

000

227001

J.O.M.	A.O.	C.G.	E.O.	D.S.M.
				Registrar
B. DIR.	19 FEB 1985			E & IL
	DEPT. OF MINES			
REF. No. 1434/85				

**MICROFILMED**

**OPEN FILE**

EXPLORATION LICENCE 33/84

SCOTTSDALE, TASMANIA

1ST QUARTERLY AND FINAL REPORT

8TH FEBRUARY, 1985

B.A. McCONACHIE

COMALCO ALUMINIUM LIMITED

CONTENTS

	<u>PAGE NO.</u>
1. SUMMARY AND CONCLUSIONS	1
2. INTRODUCTION	2
3. OBJECTIVES	2
4. REGIONAL RECONNAISSANCE	2
5. GEOLOGICAL FRAMEWORK	4
6. AIRPHOTO GEOLOGICAL INTERPRETATION	4
7. GEOLOGICAL HISTORY	4
8. SAMPLING	6
9. SEISMIC REFRACTION	6
10. REFERENCES	8

TABLES

1. KAOLIN ANALYSES
2. AVERAGE SEISMIC VELOCITIES

MAPS

1. TENEMENT LOCATION MAP
2. TOPOGRAPHY
3. PRELIMINARY AIRPHOTO GEOLOGICAL INTERPRETATION
4. REFRACTION SEISMIC TRAVERSE, HAND AUGER HOLE AND SAMPLE LOCATIONS

APPENDIX

1. SEISMIC REFRACTION

1. SUMMARY AND CONCLUSIONS

This report is based on two reconnaissance surveys within EL 33/84 and preliminary field investigations in the Gladstone and Back Creek areas of Northeast Tasmania.

Where in situ kaolinized granite is exposed at the surface it is deeply scarred by erosion channels due to the low wet strength of the material. The absence of exposed kaolinized granites within EL 33/84, except at Tonganah, suggests that none are present along the modern river channels.

The extent to which kaolinized granite might be preserved below areas of thicker tertiary sediments is difficult to estimate. To do this, further testing of these areas will be necessary.

The quality of the low iron kaolinized granites sampled at Tonganah and in the Gladstone region is poor due to the high percentage of alkalis present, particularly potassium.

Our management has made a decision to indefinitely defer our aluminium/silicon alloy project and, as the potential for locating an economic deposit of pure low iron kaolin within EL 33/84 is unlikely as a result of this work, we have decided to relinquish Exploration Licence 33/84 Scottsdale.

2. INTRODUCTION

Map 1 shows the location of Scottsdale EL 33/84. This was taken up by Comalco in order to locate a deposit of low iron kaolin suitable for the production of aluminium silicon alloys. It was envisaged that a kaolinized low iron granite would be suitable. An established kaolin mining operation is located at Tonganah (Map 2) where APPM obtains filler for the paper manufacturing industry.

3. OBJECTIVES

1. To investigate the regional Cainozoic geology of Northeast Tasmania and to note occurrences of low iron kaolin.
2. To check and refine the airphoto geological interpretation of the Scottsdale area within EL 33/84.
3. To locate and sample areas containing low iron kaolin within EL 33/84.
4. To test the suitability of the seismic refraction method to define decomposed granite profiles at the Tonganah kaolin deposit.
5. To test potential areas within EL 33/84 using the refraction method, in order to determine the thicknesses of decomposed kaolinitic granite present.

4. REGIONAL RECONNAISSANCE

(a) Back Creek Area

Kaolinized Middle Paleozoic sedimentary rocks of the Mathinna Beds are exposed in cuttings in this area. The kaolin occurrences recorded at Back Creek have probably resulted from mudstone beds within this unit. These beds exhibit extensive faulting causing poor lateral continuity and the depth of kaolinization was shallow in all outcrops studied. No thick kaolinized claystone beds appear to be present, only silty mudstones. For these reasons, this area is not considered to have significant low iron kaolin potential.

147°00'

147°30'

227005

BASS STRAIT

ANDERSON BAY

Bridport

GEORGE TOWN

EL. 33/84

Scottsdale

LAUNCESTON

Tasman Highway

East Tamar Highway  
TAMAR RIVER

PORT DAIRYMPLE

41°00'

41°30'

N. E. TASMANIA

TASMANIA

HOBART

SCOTTSDALE  
LAUNCESTON

5 cm

10 0 10 20 30 40 kilometres

SCALE.

MAP I.

TENEMENT LOCATION MAP

E.L. 33/84



COMALCO  
EXPLORATION DEPARTMENT

COMPILED: B.F.B. 15 / 6 / 1984

DRAWING N°

DRAWN: B.F.B. 15 / 6 / 1984

TAS / 84 / 398.

(b) Gladstone Area

Threader (1984) has noted the presence of low iron decomposed granite at a number of locations in the Gladstone region of Northeast Tasmania. Several of these areas were confirmed and one additional area west of Mt Cameron was located during a one day reconnaissance. Five samples were taken for analysis. The following aspects of the regional geology were noted.

- (1) Where in situ kaolinized decomposed granites are exposed at the surface, they commonly exhibit steep sided erosion gullies which cut deeply into the soft kaolin. In some areas, surficial residual sand concentrations had been mined from these areas, probably to obtain concentrated heavy minerals, principally cassiterite. It was later learned from local residents that the Tonganah kaolin deposit had been known from surface exposure long before APPM "discovered" it. (It was used locally to whitewash chimneys and fireplaces in the 1920's).
  
- (2) Throughout the region, but particularly well exposed at Derby, poorly consolidated Tertiary sandstones and conglomerates are preserved as deep leads under basalt flows. These sequences are trough crossbedded and exhibit coarsening upward cycles near Branxholm. The conglomerates there are polymictic and contain what appear to be transported intraformational kaolin clasts. Alternatively these may represent mudstone clasts kaolinized in situ and then protected from iron bearing solutions in the modern weathering environment by their relative impermeability. Principally, these Tertiary sediments appear to have been derived from granites although silcrete, igneous and metamorphic pebbles are also present. When weathered, sandy Tertiary sequences are very difficult to distinguish from the residual deposits of kaolinized granites.

5. GEOLOGICAL FRAMEWORK

McClenaghan et al. (1982) studied much of the area covered by EL 33/84 as part of a comprehensive report on the Boobyalla and Ringarooma areas. The following units recognised within EL 33/84 are based largely on that work.

- Quaternary      River alluvium, swamp deposits ? and scree
  
- Tertiary        Basalt flows
  - Mudstones, sandstones and conglomerates
  - Swamp deposits ?
  - Silcrete and kaolin paleosols
  
- Upper            Granodiorite and adamellite of the Scottsdale
- Devonian to     Batholith
- Lower
- Carboniferous
  
- Ordovician ?    Contact metamorphosed psammite, pelite and
- Devonian        schist of the Mathinna Beds

6. AIRPHOTO GEOLOGICAL INTERPRETATION

A geological map based on an uncorrected mosaic of six black and white, 1:42 000 scale air photos has been produced as a result of this field work (Map 3). The Tertiary basinal characteristics and the stratigraphic sequence present appear to be fundamental to the location of in situ, kaolinized, low iron granites.

7. GEOLOGICAL HISTORY

In the Scottsdale area the pre-Tertiary land surface was composed of the Scottsdale Batholith and the Mathinna Beds. During the Early Tertiary, lateritic weathering produced silcrete and kaolin paleosols over parts of the irregular land surface.

007

The Tertiary Scottsdale Basin (Trough) is defined by the Sideling Range in the west and the Kapai and Kamona Ridges in the east. In the south, South Springfield on the Maurice High Plains forms the boundary while to the north the basin is covered by Quaternary sand dunes and was presumably open to the sea.

Initial Tertiary sedimentation in the Scottsdale Basin consisted of mudstone, siltstone, sandstone and conglomerate deposited by mixed load rivers draining the surrounding lateritized highlands. Organic podsols known as 'coffee rock' are present within this sequence. The aerial extent of lateritization within the Scottsdale Basin is difficult to estimate. The only exposed in situ kaolinized granite is at Tonganah where the Tertiary cover is very thin. In the many other areas where this cover has been recently removed by modern weathering there is little evidence of preserved in situ kaolinized pre-Tertiary land surface. It is difficult to determine if this was largely stripped during the period of sedimentation or whether lateritization was inhibited within a large part of the basin. Certainly the presence of scattered silcrete boulders at Tonganah does suggest that a silcrete cap may have protected parts of that deposit.

The final phase of preserved Tertiary sedimentation in the Scottsdale Basin is the alkali olivine basalt plateau centred around Scottsdale. These are formed from two flows separated by up to 30 metres of clastic material. The depth to the base of the basalt at Scottsdale is 47 metres, with only 5 metres of sediment separating the upper and lower flows. Over most of the area the basalts are completely weathered to red soil and even the fresher material is considered too weathered for K/Ar dating. They are probably equivalent to the flows further east however, and these have been dated at 16 million years.

Where the basalts have been removed the underlying Tertiary deposits have weathered rapidly to form Quaternary alluvium. This material is very difficult to distinguish from in situ Tertiary rocks except along modern drainage channels. Where the Tertiary deposits have been reworked, in situ kaolin would also be removed.

## 8. SAMPLING

During this reconnaissance 15 hand auger holes each approximately two metres deep, were drilled within EL 33/84. No in situ low iron kaolin was encountered outside the APPM Tonganah Clay Mining Lease, 38M/76. The location of these auger holes is presented on Map 1.

Table 1 presents the kaolin analyses undertaken by Comalco Research Centre, Melbourne as part of this study. Samples 1 to 5 are kaolins from 10 to 16 metres depth from the northeast production pit at Tonganah (Map 4). Samples 6 and 7 were obtained from approximately 2 metres below the surface of the new northwest pit on the Tonganah lease. Samples 8 to 12 were obtained from surface outcrops of kaolinized granites in the Gladstone area.

The results of these analyses indicate that acceptable yields of low iron kaolin can be obtained from kaolinized granites. High levels of potassium (1 - 2%) are also present in almost every sample and this contaminant will be difficult to remove. Preliminary tests indicate that no significant reduction in potassium levels was achieved by -10  $\mu$ m fractionation.

## 9. SEISMIC REFRACTION

### (a) Outline

Within EL 33/84, ten reversed seismic refraction surveys (numbered T1 to T10) were carried out and the locations of these are shown on Map 4. Traverses T1 to T9 were located within Mining Lease 38M/76. T1 was an experimental line which has not been used in compiling results. T2 to T6 were conducted upon the natural ground surface, although in some cases this had been cleared and root-raked. T7 to T9 were run along the floors of mining pits or costeans. T10 was undertaken for the purpose of exploration north of Lucky Strike Peak.

TABLE 1 - KAOLIN ANALYSES

(-45  $\mu$ m fraction)

SAMPLE NO.	LOCATION	YIELD (-45 $\mu$ m) %	Fe <sub>2</sub> O <sub>3</sub> %	Al <sub>2</sub> O <sub>3</sub> %	Na <sub>2</sub> O %	K <sub>2</sub> O %	CaO %	MgO %	L.O.I. %
1	Tonganah - NE Pit	27.3	0.95	36	0.1	1.4	<0.1	0.1	12.6
2	Tonganah - NE Pit	24.1	0.95	36	0.1	1.8	<0.1	0.1	12.1
3	Tonganah - NE Pit	28.2	0.95	36	0.1	1.9	<0.1	0.1	12.3
4	Tonganah - NE Pit	29.8	0.80	35	0.1	2.2	<0.1	<0.1	12.0
5	Tonganah - NE Pit	81.8	1.05	35	0.1	3.3	<0.1	0.1	10.8
6	Tonganah - NW Pit	80.5	0.75	37	0.1	0.5	<0.1	0.1	13.1
7	Tonganah - NW Pit	48.3	0.85	37	0.1	1.3	<0.1	0.1	13.2
8	Gladstone	74.8	0.85	35	<0.1	1.2	<0.1	0.3	12.2
9	Gladstone	42.0	2.35	36	0.1	1.1	<0.1	0.6	13.0
10	Gladstone	86.5	1.35	35	<0.1	1.8	<0.1	0.2	12.5
11	Gladstone	42.8	0.85	38	0.1	0.9	<0.1	0.1	13.3
12	Gladstone	53.7	1.20	36	<0.1	0.5	<0.1	0.1	13.4

(b) Results

Distance - Time plots were produced for each traverse and the apparent velocities and layer compositions are summarized in Table 2. The thicknesses of the various layers were obtained from a pocket HP calculator program presented in Appendix 1.

(c) Conclusions

The refraction method was successful in delineating the layers present at each traverse site. No difficulties due to velocity inversions were encountered and the reversed profiles produced indicate that in most cases the layers are not horizontal.

From Table 2 it can be observed that the apparent velocities of the various layers present at each site are not consistent throughout the region and can only be used as a general guide to layer composition. Deeper auger holes are necessary for good geological control at seismic refraction sites.

From the traverses T8 and T9 carried out on a bench of the Main Pit (AMG 550700 5443400) at Tonganah and discussions with mine personnel, it was possible to determine that there is no physical boundary at the lower mining limit. Kaolin quality, particularly visually estimated iron levels, appear to be the controlling factor.

From traverse T10 it seems that thick Tertiary sands are present in this area as the local farmer confirmed that "sand and peat" had been recovered from auger drilling to depths of "50 to 60 feet" in search of deep lead tin deposits. The depth of penetration at this site was in excess of 70 metres and it is therefore probably not prospective even at depth.

Finally it should be noted the hammer energy source used throughout this study did not provide sufficient depth penetration at all sites. Small explosions or other high energy sources should be considered for future operations.

TABLE 2.

SCOTTSDALE EL 33/84. AVERAGE SEISMIC VELOCITIES (m sec<sup>-1</sup>)

TRAVERSE	NATURAL SURFACE					IN PIT			SITE 1
	T2	T3	T4	T5	T6	T7	T8	T9	T10
Material									
Soil (sandy)	750*	370*	140*	360*					240*
Sand (dry)			570*						950
Sand (wet)									1655
Clay (dry)	960*	900*		650*	755*	460*	380*	355*	
Clay (wet)	2110	1270			1610		1830*	1480*	
Bedrock							4000		

\*Material confirmed by drilling or nearby pit exposure.

10. REFERENCES

McCLENAGHAN, M.P., TURNER, N.J., BAILLIE, P.W., BROWN, A.V.,  
WILLIAMS, P.R., and MOORE, W.R., 1982: Geology of the Ringarooma -  
Boobyalla area. Bull. Dep. Mines Tasm., 61, 198 pp.

THREADER, V.M., 1984: Personal communication to A.H. Bartlett.

SEISMIC REFRACTION

HP pocket calculator programs to determine layer velocities and thicknesses from Time - Distance Plots in the field.

AUTHOR

B.A. McConachie

REFERENCE

(Symbols, Equations)

DOBRIN, M.B., 1960: Geophysical Prospecting. 2nd edn. pp. 69-103, Mc Graw-Hill, New York.

014

(1) 2 LAYERS (using critical distance)

$$\text{Eq. (1)} \quad v = \frac{x_2 - x_1}{T_2 - T_1}$$

$$\text{Eq. (2)} \quad Z_0 = \frac{1}{2} \sqrt{\frac{V_1 - V_0}{V_1 + V_0}} x_c$$

HP STEPS  
 f lbl A  
 Input R/S (x<sub>2</sub>)  
 Input R/S (x<sub>1</sub>)  
 -  
 Input R/S (T<sub>2</sub>)  
 Input R/S (T<sub>1</sub>)  
 -  
 ÷  
 STO 0 (V<sub>0</sub>)  
 Input R/S (x<sub>2</sub>)  
 Input R/S (x<sub>1</sub>)  
 -  
 Input R/S (T<sub>2</sub>)  
 Input R/S (T<sub>1</sub>)  
 -  
 ÷  
 STO 1 (V<sub>1</sub>)  
 RCL 0  
 -  
 RCL 0  
 RCL 1  
 +  
 ÷  
 f √x  
 Input R/S (x<sub>c</sub>)  
 x  
 2  
 ÷  
 STO 3 (Z<sub>0</sub>)  
 GO TO A

RCL 0 - V<sub>0</sub>

RCL 1 - V<sub>1</sub>

RCL 3 - Z<sub>0</sub>

(2) 3 LAYERS (using intercept times)

HP STEPS

$$\text{Eq. (1) } V = \frac{x_2 - x_1}{T_2 - T_1}$$

f lbl A  
 Input R/S (x<sub>2</sub>)  
 Input R/S (x<sub>1</sub>)  
 -  
 Input R/S (T<sub>2</sub>)  
 Input R/S (T<sub>1</sub>)  
 -  
 ÷  
 STO 0 (V<sub>0</sub>)  
 Input R/S (x<sub>2</sub>)  
 Input R/S (x<sub>1</sub>)  
 -  
 Input R/S (T<sub>2</sub>)  
 Input R/S (T<sub>1</sub>)  
 -  
 ÷  
 STO 1 (V<sub>1</sub>)  
 Input R/S (x<sub>2</sub>)  
 Input R/S (x<sub>1</sub>)  
 -  
 Input R/S (T<sub>2</sub>)  
 Input R/S (T<sub>1</sub>)

$$\text{Eq. (2) } Z_0 = \frac{T_{i1}}{2} \frac{V_1 V_0}{\sqrt{V_1^2 - V_0^2}}$$

-  
 ÷  
 STO 2 (V<sub>2</sub>)  
 RCL 1  
 RCL 0  
 x  
 RCL 1  
 g x<sup>2</sup>  
 RCL 0  
 g x<sup>2</sup>  
 -  
 f √x  
 ÷  
 Input R/S (T<sub>i1</sub>)  
 x  
 2  
 ÷

$$\text{Eq. (3) } Z_1 = \frac{1}{2} \left( T_{i2} - 2Z_0 \frac{\sqrt{V_2^2 - V_0^2}}{V_2 V_0} \right) \frac{V_2 V_1}{\sqrt{V_2^2 - V_1^2}}$$

STO 3 (Z<sub>0</sub>)  
 RCL 2  
 g x<sup>2</sup>  
 RCL 0  
 g x<sup>2</sup>  
 -  
 f √x  
 RCL 2  
 RCL 0  
 x  
 ÷  
 RCL 3  
 x  
 2  
 x  
 Input R/S (T<sub>i2</sub>)  
 hx → y

.....cont

(2) 3 Layers cont

HP STEPS (cont)

```

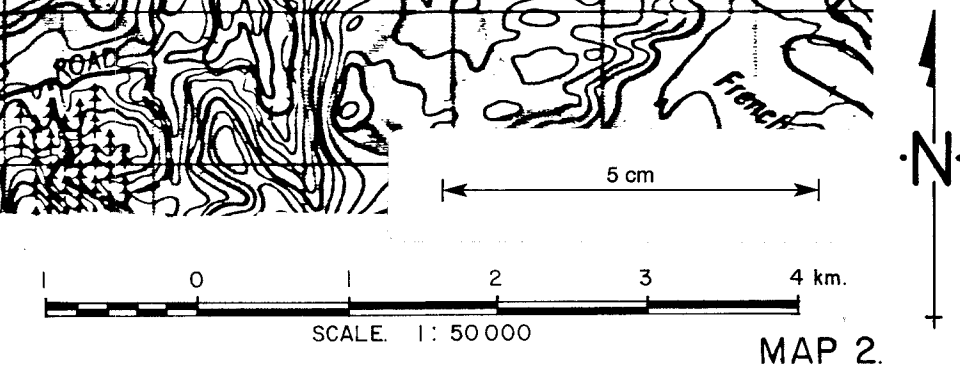
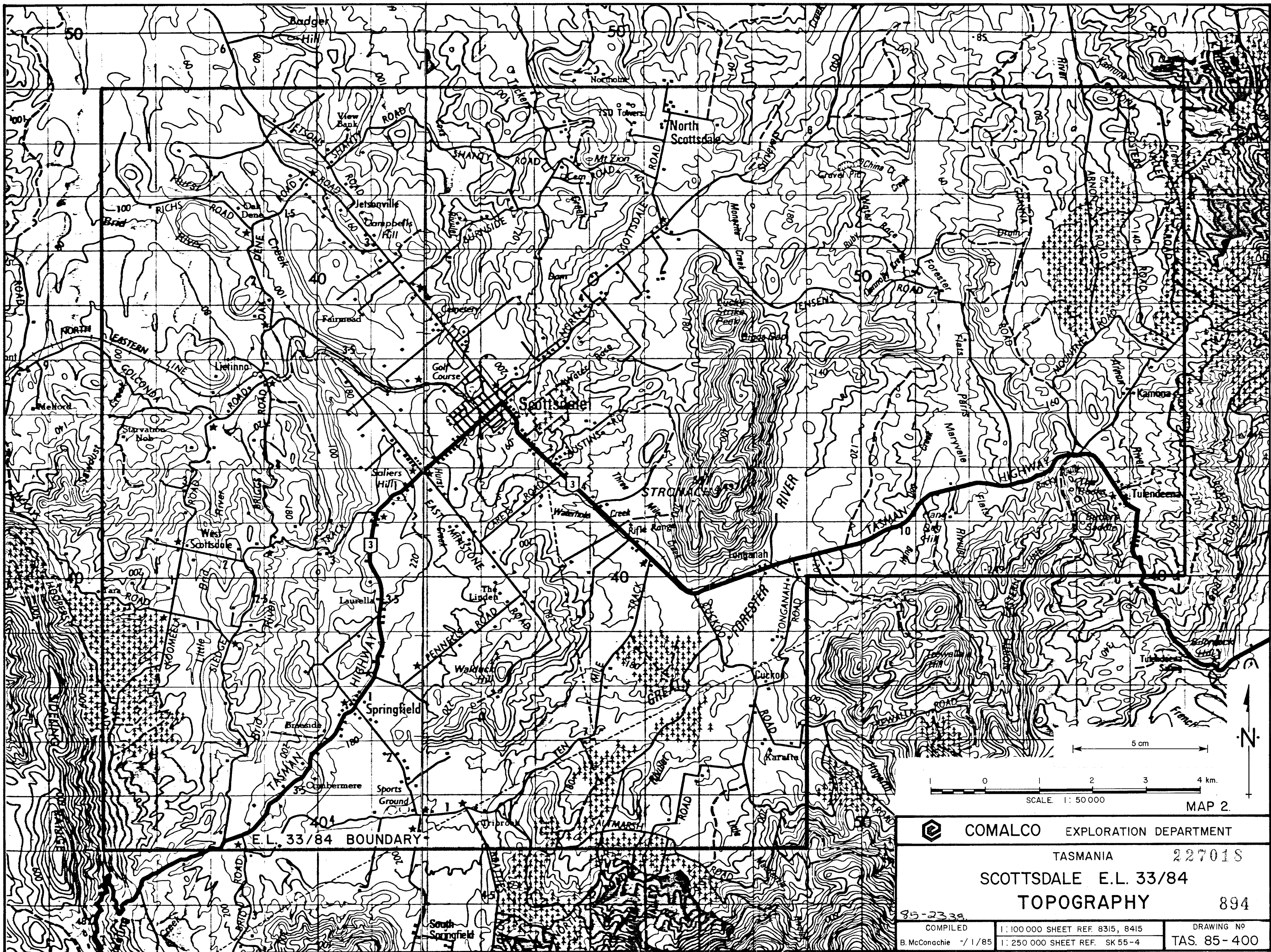
-
2
÷
RCL 2
RCL 1
x
RCL 2
g x²
RCL 1
g x²
-
f √x
÷
x
STO 4 (Z1)
GO TO A

```

```

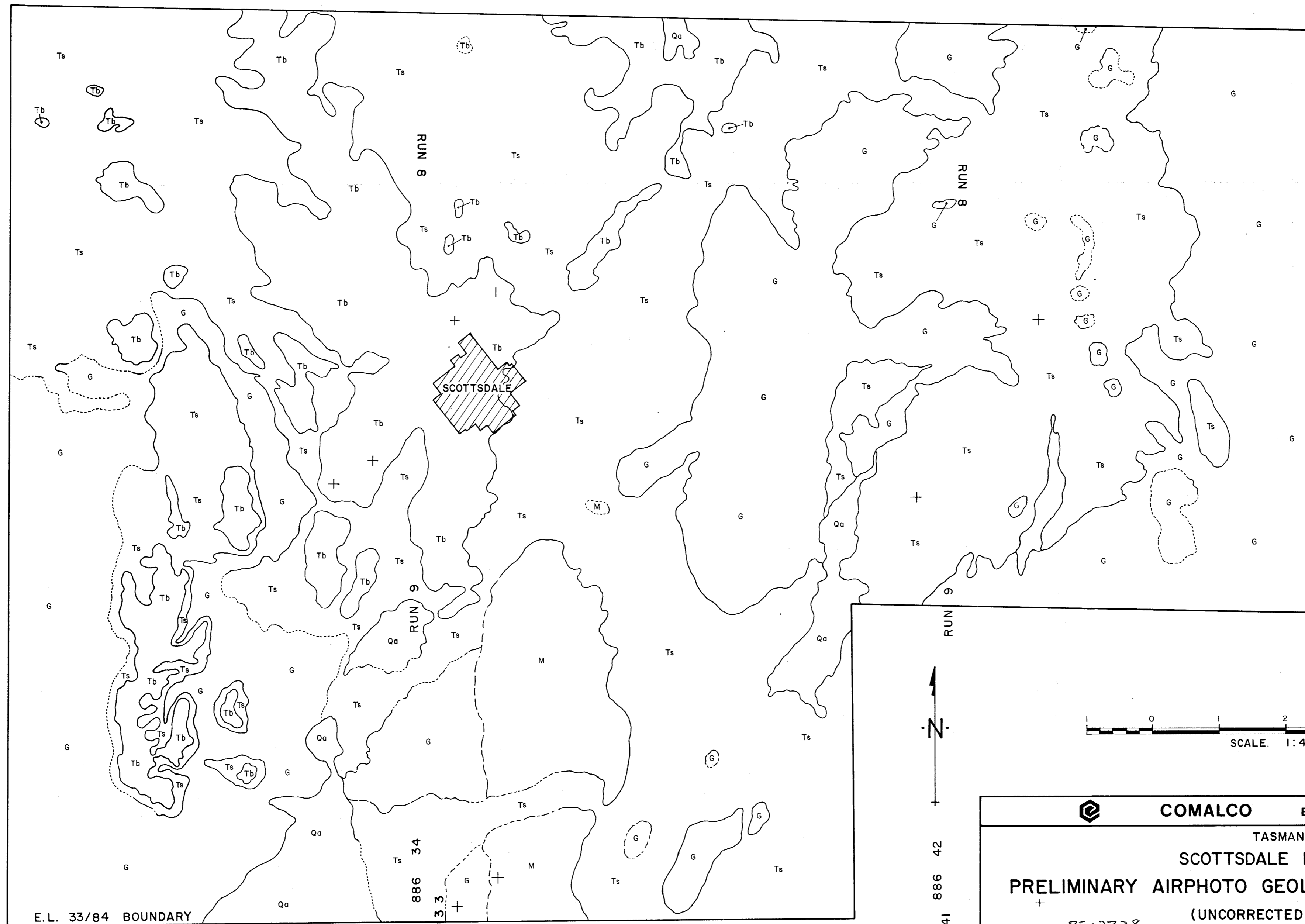
RCL 0 → V0
RCL 1 → V1
RCL 2 → V2
RCL 3 → Z0
RCL 4 → Z1

```



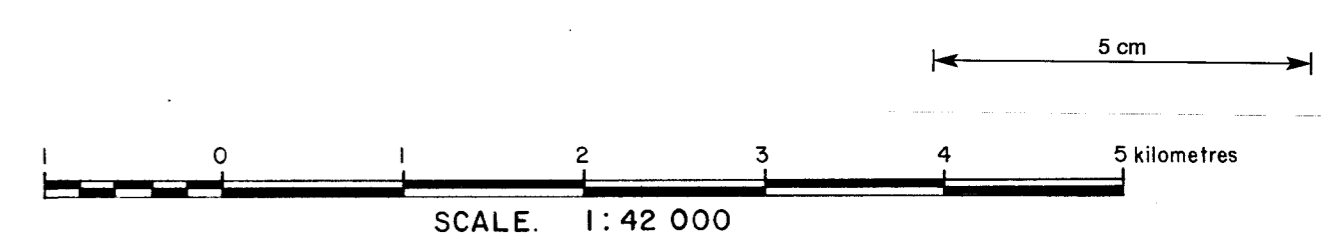
COMALCO EXPLORATION DEPARTMENT  
 TASMANIA 227018  
 SCOTTSDALE E.L. 33/84  
 TOPOGRAPHY 894

85-2338	COMPILED	1:100 000 SHEET REF. 8315, 8415	DRAWING NO
	B. McConachie - / 1/85	1:250 000 SHEET REF. SK 55-4	TAS. 85-400



- LEGEND.**
- Qa.....Quaternary alluvium
  - Tb.....Tertiary basalt
  - Ts.....Tertiary sediments
  - G.....Scottsdale Batholith
  - M.....Mathinna Beds
  - +.....Airphoto location marks
  - 886 34
  - 018.....Airphoto identification
  - RUN 9.....Airphoto run number

041 886 42



227019 MAP 3

<b>COMALCO</b> EXPLORATION DEPARTMENT	
TASMANIA	
<b>SCOTTSDALE E.L. 33/84</b> <span style="float: right;">895</span>	
<b>PRELIMINARY AIRPHOTO GEOLOGICAL INTERPRETATION</b> (UNCORRECTED MOSAIC)	
85-2338	
COMPILED: B. McConochie -/1/1985 DRAWN: K. Mc. -/1/1985	1: 100 000 SHEET REF. 8315, 8415 1: 250 000 SHEET REF. SK. 55-4
DRAWING NO TAS. 85 - 401	

E.L. 33/84 BOUNDARY

+

026 885 234

018 885 226

010 885 218

RUN 8

RUN 8

RUN 8

RUN 9

RUN 9

RUN 9

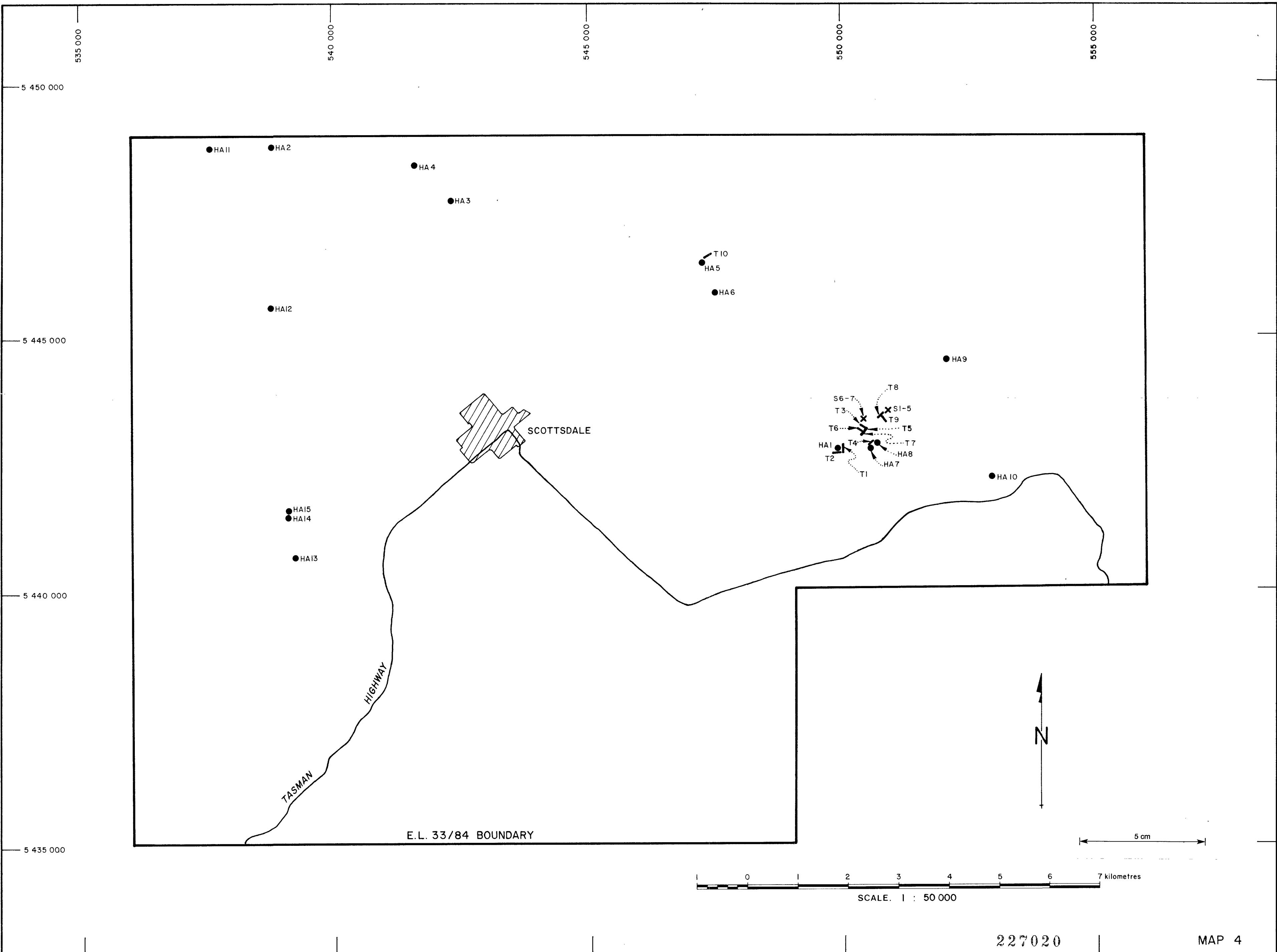
886 26

025

886 34


033

041



**LEGEND**  
 \ T4.....Refraction seismic traverse.  
 ● HA4.....Hand auger hole location.  
 X SI.....Kaolin sample location.

DATE	AMENDMENTS

 <b>COMALCO</b> EXPLORATION DEPARTMENT		227020	MAP 4
TASMANIA <b>SCOTTSDALE E.L. 33/84</b>		896	
<b>REFRACTION SEISMIC TRAVERSE,          HAND AUGER HOLE &amp; SAMPLE LOCATIONS</b>			
COMPILED: B. McConachie -/1/1985	1 : 100 000 SHEET REF. 8315, 8415	DRAWING N <sup>o</sup>	
DRAWN: K. Mc -/1/1985	1 : 250 000 SHEET REF. SK.55-4	TAS. 85-402	