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WELDBOROUGH TIN FIELD

1. INTRODUCTION:-

The prosperity of the Weldborough district has at all times been dependent on the Tin Mining industry and, during its early history, maintained a large and prosperous population of both whites and chinese. Although in recent years both tin production and population have fallen off, tin mining is still the staple industry of the district and maintains in employment the greater portion of the population.

Although numerous tin bearing veins are known to occur in the granites of the district little has been done to develop them and the greater part of the tin production of the field comes from alluvial tin mining.

The primary object of this examination was to report on the future possibilities of the Bell Hill Tin Mine - a separate report has been written on that mine - and to examine the possibilities existing in the area for increased production.

2. AREA AND ACCESS:-

The area examined extends westerly from the township of Weldborough a distance of ten miles to Bells Plain. It covers most of the old mines of the district. In a northerly direction the area is about five miles in extent.

The area is served by a second-class road from Weldboroug to Ringarooma. As far as Bells Hill from Weldborough, the road is in fair condition and can be used by motor vehicles. Between Bells Hill and Bells Plain, a distance of 3½ miles, the road is in need of repair but from Bells Plain to Ringarooma it is reported to be in fair condition.

A cart track from this road at Bells Plain gives access to Branxholm whilst a road to Derby, in need of slight repair, serves the north western corner of the area.

3. GEOLOGY:-

The greater part of the area examined is occupied by granite of Devonian age. In general, it is a medium grained granite, white in colour, which tends to become porphyritic towards the east end of the area. Occurrences of a fine grained granite, brown in colour, were met. These were aplitic in character.

Traversing the granites are numerous veins of greisen and to a lesser extent aplite. Associated with the greisen are bands of pegmatite. It is with the greisen that the tin occurs.

On the western and south-western section of the area, a comparatively thin layer of altered sandstones and shales occur overlying the granite. The sedimentary rocks are regarded as belonging to the Cambro-Ordovician period.

On the road from Weldborough to the Mt. Paris Dam and lying to the south thereof, an area of Tertiary basalt has been

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recorded. Isolated areas also occur near Brock's adit, in Rattler Creek and on the Star of Peace track.

4. ECONOMIC GEOLOGY:-

The minerals of economic importance in the Weldborough district are cassiterite, wolfram and bismuth. Of these minerals, cassiterite is the most important and so far has proved to be the only one which has been profitably mined. It is widely distributed, occurring in association with the numerous greisen and aplite veins which traverse the granites of the area. Few, if any, of the greisen veins are barren of tin whilst in some there are short shoots of ore which are definitely high grade. It is, however, doubtful if any of the veins are, as a whole, sufficiently high in grade to lend themselves to profitable treatment by mining and milling, although it is from them that the tin of the field has been shed and which has been won by ground sluicing. This is evident when examining the workings known locally as "Leader Faces".

Leader Face is a term applied to workings which have exposed numbers of greisen veins in the working face and where the decomposed granite has been removed by sluicing. The cassiterite recovered is, in general, angular though variable in grain size and is obviously the result of the breaking up of the veins. In some instances the veins show short shoots of high-grade ore. Under present methods of operation and the lack of facilities for crushing, this ore is lost as forkings.

The early operators on the field concentrated on the recovery of alluvial tin from the surface wash. Large areas have already been worked out. They have been responsible for extensive prospecting by shaft sinking and the driving of adits. Several treatment plants were erected to test the grade of ore but all were unprofitable. Present operations deal only with the alluvial material or that from Leader Faces. In both instances sluicing methods are adopted to recover the tin.

5. WORKINGS:-

The following workings were examined:-

(a) Bells Plain.

The area known as Bells Plain is one of approximately 300 acres extending from the Nugget water-race, where Nelson Creek crosses the Weldborough-Ringarooma road, in a northerly direction to the wooden syphon of the Mount Paris water-race. It embraces portion of Nelson Creek together with portion of Black Creek and the headwaters of that creek and its tributaries. The plain, on the south, comprises a series of comparatively narrow areas, separated by low granite ridges which trend together towards the north.

Of the 300 acres practically the whole has, at times, been held as mining leases. Of the workings previously held the more important are Hannah's workings; The Exile Mine; and the Montrose Mine. The operations on these three holdings have resulted in the treatment of 83 acres. From this work it is revealed that the depth of material varies to 18 feet with a probable

average of 10 feet. Most of the work has been done by ground sluicing aided in part by hydraulic lifts or blowers. It is doubtful if bottom has been reached in all the workings.

There is only one holding in force at Bells Plain. On the southern end of the area Messrs. J.S. Cox and A.H. Murtagh hold a lease of 16 acres along the course of the upper portion of Black Creek. Production from this lease has not yet commenced but several prospect shafts sunk on the property are reported to vary to 27 feet in depth with the wash being of a grade of two lbs. per cubic yard. A dam for the conservation of water has been constructed.

There is no evidence on which to make an estimate of the grade of wash remaining on Bells Plain. With an adequate water supply the area is admirably situated for treatment by ground sluicing and as 200 acres of comparatively level country is still untouched further prospecting either by boring or by shaft sinking is advisable.

(b) Brock's Adit

Brock's Adit is situated about three-quarters of a mile south from the concrete dam, built by the Mt. Paris Tin Mines Limited, about four miles west from Weldborough. The Adit has been driven in a southerly direction for a distance of 194 feet from the portal.

In the main adit several minor veins have been cut and at a distance of 55 feet from the portal a white quartz porphry (Elvan) dyke eight feet wide has been crossed.

At a distance of 167 feet from the portal, where ironstaining appears, a short crosscut has been driven, in white granite, five feet to the west. Nothing of economic value was exposed.

At 187 feet from the portal some development has taken place on a narrow vein striking at 295° and dipping north at 60°. The vein is essentially a quartz greisen one varying in width to 18 inches. It has, on its hanging wall side, a quartz vein varying to six inches in width.

Development consists of levels driven to the east, a distance of 110 feet, and to the west a total distance of 60 feet.

In the eastern level both the greisen vein and the country rock (granite) have been so hard that a minimum of material has been removed. The level is triangular in shape with the north wall of the level, dipping at 60°, formed by the hanging wall of the greisen vein. The roof of the level is in width that of the quartz vein whilst the floor has been made only sufficiently wide to enable the passage of a mine truck.

The western level has been driven from a point five feet further from the portal than the eastern level. In this level the quartz vein is not more than two inches wide but the greisen vein varies in width to five feet as shown by a crosscut driven north from a point in the level 15 feet from the adit.

The quartz vein terminates at a greisen vein, 6 inches wide, which crosses the level at a bearing of 315°, 48 feet from the adit. At this point the level trends more northerly and cuts

another greisen vein 12 inches wide which is exposed in the face of the level.

Over short sections of the quartz vein as exposed in the levels, cassiterite (tin oxide) is readily visible as is also the case with a small quantity of ore stacked outside the adit. Mining has proved hard and difficult and the fact that no stoping has been carried out suggests that operatinns were unprofitable.

On the hill above and to the south of the adit a shaft, reported as being 150 feet deep has been sunk on the main vein. The collar of the shaft has collapsed and it is now inaccessible.

(c) Connolly's workings (Carnac or Central Cascade)

Connolly's workings are situated on the eastern end of an eight acre lease, 11765/M, at the head of Carnac Creek which flows into the Cascade River at a point about two and a half miles downstream from the Mt. Paris Dam.

The area has previously been worked by ground sluicing during which the surface soils and normal wash have been removed. The present operations have revealed numerous greisen veins in a typical "leader face" in decomposed white granite. Water is drawn from the Mt. Paris dam by means of the Mt. Paris Water Race. The decomposed granite readily lends itself to treatment with a hydraulic nozzle. The present workings have been carried to depths of approximately 20 feet. Over a limited area greater depths were reached by the use of a hydraulic lift (blower). Sufficient water is not always available to successfully work the lift.

The present operations have covered an area approximately 800 feet in length over widths varying to 150 feet and depths varying to 20 feet. The southern boundary of the workings is marked by a fault, striking 245° and dipping steeply to the north, to which the principal veins are parallel. Minor veins strike at right angles to the major ones and vary in width to six inches.

The veins are, in general, greisen ones. Parallel with the fault, on the southern side of the workings, two prominent quartz veins occur. The more northern of these veins varies to 15 inches in width and contains some high grade ore which, at times, is in sufficient quantity to warrant stacking for treatment. In general, however, the vein material is comparatively low in grade.

The cassiterite being recovered is, in general, angular and variable in grain size. Although some difficulty is experienced in its final cleaning, the concentrates are generally high grade. Considerable loss takes place owing to the presence of specimens, i.e., fragments in which particles of cassiterite are attached to particles of vein material. It is, however, claimed that recovery is equivalent to 0.5 lbs. per cubic yard.

(d) Mammoth Mine and Rattler Hill Workings.

Both the Rattler Hill workings and the Mammoth Tin Mine workings have been directed towards the development of the one formation. A prominent greisen formation strikes at 250 degrees along the top of a ridge immediately to the north of Done Again Creek. Rattler Hill is the eastern end of this ridge and Rattler Creek has its source close by. Along the

greisen formation pegmatitic veins occur striking generally at an acute angle with it. It is in these pegmatitic veins that prospecting has taken place.

From previous reports it is gathered that on Rattler Hill two shafts and an adit have been driven in the greisen formation. At present only the two shafts are discernable. The collars of the shafts have collapsed and the workings are inaccessible. The spoil-dump contains discarded ore in which both cassiterite and copper pyrite is common.

On the end of the formation where the Mammoth workings are situated two shafts have been sunk. The shafts are 100 feet apart and one, estimated from the size of the spoil dump, is judged to be 100 feet deep.

From the level of Done Again Creek an adit has been driven on a bearing of 339 degrees a distance of 365 feet from the portal to cut the formation.

The first 30 feet of the adit has been driven through a fine-grained granite, brown in color. From that point the granite is the normal white variety which persists throughout the length of the adit expept for a distance of 10 feet (210 feet to 220 feet) where a brown aplite dyke is cut. Only minor veins are exposed in the adit.

At 285 feet from the portal the walls of the adit show minor copper stainings which persist till the main pegmatite vein is cut at 355 feet from the portal.

At 365 feet from the portal short levels have been driven along the formation. On a bearing of 309 degrees a level has been driven for a distance of 25 feet. From that point a crosscut 10 feet to the south-west has terminated in granite. From the point 365 feet from the portal a level has been driven for eight feet on a bearing of 115 degrees.

Over the greater part of the levels copper staining is prominent and the ore contains an appreciable amount of copper pyrite. In the centre of the pegmatite vein a comparatively soft band occurs.

Sampling of the face showed the following grade of ore:-

(1) Soft band 6 inches wide - Sn 0.0%:Cu 0.1%
(2) Remainder of face - Sn 0.55%:Cu 5.3%

whilst a grab sample of the ore lying on the spoil dump at the portal of the adit yielded Sn 0.15%:Cu 1.3%.

(e) <u>Tin Pot Creek Mine</u>

The Tin Pot Creek Mine is situated on Tin Pot Creek near its crossing with the Mt. Paris Water Race 3113/W. The underground workings of this mine are fairly extensive and consist of shafts and adits. From the top of the hill several shafts and two appreciable opencuts have been sunk. Two adits have been driven.

The principal adit has been driven from the northern slope of the hill in a southerly direction for approximately 800 feet to connect with a shaft sunk from the hill-top. Water from Tin Pot Creek has been turned into the adit through the shaft to facilitate the working of the Carnac (Connolly's) Mine. This has resulted in the adit being part-filled with sand washed in by the water. Not more than 200 feet of the adit are now open for inspection.

The second adit has been driven from the southern slope of the hill in a northerly direction about 130 feet to cut the tin-bearing material now exposed in the eastern opencut.

Several costeans have been dug between the two opencuts which are separated by a distance of approximately 500 feet. The opencuts have not been worked to any great depth the eastern one being 30 feet and the western one 20 feet in depth.

The main feature in the opencuts is a white decomposed quartz-porphyry dyke formation. This dyke is in an extremely weathered condition and resembles a gritty kaolin formation. It strikes in an easterly direction and dips northerly at a high angle. When tested the dyke material was found to be low grade in tin.

On the hanging wall side of the dyke a quartz vein occurs. It varies in width to 15 inches but was not tin bearing.

A little to the south of this formation a greisen vein varying to two feet in thickness occurs. Except in the eastern opencut no work has been done on this vein. The extent to which the opencut workings have been developed suggests that at these positions the grade of ore was profitable. Between the opencuts, except for a few costeans, little has been done to test the continuity or grade of the dyke material. Further prospecting is advisable.

To the end of the year 1907, records show that the Tin Pot Mine yielded 55 tons of tin oxide. There are no later records but local claims suggest that the above figures are far from complete.

(f) Star of Peace.

The Star of Peace workings are situated near the head of and on the north bank of the Cascade River. Several prospecting shafts and costeans have been sunk on the old leases but the principal workings consist of a fairly extensive opencut. The opencut is in two sections each approximating 250 feet in length. One section of the opencut trending on a bearing of 175 degrees is at present used as a dam for the storage of storm water and could not be examined. The remaining section, trending at 120 degrees was open for inspection. From the bottom of the opencut, about centrally situated, a three chambered shaft has been sunk. The shaft was full of water and the spoil dump has been removed. The depth, therefore, could not be estimated. An adit has been driven in a northerly direction into the northern wall of the cut from a position opposite the main shaft. These workings would all be in granites. In the north-eastern corner of the opencut another shaft, now collapsed, has been sunk.

What ore was treated from this mine was taken to a battery situated on the north bank of the Cascade River about three quarters of a mile downstream from the mine.

In the vicinity of the Star of Peace workings the surface rocks are slates and quartzites of the Cambro-Ordovician period. These give place at shallow depths to granites which have been exposed in the mine workings. Several greisen veins occur traversing the granites in the opencut.

6. WOLFRAM DEPOSITS:-

Wolfram in minor quantities has been reported from the Weldborough district:-

(a) Cox's Wolfram. About half a mile west from the Bell Hill Mine, a greisen vein occurs crossing the road to Ringarooma and striking at 35 degrees. The vein varies to 20 feet in width. Quartz, occurring as fillings of joints and cracks in the greisen, is associated with wolfram. The quartz is not persistent, and although at one position a width of 20 inches was observed, it occurs only as short shoots generally only a few feet in length and seldom more than three inches in width. Wolfram occurs only in negligable amounts and cannot be regarded as of ecemomic importance.

(b) Walker's Prospect. Mr. V. Walker of Weldborough now holds as a prospecting area portion of consolidated lease 10378/M originally held by Mt. Paris Tin Mines Limited. This area, situated about three-quarters of a mile south-west from Weldborough was originally operated as a tin mine but is reported as being abandoned because of the high wolfram content in the concentrates.

In the year 1928 the Mt. Paris Company sold two parcels of ore, as follows:-

Nett Weight			Analysis			Nett Value		
cwt.	qrs.	lbs.	Tin (Sn)%	Wolfram (WO_3)%	Bismuth (Bi)%	£.	S.	D.
6	0	0	35.0	28.5	8.8	39.	19.	3.
1	0	1	34.3	16.1	4.1	4.	16.	3.

This ore was sold to Launceston agents who paid for only 90% of the tin and wolfram contents and made no payment for bismuth.

The workings from which this ore was produced are fairly extensive, being in the form of an opencut approximately 400 feet in length and 60 feet in width. The depth of the cut varies to 30 feet.

A greisen vein up to 10 feet in width traverses the opencut in a northerly direction with minor veins branching from it in a north-easterly direction.

In the southern end of the workings the vein occurs in two sections separated by a quartz vein six inches in width.

Eight samples were taken from the vein in the workings

but these were all low in grade and served only to show that tin, wolfram and bismuth were present in the ore. A sample of tailings below the sluice box showed Tin (Sn) 10.3%, Wolfram (WO_3) 6.93% Bismuth (Bi) 3.8%.

Further and detailed sampling may reveal sections of the workings where the grade of ore is higher than is indicated here.

7. BISMUTH:-

The only occurrenne of Bismuth examined during the present investigation was in Walker's prospect previously described under the heading of Wolfram deposits. Further prospecting is necessary to determine whether or not an appreciable quantity of Bismuth ore is present. The samples taken were all low-grade in Bismuth although a sample of tailings taken below the sluice box revealed 3.8% Bismuth.

8. CONCLUSIONS:-

The Weldborough district has been predominantly an alluvial tin field and the greater portion of the tin produced has been won by sluicing methods. During the earlier history of the field normal ground sluicing was adopted and the main advance in methods of treatment has been the introduction of hydraulic nozzles and blowers (lifts). By these methods a large area has been treated. Some attempts have been made at mining and milling where greisen veins have been plentiful. It is doubtful whether, at any time, such operations were profitably carried out and although the existing treatment plants are evidence of inexperience and lack of knowledge, it is certain that as a whole, the greisen veins are too low in grade to yield a profitable return. Short shoots of high-grade ore occur in the veins but the quantity available is in general insufficient to warrant the erection of treatment plants. Future production must, therefore, depend on the continued treatment of alluvial and detrital material by sluicing methods.

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