

REPORT

on

MINERAL LEASE No. 9450/M, 25 acres, CHARTED  
IN THE NAME OF H. AULICH (GREAT PYRAMID  
MINE) UPPER SCAMANDER.

---

SITUATION AND ACCESS

The mineral district, of which this area forms a part, is situated on the East Coast of the Island. It extends along the coastline for a distance of 15 miles and inland for roughly 7 miles.

The Scamander River, which empties into the Sea, flows easterly through the centre of the district. The mouth of the river is twelve miles by road south of George's Bay, the chief port on the East Coast, on which the township of St. Helens is situated.

From Scamander Bridge the main road is followed for about a mile south and a branch road along the southern bank of the River leads to the Property. The River is crossed by a ford about 5 miles from the main road, thence for a distance of about three miles on a steeply graded winding road the mine workings are reached.

GENERAL STATEMENT

The discovery of tin ore in the district dates back to the year 1910 and closely following that time a considerable amount of work was carried out in prospecting a number of lode outcrops by surface trenching and tunnelling operations.

A good deal of attention was centred on the district and an examination of it was made by the late W. H. Twelvetrees, then Government Geologist. His report on the Great Pyramid Mine together with plan of workings etc. and assay results of sampling the various lode formations is included in Geological Survey Bulletin No. 9 issued in the year 1911. Mr. Twelvetrees describes in detail the geological features of the area; the general structure and composition of the ore-bodies.

Following the cessation of work by the original operators the property lay dormant until the year 1925 when Mr. H. Aulich the present lessee erected a five head stamp battery and commenced crushing operations which were continued for a short period only owing to the inadequate dressing appliances with which the plant was equipped. All work at the mine is now suspended, capital being necessary for its further development before the question of a scheme for the treatment of the ore can be considered.

TOPOGRAPHICAL FEATURES

The name applied to the mine is to some extent descriptive of the area on which it is situated; its Western extremity is the termination of a high ridge extending from the more elevated country lying to the north west. The highest point on the lease is approximately 750 feet above sea level. Excepting the western portion, the ground falls away steeply on all sides for several

hundred feet on an even slope of 1 in 1½ to 1 in 2. Westerly from the summit, which is at a slightly higher elevation than the connecting ridge or saddle, it falls away slightly for a few chains, then rises gradually to a height of 2000 feet above sea level.

The neighbouring hills are of similar outline. All the country lying to the north and north west for some miles distant is of high relief. The valleys have no permanent water courses.

In the wet season they would carry a fair volume, but owing to the comparatively light rainfall of the district, they would be dry for the greater part of the year.

Rainfall statistics taken over a period of nine years give an average of 24 inches with a mean of 65 wet days per annum.

The district is well provided with timber, there being a good forest growth of large trees comprising iron-bark, blue-gum, peppermint, etc. Very little undergrowth occurs, except in the valleys where soil has accumulated.

#### ECONOMIC GEOLOGY

The country-rock consists of alternating bands of sandstone and slate intersected with veins of quartzite of varying thickness. The quartzite bands as a rule are tin bearing. The tin occurs as oxide chiefly in the form of thread-like veins running parallel to the strike of the veinrock. In some cases it occurs as irregular segregations also as small crystals distributed through the stone.

The tin-bearing stone is singularly free from any associated mineral that would tend to interfere with a high grade concentrate being obtained in milling. In places small quantities of pyrite were observed, the occurrence of this mineral is in such quantity as to render it almost negligible.

The surface of the area where not covered with angular rubble exhibits hard crusted outcrops, below the surface the rock has a tendency to become much softer in character.

They show many variations in colour, that predominating for slate being light grey. The quartzites are usually grey and in those parts carrying the highest proportion of tin; small cavities occur lined with oxide of iron representing the remains of pyrite which at some former period filled them.

Briefly the occurrence of tin in this area is due to the invasion of granite magma into the slate and sandstone sediments.

Siliceous solutions carrying tin ore emanated from the magma penetrating these sedimentaries along certain defined zones, as a rule running parallel to the bedding planes, but sometimes crossing them, converting them into quartzite through the deposition of silica, the tin oxide being precipitated at the same time.

In Geological Survey Bulletin No. 9, Mr. Twelvetrees refers to the occurrence of a dyke coursing N. 65° E., dipping northwest, in No. 1 South low level tunnel; where passed through is 25 feet wide but has not been seen at the surface. He describes it as a dark-grey slightly greenish rock of fine even-grained texture, sprinkled with minute glistening facets of pyroxene and generally resembling a fine-grained diabase. Little nests of pyrite are scattered through it. In the walls of the adit it shows a concentric parting into hard kernals. Although the occurrence of this dyke has no apparent bearing on the economical development of the mine it is of much geological interest.

The general strike of the country rock is northwest, but it shows considerable variation in both direction and dip.

#### MINE WORKINGS

In all, eleven prospecting tunnels have been driven into the hill from different elevations and directions. Most of these have resulted in work of a negative character and seem to have been driven without regard to any particular objective, hence a great deal of money has been spent to no useful purpose. In a few of the tunnels some valuable work has been accomplished.

Very little work of any description has been carried out on the mine since the original company as optionees drove the tunnels referred to besides carrying out some surface operations such as trenching and sinking shallow shafts.

The following is a brief description of the various adits and other workings:-

#### North adit -

The present lessee when he commenced the treatment of stone in the battery erected on the north bank of the Scamander River made road connection between this adit and the existing road further down the hill to the east, which goes on to the old workings of the Eastern Copper Mine from the River at ford crossing. The mouth of this adit lies at an elevation of 650 feet above sea level or 80 feet below the summit of the hill. It has been driven a distance of 300 feet on a bearing a little to the west of south. At 10 feet from the entrance is a band of quartzite striking at N. 48° W. underlying north east with an inclination of 1 in 6. In this tunnel occurs a typical example of the banded structure of the quartzite up to 6 inches in thickness intersecting light grey shale rock.

At 53 feet from the entrance a rise has been put through to the surface, this has served as an ore pass; it has been left filled with broken stone blocking the passage through, and partly blocking the tunnel.

From tunnel level to surface through rise to surface the distance is 47 feet. The stone in the pass has been broken from the surface workings above the rise, a sample taken from the heap indiscriminately over the whole of it assayed 0.84% metallic tin.

Old plans of the workings show a cross-cut driven a distance of 30 feet in a south westerly direction at a point 53 feet from entrance of tunnel. At the time of the writer's visit this cross-cut was inaccessible owing to the entrance being filled with

ore from the rise.

The first 10 feet section of the cross-cut according to old records on plan is through stone assaying 0.78% tin, the next 10 foot section 2.95% tin, the remaining portion 0.57% tin. It is evident that the ore body was passed through in the east section and in the sample the wall rock has been included. Excepting in one section of 8ft. at 92 ft. from the entrance, which returned 0.62% tin, the remaining portion of the drive is through country rock.

The course of this drive has not followed the lode channel and in common with most of the work carried out on the property a great deal of money has been fruitlessly spent in driving through country rock in a more or less aimless way.

On the surface above the tunnel to the south of rise at a distance of 34 feet a quartzite outcrop is located in a shallow cut. The stone here carried good prospects of tin. At 66 feet from the rise a surface opening 6 feet wide upto 12 feet deep has been put in across the lode outcrop, which here is about 20 feet wide. The lode material consists of hard quartzite carrying payable quantities of tin. In one place on the north side at bottom of cut some very rich stone occurs in a transverse vein.

Mr. Aulich informed the writer that he obtained 7 cwt. of concentrates assaying 68% metallic tin from 4 tons of picked stone which he crushed and treated by boxing method which is equal to a content of 5.95% metallic tin.

The lode has not been followed either on the surface or in the tunnel to prove its continuity. It is hard to understand why those responsible for the development of the lode failed to follow the channel. The tin bearing stone is quite distinct from the country rock, the lateral extensions of the lode are well defined. It is an unfortunate circumstance that the direction of the tunnel, after passing through the lode, was continued in country rock instead of endeavouring to follow the ore.

#### No. 2 Low Level Tunnel -

This adit is driven in on a south west course a distance of 240 feet at an elevation of about 529 feet above sea level, if continued on its general direction a distance of 160 feet the end would be vertically below that of the north adit. At a point 164 feet from the entrance a cross-cut has been driven a distance of 138 feet on a bearing of N. 45° W. The country rock consists of light grey slate with irregular occurrences of bands of quartzite. At a distance of 39 feet in cross cut a wall of a strong lode of quartzite was cut at 50 feet, the footwall was passed through, making the distance obliquely through at 11 feet. The strike of the lode is north. Samples of stone taken from either side of the crosscut assayed North side 0.1%, south side 0.4% tin. The extension of this lode south from crosscut has been passed through towards the end of main drive; a sample of the stone from this returned 0.15% tin.

The lode cut in this tunnel is apparently the downward continuation of that cut in the north adit. The stone where passed through in the lower tunnel is low grade. It has been cut at two points only at that level, that is near the end of the adit and in the cross-cut.

No. 1 North Low Level Adit - (522.5 ft. above sea level)

This adit has been driven a distance of 298 feet in a direction parallel to No. 2 Low Level Adit. The entrance of this tunnel has collapsed rendering an inspection of it impossible. Records of the sampling indicate very low tin assays. The approach to this adit is on vacant ground.

"E" Adit situated at an elevation of 595 feet has been driven in a south easterly direction a distance of 230 feet. From the north western fall of the hill the entrance is 560 feet due west of that of No. 1 Low Level Adit. The country rock passed through in this drive is very irregular both in strike and dip. Very little tin occurs here, there being a complete absence of the tin bearing stone usually found on the property.

No. 3 North Low Level Adit -

This is situated about 280 feet due north of the east adit at an elevation of 100 feet below it. From the approach this tunnel takes a south easterly course (S.70°E) for a distance of 100 feet chiefly through slate rock with a little quartzite near the end. The course of the drive is altered to a bearing of S. 30°W. and continued for a distance of 160 feet, passing through massive quartzite occurring in horizontal layers. A sample of the stone from this tunnel assayed 0.08% tin.

"C" adit has been driven on a bearing of N.70°W. from the western fall of the hill at an elevation of 591.5 feet above sea level. The total distance driven is 280 feet. The country rock passed through is a succession of alternating bands of varying thicknesses of quartzite and slate. The strike of the country rock is roughly at right angles to the direction of the tunnel. To 31 ft. from the entrance the stone is not tin bearing, from that point to 64 feet it consists of jointed siliceous stone carrying payable quantities of tin.

According to the records of the earliest investigations of these workings a band of stone 20 feet wide, 140 feet from the entrance of this tunnel assayed 1% tin. From that point back towards the entrance of the tunnel for a distance of 130 feet including the band referred to the average tin content is recorded at 0.64%.

The writer took a sample over a width of 10 feet at 71 feet from entrance, which assayed 0.76% metallic tin.

The general prospects of developing a quantity of payable ore in this tunnel are promising; nothing more than passing through the stone in tunnelling has been done, consequently no estimation of the probable quantity of stone available could be arrived at.

South Low Level Tunnel -

Three tunnels lying at an elevation of about 450 ft. above sea level have been driven at widely separated points from the south-westerly fall of the hill. A detailed description of these workings is unnecessary as their respective situations and recorded assays of a series of samples systematically taken appear on the accompanying plan. The general character and features of the country rock passed through

in these tunnels are similar to those described in the other workings. The assay results indicate a very low average grade of stone.

"A" & "B" Tunnels are driven in a north easterly direction from the south westerly fall of the hill, they lie at an elevation of a little above 600 feet above sea level and have been designed to prospect the easterly extension of the ridge from the western fall.

"A" Tunnel has been driven 170 feet and "B" Tunnel about 200 feet. These tunnels failed to penetrate tin bearing stone, the country rock being chiefly slate with isolated bands of quartzite occurring through it.

#### Surface Workings -

These consist of a number of trenches and shallow shafts placed at various points over the area. The outcrops disclose higher grade ore than that occurring below the surface in the tunnels. There is a complete absence of regularity in the occurrences of stone in these outcrops as well as the tin content.

Quite a number of promising exposures have been made in the surface outcrops but very little work beyond locating tin bearing stone has been carried out; consequently an opinion regarding the probable extent or continuity of any particular outcrop cannot be definitely stated.

From the approach of North adit a distance of 64 feet on a bearing of S. 50° W. a small surface excavation 12 feet long by 4 feet wide has been put in on an outcrop of stone showing tin freely as black oxide in the form of thread-like veins, the stone is of the usual siliceous character. From this point on a bearing N. 42° W. at a distance of 89 feet is another small outcrop into the hillside on a promising outcrop of stone. A sample from this assayed 0.65% tin. At a distance of 43 feet on a bearing a little to the east of north a quartzite formation is cut through on the track. This is exposed for a width of 8 feet and shows the usual banded structure. Following the track which takes a direction of North West a similar outcrop of stone 6 feet wide has been cut through. Between Nos. 3 and 5 shafts an outcrop of stone 10 feet wide is exposed. A sample taken from this spot assayed 0.43% tin. No work has been carried out here,

"D" Trench shown on plan exposes a large mass of quartzite with a small vein of rich tin bearing stone 1" to 1½" wide coursing due east, apart from this occurrence of tin, the stone is barren and crusted.

There are a number of other outcrops of quartzite on the area particularly in the vicinity of the ground near the summit of the hill above the north tunnel, these and occurrences of tin bearing stone followed in the shafts, the positions of which are indicated on the accompanying plan, fully warrant further investigation to determine their extent and prospective value.

#### Alluvial Tin -

A limited but highly payable quantity of alluvial tin ground occurs along the banks of some of the water courses. The latter are dry for the greater part of the year. The total area is not sufficient to warrant the work necessary to ensure a water supply to sluice the ground.

The situation of the area is very favourable for the adoption of cheap and efficient mining methods. The character of the country rock is such that very little timber would be needed to support excavations made in mining the ore.

The mine openings should as far as practicable be made on the southern fall of the hill at convenient levels in relation to the ore-bodies, in order that ore deliveries may be made to a common centre from the various workings for transportation either by aerial ropeway or gravity tramway to milling site.

The most convenient site for the latter from general observation, appears to be a point near the foot of the southern slope of the hill to which an assured water supply could be delivered from the Scamander River. A site selected hereabouts would get over any difficulty regarding pollution of the Scamander River by tailings, as channels which carry water in the winter months, but which carry no water in the dry seasons, would deliver any debris discharged from the plant below the running water in the River.

#### MILLING

The present lessee constructed a small milling plant on the north bank of the Scamander River consisting of a five head stamp battery and a wilfley concentrating table. It is stated that 50 tons of stone obtained from the lode occurring on the north tunnel workings treated in the battery returned 16 cwt of tin concentrates, the metallic tin content of the latter being 66 per cent. This return is equivalent to a recovery of approximately an average of  $\frac{1}{3}$  per cent. metallic tin in the crude ore treated.

The saving appliances in the plant are not sufficient to ensure anything approaching a reasonable percentage recovery of the oxide contained in the stone treated.

A fine screen was used on the stamp battery which reduced its capacity to the lowest limit, and only that portion of the tin oxide released by the initial crushing was available for recovery on the concentrating table.

In ore of the character of that occurring at this mine the initial crushing is not sufficient to release the whole of the tin oxide for recovery by subsequent concentration. A proportion of the tin would be saved in the first concentration but regrinding of the "seconds" product of the concentrating machines is essential with further concentration of the latter product, to ensure a satisfactory recovery of tin oxide contained in the crude ore. Sizing and classification of the pulp is also necessary in the treatment process otherwise losses by concentration will be disproportionately high.

The light specific gravity of the gangue, rock, together with the absence of any heavy constituent in association with the tin oxide renders the stone of ideal character for concentration purposes.

The following is a list of assays of samples taken from various parts of the area:-

	<u>Per Cent.</u> <u>Tin</u>
1. "C" Tunnel 6 ft. wide 160' from entrance	0.10
2. "C" Tunnel 71 ft. from entrance 10' wide	0.76
3. Small trench at surface 1½ chs. west of tunnel	1.17
3a. N. Lower Level Tunnel	0.08
4. Heap of stone N.E. adit at bottom of rise	0.84
5. Shaft 17ft. deep S.E. of "C" Tunnel	1.96
6. South side of lode North Low Level Tunnel	0.40
7. Shaft 18 ft. deep near "C" Tunnel	0.53
8. End of North Low Level Tunnel	0.15
9. N. Lower Level Tunnel north side of lode	0.10
12. Outcrop North of No. 3 shaft	0.43
13. From trench above North adit	0.65
15. From trench 1 ch. S. of Rise N. Adit	0.43
Sample of stone at Battery Bin	0.35

#### CONCLUSION

The area is one possessing distinct possibilities as a tin producer. Past work has demonstrated that a deposit of lode tin occurs in the area. The greater part of the work carried out has not been of any value in determining the extent or continuity of the various lode occurrences which are tin bearing.

In a number of places on the surface and in the tunnel workings definite bodies of tin bearing stone have been located but these have not been developed by driving on the course of the stone or otherwise following the shoots of tin to determine their extent and value.

Until a definite scheme of work is outlined and put into effect the possibilities of the property becoming a payable one will not be known. Its present prospects and general facilities for work are sufficiently encouraging to warrant the expenditure necessary to thoroughly develop the known occurrences of tin bearing stone.

J. B. Scott  
STATE MINING ENGINEER.

Mines Department,  
Hobart.

12th November, 1928.