

REPORT ON R.B. HILL'S AREAINTRODUCTION

The area held by Mr. R.B. Hill consists of three applications for lease Nos. 18M/51, 32M/51 and 17M/52 (Zeehan Mineral Chart) each of 40 acres located between the Comstock and the Swansea Mines west of Zeehan. The leases have not been surveyed as at the date of this report. On the accompanying plan, the positions of the marking out notices are shown and the boundaries of the leases indicated by broken lines. The lodes within the area are silver-lead-zinc bearing.

The area is readily accessible by vehicle, being distant about six miles from Zeehan. Access is gained via the Trial Harbour Road to the Comstock and thence via the old T.L.E. tram formation towards the Swansea. This latter formation passes through the group of T.L.E. workings and, further on, the old North Tasmania workings occur on the east side of the formation.

The workings occur near the eastern edge of a low-lying area stretching several miles westwards towards the coast. To the north and east low hills occur. To the south a low ridge separates the area from the Tasmania and Swansea mines south of which rises the conglomerate mass of Mount Zeehan.

The flat portion of the area is mostly covered with scrub of varying density while the ridges are mainly of buttongrass with patches of forest in the valleys.

PREVIOUS MINING OPERATIONS

Prospecting west of Zeehan shortly after

2.

the original discovery of silver-lead ore in this district soon revealed the presence of a series of lodes in the Comstock-Swansea area and, by 1890 a number of small companies were working this field. Among these were the T.L.E. (Tasmanian Land Exploration), the Stonehenge and the North Tasmania. A major financial upset occurred in 1891 with the failure of the V.D.L. Bank followed by a depression over the whole of the Zeehan field. Along with many others, the three companies mentioned above went out of existence. Subsequent work on their properties was carried out intermittently by tributing parties. These parties usually had limited financial resources and were not able to carry out much developmental work. Their activities were, therefore, mostly confined to the extraction of ore in sight.

The areas held now by Mr. Hill comprise the workings of the three companies mentioned above. Except for three drives and the tops of several stopes to the surface, these workings are not now accessible. During the present investigation, the position of all surface openings has been plotted and the following notes regarding previous operations have been compiled from verbal information supplied by Messrs. R.B. Hill, A. Hill, A. MacGuinness and A. Nicholas and from a Mines Department progress report by W.H. Twelvetrees dated 1900.

The T.L.E. Workings

These are now located in the northwest corner of lease No. 32M/51. Three lodes occur, trending east of north (Nos. 1 and 2) and a little west of north (No. 3). The original (No. 1) lode was first worked by adit, 40 ft. of backs being obtained, and was stoped to the surface. Later, a main shaft was sunk to 100 ft. and

3.

a 15 ft. crosscut put out to the lode. Drives were put in north and south. According to Twelvetrees, 275 ft. of such driving was done and some stoping carried out in the south end. According to Mr. R.B. Hill, 200 ft. of driving was done south but none north. The level was timbered but no stoping was done. Three feet of good quality milling ore of high silver content occurs. Twelvetrees records that the lode was "high grade (viz high silver content) galena-blende".

The No. 2 (Hughes') lode was revealed when the tram formation was cut. It occurs 220 ft. east of No. 1 and appears to be parallel with it. The lode was worked from an adit crosscut and later from a shaft. This is of unknown depth but, judging from the dumpheap, it is probably not deeper than 100 ft. According to Mr. Hill the lode was driven on for some 200 ft. and the whole of this length stoped to the surface. It is alleged that Hughes' sale assays from this lode were approximately 80% Pb and 130 oz. Ag. There appears to be some supporting evidence for the statement that Hughes' lode was quite rich. Mr. A. Nicholas who held the section with C. Brumby and from whom Hughes had a tribute reports that "Hughes did very well out of this lode". Mr. A. MacGuinness who was sampling at the Zeehan Smelters at the time reports that "Hughes' ore was the prettiest on the field. It had a high silver content and no zinc".

In 1908 the tributors, Messrs. Thurston and party, discovered No. 3 (Thurston's) lode west of No. 1 lode and trending a little west of north. They crosscutted to it from the original No. 1 lode adit working a shoot of ore 70 to 80 feet long. At this stage,

4.

it is not possible to gain any idea of the values in this lode.

The Stonehenge

The workings on this property occur on the flat some 200 yards southeast of the T.L.E. main shaft. There are alleged to be three lodes of which the central one was the only one worked. In 1885, a shaft was sunk to 20 ft. on a lode 1 ft. wide stated to be "half lead and half zinc". In 1908, R.B. Hill and party stoped the ore to the surface over a distance of 30 feet. The lode is stated to be offset by a number of cross faults each of a foot or two displacement.

Mr. A. MacGuinness worked in the mine subsequent to 1908 until it was closed down. During his time, the shaft was deepened to 60 feet and further driving undertaken. He states that the lode was about 6 inches wide and consisted of a series of small shoots of alternately "clean lead and clean zinc". The silver ratio was about one to one.

The North Tasmania

In about 1885, an English company commenced work on this section. No. 1 lode was located and a shallow adit drive put in for about 200 ft. gaining 25 feet of backs. Ore was stoped to the surface. A main shaft was sunk to 190 feet and levels opened out at 100 ft. No record can be found of the amount of driving done. In 1900, W.H. Twelvetrees states that "levels were opened out on a good sized lode which has been stoped to the

5.

surface on a good run of galena-blende ore. The lode bears N 20°W and dips to the northeast." He quotes a series of sale assays averaging as follows:-

Firsts - Ag - 69 oz. per ton, Pb - 73%

Seconds - Ag - 49 oz. per ton, Pb - 60%

He further states that "the silver ratio is a little under one ounce per unit on the other hand a good deal of the ore is stated to be only half an ounce to the unit". The company ceased operations in 1891 but some tributing work is stated to have been later carried out.

The No. 1 lode is reported by Mr. A. Hill to have been out in a prospect drive put in 240 ft. south of the main shaft but the values where out were poor.

Some 200 feet west of the main shaft, a parallel lode (No. 2) has been worked from an adit. A line of pits, stopes and collapses indicated the known length to be about 200 ft. The workings are shallow.

North of No. 2, a group of three very small lodes has been prospected by means of pits.

East 400 feet from the main shaft is the portal of Horton's No. 1 Adit driven due East for 180 ft. The date of this adit is indeterminate. At the end of the adit, a trace of a lode formation (No. 4) occurs carrying no values. The adit was put in to test at 40 ft. depth a gossan outcrop occurring on the hill above.

Some 500 feet north of the main shaft, Horton's No. 2 adit occurs driven 430 feet in a westerly

direction. This adit failed to reveal any continuation of No. 1 lode.

In approximately 1894 - 95, C. Riley located a lode (no. 3) some 500 ft. south of the main shaft by means of an adit crosscut. It was thought that this was the southern continuation of No. 1 lode. However, it was found to be low grade ore averaging about 40% Zn and 20% Pb and thus carrying a high penalty. A 16 ton parcel, when sold, failed to pay cartage costs and Riley and Party abandoned the project. In about 1900, when the Tasmanian Smelting Company were operating in Zeehan, two tributors re-opened these workings and stoped a length of 80 feet to the surface. These workings have recently been re-opened by Messrs. R.B. and A. Hill who are driving the level northwards. It is possible that Nos. 2 and 3 lodes as specified above are actually the same lode.

In 1925, Mr. A. Hill continued the old adit south of the main shaft "for several hundred feet past the point where No. 1 lode was cut" and cut a formation about 2 feet wide showing "splashes of metal" (No. 5 lode).

At some period subsequent to 1900, a prospect trench 1200 feet long was cut at right angles to the lode system just north of the No. 1 lode workings by a government prospecting party but apparently nothing of value was revealed.

7.

Copper Prospect

Some years ago, Mr. R.B. Hill located a small outcrop some 400 feet west of the Stonehenge on flat ground. The outcrop showed copper mineralisation and is reported to have assayed 15% copper. A shaft put down 20 feet in soft ground failed to locate the lode at this depth.

R.B. HILL'S PRESENT WORKINGS

Present operations are being undertaken on C. Riley's old workings on No. 3 lode. A long curved approach had been cut followed by 140 feet of adit crosscut to the lode. Riley's and a later party did some stoping to the surface. Mr. Hill has recovered a shaft where the crosscut cuts the lode and has been driving north. The total amount of driving done by Mr. Hill and others is 60 ft. north and 40 ft. south. A maximum of 30 feet of backs has been obtained but this is decreasing rapidly as work proceeds northwards. The adit crosscut is in soft black shales sometimes partly decomposed. Where intersected, the lode is 9 ft. wide and a winze has been sunk a few feet at this point. The walls are steeply inclined and the lode appears to be nearly vertical. Followed northerly, the average width of drive is 3 to 4 feet. In the face the lode is 2 ft. 6 inches wide. The south drive has not been touched for many years. At 40 ft. from the crosscut there is a small cross fault offsetting the lode several feet to the east. South of this

8.

point, two pits on the surface show the lode continuation. The lode trends generally at 30° west of north. South of the crosscut, there appears to be a split for a 6 inch vein occurs in a crosscut west 15 ft. from the main lode.

Three samples were taken in the present workings during this investigation.

- z/87 - Samples taken across 9 ft. width at bottom of shaft. (Chip sample across floor)
- z/88 - Sample across the north face as at 14/10/53. Horizontal width 3 ft.
- z/89 - Chip sample across 6 inch vein of ore in crosscut south of shaft (on the "split" referred to above)

Assays were carried out by the Department of Mines Laboratory, Launceston, with the following results:-

	Ag (ozs)	Pb (%)	Zn (%)
z/87	1.6	19.5	1.3
z/88	6.8	34.8	0.7
z/89	2.1	18.1	0.3

The ratio of silver per unit of lead in each case is .08 : 1, .19 : 1 and .12 : 1 so that the ore may be regarded as of low grade as far as silver content is concerned. The zinc contents are surprisingly low. It should be pointed out that much sphalerite is present in the lode and that the ore heaps show a fair proportion of this mineral.

The characteristics of this lode are:-

9.

- (1) Fair to good lead content
- (2) Moderate zinc content
- (3) Low silver content.

In these respects it is remarkably similar to the Tasmania and the Swansea lodes further south. When these three lodes are plotted on a plan, there can be no doubt that they are actually one and the same. The relative abundance of the three minerals supports this view.

GENERAL GEOLOGY

Natural outcrops in the area are very few and these notes have been compiled from observations on artificial outcrops of which there is a relative abundance.

Both sedimentary and igneous rocks occur. The sedimentaries in the vicinity of the T.L.E. consist of a prominent band of coarse grit or fine conglomerate with associated shales and sandstones. The grit has a general pale-coloured aspect and consists of siliceous pebbles both angular and rounded ranging up to half an inch in diameter cemented by a finer grained siliceous material. Grainsize is variable throughout the mass and a number of sandy lenses occur. It appears to be a near-shore deposit formed adjacent to a fluctuating strand-line. The best exposure is seen in the tram cutting just before reaching the T.L.E. workings. Here the grit is exposed over a distance of 140 ft. The northern limit is visible but to the south the grit disappears beneath soil. The apparent width of the bed is 80 ft.

The succeeding beds to the north are black

and grey fairly thinly bedded shales. In places they are siliceous and approach the composition of argillaceous sandstones. The contact between the shales and the grit is not a clean one. Rather, the grits grade to shales along an irregular zone. It is not considered that this contact is a fault. It appears to be a normal succession, the offshore region over which the grits were accumulating gradually sinking to allow finer grained material to be deposited.

The southern limit of the grits is exposed in a ballast quarry situated on the northern side of the tram formation between Nos. 1 and 2 lodes. The contact here is fairly sharp, the material south of the grit being a rather consolidated pale coloured sandstone in places argillaceous.

Attitudes over the area are difficult to find. The few that have been observed indicate that the series strikes 60° to 70° east of north and dips steep northwest or vertical.

The distinctive grit band has proved most useful in determining the structure in the F.L.E. area. As shown on the plan, the bed has been dislocated by two faults which have been mineralised and are designated Nos. 1 and 3 lodes. Unfortunately, there are no outcrops of the grit in the vicinity of No. 2 lode to assist in determining whether or not that lode is also located along a fault.

In the vicinity of the southwest corner peg of lease No. 18M/51, there is a prominent low ridge of similar grit. This is exposed in a tram cutting and can be traced for 200 yards east and 400 to 500 yards west of the tram trending a little north of west. The apparent width of the band is 60 to 80 ft. The grits are followed to the south by pale sandy shales and to the north by black shales. Dips recorded on the former beds are in the range 60° to 70° to the north. The black shales have been traced northwards from the grit where it crosses the tram almost continuously up to the prospecting pits just south of Hill's workings. They occur in the adit crosscut to these workings and also intermittently along the main tram formation. Northwards, from the workings, the general shaly character of the outcrops is maintained but there is some variation in colour towards grey and, where deeply weathered, to yellow brown.

The shales in this area show some variation in attitude, the strikes varying from northeast to southeast and the dips, mostly steep, are to both the north and south. This indicates a considerable amount of contortion within the shale series whereas the grits are apparently more regularly bedded. This is a common feature of West Coast geology. More competent beds such as conglomerates, quartzites, etc. show gentle rather than sharp folds, the beds fracturing when the degree of folding becomes high. The less competent beds such as shales usually do not fracture unless the folding is extreme but rather tend to be thrown into intricate fold patterns.

Although outside the area under consideration, it is recorded here as a matter of interest that two distinctive grit bands in all respects similar to those above described occur in the vicinity of the Swansea mine some

12.

half to three quarters of a mile southeast of Hill's present workings. These also are associated with black shales and with sandstones. It is the opinion of the writer that all outcrops of the grit represent the one stratigraphic horizon repeated either by folding or by faulting. It is considered that, were structural geological work to be undertaken at some future time in this general area, the grit bands would serve as useful marker bands.

The country rock in which the North Tasmania No. 1 lode occurs is a rather soft pale coloured material showing almost no signs of structure. The western portion of the prospecting trench north of these workings, where not filled with vegetation and rubbish, also shows this type of material. It is considered that this is original argillaceous material hydrothermally altered and perhaps kaolinised, the alteration being associated with the intrusion of the subjacent ultrabasic mass.

To the north of the long prospect trench and exposed in Horton's No. 2 Adit is a thick series of black shales, highly contorted and in places carrying quartz stringers. The northern extent of these beds was not investigated.

The flat area south of the T.L.E. and west of Hill's workings is composed almost entirely of ultrabasic rock now converted to serpentine. In many places it is highly weathered and difficult to recognise as serpentine but occasional less-weathered outcrops leave no doubt as to its composition. This is the eastern edge of an extensive serpentine belt which forms the Red Hills, Tenth Legion flat and probably is physically connected on the surface with the serpentine south of Trial Harbour. Ultrabasic rocks are the product of deep-seated intrusions

13.

and, like granitic intrusions, they normally have highly rubbish lines of contact with the enclosing sedimentaries. The present case is no exception. Two tongues of serpentine project eastwards from the main mass and can be observed on the tram formation. One occurs just southeast of the T.L.E. workings. Its eastern limit has not been determined but it will not be found to extend beyond the base of the hills. Another tongue crossed the tram west of Hill's workings. The limits of this have been determined with fair accuracy. Where crossed by the tram the tongue is narrow but widens eastwards. As shown on the plan, it reaches almost but not quite to No. 1 lode and No. 2 lode is within its boundaries. The southern limit occurs between the known southern limit of No. 2 lode and the northern limit of No. 3 lode. A group of small lodges north of No. 2 is found in a zone showing an abundance of ironstone boulders. This latter feature is not a gossan but a magmatic segregation of ironstone within the serpentine. Such segregations are common features of serpentine intrusions in the West Coast area. Occasionally, as for instance at Dundas, gossans occur within the ironstone segregations. The group of small lodges mentioned above is an instance of this. At least one other patch of ironstone segregation was noted southwest of the southwest corner peg of lease No. 18M/51. A prospect trench through this has revealed no sign of mineralisation.

The Stonehenge lodges and the "copper prospect" occur entirely within the serpentine boundaries. It appears likely that the Stonehenge lodges are normal fracture fillings and that their location within the serpentine is entirely fortuitous. Although no data can be secured with reference to the copper prospect - it being only a very small outcrop in a swamp - it is considered likely that it is either an original segregation within the

14.

the serpentine or the product of autoinjection during the later stages of the intrusion, the copper being derived from the same magma as produced the serpentine. It is possible that nickel is present along with the copper.

No age determinations of the rocks were made during the investigation. However, from general lithological similarities with other known rocks in the Zeehan district it can be stated that the shale-grit series is of Cambrian age and probably is located near the Upper Middle Cambrian. The serpentine intrusion is regarded, from evidence observed elsewhere, as Lower to Middle Devonian in age.

DISCUSSION OF LODGE SYSTEMS

The No. 1 T.L.E. lode bears 36° east of north and underground observations show the dip to be 75° W. No. 2 (Hughes') lode to the east is almost parallel (34° east of north) but at no place could the dip be seen. The position of the shaft indicates that the lode is nearly vertical. Two shallow prospect shafts to the south reveal a slight change in the position of this lode. It is probably offset by a fault associated with the ultrabasic intrusion. No. 3 (Thurston's) lode has quite a different strike (04° west of north). In the top of an open stope the channel of this lode is visible and appears to be almost vertical. The position of the fine conglomerate band referred to above indicates clearly that Nos. 1 and 3 lodes are located along fracture planes and it is deduced that the lodes are fissure fillings. It is clearly evident that Nos. 1 and 3 lodes will junction at some point not far south of the adit portal.

There is insufficient evidence available to enable it to be definitely stated that No. 2 lode is a fissure filling. However, in view of its nearness to and parallelism with No. 1 lode it is presumed that it

is of this type also.

The near-surface portions of the lodes which could be examined showed that they are very narrow. No. 3 lode is a mere track while No. 1 lode stopes are a maximum of 18 inches wide where they can be seen. This narrowing near the surface appears to be a characteristic of these lodes. It is presumed that the lodes widen at depth for no company would have undertaken operations on lodes as narrow as these appear to be at the surface.

Little ore is lying on the dump heaps. Some was seen on the northern prospect workings of Thurston's lode and some on three dumps south of Hughes' lode. In each case the ore consisted of about equal portions of galena and sphalerite. It is, of course, possible that the sphalerite is concentrated near the surface. It seems probable that this is so, for it is hardly likely that lodes having as high a zinc content as would appear from these surface indications would have been worked in times when there was a high penalty on zinc content.

With reference to the Stonehenge, little can be added to the description given above. The lode occurs in flat-lying country and one can now see nothing of the lode itself. It occurs in serpentine, probably as a fissure filling. It is quite narrow, has apparently a high zinc content and is very patchy. It is hardly an interesting proposition under present conditions.

In the North Tasmania area, there appear to be a maximum of five lodes of which two, Nos. 4 and 5 are of no value. The No. 1 lode was apparently a good lode of high grade ore according to the assays quoted by Twelvetreets. This lode has been stoped to the surface above 100 ft. level. The shaft is to a reported depth of 190 ft. and appears to be standing well. It would be a relatively simple matter to unwater this shaft and to cut the lode at 190 ft. for prospecting purposes. It appears to the writer

16.

that this would be a worthwhile undertaking from a prospecting point of view. There is no evidence to indicate how far the lode continues south. To the north it has not been cut in Horton's No. 2 Adit 660 ft. northwards from the shaft along the line of lode. It is, however, possible that the lode curves to the west and that the adit is not driven far enough west to intersect it. There is no direct evidence either way on this question.

The group of small lodes to the west of the main shaft occur in a magmatic segregation of iron ore in serpentine. It is considered most unlikely that they will prove of any value.

The No. 3 lode at present being worked bears 38° west of north and is almost vertical. As detailed above, it is almost certainly a continuation of the high-zinc, low-silver lode worked in the Swansea and Tasmania.

The No. 2 lode bears 10° west of north and dips west at 80° . Most of the dump heaps along it show fair quantities of zinc. Although the lode designated as No 2 does not line up in plan with that designated No. 3, it is distinctly possible that they are indeed the same lode. This appears to be borne out by the relatively high zinc content of each. It is probable that a fault occurs, perhaps along the course of the small stream, which has served to offset the lode. It is not possible to be definite on this point at present.

CONCLUSIONS

- (1) Within the area held by Mr. R.B. Hill there are at least eight known lodes falling into two groups (a) the T.L.E. and Stonehenge and (b) the North Tasmania.
- (2) The former group trend generally east of north and dip vertical or steep west while the latter trend generally

west of north and dip steep west.

(3) All the lodes with the exception of two small ones at the Stonehenge have been worked previously with varying success.

(4) Of the lodes described, only T.L.E. Nos. 1, 2 and 3 and North Tasmania Nos. 1, 2 and 3 show any promise, the latter two mentioned probably being one lode.

(5) The North Tasmania Nos. 2 and 3 lodes (or lode) are zinc-bearing and have low silver content. To counteract these characteristics, it is necessary to have a high galena content in order to make the ore payable. The galena content of ore from Hill's present workings is not particularly high.

(6) It appears that the remaining lodes in the area are normal Zeehan-type as regards metal content viz. moderate to high silver content with low zinc. However, in only one case is this assertion supported by recorded assays.

(7) The lode at present being worked by Mr. Hill does not appear to be a suitable proposition for a company.

(8) The upper portions of all the lodes have mostly been worked out to varying depths up to 100 feet. It follows, therefore, that the future of the area, if any, lies in the extraction of any ore occurring below 100 ft. level. Some considerable financial outlay would be involved in prospecting below this level.

(9) In this connection, the most promising proposition appears to be the North Tasmania No. 1 lode. Quoted assays are quite good and a good shaft is already in existence to 190 ft. Prospecting could be undertaken by unwatering this shaft, crosscutting to the lode and driving. This appears to be preferable to diamond drilling in this case which is always difficult with regard to lead lodes owing to the patchy nature of the ore. It should be stressed that the known horizontal length of this lode is

18.

not great. This fact must be taken into account when deciding whether or not to investigate in depth. It should also be pointed out that, should an investigation of No. 2 lode at depth be considered warranted, it could be carried out from this same shaft by crosscutting 200 ft. (10) As regards the T.L.E. lodes, the most practicable method of investigation would be by diamond drilling. In this case there is a shaft to 100 ft. only and investigation in depth otherwise would involve shaft sinking. Should such drilling reveal ore, it is pointed out that all three lodes could be worked from the main shaft, a maximum of 400 feet of crosscutting being necessary to intersect the whole lode system.

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REGIONAL GEOLOGIST

Zeehan

18th December 1953

The Director of Mines,
HOBART.