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REPORT BY THE GOVERNMENT GEOLOGIST

MR. W. H. TWELVETREES

on the

UNDERGROUND WORKINGS OF THE MAGNET SILVER MINE

26th. July, 1918.

(Not Published)

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Geological Survey Office,



Launceston, 26th July, 1918.

Dear Sir,

By this post I am forwarding to you a discussion of the features of the lode and underground workings of the Magnet Mine at Magnet, and a copy of same for transmission to the Company.

I left at the mine a summary of the results of conversations with the Manager there; and since my return I have seen one of the Directors and the Legal Manager who waited on me to obtain information, so that the Board knows in a general way of the opinions I formed during my visit: but the accompanying statement goes more into detail.

Speaking broadly the mine is not in too healthy a condition. The ends of the levels are not in payable ore, and the orebody at the lower levels has not the dimensions which it had at the upper ones. Whether this constriction is real and permanent will be shown more clearly at the next level, to which it is intended to sink. My personal opinion is that the northern end of the ore shoot has been reached, and any further ore met with in driving north will be a new shoot. The workings have now reached a good depth from surface (800 feet), and the silver ratio has fallen from 4 ounces per unit of lead in the upper levels to a couple of ounces in the lowest level. The zinc proportion has also increased twofold. The levels seem now to be in the zone of primary ore.

Although the ends south are blank and unpromising, their continuation would take them into unproved ground which is directly underneath ore which was worked above. It is difficult to believe that the long stretch of payable lode worked at and above No.1 Level has no downward extension. The future of the mine in my opinion depends upon how this great southern block of unknown ground opens out.

There are numerous slides and slips in the orechannels, and the ore often disappears after passing these, but I have been led to regard them as mere gliding planes against which the ore has frequently formed. It would be useless to spend money in trying to pick up suspected faulted parts of the lode beyond these slides, many of which existed already before the mineral was deposited. The nature of the lode channel itself (and not its movement) in this way affects the distribution of the ore, and the irregularity of the latter leads to disappointment which one cannot help. Where the lode channel has been physically favourable, ore has formed, and that is nearly all one can say about it. A vigorous exploration policy is therefore indispensable.

As the report is of the nature of a confidential communication, I have spoken plainly and in language which I hope will be readily understood. The attached profile will give you an idea of the depth to which the workings have been carried.

Yours truly,

W. G. F. P. [Signature]

Government Geologist.

W. H. Wallace, Esq.,
Secretary for Mines,

*Read
N. G. Lewis
[Signature]*

Geological Survey Office,

LAUNCESTON, 26th July, 1918.

Dear Sir,

MAGNET MINE.

In accordance with instructions I proceeded to Magnet on the 18th ultimo to confer with Mr. Hales, the General Manager at the mine, on certain problems with which the Company has been confronted in developing the mine. I returned to town on the 3rd instant.

The General Manager conducted me through the levels and stopes wherever these were accessible. The workings at the upper levels, being abandoned for a long time, do not now admit of examination. The following levels were entered:- Nos. 7, 8, 9, 10, 11, 12; also the new South Adit; and the surface out-crops were inspected. Our examinations and discussions resulted, I think, in throwing some light on a few obscure features of a remarkable ore deposit. For your information, the whole subject will be dealt with under separate heads as under:-

1. The lode is in the hanging wall portion of a broad dyke of eruptive rock (websterite-porphyr), which seems to be about 400 feet wide bearing about 20 degrees east of north and underlying to the north-west. This dyke is bounded on its eastern side by sandstone and indurated slate; on the west it is bounded towards the south by slate, and towards the north by a nodular igneous rock to which an eminent European petrologist has given the name of diabase-porphyr. This rock may prove to be a later intrusion along the dyke line.

On the footwall or eastern edge of the dyke is an unimportant vein of galena; but the lode which is being worked is, as mentioned above, on the hanging wall of the dyke. Thus the ore-bearing solutions have welled up along lines of weakness at the margins of the dyke, the principal channel being along its hanging wall.

The lode consists of a series of parallel bands of galena, alternating with bands of carbonate of iron and dolomite; the dolomite is frequently highly ferriferous. The whole forms a lode belt, which sometimes attains a width of over 100 feet. In the footwall portion of this belt there will be up to 30 feet of ore ground; in the central portion about 10 feet; and on the hanging wall about 5 feet. The average width of the lode taken out is from 40 to 45 feet of varying quality. There are therefore as a rule, three parallel drives on each level.

2. The economic mineral of the lode is essentially galena, with which is associated a subordinate proportion of zinc blende. The silver and gold contents in the upper part of the lode were abnormally high, the gold averaging 2 dwts. per ton, and the silver 4 ozs. per unit of lead. These high figures were no doubt due to solution and precipitation in the zone accessible to surface water. Primary ores of argentiferous lead and antimony were decomposed and formed new combinations, chromate; sulphate, and carbonate of lead; native silver and jamesonite. The result was the formation of a zone of enrichment which descended to a considerable depth, but which at the deeper levels gives place to a zone of leaner primary ores, with which an increasing proportion of zinc blende is associated. The silver ratio in the deepest part of the mine is perhaps about half what it was in the upper zone; but it is gratifying to note that the content is still satisfactory. As the mine deepens, a progressive increase in the zinc content may be expected.

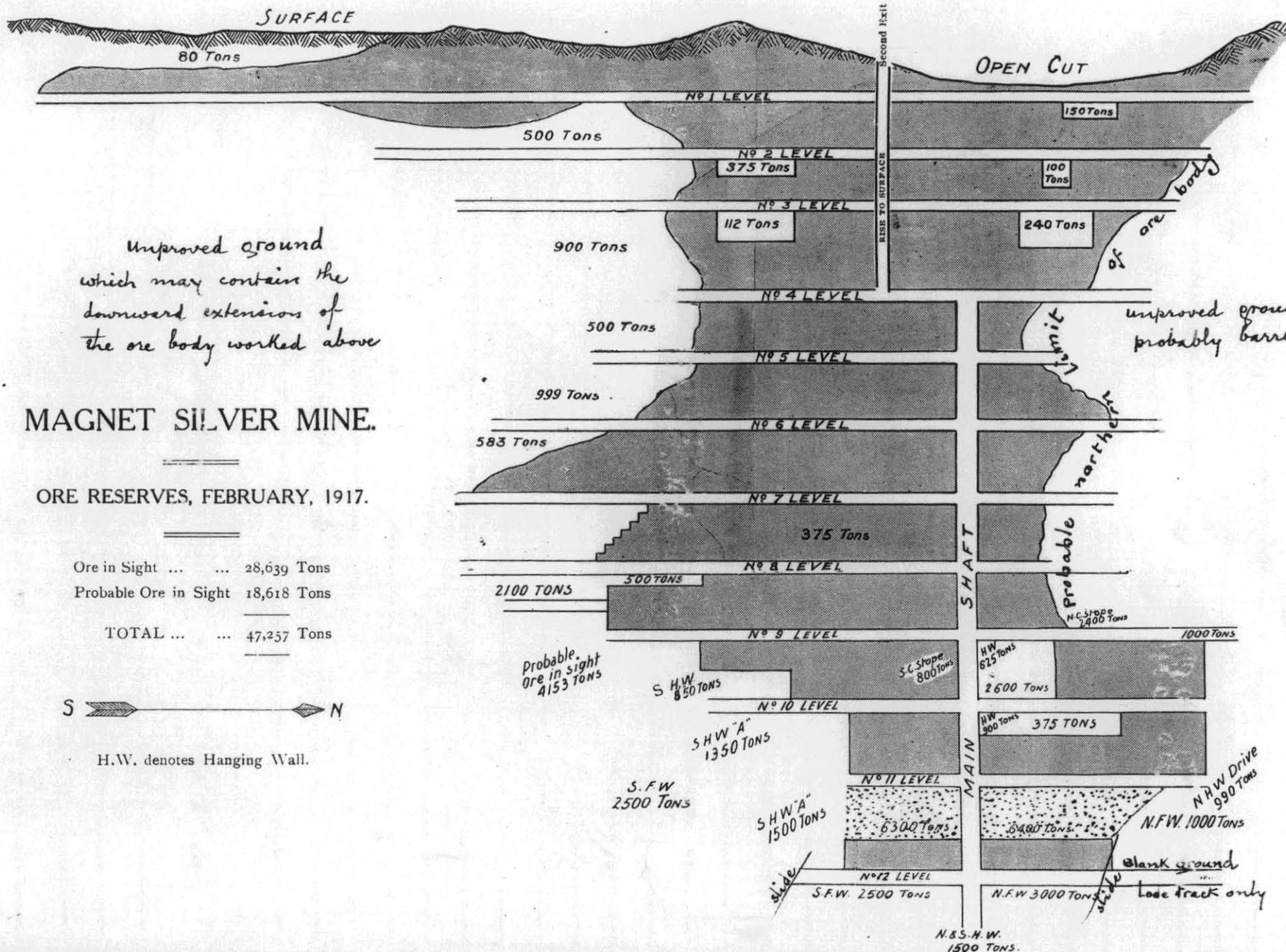
In the upper zone a whole series of lead and antimony minerals is present. Besides those mentioned above, the following varieties exist:- Pyromorphite (chloro-phosphate of lead); Mimetite (chlorarsenate of lead); Vanadinite (chlorvanadate of lead); Endlichite (arsenical chlorvanadate of lead); Massicot (yellow oxide of lead); Minium (red oxide of lead); Bindheimite (oxide of lead and antimony); Stibnite (sulphide of antimony). Then we have also the oxides of iron and manganese forming the gossan ores which were worked down to an appreciable depth.

3. The gangue minerals of the lode are carbonate of iron; dolomite (carbonate of lime and magnesia); calcite (carbonate of lime). Quartz is absent.

The absence of free silica is noteworthy in view of the fact that we must consider the metals as having arrived in solution from an underlying siliceous granite-magma reservoir. It may be imagined, however, that the siliceous solutions in their upward course gave place to ferro-magnesian solutions derived from the decomposition of the dyke rock which they traversed.

The lode channel is not to be regarded as having been an open gaping fissure ready to receive in one act the lode minerals as we see them to-day, but rather as having widened slowly by the breaking down and removal of successive bands of soluble rock, which were replaced successively by bands of mineral. Thus, the original channel which was perhaps originally not an inch wide, gradually acquired a width of fifty to a hundred feet. The dissolution of the magnesian dyke rock furnished magnesian solutions which consolidated as dolomite. A good deal of this mineral formed at the same time as the lode bands; and a good deal of it went on forming after the deposition of mineral ceased. In its latter phase it formed a kind of hanging wall to the ore veins, and here and there some indications suggest that it even encroached on the lode itself and replaced the ore. This however is a hypothesis which cannot be definitely accepted without further evidence. What seems clearer is that the dolomite does over a considerable extent of the lode fill the lode channel to the exclusion of the ore. Sometimes the lode channel, several yards in width, is completely filled with massive white dolomite, and when this occurs the prospect is not promising. That it was then subsequent to the formation of the ore is shown by occurrences in which disjointed fragments of banded ore are seen scattered throughout the dolomite matrix. A frequent occurrence in the mine is for the ore to cease suddenly, and for dolomite then to fill the vein channel. Exactly why this has happened admits of argument, and extended observation and study are necessary before a reliable opinion can be formed. In the meantime opinions must be based on each occurrence separately, and generalisations postponed till our knowledge is more complete.

The metalliferous portion of the lode is as a rule between the greenish dolomitised dyke rock on the footwall and the white dolomite on the hanging wall. Although dolomitisation is more pronounced close to the lode, it exists in an incipient stage all through the dyke, so that absolutely fresh dyke rock is difficult to find. Although too much dolomite may be looked upon as unfavourable for ore, the presence of this mineral is undoubtedly an indication of the ore solutions. In prospecting, therefore, if we meet with dolomite, we may be confident that we are in a lode channel.



Unproved ground which may contain the downward extensions of the ore body worked above

unproved ground probably barren

MAGNET SILVER MINE.

ORE RESERVES, FEBRUARY, 1917.

Ore in Sight	28,639 Tons
Probable Ore in Sight	18,618 Tons
TOTAL	47,257 Tons



H.W. denotes Hanging Wall.

Probable Ore in sight 4153 TONS

S.H.W. 850 TONS

S.C. Slope 800 TONS

H.W. 675 TONS

2600 TONS

1000 TONS

S.H.W. "A" 1350 TONS

S.F.W. 2500 TONS

S.H.W. "A" 1500 TONS

6300 TONS

N.H.W. Drive 990 TONS

N.F.W. 1000 TONS

S.F.W. 2500 TONS

N.F.W. 3000 TONS

N.B.S.H.W. 1500 TONS.

Blank ground Lode track only

4. The ore body which has been worked has (disregarding the singular constriction at No.1 Level) been in the form of a slightly sinuous vertical column bounded north and south by unproved ground. It used to be taken as an axiom that the ore body had a pitch to the south, but as a matter of fact, one cannot affirm positively that it pitches either north or south. For the first five levels the shape of the northern boundary did suggest a southerly pitch, but then it straightened up a bit and the shoot became practically vertical; below Nos. 9 and 10 Levels a northerly pitch came in; and at No.12 Level the column has contracted in width and seems to be descending vertically. Until, however, the southern block of ground below No.1 Level has been proved, the actual shape and size of the ore body cannot be stated; the present shape may be more apparent than real.

5. It is improper to regard the north and south boundaries of the orebody in this mine as being faulted boundaries. It is true that slides are common, but there is no evidence of major dislocations, and the manager has a very different task from that which he has in other mines where a lode is faulted and he has to search for and pick up the faulted part beyond the line of disturbance. The slides here are in the first place local and confined to the lode channel itself; at most they extend merely to the dyke and do not pass from the dyke to the enclosing country; that is to say; they are not regional. Many of them are parallel to the lode and do not affect its walls; some of them cross the lode at right or obtuse angles without any disturbance of the ore being apparent. At other times the ore will make up to the slide and disappear beyond it. In very many instances I believe that the slides existed before the formation of the ore and that they often formed a kind of wall against which the ore formed. In such cases we may find that the ore ceases beyond the slide, and that the ore channel is either filled with dolomite or narrows perhaps to a mere track. At the same time there are cases in which some movement of the ore subsequent to its formation may be noticed, but I feel convinced that these are unimportant. It may be stated as a hypothesis that most of these slides represent differential movements in the dyke rock, due to its hydration and consequent increase in volume. Similar gliding planes and partings are abundant in serpentine masses, which are closely allied in constitution to the present rock.

It can be readily understood how important it is for the Manager to bring all his knowledge of the behaviour of the lodes and slides to bear on the difficulties in the mine as they arise. It may be said that a great deal of the success of the mine will depend upon how he applies this knowledge to the operations underground.

6. The shallow workings of the mine extend horizontally for a thousand feet; the maximum depth attained so far is nearly 800 feet. In mining there is a general rule (to which there are exceptions) that the depth to which an ore shoot descends is at least equal to its length. Consequently there is some depth to sink before anticipating any adverse physical alterations in the lode. The shortening of the shoot in the lowest part of the mine is however disquieting.

7. Bottom Level - No. 12:

None of the ends in this level are being driven at present, and none of them show pay ore in the face. There is one drive north and three drives south.

Level North:

From No.4 Level down to No.9 the ore shoot has never extended far north of the meridian of the main shaft, but between Nos. 9 and 11 it doubled its length in this direction despite the fact that there was no ore above it for several levels, although there was ore in Levels 1, 2, and 3. This irregularity illustrates how, after a long vertical blank, ore may make again. Unfortunately, its length is again diminishing.

The drive from the main Crosscut has been extended in ore for about 60 feet on a bearing 10 degrees W. of N.; it then turned NE, following a slide for some 120 feet, but with no ore. The end of the drive shows white dolomite on the hanging wall or western side, resting on a narrow band of soft crushed dyke rock. This band occupies a position between the dolomite and the foot-wall country of rather fresh looking dyke rock. This position is normally that of the lode and the few inches of crushed dyke material may be taken as representing the dwindled lode channel. The present bearing of this drive agrees with that of the hanging wall drive south of the crosscut, which has been more or less on ore for its entire course. It also nearly agrees with the surface line of lode outcrop. On the other hand it is rather remarkable that most of the ore in the lower levels has been won on a north and south line, which if followed, would in time impinge on the hanging wall of the dyke and terminate there. Still there has been this turn of the lode channel to the east in the three lowest levels, and some ore has been won on this bearing, which on the whole is the natural one, being the direction of the dyke.

The stope at the northern end of the ore shoot shows quite plainly that the ore stopped at a slide. It is clear that the slide represents some movement of the wall rock, but it is not clear that it disturbed pre-existing ore. There are no signs of movement on the ore. It may be assumed therefore that the slide influenced the precipitation of the ore; when the solutions were exhausted, the ore channel became barren and may be expected to continue so until a point is reached where it has collected fresh accessions of mineral. To continue the present drive therefore is the course indicated, in order to reach a better section of the lode at this level, if such exists.

At the same time I have come to the conclusion that the northern end of the shoot which has been worked in this mine has now been reached at this level. The level is as far north as any part of the ore body which has been worked above, and the persistent cessation of ore in the north ends of levels above is very suggestive. Nevertheless, the great width of dolomite in the North Magnet level shows that the lode line has not died out northwards, for the dolomite is an indication of the lode solutions.

I was in the North Magnet level last in 1903, and an extract from my notes at that time may be of interest now.

The adit has been driven into the hill, intersecting 8 feet of white banded dolomite, into 9 feet of soft puggy rock on the west side. A little water was coming down from where the dolomite was struck. A drive south from the tunnel was put in on the hanging wall of the dolomite and continued for 2 chains. It was in soft puggy rock, leaving hard massive white dolomite on east side, but towards the end the level bears obliquely across to the hard dolomite and carries it with it to the end. A cuddy has been driven east and west across the end of the drive for a width of 17 feet. The eastern part of the face shows massive white dolomite, with just a speck or two of mineral; banded carbonate of iron is absent. The western part of the cuddy is in the soft puggy hanging wall seamed with dolomite. The direction of the drive is 30 deg. W. of S. but it is on the wrong side of the dolomite to be in the lode channel, which doubtless was not realised at the time.

Returning now to the question of the North drive in the Magnet mine at No.12, it will, if extended, advance into the ground between its present end and that tapped by the North Magnet adit - though much deeper than the latter - and along a lode channel which is apparently continuous. If, as stated above, the present end has been advanced beyond the Magnet ore shoot, it follows that any ore met with further along this line will belong to a new shoot, and this to my mind is the only hope we can entertain in continuing this level north. The absence of any ore outcrop between here and the North Magnet meridian is an adverse feature; still I take it that the Company cannot afford to cease all exploratory work in this direction. I understand that the Manager is in favour of continuing the drive as an exploratory one, and I am quite in agreement with this policy.

Footwall drive south at No.12:

There was payable ore along this drive until the lode narrowed and terminated at a slide behind the present end. The end is in dry disturbed country, beyond and evidently under the influence of the slide. The rock shows gliding planes and signs of some movement. The drive has been on the north-south ore line, and at present has reached an indecisive point - that is, it is not beyond the disturbed zone. The only thing that can be done is to drive on and see whether the orechannel can be picked up beyond the slide country. The objection, however, to this is that there is nothing to follow - and the dry rock is not a good sign. The Manager proposes to leave this end as it is for the present, and concentrate work at this level on the other drives. This would seem to be prudent.

Hanging wall "A" drive south at No.12:

This has been driven the furthest south at this level. It has been following a north and south slide nearly all the way, which is crossed by another just behind the face. In its course some minor slides were met with. Though more or less ore has been followed, it is said that the lode generally has been disappointing. The end is poor. The lode seams diverge in the face; the eastern branch carries a few specks of ore; the western one is the more important looking. The Manager wishes this drive to be continued. Its bearing is normal and its position good for exploring in any direction. An eventual crosscut west will prove the ground between this and the Hanging wall drive.

Hangingwall drive south at No.12:

This is practically on the same bearing as the drive on the slide north of the main crosscut. The distance between the footwall and hanging wall drives shows the great width of the lode belt in this mine, and the directions of the drives illustrate the irregularity of the veins. At any point between the foot and hanging walls of the belt there may be a development of branching or parallel veins, making exploration difficult and costly.

More or less ore has been met with in this drive all the way. Small slides have crossed the drive, and, as usual, there is one behind the end. This however does not seem to have moved the lode at all; the face is poor, showing white seams and a little ore. This is one of the drives which the Manager recommends to be continued. This and the "A" drive will satisfactorily explore the lode towards the south at this level.

No. 11 Level:

The Manager does not propose any further driving for the present at No. 11, as the stope from the level below is coming up on the footwall. In the drives north at this level we see how the dolomite has encroached on the lode and wholly taken its place, so that the white dolomite is now resting immediately on the green dolomitised rock. The white dolomite in the north end of the footwall drive is a dense band 8 inches wide.

In the end of the Footwall drive south the lode has petered out, though the walls are unchanged.

The Hanging wall "A" drive south has been extended in good ore. There is very little ore in the face, which looks hard and not at all inviting, though a little behind the end, the appearance was a little more promising.

The face in the end of the short Hanging wall drive is in hard ground and shows very little ore. It is seamed with dolomite, and the drive has met with a slide.

No. 10 Level:

The Footwall drive north has broken down and it is not possible to enter it.

The Footwall drive south has been extended a good distance, but soon after leaving the main crosscut I understand that the ore petered out. A few slides occur along and across this level, and the south end is in slide country, the drive passing through crushed rock south of a slide, into more solid rock. This drive will probably be left alone for the present, as it will cost a good deal to repair it.

North Central drive: The end of this short drive is in a dolomite-veined stockwork carrying a little ore; on the footwall side it is in soft rubbly crushed slide material about 3 ft. 6 in. wide. The fault channel carries loose fragments of ore

Hanging wall drive south at No. 10: There is a good hanging wall all along this drive, but no metal to speak of. The end is in dolomite and carbonate of iron formation, with a little ore. It looks as if it might be worth following, but it must be borne in mind that any driving in No. 10 will be of a purely prospecting nature, and that though the latter part of the drive has been in formation, there have been no values.

No. 9 Level:

The end of the Footwall drive south shows a white-seamed face of greenish grey dolomite with no ore. The end of Hanging wall drive south shows practically no ore. The lode terminates at slide in white-veined rock; greenish dolomite on west wall. This level is fairly well advanced south relatively to the levels above, and stopes above it for the greater part of its course have produced a good deal of ore, but there is no use in driving every level simultaneously for exploration purposes. Consequently no recommendation is made with respect to this level.

No. 8 Level:

The south ends of footwall and hanging wall drives were visited. The former has followed a flat vein with zinc blende, which has split behind the end, showing a two feet face on the hanging wall side and a six inch vein on the footwall with one foot of formation between them.

The south end of the hanging wall drive is barren and in dolomite. Its appearance is not encouraging.

When No.8 Level was being driven it was reported as being the best so far opened up in the history of the mine: the ore shoot was long and broad.

No.7 Level:

This was also a very satisfactory level. The present appearance of the Footwall drive south end is that of a lode channel diverted to the SE by a slide. A wide face is shown in rock veined with dolomite. At this end we are some distance past the ore shoot as worked, but by all the rules of mining the end ought to be in ore.

Unproved ground south of mine workings.

Between Nos. 1 and 7 the south ends entered blank ground; but at No.7 ore was stoped which is directly below the ore body at No.1, showing that the ore won at No.1 is part of an ore shoot which is not confined to the shallow developments near the surface. However, No.8 and No.9 showed blank ground again.

There is thus evidently an uncertainty of results from level to level, but from all the facts it is equally evident that the missing part of the lode has not been removed by faulting, and attempts to pick up supposed faulted portions of lode will therefore fail.

It is not, let me repeat, faulting, but, to use a homely and expressive term, a diseased lode which is the cause of the disappointment. Plainly it is impossible to predict with any certainty the downward continuation of ore at any particular level. The solutions have filtered through any easy channels and have, either in obedience to conditions which are unknown to us, passed through the ground without precipitating their metallic contents, or the ore deposit has been removed during some later process. Apparently the latter has occurred sometimes, but I doubt whether it has happened on any large scale. I am disposed to think that the original deposition of mineral was as a rule irregular, and took place only where the original dyke rock was soft and readily amenable to decomposition by the ore-carrying solutions. Where it remained hard and resistant, the channels formed were unimportant. During this phase the rock took up water and increased in volume, slipping and sliding on its constituent parts and giving rise to the numerous slides observed in the mine. Unfortunately the existing indications do not permit us to diagnose the condition and character of the lode channels in advance of work.

The exact role played by the dolomite is obscure. It is a decomposition or transformation product of the dyke rock: it evidently began to be deposited at the same time as the bands of ore in the lode, but its formation continued after ore deposition had ceased, and it became a massive mineral, replacing the dyke rock alongside the ore and often filling the ore channel itself. We cannot always determine whether it actually replaces lode matter which was once ore-bearing, or whether it simply fills the channels which the ore failed to fill. In any case, when the lode channel is filled with massive dolomite there does not seem to be any room for ore; on the other hand, wherever any kind of dolomite is met with, there is a chance of ore existing somewhere in the vicinity, as it is an evidence of lode action.

Is ground more favourable for exploration at upper or
lower levels?

In appraising the chances of exploration from the upper and lower levels respectively, there are two factors which favour the upper levels, but not so as to exclude the necessity for exploring from the bottom drives.

The ground in the upper, or to speak more strictly, in the middle levels seems on the whole to be looser and not so hard and tight as the south ends in the bottom levels, and to this extent has a more favourable appearance for ore deposition.

A good mining rule in testing ground is not to go too far from known ore. Thus it is sounder practice to drive one or two hundred feet below an outcrop of ore than it would be to drive one 700 or 800 feet below it.

Of course there is worked ground not very far above the south ends of the two bottom levels, but when these are fully extended, they will be a considerable distance below the ore at No. 1 Level. We have also to be prepared for the possibility of there being a real contraction of the ore body at these lower depths; this makes the next sink of the main shaft so important for a fuller understanding of the position.

There should be ore somewhere in advance of Nos. 4, 5, and 6 Level ends south. The necessity for a thorough exploration of this ground is indicated, but it would seem to be an expensive piece of work to secure jumping off points, in view of the present state of these old drives.

Although in driving the bottom levels south, there is, as said just now, always the possibility of finding that the ore shoot has gradually contracted in descending, and consequently of advancing into blank ground, still this is a risk which has to be taken. One or two of these levels must be continued to establish the permanency of the mine.

Recommendations.

After a good deal of thought the manager recommends the following work, and I am in agreement with him:-

1. To continue driving the north end of No. 12 Level in the hope that the ore channel, which is now reduced by the slide to a mere track, may open out again. There is just a possibility here, but if the dolomite comes in wide and massive the outlook is not encouraging. If ore is met with in extending this end, it will I believe prove to be a new body, as I fear the northern limit of the old shoot has been reached and passed. The manager proposes to put out a short crosscut behind the present end, which is very advisable.
2. To continue the Hanging Wall drive south at No. 12 and also the south "A" drive; and subsequently to crosscut west from the latter, so as to prove the lode country between these two drives.
3. To leave Levels No. 10 and No. 11 south for the present. Under the proposed scheme only one deep level at a time would be selected.

- 4. To prove the lode south of the present workings by driving north on it from the new south adit. This will be a continuous permanent work, and if it is on ore all the way, it will be no strain on the Company's resources. According to the plan it would involve more than 300 feet of driving before coming below any of the worked ground in the upper part of the mine. I may add that if some easy and not too costly way can be devised for proving the lode channel immediately south of one of the ends of Levels 4, 5, 6, 7, or 8, I think it should be adopted. I know the levels are in a dangerous state of disrepair, but I commend the idea to the Manager's consideration.
- 5. The dyke has an apparently continuous course, traced to a considerable distance north and south. Stone at the Magnet Proprietary shaft, a long distance south, shows that the lode solutions were still active as far as that. So far however, the Magnet orebody has been the most important centre of deposition. Still, other points are almost sure to exist, and careful surface prospecting along the line of lode should not be lost sight of.

New South Adit.

This at the time of my visit had been driven into the hill on a beautifully straight west line for a distance of 1039 feet, and is designed to intersect the lode below an outcrop of mineral located in one of the south trenches.

The lode is expected to be struck at some 250 feet or so vertically below surface. The outcrop shows zinc blende with occasional splashes of galena. Some pieces of same have been assayed by the Government Assayer with the following results:-

Zinc	28.5%
Lead	1.32%
Silver	21 oz. 4 dwts. 16 grs. per ton.

Evidently the zinc-blende is carrying the silver values.

At the time of my visit the face of the adit was in a dense rock which microscopic examination has shown to be an indurated slate. Since then the Manager has reported a change of country, the rock now apparently being the same greenish grey dyke rock as was met with in the No. 4 Adit.

A peculiar feature is that this dyke rock has not been entered before. By calculation, and supposing the dyke to maintain its bearing and width, the adit ought to have been passing through it for the last 400 feet of driving. It seems as if the dyke has thinned considerably going south; that is, if the position of the new adit is correctly represented on the mine plan. In this case the lode ought to be cut within the next month or two.

According to the plan, the lode will be intersected at a point between 300 and 400 feet south of the most southerly workings in the old mine, and if payable ore is struck, a new mine will be opened up. The horizon has been well selected as being the most useful one for testing the unproved lode channels south of the existing workings; that is, it is neither too high nor too deep. A northern drive will eventually come into the very heart of the ground which may carry the downward extension of the southern orebody - that is to say, as I have expressed myself more than once, into ground on which to my mind hopes for the future will have to be fixed.

Conclusion.

From the above it will be seen that the task of discovering fresh supplies of ore is not an easy one, owing to the irregularity of the ore channels and of ore deposition. The main directions seem to be constant, that is along the footwall and hanging wall of the formation, but between these there is more or less uncertainty, and the slides in the vein formations make it impossible to be certain beforehand how the lode is going to behave. The formation of dolomite also adds to the difficulties.

Still there is the undoubted fact that ore was won above No. 1 Level for a long distance south, making the horizontal extension of the orebody over 1000 feet in length, and it is difficult to conceive that below 100 feet from the surface the great southern extension has disappeared, leaving not a trace behind. During my examination I have continually borne this in mind and have felt that the possibilities in this direction outweigh the present unpromising appearance of so many of the ends south. Assuming that at certain horizons the conditions were unfavourable for the formation of ore, this would only mean that the process was intermittent and that at some point or other in the downward course the continuation of the ore above will reappear.

Exploration work is therefore strongly indicated in this south ground; and the direction in which such work may be tried to the best advantage has been suggested above. It is impossible to anticipate results, because exploratory work involves and implies risks; but there is a time in the history of every mine when these risks have to be faced. At present the Magnet mine is living largely on its capital; that is, it is stoping and treating supplies of ore which have already been opened up, and it is not discovering new supplies. Of course the main shaft will be sunk deeper, and being in the centre of the ore body, the crosscut from the bottom may be confidently expected to cut ore when the lode is struck, but the distances to which mineral will extend north and south are uncertain. The main conclusion at which I have arrived is that the mine depends largely for its future permanency on the southern block of lode-ground, and that the chances of this block proving ore bearing are what may be described as fair mining risks.

I have the honour to be,
Sir,
Your obedient servant,

W. R. F. ...

Government Geologist.

The Secretary for Mines,

H O B A R T.