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**RIO AUSTRALIAN EXPLORATION PTY. LIMITED**  
**MELBOURNE, AUSTRALIA**

PROJECT:— PRP/7/100

REPORT No.:— Misc. 1957

APPRAISAL

of the

RENISON BELL TIN FIELD

NORTH-WEST TASMANIA

by

J. H. RATTIGAN

5M-145

Renison Bell tin field appraisal  
by  
J.H. Rattigan  
26/2/57

FILE REFERENCE:— 8D/21

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NORTH WEST TASMANIA.PURPOSE AND SCOPE OF INVESTIGATION

During the period February 12th - March 4th, 1957 an examination of the Renison Bell Tin Field and a number of outlying tin prospects was made.

This appraisal is based on a rather rapid examination of surface and underground workings and surface geology of the Renison Field, and outlying prospects. From this work the surface and underground mapping of Fisher (1943) was proved to be sound, and the surface maps of Hills (1952) proved to give a reasonable interpretative picture of the geological conditions on the field.

Particular attention was paid to mapping of surface and underground workings in the area of Dunn's and the Battery Workings, as the cassiterite bearing ore bodies in these areas are the only sulphide deposits on the Renison field which have been reasonably well outlined by surface and underground drilling and mine development. These deposits form the only current feed to the Renison Mill and are mined at the rate of about 1,000 tons per month.

While many sulphide bodies are partly exposed in the many scattered workings on the Renison field, the ore bodies in the Dunn's-Battery area are the only deposits in which ideas of form and size of the sulphide bodies and the values and variability in grade of cassiterite within them can be gained. The size and grade of these bodies is important in assessing the potential of other known sulphide bodies of which the extent is not known.

No samples could be assayed in the time available and for ideas on grade this appraisal is dependent on mine assays and previous sampling by McKeown, Lindsay Clark and Fisher as recorded in various reports.

This report is not intended to be a comprehensive survey of the field and all previous geological and geophysical reports are taken as read. Certain salient features relating to geology and ore occurrence are briefly dealt with.

GEOLOGICAL BACKGROUND

The tin bearing sulphide deposits are localised in rocks of the Cambrian Dundas Group. The principal sedimentary rock units recognised in the Cambrian sequence on the Renison Field are the Dalcoath Quartzite, Renison Laminated Slates, the Razorback Formation ("Red rock") and the Brewery Junction Slates and Tuffs. These units are described by Loftus Hills. Igneous rocks intruding the sedimentary sequence include Cambrian basic and ultrabasic intrusives, and dolerite (dykes) and quartz porphyry (dykes and sills?) of uncertain age. The regional geology is described in a separate report by D. King.

The structure of the field has been interpreted by Loftus Hills and while interpretive, his concepts appear fairly sound. The sedimentary rocks dip at low to moderate angles but the attitude of the beds varies markedly from place to place due to the effect of numerous major and minor faults. Two major sets of faulting occur, one N.W. trending set, and a transverse easterly trending set. Near major faults a marked steeping of dip and shattering and induration of rocks is observed. Minor faults are observed to be very numerous in the relatively few good exposures in mine workings and road and rail cuttings. They trend in random directions and while displacement is small, in combination they cause marked variations in the observed attitude of the beds.

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ORE OCCURRENCE

Approximately 500,000 tons of 0.72% Sn ore have to date been worked from the Renison Field. The bulk of this ore was mined from oxidised deposits (leached skeletal quartz and ferruginous gossans developed over sulphide bodies) with contributions from sluiced eluvials and from alluvial deposits. Sulphide ore has been treated within the last 20 years and is the only ore at present being worked.

As it must be assumed that the bulk of the better oxidised ore (which carried relatively better values and is more easily worked than the unoxidised sulphides) has been worked out, the potentials of the field lie chiefly in the proving and development of tin bearing sulphide bodies. Other tin bearing materials which must be considered in any appraisal are mineralised country rock developed marginal to the massive sulphide bodies, oxidised ores, veined slate porphyry, pegmatic veins and eluvial (detrital) deposits.

1. Primary Sulphide Bodies.

Past reports give full descriptions of this type of primary ore occurrence. Cassiterite is associated with massive sulphides (chiefly pyrrhotite) in two main types of body.

- "Feeders" - steeply dipping fissure veins.
- "Floors" - irregular sill like bodies generally conforming to the bedding of country rock.

(1) "Feeders" The feeders are lenticular bodies of massive sulphides located in lode channels which are linear zones of discontinuous faulting and fissuring. Individual fissures within such zones are developed in line, or en echelon, and sometimes branching. They are not continuously mineralised throughout their length and sulphide bodies developed within the fissures may be separated by poorly mineralised or unmineralised country rock. The longest continuous body is the Federal lode extending for a length of more than 750 feet.

The dominant lode channels trend N.W. (Renison Bell Main Lode System, Dreadnought-Federal System, Dunn's-Battery System, Montana System) but a less important transverse set is known (Hetherington's, Dalcoath Creek).

(2) "Floors" These deposits are the most interesting in any consideration of the development of the field. The floors extend outwards from the feeders rather irregularly but generally conforming to the bedding. All known floors are localised within the Renison Laminated Slates, stratigraphically below the Razor-back Formation. Floors are developed at several horizons within the Renison Slates and it appears that any massive or thickly bedded members within the Renison Slates or the overlying Razor-back Formation may have exerted a control in determining the position of the floors. Repetition of floors within a short vertical interval has been observed.

The boundaries of the floors are irregular and the massive sulphides may lens out gradually, pass gradually into mineralised country rock or abruptly terminate against a blunt wall.

The floors have been described by Fisher and Hills, between whom there is one major point of difference. Fisher believed that the floors were formed by bodily displacement but Hills considers them to be replacement bodies. In this respect, Hills' interpretation is preferred as narrow bands of indurated slate project down into the floors from the hanging wall, and it is difficult to see how the theory of bodily displacement could explain this.

(3) Occurrence of Cassiterite - In the feeders and floors cassiterite occurs in small amounts associated with sulphides of which pyrrhotite is dominant and pyrite, arsenopyrite and sometimes galena blende and stannite are accessories. Non-metallic gangue is chiefly quartz and a carbonate rock referred to as "dolomite."

From past reports, observations on position of mine workings and the opinions of mine workers, some conclusions were drawn as to tin occurrence. The richer shoots of cassiterite appear to be localised where the quartz content of the sulphide bodies is high; some more massive sulphide rock is practically barren of tin. The tin values are better near the walls of the bodies. The feeders generally seem to be richer in tin than the floors and the portions of floors nearest the feeders may be richer than the extremities. The "dolomite" sometimes is barren but is known at times to carry good tin values.

## 2. Mineralised Country Rock

The massive sulphide bodies are often surrounded by zones of mineralised host rock which is veined and partially replaced by sulphides. Good tin values are known from such rock close to the massive sulphide bodies and such material is mined at the present time from the Battery Workings. McKeown remarks on a large tonnage of such mineralised slates near the E.B.R. penetrated by No. 1 Bore, which is reported to give a 60 feet intersection of 0.717% Sn.

Generally, however, little is known of the extent and thickness of mineralised country rock and values cannot, in the absence of definite information, be considered as anything but low.

## 3. Veined Tourmalinised Slate and Porphyry and Pegmatite Veins.

The extent of such deposits described from the Pine Hill area by Hills (1951) is not known and only low to moderate values are recorded, except in odd boulders of detrital cassiterite.

## 4. Gossanous Deposits.

Patches of gossanous material are developed at the surface in many areas of the Renison Tin Field. Many patches are extensive as near the Cable Workings. Much of this material may be secondary ferruginous material not necessarily developed over sulphides. In bulk, since much of it is unworked, tin values are presumably low, although cassiterite is visible in selected specimens. McKeown and others have mentioned possible mechanical secondary enrichment of tin in some layers of gossanous material but sampling from trenching and bore holes of unworked gossanous deposits has indicated low values generally.

## 5. Detrital Deposits

Detrital deposits such as those recorded by Hills in the Pine Hill area do exist, but values can be presumed to be low.

## CONSIDERATION OF ORE RESERVES

### 1. Renison Bell Main Lode System

Fisher has estimated a possible figure of 500,000 tons of ore possibly averaging 0.75% Sn. from ore bodies of the feeder type in the Renison Bell Main Lode between the Argent River and the southern limits of the Upper Blow Workings. This represents ore in discontinuous bodies throughout a total length of 3,200 feet and ranging in width from 2-20 feet. The ore is inferred by projecting dimensions of ore bodies evident at the surface,

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in shallow workings and in drill holes to an R.L. of 1700 feet (Plate 1). Surface elevation ranges from 1700 feet to 2550 feet.

Fisher's estimate is possibly conservative, but cannot be improved upon with the limited data available. It appears that the bulk of this ore would not, of itself, be mineable by open cut methods because of the discontinuous nature and relatively narrow width of ore bodies and the great depth (ranging up to 850 feet) subsurface where the greatest part of the ore lies.

## 2. Floors developed east of the Renison Bell Main Lode.

Open Cuts and adits indicate that sulphides are developed as a floor or floors ranging up to more than 20 feet in thickness over the wide areas, between Renison North Workings and the Cross Lode (Hetherington's Workings.)

Persistent economic values are only known from a small area (200' x 100') near the Black face and Fisher has conservatively estimated 30,000 tons of about 0.8% Sn. in this small area. Elsewhere in the section considered, values obtained by diamond drilling and mine development (as recorded by McKeown, Fisher and in mine records, and by hearsay from mine workers) are very variable. Values generally are poor but some reasonable intersections are recorded in drill cores.

However, one possibility that has been considered is open cut mining on the northern spur of Renison Bell Hill to work all mineralised country on the footwall and hanging wall of the main lode, the main lode itself and floors developed east of the main lode to the level of Renison Bell Creek. This would involve large scale working of very low grade tin ores and would be economic only if mineralised country rock adjacent to the sulphide bodies of the floor and feeder type were sufficiently extensive and carried significant tin values.

Seven diamond drill holes have been put down (1912-1913) in this section and the cores analysed by panning (refer McKeown 1927 and Fisher's Local Cross Sections AA'-JJ'). One drill hole (No. 1) depressed at a low angle gave some interesting intersections of mineralised country rock carrying good values. Other drill holes revealed considerable barren stretches, but there is some doubt whether all core was tested.

More recent diamond drilling near Hetherington's Workings by the present Renison Company (Nos. S7-S14) revealed some narrow intersections of very good sulphide ore, but assays of all core samples of mineralised country rock were not made and the fact that the positions of the holes are now known does not help any appraisal.

## 3. Montana North Workings

Floors are exposed in a series of shallow workings on the divide at the head of Renison Bell Creek. There appears to be repetition of floors at two horizons, one being 8 feet in thickness and another of the order of 3 feet.

Nothing is known of the lateral extent of these floors or of values in the limited areas of sulphide faces and gossanous material exposed, but values may be low as the workings are not extensive. It would be optimistic to consider that more than 50,000 tons of sulphide ore exists at this locality on present indications.

#### 4. Montana South Workings

Several "feeders" and perhaps three "floors" occur in this locality, but there has been no development of any of the sulphide ores. Several percussion and jumper holes were put down to test the area (Clark 1927), and Clark reports that sulphides and gossanous material are exposed more or less continuously over an area of 200,000 square feet in the Montana-Gallipoli area. Some interesting intersections were recorded in the shallow boring including a 20 foot intersection of 2.2% Sn. (Bore 50 G), and good values (> 1% Sn.) were obtained by sampling exposed faces. However, other samples from boring gave low values.

#### 5. Dreadnought Lode

Workings have exposed this lode over a known length of 2000 feet but ore occurrence is rather patchy. McKeown conservatively estimated probable reserves of about 100,000 tons ore of value 0.92% Sn. This was calculated from 5 disconnected blocks ranging up to 50 feet in thickness. We could not improve on McKeown's figures for probable ore. It is considered that this ore could not be economically developed by open cut methods. Although more ore might be proved along the extensions of the Dreadnought lode, in sections of the lode between the workings, and at depth beneath the known workings, any quantity estimated on present indications would be pure speculation.

#### 6. Federal Lode

Fisher's estimate of 150,000 tons of ore greater than 0.75% may be taken as the most reliable figure. This is based on a persistent ore body developed over a length of 800 feet, from surface level which ranges up to 2,100 feet, to a depth of R.L. 1,920 feet. Ore occurs with horses of mullock and ranges from 6 feet to 40 feet in thickness. The ore body dips easterly at about 70°. It is difficult to see how this steeply dipping tabular body could be worked economically by open cut methods.

Previous geological reports have referred to the possibility of "floors" being developed where the Federal and Dreadnought lodes cut the Renison Slates at a subsurface depth of about 300 feet. Although a reasonable speculation, no indications of such floors can be seen in the workings which are shallow.

#### 7. Battery Workings - Dunn's Cut Area.

The known sulphide bodies in this area are reasonably well outlined by surface and underground mining and drilling. A persistent feeder occupies a lode channel passing through Dunn's and the Battery workings and floors extend outwards from this.

Regarding known floors which have been partially worked, the body currently being worked (after having been discovered by an ore intersection in a diamond drill hole S.16) has a probable reserve of about 40,000 tons of ore possibly 0.75% Sn.

#### 8. Lucks Workings.

No sulphide ore can be indicated in this area where a small floor appears to be largely worked out.

#### 9. Cable Workings

There is no indication that sulphide ore of any quantity could be obtained from near the Cable workings. A ferruginous gossan like deposit extends over a wide area between the Boulder Tram near the Cable Workings, to the Battery Workings. This deposit has been tested by shallow surface bores and trenches and at depth by the Dalcoath Creek Adit (150-300 feet beneath surface of gossan) and by adits from the Cable Workings. No large sulphide deposits were indicated by this work. The gossan may be largely secondary but carries tin values which are patchy.

#### 10. Dalcoath Lode

Sulphides are exposed over forty feet in the floor of an open cut but the form of the body is not known. Hills has interpreted the body as a vertical tabular replacement along a fault, and having an irregular north wall. We could find no grounds to support or contradict this view.

Good tin values in ore mined from the Dalcoath Lode are referred to in past reports, but the lack of development in recent years by the Renison Company when searching for ore to feed their mill gives no grounds to support the view that a large tonnage of easily treated ore of good grade is available.

#### 11. Dalcoath Creek Lode

This "feeder" type deposit occurs in the bed of a creek and would not be suitable for open cutting.

#### 12. Outlying Occurrences of Tin within the Renison S.P.L.

In the Pine Hill area, tin is known from gossanous deposits over sulphide bodies, from veined tourmalinised porphyry and slate, and from detrital material. It is doubtful if the detrital material, if mined in bulk, would give values as great as 0.5% Sn. though Loftus Hills quotes an assay of that figure for a sample.

The extent of the veined porphyry-slate complex (Penzance Workings) is not known. Loftus Hills records an assay of 0.5% Sn. from this material, but it is doubtful if the material would approach this figure if mined in bulk.

The Karlson and Riley Prospect is a sulphide deposit with a gossanous cap and no indication of the form and size of the sulphide body could be gained.

#### 13. Prospective Ore from Geophysical Indications

Geophysical anomalies from the various surveys by the I.E.G.S. B.M.R. and our own airborne E.M. and magnetometer surveys are in some cases untested.

However, it must be noted that all geophysical methods employed are primary guides to sulphide bodies, only, and are secondary guides to tin which may or may not be associated with sulphides (either massive or in mineralised country rock) in economic quantities. In this respect the Tasmanian Government Bore No. 21 put down to test an I.E.G.S. indication south of Dunn's workings is significant. This intersected 25 feet of carbonate rock and barren sulphides.

The most promising indications are perhaps the magnetic anomalies extending south of the Upper Blow workings on Renison Bell Hill which would seem to indicate an extension of the Renison Bell Main Lode, and a northwest trending line of magnetic anomalies extending N.W. from the Montana South Workings.

#### 14. Tin Prospects outside the limits of the Renison S.P.L.

To gain an idea as to what might be expected as additional contributions to reserves of the Renison field from surrounding areas, several tin prospects in the Renison-Dundas district were inspected.

A number of prospects (Salmons, Fentons) occur near the junction of the X-River with the Pieman River. These are narrow lenticular cassiterite bearing, sulphide fissure lodes and do not appear to be sufficiently persistent to consider working.

The Razorback Lode in the Dundas area is a fissure lode extending over a known length of 2,600 feet along a faulted contact between slates and serpentine rock. The tin bearing material is not developed continuously throughout this length. Sulphides are rarely exposed as they have not been worked. Three exposures are known and indicate a width of "feeder" type lodes ranging up to 15 feet. No estimate of reserves of sulphide ores can be made. A single assay recorded from sulphide ore is 0.48% Sn. Oxidised ore exposed at the surface and in workings gives low values in bulk, although richer patches are currently being worked in a small way. The Tasmanian Department of Mines has estimated a figure of 320,000 tons of 0.3% Sn. as the reserves of oxidised material.

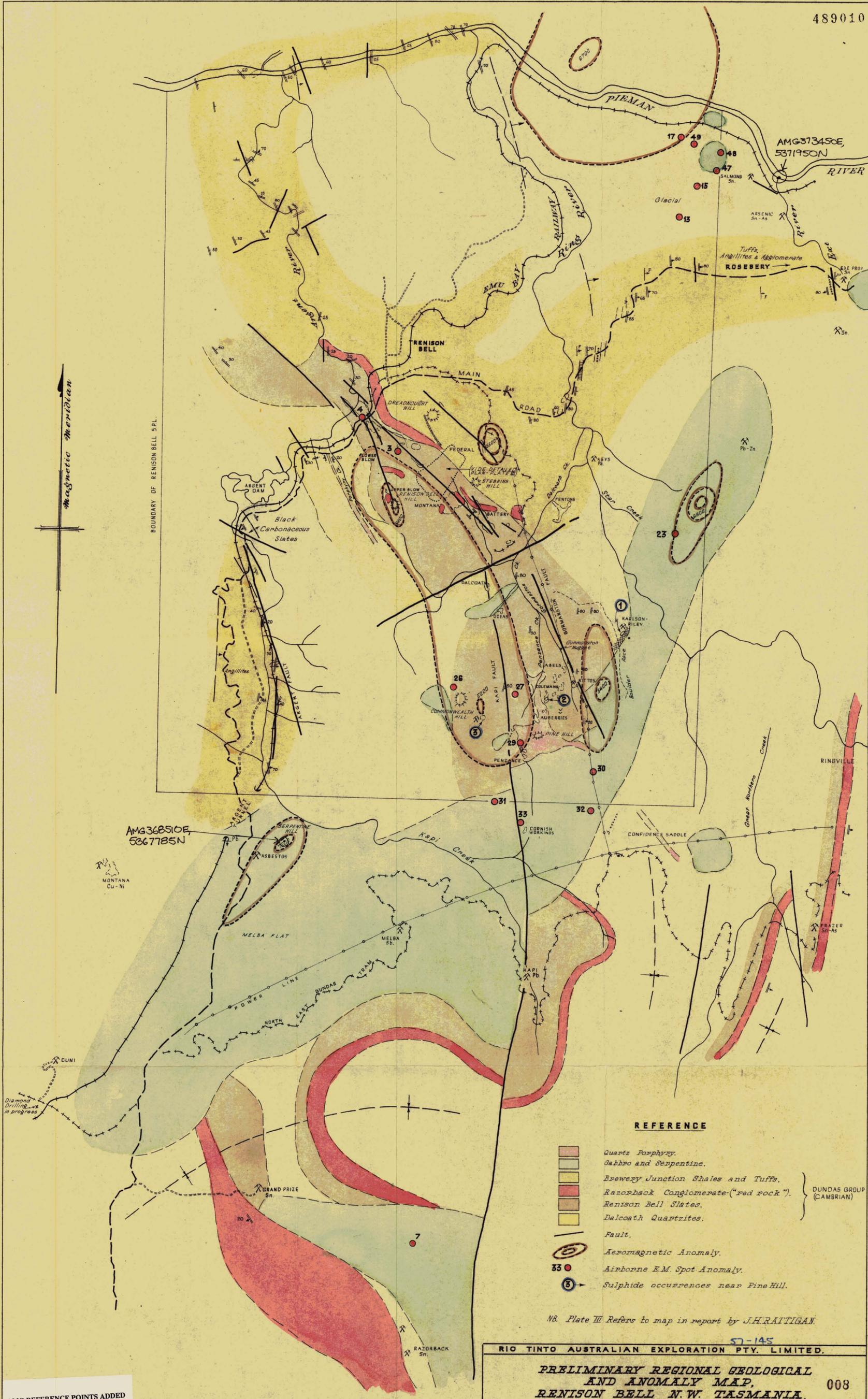
#### CONCLUSIONS AND RECOMMENDATIONS

The Renison field is largely untested although many scattered partial exposures and indications of tin bearing deposits occur. The development of tin ores of good grade on the field on a large scale would seem to rest largely on proving the existence of sill like sulphide floors at shallow depths which could be mined by open cut methods. The steeply dipping "feeder" type lodes could only be mined for higher grade tin ores by underground mining. The possible reserves indicated would not seem to justify such mining of scattered and discontinuous lenticular bodies for a large tonnage project.

J. H. Rattigan  
Geologist

12th March, 1957.

*This report is merely a summary of  
existing reports and does not cover any  
new ground at all.*



AMG REFERENCE POINTS ADDED

5 cm

Compiled from uncontrolled Enlarged Air Photos. Geology of Southern Area by - Elliston - 1952.

REFERENCE

- Quartz Porphyry.
- Gabbro and Serpentine.
- Brewery Junction Shales and Tuffs.
- Razorback Conglomerate ("red rock").
- Renison Bell Slates.
- Dalcoath Quartzites.
- Fault.
- Aeromagnetic Anomaly.
- Airborne E.M. Spot Anomaly.
- Sulphide occurrences near Pine Hill.

NB. Plate III Refers to map in report by J.H. RAITIGAN

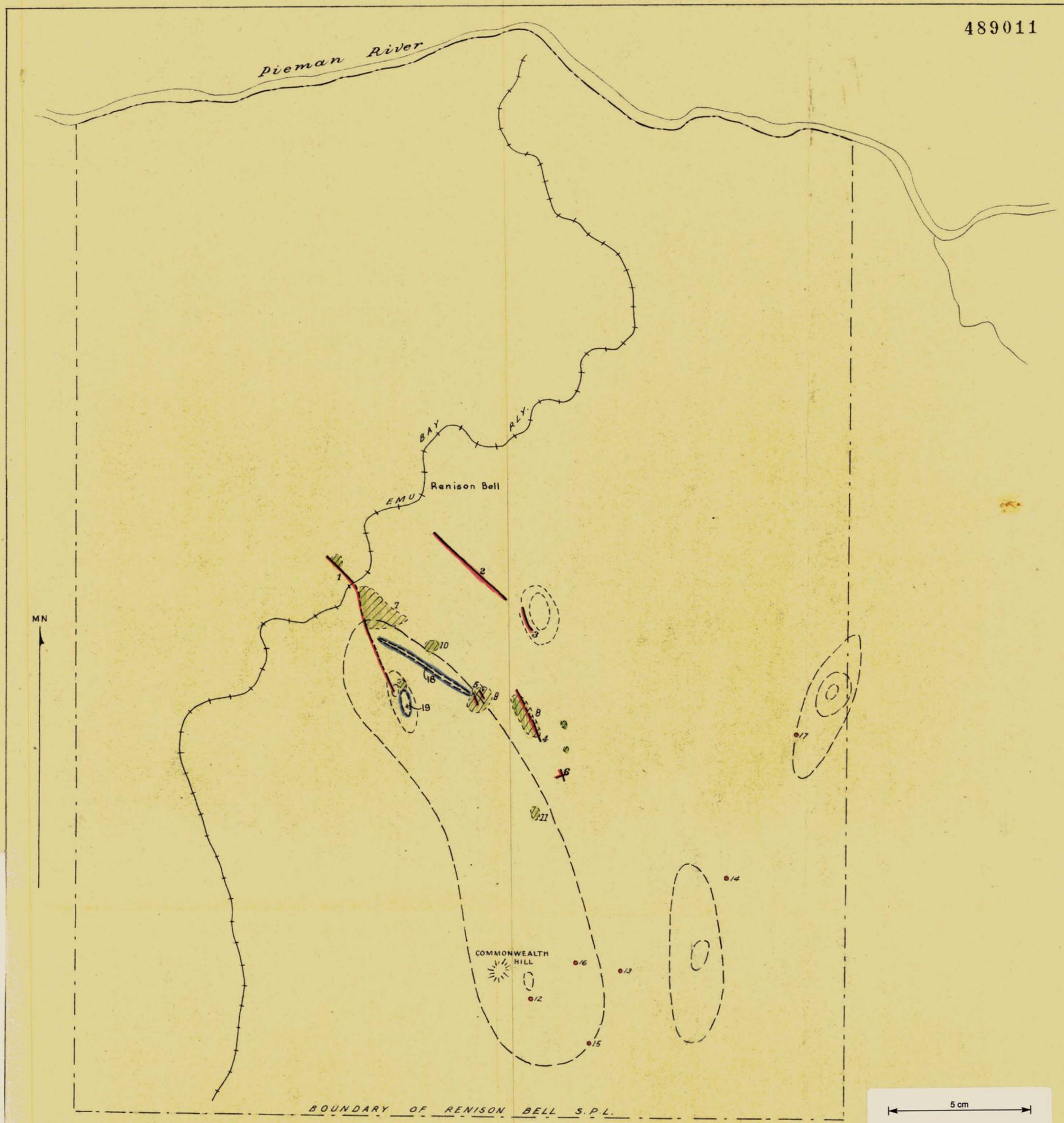
RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED.

**PRELIMINARY REGIONAL GEOLOGICAL AND ANOMALY MAP, RENISON BELL N.W. TASMANIA.**

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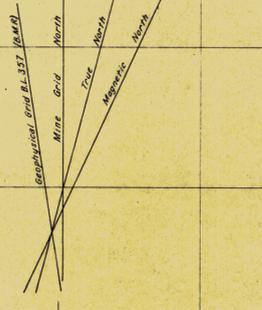
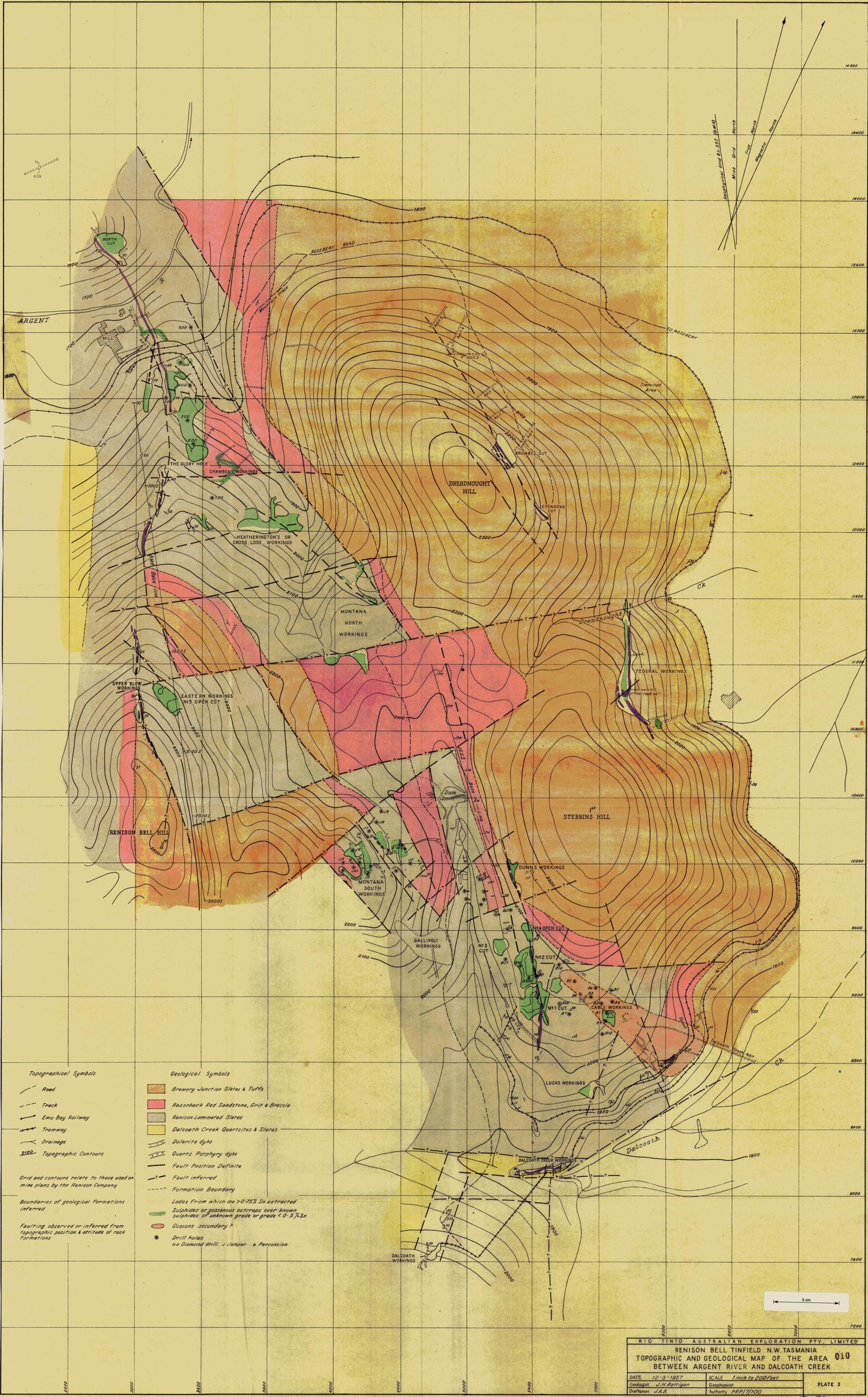
DATE	March 1957	SCALE	4 inches = 1 mile
Geologist	D. King	Geophysicist	
Draftsman	D. Lawford	Authority	PRP/7/100

**PLATE 1**



- 1 Fissure Lodes (Nos 1-6)
- 12 Known Sn Occurrences and EM Anomalies
- Flat Floors (Nos 7-11)
- 18 Magnetometer Anomalies - Ground and Airborne (Nos 18, 19)

57-145		
RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED		
SKETCH ILLUSTRATING ORE OCCURRENCES AND INDICATIONS		
<b>RENISON BELL - TINFIELD 009</b>		
(Overlay for D. King's Regional Map)		
Date 13.3.57	Scale 1 inch to 1320 feet	<b>PLATE 2</b>
Geologist J.H.R.	Authority PRP/7/100	



**Topographical Symbols**

- Road
- - - Track
- Emu Bay Railway
- Tramway
- Drainage
- 1000 Topographic Contours

Grid and contours relate to those used on mine plans by the Renison Company

Boundaries of geological formations inferred

Faulting observed or inferred from topographic position & attitude of rock formations

**Geological Symbols**

- Brewery Junction Slates & Tuffs
- Razorback Red Sandstone, Grit & Breccia
- Renison Laminated Slates
- Dalcoath Creek Quartzites & Slates
- Dolerite dyke
- Quartz Porphyry dyke
- Fault Position Definite
- Fault Inferred
- Formation Boundary
- Lodes from which over 75% Sn extracted
- Sulphides or gossans outcrops over known sulphides of unknown grade or grade < 0.5% Sn
- Gossans Secondary?
- Drill holes  
o-o Diamond drill, J Jumper & Percussion

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED  
RENISON BELL TINFIELD N.W. TASMANIA  
TOPOGRAPHIC AND GEOLOGICAL MAP OF THE AREA 010  
BETWEEN ARGENT RIVER AND DALCOATH CREEK

DATE 12-3-1957	SCALE 1 inch to 200 feet	PLATE 3
Geologist J.H. Pettigan	Geophysicist	
Draftsman J.A.B.	Authority PRP17100	

