

TR5-104-113

AREAS SELECTED FOR GEOPHYSICAL WORK—NORTH-EASTERN TIN FIELDS

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OBJECT

An investigation of the North-Eastern Tin Fields of Tasmania was made to find areas suitable for geophysical prospecting for tin. In 1953 Keid (1) recommended several potential tin bearing areas for boring. Further examination has shown that in some of these areas it would be advantageous to carry out geophysical work before boring operations.

The geophysical survey should attain several objects:—

Show any irregularities in the old land surface on the bedrock.

PROPOSED GEOPHYSICAL SURVEYS NORTH EASTERN TASMANIA

0 4 8 MILES

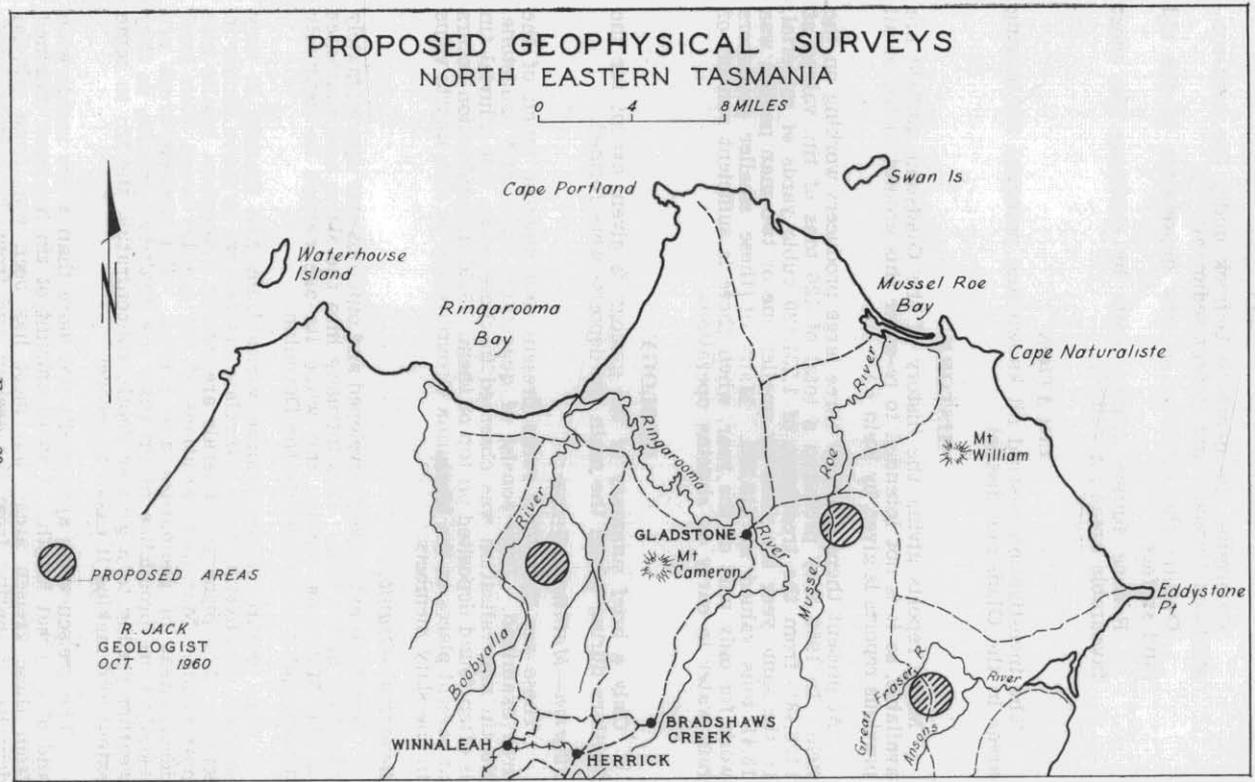


FIGURE 28.

Determine the depth to bedrock under the semi-consolidated Tertiary and Recent sediments.

Outline the direction of any depressions in the old land surface.

Reduce future drilling costs by outlining the most favourable areas for drilling.

LOCATION

The investigation covered all known and potential tin bearing areas in the Gladstone district.

HISTORY

Many reports giving the history of the Gladstone tinfield are available, so it is not intended to re-cover this ground; a list of all previous reports is given by Keid (²).

At present there are only three large producers working on the field. In 1959 they produced a total of 120 tons of tin, valued at £126,481, from the treatment of 1,731,520 cubic yards of material. In the same year the yield by smaller one or two man parties was 18.41 tons valued at £19,391. Many of these smaller producers work for only part of the year, when there is sufficient run off of rain water to carry on sluicing operations.

GEOLOGY

Only a brief summary of the geology is given, except for the Tertiary during which the main tin deposits were formed.

Silurian—Mathinna Group

These are the oldest rocks present and underlie much of the area examined. They consist of quartzites, slates and sandstone. No tin mineralisation was observed in these rocks, but alluvial tin is often found deposited on top of them. Gold mineralisation occurs at several places in the Mathinna Group usually in thin quartz veins in the slaty members.

Devonian—Granite

Granite is extensively developed and outcrops over approximately one third of the area. It is intrusive into the slates and quartzites of the Mathinna Group, and while its age cannot be definitely determined it is assigned to the Devonian.

The texture of the granite varies from fine grained to very coarsely porphyritic, with orthoclase crystals up to three inches in length. The principal minerals are quartz, orthoclase, biotite and hornblende. Marginal variations of the granite occur, with local development of pegmatites and greisen. The greisen areas are usually more productive of tin than the unaltered granite, as they weather readily to a greater depth, concentrating the tin to some extent and making it easier to recover.

The greisen veins are usually not more than a few inches wide and of no great length. A small amount of tin has been obtained from these greisen areas, but most has been won from alluvial deposits originating from the greisen and from the granite itself.

Permian—Sandstone

The sandstone occurs as isolated outcrops in the north-eastern part of the area. It is flat lying and of small extent.

Jurassic—Dolerite

The dolerite covers a large proportion of the northern and north-eastern part of the area, apparently as sill-like intrusions into the Mathinna Group.

Tertiary—Lower: Sandstone, Conglomerate, Grit and Clay. Upper: Basalt and minor sedimentation.

During the Lower Tertiary this north-east part of Tasmania was slowly subsiding, and the alluvial material concurrently deposited from the streams gradually filled up the old valleys. With further subsidence the lower reaches of the rivers formed broad lakes and estuaries, the sediments there being deposited under stagnant conditions. With the land still subsiding the sea encroached over the lower reaches of the rivers and marine sediments were deposited, mainly coarse conglomerate, shingle, grits and fine sand. Thus in the lower reaches of the rivers a succession was built up of stream gravels overlain by lacustrine, estuarine and marine sediments. In this manner a considerable thickness of material accumulated, the deepest sediments occurring in the old stream channels.

At or near the end of this period of subsidence basalt was extruded. This spread along the valleys, filling them and covering the sediments. About this time the land began rising again. The streams were rejuvenated, some following their old course and others cutting new courses, sometimes very different to their old ones.

With the uplifting of the land, erosion has stripped off much of the surface, in some cases revealing the old Tertiary tin bearing gravels. More recently some of these have been eroded and re-deposited along the banks of the lower reaches of the present streams.

FUTURE OF THE INDUSTRY

Although production over the past few years has been maintained at a steady figure, this will decline as the existing reserves are worked out. A little prospecting is being done on the area by the principal tin producers, but this is mainly trying to find continuations of old leads or new leads adjacent to the known ones. Any new deposits found in this way will help maintain production at its present level, but they are not expected to prove large enough to enable the industry to expand or entice new companies to the area. The prospecting of new areas away from the known tin bearing areas is needed. If this is successful and new deposits are found it should provide a stimulus to the industry and encourage the prospecting of other untested areas.

THE GEOPHYSICAL SURVEY

The geophysical work undertaken would be mainly seismic. This should give a profile of the bedrock and, with reasonable accuracy, the depth to bedrock under the loosely consolidated sediments. By suitably spacing the traverses it should be possible to follow any old stream depressions found on the bedrock.

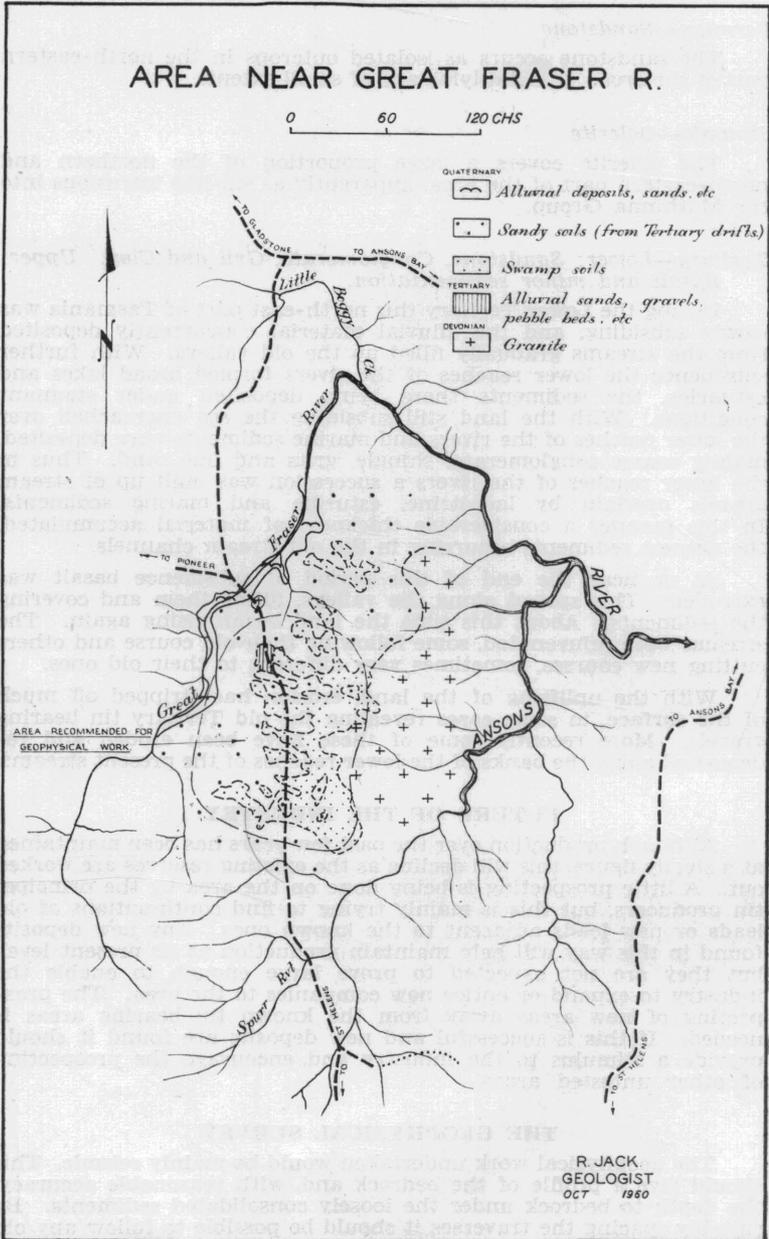
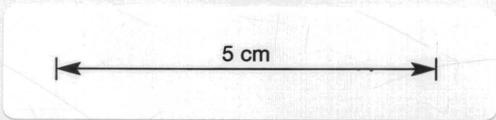


FIGURE 24.



The tin bearing gravels are usually found in or near the old stream beds, and this work should be undertaken in the places where these old streams probably existed. The seismic method could not be expected to work as well on the marine terrace type of deposit. Where due to the sorting action of the waves the tin was concentrated and left at any elevation on the underlying rock. However, any old stream beds still existing beneath the marine sediments should show on the bedrock profile.

AREAS SELECTED FOR GEOPHYSICAL WORK AND POSSIBLE FUTURE BORING

Keid ⁽¹⁾ selected five areas and recommended them for boring. These were examined to determine their suitability for geophysical methods of prospecting as a preliminary to boring. Of the areas investigated the three listed below, in order of preference are suitable for testing by the methods it is proposed to use:—

- (1) The Area North of Winnaleah.
- (2) The Great Fraser River Area.
- (3) The Great Mussel Roe River Area.

The other two areas recommended by Keid are dealt with briefly but are not considered suitable for the type of work proposed. They are:—

- (4) The Area Near Boobyalla.
- (5) The Area North of Mt. Cameron.

THE AREA NORTH OF WINNALEAH

This covers the probable course of the main Ringarooma lead. It is approximately six miles long and is bounded on the west by the Boobyalla River and on the east by the Little Boobyalla River. Several mine workings occur on the margin of the area but none are on the probable course of the main Ringarooma lead. Boring has been carried out on the margin of the area near the Boobyalla River in the vicinity of the Banca workings and deep ground was found to contain some low grade tin values.

In the southern part of this district the presumed course of the main lead is covered by a deep accumulation of Tertiary sediments sometimes capped by basalt flows. Near Winnaleah the minimum depth of sediment cover that could be expected is approximately 300 feet. This depth of sediment cover decreases northward until at the junction of the Boobyalla and Little Boobyalla Rivers a minimum depth of approximately 80 feet was found by drilling.

The drilling done by Rio Tinto Australian Explorations ⁽²⁾ in this area did not show any tin values, and from the succession logged they presumed that the sediments in this area are of estuarine origin. This estuarine nature of the sediments does not preclude the possibility of tin deposits being there as tin is found below estuarine muds and sands in the Fosters Marsh area to the east. However the possibility of finding tin is less than in the undisturbed sediments and any future work should be done further south where the marine incursion is expected to have had less effect.

Any tin found in the deep lead in this area would not have been derived from as far upstream as Derby, as any except the finest particles of tin would only be carried three or four miles by a stream of the presumed gradient of the old Ringarooma River. It must therefore be derived from tributaries not too far upstream from

the immediate area under investigation. Such tributaries on the margin of this area south of the junction of the Boobyalla Rivers have been worked for tin and there must be a good possibility of tin being present in the main lead.

To be economical the grade of tin present would have to be sufficient to carry a large amount of overburden with little or no tin values. The expected grade of tin found in the deep lead could possibly carry 150 feet to 200 feet of overburden if large scale workings were undertaken, and testing should be first done in that area where the overburden does not exceed that depth.

Such an area exists approximately three miles south of the junction of the Boobyalla Rivers, where a limited amount of testing was done by Rio Tinto Australian Explorations (³). One bore hole was drilled but this has subsequently been shown to be not on the deepest ground.

In view of the very limited nature of the work already carried out it is proposed that further geophysical traverses be run to the south of those already completed. This should determine the course of the deep lead more precisely. Follow up drilling will be necessary and several holes at suitable intervals should be drilled across the lead and on the flanks, as experience elsewhere has shown that the best tin values are not always in the deepest part of the lead.

THE GREAT FRASER RIVER AREA

This area lies on the eastern bank of the Great Fraser River and is approximately one and a half miles from the headwaters. The region selected extends for three miles in a northerly direction and has a width of one and a half miles. The country is of low relief and consists of alternating thinly forested ridges and swampy grass flats. Most of the area is covered with fine quartz gravel but larger pebbles were noted particularly in the northern part.

The Great Fraser River rises on the eastern side of the Blue Tier which is also the watershed for the Great Mussel Roe and Winiford Rivers. On both these rivers tin is found in the upper reaches, and Keid (¹) has reported some found in washing along the Great Fraser River.

The low ridges in the area run in a north-westerly direction, and probably represent a partially dissected filled valley or flood plain. Boring with a land auger to determine the depth of sediment was unsatisfactory, as in each case water was encountered at shallow depth. The deepest hole bored was 10 feet but the depth of sediment would possibly exceed 30 feet.

To cover the area adequately geophysical traverses would be needed near the southern boundary and also towards the northern end. If only one portion is traversed then the area towards the northern end should be selected as this shows the most shingle wash.

THE GREAT MUSSEL ROE RIVER AREA

The Great Mussel Roe River area extends for a distance of approximately three miles on either side of the river, south from the Gladstone-Ansons Bay road crossing. The area varies in width to a maximum of one and a half miles, and it contains mainly flat country with a few low ridges.

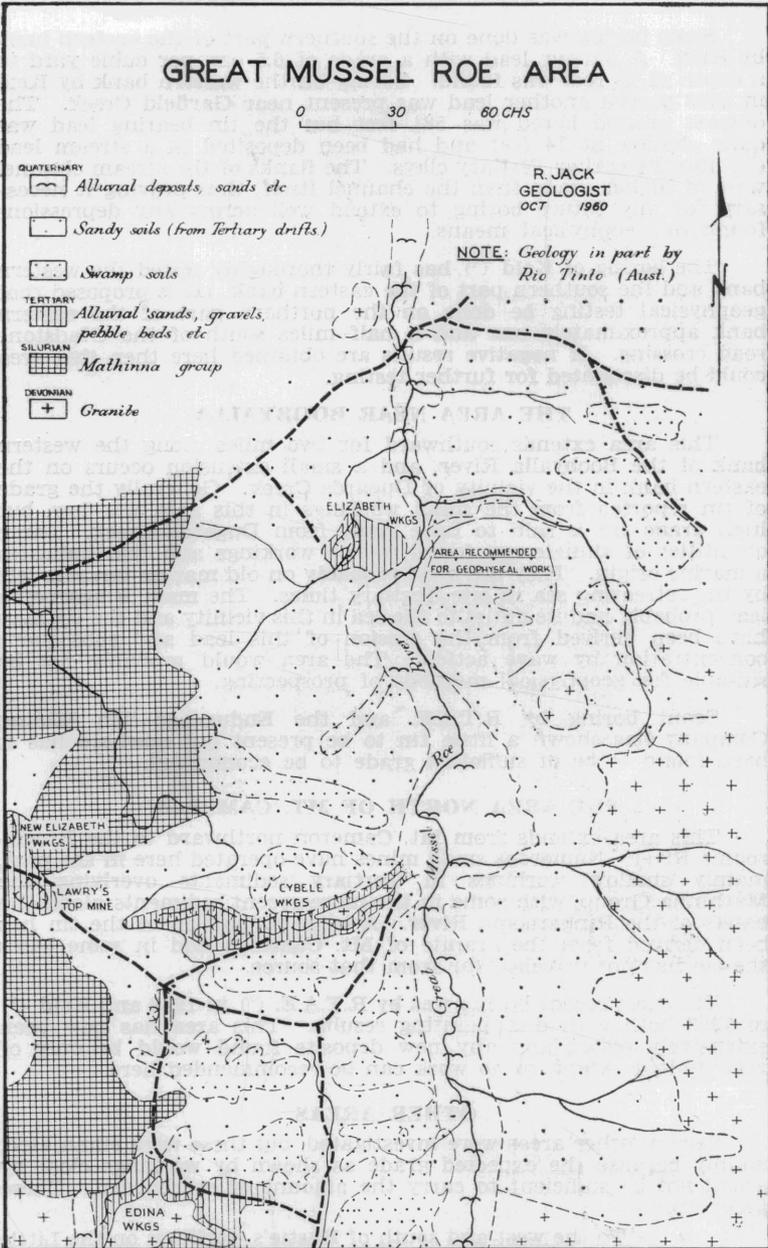
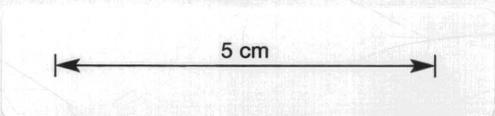


FIGURE 25.



AREA NORTH OF WINNALEAH

0 60 120 CHS

QUATERNARY

- Alluvial deposits, sands etc
- Older coastal deposits
- Terrace pebble deposits
- Sandy soils (from Tertiary drifts)
- Swamp soils

TERTIARY

- Basalt
- Alluvial sands, gravels, pebble beds etc

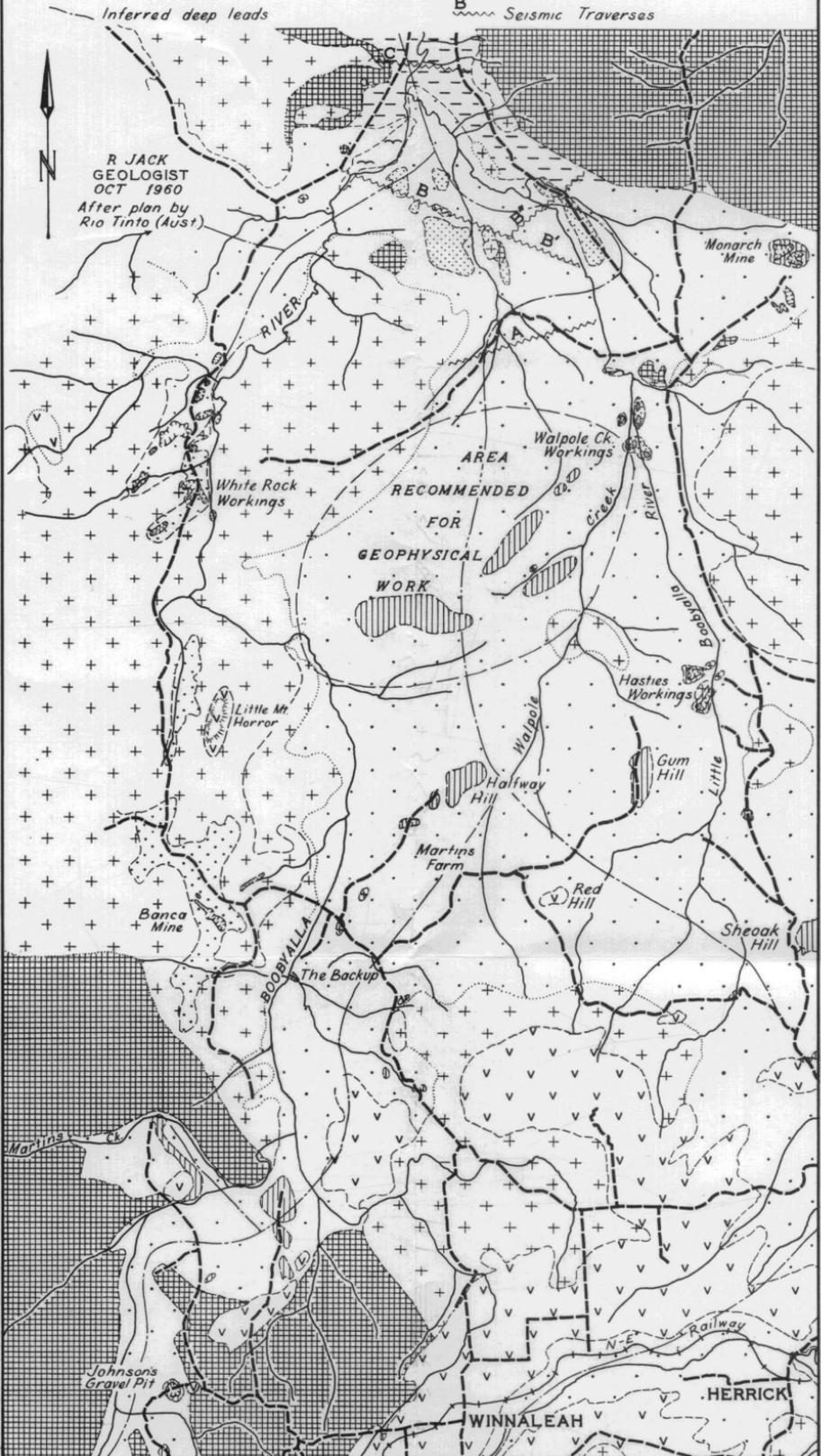
SILURIAN

- Mathinna Group

DEVONIAN

- Granite

B Seismic Traverses



R JACK
GEOLOGIST
OCT 1960
After plan by
Rio Tinto (Aust)

Monarch Mine

RECOMMENDED
FOR
GEOPHYSICAL
WORK

Railway

WINNALEAH

HERRICK

5 cm

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FIGURE 51.

Some boring was done on the southern part of the eastern bank by Keid. A narrow lead with a grade of 6.5 ozs. per cubic yard to a depth of 23 feet was found. Boring on the western bank by Keid in 1953 proved another lead was present near Garfield Creek. The deepest ground bored was 58½ feet but the tin bearing lead was quite shallow at 14 feet and had been deposited in a stream lead cut into the earlier Tertiary clays. The flanks of the stream channel were of higher grade than the channel itself, thus proving it necessary for any future boring to extend well across any depressions found by geophysical means.

The boring of Keid (4) has fairly thoroughly tested the western bank and the southern part of the eastern bank. It is proposed that geophysical testing be done on the northern part of the eastern bank approximately one and a half miles south of the Gladstone road crossing. If negative results are obtained here then this area could be discounted for further testing.

THE AREA NEAR BOOBYALLA

This area extends southward for two miles along the western bank of the Boobyalla River, and a small extension occurs on the eastern bank in the vicinity of Dugards Creek. Generally the grade of tin reported from the small workings in this area was low, but high grade tin is said to have come from Dugards Creek. Large quantities of shingle are found in the workings and this indicates a marine origin. They are most probably on old marine terraces left by the retreating sea in late Tertiary times. The main Ringarooma lead probably had its outlet to the sea in this vicinity and the tin may have been derived from the erosion of this lead and subsequent concentration by wave action. The area would probably not be suitable for geophysical methods of prospecting.

Scout boring by R.T.A.E. and the Endurance Tin Mining Company has shown a little tin to be present but nowhere has it been found to be of sufficient grade to be economical.

THE AREA NORTH OF MT. CAMERON

This area extends from Mt. Cameron northward to the Ringarooma River. Numerous small mines have operated here in the past, mainly shallow workings in Tertiary sediments overlying the Mathinna Group, with some in the more recent sediments along the banks of the Ringarooma River. A large proportion of the tin has been derived from the granite of Mt. Cameron and in some cases the tin has not travelled far from that source.

The most recent boring was by R.T.A.E. (5) in 1958 and Keid (4) in 1953 both with disappointing results. This area has now been extensively tested and any new deposits found would be of only very limited extent, so no work can be recommended here.

OTHER AREAS

Several other areas were investigated, but these were eliminated, mainly because the expected grade as shown by workings close by would not be sufficient to carry the amount of overburden. These areas were:—

To the west and south of Hastie's workings on the Little Boobyalla River;

North of Hastie's workings along the Little Boobyalla River—this area has had some boring done on it by the Endurance Tin Mining Company and they may do more in the near future;

Along the eastern bank of the Ringarooma River near the Great Northern Plains Area.

CONCLUSIONS

The three areas recommended for geophysical work are those most likely to contain economic tin deposits. Any deposits found on the first two areas should be capable of substantially increasing the present rate of production, while on the third area there is the likelihood of a smaller deposit capable of supporting several people.

If tin of economic grade is found on the first area north of Winnaleah then more geophysical work and boring should be done to see if some of the deeper ground further south is of economic grade.

REFERENCES.

- (¹) KEMD, H. G. W.—Areas Selected for Boring North-East Tin Fields. *Tas. Geol. Survey*; Typewritten Reports, 1953 (unpublished).
- (²) ————Report on the Tin Fields of North-Eastern Tasmania. *Tas. Geol. Survey*; Typewritten Reports, 1952 (unpublished).
- (³) RATTIGAN, J. H.—Rio Tinto Australian Exploration Pty. Ltd., Report on Alluvial Boring, Ringarooma District, North-Eastern Tasmania. May-September, 1958 (unpublished).
- (⁴) KEMD, H. G. W.—Boring Campaign in the Gladstone District, 1953. *Tas. Geol. Survey*; Typewritten Report, 1954 (unpublished).