			
76	105	29	Grey and dark grey lst.			
105	108	3	Light and grey lst.			
108	194	86	Grey and dark grey lst.			
194	227	33	Dark grey lst. Scattered white calcite with pyrtie			
227	241	14	Cavity			
241	242	1	Medium grade ore	7.5	9.2	o.9
242	245	3	Cavity			
245	247	2	Low grade ore	3.2	1.1	0.8
247	249	2	Cavity			
249	250	1	Low grade ore	3.0	1.2	0.8
250	252	2	Cavity			
252	254	2	High grade ore	21.0	6.8	3.8
254	255	1	Low grade ore	5.5	1.0	0.4
255	256	1	Cavity			
256	257	1	Low grade ore	6.2	2.0	0.8
257	264	7	Cavity			
			Core recovery: 84%			
			Recovery in Ore (241'-257'): 37%			

MARIPOSA

D.D.   N.B.H.   No. 9

Bearing 245°   Depression - 45°

From	To	Run	Description	Assays		
				Pb	Ag	Zn
0	8	8	No recovery			
8	148	140	Grey lst. mottled and banded			
148	164'6"	16'6"	Grey lst. Specks and veinlets galena and pyrite in white calcite			
164'6"	166'3"	1'9"	Grey mottled lst.			
166'3"	167'9"	1'6"	Low grade ore	5.5	1.5	8.7
167'9"	170'8"	2'11"	Grey lst. replaced by white and cream carbonate			
170'8"	173'2"	2'6"	Low grade ore	o.4	o.1	3.2
173'2"	211'	38'	Grey mottled lst.	0.4	0.1	3.2
211'	214'6"	3'6"	Low grade ore	3.6	1.0	1.2
214'6"	215'11"	1'5"	High grade ore	21.0	5.2	1.1
2.5'11"	221'9"	5'10"	Low grade ore	o.7	0.3	0.6
221'9"	226'	4' 3"	" " "	0.8	0.4	1.1
226'	233'	7'	Grey brecciated lst.			
233'	263'	30'	Cavity			
263'	266'	3'	Grey lst.			

Core Recovery: 84%

Recovery in Ore (211'- 226')
87%

527025

MARIPOSA

D.D.   N.B.H.   No.10

Bearing 245°   Depression - 45°

From	To	Run	Description	Pb	Assays Ag	Zn
0	8	8	No recovery			
8	129	121	Grey 1st.			
129	134'3"	5'3"	Light grey 1st.			
134'3"	135'6"	1'3"	Medium grade ore	12.3	3.7	14.4
135' 6"	154'	18'6"	Grey 1st.			
154'	156'	2'	Cavity			
156'	157'	1'	Medium grade ore	12.2	2.3	3.7
157'	160'	3'	Cavity			
160'	160'9"	0'9"	Low grade ore	4.5	0.9	2.3
160'9"	169'	8'3"	Grey 1st.			
169'	170'	1'	Brecciated grey 1st. Specks galena			
170'	193'	23'	Grey 1st. Cavities			
193'	194'	1'	High grade ore	16.1	2.4	0.7
194'	245'	51'	Cavernous black pug			
			Core Recovery:69%			

MARIPOSA

D.D.   N.B.H. No.11

Bearing 245°   Depression -45°

From	To	Run	Description	Pb	Assays ag	Zn
0	8	8	No recovery			
0	227	219	Grey and light grey 1st.			
227	375'6"	148'6"	Grey 1st. dark bands			
375'6"	376'	0'6"	Low grade ore	3.0	2.0	o.4
376'	379'	3'	Cavity			
379'	381'6"	2'6"	High grade ore	17.7	20.6	0.9
381'6"	382'	0.6"	Cavity			
382'	383'	1'	Medium grade ore	8.7	3.2	5.0
383'	389'	6'	Cavernous barren calcite			
389'	389'4"	o'4"	Low grade ore	6.1	1.1	0.5
389'4"	392'9"	3'5"	Barren & cream calcite			
392'9"	393'	0.3"	Medium grade ore	11.0	1.4	1.2
393'	440'	47'	Grey 1st.			

Core Recovery :   93%

Recovery in Ore(375'6"- 393') : 58%

APPENDIX "B"

NOTES OF COSTS AND PROFIT

by

W.J. CADWALLADER

REPORT ON COSTS AND PROFITS
MARIPOSA MINE.

Ore Disclosed by Diamond Drilling:

A diamond drilling programme carried out by North Broken Hill Ltd. has disclosed a continuous ore occurrence over a length of 460 feet. The main ore body extends over the whole of this distance, and the average true width of the drill intersections was 5.6 feet. This body weakens at the southern end of the area but is strong at the northern end. The results of the geophysical survey carried out by the Commonwealth Government indicate that this ore body continues for some distance beyond the most northerly drill intersection. In evaluating the possible target this ore body is taken as 600 feet in length. However, it is emphasised that this is in no way intended to represent a figure for the calculation of ore reserves. A second ore body parallel to the above occurs at the southern end of the field. This body is approximately 150 feet in length and four feet wide.

The average assay values of diamond drill intersections are 9.2% Pb., 4.7 oz. Ag. and 1.7% Zn.

The two ore bodies described will yield approximately 360 tons per vertical foot.

Workings:

The main shaft has been sunk to a depth of 144 feet and a level opened up at 140 feet. The north drive has been extended to 435 feet at this level and several crosscuts were driven, but no stoping carried out.

These development openings are expected to be in a very poor condition, and will require a considerable amount of picking up. Their value as openings has been neglected in the estimates and full costs of development work has been allowed.

Development Costs:

Primary development will consist of shaft sinking, driving, crosscutting and rising. Level intervals have been assumed as 100 feet, but would possibly be increased to 150 feet in order to cut down development costs.

Shaft sinking	-	100 ft. @ £80.	£8,000.
Driving	-	800 ft.	
Crosscutting	-	100 ft.	
		900 ft. @ £15.	13,500.
Rising	-	500 ft. @ £12.	6,000.
Stope Preparation			4,000.
			£31,500.

Tonnage - 360 x 100 = 36,000 tons.

Costs per ton = 17/6d.

Mining Costs:

Experience in the Zeehan district indicates that good mining conditions will prevail below a depth of 100 to 150 feet. The limestone surrounding the ore bodies has given good core recoveries and it is therefore assumed that with the exception of the upper 100 feet a reasonably cheap mining method will be applicable. No attempt is made to give a detailed estimate of costs, but it is considered that ore extraction should not exceed 50/- per ton.

The total extraction and mining costs are thus estimated as 67/6d. per ton.

Ore Treatment:

The limestone-lead ore in the Zeehan district presents no metallurgical problems. The zinc content at Mariposa is a little higher than is usual and as a result the concentrate may require stripping by flotation.

It is assumed that a simple gravity or gravity flotation circuit on a basis of 100 tons per day will result in a recovery of 95% of the lead and 90% of the silver and treatment costs are estimated as £1 per ton.

Total Costs:

Total mine costs, based on 100 ton per day production, are thus estimated as follows:-

Development	17/6d.
Ore Extraction	50/-
Treatment	20/-
	87/6d.
Add Admininstration & General	13/6d.
Total	100/- per ton.

Estimated Capital Costs:

The estimated capital costs, excluding underground development, are as follows:-

a) Pumping - This factor is entirely unknown but established fact is that old timers managed with a 5 ft. pump and probably a Cornish lift. However the water problem in the district is very real and it is concluded that estimates should be based on a water make of 400 g.p.m. with a similar stand-by unit. For the purpose of these estimates the pumping head has been assumed at 450 feet. Each unit will require a 100 H.P. motor. Estimated cost of two Pomona pumps with electric head, including column and installation.   £8,000

b) Winder - half ton ore load, total load, say, 3,300 lbs., slow acceleration. Require approximately

30 H.P. Winch with liquid rheostat
and S.R. Motor, probably available
secondhand.   £1,500

Headframe - approximately 40 - 50
ft. high.   1,500
Cages - 3 at £120   360
Trucks - 20 at £70   1,40C
Hoisting ropes and other gear   500

c) Compressed Air and Air Tools-
    400 c.f.m. compressor (electric)
    with 100 H.P. S.C. Motor   2,000
    Air tools and hoses, etc.   1,500
    Drill steel   200
    Tools and Spares   800

d) Pipes and Fittings -
    3" Air - 1,000 ft.
    2" Water - 1,000 ft.
    1" Air and Water - 1,000 ft.   400
    Fittings and Valves   300
    Surface Pipes - allow   250

e) Building -
    Winder   600
    Workshop   400
    Change house - office - store   2,000
    Power   600
    Magazines   600

f) General -
    Machine Tools   1,500
    Hand Tools   1,500
    General Stores   4,000
    Surface Preparations - Levelling, etc.   2,000
    Road Construction - 1¼ miles   5,000
    General expenses, including
    supervision and administration
    until production   6,000

g) Milling -
    Work 2 shifts at 6½ tons per hour
    Power requirement 100 H.P.
    Estimated Mill Cost   24,000

h) Power -
    Winder   30 H.P.
    Compressed Air   100 "
    Pump (one only)   100 "
    Mill   100 "
    General and Lighting   50 "
                                 400 H.P.

    Suggest 2/200 or 1/400 K.V.A.
    transformers, 44 K.V./415 volts   2,000

    Sub-station Equipment -
    Yard   £150
    Switch Fuses   300
    Lightning Arrestors   180
                                                                 630
    Switchboard Equipment   2,500
    Installation   1,000
    Cables   500
    Power Line - 4 miles (estd.)   4,000

i) Transport and Communications-
   One Utility   £1,000
   Two Trucks   3,000
   Telephone   160

                                              £4,160

j) Working Expenses   10,000

k) Contingencies - Approximately 10%   8,300

                                             £100,000

Recoverable Value:

   Only lead and silver are considered. Ore grade 9.2% Pb., 4.7 oz. Ag. per ton and recovery assumed as 95% for lead and for silver.

   Three lead prices are considered. They are £50, £70 and £90 per ton of lead contained in concentrates. These prices correspond to £65, £85 and £105 respectively per ton of lead. The price of silver in lead concentrates is taken as 5/6d. per oz.

   The recoverable value per ton of ore is thus 110/-, 145/- and 180/-

   The tonnage of ore which it would be necessary to prove in order to provide sufficient reserves to pay back capital (excluding exploration and purchase) is given in the following tabulation:-

Lead Price	Realized Price	Recoverable Value	Costs	Operating Profit	Tons to Repay Capital	Vertical Depth
£A	£A	A/-				
65	50	110/-	100/-	10/-	200,000	555 ft.
85	70	145/-	100/-	45/-	44,500	123 "
105	90	180/-	100/-	80/-	25,000	70 "

   It would thus be necessary to prove two years' ore supply in order to pay back capital with lead at £A85 per ton. It is reasonable to expect ore to be proved to a depth of 450 to 500 feet in order to provide a return of capital and a good margin for profit.

Diamond Drilling:

   No allowance has been made in the cost estimates for diamond drilling. In order to prove the ore bodies thoroughly to a depth of 500 feet at least 8,000 feet of drilling might be necessary. The cost of this programme is estimated at £16,000. However, it is considered that a satisfactory position might be established with much less drilling.

Summary:

The Mariposa project may thus be
summarised as follows:-

An expenditure of £16,000 on diamond drilling
would have as its target the proving of the
ore bodies to a depth of 500 feet. If the ore
is shown to be continuous to this depth and if
the average future lead price can be accepted
as £A85 per ton, for a capital outlay of
£100,000 there can be expected a total working
profit of £400,000 period of eight years'
production. From this must be deducted capital
expenditure of £100,000 exploration cost
including diamond drilling, purchase of mine,
and taxation.

W.J. Cadwallader.

APPENDIX "C"

DRAFT OF REPORT ON

GEOPHYSICAL WORK

By. R. Philip Loh

(Commonwealth Bureau of Mineral Resources)

With Six Plates

I. OUTLINE GEOPHYSICAL WORK

(a) General:

The purpose of the survey was to examine the
Mariposa area for possible magnetic and gravity effects
associated with the known mineralization and thence to
determine the extent of this mineralization; and also
to investigate the swamp covered limestone area for hidden
mineralization. Further, it was considered that the
results of the survey and the behaviour of the
instruments in the difficult terrain would serve as a
guide to the usefulness of the magnetic and gravity
methods in other similar prospecting areas in the
Zeehan field.

(b) Surveying:

A base line was laid out approximately 170
feet east of the Mariposa shaft and approximately
parallel to the line of lode for a distance of 700
feet north and 300 feet south of the shaft. Cross
traverses were extended for 700 feet on either side.
East of the base line the traverses cross the limestone
swamp and extend to the rising ground of the Dundas
Series, and west of the base line they extend for 100
feet beyond the crest of the sandstone hill. Pegs
were spaced at 25 feet intervals. The levels required
for the gravity survey were referred to a base datum
station with nominal elevation of 600 feet.

Traverses were cleared of scrub, vines and
roots to give easy access and security on the steep
slippery slopes. In places steps were cut or rough
ladders used. The cutting and surveying of these
traverses occupied most of the time of the party
although North Broken Hill Ltd. provided a surveyor,
his assistant, and one or two scrub-cutters.

(c) Magnetic Method:

In the magnetic method an observation of the
vertical component of the earth's magnetic field is
made at each station of the area and the value expressed
relative to that at an arbitrarily selected base station.
Anomalous variations in the field may be caused by the
presence in the rocks of magnetic materials. At Oceana
the mineralization contained slightly magnetic material
probably in the iron carbonate, and this produced
a small well defined anomaly over what was proved to be
an ore body. (Langron, 1950). It was thought that
the magnetic method might similarly provide indications
of mineralization in the Mariposa area.

A Watts' vertical force variometer 15977 with a
sensitivity of 1 division = 32.8 gamma was used. Some of
the readings in the area were effected by the presence
of the diamond drill and its associated pumps, pipes and
dumps of drill steel. Towards the end of the survey
a worn knife edge prevented complete coverage of the
area by the variometer.

(d) Gravity Method:

At each of the stations on the area the
gravitational force was measured relative to that at a select
base station. The gravimeter used was the Heiland No. 58
fitted with a waterproof perspex cover. Its sensitivity
was 0.1067 milligal per scale division. In an
endeavour to obtain firm foundations on the swampy soil

a special tripod with long legs was used and it
was usually necessary to push the feet of the tripod
down to a depth of about 12 inches. Despit these
precautions, movements of personnel and vibrations
of the diamond drill were transmitted through the
mud and readings were often difficult to obtain.
Base readings were taken at hourly intervals and
readings on traverses with unsatisfactory and closures
were repeated until consistant. Weather, contrary to
expectations, was almost free of rain. Trouble was
experienced on two days from overheating of the meter
in the warm sunshine.

The observed gravity values were corrected for
differences in elevation and latitude of the stations
from the base, and also for the terrain effect due to
nearby hills and valleys, To arrive at a suitable
elevation correction factor determinations were made
of specific gravities of samples from outcrops and
drill cores and these gave the following values; Crotty
sandstone (surface 2.5); limestone 2.7; Dundas mudstone
2.5. The elevation correction factor corresponding to
a specific gravity of 2.5 was adopted. This factor
was in agreement with that determined by the
mathematical application of method of three-stations
and of a traverse along the Queenstown road, together
air photographs, a contour map was drawn of the area.
Terrain corrections were then applied. These should
be accurate over the limestone area and the eastern
slopes of the sandstone, but are liable to be
inaccurate near the top of the hill and the west of it.

The reduced gravity values obtained by correcting
the observed values for elevation, latitude, and terrain
may show regional anomalies such as could be related to
major features in the underlying geological structure,
or localised anomalies which are of interest in mineral
prospecting as they may be caused by zones of
mineralization which, owing to mineral content, have a
higher density than that of the surrounding formation.
It was found in the Oceana survey that some of the
anomalies investigated were caused by the occurrence of
a zone of siderite which is of a higher density than the
country rock limestone (Langron, 1950). The siderite
was the gangue material in which was found argentiferous
galena.

The satisfactory testing of the gravity method
over the known mineralization in the Mariposa area
presented some difficulties. The lode occurs at the
foot of a steep hill and near or underneath an overlying
sandstone bed. This meant that the readings of each
traverse were taken on a slope rising away from the
expected mineralized zones. Furthermore, the gravity
picture could be complicated by the occurrence of black
pug presumably of low density, which, being adjacent
to or intermingled with the mineralization, would tend
to decrease the density contrast between the mineralized
zone and the limestone.

II. RESULTS AND INTERPRETATION

(a) Magnetic:

The magnetic profiles (Plate 6) show no well
defined anomalies but rather a zone of magnetic
disturbance in the vicinity of the shaft and zone of
mineralization. It is not possible to decide whether
these disturbances are due to the mineralization or to

drilling equipment, old mining iron, etc.

(b) Gravity

The gravity profiles (Plate 3) represent the
reduced gravity values. The profiles show a pronounced
general decrease in values to the west and superimposed
on this trend a definite positive anomaly just west of
the baseline. There is also a general decrease in
values northward from O O traverse. The density
difference at the sandstone-limestone contact could
explain portion of the westerly trend but it is
more likely a regional effect connected with the
synclinal structure. In order to examine the results
for local anomalies it is necessary to remove these
regional trends. Forthis purpose a regional contour
pattern was produced by a process of asvere smoothing
of the contours drawn from the original reduced
values. From the regional contours, smooth regional
profiles were derived and are shown by broken lines on
Plate 3. The differences between regional and reduced
values have been plotted as residual gravity profiles,
variations in which should be due to purely local
effects. The profiles of these residual values and
contours at intervals of 0.1 milligal are shown on
Plate 4.

Examination of these contours shows seven anomaly
centres. (1) and (2) are centres of an elongated
positive anomaly the axis of which is parallel to,
but about 50 feet east of, the line of mineralization
as intersected by the drill holes. The peak of anomaly
(1) occurs near traverse N3. The old drive passed
under this traverse at a depth of 100 feet below datum.
Diamond drill holes NBH DD4 and DD5 passed under the
anomaly at depressions of 45 degrees and 35 degrees,
respectively and both made ore intersections. (Plate 5).
Specific gravity determinations made on core samples
from DD4 showed a general figure of 2.7 for the limestone
with a sharp increase to 3.3 ten feet before the
mineralization was reached. Although no samples of
the mineralization were available for testing, it is
safe to assume that the specific gravity would be at
least 3.3 and probably higher. Beyond the mineralization
the specific gravity returned to 2.7 but was 2.9 over
the last ten feet, in which clay occurred in the limestone.
Close inspection of the last core sample recovered disclosed
minute mineralization along a clay filled fissure. The
specific gravity determinations are sufficient to show
that the specific gravity of the lode formation, being
at least 0.6 higher than that of the limestone, is
favourable for the production of a positive gravity
anomaly at the surface.

Theorectical examination has been made of the
anomaly along N3 traverse but interpretation is made
difficult by the fact that readings were taken on a slope
and therefore at an increasing distance from the
anomalous zone. A preliminary examination indicates
that the anomaly could be mainly due to a tabular body
dipping steeply to the west, extending 400 feet deep
and reaching to within 20 feet of the surface at a point
corresponding to the peak of the anomaly. However a
hypothetical body of this form would be displaced to
the east of the known mineralization, and in order to
reconcile the interpretation with the known mineralization
as shown in DD4, DD5, one needs to consider either one
body passing steeply through the major ore intersections
with a change of dip to reach the surface underneath

the peak of the anomaly; or a 70 degrees dipping body
passing through the end of DD4 and the mineralization
of DD5 and continuing to the surface, with a secondary
body with wimilar dip passing through the DD4 mineralization,
its upper limit below the line of DD5.

The line of anomaly (2) is displaced about 100 feet
east of that of anomaly (1). The contour pattern
suggests that one of the traverse faults mentioned by
Loftus Hills crosses the area close to the Mariposa
shaft and has caused a lateral displacement of the
geological features and hence of the gravity indications.
The northern portion of anomaly (2) has been tested
by NBH DD10, situated on traverse S1. The recovery from
this hole was small and showed scattered mineralisation
in a position which suggests that, south of the Mariposa
shaft the lode tends to swing to the west, i.e. that it
follows the same trend as the gravity indications. The
magnitude of anomaly (2) appears to be increasing to the
south towards the site of the South Nevada workings.

Anomalies (3), (4) and (5) occur over the sandstone
in proximity to the brow of the hill. In this region
terrain corrections can not be relied on for accuracy.
The anomalies could be due to consistant errors in
estimating the height of the unsurveyed country to the
west.

Anomaly (6) is a broad anomaly that becomes
apparent after the regional correction has been applied.
There is surface evidence that the ground underneath
the anomaly contains some sandstone. This would
complicate the gravity picture but the existance of
a sandstone-limestone contact would be favourable for ore
occurrence. The anomaly could be due to a mineralized body
at a depth of 200 to 250 feet.

Anomaly (7) is a negative localized one. It is
probably caused by a large cavity in the limestone
fairly close to the surface. Cavities in the limestone
are quite a feature of the Zeehan field and any gravity
indications are likely to be modified, by the occurrence
of vugs in close proximity to the mineralization.

III. RECOMMENDATIONS

Although it is difficult to find a satisfactory
interpretation of the main gravity indication, anomaly (1)
consistant with the drilling results, it is considered
significant that anomalies (1) and (2) form a continuous
feature which closely follows the known line of
mineralization. As this gravity feature extends beyond
the limits of the present drilling it provides sufficie t
justification for extending the drilling at least another
300 feet to the north. If this testing is carried out,
the drill holes should be depressed 45 degrees and if
possible continued until the sandstone contact is reached.
The increasing magnitude of anomaly (2) towards the
south is a point in favour of further drilling south
of NBH DD10. In this case the collars should be placed 50
to 10 feet east of the baseline.

Anomalies (3) and (5) are uncertain and of small
magnitude and would warrant investigation only if a definite
decision to mine the area were made. Anomaly (4) is of
fairly large magnitude but the survey was not continued
sufficiently far to the south to close the anomaly
contours, and terrain and regional corrections on the
edge of a survey's grid are subject to inaccuracy.

At the present stage of investigations this anomaly does not justify a drilling recommendation.

A trial hole should be run into the swamp covered limestone under N6 traverse in order to investigate anomaly (6). The target area should be the zone 200 to 250 feet below the centre of the anomaly.

IV. CONCLUSIONS

The area has been covered by a gravimetric survey and partly by a magnetic survey. No significant results were obtained from the magnetic survey; this being partly due to artificial disturbances produced by the presence of iron materials on the surface. The Heiland gravietor has not been designed for use in such rough country as the Mariposa area, and under these conditions of operation the maximum accuracy could not be obtained with the instrument. The large corrections necessary for rough terrain reduce the possibility of detecting anomalies such as associated with ore, and may cause the introduction of spurious anomalies. However, it is considered that the gravity results include significant anomalies which can be related to the known mineralization and which provide sufficient justification for further drilling in the area. Further testing of the anomalies found by the gravimeter should indicate the suitability of the gravity method for the investigation of other similar areas in the Zeehan field.

R. Philip Loh

6th October, 1950

SUPPLEMENTARY REPORT

on

THE MARIPOSA MINE
ZEEHAN, TASMANIA

SUPPLEMENTARY REPORT   527039

ON

THE MARIPOSA MINE

ZEEHAN. TASMANIA.

1. INTRODUCTION.

This report is intended to present information
supplementary to that contained in my report of January
31st 1931. Some additional information is presented, and
certain calculations and deductions are given in more detail.
The report is not complete in itself, and should be read in
conjunction with the report dated January 31st. Most of the
additional material relates to Appendix "B" to my earlier
report, being "Notes on Costs and Profit", prepared by Mr.
W. J. Cadwallader.

2. THE OREBODY.

The amount of diamond drilling so far carried out
on the Mariposa Mine is quite insufficient to permit of an
estimate of tonnage and grade of ore available to be prepared
with any pretence to accuracy. In my earlier report it was
intended merely to indicate the general order of size and
value which could be expected as a reasonable possibility if
further testing were undertaken. Accordingly, it was con-
sidered unnecessary to make allowance at that stage for dilution
by overbreak or for the details of disposition of the drill hole
interactions.

The drill hole indications were regarded as indicating
an average true width of 5.6 ft. with an average grade of
about 9.2% lead, 4.7 ozs. silver per ton, and 1.7% zinc, the
individual widths ranging from 2.6 ft. upwards. The foregoing
grade was calculated without making any allowance for variation
of width and grade being used — and without including in the
calculations any allowances for the prenounced cavities en-
countered in the ore zone. The cavities were included as
probably indicating ore, for the purposes of determining width,
but were not given any weight in the calculation of grade.

A more detailed work-out is provided herewith. True
widths have been calculated to the nearest inch, and a gen-
erous allowance has been made in all instances for overbreak.
A weighted average grade has been determined, using all the
drill hole intersections, by weighting grade against width
of intersection. However it appears to be both inappropriate
and inpracticable to introduce into the averages thus calculated
any faster to represent the spacing of the drill holes in
longitudinal. From the longitudinal section (last plan in
previous papers) it is seen that the drill holes are reasonably
evenly spaced longitudinally, but that D.D.4 and D.D.5 occur
in the one section and so do D.D.7 and D.D.11. These pair of
drill holes do, nevertheless, express vertically approximately
the mass spacing as the others express horizontally. Another
general impression gained from the longitudinal section, but
not expressed in the average, is that there is a general
improvement in the orebody (particularly as regards width)
going downwards in the neighbourhood of D.D.7 and D.D.11.
The deepest vertical intersection (D.D.11) also has the best
intersection of ore.

The detailed tabulations for diamond drill holes
are given in Appendix "A". In making the calculations,
some method had to be adopted for dealing with the cavities
which commonly occur in the drill core in the ore zone.
The cavities are believed - from evidence at the closely
similar Cocana Mine - to represent sections of ore or rock
which have been dissolved away by virtue of the limestone
gaugue. Where cavities have occurred in the ore itself,
they have, for purpose of these calculations, been accepted
as having a grade similar to that of the core which preceeded
them. Ordinarily, this procedure has ascribedto the cavities
a grade which is less than the average grade of the inter-
sections. For example a notable cavity of three feet in
D.D.11 has been given a grade of 3% lead, corresponding
to the ore proceeding it in the drill hole, where the ore
following it has a grade of 17.7% lead. Thus, this method
of assessing the cavities, which cannot be ignored al-
together most likely led to an unduly low average grade
being determined. An exception occurs in the case of
D.D.10. Here, the cavity represents the greater portion
of the intersection of lod$, and is proceded by ore of
12.2% lead grade, but followed by ore of 4.3% lead grade.
In this case, it was considered expedient to take the
average grade of the whole width of ore as being the
average grade of the intersections; this grade was then
adjusted to allow for overbreak.

The calculations in the appendix show that after
allowing for overbreak, and for the grade of cavities in
the manner described, the main orebody, based on the drill
hole intersections, can be expected to have a grade of
7.3% lead, 3.8 ozs of silver per ton, and 1.2% zinc. The
average stoping width works out at 69.3 inches. There is
obviously also ore in the southern orebody, but it is not
considered practicable to supply estimation of average
grade or width; some details are given in the appendix.

3. MINING CONSIDERATION.

Drilling on the main orebody has already shown
that ore occurs over a length of 400 ft. The geophysical
survey, and the existence of old surface workings to the
north of D.D.4 and D.D.5, both indicate strongly the
extension of ore northwards beyond the last drill hole.
It is considered reasonable to hope that ore will occur
over a length of 600 ft.

The southern orebody is not very attractive on the
evidence to date, but there is some good grade ore in
D.D.10, and it is not unreasonable at this stage to hope
that a length of 850 feet of payable ore could be developed
in this orebody.

In addition to the foregoing direct evidence, there
is also the geological consideration that considerably
larger bodies of low to medium grade ore may be hoped for
in this enviroment. This consideration is one which was
advanced at the Ocean Mine, and later fully justified by
diamond drilling.

In calculations in the report the minium standard
width has been taken as 3 ft. With the conception of
D.D. No.4, all intersections of ore are of reasonable
width in good grade ore. The next lowest intersection
is in D.D.7, where the width of actual ore is 30 inches.
The stoping width throughout has been taken as varying
from 3 ft. to 12 ft., including overbreak.

The orebody is in limestone, controlled by shearing and the walls are clean. Hence, overbreak is not expected to be excessive. The overbreak allowed has varied from 6 inches to 17 inches. It has been taken as having zero grade in all cases, although there would probably be an appreciable metal content in practice.

The possible tonnage available in the main orebody is derived by taking a length of 600 ft., a width of 70 inches, and a density of 11.5 cubic feet per ton. This gives 304 tons per vertical foot. For the southern orebody, a reasonable expectation would be 130 feet in length, 46 inches in width, giving 50 tons per vertical foot. The total reasonable expectation is then 334 tons per vertical foot. This figure is to be compared with the 360 tons per vertical foot quoted as a round figure estimate in the earlier report.

On the basis of development costs per 100 ft. of depth being £31,500, a development cost was quoted in the original report as 17/6 per ton. With 354 tons per vertical foot instead of 360, the development charge now becomes 18/-. A typing error in the original report placed administration and general at 13/6 per ton, instead of 12/6 per ton - the error is made obvious by comparing individual items with the total. The overall cost of 100/- per ton for development, ore extraction, treatment, administration and general, could now be set out as follows:

Development	18/-
Ore Extraction	50/-
Treatment	20/-
Administration and General	12/-
Total	100/- per ton

It now remains for further details to be given in regard to the ore extraction charge of 50/- per ton.

4. MINING COSTS.

As stated in the original report, no attempt was made to give a detailed estimate of costs, but it was considered that ore extraction cost should not exceed £2.10.0 per ton.

The figure of 50/- per ton was arrived at on the basis of comparison with other mines having a generally similar mining operation to that expected at Mariposa, with due allowance for variations in likely extraction rates, cost of power, and the like. It is considered that the foregoing method is quite legitimate, and indeed, the only one applicable in the circumstances. We do not know even the mining method which will be adopted at the Mariposa Mine.

Nevertheless, if it is sound, such method of estimation must be capable of being reconciled with a detailed study of costs for the Mariposa based upon a hypothetical but likely set of conditions. Accordingly certain conditions have been assumed for the Mariposa as follows:

e/

(a) Average stoping width 6 feet.

(b) Stops walls sound and clean.

(c) Ore can be left in stopes for reasonable periods without deterioration.

(d) Boring conditions good (limestone).

(e) Ore does not hang up in stopes.

(f) Output, for direct labour only, 10 tons per man shift.

On the basis of the foregoing assumptions, a tabulation of costs, using shrinkage stopes, is as follows:

Two shift operation	-	50 tons per shift.
Face Labour	-	10 men.
Timber	-	4 "
Pipe fitters and maintenance	-	2 "
Drains, tracks etc.	-	2 "
General Labourers.	-	4 men
Brace and Plat	-	4 "
Engine Driver	-	2 "
Surface hands ex-mill	-	4 "
Pumps	-	2 "
		34 men

Average earnings taken at 55/- per shift.
Total direct labour per day £10⅝   5/

Compressed Air

½ man per shift plus oil and
maintenance - per day   6

Water - surface maintenance   2

Explosives at 1/- per ton plus magazine
charges - say £3.0.0   8

General plant maintenance   13

Timber - 10 s.f. per ton @ 55/- per 100 s.f.   28

Power - 100 H.P. continuous at 1d. per
H.P. hr. plus attendant   12

Subsequent filling allow 5/- per ton   25

General Stores   25

Supervision - underground   10

Contingencies   14

Total cost per day   £250

Cost per ton 50/-

5. MILLING.

In the earlier report it was stated that milling costs could be taken to be no more that £1.0.0. per ton. It was also assumed that a simple gravity or gravity and fixtation circuit on a basis of 100 tons per day would result in a recovery of 95% of the lead and of 90% of the silver.

The quoted price of £1.0.0. per ton for treatment cannot be considered as an estimate in the ordinary engineering sense of evaluating all the factors involved in the same manner as has been done for the mining cost. In the first place, the exact method of treatment which will be necessary has yet to be determined. Secondly, likely variations in the figure quoted would not seriously affect the value of the prospect at this stage. The figure of £1.0.0. was arrived at on the basis of a general comparison with other mines whose mills are generally similar in metallurgical design, and in throughput.

An example may be quoted of the mill of the Morning Star Mine at Wood's Point, Victoria. The throughput is 400 to 500 tons per week. Metallurgical treatment is not similar, the ore at Wood's Point being a gold ore, but the labour requirements would be similar. Power is a very heavy item at Wood's Point, accounting for approximately 32% of the total costs of mining and milling, which amount to 105/-. Very much cheaper power would be available for the Mariposa project. Since the milling cost at the Morning Star Mine is 22/- per ton, it is considered that £1.0.0. per ton for the Mariposa ore is ample.

The recoveries quoted as being likely are based on the similarity of the Mariposa ore to Oceana ore, and the metallurgical work which has been carried out on the latter. The Mariposa ore is not far from the Oceana ore, is in a closley similar geological environment, and would be expected to be similar in characteristics; confirmation is found in the examination of the drill core. Metallurgical tests carried out on the Oceana ore on behalf of Zeehan Mines Pty. Ltd., in the laboratory of the South Mine at Broken Hill, have shown that high recoveries of lead and silver will easily be achieved. The laboratory tests indicated that 98% of the lead and 95% of the silverwould be recovered in a simple plant. But 95% for lead and 90% for silver would appear to be reasonable figures to use at this stage for the Mariposa ore.

6. RECOVERABLE VALUE.

The inclusion of specific allowance for overbreak somewhat alters the recoverable value figures presented in Mr. Cadwallader's appendix to my report (see page 4). Amended figures are now presented.

Only lead and silver are considered. The question of whether there will be a zince concentrate produced will largely depend upon whether the amount of zince present will exceed the quantity accepted in lead concentrate without penalty, and on whether the production of zince concentrate would pay for itself and cover the loss of lead which might be involved.

A mill feed grade of 7.3% lead and 3.8 ozs. silver per ton is assumed, and the recovery is taken as 95% for lead and 90% for silver. Without discussing in detail the economics of concentrate disposal, it may be taken for granted that production will not be sufficient for the construction of a local smelter and concentrate will probably be sold either ex-mill or on wharf at Burnie or Strahan. In order to allow for returning charges and freight a deduction of £15.0.0. per ton of lead contained in concentrate is made. This £15.0.0. deduction is made up of £2.0.0. for freight and handling to the nearest port (Strahan) and £13.0.0. for smelter returning charges and sea freight. The figures are appropriate for concentrate sale to Pt. Pirie, although this method of disposal is neither advised nor considered likely. Freight overseas will be higher than £2.0.0. per ton, but realised land prices also are likely to be much higher.

Thus, for realised lead prices of £65, £85, and £105, per ton, the corresponding net prices are £50, £70 and £90 respectively. The Price of silver is taken conservatively at 5/6 per ton.

On the foregoing basis, the recoverable value per ton of ore is thus:

Lead at £50 per ton -
7.3% x 95% x 50 x 20   =   69/-

Lead at £70 per ton -
7.3% x 95% x 70 x 20   =   97/-

Lead at £90 per ton -
7.3% x 95% x 90 x 20   =   125/-

Silver at 5/6 per ounce -
3.8 x 90% x 5.5   =   19/-

Recoverable values for lead and silver -

Lead Price.	Recoverable Value.
£50	88/-
70	116/-
90	144/-

From the recoverable value must be provided mining, development, milling and administrative costs. The tonnage of ore which would have to be proved in order to provide sufficient reserve to pay back capital (excluding exploration and purchase) is given in the following tabulation:

Lead Price	Realised Price	Recoverable Value	Costs	Operating Profit	Tons to Repay Capital	Vertical Depth
65	50	88/-	100/-	less	-	-
85	70	116/-	100/-	16/-	123,000	350 ft.
105	90	144/-	100/-	44/-	46,000	130 ft.

7. <u>SUMMARY</u>.

Making specific allowance for overbreak, and taking
the drill hole assays literally, requires some modification
of the summary on page 5 of Mr. Cadwallader's report. The
position can now best be stated as follows:

With lead at £A105 and silver at 5/6 (Aust.) per oz.,
about 46,000 tons of ore would be necessary to repay the
capital expenditure. This is about two years supply of ore;
for this tonnage the orebody would need to be proved to a
depth of 130 ft. However it is considered that testing
should aim at proving the existence of the orebody to a
depth of 450 ft. in the first instance. It will be evident
that for an increase in the realised price of lead, and
for depth of ore proved in excess of 130 ft., considerable
profit will accrue. If ore can be shown to be continuous
to a depth of 450 ft., and if the realised price of lead
were an average of £105 per ton the position would be:

For a capital outlay of £100,000, there could be
expected a total working profit of 44/- per ton for
450 x 354 tons, or £350,000. This would be derived from
the treatment of 160,000 tons over a period of about
seven years. From the £350,000 would have to be deducted
the capital expenditure of £100,000 less salvage value,
as well as the exploration costs, purchase of mine, and
taxation.

Dr. M. D. GARRETTY

Melbourne,
2nd April, 1951

APPENDIX "A"

Details of Grade and Width Calculations:

The following calculations of probable ore
reserves are based on grade and width determinations
as determined by the recently completed drilling
programme and by the earlier drilling results.

The details of stopable ore intersections
in the recent programme are as follows:-

D.D. 1   Depressed 45° at collar, surveyed angle
at ore intersection 31°.

From	To	T.W.	Grade			Product		
			Pb	Ag	Zn			
595	597½	26"	5.9	1.9	0.9	153.0	49.3	23.4
597½	599	15"	24.5	14.5	10.5	367.0	217.0	157.6
599	601½	26"	9.5	3.1	2.4	247.0	80.8	62.4
Overbreak		6"	2.0	0.9	1.4	12.0	5.4	8.4
		73"	10.7	4.8	3.4	779.0	352.5	251.8

D.D. 2   Depressed 48° at collar, surveyed angle
of ore intersection 39½°.

From	To	T.W.	Grade			Product		
			Pb	Ag	Zn			
613'	614'	37"	4.8	1.1	0.8	177.0	40.3	29.6
Overbreak		6"	-	-	-	-	-	-
		43"	4.1	0.9	0.7	177.0	40.3	29.6

D.D. 3   Intersection consisted of lode formation only.

D.D. 12   Depressed 54° at collar, surveyed angle
at ore intersection 32°.

From	To	T.W.	Grade			Product		
			Pb	Ag	Zn			
753	757	41"	4.9	1.7	0.7	201.0	69.8	28.7
757	760	30"	7.5	1.8	0.5	225.0	54.0	15.0
Overbreak		6"	1.0	0.5	0.6	6.0	3.0	3.6
		77"	5.6	1.6	0.6	432.0	126.8	47.3

The calculations of probable ore reserves as
disclosed by diamond drilling are based on the two areas
shown in the attached longitudinal projection. The grade
and width of Block "A" have been accepted as 7.3% Pb.,
3.8 oz. Ag., 1.2% Zn. and 69.5" as determined in the
report by Dr. M.D. Garretty and dated 27th March, 1951.

The grade and width of Block "B" are
determined by considering D.D.'s 4, 11, 1, 2 and
12 as follows:-

D.D. No.	T.W.	Grade			Product		
		Pb	Ag	Zn			
4	48"	4.2	1.2	1.3	199.0	59.0	61.0
11	79"	9.9	10.1	1.1	778.0	805.0	84.0
1	73"	10.7	4.8	3.4	779.0	352.5	251.8
2	43"	4.1	0.9	0.7	177.0	40.3	29.6
12	77"	5.6	1.6	0.6	432.0	126.8	47.3
	320"	7.4	4.3	1.5	2,365.0	1,383.6	473.7

The average stoping grade accepted is 7.4% Pb.,
4.3 oz. Ag. and 1.5% Zn. The average width is 64".

Ore Reserves:

Block "A"

460 ft. long x 260 ft. deep x 69.5 inches wide.
Tonnage factor 11.5 c. ft. per ton.

$$\frac{460 \times 260 \times 69.5}{11.5 \times 12} = 60,000 \text{ tons.}$$

Block "B"

Three areas x 64" wide.
Tonnage factor 11.5 c. ft. per ton.

250 x 208	=	52,000 sq. ft.
$\frac{210 \times 208}{2}$	=	21,840 " "
$\frac{250 \times 86}{2}$	=	10,750 " "
		84,590 sq. ft.

$$\frac{84,590 \times 64}{11.5 \times 12} = 39,300 \text{ tons}$$

Stoping Grade:

Block	Tons	Grade			Product		
		Pb	Ag	Zn			
A	60,000	7.3	3.8	1.2	438	228	72
B	39,300	7.4	4.3	1.5	291	169	59
Total	99,300	7.3	4.0	1.3	729	397	131