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F.L. 6/88

PROSPECTS AND INVESTIGATION

IN THE

BLUE TIER TIN FIELD

OF

NORTH EASTERN TASMANIA

GEOPHOTO MINERALS REPORT 1969/13

Prospects & Investigation in the
 Blue Tier Tin Field of N.E. TAS
 F.L. 6/68 - geophoto

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M E M O

TO : R.H. BARTON

FROM : J.H. RATTIGAN

May 23, 1969.

RE : BLUE TIER REPORT - B.R. HERD

Attached is a report by Bruce Herd on the Blue Tier Prospects. Bruce has summarised relevant features of the many deposits of this area. They are chiefly tin, but wolfram, molybdenum, bismuth and uranium occurrences are known. The known tin deposits are of several types some being flattish "floors" and irregular disseminations limited as to depth and others being steeply dipping vein type deposits extending to depth.

I would suggest :

- (i) that the Liberator Mine and its extensions and intersections with the Australia line be prospected for a tin-molybdenum deposit.
- (ii) The Southern Cross-Mt. Marie line be prospected for tin.
- (iii) The Summit Mine and environs be prospected for Sn, Cu, Mo and W.
- (iv) The Moon Mine extensions to be probed to prospect for additions to the known reserve.
- (v) The Hope Creek Vein be tested for bismuth content.

Whilst I would agree that feasibility study of the grouping of richer sections of known deposits and proving up their extensions for possible large ore reserves capable of being fed to a common mill is a viable early approach, it would still be best if large scale open cast mining at single pits and large scale treatment be the aim as milling costs are high for lode tin and economies of scale must be had to counter the marginal grades so far indicated.

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AMG REFERENCE POINTS ADDED

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I feel that past emphasis in this area has always been on tin yet associated base metals, molybdenite and wolfram have largely been ignored and could be usefully sought in the areas indicated above and in the Tier indicated by geochemistry or geologic study and prospecting.

J.H. RATTIGAN.

PROSPECTS AND INVESTIGATION

IN THE

BLUE TIER TIN FIELD

OF

NORTH EASTERN TASMANIA

BY

B.R. HERD

Accompanying maps

1. Sketch plan of Blue Tier tin field
2. Geological sketch plan of Blue Tier tin field

PURPOSE

This work was done on ground within the boundaries of EL6/68 on ground held for Texins Development Ltd. The report was compiled from a study of reports on the old mines and mineral occurrences in the Blue Tier region and from my own observations on various visits to this region. The object of this study was to define the most likely targets for further exploration and to determine the best method for such exploration.

INTRODUCTION

The Blue Tier is situated approximately seventy miles north east of Launceston Tasmania near Weldborough, which lies on the main highway to St. Helen's on the east coast. The region is serviced by a rail head twenty miles to the west at Herrick and by the main road at Weldborough.

The main feature of the Blue Tier is Mt. Littlechild which rises three hundred feet above a large north-easterly trending high plain of elevation about 2500 feet above sea level. The main drainage system of the region is the Wyniford River which starts on Sun Flats (Plate 1) and drains most of the old mines and mineral occurrences as it progresses to the west and north to join the Ringarooma River at Pioneer

(the Wyniford lead). The eastern and southern flanks of the 'Tier' are drained by the Groom River which joins the George River to the east and empties into Georges Bay near St. Helen's.

Tin was first discovered in the Blue Tier in 1874 as alluvial detritus. The subsequent hydraulic mining of the alluvial deposits exposed the tin bearing granite below the mining of lode tin commenced in 1895. Since that time some 2,142,000 tons of 0.2% tin ore has been worked. The majority of this material came from the Anchor Mine. Mining in this region ceased around the beginning of the Second World War because of a drop in the price of tin and the shortage of labour. Exploration has been carried out at intervals chiefly over the Anchor Mine area.

GEOLOGY

The Blue Tier is a stripped peneplain of Permian age. The remnants of Permian strata may be seen in the 200 feet of section capping Mt. Littlechild. Lower Palaeozoic sediments were intruded by a granitic pluton of Devonian age, which was itself intruded by several igneous differentiates of the same magmatic cycle. The whole region was uplifted by block faulting of the Devonian granitic massif in post-Devonian times. The granites may be divided into two main types; a barren porphyritic granodiorite and a tin-bearing, muscovite granite. The following description

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of the two types is given by D. Groves of the Mines Department of Tasmania in his technical report on the Blue Tier granites. (Groves, 1966).

The porphyritic adamellite comprises large orientated phenocrysts of oligoclase, up to 8 cm. in length in a general rock mass of potash, feldspar, oligoclase, quartz and biotite. In places the plagioclase phenocrysts are zoned, with a calcic core, and the potash feldspar is demonstrably microcline in a few sections. Inclusions of biotite occur in both oligoclase and potash feldspar and small inclusions of oligoclase are present in potash feldspar in places. The quartz is generally intragranular.

The "tin granite" has a granular texture and contains quartz, andesine, muscovite, potash feldspar, topaz and biotite, in extremely variable proportions. It is typically a quartz-muscovite adamellite comprising large, anhedral quartz crystals up to 3 mm. in diameter with numerous inclusions of andesine, potash feldspar and andesine laths up to 1 mm. in length and muscovite as large flakes or as sheaves. A minor portion of interstitial, dusty ground mass is feldspathic. Topaz is irregularly distributed as small prismatic crystals which in places replace feldspar and comprise up to 15% of the rock. Minor greenish biotite occurs in some sections and talc may also be present.

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The roof of the tin granite may be considered to be domal in aspect, several "domal" features are known and cupolas are localised at their crest. The tin granite outcrops as two masses one on the north and one on the south side of the 'Tier' with barren adamellite in the intervening space, traversed by dykes of tin granite and pegmatite.

During the crystallization of tin granite it is supposed that the more volatile fluids rose to the top of the magma and formed lenticular metalliferous ore deposits within the cupola portions of the irregularly shaped roof, or pegmatite veins in the overlying country rock. The roof regions (and presumably much of the tin deposited therein) have now been eroded.

THE DEPOSITS

There are three types of tin deposit in the Blue Tier region. They are firstly lenticular deposits in the tin granite massif, secondly dyke like bodies of pegmatite and tin granite in the adamellite, and thirdly quartz griesen veins.

The lenticular deposits occur beneath gently domed seams of pegmatite that mark the contact between the tin granite and the adamellite host roof. It is inferred that mineralizing solutions,

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introduced through contraction joints, now marked by griesen veins, were obstructed by the dome of pegmatite and flowed laterally along horizontal joints to form the series of lenticular metasomatic deposits one on top of the other which are so peculiar of this region. These metasomatically altered zones are variable as ore carriers and are usually associated with pinite and topaz. Though these deposits sometimes have fairly extensive width they very seldom range deeper than 100 feet, except by way of extensions in fractures through which the mineralizing solutions penetrated. It is not likely that large deposits would occur at a greater depth beneath the roof as the physiochemical conditions in magma and structural openings would not assist the emplacement of cassiterite.

Dyke deposits are usually of pegmatite or griesenized tin granite. The cassiterite is concentrated mainly near the centre of the dyke and grades out to the barren adamellite wall rock. These deposits are usually more variable than other types of deposits as the ore occurs in shoots. However they do go to much greater depth.

There are numerous vein type deposits in this region, most of them being the quartz-griesen type. These veins often contain other metallic minerals such as wolfram, chalcopyrite and molybdenite. These veins are considered to be infillings of fractures caused during cooling of the magma.

THE WORKINGS

The Anchor Mine, which has been the largest tin producer in the region, is situated on the southern slope of the Blue Tier about one half mile east of Crystal Creek on a deposit of the first type. The workings consist of an open cut containing four benches at 20 to 40 feet intervals, and is 700 feet in width extending 1200 feet in an east-west direction. The deposit is of the lenticular type occurring within a cupola. The roof may be seen on the east and west sides dipping at 5 - 7 degrees. This would suggest a limit (dictated by overburden) for mineralization suitable for open cast operations in these directions. The north east end of the cut however, shows no limit to mineralization. The ore is mostly a pale green pinite enclosing crystals of topaz and cassiterite with minor secondary mica, zircon, and quartz. Wolfram, scheelite, chalcopyrite and molybdenite occur in minute veins and in the pegmatite seam. The metasomatic deposit is variable as an ore carrier, the values occurring in north-easterly trending belts separated by barren material. This effect was caused by parallel zones of griesenization trending north-east along structure plains. The deposit was drilled by the Aberfoyle Group recently. However, they failed to define enough ore to mine profitably on a small scale.

The Crystal Hill Mine lies on the western side of Crystal Creek about one and a half miles from the Anchor Mine. The workings

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at this mine consist of several trenches opening a body of tin granite which is geologically similar to the Anchor deposit. Overall the deposit is very low grade tin ore but is fairly extensive having a width of 2000 feet and a length of 6000 feet. Here as at the Anchor Deposit small veins, containing various metals in small proportions occur in the mineralized zone.

The Liberator Mine lies on the southern spur of Mount Littlechild one half mile from the Crystal Hill Mine. The workings consist of two small open cuts, the deepest of which is 30 feet having a diameter of 60 feet. The workings open a body which appears to be the apex of a cupola. Mineralized sections of average value of 0.2% tin have been indicated and molybdenite is present in the pegmatite seams and to a lesser degree in the "tin granite". Some large flakes may be seen in a vein of decomposed pegmatite on the east side of number one open cut. A body of average grade and fairly extensive area has already been proven here.

North of the cut described and above the road, are the North Liberator Mine and a small prospect which has been opened in tin granite which is identical in type and grade to the Liberator deposit. As these shows lie on a straight line over a distance of one mile, and are believed to be on the apex of the "Liberator Fold", they show prospects of a very extensive, though low-grade deposit of tin with molybdenite.

The Australian Mine lies on the northern side of Crystal Creek near the top of the Blue Tier. The ore occurs in a greisenized zone of tin granite caused by mineralizing fluids channelled along four parallel veins striking north 70° east and dipping to the north west. This deposit is some 40 feet wide and resembles the Anchor deposit quite closely. As this deposit is not of the lenticular type but more of the vein type it is very possible that it will go to depth as well as to run for some distance in an east-west direction. An interesting aspect to this particular deposit is that it must cross the line of the "Liberator Fold" somewhere just to the west. If the mineralizing solutions penetrated to this point there is a possibility for enhanced mineralization at this point.

The Don Mine, which is situated above the junction of Tin Dish Creek and Crystal Creek, is on a body of tin granite identical to that of the Liberator deposit. The ore body averages about 0.08% tin but is cut off sharply by a fault on the northern side. The deposit is neither rich nor extensive.

The Summit Mine is located on a body of "tin granite" to the north of the Australia Mine. The workings open a deposit which occurs at the apex of a cupola and which is geologically similar to the Anchor Mine. The workings consist of an open cut 140 feet long running into a quarry 72 feet by 48 feet and 30 feet deep. The "tin granite" is highly pinitized for 1200 feet west and 600 feet east showing a possibility for

another fairly extensive low grade deposit, the average grade being 0.2% tin. There is in this area, east of the Australia and north of the Don Mine, a number of quartz-greisen veins, containing cassiterite, chalcopyrite, molybdenite and wolfram.

The Southern Cross Mine is located at the southern end of a dyke of "tin granite" which cuts the adamellite. The dyke rock varies in width from 30 to 120 feet and may enclose portions of the adamellite. The dyke is a "tin granite" in which the pinite has been highly developed with abundant topaz and secondary mica, also minor fluorspar and malachite incheavage planes. The ore is very irregular and cassiterite occurs mainly near the central portion of the dyke in shoots and grades out to the barren adamellite. As this dyke can be traced for almost a mile and most certainly goes to depth it offers yet another possible large low grade deposit.

The Mount Michael Mine lies in the dip on the north-western side of Mount Michael. The mine opens a body of tin granite, in an open cut 300 feet in diameter and 20 feet in depth. At greater depth the water table is encountered. The rock here is of medium grain and partly decomposed. The average grade is 0.4% tin. As the mine lies on the Southern Cross-Mount Marie line, and there is no essential difference in the type of tin granite, it is probable that other deposits may be discovered by tracing this line through the intervening country.

The Moon Mine is situated at the confluence of Moon and Hope Creeks. The workings consist of an irregularly shaped open-cut 20 feet in depth and a 45 foot shaft. The deposit is an "outlier" of tin granite. Through the centre portion the rock has been silicified and molybdenite is quite conspicuous. The tin ore is, as a rule, coarse in grain and of high quality. The Mount Lyell Mining and Railway Co. trenched and drilled the deposit and found it to run 0.4% tin over a width of 373 feet. This outlier of the "tin granite" is interesting for the geologic impressions it gives. The contact with adamellite on the west side is vertical while it dips 12° east on the northeast side. Small bodies of adamellite, some very narrow, are enclosed in the tin granite perhaps indicating a larger body of "tin granite" below. However, the deposit as it is known is probably too small for economic mining of tin.

To the south east along Hope Creek is a series of small veins of quartz, striking north 53° east and dipping 65° west which are reported to contain bismuth in small flecks.

RADIOACTIVITY

The mines of the Blue Tier region were surveyed for radioactive occurrences by the Enterprise Exploration Co. under the direction of Mr. P.G. Miller. Mr. Miller came to the conclusion that U_3O_8 is present in the granitic rock of the region and occurs in concentration

at the apex of the cupola or in veins and joints. Monazite and Torbernite are usually present near any high reading and account for the relatively high background reading of the granites.

At the Australia Mine readings were generally low, However, on a northeast trending vein of a brown clayey material a very high reading was obtained over a span of from 3 inches to 2 feet. Torbernite was found upon inspection of the vein which showed signs of griesenization. The vein material assayed only 0.035% U_3O_8 . Though not high it may be significant.

Some further prospects may develop from our Gamma Ray Spectrometer survey when digitized data is to hand following completion of the flying of the area in April 1969.

PROSPECTS AND INVESTIGATIONS

There are five prospects in the Blue Tier Region which are worthy of further investigation. They are the "Liberator Fold", the westerly extensions of the Australia Vein, the Southern Cross-Mt. Marie line, the Moon deposit and the Hope Creek vein. However, I feel that we must consider the probability of mining several of the partly developed old tin deposits in conjunction with a central milling plant, before venturing into the intensive exploration at depth and on strike and lateral extensions

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of the various prospects. The minerals wolfram, wolframite, molybdenite and chalcopyrite usually occur in association with cassiterite in the cupola deposits. Individual tin shoots are small in size and occurrence and values tend to be erratic within the larger areas of metasomatised host. By grouping several mines around one milling plant a large low grade ore reserve is available. In order to consider the feasibility of mining in this manner one must determine the ore reserve of each individual mine. If the ore reserve is large enough one then has the problem of determining the most economic mining method for each individual operation and to find a convenient site for the mill. The problems are present in bringing the region into production but I feel that there is a good possibility of achieving this end. An added bonus to the mining of tin is the molybdenite associated with almost every deposit in this region.

The Australia Vein has never been traced in its east and west directions and therefore shows promise for further expansion in these directions.

The Liberator Fold shows promise for further lodes along its strike and looks especially promising at the point where it meets the Australia Vein.

The dyke on which the Southern Cross and Mount Marie mines are situated also show promise for more ore especially along the line to Mount Michael.

The Moon deposit shows signs of widening out at depth and may therefore contain more ore also.

The Hope Creek vein shows bismuth and is worthy of testing for this metal.

RECOMMENDATIONS

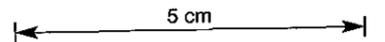
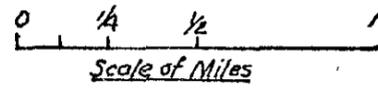
I recommend that firstly a study be made of the feasibility of mining several of the known existing low grade deposits in this area for treatment at one milling plant.

Secondly, a diamond drilling programme should then be initiated to prove up or check the ore reserves of the various mines involved. During the drilling of the Liberator Fold and the Australia Vein extensions should be undertaken.

There has never been a large rich body found in this area, although low-grade operations at the Anchor Mine were considerable so it is relatively safe to assume that the future of this field depends upon the grouping together of several ore bodies to give a large ore reserve to a central mill and to extract several minerals from the one ore.

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SKETCH PLAN OF BLUE TIER TIN FIELD

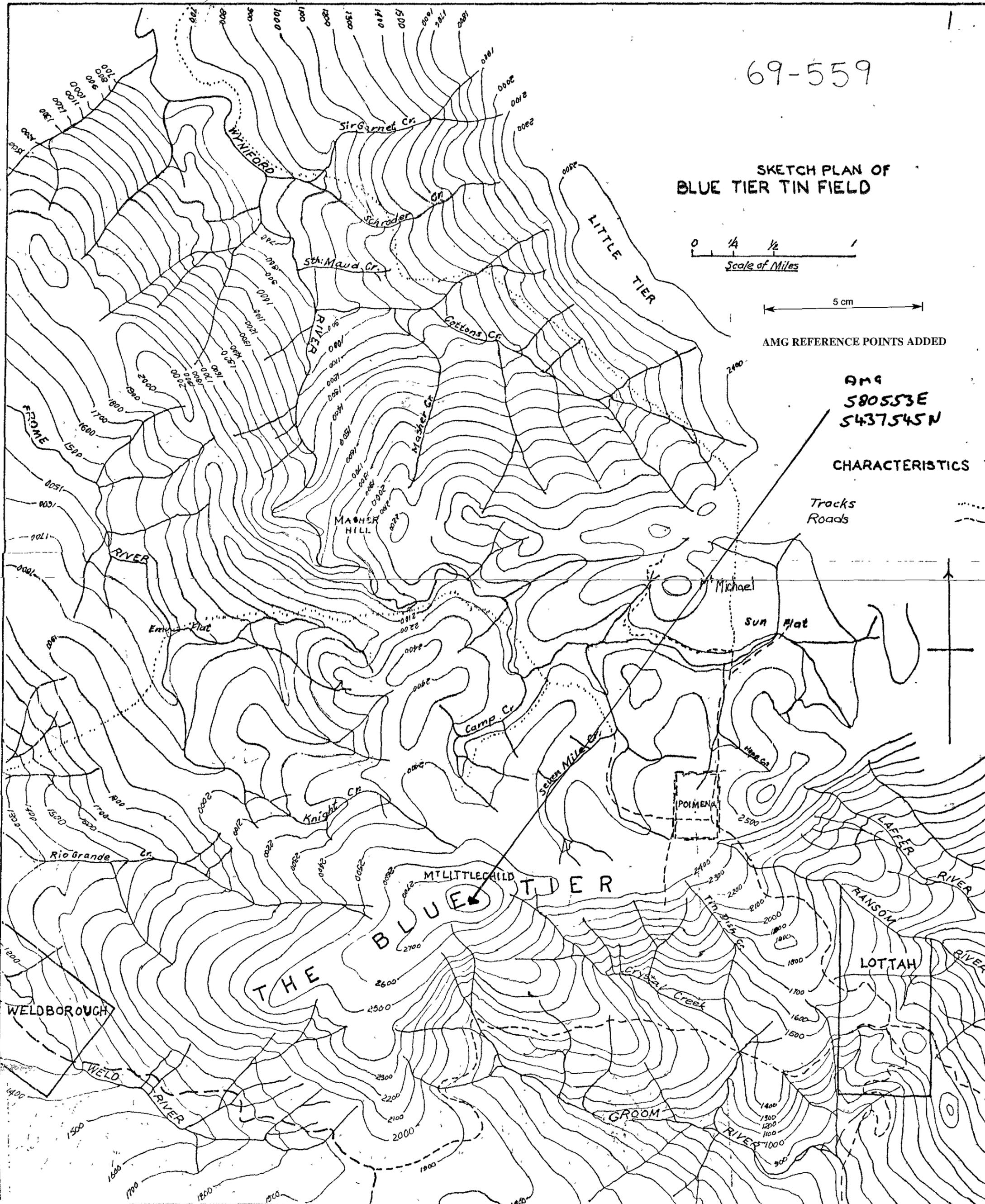


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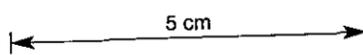
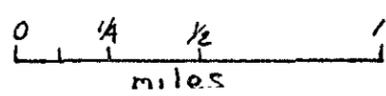
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CHARACTERISTICS

Tracks
Roads



GEOLOGICAL SKETCH PLAN OF
 BLUE TIER TIN FIELD
 TO SHOW KNOWN OCCURENCES OF THE
 TIN GRANITE



LEGEND

Alluvium	Qa
Basalt	Tb
Permian	P
Tin Granite	Dgt
Porphyritic Granite	Dgp
Granite Porphyry	Dgy

CHARACTERISTICS

Tin Mines

