



CONTENTS

	<u>Page</u>
1. INTRODUCTION	2
2. CRITERIA FOR EVALUATING THE RENISON-DUNDAS MINERAL POTENTIAL	2
2A. The Pine Hill Granite (PHG)	4
(i) The importance of the PHG	4
(ii) The Shape of the PHG and Controls on Structure	4
(iii) PHG Apophyses, Structure and Rlated Min- eralisation	5
2B. Major Structural Trends	6
(i) Granite Related Fault Structures	6
(ii) Fault Trends and Mineralisation	7
(iii) Structural Preparation of Host-rocks for Mineralisation	7
2C. Stratigraphy	
(i) Correlation of Stratigraphic Units	9
(ii) Potential for Carbonate Replacement	10
2D. Mineralisation	11
(i) Alteration (metamorphism, metasomatism, and vein paragenesis)	11
(ii) Metal Zonation	12
3. RECOMMENDATIONS	14
3A. The RML	14
3B. EL 101/87 and EL 13/88	15
4. SUMMARY OF RECOMMENDATIONS FOR RML AND EL'S 101/87 & 13/88	18
5. REFERENCES	19

## 1. INTRODUCTION

At the request of Ray Roberts, Chief Geologist, Renison Tin Mine, a critical review of the exploration potential of the leases held by Renison Goldfield Consolidated Exploration (RGCE), i.e. EL's 101/87 and 13/88, adjacent to the Renison Mine Lease (RML), has been undertaken. This evaluation was required because RGCE wishes to relinquish these EL's at the time of their renewal.

A critical evaluation of the mineral potential of the areas covered by both EL's together with the RML, has therefore been documented in the following report and recommendations made regarding the areas prospectively. Figure 1 outlines those areas under consideration, i.e. RML (IM/89) and EL's 101/87 and 13/88. The area considered for relinquishment covers the lower half of the EL's from 5365000N (see dotted line, Figure 1).

## 2. CRITERIA FOR EVALUATING THE RENISON-DUNDAS MINERAL POTENTIAL

To critically evaluate an area for its mineral potential a concise exploration model for the commodity in question is required. As Renison is the world's largest underground tin mine our exploration obviously centres on Sn but other base metals have not been totally dismissed.

The criteria listed below outline the salient features that should be considered in an evaluation of the Renison-Dundas area. These criteria have been developed principally by RGC geologists while exploring for carbonate replacement (Renison style) Sn deposits in western Tasmania. Each of these criteria will be evaluated and discussed with respect to the mineral potential of both the EL's and the RML.

The recommendation for future exploration of the Renison-Dundas areas covered by the RML and EL's 101/87 and 13/88 have been based on these criteria.

**The Criteria to Explore for Renison Style Deposits**

**A. The Pine Hill Granite (PHG)**

- (i) The importance of the PHG.
- (ii) The shape of the PHG and controls on structure.
- (iii) Mineralisation and depth to the PHG. *distance of PG from host*
- (iv) PHG apophyses, structure, and related mineralisation.

**B. Major Structure Trends**

- (i) Granite related fault structures.
- (ii) Fault trends and mineralisation.
- (iii) Structural preparation of host rocks for mineralisation.

**C. Stratigraphy**

- (i) Correlations of stratigraphic units.
- (ii) Potential for carbonate replacement.

**D. Mineralisation**

- (i) Alteration (metamorphisms, metasomatism and vein mineralogies).
- (ii) Metal zonation.

A. **The Pine Hill Granite (PHG)**

(i) **The importance of the PHG:**

Leaman and Richardson (1989) recognised the Devonian PHG as probably the most important in western Tasmania because of its unusual and critical relationship to an array of hosts. The PHG occupies the central spinal region of the east-west oriented Heemskirk-Granite Tor ridge. This E-W ridge is believed to have been intruded along a deep crustal structure (Leaman, 1986; Large, 1989) and positioned the PHG such that it intrudes across a basin with associated Precambrian, Cambrian and Ordovician carbonate sediments and not along a basin margin of the Dundas Trough. The only outcrop of the granite in the Renison-Dundas region occurs at Pine Hill where a tourmalinised greisen plug (apophysis) can be seen. The remainder of the intrusion remains buried and because of its high relief roof and numerous cupolas it presents itself as having an enormous potential for associated mineralisation.

(ii) **The Shape of the PHG and Controls on Structure**

The greatest single achievement in the last few years in the exploration for Renison type Sn deposit in the Renison-Dundas region, has come from the definition of the underlying shape of the PHG through gravity interpretations. A large proportion of exploration and geological interpretation has only been possible through this knowledge. Gravity is also the only technique which allows deep geological interpretation without requiring a diamond drill hole. Because of this fact it is the cheapest method to test for very deep mineralisation over large areas.

The gravity model for the Renison-Dundas area (Leaman, 1990) can be improved. Leaman (ibid) has mentioned in his report that gaps in data occurred between Renison and Colebrook Hill. As this area is associated with Sn mineralisation (East Renison - Fentons Gar) this area obviously requires more detailed gravity work. Leaman's modelling for the PHG was not based on a study of the host-rock density and susceptibility measurements. Leaman has used a density of 2.62 g/cc for the granite but actual values are 2.66 gm/cc. As a consequence the granite-sediment interface, intersected by drilling, is 70-200 m lower than that predicted by the gravity model by

*In the mine area up to 250 m lower than the actual position of high density granite-sediment interface in underlying sediments.*

using the actual physical properties taken from the host sequences across the region should be seriously considered.

(iii) **PHG Apophyses, Structure and Related Mineralisation:**

The association between granite apophyses, structural deformation of host sediments above the apophysis and associated mineralisation has been documented for many centuries. Mesothermal post-orogenic, volatile-rich (Sn, F, B, H<sub>2</sub>O, Cl, etc.) granitoid intrusions typically produce brittle tensional fractures in the surrounding country rock (Burnham, 1979). These deformation processes result from the exsolution of a volatile-rich aqueous magmatic fluid from a crystallising magma, where over pressuring in the apices of the intrusion exceed both the minimum compressive stress and the tensile strength of the surrounding country rocks (Burnham, 1979; Plimer, 1987). Ore deposition results from venting of the magmatic fluid from the lithostatic igneous source regime into the overlying hydrostatic ore-depositional environment where the magmatic fluids may cool, undergo phase separation and/or interact with wall rocks and/or fluids of meteoric, connate, seawater or metamorphic origin (Heinrich et al, 1989; Heinrich, 1990).

The recognition of the importance of apophyses within the PHG and in particular beneath Renison has been documented by Kitto (1992). In the mine area he has demonstrated the close associations between the apophysis, development of complex fault patterns, fluid focussing and the development of carbonate replacement styles of mineralisation.

In summary, the PHG is recognised as being unique in western Tasmania because of its buried nature, its location within the carbonate rich sediments of the Dundas Trough, the recognition of the enormity of this granita body by gravity modelling and the close association between apophyses in the roof the intrusion, structural deformation of overlying host sequences and the focussing of volatile rich hydrothermal fluid through these apical regions of the intrusion.

**B. Major Structural Trends****(i) Granite Related Fault Structures:**

Fault structures associated with the forceful emplacement of the PHG have been shown to produce an array of NW trending horst and graben structures across the RML (Lea, 1991). The most important of these horst structures is that bounded by the Federal-Bassett Fault (FBF) and the Argent Fault associated with the Renison Tin Mine. The FBF, a fault couple with up to 100 m of separation, has experienced up to 700 m of dip slip movement in the area of the mine associated with the underlying apophysis in the granite. The Argent Fault has some 400-500 m of dip slip movement (Marjoribank 1990). Other major faults such as the Grand Prize Fault (GPF) have an uncertain vertical displacement but have up to 150 m of dextral slip.

Kitto (1990) has interpreted the dextral component of wrenching along faults as being associated with the regional stress field present during the Devonian. The dextral component of movement becoming dominant only after fault initiation and normal dip slip faulting ceased because of a decaying stress field related to granite replacement.

Fault structures associated with horst and graben development and which require further investigation are the possible extension of the Tuesday Fault south of Argent Dam toward Pine Hill and the extension of the GPF north of Grand Prize into the Tunnel Hill area. Interpretation of the shear zone in the Exe River - East Renison area in relation to granite emplacement will not be possible until a refinement of Leaman's gravity model has taken place. Cross-sectional interpretations for EL 101/87 and EL 13/88 should be undertaken to assist in the structural understanding of prospective areas south of Pine Hill. It is envisaged that displacements on major fault structures associated with NW trending horst and grabens diminish upon approach to the ultramafic complex (UMC) around the Pine Hill intrusion. The UMC was emplaced as an allochthonous thrust sheets during Cambrian (Berry & Crawford, 1989) and would undergo ductile deformation in preference to brittle deformation of the surrounding sediments. This interpretation is supported by observations for the FBF which appears to have disappeared without a trace before reaching the UMC.

If this interpretation is considered further then, structural preparation of sediments close to the UMC's may not have been possible at Pine Hill and exploration for Renison style Sn deposits close to UMC's should only be undertaken after very careful structural interpretations.

(ii) **Fault Trends and Mineralisation:**

Across the top of the PHG a complex array of conjugate fault sets has been identified. The predominant orientations being NW and NNE. Development of conjugate faults, largely constrained between boundary faults, result from extension associated with domal fracturing above granite intrusions. Such fault sets are more difficult to predict than bounding faults associated with the given shape of the granite. Where conjugate faults have been identified a dextral component of displacement can be seen to offset stratigraphic units. The NW trending faults appear, however, to have been the only dilational structures during stanniferous hydrothermal fluid circulation (e.g. FBF, Fraser Lodes, Godkin Lodes, Exe River, Grand Prize, Razorback, Montezuma and the Greens Prospect). Although all of the above fault systems contain Sn and have a dextral component of off-set it has only been the FBF that exhibits an extensive dilational jog (Federal Orebody) as a consequence of this wrench movement.

Recognition of potential areas above a complex granite intrusion where faulting and focussed fluid flow has occurred under a predetermined stress field is possible. the computer package STRAND6 for example uses a 3-D finite element analysis program to perform such calculations. Dr Colin Foster in the Engineering Faculty at the University of Tasmania and his PhD student Randell Muir are assisting Paul Kitto with a rudimentary approximation of the PHG (Leaman, 1990). Pending preliminary results this technique may assist in identifying further prospective areas above the PHG.

(iii) **Structural Preparation of Host-rocks for Mineralisation:**

The structural preparation of host sediments by faulting has proven crucial to the development of extensive carbonate replacement at Renison (Kitto, 1991 & 1992) (Figure 2). Fault structures of all magnitudes have been recognised at Renison, from

the first order FBF and Argent Faults associated with the margins of the PHG intrusion; to the second order listric extension Transverse Faults that interconnect the first order structures and act as basal detachments above an apophysis in the PHG; to third order synthetic and antithetic faults that are parasitic upon the Transverse faults; to the finest microfractures within dolomite horizons only visible using catholuminescence. All these structures are important for assisting in focussing large volumes of hydrothermal fluids away from apophyses in the granite and into potential trap sites for mineralisation.

In summary, the forceful emplacement of the PHG has been crucial for the structural preparation of host sediments for carbonate replacement styles of mineralisation, observed at Renison. Development of conjugate fault sets along the roof of the PHG, but not associated with major bounding faults, have been recognised but only the NW trending faults have been dilational and therefore hosted weak stanniferous mineralisation. This suggests that perhaps economic Renison style deposits will only be associated with first order structures that propagate off the margins of granite ridges rather than with those associated with roof pendants. Finally, it has been hypothesised that significant first order fault structures associated with granite emplacement may not be created close to UMC's and because of this such areas should be considered of low prospectivity.

**C. STRATIGRAPHY****(i) Correlation of Stratigraphic Units:**

A working understanding of the stratigraphy of the Success Creek Formation (SCF), Renison Mine Sequence, Crimson Creek Formation (CCF) and Dundas sediments would be of assistance to any geologist within the Renison-Dundas area. Such a knowledge would assist in:

- (a) predicting depth to the mine sequence dolomites,
- (b) interpretation of fault locations and extent of displacement,
- (c) correlation between carbonate units and
- (d) recognition of potential hosts to mineralisation.

To date, the Renison Mine Sequence (RMS) is well constrained and includes easily recognisable marker horizons. Morrison (1993) has established a preliminary set of sub units in the lower 900 m of the Crimson Creek Formation but a potential 2500 m of this Formation is still undifferentiated. The Success Creek Formation has had the top 100 m interpreted but a further 1000 m remains undifferentiated and the Cambrian Dundas formation has been subdivided but a great deal of conjecture still exists with this formation in areas out of the type section described by Elliston (1951).

It becomes immediately apparent that our knowledge of the Renison-Dundas sediments, even now, is very limited and it will only be through detailed, painstaking and systematic stratigraphic observations of existing drill-core and field relationships that satisfactory progress will result. Morrison (1993) has shown that across the Renison district correlations are possible and he has demonstrated that facies and structural variations within the RMS and CCF have occurred from the NW to SE (Owen Meredith to Pine Hill) and W to E (Tunnel Hill to Pine Hill and approaching the FBF). By encouraging sedimentologists and academics to undertake research in this area a great deal of information can still be gained that will readily assist exploration geologists searching for Renison style Sn deposits.

(ii) **Potential for Carbonate Replacement:**

Carbonate replacement mineralisation has been recognised throughout the Dundas Trough within the Precambrian Oonah; the Eo-Cambrian SCF, RMS and CCK; the Cambrian Dundas formation; the Ordovician Gordon Limestone equivalents; and in altered Cambrian UMC's. Within the Renison-Dundas district the most prospective carbonate units likely to host Renison style deposits are the SCF, RMS, CCF and Dundas Sediments.

Mineralised carbonate units in the SCF beneath Renison have been recognised (Lea, 1991). Historically, however, all drilling has ceased once the RMS has been passed through and therefore potential still exists for a significant deposit beneath Renison within the SCF.

The CCF like the RMS also hosts replacement style deposits where major feeder faults occur at appropriate distances from the fluid sources to form distal skarns rather than proximal skarns (e.g. Federal 2035 and 2170, Dalcoath Open-cut).

Significant dolomite horizons have also been recognised in the Dundas sediments and include the Maestries dolomitic conglomerate and a 100 m thick unit noted by Delbin (1990, In Crossing 1991) near Carbine Hill.

In summary, our knowledge of the stratigraphy within the Renison-Dundas area is still somewhat rudimentary and a great deal of advancement can still be made by those sedimentologists prepared to undertake the laborious steps necessary to unravel the stratigraphic maze. The spoils to be gained include predicting depths to potentially mineralised carbonates, estimates of locations and throws on major fault structures, and correlation of stratigraphic units across large distances of the Dundas Trough.

## D. MINERALISATION

### (i) **Alteration (metamorphism, metasomatism, and vein paragenesis):**

A general model for alteration zonation has been documented by Morrison (1993). This model developed in conjunction with Paul Kitto has been further refined and is presented in Tables 1, 2 and 3.

Contact metamorphism during the emplacement of the PHG has changed the mineralogy and texture of adjacent host rocks (andesitic greywackes, impure limestones, pelites, dolomites and sandstones) to hornfels but has not changed the bulk chemistry of these sedimentary units. Two zones of hornfelsing are recognised (Table 1). The first is a spotted cordierite hornfels developed in non calcareous hosts within ~ 100 m of the granite contact and the second, a dark brown biotite hornfels seen up to 800 m from the granite contact. This region may extend up to 1000 m from the granite in areas associated with major bounding faults, such as the FBF. Morrison (1993) has recognised in drill core that the metasomatic zones overprint the hornfels but in general the outer limit of biotite hornfels roughly coincides with the change from chlorite or amphibole to carbonate metasomatic zones.

The metasomatic mineral assemblages, relating to fluid expulsion from a cupola which forms veins and replacement mineralogies with different bulk chemistries from the host, has been grouped into 6 zones and named according to the major mineral (Table 2). the Skarn Zone (proximal) can be further divided into subunits identified by Manly (1982) and recognised in metasomatised limestones of the CCF at Pine Hill. The zonation pattern illustrates declining temperature gradients away from an apophysis associated with the PHG. Because of zonal collapse with declining temperature and the inward overprint of outer cooler zones upon inner hotter zones the outermost occurrence of high temperature assemblages determines the cut off for each zone.

Morrison (ibid) has illustrated that the apophysis on Pine Hill was the fluid source that resulted in the overall zoning pattern but that another apophysis must be present

beneath the Renison Mine. This has also been hypothesised by Kwak (1987), Kitto (1991 & 1992) and Bajwah (in press) to explain the distal skarn assemblage, the deformation structures and the granite alteration features associated with the Renison deposit.

A preliminary detailed vein paragenesis and deformation history has been documented in Table 3. This has been developed for the FBF based on underground mapping, drill core logging, handspecimen descriptions and thin section microscopy. Although this paragenesis is for the FBF it is most likely to be applicable to a far wider area. This report is not the place for a detailed discussion of the vein paragenesis except to say that the 5 stages identified in the table can be recognised throughout different metallogenic zones of the Renison-Dundas district.

(ii) **Metal Zonation:**

Regional gravity lows have highlighted the fact that Devonian granite intrusions occur throughout Tasmania and that in particular the granite ridge between Heemskirk Granite and Granite Tor is of primary interest because of classic metal zonations around the Heemskirk Granite and the fact that Renison is located along the granite ridge. Figure 3 from Leaman & Richardson (1989) illustrates the obvious relationship that exists between Devonian vein systems and depth to the subsurface granite ridge. Figures 4 and 5 illustrate very nicely for the Renison-Dundas district a classic telescoped metal zonation around the PHG beginning with a central Sn-rich core and passing out through a Cu-zone to a peripheral Ag-Pb-Zn zone. Cross-sections, seen in Figure 6, also illustrate the beautiful zonal nature of the mineralisation about the PHG. In particular, the small Sn window at Razorback and Grand Prize mines can be satisfactorily explained by gravity models for the PHG.

Interestingly enough oxygen isotope values for quartz from main stage mineralisation both along the FBF and on a district scale correlate very closely with the observed metal zonation patterns (Figures 7 and 8).

In summary, a classic metal zonation pattern has been identified around the PHG

based on gravity models for the intrusion and base metal distributions associated with mines and prospects. Exploration within the Renison-Dundas telescoped mineral field has been greatly assisted with the development of alteration models for contact metamorphism, metasomatism and vein paragenesis. Preliminary oxygen isotopes investigation also appear to provide a very useful exploration tool.

908015

### 3. RECOMMENDATIONS

The following recommendations for the RML together with EL 101/87 and EL 13/88 have been made, based on the exploration criteria for Renison style Sn deposits that have been outlined at the beginning of this report.

#### 3(a) The RML

- (i) The eastern half of the RML from Tunnel Hill to the Ring River is underlain by the PHG which plunges to the NW from Pine Hill under the mining lease. This area still remains highly prospective and should be retained.
- (ii) The western half of the RML which has historically been retained for a tailings dam should be assessed for its mineral potential and if un-prospective relinquished. This area has recently been mapped by Dr Bob Finlay from the Tasmanian Department of Mines and he has interpreted a carboniferous thrusting event analogous with the Tenth Legion Thrust. Discussions with him may prove fruitful.

If this area proves unprospective it should be relinquished as new tailings dams in this western area appear most unnecessary.

- (iii) Within the Renison M.L. Tunnel Hill would be the most prospective area outside of the immediate mine and recommendations outlined by Morrison (1993) should be implemented. This involves a review of the stratigraphy and alteration seen in existing DDH's, an interpretation of fault locations together with a detailed gravity survey prior to selection of potential drill targets.
- (iv) The second most prospective area on the RML is the region immediately south of the Argent Dam and north of the Tuesday Fault Grid of Lea (1991), (see Map 1). This region consists of the Crimson Creek Formation underlain by the Renison Mine Sequence. Gravity modelling by Leaman (1990) has

identified a weak apophysis in the PHG under this region (-250 m granite contour). Lea (1991) has also identified an aeromagnetic anomaly and minor workings can be seen to occur on the eastern edge of the area. The eastern edge of this zone corresponds to the boundary b/w Morrison's (1993) MSW and DHM/DM. If this represents a major fault structure along the eastern margin projected off an apophysis in the granite then prospectivity in this area is high. It should also be pointed out that only one DDH (S376) is located in this area. Close proximity to the granite may however lower the potential for carbonate replacement style mineralisation.

**3B. EL 101/87 and EL 13/88**

Prospecting within EL 101/87 and EL 13/88 for Renison style deposits can be narrowed down to three zones:

- The south western side of EL 101/87 from Razorback through to Grand Prize and then onto CRA's EL 43/92 before joining the RML at Tunnel Hill.
  - On Carbine Hill in the region overlapped by both EL 101/87 and EL 13/88.
  - The Exe River - Tin Vein area in the north eastern corner of EL 101/87.
- (i) The Razorback - Grand Prize area of EL 101/87 sits above an apophysis in the PHG, has a well developed fault structure, Sn mineralisation, and falls within the defined Sn field for oxygen isotope values in quartz. This area therefore has all the criteria necessary for Renison Style Sn deposits except good carbonate host rocks. The carbonate after serpentinite at the Razorback Mine, for example, is believed to have been too ductile to allow the infiltration of large volumes of Sn-rich hydrothermal fluids into the host sequence to enable large replacement ore bodies to form.

Considering the large exploration efforts already committed to this region by previous explorers it would appear that unless favourable host rocks can be found that this area is low in prospectivity and relinquishment of EL 101/87 and EL 13/88 below 5365000m N would be appropriate.

- (ii) At Carbine Hill Leaman (1990) has identified a weak apophysis associated with the -600 granite contour that very much resembles a similar structure beneath Renison. If this apophysis represents a late phase granite intrusion associated with Sn as proposed by Kitto (1991) for Renison then we have a highly prospective area. This area may overlap with the Minops (Godkin) exclusion zone (!) within EL 101/87. Fault structures through this area include the NNE trending Great Northern Creek Fault. This suggests that some structural preparation of host rocks does occur. Delfin (1991) reported a 100 m thick dolomite unit in the area and Crossing (1991) has recommended that stratigraphic drilling be undertaken, should the tin price improve.

The carbonate replacement criteria indicators for this area would indicate high prospectivity and it is recommended that a detailed gravity investigation by D Leaman be undertaken based on density and susceptibility measurements of handspecimens taken from this area.

Renewal of EL 101/87 and EL 13/88 across this area should be proceeded with.

- (iii) In the north-east corner of EL 101/87 is the East Renison - Fentons Gar prospect (Fig. 9). Comstaff proved up reserves in the Fin Vein of 0.38 mt at 0.94% Sn and adjacent to this in the Salmons Vein reserves of 0.65 mt at 247 g/t Ag, 5.4% Pb and 3.3% Zn. Beneath this area Leaman has failed to provide an appropriate gravity interpretation due to inaccessibility.

It is recommended that this area between Colebrook Hill and Renison undergo a detailed gravity survey as its prospectivity according to the criteria outlined is high. It occurs over a weak apophysis in the granite, it has been somewhat prepared structurally, Sn mineralisation is well demonstrated but the stratigraphy is poorly understood. A stratigraphic and alteration interpretation of existing DDG's housed at the Zeehan core shed of RGCE could be easily accomplished.

1  
This northeastern corner of EL 101/87 appears highly prospective, should be retained, and warrants detailed study. Depending upon the results of this investigation the area east of and adjacent to 101/87, toward Colebrook Hill, should be considered for acquisition although it has previously been held by RGCE.

Some thought should also be given to opening this area up to contract exploration companies such as Minetec (Tim Ackerman) but this would require obtaining this area as part of the RML.

**4. SUMMARY OF RECOMMENDATIONS FOR RML AND EL'S 101/87 & 13/88**

- (i) Retain the sections of EL 101/87 and EL 13/88 that occurs north of 5365 000 m N. This area contains the prospective zones associated with Exe River Tin Veins and Carbine Hill.
- (ii) Consider relinquishment of the western portion of the RML previously planned for tailings dams.
- (iii) Re-evaluate the area just east of EL 101/87 between Renison and Colebrook Hill based on the exploration criteria outlined in this report. this area may be re-considered for acquisition pending these findings.
- (iv) Proceed with detailed gravity investigations across four prospective areas covered by the RML and the EL's. These areas are:
  - (a) Tunnel Hill
  - (b) Tuesday Fault Grid - Argent Dam
  - (c) Carbine Hill above the apophysis in the -600 m granite contour
  - (d) Exe River - Tin Vein.
- (v) Consider acquisition of the Exe River - Tin Vein area in the north east section of EL 101/87 as part of the RML and then open it up to contract miners such as Minetec. Information obtained from mining in this area would assist in interpreting the CCF and the area west toward Renison.
- (vi) Proceed with the next phase of exploration at Tunnel Hill which would involve a review of the stratigraphy and alteration as well as a structural interpretation of major faults and their associated displacements.
- (vii) At the very least the retention of these areas outlined above provide some buffer to exploration by other companies around the RML and should therefore be retained.

5. REFERENCES

- Bajwah, Z. U., A. J. R. White, T. A. P. Kwak, and R. C. Price, (in press) "The Renison Granite, western Tasmania: a petrological, geochemical and fluid inclusion study of hydrothermal alteration." Econ. Geol.
- Burnham, C. W., 1979. "Magmas and hydrothermal fluids." In Geochemistry of Hydrothermal Ore Deposits, ed. H. L. Barnes. 71-136. 2nd Edition ed., Vol. John Wiley & Sons.
- Crossing, D. J. F., 1991. E. L. 101/87 Dundas and E. L. 13/88 Moores Pimple annual report 1990/91. RGC Exploration Pty Limited (unpubl.).
- Elliston, J. 1950. "Dundas Mineral Field." B.Sc. (Hons.) unpubl., University of Tasmania.
- Heinrich, C. A., 1980. "The chemistry of hydrothermal tin (-tungsten) ore deposits." Econ. Geol. 85: 457-481.
- Heinrich, C. A., R. W. Henley, and T. M. Seward, 1989. Hydrothermal systems. Adelaide: Australian Mineral Foundation.
- Kitto, P. A., 1990. The history of brittle deformation and reactivation at the Renison Tin Mine, Tasmania. Renison Tin Mine. Company report
- Kitto, P. A., 1992b. "The geological and structural controls on mineralisation at the Renison Tin Mine." Bull. Geol. Surv. Tasm. 70: 97-117.
- Kitto, P. A. and R. F. Berry. 1991. "A history of brittle deformation and related mineralisation at the Renison Tin Mine, Western Tasmania." In SGEG Ore Fluids Conference in Canberra, Bur. Miner. Res. Geol. Geophys. Aust.,
- Kitto, P. A. and R. F. Berry. 1992. "Structural controls on mineralisation at the Renison Tin Mine, western Tasmania." In 11th Aust. Geol. Convention in Ballarat. 70-71.
- Kwak, T. A. P., 1987. W-Sn skarn deposits and related metamorphic skarns and granitoids. Vol. 24. Developments in Economic Geology.
- Large, R. R., 1989. "Metallic Mineral Exploration Models and Case Histories." In Geology and Mineral Resources of Tasmania, ed. Burrett C. F. & Martin E. L. (eds.), 574. Spec. publ. 15. Geol. Soc. Aust.
- Lea, J. R., 1991. Renison mine lease exploration: Models, concepts, interpretations and future directions. Renison Limited, Mine report (unpubl.)
- Leaman, D. E., 1986. Gravity interpretation west and northwest Tasmania. Geophysical Report Mt. Read Volcanics Project. Dept. Mines Tasmania.
- Leaman, D. E., 1990. Renison mine lease gravity survey. Renison Mine. Unpubl. report, Leaman Geophysics
- Leaman, D. E. and R. G. Richardson, 1989 "The granites of west and north-west Tasmania: a geophysical interpretation." Bull. Geol. Surv. Tas. 66: 146pp.
- Manly, M. 1982. "Mineralogy and paragenesis of skarns occurring at Pine Hill, Renison Bell district, North West Tasmania." Hons. (unpubl.), La Trobe University.
- Marjoribanks, R. W., 1990. Structural observations of the Renison Mine area with some exploration implications. Renison Limited. Mine report (unpubl.)
- Morrison, G. W., 1993. Stratigraphy of the Crimson Creek Formation in the Renison mine lease and implications for exploration. Renison Tin Mine. Mine report (unpubl.)
- Plimer, I. R., 1987 "Fundamental parameters for the formation of granite related tin deposits." Geol. Rundschau 76: 23-40.



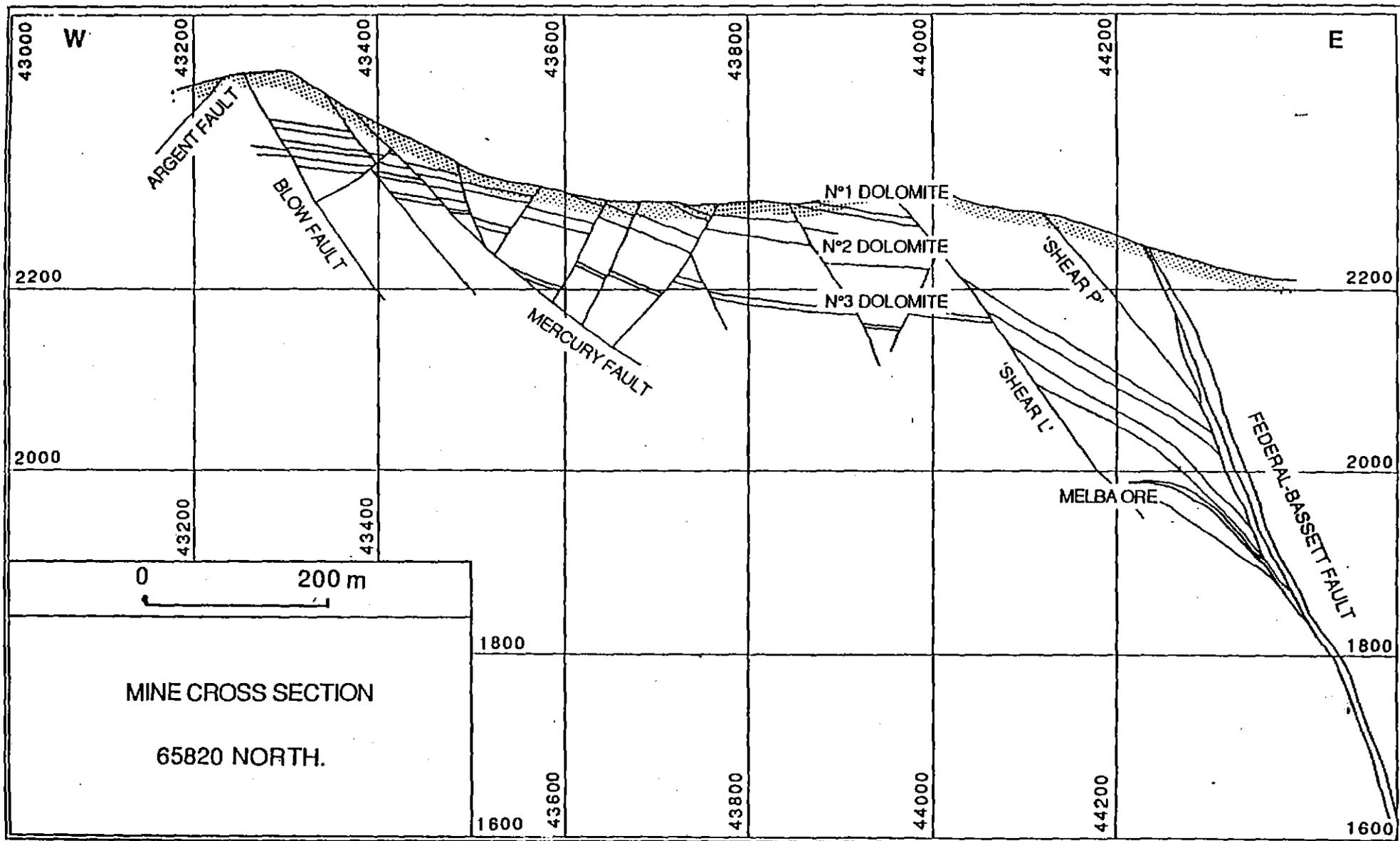


FIGURE 2 (from Kitto, 1991)

5 cm

260806

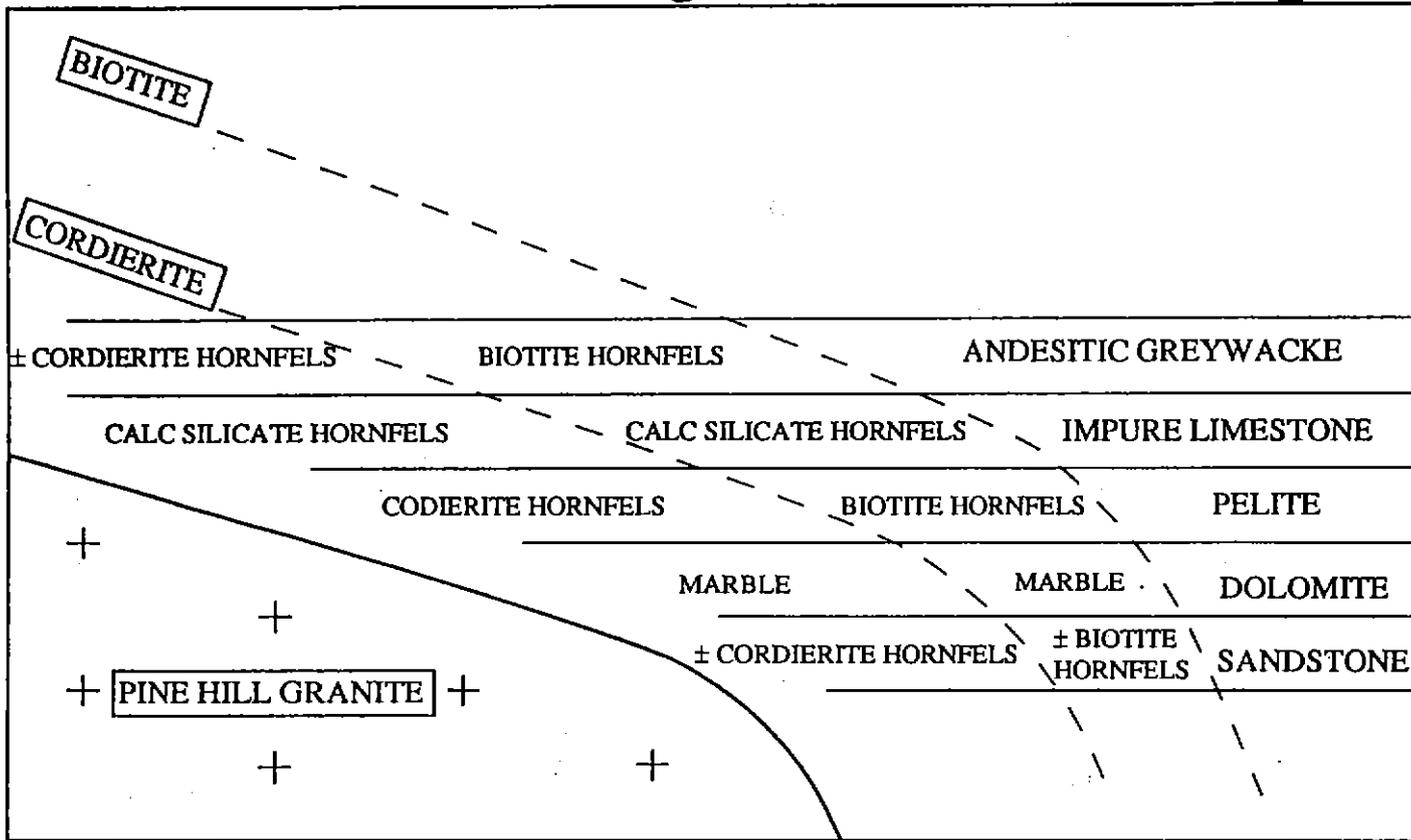


TABLE 1. Contact metamorphic mineral assemblages associated with the Pine Hill intrusion, Renison.





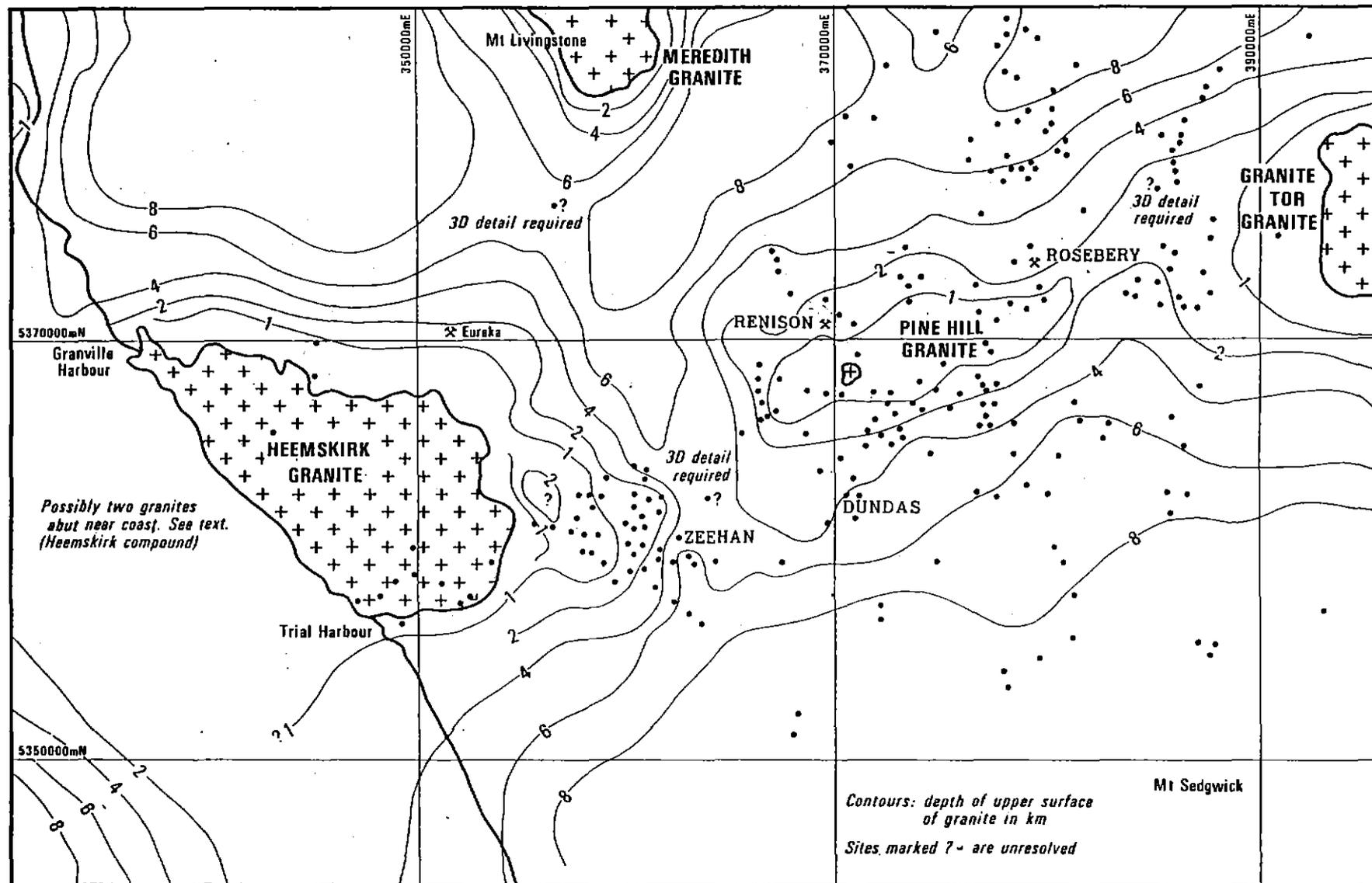


Figure 3. Provisional interpretation of the form of the Heemskirk and Pine Hill granites. Mineralised sites (indicated \*) from Leaman (1986a) and Bamford and Green (1986).

FIGURE 3.  
(From Leaman + Richardson, 1989)

5 km

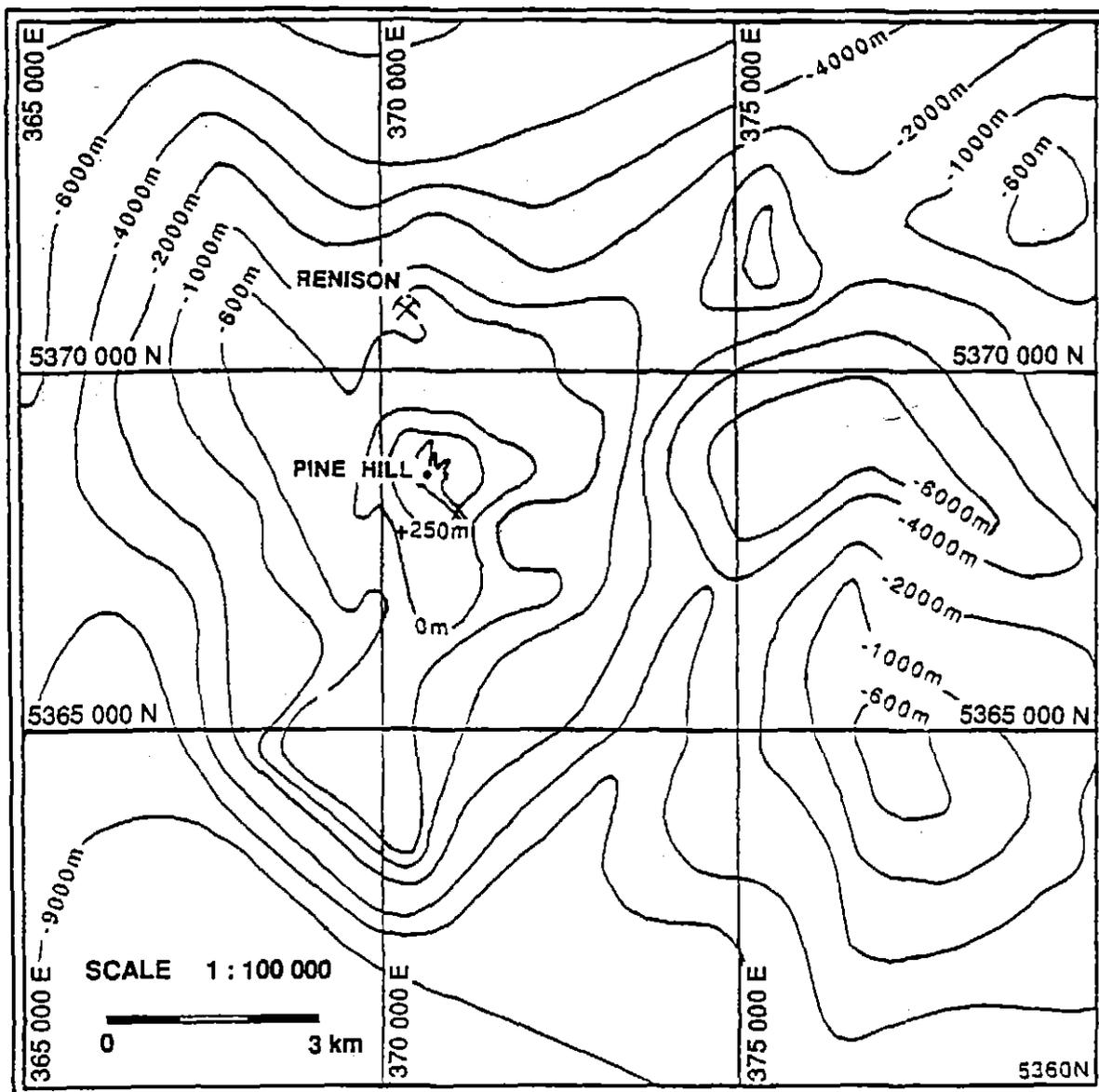
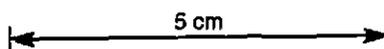


Figure 4. Pine Hill Granite contours (from Leaman, 1990).



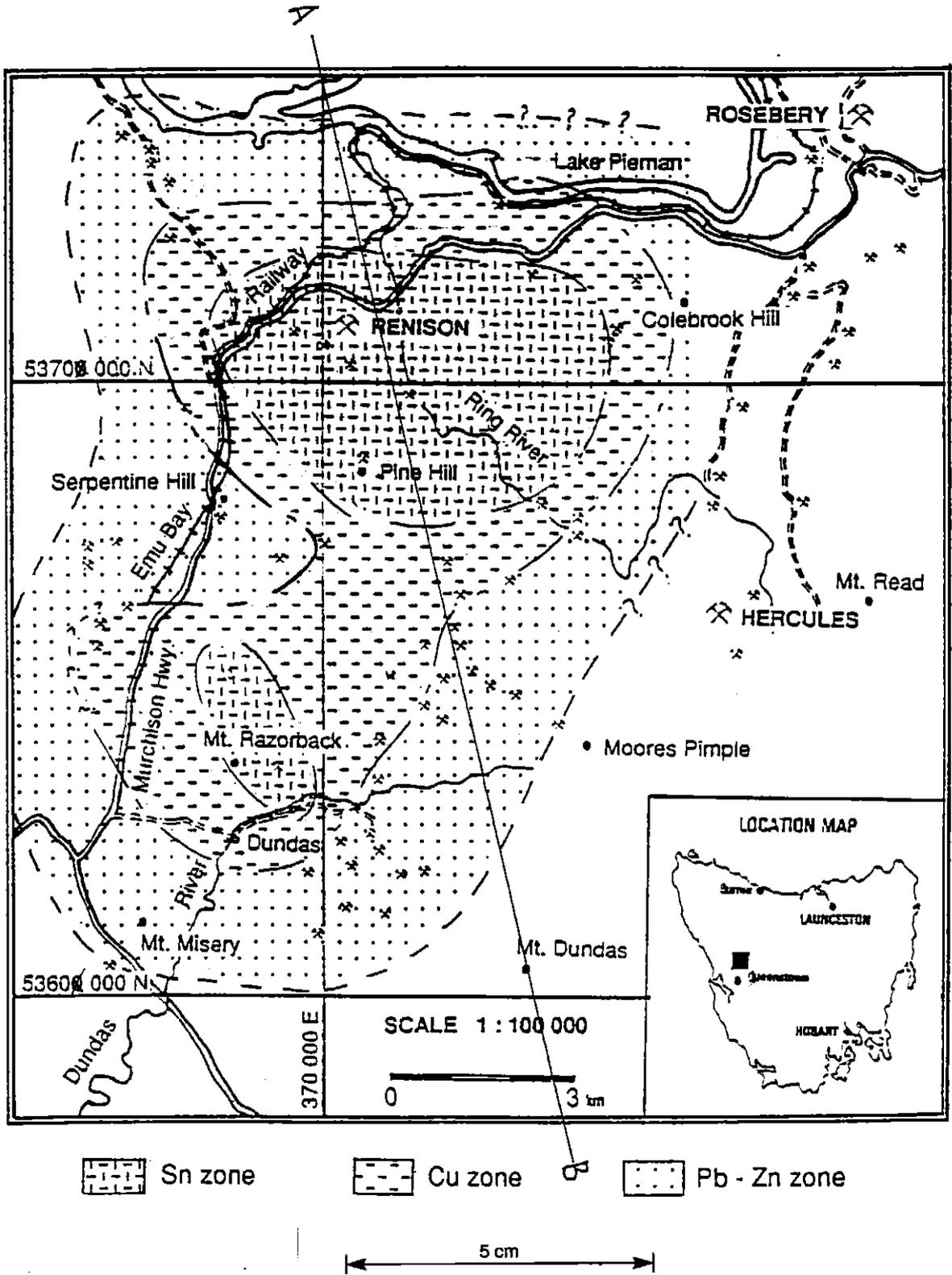
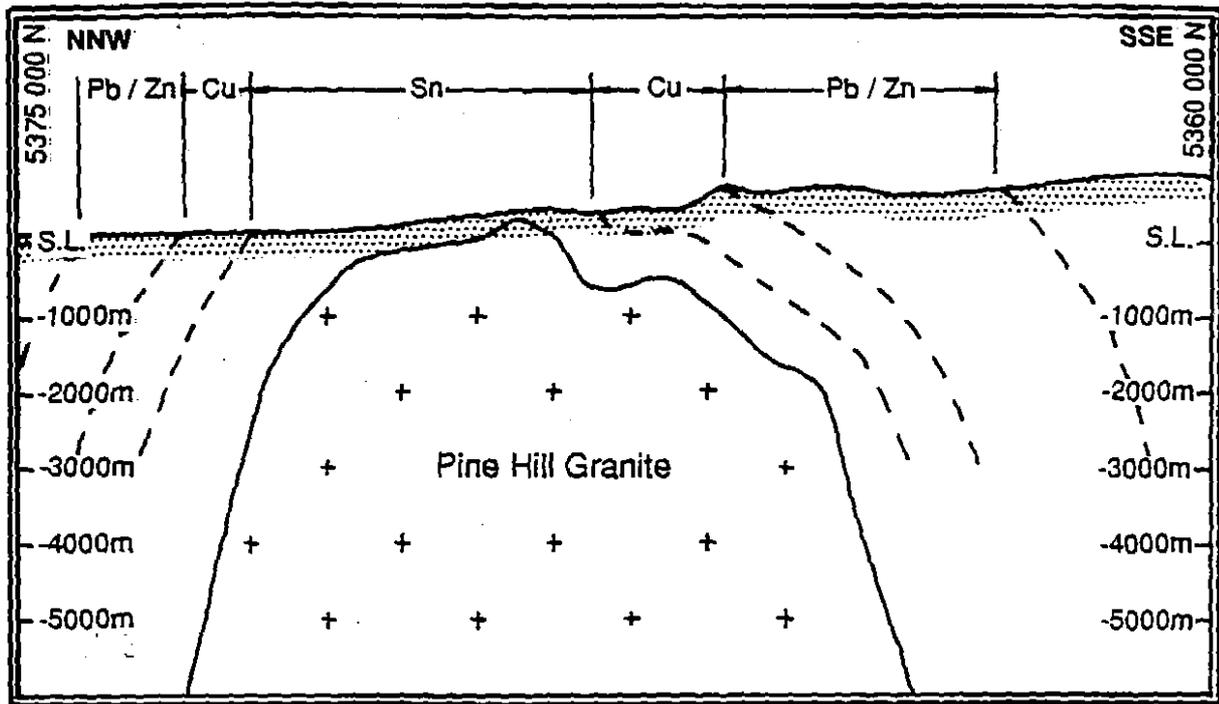
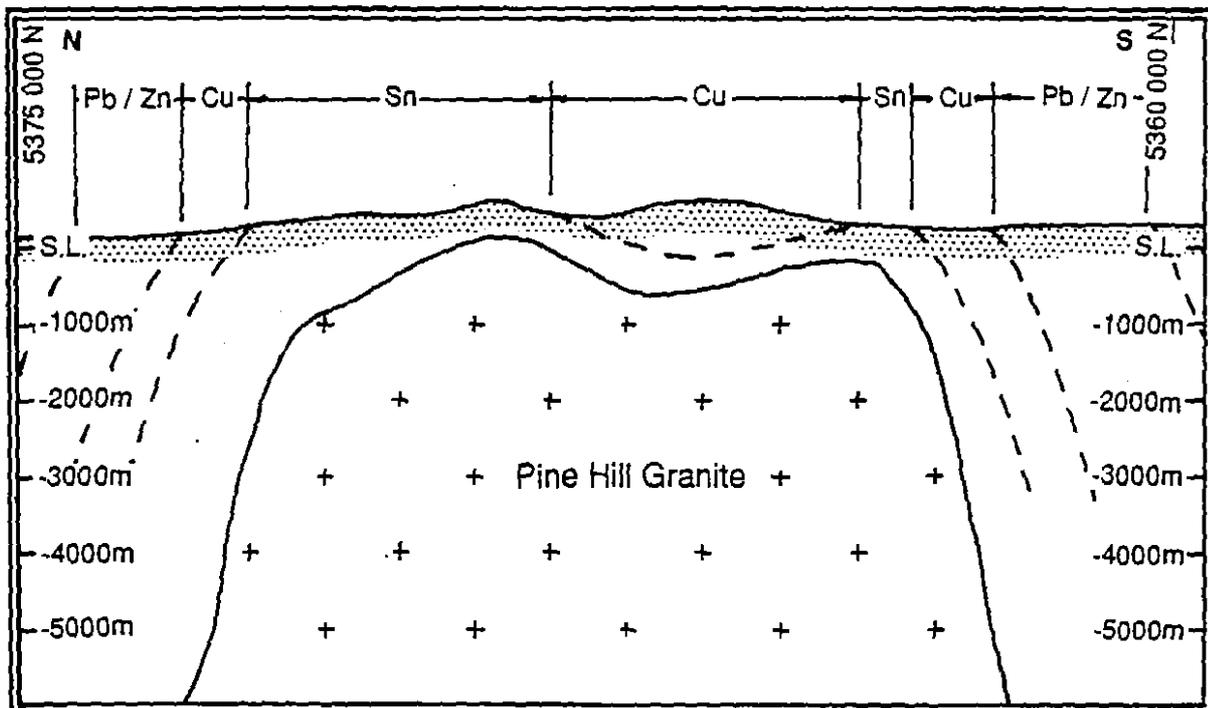


Figure 5. Mineral zonation around the Pine Hill Granite, Renison - Dundas mineral district.



(a) SECTION A - B

5 cm



(b) SECTION 370 000 E

Figure 6a, b Cross sections of the Renison - Dundas mineral district.

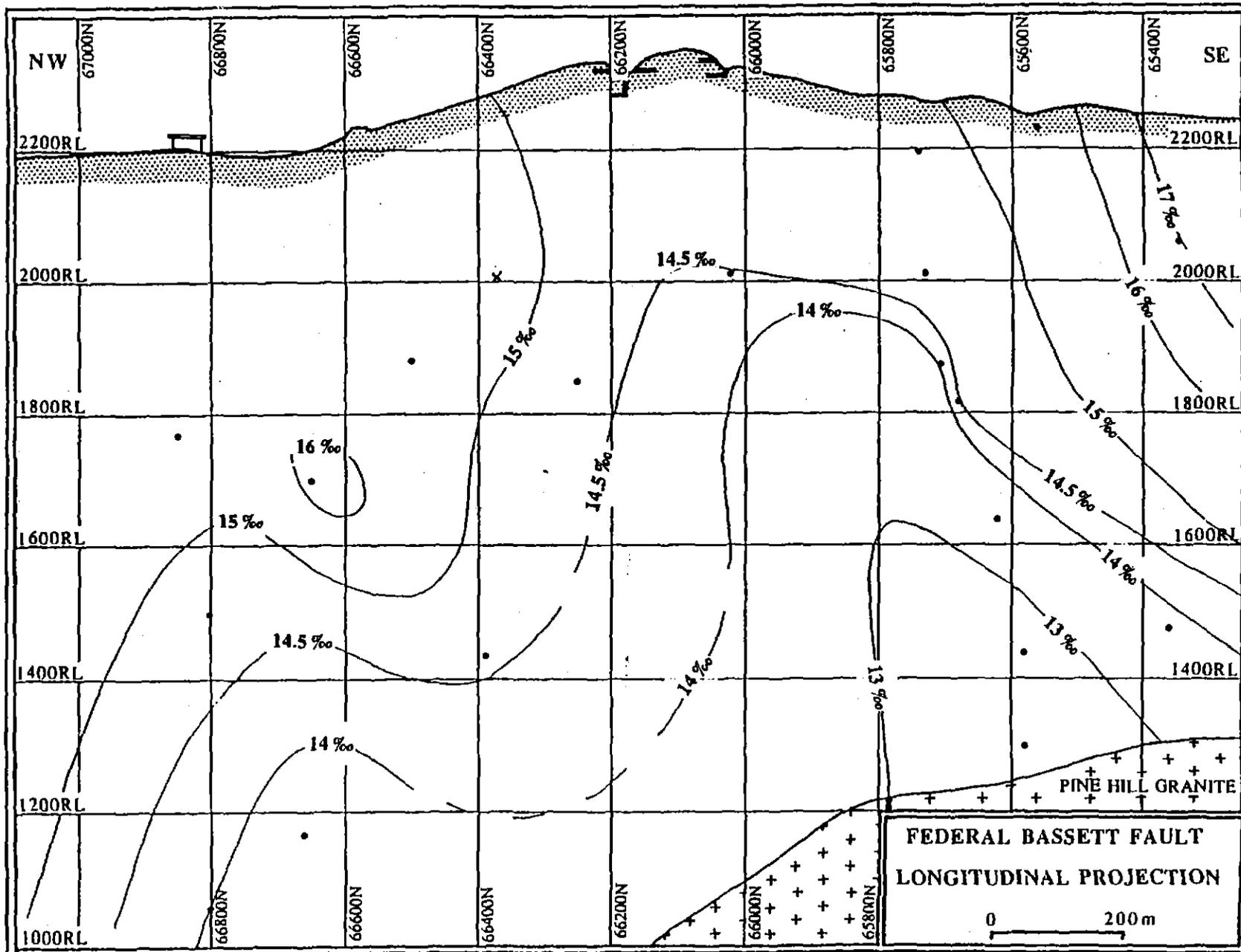


Figure 7. Contours for  $\delta^{18}O_{Qtz}$  from the main stage of qtz.-po.-cass. mineralisation, Renison Tin Mine.

0 200m  
5 cm

908030

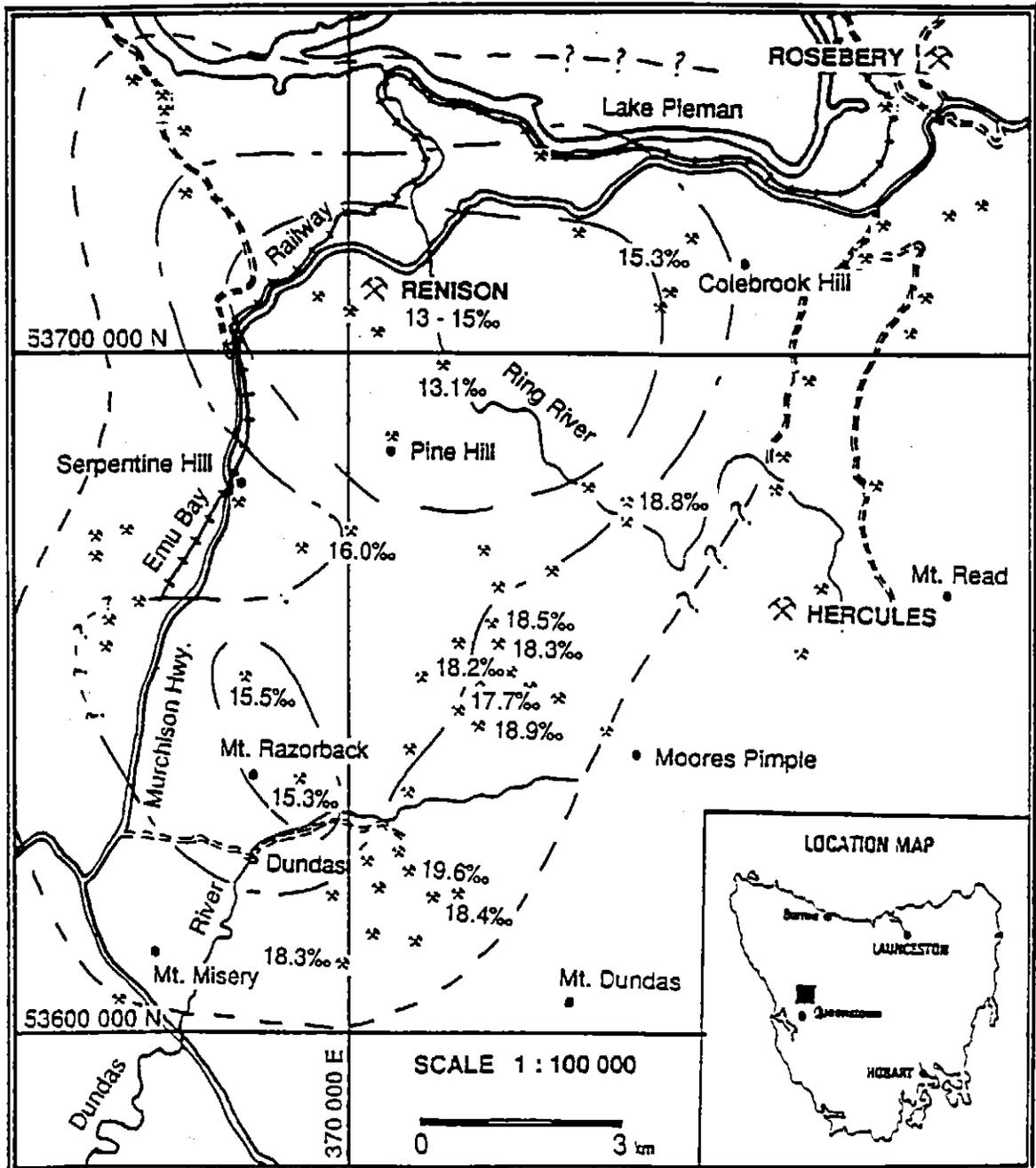
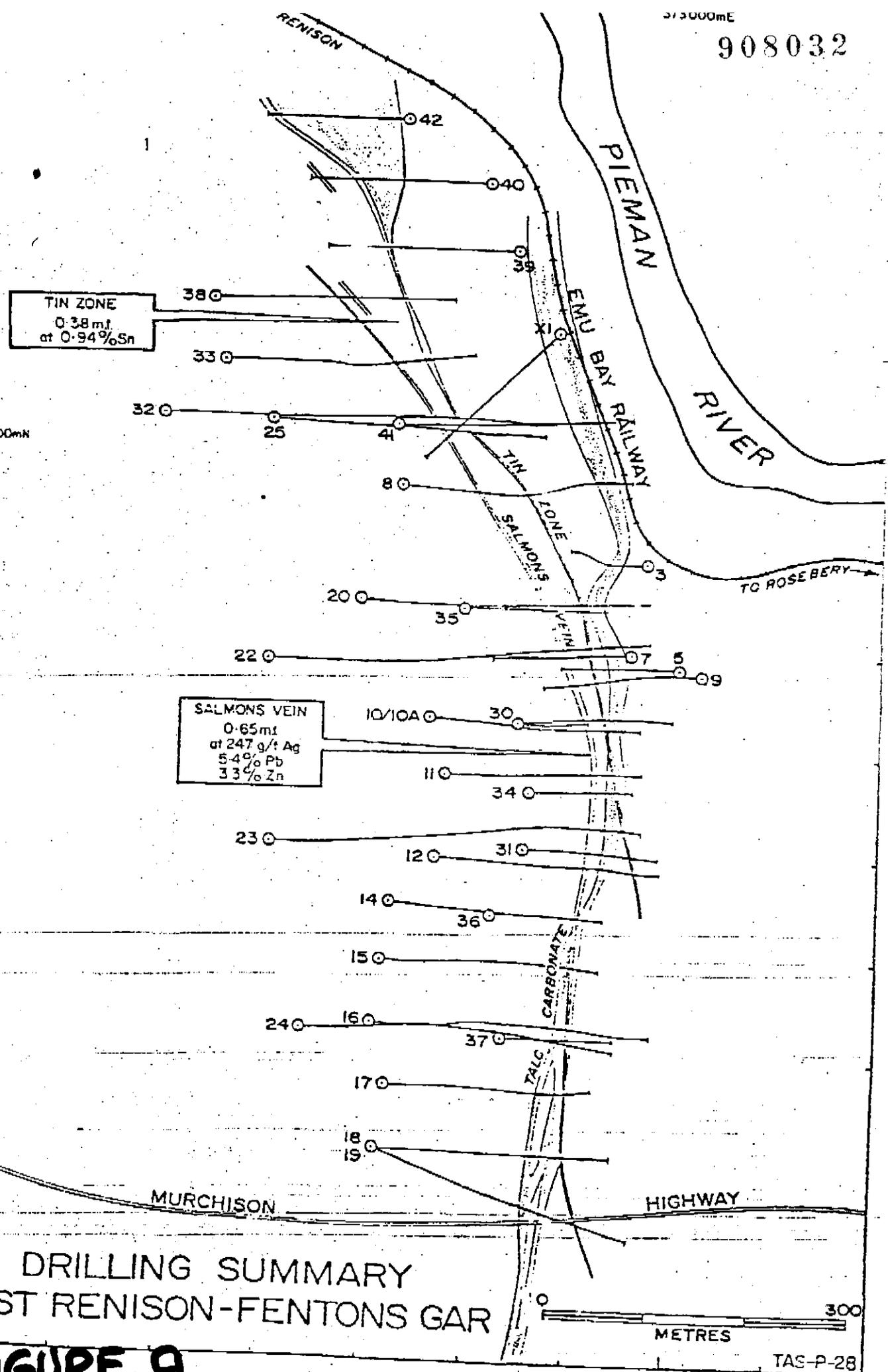


Figure 8.  $\delta^{18}O_{Qtz}$  values and metal zonation, Renison - Dundas mineral district.

5 cm



DRILLING SUMMARY  
 EAST RENISON-FENTONS GAR  
**FIGURE 9.**