RIO TINTO AUSTRALIAN EXPLORATION PTY LIMITED
MELBOURNE AUSTRALIA

REPORT ON ALLUVIAL BORING

RINGAROOM DISTRICT

N.E. TASMANIA

MAY – SEPTEMBER 1958

by

J H Rattigan

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REPORT ON ALLUVIAL BORING, RINGAROOMA DISTRICT N.E. TASMANIA, MAY-SEPTEMBER, 1958.

by

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CONTENTS

APPENDICES

CONTENTS (ii)

LIST OF PLATES AND TABLES

GENERAL

A limited programme of scout boring was carried out during the period May to August 1958 for the purpose of testing depths to bedrock and possible cassiterite content in several selected areas within R.T.A.E. permits in N.E. Tasmania. During this period nine deeper holes totalling 679 feet were put down by a diesel driven cable tool plant and 14 holes totalling 420 feet with a hand plant.

The scout programme was discontinued in mid August following a decision to carry out check boring on two lines on the Scotia Lead, previously drilled by the Tasmanian Department of Mines. This work ceased on September 7th following poor results from the one line which was checked to that stage. Nine holes totalling 933 feet were completed in this check boring.

DETAILS OF BORING PLANTS AND PRACTICE

The main plant used for scouting and check boring was a trailer mounted, diesel cable tool rig with a wooden mast. This plant with a crew of two (driller and helper) was hired from the Tasmanian Department of Mines. The plant was of a type used chiefly for water boring and had some limitations from the point of view of testing for alluvial mineral deposits. The main disadvantage was that no turntable was attached to this plant and putting casing down involved the use of manpower working bars on a clamp attached to the casing string. The near vertical mast did not allow men at the bars to work the tubes down by turning a full circle, and the practice was to work the bars back and forth from the one position. This often resulted in casing lengths working loose at depth when ground became tight, and this effectively slowed the rate of drilling while tubes were tightened by working the bars in one direction.

The casing string was normally 5", the outer diameter of the slightly belled and smooth cutting shoe being 5" when new. To depths of about 60' a boring rate of up to 55 feet per 8 hour shift could be obtained under maximum efficiency with a crew of three. Beyond about 60' subsurface (depending to some degree on the type of ground) the putting down of tubes required more manpower (4-6) at the bars.

In barren ground the rate of boring at depth could be improved by pulling the casing a short distance and putting it down again to its former level, this procedure widening the hole and casing tube turning. In pulling the tubes some interference with sample interval and volumes recovered occurs and this practice cannot be used near or in a tin bearing section.

Driving the tubes with the full weight of a tool string on the capped collar of the casing string was practised but chiefly in tin bearing sections, where it was necessary for accurate sampling. There was a risk with this rig of overstraining the plant during pulling of casing after driving (shown up by the breaking of the mast twice during the boring).

A second string of 3" casing was available with the plant but was only used in two of the 17 holes bored. The use of 3" tubes was not satisfactory as the sample recovered is too small for a reasonable test of the alluvials and the 3" pump could not adequately cope with running ground when met at deeper levels.

A borrowed hand plant was used in the earlier stages of the scouting programme to test ground believed to be of shallow depth and to occupy casualhands required part of the time to assist with the cable tool plant. This plant consisted of a wooden tripod, boring being carried out with augers and sand pump attached to drill rods. Four inch tubes were used with this plant, there being only 45' available with the plant. The use of a Landrover winch in the operations of pumping and pulling casing allowed of a two men crew operating the plant in place of three or four necessary with a hand windlass.

Sampling practice was essentially that described in an earlier report (J.H. Rattigan, 14/3/58, Miscellaneous Reports). Departures from this procedure were that in samples from barren sections of ground a measured volume of ¼ cubic foot only from each five feet sample was washed as a check, and only tails from tin bearing holes were checked over corduroy cloth. Full volumes in and near tin bearing sections of ground were washed and the tails checked over corduroy cloth. In sampling tin bearing sections particular care was taken to ensure that tubes were kept below the sand pump to prevent, as far as possible, excess core from running ground. This involved up to six men turning tubes accompanied by driving. In deeper ground it was difficult to get runs of more than a foot by this means. To ensure tubes were below the casing, the full length of the casing string was noted (connecting for departures from the standard 5' length in each tube). The cable was then marked by taping at this length and the tape kept more than 3" above the driving cap.

SCOUT BORING

1. Selection of Areas for testing

The scout holes were put down in the following areas:-

(i) Boobyalla District, near the junction of the Little and Big Boobyalla Rivers.

Four holes were put down in this area where an earlier seismic programme had been carried out. From a regional survey it was considered that natural stripping would allow testing for the inferred Main Ringarooma Lead at a reasonable depth. The aim of scouting was to check depths in relation to seismic profiles, and to intersect, if possible, stanniferous deposits in the deep lead and possible superficial deposits.

(ii) Boobyalla Plains

Five hand bores were put down across the coastal Boobyalla Plains, where some small mines had operated and a wide area of low country offered hopes for shallow testing of any deposits.

(iii) Shallamar Flats District

Five hand bores were put down across the mouth of an embayed depression filled with Tertiary strata, and heading from the north western slopes of Mt. Cameron. Small tin mines had operated at the head of this depression and it was considered that some chance of a deep lead existed in this area.

(iv) Stinking Creek Area, Great Northern Plain

Three scout bores were put down in this area to test, if possible, the Scotia Lead, and superficial deposits which showed good values in surface pits.

(v) Mayfield Area, Great Northern Plain

Three hand bores and one deeper scout hole were put down in this area with the three objectives, the possible testing of the Scotia Lead near its presumed outlet, the possible testing of bottom shingle of the type proved in the adjoining Fosters Marshes, and the testing of superficial deposits.

(vi) McGregor Mine Area, Great Northern Plain

One hole was put down in low plains country west of the McGregor Mine area as a general scout of bottom depth in an area where superficial stanniferous ground had been worked in many places in the past.

2. Results from Scout boring

(i) Boobyalla River Area

Three holes were put down on seismic line C to test deepest ground (GB1 and GB3), and a higher depression with well defined flanks (GB2) shown on the profile submitted by the Bureau of Mineral Resources. A fourth hole (GB4) was sited on the deepest depression shown on the profile of seismic line A.

The B.M.R. geophysicists had drawn up two profiles a deeper calculated with V_1 = 5,000 ft/sec. and a shallower calculated with V_1 = 3,400 ft/sec.

It was thought earlier that the deeper profile would most closely approximate to the bedrock surface but this was proved not to be the case following our boring and bedrock shooting at the Endurance Mine.

The sections (Plan No. T.455) illustrate the bore results and comparison with seismic profiles. The sections passed through in the bores GB1, GB3 and GB4 comprised:-

(1) An upper sequence of light grey sands and pebble beds.

(2) A lower sequence of unsorted pebble beds with a blue grey clay matrix, and grey green clayey sands and sandy clays, characterised by abundant marcasite.

In GB2 the section varied somewhat from the other holes, the full thickness of pebble bearing clays of the lower sequence not being encountered. This hole passed into blue-green shales soon after penetrating the upper pebble beds. The core from this section was largely recovered as a thick sludge but solid cuttings showed laminated shales. It was first thought that these shales were older bedrock slates as developed on adjoining ridges, but it is probable that they may be a facies variant of the pebbly clays of holes 1, 3 and 4 and Tertiary age. They were penetrated for 30' when grey-green micaceous and clayey material characteristic of weathered granite was entered.

No sign of a bottom stanniferous wash was encountered in any of the four holes and superficial pebble beds carried only a trace of fine tin.

It is not considered that this testing was exhaustive as regards bottom stanniferous deposits. The scout holes proved that bottom is not beyond reasonably economic limits and that little can be expected from superficial deposits in the way of economic minerals, though some superficial ground has been worked for tin with subsidiary gold in the general area. The fact that the lower strata are probably estuarine in origin does not automatically exclude the possibility of bottom tin deposits, as a clean stanniferous wash is found at depth below estuarine muds and sands in the Fosters Marsh area further to the north, near the present coast line.

As regards the checking of the value of seismic work in outlining bedrock profiles the following conclusions were drawn.

(1) The upper profile (V_1 = 3,400 ft/sec.) is closest to the true bed rock depth.

(2) The three holes put down on line C show that the upper profile gives as good an approximation to true bedrock surface as we could reasonably expect with the method.

(3) Possibly because of the limited nature of the work carried out the gradient of bottom cannot be inferred with reasonable accuracy between seismic lines. This is apparent from the longitudinal section between Bores GB4 and GB3.

From the seismic records bores GB4 and GB3 were expected to be sited near the deepest ground on seismic lines A and C respectively. The actual gradient between the bottom of these bores shows a fall of more than 36 feet per mile. This is greatly in excess of that of the average gradient of old Ringarooma lead between Derby and Seismic Line C which is about 21½ feet per mile (direct distance). The inference is, that since there is reasonable grounds for assuming GB3 to be close to deepest ground on line C, the bore GB4 cannot be located on the deepest absolute bottom on line A if a deep lead passes through the area.

(ii) <u>Boobyalla Plains</u>

A cross section across the Boobyalla Plains, as is apparent from present data, is shown on Plan T.456. The scouting by hand bores was limited and not exhaustive but it indicated:-

(1) The worked tin deposits of the Dugarde Creek Mine are confined to a shingle band in a narrow shallow depression. Some stanniferous ground remains east of the workings but although the area has not been worked for more than 25 years mineral leases are currently held over the bulk of the remaining tin bearing ground which is probably small as regards yardage.

(2) The tin deposits of the Delta Mine occurred in coarse pebble and boulder beds over a high basement ridge. West of the old mine face, two scout hand bores did not bottom Tertiary sediments and a steep drop in bottom is evident. Up to 45' of sands, often very fine even grained types, similar to sea sands, were encountered in HB No. 5 about 1100' west of the Delta face.

It is probable that the bedrock surface beneath the Boobyalla Plains is undulating and tin deposits could occur on bottom in the depressions. These are likely to be patchy and of small yardage from knowledge of deposits known in the abandoned workings.

(iii) Shallamar Flats Area

The profile shown by surface work and limited hand boring is shown on Plan No. T.457. The deeper ground shown by HB No. 14 was not bottomed, the sequence penetrated being light grey, sands and clays.

At the head of the embayment, cassiterite was won from small mines ("Monarch") in which coarse, thumb size nuggets of cassiterite were found. The work done at the mouth of the embayment has by no means exhausted the possibility of a lead arising in the area.

The work has shown that deepest bottom occurs beneath higher timbered rises, and this fact may be significant as there has always been a tendency for past boring to be carried out over the flats.

(iv) Stinking Creek Area, Great Northern Plain

The boring carried out here was intended, if possible to check the Scotia Lead, and the continuity of superficial deposits known from surface work in the area to yield interesting values.

The R.T.A.E. bore GB5 was sited about 250' south of the mid point of 4 holes of a Government bore line, in which reasonable values were recorded to depths of 113'. No tin deposit was encountered in GB5 to 95' (bottom), and it is apparent (See Plan No. T.416) that any tin deposits of the Scotia Lead in this area are narrow, thin and deep. This was later substantiated by our check boring near the head of the lead.

Although pits in the area show superficial wash to depths of 20 feet carrying values of near 0.5 lb/yard the bores GB5, 6 and 7 showed no values and indicated that the ground is patchy and purely superficial. Pit sinking, of course, gives a better test of this type of ground by virtue of the larger area and volume tested, but it appears that no large yardage with reasonable values could be expected from the superficial deposits of themselves.

(v) Mayfield Area

Surface prospecting in this area showed interesting values in pebble beds.

The scout boring proved these deposits were purely superficial and patchy and unlikely to result in large yardages. The deep hole GB8 was positioned between two bedrock ridges through which the Scotia Lead should have its outlet to the Fosters Marshes area. The hole passed through 78' of estuarine muds and sands bottoming in compact grey shales and sandy siltstones. No tin was encountered but as with Dorset's boring on Fosters Marshes there is some doubt as to the nature and age of the bottom. As a result of check boring of the Scotia Lead no recommendation for further testing in this area can be made.

(vi) McGregor Mine Area

The hole GB9 was put down west of a series of small mines which were worked for tin in superficial wash bands. Traces of tin were found in the upper 20' but the hole there after passed through 50' of even grained sands typical of sea sands. There is still a chance that undiscovered bottom deposits exist in this area but the large areas of low grade superficial stanniferous ground does not appear to warrant further testing on the results of this bore hole and earlier testing by Dorset Tin which is considered reliable. Small pockets of richer superficial ground may occur but these are likely to be of interest to small syndicates.

CHECK BORING, SCOTIA LEAD

1. Reasons for Check Boring

Extensions of two long abandoned tin workings the "Scotia" and "Lochaber" were tested by the Tasmanian Department of Mines over a number of years. Eight hundred and fifty five bores were put down in an ambitious programme and bore plans and records indicated two tributary deep lead channels, the Scotia Lead and the Lochaber Lead joining to form one main lead referred to in some records as the "Scoloch Lead". Close boring was carried out for a length of 4,550 feet of the Scotia tributary and for a 7,000 feet length beyond the inferred junction of this lead with the Lochaber.

In the closely bored sections an appraisal by Blake (1955) showed reserves of 4,300,000 cubic yards of ground carrying 980 tons of cassiterite in five blocks. Good tin values were reputedly found in a bottom wash varying up to 30 feet in thickness and with over widths ranging from 100 to 300 feet. Average depth of bottom was 109 feet. Average values were given as 7.78 ozs/cubic yard which is approximately 0.49 lbs/yard.

As the closely bored area included only about 25% of a possible length of tributaries and main lead, there was a chance that yardage and tin content might be sufficient to justify a mining operation on a moderate scale by proving further sections of the lead. A decision was made in August to check the worth of Government boring, initially by checking two lines of bores, as there was some doubt as to the soundness of the boring and evaluation practice during the Government programme.

Two bore lines were selected for checking after consultation with the Chief Geologist of the Department of Mines (H.W. Keid), both lines having a range of values up to 10 oz/yard in individual bores but not including any extreme values. One line was across the Scotia tributary and the second across the main lead beyond the entry of the Lochaber Lead. After completion of checking the former line in which bore values did in no way measure up to those recorded in Government plans, it was decided not to proceed with checking of the second line.

Procedure in Checking

Check boring was carried out on nine holes in an east-west line from bores No. 93 to 27 of the original Government programme. The original bores were at times offset from a straight line, the drilling plant having avoided the Mt. Cameron water race branch and taller trees in siting. The holes were approximately ¼ chain apart.

The original bore holes were re-established by surveying from marked posts to check the existing bore plans and the check holes were also surveyed. It was decided to place the R.T.A.E. check holes as close to the original as was practicable, allowing for difficulties in towing the plant into position in the heavy ground present during much of the period in which boring took place. It was considered inadvisable to place the check holes directly adjacent the original in case the old holes were intersected. A distance of about three feet was considered a satisfactory margin.

The length of bore line checked totalled 264' (4 chains) and the average spacing between check holes was 33' (½ chain) but because of disposition of old holes and natural difficulties in siting plant the individual spacing ranged from 25' to 49'.

During boring all holes were carried down to and beyond the level of bottom recorded in the original holes so that there would be no chance of error in comparing bottom levels.

2. Results from Check Boring

The section passed through in the bores comprised three distinct lithological units:-

(1) An upper formation consisting of light grey or white clayey sands and sandy clays ranging up to a maximum but incomplete thickness of 45'.

(2) Light brown sands and grits, characteristically carbonaceous or lignitic and frequently bonded with secondary marcasite, ranging up to 57' in thickness.

(3) A basal pebble bearing stanniferous member ranging up to 5'6" in thickness but lensing rapidly. The larger pebbles in this wash zone consist of subangular quartz up to 2" in length (as recovered by the sand pump). Smaller pebbles are sometimes well rounded, of the "birdseye" type. The matrix is a coarse unsorted grit which is sometimes bonded with marcasite.

This section in many respects resembles that at the Clifton workings of the Endurance Company at South Mount Cameron. There is generally a sharp upper and lower junction to the pebble wash where developed. The wash band (see plan) is thickest in a gutter and lenses out on the flanks. It is inferred to be a fluviatile lead buried by barren astuarine strata.

Cassiterite except for traces of finer material is restricted to the wash zone. It is not, however, developed consistently within the zone, as for example in the richest hole, R.T.A.E. 14, in the five feet of wash penetrated between bore depths 99'0" to 104'0" most tin is restricted to a narrow band between 100'0" and 101'9".

Because of the great thickness (approx. 95') of barren overburden weighted values over the full bore depths were low. The best hole, R.T.A.E. 14, showed an average of 0.35 lbs/cubic yard (5.6 ozs/yd) but all others showed values less than 0.10 lb/yard. The cassiterite is not particularly coarse but when dressed is of good class for this district. A screen analysis by Dorset Tin on cassiterite for R.T.A.E. 14 showed 41.5 % of +50; 48.1% of +100 and 10.4% -100.

3. Comparison with previous Government results

A comparison of bore data between the R.T.A.E. check bores and the Government bores is shown on Table 1. In general, the bore depths check except in the case of R.T.A.E. No. 11 bore which varies 5' from the original bore, and this might be attributed to incorrect measurement of one casing length.

All R.T.A.E. holes were put down to below the level recorded as bottom on the original bores, irrespective of the level taken as bottom in the R.T.A.E. holes. This was necessary to provide a full check.

The cross section (See Plan No. T.454) varies to some degree from the Government bore section in that it shows one shallow depression in bedrock with one narrow and shallow gutter at the deepest point and gently sloping flanks. This gutter has the best and really the only interesting values (0.35 lb/yard). All bores on the nearer flanks show values of < 0.1 lb/yard.

The only Government bores which compare in values are two recording traces, the Government bore values being invariably much higher; three being of the order of 0.5 lb/yard or better. While it is doubtful if in such narrow tin bearing bands we could expect values in a check bore to agree within 10%, except with very large diameter holes, it is certainly not reasonable to expect the average values in R.T.A.E. holes to be less than ½ of the values recorded in the Government holes (as they are) unless some gross errors were made in sampling practice or "salting" was carried out.

The former could quite easily be the case as throughout the whole section the wash is generally the only ground that "runs". This was found to be the case in R.T.A.E. boring, and also verbal reports of original boring crew members show that "running ground" was a feature of the wash and caused trouble in sampling.

Causes of over evaluation can often be attributed to excess cores and/or poor volume measurement. Even when the excess volume is corrected for, errors can arise if rich tin is concentrated in very narrow bands and the sampling interval is relatively larger. If over most of the length of the sampling interval the cores recovered approached the theoretical but excess cores were recovered in a narrow tin bearing section, values can be grossly over estimated even after correcting for excess core over the full sample length. A theoretical consideration of this is shown on Plan T.453 where it is shown how a 15% excess core corrected over a wide sample interval could result in 50% over estimation of ground.

Something similar to this was encountered in R.T.A.E. 14, the check bore with best values.

To allow for any chance of this happening in the R.T.A.E. check bores, samples in the tin bearing sections were checked at intervals of 1' to 2' to see whether and to what degree excess cores were being obtained. These samples were measured and washed separately if excess cores were being obtained so that corrections could be made as necessary at short intervals. Thus a full control over volumes was available in the tin bearing section.

4. Conclusions

1. The R.T.A.E. boring shows that values recorded on one of many Government bore lines in the Scotia area cannot be substantiated on checking, and poor sampling practice is suspected.

2. Whatever the cause of the great difference shown in values it is considered that the check holes were close enough to the original bore holes and closely enough spaced to provide a fair test of the line particularly when averaged over the width of the bore line. Ground may be patchy and some richer sections may not have been encountered by the bores but the profile and spacing of bores show clearly that it would not be reasonable to expect much better values.

3. On the basis of this one line it would not be fair to say that we could expect all the Government boring to be as much in error particularly as the programme was carried out over a number of years with differing personnel and possibly sampling practice. However all bore results must be highly suspect.

4. The line checked was considered in the old bore records to be across the Scotia Lead but it was not possible to check this beyond all doubt by one check bore line.

5. It is possible that improved values would be present in the main lead north of the junction of the Lochaber tributary. Workers on the original boring are unanimous in saying that very rich values were obtained when the gutters of the lead were hit in bores, but how much of this is fact and how much fancy after the passage of years is impossible to judge. On the basis of this one check line we can severely discount these reports.

6. The values shown in the original boring were marginal considering the depths and narrow widths involved.

As the R.T.A.E. check values are less than 25% of the original on average over the one bore line and in no way approach economic limits, it is considered that the Scotia-Lochaber Lead system has no attraction for futher exploration.

GENERAL CONCLUSIONS

1. Boring Plants

(1) The diesel cable tool rig of the type supplied by the Mines Department performed reasonably well on this recent R.T.A.E. programme. It has maximum efficiency to about 60 feet bore depth when an operating crew of three are sufficient. At greater depth boring cost per foot is greater due to more manpower necessary to turn tubes. A better performance in driving could probably be achieved with a different type of sinker bar than that supplied for the R.T.A.E. programme.

(2) A hand plant used reaches maximum efficiency in shallow ground in areas inaccessible to heavier plants (e.g. boggy country), as it is readily transportable and quickly and easily erected. In practice it could bore two 30 feet holes in a day at maximum efficiency. It is also a useful adjunct for fully employing casual hands from time to time when not required for work on a cable tool plant.

2. Tin Prospects

The scout and check boring was carried out largely in coastal areas of our permits and nothing was done in the wide areas south of Mt. Cameron and in the Mussel Roe area. The boring programme was limited and while no results of positive economic value to the company were obtained the following points may be noted:-

(1) Basic data as to depth of ground was obtained from which bedrock studies can be made and data applied to southern areas of our permits.

(2) An appreciation of the worth of seismic work in testing for deeper channels and gutters was gained.

(3) The Great Northern Plain area can be largely eliminated from further testing as it offers little hope of deposits of moderate and large size with economic grades. Scouting of this area was based on bore records showing reasonable values in the Scotia area and superficial occurrences of tin bearing wash. The former has been found to be suspect and the latter are small and patchy and of little interest for the scale of operations required by the Rio Tinto Group. Cassiterite does occur in the area as shallow deposits of reasonable grade but of very small yardage and larger and deeper deposits of uneconomic grade (e.g. Fosters Marshes, Scotia Lead, McGregor Area).

3rd October, 1958.

J.H. Rattigan,
Geologist.

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TABLE I

COMPARISON OF DATA FROM CHECK BORING SCOTIA LEAD

R.T.A.E. Check Bore No.	Depth to Bottom	Thickness of Tin bearing section	Values in Tin bearing section	Weighted Value for bore hole	Govt. Scotia Bore Numbers	Recorded Depth to Bottom	Recorded Thickness of Wash (Bore Logs)	Recorded Values
10	98'0"	6'0"	20.5 oz/yd.	1.25 oz/yd.	44Z	99'	7'0"	7.6 oz/yd.
11	100'3"	8'6" (Wash 0'9")	4.89oz/yd. (approx.49.0 oz/yd.)	0.41 oz/yd.	93	95.4'	3'4"	5.91 oz/yd.
12	100'9"	3'3"	40.5 oz/yd.	1.30 oz/yd.	46Z 55Z	98.0' 98.5'	Nil 0'6"	Tr. 0.22oz/yd.
13	100'0"	6'0"	16.2 oz/yd.	0.97 oz/yd.	48Z	101.5'	5'6"	3.7 oz/yd.
14	104'0"	5'6"	114.8 oz/yd.	5.6 oz/yd.	47Z	103'	7'0"	8.37 oz.
15	95'6"	3'6"	11.3 oz/yd.	0.42 oz/yd.	28	97.8'	4'10"	10.0 oz/yd.
16	92'6"	Nil	Tr.	Nil	27	95'	Nil	0.58 oz/yd.
17	104'0"	9'6" (Wash 2'6")	11 (27.8 oz/yd.)	0.96 oz/yd.	43Z	102'	8'0"	3.2 oz/yd.
18	98'0"	3'6"	42.1oz/yd.	1.50 oz/yd.	45Z	95'	?	Trace

Note: (1) R.T.A.E. values are calculated from all tin recovered from the hole from hand panning plus that recovered from tails passed over corduroy cloth.

(2) Depth of bottom given in R.T.A.E. bores and also depth of wash may include up to 1 foot of bottom material included in samples and carrying a trace of tin. Some ground with traces of tin in the section above richest wash has not been included in the R.T.A.E. figures for depth of tin bearing section but allcassiterite has been included in calculations for weighted values of holes.

APPENDIX I

Brief logs of Scout Bores put down with 5" Cable tool plant.

GOVT. BORE NO. 1

Location Peg 3105, Seismic line C, Boobyalla River R.L. 29

VALUES NIL

0' - 2'	2'	Surface soil
2' - 9'	7'	Medium grained light grey sands.
9' - 15'	6'	Fine light grey sandy clay
15' - 32'	17'	Pebble beds. Rounded quartz and quartzite pebbles in a light grey silty sand matrix.
32' - 75'	43'	Pebbly and sandy clays and fine puggy sands. Colour characteristically blue-green. Secondary marcasite.
75' - 80'	5'0"	Weathered biotite granite.
80' - 81'6"	1'6"	Solid granite bedrock.

GOVT. BORE NO. 2

Location Peg 1325, Seismic line C, Boobyalla River R.L. 52

VALUES NIL

0' - 25'	25'	Sands and puggy sand
25' - 50'	25'	Pebble beds. Quartz and quartzite pebbles in a light grey sandy or clayey sand matrix.
50' - 55'	5'	Pebbly and sandy clays. Pebbles in a tight unsorted clayey matrix. Colour characteristically blue green.
55' - 60'	5'	Blue green muds and sandy clays
60' - 85'	25'	Grey green laminated muds and sandy clays.
85'		Grey green micaceous weathered granite.

GOVT. BORE NO. 3

Location Peg 5315, Seismic line A, Boobyalla River R.L. 26

VALUES NIL

0' - 13'	13'	Puggy sand
13' - 20'	7'	Pebble conglomerate. Pebbles in a light grey unsorted sandy matrix.
20' - 80'	60'	Pebbly and sandy clays and fine puggy sands. Colour characteristically blue-green.
80' - 85'	5'	Weathered biotite granite.

GOVT. BORE NO. 4

Location Peg 5315, Seismic line A, Boobyalla River R.L. 117

VALUES NIL

0' - 5'	5'	Surface soil and brown ferruginised sands.
5' - 10'	5'	Light grey puggy sand.
10' - 21'	11'	Coarse unsorted grit.
21' - 42'	21'	Pebble conglomerate. Rounded quartz pebbles in a gritty matrix, cemented with silica and iron oxides at intervals.
42' - 82'	40'	Pebbly and sandy clays, brown or blue green matrix.
82' - 87'	5'	Weathered granite. Bottom.

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GOVT. BORE NO. 5

Location: Stinking Creek, Great Northern Plain R.L. 38

VALUES NIL

0' - 5'	5'	Light grey silty and puggy sand.
5' - 40'	35'	Fine, light brown and grey sands, silty sands and sandy siltstones. Carbonaceous material and plant fragments characteristic.
40' - 80'	40'	Light brown, unsorted grits and silty sands. Carbonaceous material and secondary marcasite characertistic.
80' - 90'	10'	Fine grey sands
90' - 95'	5'	Fine brown silty carbonaceous sands
95' - 108'	13'	Grey, quartz veined, slates and sandstones. Bedrock.

GOVT. BORE NO. 6

Location: Stinking Creek R.L. 35

VALUES TRACE

0' - 10'	10'	Light grey medium grained sand
10' - 20'	10'	Grey medium grained sandstone.
20' - 27'	7'	Fine white micaceous siltstone, fairly compact (possibly of Permian age as it resembles nearby exposed Permian strata)

GOVT. BORE NO. 7

Location: Stinking Creek Area, Great Northern Plain R.L. 48.5

VALUES: Trace gold and tin

0' - 3'6"	3'6"	Surface soil and brown ferruginous cemented sands.
3'6"- 15'	11'6"	Light grey sands and silty sands.
15' - 16'6"	1'6"	Pebble wash. Small pebbles in a silty sand matrix.
16'6"-20'	3'6"	Light grey medium grained sand.
20' - 37'	17'	Light brown fine sands and silty sands. Carbonaceous and lignitic material characteristic.
37' - 45'	8'	Grey quartz veined slates and sandstones. Bedrock.

GOVT. BORE NO. 8

Location: Mayfield Flat R.L. 11

VALUES NIL

0' - 1'6"	1'6"	Surface, clay soil
1'6"- 10'	8'6"	Fine grey silty and puggy sands with narrow wash bands.
10' - 28'	18'	Fine grey sandy clays and puggy sands with plant fossils.
28' - 32'	4'	Fossilised tree trunk
32' - 37'	5'	Fine puggy grey-green sands, carbonaceous grits and narrow pebble bands.
37' - 52'	15'	Fine grey green puggy sands and sandy clays.
52' - 60'	8'	Black clay.
60' - 77'	17'	Fine grey green puggy sands.

77' - 81'	4'	Fine grey sandstones and shales, well bedded or laminated.
81' - 90'	9'	Dark grey slates. Bedrock.

GOVT. BORE NO. 9

Location: McGregor Mine Area R.L. 67

VALUES NIL

0' - 10'	10'	Silty and clayey sands with some wash bands containing quartz and quartzite pebbles.
10' - 25'	15'	Sands and silty sands.
25' - 48'	23'	Fine grey even grained sands
48' - 50'	2'	Pebble band.
50' - 70'	20'	Fine light grey even grained sands ("seasand").

APPENDIX II

Brief Logs of Scout Bores put down by 4" Hand Plant.

396020

HAND BORE NO. 1

Locality: East of Dobson's Dugarde Creek Mine R.L. 65

VALUES 0.22 lb/cu.yd. to 16'6" depth (Values unreliable because of small bore diameter in coarse pebble beds.)

Bore Depths	Thickness	Description
0' - 4'	4'	Light grey sandy pug
4' - 15'	11'	Pebble conglomerate. Pebbles of quartz and quartzite, well rounded, in a silty sand matrix. Stanniferous.
15' - 22'6"	7'6"	Light grey medium grained sands and micaceous sands.
22'6"-24'6"	2'0"	Weathered silty sandstone.

HAND BORE NO. 2

Locality: Dugarde Creek area, Boobyalla Plains R.L. 68'

VALUES NIL

Bore Depths	Thickness	Description
0' - 1'6"	1'6"	Light grey sandy surface soil
1'6"- 13'0"	11'6"	Pebble conglomerate
13' - 16'	3'	Light grey clayey sand.
16'		Dense grey sandstone bottom.

HAND BORE NO. 3

Locality: Dugarde Creek Track R.L. 73'

VALUES NIL

0' - 10'	10'	Light grey medium even grain sands (aeolian)
10' - 15'	5'	Coarse grit, with pebbles
15' - 18'	3'	Grey puggy sand
18' - 24'	6'	Dark grey slates, quartz veined (bottom)

HAND BORE NO. 4

Location: 600' west of Delta Mine face R.L. 70

VALUES NIL

0' - 4'	4'	Grey surface soil and ferruginised sand
4' - 16'6"	12'6"	Coarse unsorted sands and grits with odd small quartz pebbles
16'6"		Hard boulder (not penetrated)

HAND BORE NO. 5

Location: 1100' west of Delta Face R.L. 65

VALUES NIL

0' - 5'	5'	Surface soil and brown ferruginised cemented sand.
5' - 46'	41'	Alternating light grey fine, medium and unsorted sands. Some odd small quartz pebbles at intervals. Finer grained sands resemble seasand.

396021

HAND BORE NO. 6

Location: Mayfield Paddock R.L. 27

VALUES NIL

0' - 4'	4'	Black and dark grey clays
4' - 6'	2'	Fine grey puggy sand with pebbles.
6' - 22'	16'	Fine grey clayey and silty sands.
22' - 25'	3'	Heavy black clay with plant remains.
25' - 28'6"	3'6"	Dark grey fine sandy clays.
28'6"- 33'	4'6"	Coarse and fine sands with a narrow conglomerate pebble band.
33' - 37'	4'	Dark brown and grey pug, plant remains and secondary marcasite.
37' - 46'	9'	Dark grey and grey green fine puggy sands with plant remains and marcasite banding.

HAND BORE NO. 7

Location: Mayfield Flats R.L. 29

VALUES NIL

0' - 10'	10'	Light grey sands
10' - 15'	5'	Light grey silty sands
15' - 20'	5'	Light grey clayey sand
20' - 25'	5'	Dark brown fine sandy pug.
25' - 30'	5'	Dark grey clays and sandy pug.
30' - 36'	6'	Heavy black clays

HAND BORE NO. 8

Location: Humphrey's Terrace, Mayfield R.L. 31

VALUES TRACE (0.13 lbs/c.yd to 25 feet)

0' - 5'	5'	Light grey pebbly sand
5' - 15'	10'	Pebble conglomerate. Rounded to sub-angular quartz and quartzite pebbles in a puggy sand matrix.
15' - 26'	11'	Pebble conglomerate. Pebbles in a sandy matrix.
26' - 37'	11'	Dark grey muds and fine sandy clays.

HAND BORE NO. 9

Location: Great Northern Plain R.L. 25

VALUES Trace tin and gold

0' - 1'6"	1'6"	Black surface clay soil
1'6"- 20'	18'6"	Light grey medium grained sands.
20' - 26'	6'	Dark earthy carbonaceous sands and fine grey-green puggy sands.
26' - 27'6"	1'6"	Small pebble wash, auriferous
27'6"-31'	3'6"	Dark green and brown weathered dolerite

HAND BORE NO. 10

Location: Shallamar Flats District R.L. 93

VALUES NIL

0' - 1'6"	1'6"	Surface soil
1'6" - 12'6"	11'	Fine and medium sands and clayey sands.
12'6"- 21'	8'6"	Weathered grey-green biotite granite.

396022

HAND BORE NO. 11

Location: Shallamar Flats District R.L. 99.6

VALUES NIL

0' - 1'6"	1'6"	Dark grey sandy surface soil
1'6"- 5'6"	4'	Sandy clays
5'6"- 12'6"	7'	Weathered granite

HAND BORE NO. 12

Location: Shallamar Flats District R.L. 124

VALUES NIL

0' - 2'6"	2'6"	Grey surface soil and brown ferruginised sands.
2'6"- 10'	7'6"	Light grey micaceous and clayey sands.
10' - 16'	6'	Fine grained light grey sandy clays.
16' - 21'	5'	Weathered granite.

HAND BORE NO. 13

Location: Shallamar Flats District R.L. 139

VALUES NIL

0' - 2'6"	2'6"	Grey sandy surface soil and brown ferruginised sand.
2'6"- 5'	2'6"	White clayey sand.
5' - 10'	5'	Sandy clay.
10' - 40'	30'	Light grey clayey sands.
40' - 47'	7'	Light brown fine sand

HAND BORE NO. 14

Location: Shallamar Flats District R.L. 111

VALUES NIL

0' - 10'	10'	Unsorted medium to coarse sands
10' - 25'	15'	Light grey sandy clays and clayey sands.
25' - 41'	16'	Micaceous and clayey sands.

396023

APPENDIX III

Brief Logs of Check Bores, Scotia Lead

Put down with 5" Cable Tool Plant.

GOVT. BORE NO. 10

Location: Checking Govt. Scotia Bore 44Z R.L. 147

VALUES 0.08 lb/yard (cassiterite)

0' - 10'	10'	Fine sandy clays
10' - 40'	30'	Light grey clayey sands and sandy clays.
40' - 45'	5'	Light grey unsorted clayey sands
45' - 75'	30'	Light brown unsorted silty sands. Carbonaceous material characteristic.
75' - 87'6"	12'6"	Light brown unsorted silty grits. Carbonaceous material characteristic.
87'6"-92'	4'6"	Coarse unsorted grits.
92' - 98'	6'	Coarse pebbly grits and pebble bands. Stanniferous
98' - 101'	3'	Grey quartz veined slates and sandstones

GOVT. BORE NO. 11

Location: Checking Govt. Bore 93 R.L. 148

VALUES: TRACE (0.026 lb/yd.)

0' - 10'	10'	Light grey sandy pug
10' - 40'	30'	Light grey unsorted clayey sands
40' - 76'	36'	Light brown sands and silty sands. Carbonaceous
76' - 99'6"	23'6 "	Light brown coarse grits, pebbly grits and sands. Carbonaceous
99'6"-100'3"	0'9"	Pebble conglomerate, stanniferous.
100'3"-101'0"	0'9"	Grey quartz veined slates and sandstones.

GOVT. BORE NO. 12

Location: Checking Govt. Bore 55Z & 46Z R.L. 144

VALUES

0' - 10'	10'	Light grey fine sandy clays
10' - 45'	35'	Light grey unsorted clayey sands and sandy clays
45' - 79'	34'	Light brown unsorted silty sands, carbonaceous and lignitic with secondary marcasite.
79' - 97'6"	18'6"	Coarse unsorted grits.
97'6"-100'9"		Pebble conglomerate; subangular quartz pebbles in a gritty matrix.
100'9"-106'		Grey slates and sandstones, quartz veined.

GOVT. BORE NO. 13

Location: Checking Govt. Scotia Bore 48Z R.L. 142

VALUES 0.06 lb/yd.

0' - 10'	10'	Light grey fine sandy clays
10' - 40'	30'	Light grey clayey sands.
40' - 80'	40'	Light brown unsorted silty sands; carbonaceous and lignitic.
80' - 82'	2'	Black carbonaceous clay
82' - 87'	5'	Coarse unsorted grits
87' - 94'	7'	Coarse unsorted pebbly grits.
94' - 100'	6'	Pebbly grits, stanniferous
100'- 102'	2'	Grey sandstones, quartz veined.

396025

GOVT. BORE NO. 14

Location: Checking Govt. Scotia Bore 47Z R.L. 144

VALUES 0.35 lb/yd.

0' - 40'	40'	Light grey unsorted sandy clays and clayey sands
40' - 81'	41'	Light brown unsorted silty sands, carbonaceous and lignitic.
81' - 89'	8'	Coarse pyritic grits.
89' - 93'6"	4'6"	Light brown carbonaceous silty sands.
93'6"-99'	5'6"	Coarse unsorted grits.
99' - 104'	5'	Pebble conglomerate. Subangular to sub-rounded quartz pebbles in a gritty matrix. Stanniferous.
104'-105'	1'	Grey sandstone and slates, quartz veined.

GOVT. BORE NO. 15

Location: Checking Govt. Scotia Bore R.L. 145

VALUES 0.026 lb/yd.

0' - 10'	10'	Light grey clayey sands.
10' - 40'	30'	Light grey unsorted clayey sands.
40' - 83'	43'	Light brown silty sands and grits, carbonaceous.
83' - 92'	9'	Pyritic grits.
92' - 95'6"	3'6"	Pebble wash
95'6"-100'	4'6"	Quartz veined slates and quartzites.

GOVT. BORE NO. 16

Location: Checking Govt. Scotia Bore R.L. 151

VALUES NIL

0' - 10'	10'	Light grey clays
10' - 40'	30'	Light grey clayey sands and sandy clays
40' - 80'	40'	Light brown unsorted silty sands. Carbonaceous.
80' - 92'6"	12'6"	Light brown coarse sands and grits
92'6"-95'	2'6"	Quartz veined slates and sandstones.

GOVT. BORE NO. 17

Location: Checking Govt. Bore 43Z R.L. 147

VALUES 0.06 lb/yd.

0' - 10'	10'	Light grey fine sandy clays
10' - 45'	35'	Light grey clayey sands and sandy clays
45' - 94'6"	49'6"	Light brown sands and silty sands, carbonaceous and pyritic.
94'6"-97'	2'6"	Pebble conglomerate, stanniferous
97' - 103'	6'	Chiefly slates and sandstones, but traces of sands and grits with cassiterite.
103'-123'	20'	Slates and quartzites, quartz veined.

396026

GOVT. BORE NO. 18

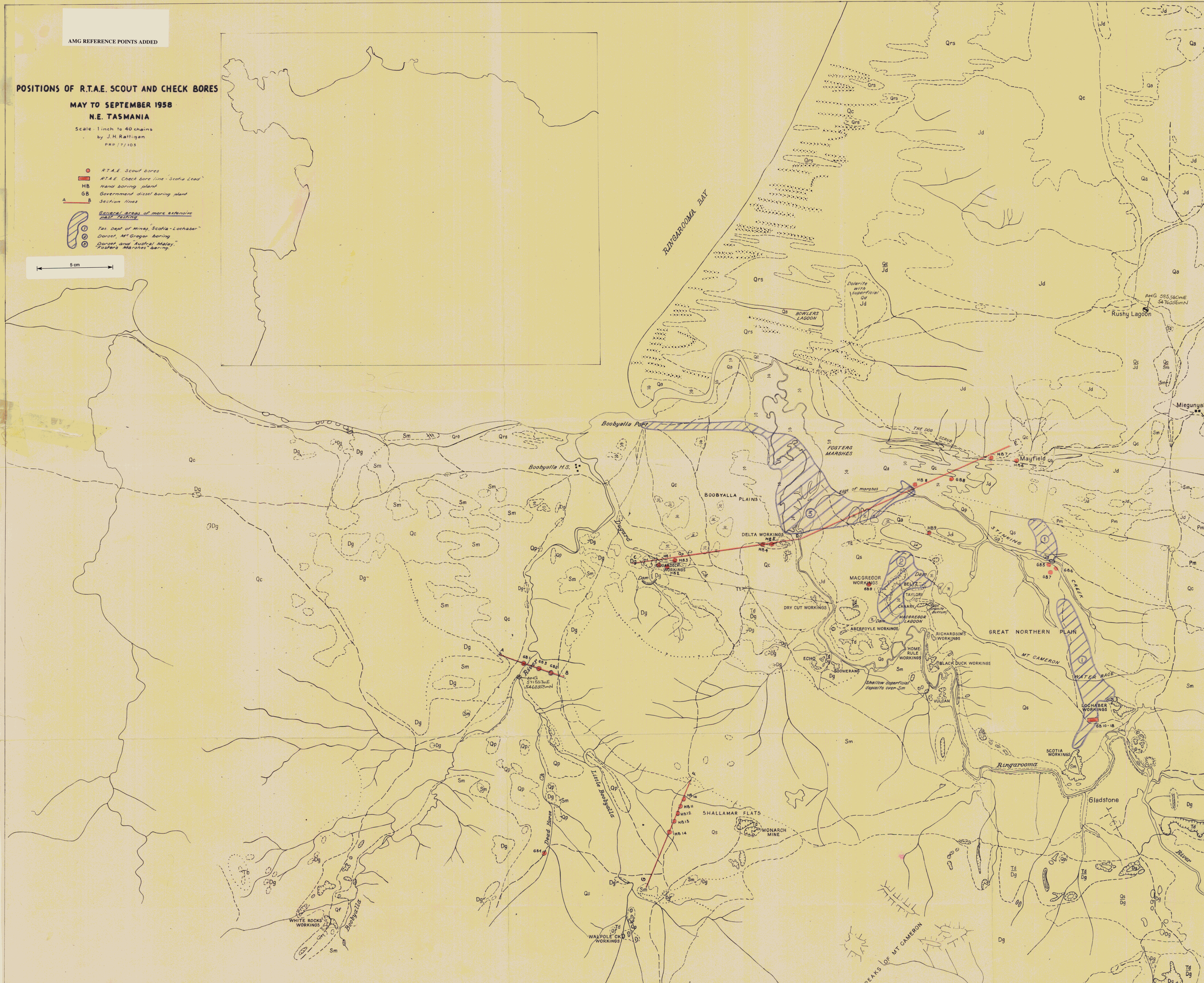
Location: Checking Govt. Scotia Bore 45Z R.L. 148

VALUES 0.094 lb/yd.

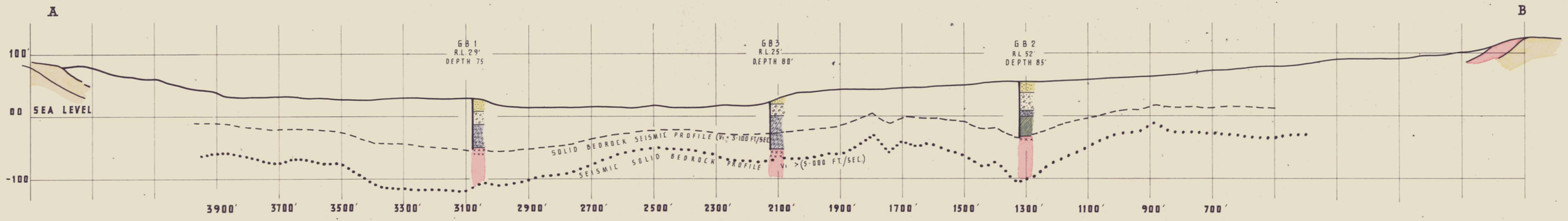
0' - 45'	45'	Light grey clayey sands and sandy clays.
45' - 94'9"	51'6"	Light brown silty sands and grits, carbonaceous and pyritic.
94'9"-96'6"	1'9"	Grits, stanniferous.
96'6"-98'3"	1'9"	Pebble conglomerate, stanniferous
98'3"-100'	1'9"	Quartz-veined slates and sandstones.

396027

SCALE : 1 inch to 40 chains

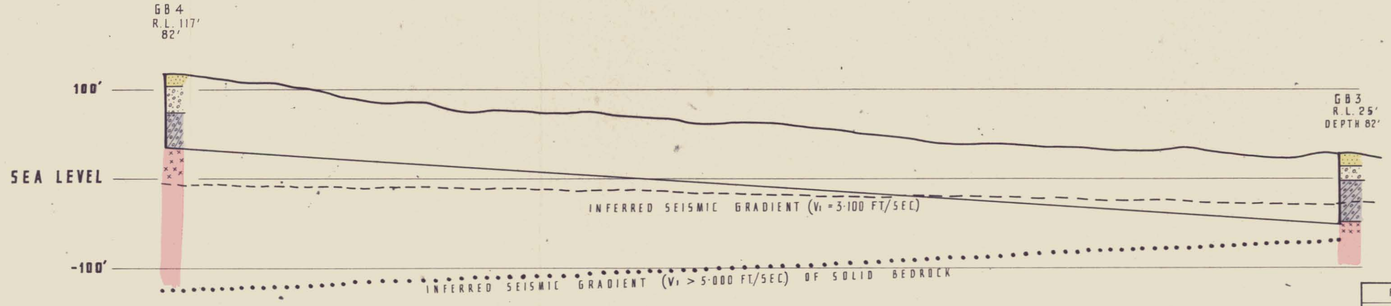


Plan No T 443



SECTION ALONG SEISMIC TRAVERSE C ILLUSTRATING
BORE SECTIONS AS COMPARED WITH SEISMIC PROFILES

Horizontal Scale : 1 inch = 200 feet ~ Vertical Scale : 1 inch = 100 feet



NORTH TRENDING SECTION BETWEEN GOVT BORES N°3 AND N°4 ILLUSTRATING
ACTUAL DIFFERENCE IN ELEVATION OF BOTTOM AS COMPARED WITH SEISMIC PROFILES

Horizontal Scale : 1 inch = 1000 feet ~ Vertical Scale : 1 inch = 100 feet

TERTIARY - QUATERNARY		Light grey sands.
		Pebble beds with light grey sandy matrix.
		Pebble beds with blue-green clay and silty sand matrix.
?		Shales and laminated sandy siltstones blue-grey to grey-green. (?Tertiary).
DEVONIAN		Granite bed rock.
EARLY PALAEOZOIC ?		Intruded quartz veined slates and sandstones.

RL's RELATE TO SEA LEVEL

396028

5 cm

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

SECTIONS – BOOBYALLA DISTRICT N.E. TASMANIA
ILLUSTRATING RELATIONSHIPS OF
BEDROCK, AS REVEALED BY BORING, TO
SEISMIC PROFILES OF THE B.M.R SURVEY.

DATE : 15th September 1958	AUTHORITY : PRP/7/103	
GEOLOGIST : J.H. Ratligan	DRAFTSMAN : D.J. Lawford	PLAN Nº T 455

58-245

B

Tr. (120B) 89

Swampy flats of Stinking Creek

Av. 4·1 oz. over 600' width of bore line

1·7 102·6 | (125B) 4·1 113·0 | 9·0 113·6 | 5·2 112·0 | 9·0 110·0 | 0·8 106 | 3·13 109·5 | 107 | 1·8 107 | Tr 105·5

Tr. 93·0 | Tr. 105·5

R.T.A.E. GB No 5 95

>32 oz. 5'

>8oz.

R.T.A.E GB6 Tr. 15(?)

R.T.A.E GB7 >8oz 20' 37

A

30 40 50

Stinking Ck.

M N

Legend

- 9·0 / ○ / 113·6 — Recorded average value in oz./yard; Govt. Bores; Depth
- >8 ozs. / 4–8 ozs. / 2–4 ozs. / 0–2 ozs / Trace or no values — Reputed values in government records.
- Gloryholes and workings
- Pits
- × Hand auger holes
- Recent R.T.A.E. bores
- Boundary of swamps
- 30 Form lines
- Values >8ozs from surface to depths ranging to 20 feet

R.T. A. E.

PLAN AND CROSS-SECTION
SCOUT BORES

STINKING CREEK AREA

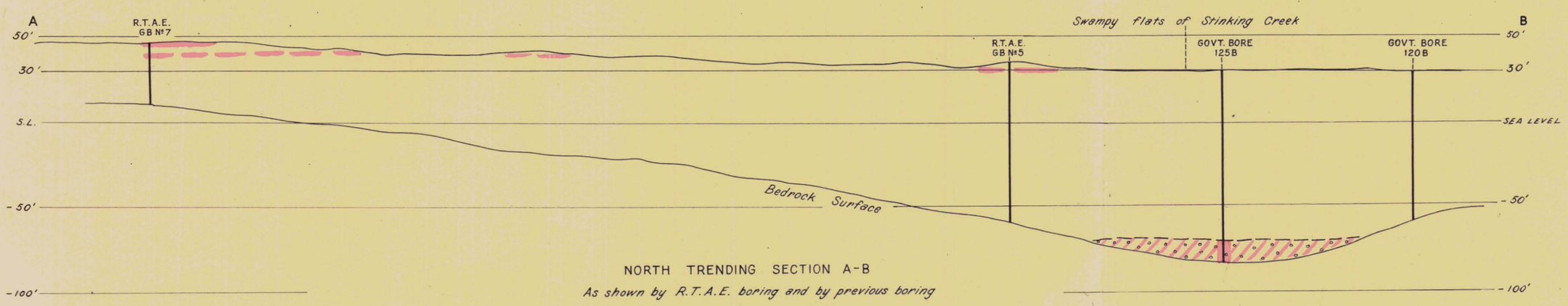
GREAT NORTHERN PLAIN

N.E. TASMANIA

Horiz. scale 1 inch to 100 feet

Based on limited plane table survey by J.H. Rattigan 15.9.1958.

P.R.P./7/103



NORTH TRENDING SECTION A-B

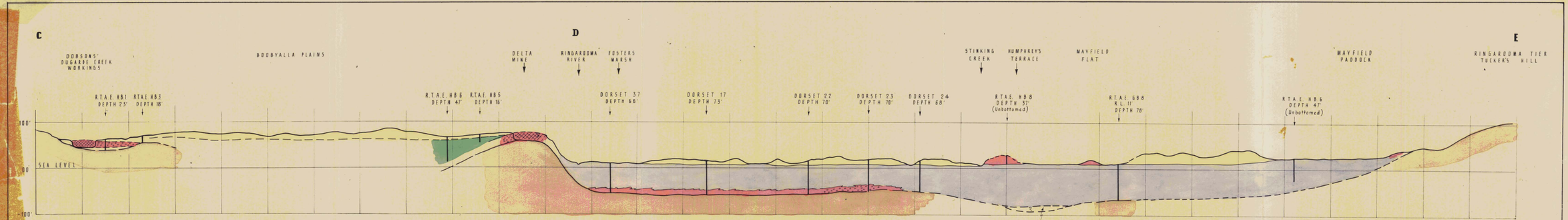
As shown by R.T.A.E. boring and by previous boring

Vertical Scale: 1 in. to 50 ft. Horizontal Scale 1 in. to 100 ft.

5 cm

396029

Plan No T 416



Horizontal Scale: 1 inch = 1000 feet ~ Vertical Scale: 1 inch = 100 feet.

396030

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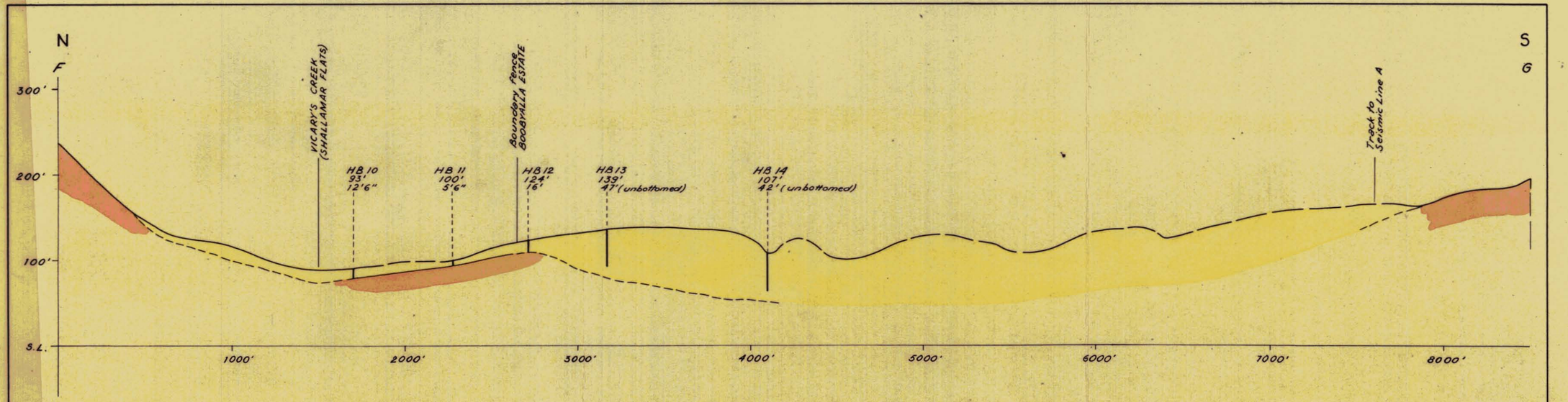
CROSS SECTION E-D-E

ACROSS BOOBYALLA PLAINS AND FOSTERS MARSH - MAYFIELD AREA

NORTH EAST TASMANIA

DATE: 15TH SEPTEMBER 1958		AUTHORITY: PRP/7/183	
GEOLOGIST: J.H. Rattigan	DRAFTSMAN: D.J. Lawford	PLAN N° T456	

58-245

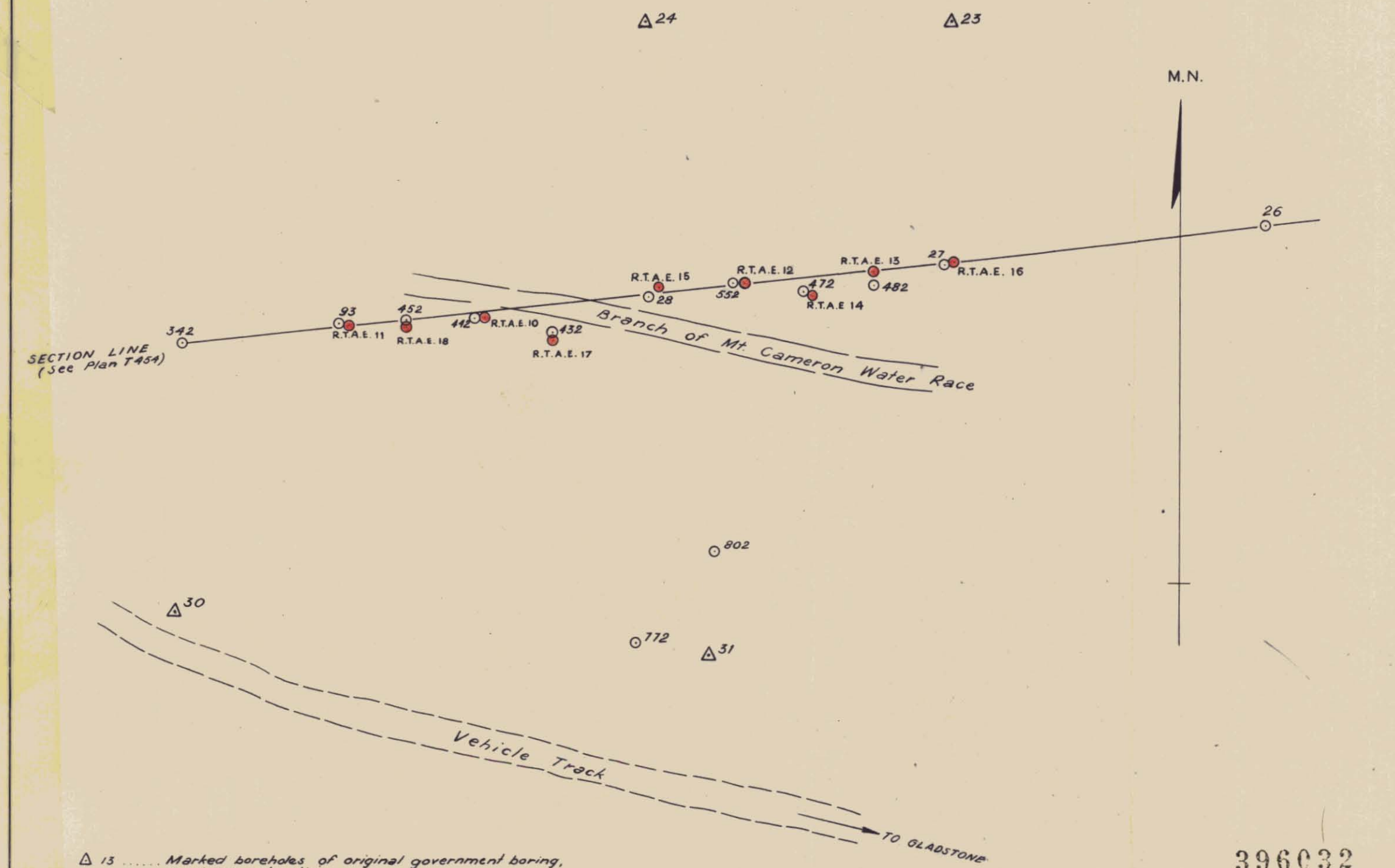


RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED.

NORTH-SOUTH CROSS-SECTION SHALLAMAR FLATS AREA RINGAROOMA DISTRICT, N.E.TASMANIA SHOWING R.T.A.E. SCOUT BORES.

396031

Geologist: J.H.Rattigan, 8-9-58.	SCALE: Horiz. 1"-500' Vert.1"-100'	PRP/7/103	Plan Nº T 457



Δ 13 ..... Marked boreholes of original government boring, used for relocation.

⊙ 223 ..... Original government bore holes, relocated by unmarked posts or other evidence

R.T.A.E. 10 R.T.A.E. check bores.

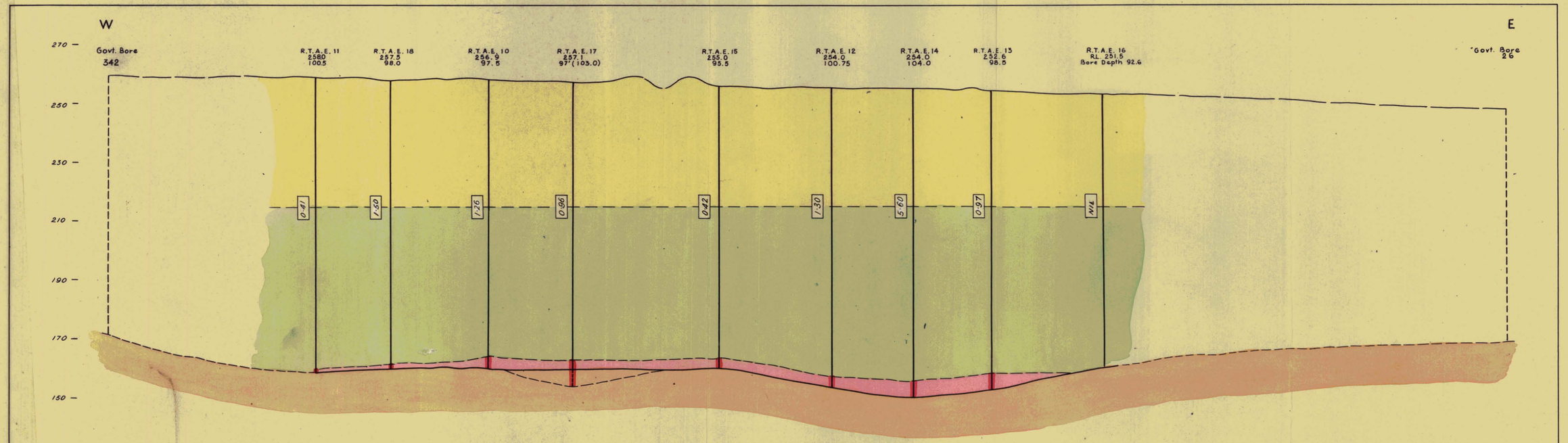
5 cm

396032

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED.

POSITIONS OF CHECK BORES
SCOTIA LEAD, GLADSTONE DISTRICT
N.E. TASMANIA

Geologist J.H. Rattigan, 18-8-58.	Scale: 1 inch to 50 Feet	PRP/7/103	Plan No T452



RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

CROSS - SECTION - CHECK BORE LINE
SCOTIA LEAD
GLADSTONE DISTRICT, N.E. TASMANIA

Geologist: J.H. Rattigan, 8-9-58	SCALE: 1 inch to 20 feet	PRP/7/103	Plan Nº T454

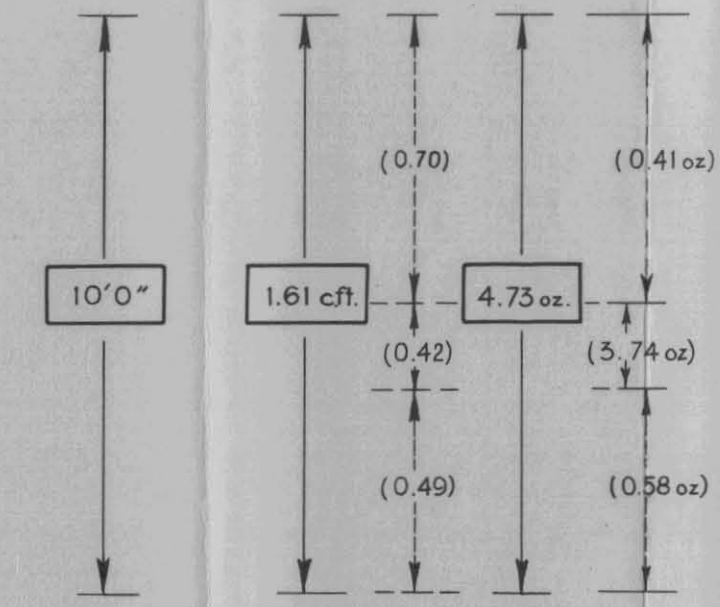
	Actual values of cassiterite over each bore depth interval	Theoretical volumes (3" tubes)	Theoretical cassiterite content 3" tubes
5'0"	1 lb/yard	0.70 c.ft.	0.41 oz.
1'6"	15 lb/yard	0.21 c.ft.	1.87 oz.
3'6"	2 lb/yard	0.49 c.ft.	0.58 oz.
	TOTALS	1.40 c.ft.	2.86 oz.

TRUE VALUE IN 10 FEET SECTION

would be $\frac{2.86}{1.40} \times \frac{27}{16} = 3.4$ lbs/c.yard

The results show how a 15 % excess core over a wide sample interval can result in a 50 % overvaluation even when apparently corrected for.

5 cm



RECORDED VALUES IN A BULK SAMPLE OVER 10 FEET

would be $\frac{4.73}{16} \times \frac{27}{1.61} = 5.0$ lbs/yard

396034

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED.

THEORETICAL ILLUSTRATION OF THE IMPORTANCE OF SHORT SAMPLE INTERVALS AND VOLUME CONTROL IN TIN BEARING ALLUVIAL GROUND.

Date : 15-9-1958	Geologist : J.H. Rattigan	PRP/7/103	Plan No T453