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## BELL HILL TIN MINE

### EARLY HISTORY -

As the early history of this mine is not generally known the following statements have been taken from previous reports as recapitulation:-

A.M. Reid, Government Geologist, in his report on the mine, dated 26/11/25 states:-

"Tin ore was discovered on this property ..... by the well known prospector and explorer W.R. Bell ..... The first exploratory work on the known lodes was performed by an English Company (unnamed) in 1876. No further attention was given to the ore-bodies until 1902 when the Purdue Company continued the work of development. At that time, attention was directed particularly to the lodes. Recently W.E. Hart of Branhholm arranged for the purchase of the property and is now engaged in the forming of a company."

There is no reliable information as to when the underground workings were completed. In August, 1925, P.B. Nye, Government Geologist, visited the area and found the workings inaccessible, for he reported that:-

"It is stated that the tunnel cut two lodes and that the second lode was driven on for 200 feet to the east. From this lode 300 tons of ore were reported to have been treated and gave a yield corresponding to  $3\frac{1}{2}$  per cent tin. It is also stated that at a later period, 100 tons of material were gathered from the surface and treated with a recovery of 30 to 35 bags of tin ore, representing a yield of  $1\frac{1}{2}$  per cent. These statements cannot, however, be officially verified.

In November, 1925, when A.M. Reid, Government Geologist, visited the field, the adit had apparently been re-opened for his report gives details relative to size and position of formations exposed in the underground workings. A plan of the mine accompanies his report.

Neither of the foregoing writers has reported grade of ore and it is apparent that no sampling was done.

In December, 1925, W.H. Cundy, Mining Engineer examined the mine on behalf of a Syndicate. Some sampling was carried out by this investigator and the results are tabulated for comparison with sampling done during the present examination.

### SITUATION AND ACCESS -

The mine is situated on the steep northern slopes of Bell Hill, six miles from Weldborough, about midway between the townships of Weldborough and Ringarooma and immediately to the south of the road connecting those two townships. Access from Weldborough presents no difficulty for traffic generally but, from Ringarooma, portion of the roadway is in a bad state of repair and is, at present, regarded as being impassable for vehicular traffic. A track from Branhholm joins the Weldborough-Ringarooma road at a point two miles from the mine.

### GEOLOGY -

The whole of the leases occupied by the Bell Hill Mine are composed of granitic rocks comprising normal granite with numerous greisen veins and some aplitic veins. To the southwest of the mine the granitic rocks are overlain by a series of quartzite

and slates obviously resulting from local metamorphism by the granitic intrusion. These metamorphic rocks are regarded as belonging to the Mathinna series of sandstone and shales.

MINING OPERATIONS -

The earliest operations at Bell Hill were directed towards the development of the many tin-bearing greisen veins which traverse the granites, and the underground workings were designed for that purpose. The veins vary in width from a few inches to upwards of 20 feet and marked variation in width occurs in individual veins. Most, if not all, of the veins are tin-bearing with some containing cassiterite which is readily visible. The detrital matter from the veins, when tested by vanning, in every case revealed the presence of tin; but a number of samples from outcrops showed only low grade ore.

The greisen veins show no regularity in direction of strike, although the major veins trend easterly, or deviate only by a few degrees from that direction. Minor veins trend generally in a north-easterly direction but may be irregular. Most of the veins dip in a northerly direction. With few exceptions the veins do not persist for appreciable distances and irregular outcrops are suggestive of minor faulting.

THE MINE WORKING -

The principal mine workings consist of a crosscut adit drive in a south-westerly direction for a distance of 474 feet; from which point it has been driven in a southerly direction a further 90 feet. Prior to this inspection, the adit was inaccessible due to a fall of earth about mid-way along its length. To enable an inspection of the workings to be made, the present proprietor had this obstruction removed sufficient only to enable access. Considerable dead work would, therefore, be necessary to clear the adit for productive mining.

In the first 275 feet of the adit, numerous greisen veins have been exposed which vary in width from one to 20 inches and strike generally in a north-easterly direction. The granite in this section of the adit is in a general decomposed state and is soft and easily mined. None of these veins have been developed and those which were sampled showed only low grade ore. Several minor faults were recorded.

At 275 feet from the portal, some development has taken place on a greisen vein varying in width to six feet six inches. This vein has been referred to by previous writers as No. 2 Lode. Stopping has resulted in the removal of perhaps 50 tons of ore of a grade which evidently promised profitable returns. The western end of these workings reveals sulphides of both iron and copper with copper occurring to a marked degree. The limited operations indicate a falling off in grade. Samples taken during the present investigation returned only 0.07% and 0.16% metallic tin but in December 1925 W.H. Cundy, mining engineer, returned a grade of 6.55% metallic tin in samples from a similar position. The vein is a hard one which factor would contribute to cessation of operation.

From this vein, the adit passes through hard granite with a marked falling off in the number of veins to be seen. Only six narrow veins are exposed till at a distance of 474 feet from the portal a vein of appreciable width occurs. Previous writers refer to this vein as No. 3 Lode. No. 3 Lode has been developed by levels driven both to the east and to the west. In an easterly direction the level has been driven in the vein for a total distance of 65 feet. At 35 feet from the main crosscut a gallery 16 feet wide to the south of the level has been opened on the intersection of

two veins which yield a total width of 13 feet of ore. In the eastern level. No. 3 lode does not exceed 3 feet in width.

At the intersection of the main crosscut with the level on No. 3 lode, a rise has been made. This rise was, at the time of this investigation, inaccessible, but was open for what was estimated to be 80 feet where apparently an intermediate level had been driven to the east. The previous writers mentioned, all refer to this rise as having been carried to surface, a distance of 200 feet. This may be so, for the present plan suggests that this rise is directly under open stopes, occurring at the surface, which have been partly filled by falls of earth. The connection, however, would not be a direct one but would be through the intermediate level.

In a westerly direction, the level has been driven for some considerable distance but is at present blocked by a fall of earth at a point 150 feet from the main crosscut. At 75 feet in the level a crosscut to the south has been driven a distance of 40 feet to cut what has been referred to as the main lode.

From 75 feet in, the direction of the level has been changed gradually until at 150 feet it is trending north-westerly.

The vein in the western level varies in width to 7 feet.

At a point 40 feet from the main crosscut a winze, reported to be 40 feet deep, has been sunk and stoping above the level has been carried out. The stoping extends for a distance of 30 feet along the level and has risen for 20 feet above it. It has been reported that 300 tons of ore from the winze and these stopes, was of a grade of 3% tin (Cundy) but present sampling yielded only 0.06% and 0.2% tin from a position above the eastern end of the winze.

In the western end of the stopes, the vein is the full width of the drive and maintains that width for at least 50 feet to the west where it partly passes out of the level. A sample from this section of the vein taken from a point in the roof 10 feet west from the crosscut, was of a grade of 0.48% tin. W.H. Cundy from a similar position reports a grade of 2.75% tin.

From a point 474 feet from the portal the adit has been driven in a southerly direction for a distance of, at least, 90 feet where a fall of earth prevents further examination. Previous reports state that about this position a greisen vein has been cut and a rise put in. No details of this work are available. In the main adit, 12 feet from No. 3 level, a greisen vein, 8 feet wide is cut. This vein has been called the main lode and is exposed:-

- (1) In the gallery from the eastern level on No. 3 lode.
- (2) At the position in the Main Adit mentioned above.
- (3) In the gallery at the end of the crosscut driven to the south from a point 75 feet from the Main Adit in the western level on No. 3 lode.

Sampling of the Main Lode gave the following results:-

In the gallery (1) above

3' wide 0.46% tin

4'	wide	0.35% tin
5'	"	0.49% tin

In the main adit (2) above

2' 11" wide	0.09% tin	} W.H. Cundy 1.12% tin
2' 11" "	0.49% tin	
2' 8" "	0.48% tin	

In the gallery (3) above

3' 7" wide	trace	} W.H. Cundy 0.47% tin
3' 9" "	0.04% tin	
4' 6" "	0.06% tin	
5' 0" "	0.05% tin	

At a point 85 feet south from No. 3 lode in the Main Adit, levels have been driven both to the east and to the west.

In an easterly direction narrow veins have been exposed in the level but at 90 feet from the Main Adit a fall of earth has closed the level.

In the westerly direction, the level is closed by a fall of earth within a few feet of the adit but it has been reported to the writer that this level extends for at least 200 feet in a westerly direction.

Although the mine workings are extensive, it appears that development has revealed no ore of profitable grade, although the stopes above No. 3 level suggest that at least one shoot of ore was worked. The stopes over the winze in No. 3 level also suggest an enrichment.

As the ore, except in No. 2 Lode, is reasonably free from sulphides, its treatment would be simplified and a high recovery could be anticipated with an efficient treatment plant.

FUTURE OPERATIONS -

It is admitted that the grade of ore, as shown by present sampling, is not high but in the face of the eastern level of No. 3 Lode one sample was of 0.95% grade with three adjoining samples of 0.46%, 0.35% and 0.49% grades representing a total width of 13 feet of ore of which the average grade is 0.54% metallic tin. This occurrence is at the junction of two veins and may be due to local enrichment but a similar grade of ore occurs over a width of 5 feet 7 inches in the Main Adit. There is, therefore, the possibility that by extending the eastern level on No. 3 Lode, a higher grade of ore would be proved.

If this work should be undertaken, a preliminary operation should be the unwatering of the winze in the western level to facilitate sampling of the vein. It has been reported that ore of 3% grade has been won at that position. After sampling, the winze could be used to deposit spoil won in extending the level eastward and so obviate the necessity for repairing the whole adit.

Future operations would then be governed by the results obtained from extending the level.

#### THE SURFACE WORKINGS -

Surface work generally has concentrated on the recovery of tin by sluicing the shallow detrital material which originally covered both the northern and southern slopes of the hill. These operations have covered some 20 to 30 acres of ground, where the material treated has varied from one to six feet in depth.

Several shafts have been sunk but one only, situated on the summit of the hill, has reached any appreciable depth. There is a possibility of its having been connected with the adit level workings.

To the east of this shaft an open cut now appears. This cut resulted from stoping operations from the adit level workings and has been referred to earlier.

From the open cut to a point at least 400 feet west of the shaft, a large greisen formation, varying to 20 feet in width, outcrops. A section of this outcrop, 80 feet in length extending from 200 feet to 280 feet west from the shaft, was sampled. All the samples were low grade in tin despite the occurrence of cassiterite, readily visible in some portions of the outcrop.

Recent operations at Bell Hill have been directed towards the recovery of tin from detrital material by milling.

#### THE TREATMENT PLANT -

The treatment plant erected in the property consists of a ten head stamp battery in combination with one Wilfley and one curvilinear concentrating tables, the feed to the mill passing first through a jaw-breaker to insure uniformity of feed. Delivery of ore to the breaker was effected by ropeway (flying-fox) or by inclined ground tramway.

The general arrangement of the mill suggests inexperience in the erection and management of such equipment and losses must of necessity have been high. Five separate power units are installed in the mill.

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Field Geologist.

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