A PHOTOGEOLOGICAL STUDY OF THE HEEMSKIRK GRANITE AND THE AREA SURROUNDING ZEEHAN, WESTERN TASMANIA.

Undertaken on behalf of

RENISON LIMITED

May 1978

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GA.39/77
GA.11/78

ABSTRACT

The photogeological study of the Heemskirk Granite and surrounding area using 1:25 000 scale colour aerial photographs has revealed new regional data and details of structure and stratigraphy that were not recognised during previous mapping. In particular, additional layered intrusions have been recognised in the essentially stratified Heemskirk Granite, especially in those parts of the granite that have not been subjected to peneplanation.

The older "red" granite that has been intruded by the younger "white" mineralising granite can now be divided into six recognisable layers, compared with the three layers that were recognised previously. No new information was revealed concerning the possible configuration of the "white" granite, but there are indications that it may exist at or near the surface in some of the higher parts of the "red" granite terrain in the east.

Whilst limited potential was revealed for the discovery of additional vein-type tin mineralisation, good potential has been recognised for the existence of large-tonnage low-grade tin deposits in possible large greisen zones within the "white" granite, and also in altered, limonite-stained Proterozoic slates and quartzites next to the eastern contact of the granite. This last-mentioned area is of considerable interest considering that cassiterite has been reported from quartz-tourmalines veins.

CONTENTS

I. INTRODUCTION

Following the submission of a proposal by R.F. Loxton, Hunting and Associates, to Renison Limited on 6th February, 1978, Loxton Hunting commenced a photogeological study of the Heemskirk Granite and a limited surrounding area on the west coast of Tasmania near the town of Zeehan. The study-area is 700 square kilometres, extending westwards from the Renison Bell Mine to the coast, and southwards to the Little Henty River. The total area is slightly less than that of the Zeehan 1:63 360 scale geological map-sheet (K 55-5-50). (See Figure 1).

The aim of the study was to map the Heemskirk Granite in as much detail as possible, and to demarcate areas of potential tin mineralisation, both of the fissure-vein type, and the low-grade and high-tonnage type. Particular attention was to be paid to the area surrounding the Cumberland Lake, which has been the centre of tin-mining operations in the past.

The study-area was mapped at the photoscale of 1:25 000 using seventy-seven (77) RC8 colour aerial photographs (see Figure 2 and the Appendix). Only the granitic terrain was mapped in detail, the stratigraphy of the surrounding area being annotated only in enough detail for geological continuity.

A number of workers have investigated the Heemskirk Granite; however the most significant mapping to date is by Klominsky (1972). A detailed description of the mineralisation within the southern part of the granite was given by Waterhouse (1915).

All previous workers recognised two main types of granite, namely the "red" and the "white" granite, and it is generally agreed that the former

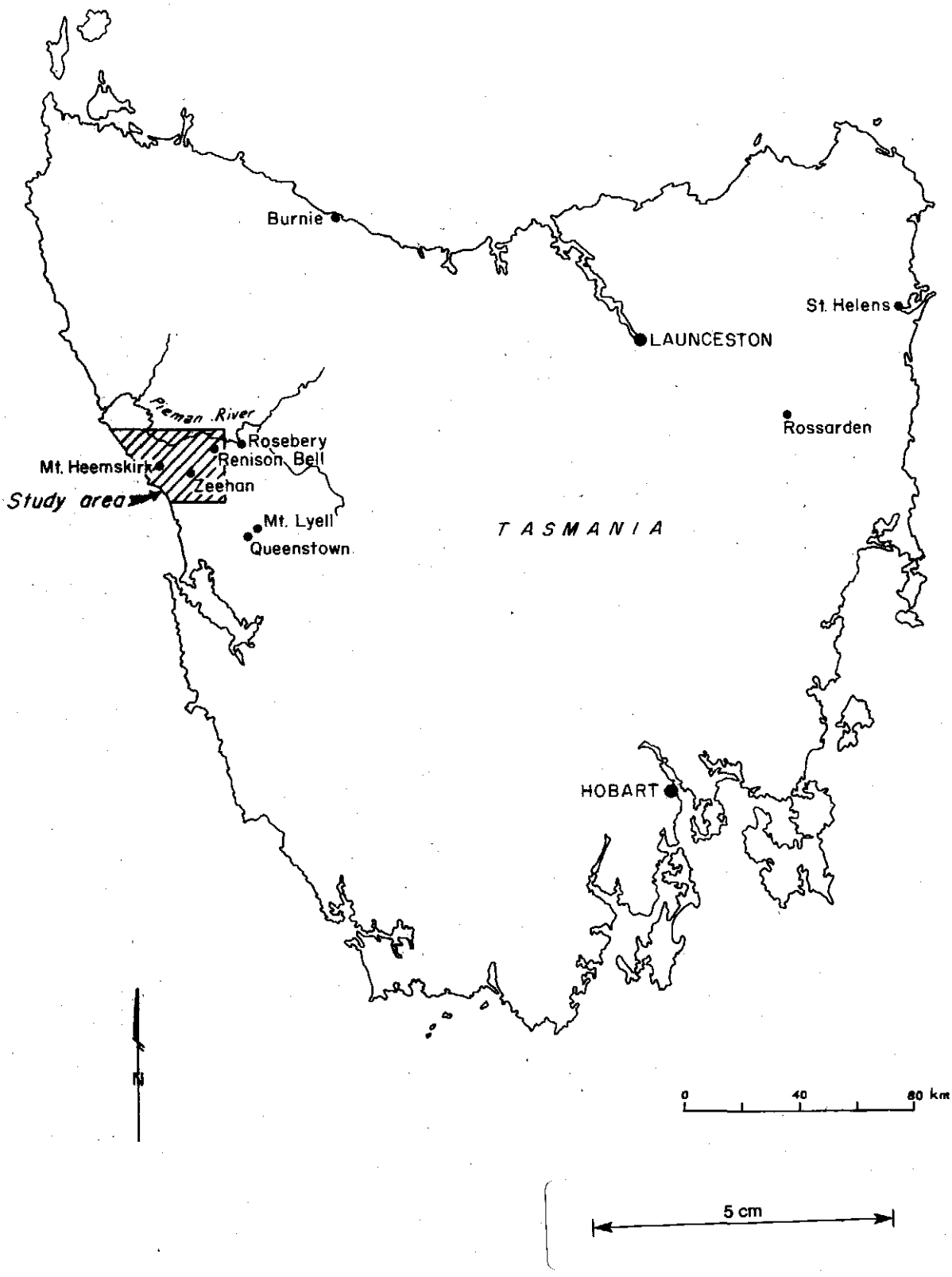

Fig 1. LOCALITY DIAGRAM

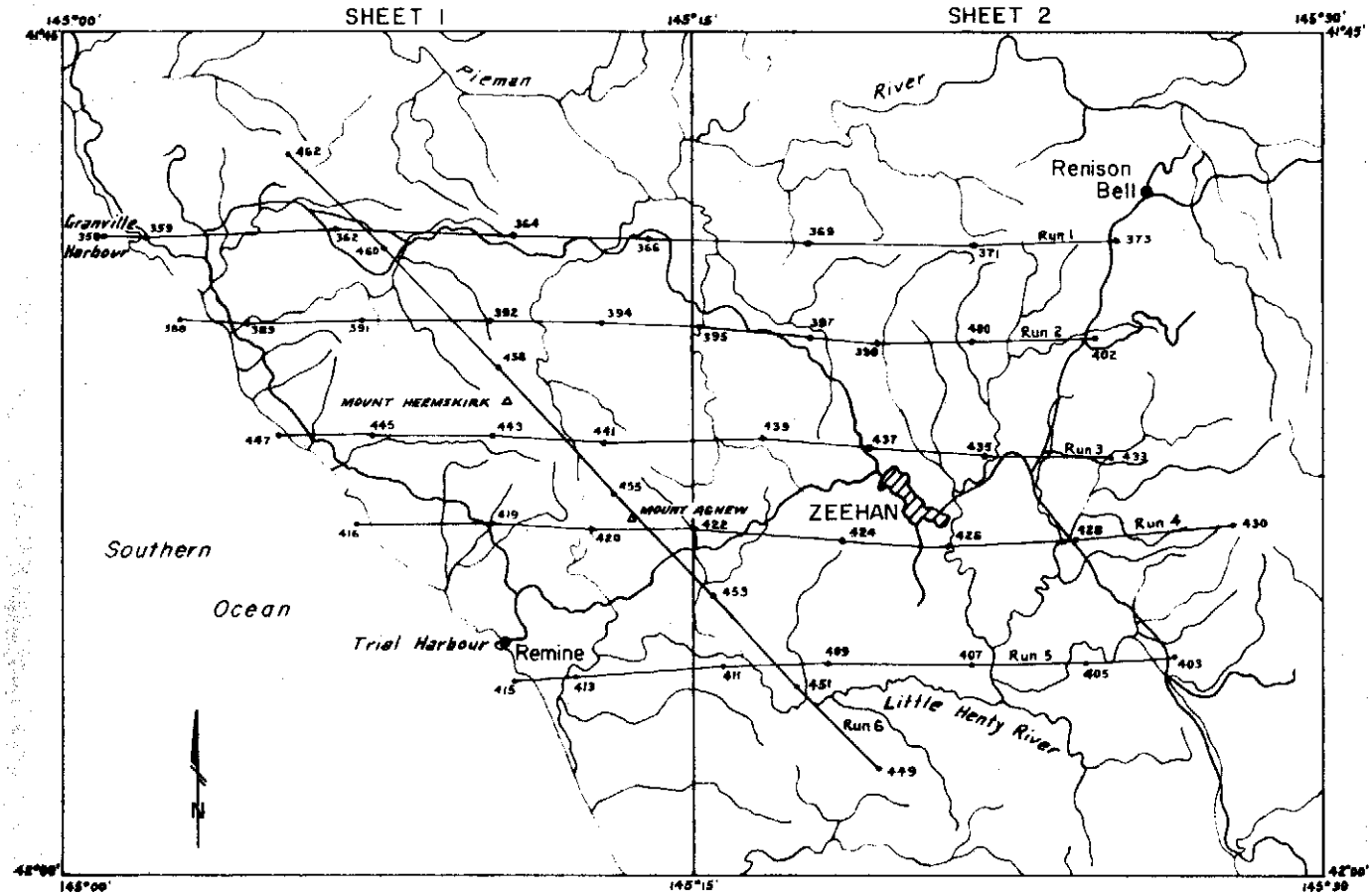

Fig 2. Diagram showing approximate position of flight lines in Heemskirk Area, Tasmania

is intruded by the latter. The Heemskirk intrusion as a whole is broadly stratified and the "red" granite tends to rest above the younger "white" granite.

To date all deposits of tin minerals have been found to be associated with quartz-tourmaline veins and quartz-topaz veins; the latter being called "white dykes". The most favourable zone (for mineralisation) seems to be near the contact of the two main types of granite.

A period of five days was spent in the study-area at the end of the initial annotation phase, in order to confirm or investigate geological contacts and structure in certain "problem" areas.

II. PROCEDURE

Because the area covered by the aerial photography corresponds approximately with that of the Zeehan 1:63 360 geological sheet (K 55-5-50), it was decided to use this as a comparative guide during photogeological annotation. The sheet extends from 41°45'S to 42°00'S, and from 145°00'E to 145°30'E. Two 15-minute square transparent drainage bases were therefore prepared from the enlarged 1:50 000-scale topographic sheet. Geological and cultural information was annotated in ink directly onto the transparent drainage bases which were superimposed on the colour photographs (see Figure 2). All annotation was carried out using a Zeiss N2 mirror stereoscope fitted with a binocular head having a x3 magnification.

The scale of the photography was found to be exactly 1:25 000. While the photographs "fitted" the drainage bases well in the areas of low relief, a certain degree of distortion was evident in areas of high relief, particularly east of the Burnie-Queenstown road, and in the eastern part of the Heemskirk Granite. This distortion necessitated the moving of the photographs beneath the overlay in order to match the drainage. Thus geological and cultural information in these difficult areas has been generalised somewhat. This should be borne in mind, especially when evaluating the detail of geological contacts and fractures in the "red" granite.

On commencing stereo-work an attempt was made to recognise the "red" and "white" granites on the basis of colour, but it soon became apparent that the designations are misnomers; the "red" granite is not necessarily always red in colour and field evidence confirms this. Thus reliance on colour was wholly unsuccessful in differentiating the various granites under the stereoscope.

An attempt was then made to recognise and define the different granites by using combinations of joint-directions as the main criterion.

This proved partially successful, but the combinations of vertical and shallow-dipping joints gave the impression that the contact-zones within the composite granite mass were vertical, to sub-vertical, rather than sub-horizontal, which they actually are.

Finally, once field-work was done by the writer, a number of areas were re-mapped in detail using both ground data and photogeological evidence. Information gained from these areas was then extrapolated to those not visited.

Klominsky's (1972) information was used as a basis for the naming of various granite types recognised on the aerial photographs. It was found that most of Klominsky's units could be verified, especially within the "red" granite; however some units could not be recognised in the "white" granite. Examples of the latter are the small units mapped by Klominsky in the northwest and also the thin outcrop of "red" granite mapped by him between South Gap Creek and Falconer Creek. On the other hand certain new subdivisions were recognised.

Total time expended on the photogeological project was two months. The work was the responsibility of P.R. Boshier.

III. GEOLOGY

A. Introduction

The Heemskirk Granite is a high level calc-alkaline granite of Devonian(?)-Carboniferous age (Brooks and Compston, 1965), that was intruded into folded, mainly sedimentary, Proterozoic and Cambrian rocks. Other rocks in the area mapped are sediments and volcanics ranging in age from Lower Proterozoic to Recent. Intruded into these rocks are Cambrian basic and ultrabasic intrusions and a dolerite cone-sheet of Jurassic age.

It is intended here to discuss only the geology of the granite and the immediate surrounding rocks. The stratigraphy and structure of the other rocks in the area are adequately described by Blissett (1962).

B. Heemskirk Granite

1. General

The granite is broadly layered and is intruded into the axis of a broad north-west-trending brachy-anticlinorium (Klominsky, 1972). The subsurface configuration of the granite superficially reflects this regional anticlinorial structure. The granite consists of "white" and "red" phases, and the former intrudes the latter. Each phase can be divided in turn into sub-phases which Klominsky (1972) based on grain-size and mineral content. Whilst this author agrees with Klominsky's divisions, he feels that the previous classification is an oversimplication, especially in the case of the "red" granite. This will be discussed in more detail below.

According to Klominsky, the granites can generally be distinguished in the field by their colour and grain-size. The "red" granite is supposed

to be distinguishable from the "white" in that its felspars are pink; it contains magnetite, sphene and allanite; does not contain muscovite and has a lower tourmaline content. Under the microscope their biotites have different pleochroism (Klominsky, 1972). Field evidence, noted by the author, suggests that colour, while important, should not be the ultimate criteria. If Klominsky's mapping is correct, then some of his "red" granites are very white in colour. Within the "red" granite areas colours ranging from pink through grey to white were recorded in the field.

Brooks and Compston (1965) found that the bulk geochemistry of the two granites was similar, but that the "white" was slightly more acidic and should be classified as an alaskite.

At the commencement of this project the author felt it would be relatively easy to distinguish between the supposed "red" and "white" granites on the colour aerial photographs, whilst realising that the direct recognition of differences in grain-size would be impossible. Results proved, however, that it was easier to confirm Klominsky's grain-size boundaries than it was to place any confidence in colour differences. Once field-work was undertaken the reason for this became apparent, especially in the case of the "red" granite where it was found, as mentioned above, that not all the "red" granites were red but varied from pink, through grey, to white. However granites of different grain-size tended to show up as recognisable geomorphological types, which this author suggests is due to two contributing factors.

Firstly the granite has been subjected to varying degrees of Pleistocence glacial activity which led to the preferential erosion of the more "susceptible" parts of the granite. Thus the coarse-grained and greisenised granites presented to the glaciers a surface that was more readily "plucked" by the ice, compared with the finer-textured granites. Secondly some of the coarser-grained granites appear in the field to be

more altered, either by greisenisation or by sub-aerial weathering, than the finer granites, leading also to preferential erosion. This theory could not be put to the test in the western portion of the granite where the "white" granite has been eroded to a peneplain surface which extends to as far east as South Gap Creek. However, in the east it was found that the coarser "red" granites tended to outcrop as negative topographic features when compared with the finer-textured varieties. They also exhibit a coarser surface texture on the aerial photographs. A feature of some note was that tree or scrub vegetation on the granite tended to be confined to the coarse-grained varieties, especially to those that had been altered or greisenised to any marked extent.

The non-peneplaned eastern portion of the Heemskirk granite exhibits varying intensities of jointing and fracturing. These joints are either flat dipping or vertical to sub-vertical. When little success was met when trying to distinguish granite types by their colour, an attempt was made to use jointing as a means of differentiating the granites. This proved to be partially successful, except that contacts between apparently different granites then commonly appear to be steep or vertical under the stereoscope. It was not until a field-visit was made, and selective detailed ground-mapping was undertaken on the aerial photographs, that the exact nature of the granite contacts could be recorded.

It was during this field-checking program that the difficulty in recognising meaningful colour differences was dramatised. A prime example of the problem can be seen near the contact between granite and slate and quartzite immediately north of the Tenth Legion Fault, in the eastern portion of the overall granite mass. Here the contact between the granite and the country rock is very clear. On the colour photographs the granite appears white, while the country rocks, being altered and containing considerable limonite, appear yellow. However, whilst this contact is very easily recognisable on the ground, the granite that appears to be white on the photographs is in fact dark pink on the ground and the

reason is the high apparent reflectivity of the granite surface. Approximately 100 metres west of the contact the "red" granite is seen to be intruded and "underlain" by a white-coloured tourmaline granite, which has a distinct chilled margin, and minor pegmatites in small cupolas. This contact between the granites is virtually impossible to recognise independently under the stereoscope. Only by knowing where it was on the ground could it be extrapolated to other areas, using the aerial photographs. This particular contact and area will be discussed in more detail below.

2. Detail

Klominsky (1972) recognised six different granite types, namely :

- contaminated porphyritic "red" granite (R1/Dgr-cp)*
- medium- to fine-grained "red" granite (R2/Dgr-mf)
- coarse-grained "red granites (R3/Dgr-c)
- contaminated porphyritic "white" granite (W1/Dgw-cp)
- medium- to fine-grained "white" granite (W2/Dgw-mf)
- coarse-grained "white" granite (W3/Dgw-c)

From the top to the bottom of the sequence the correspondence is essentially that as seen in the field. Intruded into this pile are quartz-tourmaline-rich aplite bodies that probably represent the residuum of the "white" granite magma. It is probably this last intrusive phase that controlled the bulk of the tin mineralisation that is associated with the granite. As mentioned above nearly all the known tin mineralisation took place near the contact between "red" and "white" granite and all previous workers regard the "white" granite as being the mineralising granite.

The contaminated porphyritic granites are found at the tops of both granite phases and are regarded by Klominsky (1972) as being due to

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* R1 = Klominsky (1972)
Dgr-cp = Loxton Hunting (1978)

incomplete assimilation of the roof-rocks by the intruding granite. Klominsky reported that xenoliths of country rocks are found near these contaminated granites. He also reported that the contacts between the medium- to fine- and coarse-grained granites is generally indistinct and transitional. This is partially confirmed by recent field evidence, but some contacts were seen to be very sharp, suggesting there may be more than one phase of "red" granite intrusion.

At the completion of this mapping program it was apparent that Klominsky's mapping of the eastern, more rugged part of the granite terrain was confirmed in general, but that modification was necessary in places, on the basis of photogeological data. However, the peneplained western and southern portions of the granite did not lend themselves well to air-photo interpretation, except in regard to the delineation of joints and fractures. Little new information was gained in respect of this part of the Heemskirk granite. This was especially true of the contact between granite and sediments in the north and south, where the only reliable method of mapping the contact was to follow it on the ground. Any future mapping in this western area would best be carried out on the ground using the aerial photographs for control.

Photogeological and ground evidence suggests that whilst Klominsky's breakdown of the "red" granite is basically correct, it tends to be an over-simplification. Photogeological evidence suggests that the "red" granite can be divided into at least five, and possibly six, units or "layers". These are, in descending order, as follows :

- contaminated porphyritic granite (Dgr-cp, Mt. Heemskirk)
- medium- to fine-granite (Dgr-mf^1)
- coarse granite (Dgr-c)
- medium- to fine-granite (Dgr-mf^2)
- coarse granite (Dgr-c)
- medium- to fine-granite (Dgr-mf) (in the west)

This last-mentioned granite is found in the western portion of the "red" granite mass, immediately above the "white" granite, in which case it could be argued to represent unit (mf^3) except that there appears to be only one other medium- to fine-grained granite above it in this area instead of two as implied by the designation (mf^3).

The author does not suggest that these layers are continuous across the "red" granite, but it would appear that, in places, they will be found to lense-out and/or to merge. Ground evidence suggests that the "red" granite units are not necessarily (always) in situ differentiates of one magma, but in some places are discrete intrusions. Evidence for this can be seen in the discontinuous pegmatite layers and chilled upper margins of the coarse, white-coloured so-called "red" granite north of the Tenth Legion Fault mentioned previously. Similar features were noted below the contaminated porphyritic granite that outcrops on the top, and to the north of Mt. Heemskirk.

The aforementioned white-coloured coarse-grained "red" granite, found below the medium- to fine-grained pink-coloured "red" granite north of the Tenth Legion Fault presented this author with a problem. Klominsky appeared to base his description and mapping-boundary on two petrological samples taken from the area which presumably exhibited the "right" mineralogical criteria, when examined under the microscope, leading to his classification of the granite as "red". However, as mentioned above, when observed in the field this granite is white in colour, has a chilled margin and contains many tourmaline nodules. This, plus the fact that the overlying pink-coloured "red" granite also contains tourmaline nodules suggests that the lower granite is a younger, very high level "white" granite. As the "white" granite is the mineralising granite the inference is that the contact zone may be highly prospective for tin. Evidence for this is discussed below in Section 4.

The bedrock in the relatively large area that was previously left unmapped by Klominsky between photo-centres 3/0442 and 3/0441 (see map) in the east-central part of the Heemskirk granite, is suggested here to be coarse-grained "red" granite. The evidence for this is the negative topography, and the rugged, tree-covered outcrop pattern - the reasoning of which was discussed earlier. This author feels that "white" granite could conceivably be found to exist at a shallow depth below this area, and may actually outcrop in some of the lower parts. If this hypothesis is true then the underlying "white" granite could be greisenised and thus prospective for tin mineralisation.

Regarding the two other small areas left unmapped by Klominsky in the north-east and south-east, geological contacts were extrapolated into these areas under the stereoscope.

3. Structure

Klominsky (1972) suggests that the granite occupies the axis of a brachy-anticlinorium that plunges doubly; to the north-west and east-south-east respectively. The internal structure of the intrusion shows with depth a diminishing influence of the enclosing country rocks. Within the granite he recognised five major joint systems, namely, NNE-SSW, WNW-ESE, N-S, NE-SW and W-E; however the main sets can be summarised as being NE-SW and approximately E-W and N-S. The joints are mainly vertical or steeply-dipping. It was noted by this author that there is also a pervasive set of generally shallow- to moderately shallow dipping joints which generally incline northwards.

Klominsky reported that both of the main N-S and E-W fracture directions may be filled by veins of quartz-tourmaline and/or quartz-topaz. He regarded the north-south set as "contraction joints" associated with extensive greisenisation and hydrothermal alteration. A good example of

this type of jointing can be seen extending north from near Cumberland Lake almost to the northern limit of exposed granite. The N-S joint direction is particularly strong in the large area that was left unmapped by Klominsky, and may lend weight to the suggestion by this author that it is an area of "red" granite underlain by strong greisenisation immediately above the "white" granite. The NE-SW trending joints are mainly confined to the "white" granite suggesting they may be the youngest in age. However, no definite evidence based on cross-cutting of the joints, was seen to confirm this suggestion.

The faulting within the granite area trends in three main general directions, namely N-S; NE-SW and E-W. Obviously they reflect the same overall constraints suffered by the major sets of joints, noted above. The east-west faults appear to post-date the north-south faults.

Two major northerly-trending faults were recognised on the aerial photographs. One is the South Gap Creek - St. Dizier Creek Fault. Based on air-photo evidence, movement appears to have been in the sense of "east block up and to the south". The apparent displacement, in plan, is approximately 1000 metres. The other major fault is that which passes through the settlement at Granville Harbour, and is sub-parallel to the coast-line. From Granville Harbour southwards the fault lies offshore and it appears to have controlled the shape of the coast-line in this region.

The major east-west fault is the Tenth Legion Fault. Photo-geological evidence, based on the alignment of drainage in the western portion of the Heemskirk granite, suggests that the influence of this fault extends for the entire width of the exposed granite mass, from east to west. There are other related(?) sub-parallel faults in the region. As mentioned above these east-west faults appear to post-date the north-south faults, as evidenced by the dislocation of the South Gap Creek - St. Dizier Creek Fault. Klominsky regards the east-west faults as thrust faults; however

there is no photogeological evidence to confirm this. Strike-slip movement is more likely, with the predominant movement being "north block west". Northeast-southwest faulting appears to be subordinate. The main example is the Tasman River Fault in the north-western portion of the granite terrain.

4. Mineral Exploration Potential

A complete description of the mineralisation that is associated with the southern portion of the Heemskirk granite and the neighbouring country rocks is given by Waterhouse (1915). Wells (1977) gives additional information concerning mineral exploration around the Federation Mine and Sweeney's Mine. He summarised the ore-types in these areas and their relation to the intrusive granite, and veins. Both authors described the known mineralisation in relative detail and the reader is referred to these reports for further information.

One requirement of the photo-interpretation program was to attempt to locate additional vein-type tin-ore similar to that which is associated with the veins of quartz-tourmaline and quartz-topaz ("white dykes") in the Federation area, and also further to the west in coarse "white" granite. These veins can be seen only with difficulty on the aerial photographs. They are only conspicuous if they have a scree slope which widens their surface expression on the aerial photographs. The only other area apart from Federation where they could be positively identified lies immediately north-west of photo-centre 3/0443 (see map).

A number of areas which conceivably are underlain by greisenised bedrock (based on criteria mentioned previously) are worthy of mention. By far the largest is the depressed area between photo-centres 3/0442 and 3/0441. This was the area left unmapped by Klominsky because dense vegetation made access difficult. As mentioned in Section 2 this area

appears to be underlain by coarse-grained "red" granite, but with underlying coarse-grained "white" granite possibly being present at shallow depth. The possibility, and the configuration of the terrain, suggest that the area could coincide with a large cupola of intrusive "white" granite. If this hypothesis is correct the possibility exists for tin-mineralisation of "Sweeney's" type in argillised (greisenised?) granite. Other locations that may be underlain by greisenised granite are the coarse-grained "red" granite areas of Klominsky, next to the north-eastern and south-eastern contacts between granite and country rock. This postulation depends solely on the hypothesis noted on pages 6 and 7 in which grain-size and alteration were related to likely degrees of erosion. Alluvial tin and sulphide mineralisation is recorded from the southern location. One other possible site of greisenisation is the coarse-grained granite found on the western slopes of Mt. Heemskirk.

The Proterozoic slates and quartzites in the vicinity of photo-centre 3/0440 (coloured area of Puo marked with red "speckles" on map) present a very interesting tin-exploration target. In this area, approximately east-west-striking slates and quartzites form an embayment in the eastern boundary of the Heemskirk granite. The southern part of the embayment is bounded by the WNW-striking Tenth Legion Fault, whilst the northern boundary is marked by an apophysis of granite which protrudes into the slates and quartzites. The apophysis has a partially faulted southern boundary. The western boundary of the country-rock embayment is faulted and has been obliquely re-faulted (a faulted, faulted contact). Based on limited ground evidence the western faulted contact appears to dip steeply to the west.

A feature of this area is the strong yellow colour anomaly found over the slates and quartzites (compared with the white colouration of the granite). as seen on the aerial photographs. A ground traverse was made up the ridge of slates and quartzites extending from the Tenth Legion gossan to the granite contact. The yellow colouration of the slates and

quartzites was found to be due to limonite staining. The slates and quartzites were moderately to strongly altered, and the degree of alteration decreases eastwards, with increasing distance from the granite. Minor boxworks after pyrite(?) were found in the altered slates and quartzites. This author would suggest that the slates and quartzites lie above and on the higher flanks of a cupola in the "white" granite the apex of which possibly lies in the area between photo-centres 3/0441 and 3/0442 (see Section 2). A feature that may help to explain why the alteration occurs only in this location is that it is essentially the only granite/slate-quartzite contact where the bedding and cleavage are perpendicular to the contact. The bedding and cleavages planes presumably presented a pathway along which hydrothermal fluids from the granite could penetrate. Effects of quartz- and tourmaline alteration are seen within the slates and quartzites, and also within the granite in this region. It is highly relevant that Klominsky reported "abundant" cassiterite from the slates and quartzites on the above-mentioned ridge ("Cassiterite was found in quartz-tourmaline veins on the ridge which is parallel to the latitude 41°52'30". Klominsky, 1972, p. 71).

One final feature that may be significant is that the aerial photographs suggest that streams which originally drained this particular area, flowed to the southeast, but because of recent glaciation the creeks appear to have been captured and now flow to the east and north-east. The old stream-courses to the south-east contain alluvial tin which may have come from the above-mentioned area in pre-glacial times.

This embayment is regarded as an important target for possible large-tonnage, low-grade tin mineralisation.

IV. CONCLUSIONS AND RECOMMENDATIONS

This project has shown that air photo-interpretation is a useful tool both for detailed mapping and also for assisting in the delineation of mineral exploration targets. Its use was limited in the western portion of the granite where it had been peneplained; however joints and fractures were recognised here that probably would not have been noticed by ground mapping. The non-granite portion of the area was mapped in only enough detail to provide geological continuity. Blissett's (1962) map has been slightly amended in certain areas, particularly regarding stratigraphy and structure in the south and east.

It is recommended that any future ground mapping in the area be done in conjunction with diligent air photo-interpretation, both in the field, and in the office. Bearing in mind the particular "stratigraphic" problems associated with the granite, the excellent scale and quality of the photographs lends itself ideally to this type of mapping, particularly in areas of limited access.

Whilst the writer feels that the potential for additional vein and "white dyke"-type tin mineralisation in the granite is limited, there appears to exist good potential for large-tonnage, low-grade tin-ore deposits in designated areas east of Mt. Heemskirk.

Notwithstanding the above, the dykes and veins located northwest of photo-centre 3/0443 should be investigated on the ground. The large areas of possible greisenised granite west of Mt. Heemskirk, and in the depression between photo-centres 3/0442 and 3/0441, and near the north-eastern and south-eastern boundaries of the granite, should all be investigated for evidence of tin mineralisation associated with greisenisation. Particular attention should be paid to the altered, limonite-stained

Proterozoic slates and quartzites contained in the embayment in the granite north of the Tenth Legion Fault ("speckled" area of Puo on map). The reported occurrence of cassiterite from this area must make it an important target for future exploration.

SELECTED REFERENCES

Blissett, A.H., (1962)
Geological Survey Explanatory Report. One Mile Geological Series K 55-5-50 Zeehan.
pub. Dept. of Mines, Tasmania, 272pp

Both, R.A., and Williams, K.L., (1968)
Mineralogical zoning in the lead-zinc ores of the Zeehan field, Tasmania.
Journal Geol. Soc. Aust., 15, 121-137, 217-244.

Brooks, C., and Compston, W., (1965)
The age and initial Sr^{87}/Sr^{86} of the Heemskirk Granite, Western Tasmania.
Journal of Geophysical Research, 70, (24), 6249-6262.

Edwards, A.B., (1953)
Heemskirk-Zeehan Mineral Field.
in Geol. of Aust. Ore Deposits, 5th Empire Mining & Metallurgical Congress, 1166-1178.

Klominsky, J., (1972)
The Heemskirk Granite Massif, Western Tasmania - A study of the chemical variability within plutonic rocks.
Ph.D. Thesis (unpubl.), University of Tasmania, Hobart.

Twelvetrees, W.H., and Ward, L.K., (1910)
The ore-bodies of the Zeehan field.
Geol. Surv. Tas., Bull. 25,

Waterhouse, L.L., (1915)
The South Heemskirk Tinfield.
Geol. Surv. Tas., Bull. 15.,

Wells, K., (1977)
Progress Report, Federation Area, EL. 11/78.
Unpublished Report: Renison Limited. 34pp, Appendices.

RENISON LIMITED : HEEMSKIRK PROJECT

DETAILS OF AERIAL PHOTOGRAPHY USED.

Contractor	Australian Aerial Mapping Pty. Ltd.
Project	Trial Harbour
Job No.	6500/3280
Date of Photography	12th December, 1977
Camera	RC8
Film No.	AAM1214c
Flying Height	3810 m
Approximate scale	1:25 000

All photographs are in colour, on semi-gloss "Estar" base prints. Photographs have approximately 60 per cent overlap forward and aft and from 20 to 30 per cent side-overlap. Runs were flown east-west. Quality was excellent and the colour-balance was selected by R. F. Loxton, Hunting and Associates to have a slight reddish bias in order (supposedly) to aid differentiation between various granites.

Note: Only Runs 1 to 5 were used for annotation. Run 6 was flown NE-SE for colour balance.

Run No.	Photo Nos.	No. of Photos
1	0358 - 0373	16
2	0388 - 0402	15
3	0431 - 0448	18
4	0416 - 0430	15
5	0403 - 0415	13
		77
6	0449 - 0462	14
	Total	91

1090

145°00' 41°45' — 145°15' 41°45'

Hoyle Creek

Duck Creek

LIMIT OF PHOTO COVERAGE

PIEMAN RIVER

GRANVILLE HARBOUR

INDIAN OCEAN

Heemskirk River

TRIAL HARBOUR

42°00' 145°00' — 42°00' 145°15'

REFERENCE

CAINOZOIC

QUATERNARY

Pleistocene

- Qra — Alluvium
- Qrb — Beach deposits
- Qrd — Sand dunes and blown sand
- Qrg — Gravels
- Qrr — Raised beaches
- Qrs — Older alluvium, marsh deposits, downwash etc
- Qpm — Moraine

TERTIARY

- Tg — Gravels
- Ts — Sand, silt and clay

PALAEOZOIC

PERMIAN

- P — Undifferentiated 104-38
- Pt — Zeehan Glacial Formation 104-36

DEVONIAN

Eldon Group

- Db — Bell Shale
- Df — Florence Quartzite 104-28

SILURIAN

- S — Undifferentiated (refer Blissett 1962)

ORDOVICIAN

Junee Group

- Og — Gordon Limestone 104-3
- Om — Moira Quartzite 104-37
- Oz — Zeehan Conglomerate 104-34

CAMBRIAN

Dundas Group

- Cfe — Fernfields Formation
- Cb — Brewery Junction Formation
- Cra — Razorback Conglomerate
- Cd — Dundas Group - unassigned
- Cc — Crimson Creek Formation
- C — Unassigned

PRE-CAMBRIAN - PROTEROZOIC

- Puo — Oonah Quartzite and slate
- Pc — Concert Schist

IGNEOUS ROCKS

- TERTIARY — Tb — Basalt
- JURASSIC — Jd — Dolerite
- DEVONIAN(?) - Heemskirk Granite — Dgw — a — Aplite granite; mf — Medium to fine grained granite; c — Coarse grained granite; cp — Contaminated porphyritic granite ("White" granite)
- CARBONIFEROUS — Dgmf — Upper medium to fine grained granite; c — Coarse grained granite; cp — Contaminated porphyritic granite ("Red" granite)
- CAMBRIAN — Eg — Gabbro, norite, dolerite; Es — Serpentinite and pyroxenite

- Main road
- Track
- Railway line
- Power line
- House
- St Dizier — Mine working (named)
- Ground control marker
- Geological traverse
- Geological contact - position accurate
- Geological contact - position approximate
- Geological contact - inserted for geological continuity
- Geological contact - open
- Fault
- Fault - position approximate
- Fracture
- Joint
- Dykes, veins
- Syncline with direction of plunge
- Anticline with direction of plunge
- Dip of bedding: < 10° ; 10° - 30° ; 30° - 60° ; > 60°
- Joint - vertical
- Joint - dipping

Compiled from 77 RCB colour photographs at a scale of 1:25 000.
5 field days were also undertaken.

227025

PHOTOGEOLOGICAL WORKSHEET OF THE HEEMSKIRK AREA, TASMANIA

undertaken on behalf of Renison Limited.

approx. scale 1:25 000

SHEET 1 78-1299

1090

SANDY CAPE 7815	ARTHUR RIVER 7915	HELLYER 8015
CONICAL ROCKS 7814	PIEMAN 7914	SOPHIA 8014

41°00' / 41°30' / 42°00' — 144°30' 145°00' 145°30' 146°00'

5 cm

GA 39/77
R.F LOXTON, HUNTING and ASSOCIATES, CANBERRA

145°15'
41°45

145°30'
41°45'

LIMIT OF STEREO PHOTO COVERAGE

RENISON BELL

Mine Complex

LIMIT OF STEREO PHOTO COVERAGE

ZEEHAN

Mt Zeehan

Dundas

Heemskirk

LIMIT OF PHOTO COVERAGE

42°00
145°15

42°00'
145°30'

41°00
41°30
42°00
144°30 145° 145°30' 146°00'

SANDY CAPE 7815	ARTHUR RIVER 7915	HELLYER 8015
CONICAL ROCKS 7814	PIEMAN 7914	SOPHIA 8014

PHOTOGEOLOGICAL WORKSHEET OF THE HEEMSKIRK AREA, TASMANIA

undertaken on behalf of Renison Limited.

approx. scale 1:25 000

5 cm

SHEET 2.

GA 39/77
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