REPORT ON PACKER'S CREEK (FORMERLY CLIFF) TIN MINE.

LOCATION AND ACCESS.

The Packer's Creek Mine is situated to the south of the creek of the same name which enters the Southern ocean two to three miles north of Trial Harbour on the West Coast of Tasmania. It is ten miles by air line from Zeehan from which township access is gained. A motor road has recently been constructed from Zeehan by the Federation Coy. to its mine - a length of 13 miles. The Packer's Creek Coy. have made a branch road of one mile from the former road to connect with their mine.

Zeehan is connected by railway with the ports of Strahan (30 miles) and Burnie (88 miles).

LEASES.

The Packer's Creek Tin Mining Coy. holds the following mining tenements :-

9899/M 5 acres in the name of J.S. Dean

10314/M 10 acres " " " "

and an Extended Prospecting Claim of 160 acres in the name of the Packer's Creek Tin Mining Coy. together with an application (2604/W) for a water right of 2 sluice heads from Federation Creek.

TOPOGRAPHY.

The land held by the above Company occurs along the shores of the Southern Ocean. The shore is a rocky one and cliffs rise steeply from the ocean to heights of 250 to 300 feet above it. Inland from the coast the land is moderately undulating and rises to heights of 500 feet above sea-level. Several miles inland the Mt. Heemskirk Range rises to altitudes of 2800 feet.

Numerous small streams rise on the south-western slopes of the range and flow in general south-westerly direction to the ocean. The largest stream in the vicinity of the mine is Packer's Creek but several smaller unnamed ones pass through the Company's properties.

GEOLOGY.

The whole of the country within the Company's property is occupied by granite of Devonian age. The intruded rocks occur a short distance to the south and consist of Cambro-Ordovician sedimentary rocks (slates, sandstones and tuffs.)

The granite generally resembles the normal Devonian granite. It is a white, medium to even-grained rock and consists essentially of plagioclase, orthoclase, quartz, biotite and tourmaline. Tourmaline is abundant as quartz-tourmaline nodules and also occurs to a smaller extent disseminated through the rock itself.

The granite is traversed by two very prominent sets of almost vertical joint planes. One set has a strike of 280° and a high dip to the south, while the other has a strike of 205° and a high dip to the west.

ECONOMIC GEOLOGY.

The only mineral of economic importance is cassiterite (oxide of tin), but associated with it are small quantities of metallic minerals such as arsenopyrite, pyrite and chalcopyrite. The non-metallic minerals occurring in the ore bodies are quartz, tourmaline (black and green) and white mica, and fluorite.

The ore-bodies consist of several varieties of altered granite the alterations having been produced by the mineralising solutions or vapours.

The various types of altered granite and varieties of granite associated with the ore-bodies are :-

1. Aplite material
2. Quartz-mica greisen veins
3. Quartz greisen veins
4. Quartz tourmaline veins
5. Quartz veins.

While these represent definite types it must be understood that most, if not all, of them merge into one another with the production of numerous intermediate types.

Of the above the quartz-tourmaline type is the most common and forms the material occurring in the majority of the lodes. The quartz and quartz-mica greisen types are the next in order of abundance, while there are numerous intermediate varieties between these and the quartz-tourmaline types. The quartz (reef) types are not common being restricted to narrow veins in the centre of lodes of other types. Aplitic material occurs only in the vicinity of the hut but is of a rather indefinite type and merges into soft mica-quartz greisen.

With the exception of the aplitic material all the above types of ore-bodies occur in the form of more or less vertical veins or lodes. These lodes and veins have strikes corresponding to the two sets of joint plans described above, viz. 205° and 280° and probably have the same dips as the joint planes. The joint planes represent planes formed by contraction due to cooling and crystallisation of the granite magma and the mineralising solutions or vapours traversed these planes and fissures in the partly cooled granite. In the Packers Creek area, the north-south fissures were followed to a greater extent than the east-west ones, the north-south lodes being generally of greater dimensions and more persistent.

THE MINING WORKS.

The mining works consist of three short adits, four shallow shafts, several small and irregular open cuts, several large and numerous small trenches, and alluvial workings.

The adits, shafts, alluvial workings and some of the trenches represent work carried out by previous owners. The work carried out by the present holders has included the excavation of numerous trenches and the repairing of the lower adit.

HISTORY.

Two of the lodes (probably the Sulphide lode and the east-west lode) were discovered prior to 1881 by Mr. Thorn in the sections held by the Cliff Prospecting Tin Mining Coy. The Cliff Tin Mining Coy. Ltd., was formed in May 1882 for the purpose of working these lodes. A small amount of mining work was carried out on the sulphide lode chiefly at its southern end and on the east-west lode. A treatment plant was erected consisting of a 5 head stamp battery, 3 tyes (sluice boxes), 3 strakes, 2 Borlase buddles, automatic tin frames, hand drssing tables and tossing tubs, the power plant consisting of an overshot waterwheel 18 feet in diameter. Very little mining and treatment appears to have been carried out and the mine was idle in 1884.

Since that time, the only work carried out on the property was that by parties of one or more men engaged in alluvial work or mining patches of rich ore at the surface of some of the lodes.

The Packers Creek Tin Mining Coy. have been interested in the property for approximately a year and have excavated numerous trenches on the Sulphide and Green Tourmaline lodes, and are at present engaged in cleaning out and straghtening up the lower adit on the east-west lode.

THE ORE BODIES.

A number or ore bodies have been discovered on the property and have been opened up to different extents.

The ore bodies (as named by the Company's representative) include:-

(1) East-west lodes -

(a) Cliff lode
(b) Unnamed lode in the northern part of the area.

(2) North-south lodes -

(c) Beach lode
(d) Small intermediate lode between (c) and (e)
(e) Battery lode
(f) Dean's lode
(g) Green tourmaline lode
(h) Sulphide lode
(i) Unnamed lode or lodes east of Sulphide lode

(3) Other lodes -

(j) White tin lode
(k) Lode north-west of white tin lode

As far as could be ascertained in the time available, these represent distinct and separate lodes. It is possible, however, that some of the longer lodes may represent one or more discontinuous, parallel lodes, approximately on the same line of strike.

(a) Cliff Lode -

This lode is the east-west one traversing parts of leases 9899/M and 10314/M. It has a general bearing of 110° to

115° but in some places individual veins appear to bear 90°. The dip is vertical or at high angles to the south.

In the vicinity of the hut and to the west thereof an irregular body of aplitic material merging into fine grained mica-quartz greisen outcrops. A few chains west of the hut a long trench bearing 115° has been cut along the course of the Cliff lode. The trench for the most part is in the aplitic material but an east-west quartz formation occurs on the southern side. At the mouth (western end) of the trench a formation six feet in width of altered granite with veins and nodules of quartz tourmaline, occurs. The Battery lode should pass through at this place and though the exposures are not too good it would appear that the Cliff lode cuts through the Battery lode.

A shaft was sunk near the eastern end of the trench to shallow depths. The dump from the shaft consists of pieces of quartz tourmaline rock with pyrite and cassiterite.

About one chain to the west and 60 to 70 feet below the trench a shaft has been sunk and a short adit driven easterly on the line of the Cliff lode. The adit has a bearing of 110° and kept a vein on the south side. The vein was 12 inches wide and had a high dip to the south. The material on the dump consisted of coarse quartz greisen with abundant tourmaline and some white mica. Some pieces show brownish cassiterite which appears to be more or less associated with the tourmaline. The shaft joins the adit at 20 feet from the mouth and it is stated that there is a short crosscut 10 feet in length driven southerly opposite the shaft. This short crosscut or drive could not be entered but if, as stated, it is driven on a lode it is probably the intermediate lode between the Battery and the Beach lodes.

About one chain further west, and still further down the cliff, another adit (the lower one) has been driven in a general easterly direction. It began about 15' south of the lode and should have cut the lode at 25 to 30 feet. Here, however, there appeared to be a crevice which had been filled in with debris. The adit passed through this and then turned slightly to the south and quartz greisen is showing in the face at 60 feet. The full width is not exposed, but a few pieces were broken out and on assay yielded only a trace of tin.

It is stated that it is the intention of the owners to drive this adit along the Cliff lode and at the same time crosscut the Intermediate, Battery, Dean's, Green Tourmaline and the Sulphide lodes.

(b) Unnamed lode in the northern part -

A very wide formation outcrops a short distance south of the unnamed creek in the northern part of the property. It consists of fine and medium quartz-tourmaline types with probably some quartz greisen on the southern side. The lode has a general east-west bearing and is of unknown width. No prospecting has been carried out on it, but by virtue of its apparent size is worthy of attention.

(c) Beach lode -

This is the most westerly lode exposed on the property. It is visible on the shore and has a trend of 10°-20° east of north through the eastern part of lease 9899/M. Altogether it has been traced at intervals along a length of 24 chains. On the coast it appears as a narrow vein in the granite. At three chains from the coast it is represented by a large outcrop

(12 feet wide) of coarse quartz greisen with veins and facings of black tourmaline. Below this outcrop an old adit 12 feet in length was apparently driven to cut this lode but merely broke into the western wall for a short distance. The lode passes about half a chain west of the lower adit on the Cliff lode and is visible ascending the cliffs on the north side of the creek. It is then traceable inland for 14 chains by by its outcrop.

Apart from the adit referred to above, no other work has been performed on this lode.

(d) Intermediate lode -

There is evidence at two places of a small lode between the Beach and Battery lodes. The first locality is the southern crosscut off the upper adit on the Cliff lode already described above. The second is at the north-east corner of 9899/M where quartz tourmaline occurs approximately on the same line as the above.

(e) Battery Lode -

The Battery lode is three chains east of, and parallel to, the Beach lode. It is not visible on the coast and is first seen to the south of the small excavation at the mouth of trench on the east-west lode. From here it can be traced at intervals for a length of 28 chains to the north. It passes through the site of the old battery, then one and a half chains east of North east angle of 9899/M and through the western part of former lease 6206/M.

The lode consists of the typical quartz tourmaline rock. About five chains north of the north line of 10314/M it consists of narrow veins in the granite. Five chains further north, two trenches have been cut across the lode. It is apparently wider here but has not been properly exposed. Pieces of quartz-tourmaline and mica greisen have been obtained some of which contain visible cassiterite.

The lode is exposed in the northern branch of the creek some five chains further north. It is 8 to 10 feet wide and consists of typical quartz tourmaline. It extends further north but no work has been performed.

(f) Dean's lode -

This lode is located some four to six chains east of and parallel to the Battery lode.

It is visible on the coast where it is two to four feet wide and consists of quartz tourmaline greisen. It can be followed up the cliffs and northwards past the hut and across the creek to the northern line of 10314/M, but has not been opened up at any point. It is not prominent for the next 15 chains but may be present. Near the southern boundary 3181/M a quartz tourmaline lode outcrops which is approximately on the line of Dean's lode. It either branches or changes its course at this lode and trends at 40° towards the Sulphide lode. A four inch vein of fine quartz tourmaline rock is prominent in this north-eastern portion.

(g) Green Tourmaline lode -

This lode is four chains east of Dean's lode. It is 30 to 40 feet west of the Sulphide lode and runs parallel with the latter for a distance of 20 to 25 chains.

It is exposed in the creek near the hut and may extend

into the shallow open cut workings to the south. From the creek northwards for a few chains numerous trenches have been cut across the lode. It consists of quartz tourmaline rock, both black and green tourmaline being present. Cassiterite is visible in some specimens and is associated with the tourmaline.

Little or no work has been done on it to the north. Its continuation is stated to occur in a long trench along the south boundary of 3181/M.

(h) Sulphide lode -

This lode has been traced for a greater distance than any of the lodes previously described. It is exposed on the west side of a small gulch on the coast where it consists of quartz-tourmaline rock with arsenopyrite, pyrite and chalcopyrite visible, the country rock being an altered granite.

The most southerly opening on it is a shallow open cut to the south east of the hut. Some ore from this was possibly treated in the old battery and the lode may correspond to that described as the Junction lode by Thureau in 1884.

The lode crosses the creek to the north of the open cut where unaltered granite separates it from the Green Tourmaline lode.

Seven chains north of the creek, a 30 foot trench partly exposes the lode. Ten chains further north another old trench was put along the lode (This is described by Waterhouse in 1916 as Spencer Bros. workings, but it appears to correspond to the work described by Montgomery in 1895 as being done by Wooding). The present owners have recently sunk a shallow shaft in the bottom of this trench, but it was full of water at the time of the writer's visit. The lode consists of quartz greisen with a little tourmaline and white mica. Arsenopyrite is also present and on the dump from the shaft solid pieces of this mineral occur. Waterhouse reported that he was informed that two to three tons of tin oxide were taken from this trench.

Seven chains further north a small area of old shallow alluvial workings occur (these are described by Waterhouse as Wooding's workings). The detrital matter was sluiced and uncovered a considerable amount of lode material including possibly the Green Tourmaline lode and part of the Sulphide lode. In the detrital material at the north-eastern end of the workings pieces of cassiterite can be picked up which range in size up to one inch square. The underlying formation here is quartz-tourmaline rock, the cassiterite being associated with the veins of tourmaline. About 25 feet to the west, a shaft has been sunk to a depth of about 20 feet. The material on the dump is a quartz greisen stained yellowish brown due to oxidation of sulphides.

From these workings northwards for several chains there appears to be a wide development of lode material to the east of the Sulphide lode. The material consists of cellular quartz tourmaline rock with nodular quartz-tourmaline and occupies the low hill north east of the alluvial workings.

At 1½ to 2½ chains north of the workings short trenches have exposed the cellular and nodular quartz-tourmaline rock. About 1½ chains further north a long trench has been cut approximately along the south line of 3181/M. The sulphide lode is not definitely defined in this trench and either of two bands of greisenised granite may represent it.

Two chains north of this boundary line a trench has

revealed a cross lode of quartz tourmaline rock.

At three chains a number of trenches and pot holes have revealed the Sulphide lode as a blocky formation of the quartz tourmaline type in which cassiterite is sometimes visible, and also a cross lode bearing 112° which shows fine cassiterite when tested.

At 5½ chains a deep trench was filled with water, but the dump showed a few pieces of lode material some of which contained cassiterite.

Other trenches occur at 6, 7, 7½, 8, 11 chains and revealed quartz-tourmaline lode material, cassiterite being visible in the ore from the northernmost one.

(i) Unnamed lodes -

Near the south-east corner of 3181/M, outcrops indicate a lode or lodes with a general course of 25° but which have not been opened up.

(j) White Tin lode -

This lode outcrops near the creek to the east of 6206/M. Cassiterite of many colours (black, red, amber, etc) can be washed from the alluvial in the creek near the lode. The lode consists of quartz-tourmaline rock. It has a strike of 285° near the creek but alters considerably to the north-west and near the north east corner of 6206/M it is 340°.

(k) Unnamed lode -

About six chains north north east of the south east corner of 3181/M a square cut has been made in altered granite with large masses of quartz containing bunches of tourmaline. The exposures are not sufficient to determine the bearing of this lode, but it appears to be 280°. It may be however that this lode is connected with either (i) or (j) lodes. Yellowish brown cassiterite is visible in the ore.

CONCLUSIONS AND RECOMMENDATIONS.

The above descriptions prove that numerous lodes have been discovered upon the property of the Packers Creek Tin Mining Coy. They consist essentially of quartz-tourmaline material with in some cases cassiterite as the economically important mineral. These lodes present the usual problems associated with tin deposits in that the distribution of the cassiterite through the lodes is erratic and a considerable amount of prospecting and mining work is necessary to define the parts of the lodes containing payable ore. The problem therefore which the Company has to solve is the carrying out of sufficient prospecting and mining work to outline the shoots of payable ore. The method of attack is more or less independent of the scope of the Company's operations, but the amount of work necessary will vary directly with the future intentions of the company.

Though numerous lodes exist on the property it will be noted that only a few of them have been opened up to any extent. Further it may be stated that the total amount of prospecting and mining work performed is relatively small. It may be said that only the Cliff, Sulphide and possibly the Green Tourmaline lodes have been tested to any extent. This rather indicates that the best tin values were found in these lodes at the surface and especially where they have been opened up. Whether this is the case or not the first point to be decided is where the best values do occur at the surface.

Unfortunately with lodes of the above nature traversing granite and in an undeveloped field, the geological evidence available is not sufficient to materially assist in this matter. Reliance has therefore to be placed on the prospecting work on the lodes. The past work apparently indicates that the Sulphide, Cliff and Green Tourmaline lodes are the most promising. Workings in the immediate future should, therefore be devoted to excavating trenches and sinking shallow shafts on those parts of the Sulphide, Green Tourmaline, and Cliff lodes which are known to contain the best tin values. As the longer lengths of payable ore become defined the work should be restricted to those portions. After the payable shoots have been outlined at the surface, underground mining at shallow depths should then be undertaken to prove the downward continuations, if any, of the shoots known at the surface. This would be carried out by adits where possible, or shafts in other cases, and would be followed by cross cutting and driving.

The amount of the above work depends upon the results obtained and on the scale of future operations decided upon by the Company.

If payable ore-shoots are not discovered at the surface, it would make the underground mining more risky and in the nature of blind stabbing, even though shoots may exist.

It is a matter for the Company to decide as the above work proceeds as to whether it is intended to :-

(a) Form a small company to erect a small treatment plant and work the mine.

(b) Prove the existence of sufficient reserves to warrant the property being taken over by a stronger company with mining and treatment on a larger scale.

In either case sufficient reserves should be proved to warrant the erection of a treatment plant of the capacity decided upon. In the first case, the amount of reserves required will be comparatively small compared with those in the second case.

It was stated that it was proposed to continue the lower adit along the Cliff lode and at the same time crosscut the Battery, Deans, Green Tourmaline and Sulphide lodes. Such a procuedure would certainly prove the Cliff lode as far as it extends along the length of at least 700 feet the adit would be driven. It would also prove the value of the ore at the intersections of the other lodes with the Cliff lode. It must be remembered however that the values in these lodes would not represent the normal value of them as enrichments might occur at the intersections. Driving on the north-south lodes would have to be carried out to determine their value.

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