695001

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EXPLORATION LICENCE 48/87 - WELDBOROUGH

ANNUAL REPORT - YEAR 1 & FINAL REPORT

(22 January, 1988 - 22 January, 1989)

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TENEMENT INFORMATION

EL 48/87 is a 94 km^2 block located in the Weldborough area, NE Tasmania (Figure 1, Plan 1). The tenement was granted to Totteny Pty. Ltd. on 22 January 1988 and the current report is for work completed in Year 1. The EL is to be relinquished at the end of Year 1.

EXPLORATION PHILOSOPHY & OBJECTIVES

The major target is zircon and sapphire in suspected basal pyroclastic units of the basaltic rocks in the Welborough Pass - Blue Tier area.

Small numbers of gem quality zircon and sapphire have been found in streams in the region by amateur fossickers for several decades and the source of these stones has not been proven, although detrital zircons have yielded Eocene dates (Yim et. al., 1985). The exploration concept for EL 48/87 was developed by analogy with sapphire, zircon and diamond producing areas in New South Wales where tuffs and agglomerates at the base of basaltic sequences have been proven to be the source of the gemstones.

Exploration is directed at finding pyroclastic rocks with evidence for zircon and/or sapphire enrichment and evidence for the presence of volcanic vents and their associated rocks.

SUMMARY OF EXPLORATION COMPLETED IN YEAR 1

Reconnaissance field sampling of creek sediments, detritus and weathered outcrop locally around the base of the target basalts was carried out. Minor zircon and sapphire was recorded. Coarse black spinel was widespread. One probable, and several possible occurrences of tuffaceous agglomerate were observed.

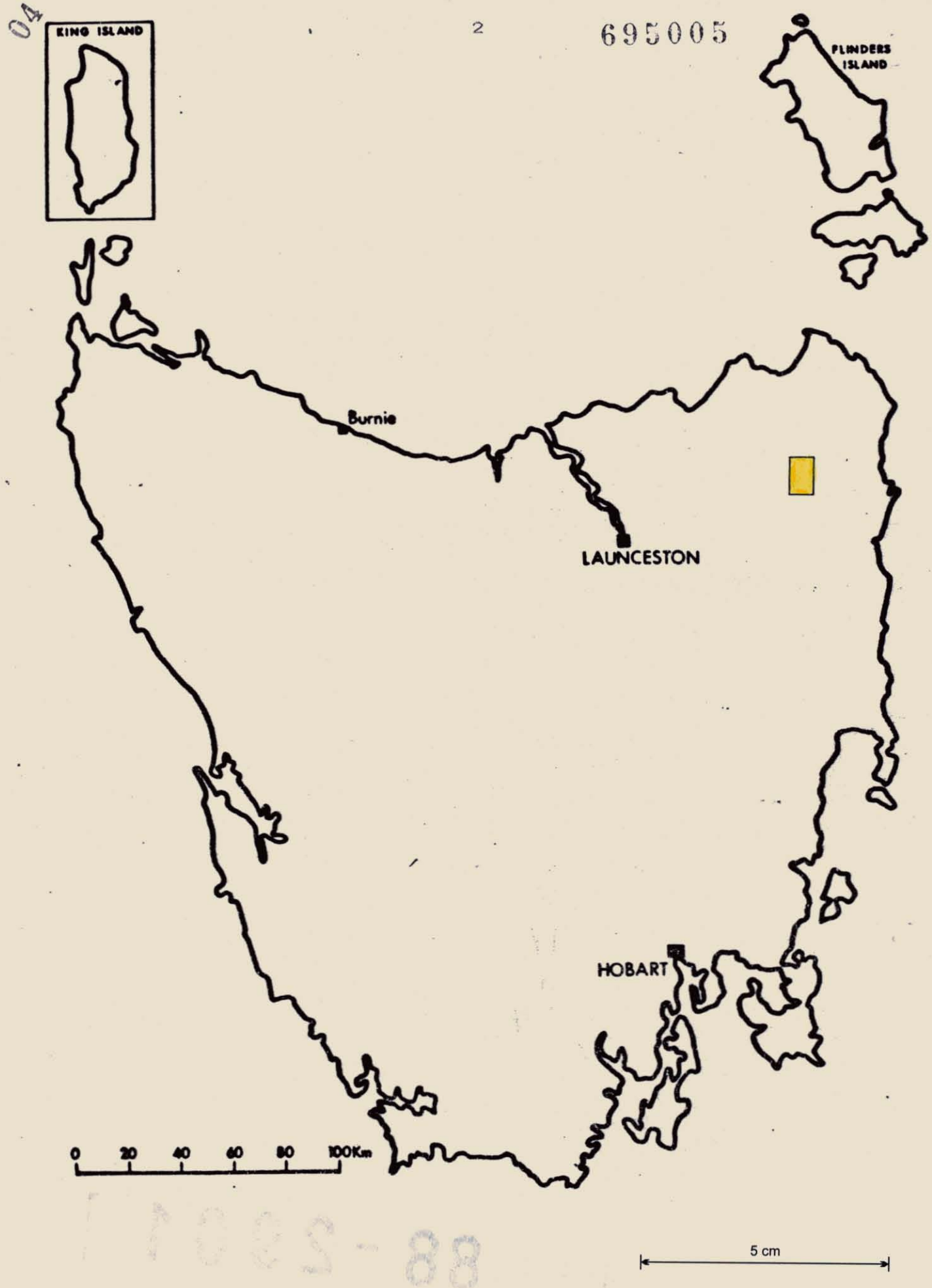

Figure 1. Location Map - EL 48/87, Weldborough

A reconnaissance ground radiometric traverse across the basaltic rocks was conducted to test the concept that zircon enriched basal units may show anomalous radioactivity. No anomalies were recorded on rocks above the granite basement.

The company has concluded that no further work is justified.

DETAILS OF WORK COMPLETED IN YEAR 1

Literature Review

As background to the development of the exploration philosophy of this EL, the author reviewed the work done by the NSW Department of Mineral Resources. This work was described and demonstrated by an officer of the Department, Mr G. Oakes, at a meeting in Sydney and Totteny wish to acknowledge the assistance and advice given by Mr Oakes.

The results of research into pyroclastic source rocks for sapphires in New South Wales is summarised in the publication *Tertiary Volcanics and Sapphires in the New England District - Extended Abstracts From a Seminar, 1/5/87.* The main findings relevant to the EL 48/87 search are summarised below.

Two main types of volcaniclastics are recognised in the gem fields of NSW : -

1) The more common type is a red - red/brown matrix supported breccia grading to tuff and mudstone. The materials are poorly sorted and poorly graded with indications of reworking and partial oxidation at the time of emplacement. These rocks overlie basement, and where heavily ferruginised, have in some cases been interpreted as bauxite and laterites. In places these materials are being mined for sapphire. Minor ultramafic nodules and megacrysts have been found in these lithologies.

2) The more restricted type is a group of grey, white volcanic breccias, mudstones and clays, commonly well bedded and layered. They essentially contain non-basaltic detritus including organic debris. In drill intersections 1) is seen to grade up to 2) implying post depostional leaching.

Sapphire, zircon and pleonaste spinel occur in both types but sampling suggests that 2) is richer. The interpretation of these sediments is that they are low energy fluvial and/or lacustrine re-workings of Type 1), with superimposed post-depostional leaching.

The tuffaceous rocks are almost completely coverted to malleable clays and gibbsite and they average 4-5 metres thick (with a maximum of 45 metres), consistently occurring at, or slightly above, the base of the volcanics.

Chemically the tuffs show elevated Th, U and Zr contents relative to the basalts.

	Th ppm	U ppm	Zr ppm
Basalt	3.4	1.0	212.5
Red Tuff	31.3	8.7	388.8

Totteny believes that this difference may partly reflect zircon enrichment in the basal tuffs and its detection offers potential as an exploration tool.

Hollis and Sutherland (1975) show uranium contents of zircons from four localities in eastern Australia ranging from 53 to 87 ppm. Attempts by Totteny to determine uranium contents from detrital zircons in the Weld River area by SEM probing have not been successful (Appendix 2).

Sampling

Pan concentrate and rock chip samples were taken from sites around the base of the Weldborough Pass - Blue Tier basalts and streams draining these rocks. Sample localities are shown on Plan 2 and sample descriptions are enclosed as Appendix 1. Basalt derived spinel was ubiquitous but coarse zircon was

restricted to some creeks draining the very basal portion of the basalt sequence and to gravels in the Weld River. Sapphire was rare, being encountered in only three samples (two in tributaries of the Weld River and one in tin mine tailings adjacent to the Weld River).

Mineralogical descriptions of the richest, coarse zircon bearing samples were conducted by S. Stephens, University of Tasmania (Appendix 2).

The most important conclusion from this work was the recognition of spinels, probably associated with mantle derived xenoliths. This is consistent with observations of ultramafic nodules in field exposures at Blue Tier (M. McLennahan, pers. comm.) and with the presence of megacrysts and nodules sometimes bearing spinels and gemstones, in other eastern Australian basalt provinces (G. Oakes, pers. comm; L. Sutherland, pers. comm.).

The interpretation of these spinels as having a probable mantle origin is based on their chrome content. Chrome spinels have been used as an indicator mineral for diamond exploration in some regions however, the apparent absence of diamonds and the paucity of gem quality sapphires and zircon in NE Tasmania, detracts from the prospectivity of the EL. The recognition of two types of zircon (very fine euhedral and coarse rounded to subhedral) is consistent with sources from both the Devonian granites and the Tertiary basalts (e.g. see Yim et. al., 1985).

Radiometric survey

Attempts to confirm pyroclastic lithologies near the base of the basalts met with little success. A traverse around the south western base of Mt Littlechild (Sample Sites 2 to 8, Plan 2) encountered slope deposit, olivine basalt and one

possible agglomerate (Site 8). Probable agglomerate outcrops on the edge of the Tasman Highway, approximately 200 metres south of site 40 (Plate 1) and a heavily weathered clay rich lithology with a fragmental texture outcrops at Site 1 (Plate 2). The strongest candidate for a tuffaceous agglomerate is sample 29 (Plate 3). This sample was found as several float fragments and was submitted to the Mines Department petrologist, Mr R. Bottrill, for identification (Appendix 3). The rock is considered to be a tuffaceous basaltic agglomerate but no zircons or corrundum were detected in the heavy mineral fraction.

A radiometric traverse was conducted on the highway, through the granite and basaltic rocks of the target area. A hand held EDA Differential Spectrometer was used and set to record gamma radiation in counts per second, averaged over 10 second intervals. The instrument was not calibrated to a specific source as the survey was intended to show contrast within the basaltic rocks and between the granite, the basalts and the tuff/agglomerates. If the tuffs are enriched in zircon, relative to the basalts, they should be more radioactive than the basalts.

The results of the survey are shown on Plan 2. Gamma radioactivity from the granites ranged from 67-98 cps and the basaltic rocks ranged from 16-33 cps.

There is no trend of increasing radioactivity toward the base of the basaltic rocks and no obvious contrast between the basalt and the agglomerate(?)/tuff. An anomaly exists near the tuff(?)-granite contact on the southern slopes of Blue Tier, where a range of 74-78 cps was recorded. The lithology here is a heavily weathered, mottled, clay-rich material with no quartz grains preserved. It is interpreted as being basalt-related but it has a close proximity to the granite contact and there is granite gravel on the road edge, both of which may have contributed to the instrument response.

Plate 1. Weathered basaltic agglomerate in road cutting (200 metres south of Site 40, Plan 2).

Plate 2. Heavily weathered and ferruginised clay-rich material with possible fragmental texture (Site 1, Plan 2).

Plate 3. Basaltic aggomerate float. Basaltic and clay clasts in a hematitic, tuffaceous, clay-rich matrix (Site 28, Plan 2. Also see Appendix 3).

The Gemstone Industry in Tasmania

Discussions were held with Mr S. Stevens, Taroona, and Mr C. Thrower, Lindisfarne regarding the past and present state of the amateur gemstone scene in NE Tasmania. These people have a long association with fossicking and gemstone faceting in Tasmania and their views are considered relevant to the current project. The general opinion was that when gem quality zircons and sapphires have been found in the Weld River area, their quality and value is equal to those from the established NSW and Queensland gemfields. The concentration of gemstones in NE Tasmania is very much lower than in the other areas and this of course is the reason why there has never been a commercial alluvial gemstone operation.

This fact, coupled with the lack of any obvious evidence that gemstone source rocks are preserved in the target area, leads Totteny to conclude that the most likely way of mining gemstones profitably is as a by-product of alluvial tin.

CONCLUSIONS

It has not been possible to demonstrate an extensive pyroclastic base to the main basalt body although some examples of rocks with fragmental agglomeratic textures were encountered. It is difficult to differentiate tuffaceous materials, slope deposits and weathering effects in the basalt.

Reconnaissance sampling and radiometrics did not indicate a zircon enrichment towards the base of the basalts. The sampling of creek sediments in the area suggested that zircon and sapphire were locally sourced but no evidence was obtained to show that preserved source rocks remain . Coarse black spinel is ubiquitous in the basalt province.

Discussions with gem fossickers and cutters familiar with yield and quality of zircons and sapphire in the region suggest that the quality of stones is comparable to the recognised gemstone regions of eastern Australia but the concentrations are relatively very low.

Further work on the project is not justified. It is likely that the only way which gemstones could be mined profitably is in combination with alluvial tin.

REFERENCES

HOLLIS, J.D. & SUTHERLAND, F.L., 1975. Origins and Occurrences of Gem Zircons in Eastern Australia. *Records of the Australian Museum (1985)*, Vol 36 : 299-311.

DEPARTMENT OF MINERAL RESOURCES, NSW, 1987. Tertiary Volcanics and Sapphires in the New England District. *Extended Abstracts From Seminar.*

YIM, W.W.S., GLENDOW, A.J.W. & VAN MOORT, J.C., 1985. Fission Track Dating of Alluvial Zircons and Heavy Mineral Provenance in North East Tasmania. *J. Geol. Soc. Lond.*, Vol 142.

APPENDIX 1

EL 48/87 - WELDBOROUGH

SAMPLE FIELD DESCRIPTIONS

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APPENDIX 1

EL 48/87 - WELDBOROUGH

SAMPLE FIELD DESCRIPTIONS - OCTOBER 1988

PC = Pan Concentrate
RC = Rock chip

W1	PC	Road cutting. Basaltic talus, agglomerate? Abundant quartz, trace black spinel, trace organic matter, basalt fragments.
W2	PC	Forest traverse. Gravel in natural gutter. Basaltic, abundant quartz moderate spinel, some (?) zeolite, olivine.
W3	PC	As above, abundant spinel.
W4	PC	As above.
W5	PC	Basaltic fragments, red-brown FeOH pellets, abundant quartz, abundant spinel, +/- zeoloite, olivine, mostly very coarse sand, some granules.
W6	PC	As above, abundant basalt fragments.
W7	PC	As above, common quartz, occassional large spinels.
W8	RC/ PC	Outcrop partially weathered olivine basalt + zeolite. Sorrounding material yields spinel, zeolite. Some basalt has agglomerate-like weathering rind.
W9	PC	Weld River near bridge. Granite, basalt derived gravels, sands on small point bar. Abundant spinel, illmenite, + very fine monazite, minor quartz, olivine, feldspar, zircon (?), zeolite (?).
W10	PC	As above.
W11	PC	Bank cutting. Sands, grits, gravel. Cobbles of basalt > granite derived heavy minerals as above + trace coarse pink zircon.
W12	PC	As above.
W13	PC	Gravel point bar deposit. Abundant ilmenite, spinel, very fine monazite, euhedral zircon, minor fine-medium cassiterite, trace coarse pink zircon.
W14	PC	Point bar gravel and sand, mainly granite derived. Trace minor spinel, ilmenite; trace very fine zircon, monazite.
W15	PC	River bank exposure - heavy minerals as above.

W16	PC	River bank gravels. Abundant ilmenite, spinel, moderate cassiterite, olivine, very fine zircon, monazite. Trace coarse pink-red zircon.
W17	PC	Bed load gravel from tributary creek. Abundant coarse spinel, zircon, trace very fine-fine zircon; fine to medium ilmenite.
W18	PC	Small creek with granite outcrop. Minor spinel, trace coarse pink zircon, trace coarse olivine, minor very fine monazite, zircon, fine ilmenite.
W19	PC	Weld River coarse gravel bed load. Minor very fine-fine monazite, zircon, ilmenite, minor coarse spinel, trace coarse pink zircon.
W20	PC	Creek sediments, granite outcrop, granite derived sediments. Trace black opaques (mainly ilmenite?).
W21	PC	Creek as per W17. Mixed granite, basalt derived sediments. Abundant coarse spinel, moderate very fine monazite, zircon, trace coarse zircon, coarse blue sapphire, coarse cassiterite.
W22	PC	Talus, soil with mixed lithologies. Pebbles of basalt, silcrete fragments. Abundant coarse spinel, common coarse zircon, trace red garnet?
W23	PC	Same creek as above, mixed granite, basalt derived sediments. Abundant black spinel. Trace coarse zircon, trace very fine - fine granite derived heavy minerals.
W24	PC	Further up stream on above creek. Granite derived sediments and minor basalt pebbles, spinel, minor very fine zircon, monazite, ilmenite
W25	PC	Spinel Creek - old tin workings. Bed load gravels with granite, basalt constituents. Very rich coarse spinel, abundant coarse zircon, common cassiterite, very fine monazite, zircon; trace sapphire
W26	PC	Cambria Mine. Sample of surface detritus. Good show of multi-coloured cassiterite up to granule size; accessory spinel, biotite, ilmenite +/- hornblende
W27	PC	Southern side of basalt ridge, near base. Mixed detritus, soil, talus. Trace spinel, very fine zircon, monazite, cassiterite. Possible contamination by road gravel
W28	PC	Track as above. Cutting in basalt talus, soil. Trace spinel
W29	RC	Agglomerate float. Basaltic clasts in cherts, hematitic clayey matrix, clasts of variable size
W30	PC	Tails, Weld River, Emu Flats. Mixed Mathinna Group cobbles and granite gravels. Minor trace pinel, coarse zircon, sapphire

W31	RC	Road cutting, near base basalt. Decomposed, heavily weathered clayey material with coarse fragmental texture (granite-like). Moderate quartz. Brown-yellow-light green.
W32	RC	Weathered basaltic rock with part fragmental texture. Abundant secondary Fe OH deposits.
W33	RC	Weathered basalt, rich in zeolite, minor olivine.
W34	RC	Sea view. Conglomerate, matrix supported. Matrix sandy, clayey, surface pitting. Pebbles (10 - 20%) quartzite, slate, vein quartz, some granules.
W35	RC	As above, less coarse pebbles. Light grey - light brown abundant clay pellets, abundant specks. Fine black material (may be surficial organics).
W36	PC	Creek at end Sea View track. Mainly granitic sediments, minor basalt pebbles. Trace black ilmenite, spinel.
W37	PC	Same creek as above, more basaltic sediments. Heavy minerals as above.
W38	PC	Creek further east, mainly granitic sediments. Trace black mica, hornblende (?).
W39	PC	Creek further east with basalt outcrop. Trace spinel, trace ilmenite, some quartz.
W40	PC	Cutting near base of basalt outcrop (highway). Basaltic clayey debris, talus, soil. Rich coarse spinel, mixed olivine.
W41	PC	Below basalt outcrop, north side of ridge. Creek gravels, basalt derived. Rich with spinel and olivine.
W42	PC	As above, further downstream
W43	PC	Further downstream in man made gutter. Brown clayey material with abundant pebbles. Very rich spinels up to small pebbles. Minor coarse zircon (3 pink; 1 clear).
W44	PC	Further downstream. Sediments as above. Rich with spinel, no zircon.

APPENDIX 2

HEAVY MINERAL ANALYSES AND SAMPLE DESCRIPTIONS

S. STEVENS
Geology Department
University of Tasmania

SAMPLE PREPARATION

Three pan concentrates were submitted by K. Morrison for mineralogical analysis with emphasis required on composition and form of zircons and spinels.

The samples were first passed through a size 8 sieve as this is the smallest useful size for gemstones. Only one or two "spinels" and pieces of quartz were held back. A size 16 sieve was tried next with only a small amount of "spinel" and a few zircons remaining. One translucent pale blue sapphire was found in this fraction of sample W21.

The rest of the sample was panned to concentrate the heavy minerals to one area where grains of interest were selected for further examination. Attention was given to various types of black minerals, various coloured translucent minerals and any bright white minerals. These were mounted in a circular plastic polished section to be examined optically and by the electron microprobe.

SAMPLE DESCRIPTION - OPTICAL EXAMINATION

SAMPLE : W17A

Grain No:	colour	reflect.	form	inclusions	likely mineral
1	black	med	angular-irregular	cracks	ilmenite
2	black	med	angular-irregular	cracks	ilmenite
3	black	low	angular-irregular	-	chrome-free spinel
4	black	low	round-irregular	-	chrome-free spinel
5	black	low	bead	-	chrome -free spinel
6	black	low	rounded	-	chrome-free spinel
7	black	low	octahedron	-	chrome spinel
8	black	low	platy-irregular	-	chrome spinel
9	black	low	dodecahedron	-	spinel+SiO_2?
10	black	low	rounded-broken	-	spinel+SiO_2?
11	black	low	rounded	-	spinel+SiO_2?
12	black	low	rounded cube	-	spinel+SiO_2?
13	brown-black	low	angular	-	spinel
14	black	low	rounded cube	-	spinel
15	green	low	columnar	striae	clinopyroxene
16	pink	low	irregular	-	orthopyroxene
17	white	low	cube	feathers	quartz
18	grey-green	low	anngular	-	clinopyroxene
19	white	low	irregular	feathers	quartz
20	brown-white	low	rectangle	needles	orthopyroxene
21	pale green	low	irregular	fluid	clinopyroxene
22	smoky brown	med - low	angular	fluid	cassiterite

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PROBE MONT NO W17A
OX :

GRAIN NO1
-2,1,2,3,4,5

ANAL. NO. 31.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 174720. TIME 26.3

TIO2	65.07	0.6449	52.63
CR203	0.37	0.0039	0.30
FEO	49.92	0.5502	40.37
MNO	0.87	0.0097	0.70
MGO	7.21	0.1415	5.83
CAO	0.21	0.0029	0.17
SUMME	123.65	1.3532	100.00

MG/(MG+FE) 20.5
CA:MG:FE 0.4 20.4 79.2
CA:NA: K 100.0 0.0 0.0
CR/(CR+AL) 100.0
0.5*AL/(0.5*AL + MG + FE) 0.0
CORR:

: GRAIN NO1
OX : -2,1,2,3,4,5

ANAL. NO. 32.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 318248. TIME 60.0

TIO2	52.07	0.6478	53.18
AL203	0.22	0.0043	0.22
FEO	38.87	0.5377	39.69
MNO	0.58	0.0082	0.60
MGO	6.17	0.1522	6.31
SUMME	97.91	1.3501	100.00

MG/(MG+FE) 22.1
CA:MG:FE 0.0 22.1 77.9
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 0.3
CORR:

: AGAIN
OX : -3,1$2,4,5

ANAL. NO. 33.
SPECTRUM RECEIVED

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                                                    TIME    60.0
 TIO2     52.07   0.9717   53.18
 AL203     0.22   0.0064    0.22
 FEO      38.87   0.8065   39.69
 MNO       0.58   0.0123    0.60
 MGO       6.17   0.2284    6.31
 SUMME    97.91   2.0252  100.00
 MG/(MG+FE)    22.1
 CA:MG:FE    0.0   22.1   77.9
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.3
CORR: 8
THEORETICAL  CATION TOTAL : 2


 TIO2     52.07   0.9596   52.96
 AL203     0.22   0.0063    0.22
 FE203     4.05   0.0747    4.12
 FEO      35.22   0.7218   35.82
 MNO       0.58   0.0121    0.59
 MGO       6.17   0.2255    6.28
 SUMME    98.32   2.0000  100.00
 MG/(MG+FE)    23.8
 CA:MG:FE    0.0   23.8   76.2
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.3
CORR:


:   GRAIN NO2
OX  : -3,1,2,4,5

ANAL. NO.   34.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 325679.     TIME    60.0
 TIO2     51.12   0.9890   52.02
 AL203     0.26   0.0078    0.26
 FEO      41.79   0.8993   42.53
 MNO       5.10   0.1110    5.19
 SUMME    98.26   2.0071  100.00
 MG/(MG+FE)     0.0
 CA:MG:FE    0.0    0.0  100.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.4
CORR: 8
THEORETICAL  CATION TOTAL : 2


 TIO2     51.12   0.9855   51.96
 AL203     0.26   0.0078    0.26
 FE203     1.11   0.0213    1.12
 FEO      40.80   0.8747   41.47
 MNO       5.10   0.1106    5.18
 SUMME    98.38   2.0000  100.00
 MG/(MG+FE)     0.0
 CA:MG:FE    0.0    0.0  100.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.4
CORR:
```

23 : GRAIN NO3
OX : -4,2,1,4,5

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ANAL. NO. 35.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 303097. TIME 60.0

TIO2	0.77	0.0148	0.74
AL203	61.73	1.8555	59.50
FEO	22.81	0.4866	21.99
MGO	18.42	0.7004	17.76
SUMME	103.73	3.0573	100.00

CA:MG:FE 0.0 59.0 41.0
MG/(MG+FE) 59.0
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 43.9
CORR:

: GRAIN NO4
OX : -4,1,2,4,5

ANAL. NO. 36.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 305222. TIME 60.0

TIO2	0.65	0.0124	0.62
AL203	62.30	1.8664	59.91
FEO	22.80	0.4847	21.93
MGO	18.23	0.6908	17.53
SUMME	103.98	3.0543	100.00

MG/(MG+FE) 58.8
CA:MG:FE 0.0 58.8 41.2
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 44.3
CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.65	0.0121	0.62
AL203	62.30	1.8332	59.48
FE203	7.57	0.1422	7.23
FEO	15.99	0.3339	15.27
MGO	18.23	0.6785	17.41
SUMME	104.74	3.0000	100.00

MG/(MG+FE) 67.0
CA:MG:FE 0.0 67.0 33.0
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 47.5
CORR:

OX : -4,1,2,4,5

24

ANAL. NO. 37.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 305868. TIME 60.0

TIO2	0.85	0.0163	0.81
AL203	61.55	1.8543	58.79
CR203	0.63	0.0128	0.61
FEO	25.15	0.5376	24.02
MGO	16.51	0.6291	15.77
SUMME	104.68	3.0500	100.00

MG/(MG+FE) 53.9
CA:MG:FE 0.0 53.9 46.1
CR/(CR+AL) 0.7
0.5*AL/(0.5*AL + MG + FE) 44.3
CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.85	0.0160	0.80
AL203	61.55	1.8239	58.41
CR203	0.63	0.0126	0.60
FE203	6.94	0.1312	6.58
FEO	18.90	0.3975	17.94
MGO	16.51	0.6188	15.67
SUMME	105.38	3.0000	100.00

MG/(MG+FE) 60.9
CA:MG:FE 0.0 60.9 39.1
CR/(CR+AL) 0.7
0.5*AL/(0.5*AL + MG + FE) 47.3
CORR:

: GRAIN NO 6
OX : -4,1,2,4,5

ANAL. NO. 38.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 302508. TIME 60.0

TIO2	1.08	0.0211	1.03
AL203	59.23	1.8157	56.73
FEO	27.63	0.6011	26.47
MGO	16.06	0.6228	15.38
NA2O	0.40	0.0202	0.38
SUMME	104.40	3.0809	100.00

MG/(MG+FE) 50.9
CA:MG:FE 0.0 50.9 49.1
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 42.6
CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	1.08	0.0206	1.02
AL203	59.23	1.7681	56.14
FE203	11.02	0.2101	10.45
FEO	17.71	0.3752	16.79
MGO	16.06	0.6064	15.22
NA2O	0.40	0.0196	0.38
SUMME	105.51	3.0000	100.00

MG/(MG+FE) 61.8
CA:MG:FE 0.0 61.8 38.2
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 47.4
CORR:

695025A.

25

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:     GRAIN NO 7
OX  : -4,1,2,4,5

ANAL. NO.    39.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 299212.     TIME    60.0
 TIO2       0.84   0.0177    0.81
 AL203     34.70   1.1488   33.38
 CR203     32.65   0.7252   31.41
 FEO       18.34   0.4308   17.64
 NIO        0.37   0.0083    0.35
 MGO       17.06   0.7143   16.41
 SUMME    103.96   3.0451  100.00
 MG/(MG+FE)     62.4
 CA:MG:FE    0.0   62.4   37.6
 CR/(CR+AL)     38.7
 0.5*AL/(0.5*AL + MG + FE)   33.4
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2       0.84   0.0175    0.80
 AL203     34.70   1.1318   33.20
 CR203     32.65   0.7144   31.24
 FE203      5.68   0.1184    5.44
 FEO       13.22   0.3060   12.65
 NIO        0.37   0.0082    0.35
 MGO       17.06   0.7037   16.32
 SUMME    104.53   3.0000  100.00
 MG/(MG+FE)     69.7
 CA:MG:FE    0.0   69.7   30.3
 CR/(CR+AL)     38.7
 0.5*AL/(0.5*AL + MG + FE)   35.9
CORR:


:    GRAIN NO 8
OX  : -4,1,2,4,5

ANAL. NO.    40.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 306220.     TIME    60.0
 TIO2       0.63   0.0120    0.60
 AL203     62.57   1.8656   59.95
 CR203      0.21   0.0043    0.21
 FEO       22.55   0.4772   21.61
 MGO       18.40   0.6938   17.63
 SUMME    104.37   3.0529  100.00
 MG/(MG+FE)     59.2
 CA:MG:FE    0.0   59.2   40.8
 CR/(CR+AL)      0.2
 0.5*AL/(0.5*AL + MG + FE)   44.3
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2       0.63   0.0118    0.60
 AL203     62.57   1.8333   59.53
 CR203      0.21   0.0042    0.20
 FE203      7.41   0.1386    7.05
 FEO       15.89   0.3303   15.12
 MGO       18.40   0.6818   17.50
 SUMME    105.11   3.0000  100.00
 MG/(MG+FE)     67.4
 CA:MG:FE    0.0   67.4   32.6
 CR/(CR+AL)      0.2
 0.5*AL/(0.5*AL + MG + FE)   47.5
CORR:
```

: GRAIN NO.7
OX : -4,1,2,4,5

ANAL. NO. 41.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 298234. TIME 60.0

TIO2	0.31	0.0065	0.30
AL2O3	38.51	1.2569	37.47
CR2O3	30.34	0.6643	29.52
FEO	15.58	0.3608	15.16
MGO	18.03	0.7443	17.55
SUMME	102.77	3.0327	100.00

MG/(MG+FE) 67.4
CA:MG:FE 0.0 67.4 32.6
CR/(CR+AL) 34.6
0.5*AL/(0.5*AL + MG + FE) 36.3
CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.31	0.0064	0.30
AL2O3	38.51	1.2433	37.32
CR2O3	30.34	0.6571	29.40
FE2O3	4.19	0.0863	4.06
FEO	11.81	0.2706	11.44
MGO	18.03	0.7363	17.47
SUMME	103.19	3.0000	100.00

MG/(MG+FE) 73.1
CA:MG:FE 0.0 73.1 26.9
CR/(CR+AL) 34.6
0.5*AL/(0.5*AL + MG + FE) 38.2
CORR:

: GRAIN NO 10
OX : -4,1,2,4,5

ANAL. NO. 42.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 304836. TIME 60.0

TIO2	0.43	0.0081	0.42
AL2O3	63.57	1.8762	61.49
CR2O3	1.49	0.0294	1.44
FEO	17.65	0.3696	17.07
MGO	20.24	0.7556	19.58
SUMME	103.38	3.0389	100.00

MG/(MG+FE) 67.2
CA:MG:FE 0.0 67.2 32.8
CR/(CR+AL) 1.5
0.5*AL/(0.5*AL + MG + FE) 45.5
CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.43	0.0080	0.42
AL2O3	63.57	1.8521	61.16
CR2O3	1.49	0.0291	1.43
FE2O3	5.51	0.1025	5.30
FEO	12.69	0.2624	12.21
MGO	20.24	0.7459	19.48
SUMME	103.93	3.0000	100.00

MG/(MG+FE) 74.0
CA:MG:FE 0.0 74.0 26.0
CR/(CR+AL) 1.5
0.5*AL/(0.5*AL + MG + FE) 47.9
CORR:

695027

27

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:   GRAIN NO 11
OX  : -4,1,2,4,5

ANAL. NO.   43.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 305326.     TIME   60.0
 TIO2      0.52  0.0100   0.51
 AL203    64.02  1.9087  61.92
 CR203     0.21  0.0043   0.21
 FEO      20.92  0.4427  20.24
 MGO      17.71  0.6677  17.13
 SUMME   103.39  3.0334 100.00
 MG/(MG+FE)    60.1
 CA:MG:FE    0.0  60.1  39.9
 CR/(CR+AL)     0.2
 0.5*AL/(0.5*AL + MG + FE)  46.2
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.52  0.0099   0.50
 AL203    64.02  1.8877  61.64
 CR203     0.21  0.0042   0.21
 FE203     4.68  0.0880   4.50
 FEO      16.72  0.3498  16.10
 MGO      17.71  0.6604  17.05
 SUMME   103.86  3.0000 100.00
 MG/(MG+FE)    65.4
 CA:MG:FE    0.0  65.4  34.6
 CR/(CR+AL)     0.2
 0.5*AL/(0.5*AL + MG + FE)  48.3
CORR:


:   GRAIN NO 12
OX  : -4,1,2,4,5

ANAL. NO.   44.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 297674.     TIME   60.0
 TIO2      0.76  0.0163   0.74
 AL203    33.84  1.1373  33.08
 CR203    33.03  0.7447  32.29
 FEO      17.68  0.4215  17.28
 MGO      17.00  0.7225  16.62
 SUMME   102.32  3.0425 100.00
 MG/(MG+FE)    63.2
 CA:MG:FE    0.0  63.2  36.8
 CR/(CR+AL)    39.6
 0.5*AL/(0.5*AL + MG + FE)  33.2
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.76  0.0161   0.74
 AL203    33.84  1.1215  32.91
 CR203    33.03  0.7343  32.12
 FE203     5.28  0.1116   5.13
 FEO      12.93  0.3040  12.57
 MGO      17.00  0.7125  16.53
 SUMME   102.85  3.0000 100.00
 MG/(MG+FE)    70.1
 CA:MG:FE    0.0  70.1  29.9
 CR/(CR+AL)    39.6
 0.5*AL/(0.5*AL + MG + FE)  35.4
```

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*   GRAIN NO 13
OX  : -4,1,2,4,5

ANAL. NO.   45.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 298351.     TIME   60.0
 SIO2      0.22  0.0061   0.22
 TIO2      0.68  0.0140   0.66
 AL203    40.04  1.2924  38.68
 CR203    27.72  0.6003  26.78
 FEO      16.85  0.3859  16.28
 MGO      18.00  0.7347  17.39
 SUMME   103.52  3.0334 100.00
 MG/(MG+FE)    65.6
 CA:MG:FE    0.0  65.6  34.4
 CR/(CR+AL)    31.7
 0.5*AL/(0.5*AL + MG + FE)  36.6
CORR: 8
THEORETICAL  CATION TOTAL : 3


 SIO2      0.22  0.0060   0.21
 TIO2      0.68  0.0138   0.65
 AL203    40.04  1.2782  38.52
 CR203    27.72  0.5937  26.67
 FE203     4.32  0.0880   4.16
 FEO      12.96  0.2936  12.47
 MGO      18.00  0.7266  17.32
 SUMME   103.95  3.0000 100.00
 MG/(MG+FE)    71.2
 CA:MG:FE    0.0  71.2  28.8
 CR/(CR+AL)    31.7
 0.5*AL/(0.5*AL + MG + FE)  38.5
CORR:


: GRAIN NO14
OX  : -4,1,2,4,5

ANAL. NO.   46.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 306006.     TIME   60.0
 TIO2      0.50  0.0096   0.48
 AL203    63.53  1.8973  61.17
 CR203     0.95  0.0191   0.92
 FEO      21.86  0.4632  21.04
 MGO      17.02  0.6428  16.39
 SUMME   103.87  3.0321 100.00
 MG/(MG+FE)    58.1
 CA:MG:FE    0.0  58.1  41.9
 CR/(CR+AL)     1.0
```

```
 0.5*AL/(0.5*AL + MG + FE)   46.2
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.50   0.0095    0.48
 AL2O3    63.53   1.8773   60.90
 CR2O3     0.95   0.0189    0.92
 FE2O3     4.48   0.0846    4.30
 FEO      17.83   0.3737   17.09
 MGO      17.02   0.6360   16.32
 SUMME   104.32   3.0000  100.00
 MG/(MG+FE)    63.0
 CA:MG:FE    0.0   63.0   37.0
 CR/(CR+AL)     1.0
 0.5*AL/(0.5*AL + MG + FE)   48.2
CORR:
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695029

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:   GRAIN NO 15
OX  : -6,1,2,4,5

ANAL. NO.    47.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 347713.     TIME    60.0
 SIO2     52.38   1.8942   52.28
 TIO2      0.41   0.0112    0.41
 AL2O3     5.85   0.2495    5.84
 CR2O3     1.20   0.0344    1.20
 FEO       4.07   0.1231    4.06
 MGO      15.81   0.8522   15.78
 CAO      19.15   0.7420   19.11
 NA2O      1.32   0.0923    1.31
 SUMME   100.20   3.9989  100.00
 MG/(MG+FE)    87.4
 CA:MG:FE   43.2   49.6    7.2
 CR/(CR+AL)    12.1
 0.5*AL/(0.5*AL + MG + FE)   11.3
CORR:


:   GRAIN NO 16
OX  : -10,1,2,3,4,5

ANAL. NO.    48.
SPECTRUM RECEIVED

                                        O=12
  TOTAL CTS IN SPECTRUM 318018.     TIME    60.0
  P2O5      0.23   0.0126    0.22  0.0151
 SIO2      37.55   2.4717   36.43  2.9660
 AL2O3     21.88   1.6976   21.23  2.0371
 FEO       34.56   1.9024   33.53  2.2829
 MNO        6.27   0.3496    6.08  0.4195   garnet - almandine
 MGO        1.64   0.1607    1.59  0.1938
 CAO        0.94   0.0660    0.91  0.0792
 SUMME    103.06   6.6605  100.00  3.9926
 MG/(MG+FE)     7.8
 CA:MG:FE    3.1    7.5   89.4
 CA:NA: K  100.0    0.0    0.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)   29.1
CORR:
```

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:   GRAIN NO 18
OX  : -6,1,2,4,5

ANAL. NO.   49.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 343804.     TIME   60.0
 SIO2     50.73   1.8486  51.00
 TIO2      0.56   0.0155   0.57
 AL2O3     7.08   0.3041   7.12
 CR2O3     0.93   0.0268   0.94
 FEO       4.87   0.1483   4.89
 MGO      16.45   0.8936  16.54
 CAO      18.28   0.7139  18.38
 NA2O      0.56   0.0395   0.56
 SUMME    99.47   3.9903 100.00
 MG/(MG+FE)    85.8
 CA:MG:FE  40.7  50.9   8.4
 CR/(CR+AL)     8.1
 0.5*AL/(0.5*AL + MG + FE)  12.7
CORR:


:   GRAIN NO20
OX  : -6,1,2,4,5

ANAL. NO.   50.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 311624.     TIME   60.0
 SIO2     53.72   1.9355  53.26
 TIO2      0.44   0.0119   0.43
 AL2O3     2.64   0.1121   2.62
 FEO      17.69   0.5330  17.54
 MNO       0.25   0.0075   0.24
 MGO      25.71   1.3805  25.49
 CAO       0.42   0.0162   0.42
 SUMME   100.86   3.9966 100.00
 MG/(MG+FE)    72.1
 CA:MG:FE  46.7  48.9   4.4
 CR/(CR+AL)    11.4
 0.5*AL/(0.5*AL + MG + FE)  10.1
CORR:


 MG/(MG+FE)    91.7
```

695031

SAMPLE DESCRIPTION - OPTICAL EXAMINATION

SAMPLE NO: W17B

Grain No:	colour	reflect.	form	inclusions	likely mineral
1	orange	low	round-broken	cracks	zircon
2	orange-brown	low	irregular	-	zircon
3	orange	low	rounded	cracks	zircon
4	pale orange	low	bead	-	zircon
5	off-white	low	bead	-	zircon? olivine
6	grey-green	low	angular	striae	othopyroxene
7	pale green	low	irregular	parallel cracks	othopyroxene
8	off-white	low	rounded	fluid, feathers	zircon
9	pink	low	bead	flakes	zircon
10	pale-green	low	columnar	striae	orthopyroxene
11	red-brown	low	irregular	opaque	zircon
12	white	low	rounded	-	quartz
13	orange	low	rounded	needles	zircon
14	yellow	low	rounded	striae	zircon
15	orange	low	rounded	opaque	spinel?
16	white	low	angular	opaque	quartz
17	brown	low	rounded	opaque sheen	spinel
18	white	low	tetragonal prism	-	zircon

695032

PROBE MOUNT W17B

GRAIN NO.4

OX,1:

ANAL. NO. 12.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	300907.	TIME	60.0
SIO2	40.89	1.0065	40.53
FEO	13.21	0.2719	13.09
MGO	46.65	1.7118	46.25
CAO	0.12	0.0032	0.12
SUMME	100.87	2.9934	100.00
MG/(MG+FE)	86.3		

CORR:

: GRAIN NO 5
OX : -6,1,2,4,5

ANAL. NO. 13.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	317675.	TIME	60.0
SIO2	56.27	1.9220	55.73
AL2O3	4.10	0.1652	4.06
CR2O3	0.53	0.0143	0.52
FEO	6.13	0.1750	6.07
MGO	32.84	1.6716	32.52
CAO	1.10	0.0402	1.09
SUMME	100.97	3.9883	100.00
MG/(MG+FE)	90.5		
CA:MG:FE	2.1	88.6	9.3
CR/(CR+AL)	8.0		
0.5*AL/(0.5*AL + MG + FE)	4.3		

CORR:

```
:   GRAIN NO.6
OX  : -6,1,2,4,5

ANAL. NO.    14.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 315121.     TIME    60.0
 SIO2     55.20   1.9040   55.22
 AL203     4.92   0.1999    4.92
 CR203     0.39   0.0108    0.39
 FEO       6.18   0.1782    6.18
 MGO      32.40   1.6657   32.41
 CAO       0.87   0.0321    0.87
 SUMME    99.95   3.9907  100.00
 MG/(MG+FE)    90.3
 CA:MG:FE    1.7   88.8    9.5
 CR/(CR+AL)     5.1
 0.5*AL/(0.5*AL + MG + FE)    5.1
CORR:


:    GRAIN NO 9
OX  : -6,1,2,3,4,5

ANAL. NO.    15.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 346082.     TIME    60.0
 SIO2     60.92   1.9275   55.96
 AL203     3.72   0.1389    3.42
 CR203     0.60   0.0149    0.55
 FEO       6.37   0.1686    5.85
 MGO      36.41   1.7172   33.45
 CAO       0.84   0.0284    0.77
 SUMME   108.87   3.9956  100.00
 MG/(MG+FE)    91.1
 CA:MG:FE    1.5   89.7    8.8
 CA:NA: K  100.0    0.0    0.0
 CR/(CR+AL)     9.7
 0.5*AL/(0.5*AL + MG + FE)    3.6
CORR:


:   GRAIN NO 10
OX  : -10,1,2,3,4,5

ANAL. NO.    16.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 278799.     TIME    60.0
  P205     0.40   0.0267    0.46
 SIO2     28.17   2.2219   32.11
 TIO2      0.47   0.0276    0.53
 AL203    19.62   1.8237   22.36
 FEO      37.18   2.4522   42.38
 MGO       0.66   0.0773    0.75
 CAO       0.41   0.0344    0.46
  K20      0.14   0.0143    0.16
  SO3      0.69   0.0382    0.78
 SUMME    87.73   6.7164  100.00
 MG/(MG+FE)     3.1
 CA:MG:FE    1.3    3.0   95.6
 CA:NA: K   70.7    0.0   29.3
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)   24.5
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695034

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:     GRAIN NO. 14
OX  : -4,1,2,4,5

ANAL. NO.    17.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 330611.     TIME    60.0
 TIO2       0.66   0.0115    0.59
 AL203     70.75   1.9408   63.97
 FEO       19.31   0.3758   17.46
 MGO       19.89   0.6899   17.98
 SUMME    110.60   3.0180  100.00
 MG/(MG+FE)    64.7
 CA:MG:FE    0.0   64.7   35.3
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)   47.7
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2       0.66   0.0114    0.59
 AL203     70.75   1.9292   63.81
 FE203      2.74   0.0477    2.47
 FEO       16.84   0.3259   15.19
 MGO       19.89   0.6858   17.94
 SUMME    110.88   3.0000  100.00
 MG/(MG+FE)    67.8
 CA:MG:FE    0.0   67.8   32.2
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)   48.8
CORR:


: NONO 16≠
OX  : -10

ANAL. NO.    18.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 227747.     TIME    60.0
  P205      0.96   0.0792    1.42
 SIO2      25.66   2.4892   37.91
 TIO2       0.17   0.0126    0.25
 AL203     13.59   1.5534   20.07
 FEO       23.57   1.9127   34.83
 MGO        2.20   0.3183    3.25
 CAO        0.90   0.0933    1.33
  SO3       0.63   0.0431    0.93
 SUMME     67.68   6.5019  100.00
CORR:
```

695035

SAMPLE DECRIPTION - OPTICAL EXAMINATION

SAMPLE: W21

Grain No:	colour	reflect.	form	inclusions	likely mineral
1	black	low	rounded	-	Fe Mg spinel
2	black	med	rounded	cracks	ilmenite
3	black	med	very rounded	cracks	ilmenite
4	black	low	sub-angular	cracks	ilmenite
5	black	low	sub-angular	rough rind	chrome spinel
6	black	low	octahedral	-	spinel
7	yellow - brown	low	sub-rounded	-	zircon
8	brown	low	angular	opaque	Al, Fe, Mg SiO_2 garnet?
9	brown	low	sub-rounded	cloudy	Al,Fe, Mg SiO_2 garnet?
10	black	med	sub-rounded	cracks	ilmenite
11	white	low	tetragonal prism	cracks	zircon
12	orange - brown	med - low	angular	striae, feathers	cassiterite
13	green	low	angular	striae, feathers	orthopyroxene
14	green	low	angular	-	orthopyroxene
15	grey	low	columnar	feathers	clinopyroxene
16	white	low	angular	black feathers	quartz
17	white	low	angular	-	quartz
18	white	low	angular	-	quartz
19	brown	low	sub-rounded	concentric opaque	garnet?

695036

15KV. OXIDE AND SILICATE ANALYSIS.

ANSWER "NO" TO ELEMENTS TO BE ELIMINATED FROM THE ANALYSIS LIST
NA :
MG :
AL :
SI :
P :
S :
CL :
FE :
K :
CA :
TI :
V : NO
CR :
MN :
FE :
NI :

: W21 GRAIN 3

: W21 GRAIN 3
OX : -3

ANAL. NO. 1.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	296403.	TIME	60.0
TIO2	17.01	0.3914	17.94
AL203	5.23	0.1885	5.51
FEO	68.12	1.7426	71.81
MNO	0.68	0.0175	0.71
MGO	3.82	0.1743	4.03
SUMME	94.86	2.5143	100.00

CORR:

```
: GRAIN 4

:   GRAIN 4
OX  : -3,1

ANAL. NO.     2.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 313918.     TIME    60.0
 TIO2     52.41   0.9648  53.60
 AL203     0.37   0.0106   0.38
 FEO      36.11   0.7393  36.93
 MNO       0.58   0.0120   0.59
 MGO       8.31   0.3031   8.50
 SUMME    97.77   2.0299 100.00
 MG/(MG+FE)    29.1
CORR:


: GRAIN 5


:   GRAIN 5
OX  : -3,1

ANAL. NO.     3.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 303148.     TIME    60.0
 AL203    58.63   1.3076  57.06
 CR203    11.59   0.1735  11.29
 FEO      10.86   0.1719  10.57
 NIO       0.34   0.0051   0.33
 MGO      21.31   0.6012  20.75
 SUMME   102.74   2.2593 100.00
 MG/(MG+FE)    77.8
CORR:


:   GRAIN 6
OX  : -4,1

ANAL. NO.     4.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 301324.     TIME    60.0
 TIO2      0.49   0.0097   0.48
 AL203    60.70   1.8685  58.73
 CR203     0.38   0.0078   0.37
 FEO      26.96   0.5889  26.09
 MGO      14.82   0.5771  14.34
 SUMME   103.36   3.0520 100.00
 MG/(MG+FE)    49.5
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.49   0.0095   0.47
 AL203    60.70   1.8367  58.33
 CR203     0.38   0.0077   0.36
 FE203     7.06   0.1363   6.78
 FEO      20.61   0.4425  19.81
 MGO      14.82   0.5673  14.25
 SUMME   104.07   3.0000 100.00
 MG/(MG+FE)    56.2
```

: GRAIN 8

: GRAIN 8
OX : -5

ANAL. NO. 5.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	265225.	TIME	60.0
P2O5	0.42	0.2168	0.52
SIO2	37.21	22.7935	46.53
TIO2	0.16	0.0729	0.20
AL2O3	27.41	19.7870	34.27
FEO	11.28	5.7777	14.10
MGO	2.88	2.6321	3.60
CAO	0.32	0.2084	0.40
SO3	0.30	0.1276	0.37
SUMME	79.97	51.6161	100.00

CORR:

: GRAIN 9

: -10

: GRAIN 9
OX : -10

ANAL. NO. 6.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	245270.	TIME	60.0
P2O5	0.62	0.0452	0.82
SIO2	29.89	2.5901	39.93
TIO2	0.42	0.0272	0.56
AL2O3	16.06	1.6404	21.46
FEO	25.13	1.8214	33.57
MGO	1.57	0.2023	2.09
CAO	0.64	0.0595	0.86
SO3	0.53	0.0325	0.71
SUMME	74.86	6.4186	100.00

CORR:

: GRAIN 10
OX : -10,1

ANAL. NO. 7.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	309565.	TIME	60.0
TIO2	49.86	3.1167	51.64
AL2O3	0.58	0.0569	0.60
FEO	36.94	2.5677	38.26
MNO	0.42	0.0292	0.43
MGO	8.75	1.0845	9.07
SUMME	96.54	6.8550	100.00
MG/(MG+FE)	29.7		

CORR:

: GRAIN 13
OX : -6,1,2,4,5

695039

ANAL. NO. 8.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 315758. TIME 60.0

SIO2	55.14	1.8886	54.70
AL2O3	5.53	0.2233	5.49
CR2O3	0.38	0.0104	0.38
FEO	6.40	0.1833	6.35
MGO	32.40	1.6542	32.14
CAO	0.94	0.0346	0.94
SUMME	100.81	3.9945	100.00

MG/(MG+FE) 90.0
CA:MG:FE 1.9 88.4 9.8
CR/(CR+AL) 4.5
0.5*AL/(0.5*AL + MG + FE) 5.7
CORR:

: GG GRAIN 14
OX : -6,1,2,3,4,5

ANAL. NO. 9.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 317076. TIME 60.0

SIO2	55.15	1.9077	54.65
TIO2	0.21	0.0055	0.21
AL2O3	4.49	0.1830	4.45
CR2O3	0.56	0.0154	0.56
FEO	8.20	0.2371	8.12
MGO	30.45	1.5699	30.17
CAO	1.86	0.0690	1.85
SUMME	100.92	3.9876	100.00

MG/(MG+FE) 86.9
CA:MG:FE 3.7 83.7 12.6
CA:NA: K 100.0 0.0 0.0
CR/(CR+AL) 7.7
0.5*AL/(0.5*AL + MG + FE) 4.8
CORR:

: GRAIN 15
OX : -6,1,2,4,5

ANAL. NO. 10.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM 342456. TIME 60.0

SIO2	49.24	1.7981	49.34
TIO2	1.01	0.0277	1.01
AL2O3	9.06	0.3899	9.08
FEO	6.72	0.2052	6.73
MGO	15.02	0.8177	15.05
CAO	17.55	0.6867	17.59
NA2O	0.95	0.0676	0.96
SO3	0.24	0.0060	0.24
SUMME	99.80	3.9989	100.00

MG/(MG+FE) 79.9
CA:MG:FE 40.2 47.8 12.0
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 16.0
CORR:

40

695040

: GRAIN 19
OX : -12,1,2,4,5

ANAL. NO. 11.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	244717.	TIME	60.0
P2O5	0.37	0.0356	0.48
SIO2	20.51	2.3468	26.57
TIO2	0.35	0.0298	0.45
AL2O3	14.17	1.9111	18.36
FEO	38.27	3.6621	49.58
MNO	0.44	0.0427	0.57
MGO	2.13	0.3628	2.76
CAO	0.22	0.0266	0.28
SO3	0.73	0.0590	0.95
SUMME	77.19	8.4766	100.00

Garnet ?

MG/(MG+FE) 9.0
CA:MG:FE 0.7 9.0 90.4
CR/(CR+AL) 0.0
0.5*AL/(0.5*AL + MG + FE) 19.2
CORR:

:

41

SAMPLE DESCRIPTION - OPTICAL EXAMINTION

SAMPLE NO: W22

Grain No:	colour	reflect.	form	inclusions	likely mineral
1	black	low	bead	fractures	spinel
2	black	low	angular	-	spinel
3	black	low	octahedron	-	spinel
4	black	med	angular	fractures	ilmenite
5	black	low	scalenohedron	rind	spinel
6	black	low	octahedron	-	spinel
7	orange	low	sub-rounded	needles	quartz?
8	light brown	low	sub-rounded	needled	zircon
9	light brown	low	bead	-	zircon
10	orange	low	angular	trans-lucent	cassiterite
11	pink	low	rounded	brown blob	zircon
12	pink	low	sub-angular	needles	zircon
13	white	low	bead	-	feldspar?
14	green	low	angular	-	clinopyroxene
15	green	low	angular	-	orthopyroxene
16	white	low	angular	-	zircon
17	green	low	angular	many feathers	xenotime?
18	green	low	sub-rounded	fluid	xenotime?
19	green	low	angular	-	clinopyroxene

```
G GRAIN NO.1

?Err 5 Input conversion error
in   routine ',MAIN.'  line 327



:   GRAIN NO.1
OX  : -10,1,2,3,4,5

ANAL. NO.   19.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 326438.     TIME    60.0
 TIO2      0.28  0.0125   0.25
 AL203    68.24  4.8114  62.32
 FEO      22.93  1.1473  20.94
 MGO      18.06  1.6103  16.49
 SUMME   109.51  7.5815 100.00
 MG/(MG+FE)    58.4
 CA:MG:FE    0.0  58.4  41.6
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)  46.6
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.28  0.0118   0.25
 AL203    68.24  4.5504  60.90
 FE203    25.49  1.0851  22.74
 MGO      18.06  1.5230  16.12
 SUMME   112.06  7.1703 100.00
 MG/(MG+FE)   100.0
 CA:MG:FE    0.0 100.0    0.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)  59.9
CORR:


:   GRAIN NO1 AGAIN
OX  : -4,1,2,4,5

ANAL. NO.   20.
SPECTRUM RECEIVED
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  TOTAL CTS IN SPECTRUM 326438.     TIME    60.0
TIO2      0.28   0.0050    0.25
AL203    68.24   1.9246   62.32
FEO      22.93   0.4589   20.94
MGO      18.06   0.6441   16.49
SUMME   109.51   3.0326  100.00
MG/(MG+FE)    58.4
CA:MG:FE    0.0   58.4   41.6
CR/(CR+AL)     0.0
0.5*AL/(0.5*AL + MG + FE)   46.6
CORR: 8
THEORETICAL  CATION TOTAL : 3


TIO2      0.28   0.0049    0.25
AL203    68.24   1.9039   62.04
FE203     4.83   0.0860    4.39
FEO      18.59   0.3680   16.90
MGO      18.06   0.6372   16.42
SUMME   110.00   3.0000  100.00
MG/(MG+FE)    63.4
CA:MG:FE    0.0   63.4   36.6
CR/(CR+AL)     0.0
0.5*AL/(0.5*AL + MG + FE)   48.6
CORR:


:   GRAIN NO 2
OX  : -4,1,2,4,5

ANAL. NO.    21.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 316380.     TIME    60.0
TIO2      1.20   0.0230    1.11
AL203    60.72   1.8198   56.15
FEO      31.71   0.6742   29.32
MGO      14.51   0.5499   13.42
SUMME   108.14   3.0669  100.00
MG/(MG+FE)    44.9
CA:MG:FE    0.0   44.9   55.1
CR/(CR+AL)     0.0
0.5*AL/(0.5*AL + MG + FE)   42.6
CORR: 8
THEORETICAL  CATION TOTAL : 3


TIO2      1.20   0.0225    1.10
AL203    60.72   1.7800   55.67
FE203     9.33   0.1746    8.55
FEO      23.31   0.4849   21.37
MGO      14.51   0.5379   13.30
SUMME   109.08   3.0000  100.00
MG/(MG+FE)    52.6
CA:MG:FE    0.0   52.6   47.4
CR/(CR+AL)     0.0
0.5*AL/(0.5*AL + MG + FE)   46.5
CORR:
```

```
:   GRAIN NO. 3
OX  : -4,1,2,4,5

ANAL. NO.    22.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 312179.     TIME    60.0
 TIO2      0.64   0.0119    0.60
 AL203    64.22   1.8767   60.81
 CR203     0.22   0.0044    0.21
 FEO      21.16   0.4388   20.04
 MGO      19.36   0.7157   18.34
 SUMME   105.60   3.0474  100.00
 MG/(MG+FE)    62.0
 CA:MG:FE    0.0   62.0   38.0
 CR/(CR+AL)     0.2
 0.5*AL/(0.5*AL + MG + FE)   44.8
CORR: 8
THEORETICAL  CATION TOTAL : 3


 TIO2      0.64   0.0117    0.60
 AL203    64.22   1.8475   60.42
 CR203     0.22   0.0043    0.21
 FE203     6.78   0.1245    6.38
 FEO      15.06   0.3074   14.17
 MGO      19.36   0.7045   18.22
 SUMME   106.28   3.0000  100.00
 MG/(MG+FE)    69.6
 CA:MG:FE    0.0   69.6   30.4
 CR/(CR+AL)     0.2
 0.5*AL/(0.5*AL + MG + FE)   47.7
CORR:


:   GRAIN NO 4
OX  : -3,1,2,4,5

ANAL. NO.    23.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 329102.     TIME    60.0
 SIO2      0.37   0.0094    0.37
 TIO2     51.53   0.9841   51.89
 AL203     0.20   0.0060    0.20
 FEO      42.24   0.8970   42.53
 MNO       4.98   0.1070    5.01
 SUMME    99.31   2.0036  100.00
 MG/(MG+FE)     0.0
 CA:MG:FE    0.0    0.0  100.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.3
CORR: 8
THEORETICAL  CATION TOTAL : 2


 SIO2      0.37   0.0094    0.37
 TIO2     51.53   0.9823   51.86
 AL203     0.20   0.0060    0.20
 FE203     0.56   0.0107    0.56
 FEO      41.73   0.8848   42.00
 MNO       4.98   0.1068    5.01
 SUMME    99.37   2.0000  100.00
 MG/(MG+FE)     0.0
 CA:MG:FE    0.0    0.0  100.0
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)    0.3
CORR:
```

: GRAIN NO 5
OX : -4,1,2,4,5

ANAL. NO. 24.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	304318.	TIME	60.0
TIO2	0.47	0.0097	0.45
AL203	36.94	1.1946	35.33
CR203	34.04	0.7386	32.56
FEO	15.21	0.3490	14.55
MGO	17.89	0.7316	17.11
SUMME	104.55	3.0235	100.00
MG/(MG+FE)	67.7		
CA:MG:FE	0.0	67.7	32.3
CR/(CR+AL)	38.2		
0.5*AL/(0.5*AL + MG + FE)	35.6		

CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.47	0.0096	0.45
AL203	36.94	1.1853	35.23
CR203	34.04	0.7328	32.47
FE203	3.03	0.0622	2.89
FEO	12.48	0.2841	11.90
MGO	17.89	0.7259	17.06
SUMME	104.86	3.0000	100.00
MG/(MG+FE)	71.9		
CA:MG:FE	0.0	71.9	28.1
CR/(CR+AL)	38.2		
0.5*AL/(0.5*AL + MG + FE)	37.0		

CORR: 0

: GRAIN NO.6
OX : -4,1,2,4,5

ANAL. NO. 25.
SPECTRUM RECEIVED

TOTAL CTS IN SPECTRUM	303998.	TIME	60.0
TIO2	0.87	0.0181	0.84
AL203	37.40	1.2152	35.79
CR203	29.75	0.6486	28.47
FEO	18.35	0.4231	17.56
MGO	18.12	0.7448	17.34
SUMME	104.50	3.0498	100.00
MG/(MG+FE)	63.8		
CA:MG:FE	0.0	63.8	36.2
CR/(CR+AL)	34.8		
0.5*AL/(0.5*AL + MG + FE)	34.2		

CORR: 8
THEORETICAL CATION TOTAL : 3

TIO2	0.87	0.0178	0.83
AL203	37.40	1.1954	35.57
CR203	29.75	0.6380	28.30
FE203	6.40	0.1306	6.09
FEO	12.59	0.2856	11.97
MGO	18.12	0.7326	17.24
SUMME	105.14	3.0000	100.00
MG/(MG+FE)	72.0		
CA:MG:FE	0.0	72.0	28.0
CR/(CR+AL)	34.8		
0.5*AL/(0.5*AL + MG + FE)	37.0		

```
:   GRAIN NR.:6
OX  : -8,1,2,4,5

ANAL. NO.    26.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 290890.     TIME    60.0
 SIO2     49.05   2.6312   59.67
 AL203    24.22   1.5309   29.46
 FEO       0.73   0.0329    0.89
 MGO       0.18   0.0145    0.22
 CAO       0.73   0.0421    0.89
  K20      3.10   0.2118    3.77
 NA20      3.82   0.3975    4.65
  SO3      0.37   0.0141    0.46
 SUMME    82.21   4.8750  100.00
 MG/(MG+FE)    30.6
 CA:MG:FE   47.0   16.2   36.8
 CR/(CR+AL)     0.0
 0.5*AL/(0.5*AL + MG + FE)   94.2
CORR:


:   GRAIN NO 14
OX  : -6,1,2,4,5

ANAL. NO.    27.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 357126.     TIME    60.0
 SIO2     52.82   1.8414   50.83
 TIO2      0.67   0.0176    0.65
 AL203     7.88   0.3237    7.58
 CR203     0.60   0.0165    0.57
 FEO       5.40   0.1574    5.20
 MGO      17.23   0.8954   16.58
 CAO      18.63   0.6960   17.93
 NA20      0.68   0.0460    0.65
 SUMME   103.91   3.9939  100.00
 MG/(MG+FE)    85.0
 CA:MG:FE   39.8   51.2    9.0
 CR/(CR+AL)     4.8
 0.5*AL/(0.5*AL + MG + FE)   13.3
CORR:


:   GRAIN NO 15
OX  : -6,1,2,4,5

ANAL. NO.    28.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 325635.     TIME    60.0
 SIO2     56.96   1.9361   55.67
 AL203     3.57   0.1428    3.49
 CR203     0.59   0.0160    0.58
 FEO       7.76   0.2206    7.59
 MGO      31.71   1.6063   30.99
 CAO       1.72   0.0628    1.68
 SUMME   102.31   3.9845  100.00
 MG/(MG+FE)    87.9
 CA:MG:FE    3.3   85.0   11.7
 CR/(CR+AL)    10.0
 0.5*AL/(0.5*AL + MG + FE)    3.8
CORR:
```

```
: GRAIN NO. 19
OX  : -6,1,2,4,5

ANAL. NO.   29.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 345644.     TIME   60.0
 SIO2     50.21   1.8257  49.93
 TIO2      0.69   0.0190   0.69
 AL203     7.23   0.3098   7.19
 CR203     0.90   0.0260   0.90
 FEO       6.22   0.1892   6.19
 MGO      16.06   0.8703  15.97
 CAO      18.66   0.7269  18.55
 NA2O      0.59   0.0413   0.58
 SUMME   100.57   4.0081 100.00
 MG/(MG+FE)    82.1
 CA:MG:FE   40.7   48.7   10.6
 CR/(CR+AL)     7.7
 0.5*AL/(0.5*AL + MG + FE)   12.8
CORR:


:   GRAIN NO.20?
OX  : -6,1,2,4,5

ANAL. NO.   30.
SPECTRUM RECEIVED


  TOTAL CTS IN SPECTRUM 317869.     TIME   60.0
 SIO2     56.82   1.9366  56.32
 AL203     3.84   0.1544   3.81
 CR203     0.25   0.0067   0.25
 FEO       6.17   0.1759   6.12
 MGO      33.24   1.6886  32.95
 CAO       0.56   0.0205   0.56
 SUMME   100.89   3.9828 100.00
 MG/(MG+FE)    90.6
 CA:MG:FE    1.1   89.6    9.3
 CR/(CR+AL)     4.2
 0.5*AL/(0.5*AL + MG + FE)    4.0
CORR:


:
```

CONCLUSIONS

Samples were derived from freshly weathered basalt and granite terrain.

Points of note :

1. Spinels from at least two sources including mantle xenoliths and basalt magma.

2. Only one (1) relatively large corundum found.

3. Only a few zircons present; they appear to be from two seperate sources. Uranium content was below detection (approx 1%) with present equipment.

APPENDIX 3

PETROGRAPHY OF TUFFACEOUS (?) SPECIMEN

R. BOTTRILL
Petrologist
Department of Mines,
Tasmania

Description of Rock Sample from Weldborough collected by K. Morrison (Sample No. G400351)

Hand specimen description

The rock is very fine grained, soft and clayey in texture, with a mottled red-yellow colour. The larger yellow to pale grey clasts (to several centimetres) are irregular in shape and show a weak banding suggestive of moderately flattened pumice. The cherry-red matrix is homogenous in texture, with fine yellow specks (to a few mm) but no obvious banding or foliation.

Thin section description

The matrix of the rock is cherry-red in colour and almost opaque, indicating extensive haematization. Numerous small kaolinite patches (to about 0.3 mm) resemble shards or pore-filling of a ropey lava. Weathered phenocrysts, represented by quite abundant yellowish clay pseudomorphs to about 0.5 mm, mostly resemble olivine, but some may have been pyroxene.

The clasts appear to be blocks of pumiceous lava, now largely replaced by kaolinite. They are commonly crystal-rich, similar to the matrix, but usually with more abundant crystals.

Representative photos are shown in figures 1 & 2.

X-ray diffraction

Both the matrix and clasts were analysed by X-ray diffraction to confirm the mineralogy; as expected the clasts were mainly kaolinite and the matrix kaolinite and fine grained haematite. Anatase is present throughout both parts of the rock, and traces of goethite and other clays may be present.

Charts for the red and yellow parts of the rock are enclosed (figs 3 & 4). Haematite is shown in orange, goethite as yellow and anatase as green; the balance is kaolinite.

Heavy Mineral Separation

Part of the sample was crushed and a silt to fine sand fraction sieved and separated with tetrabromoethane. The heavy fraction was passed through a magnetic separator, resulting in a non-magnetic and a slightly magnetic fraction. The more magnetic fraction is mainly haematite, while the non-magnetic fraction is very small and its identity has not yet been confirmed. It does, however, closely resemble the REE-rich mineral (probably florenceite, $CeAl_3(PO_4)_2(OH)_6$) found in kaolinite underlying basalt at Legerwood (Bottrill, unpub. data).

Discussion

The rock is deeply weathered and thus its identity cannot be confirmed at present. XRF analyses are underway. The rock appears, however, to have been a basaltic agglomerate, with pumice clasts in a fine tuffaceous matrix. Presumably the porous pumice was rapidly filled with kaolinite, preventing the inflow of later haematite-rich solutions (during tertiary laterisation?). The anatase and (?)florenceite probably formed at this stage also.

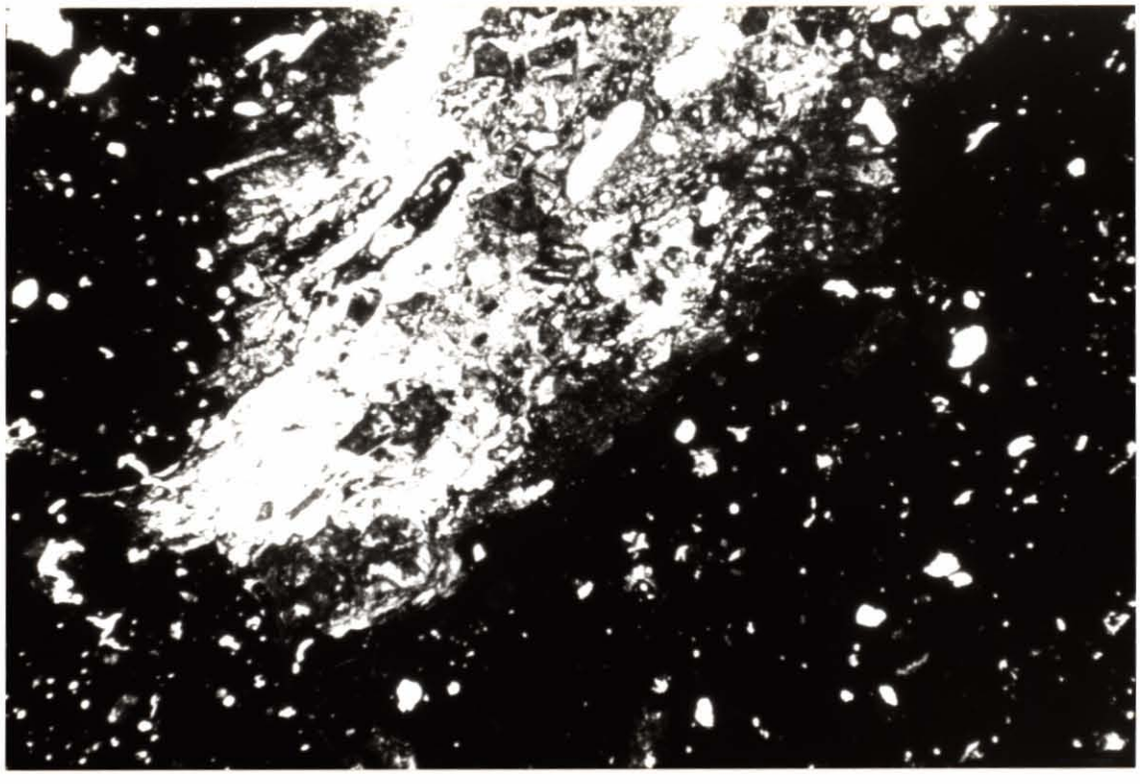


Fig. 1. Vesicular, crystal-rich clast in semi-opaque matrix. Most of the white area is kaolinite and the black area is haematite-rich; crystals are grey. Plane polarised light, Field of view: 4.4 X 3.0 mm.

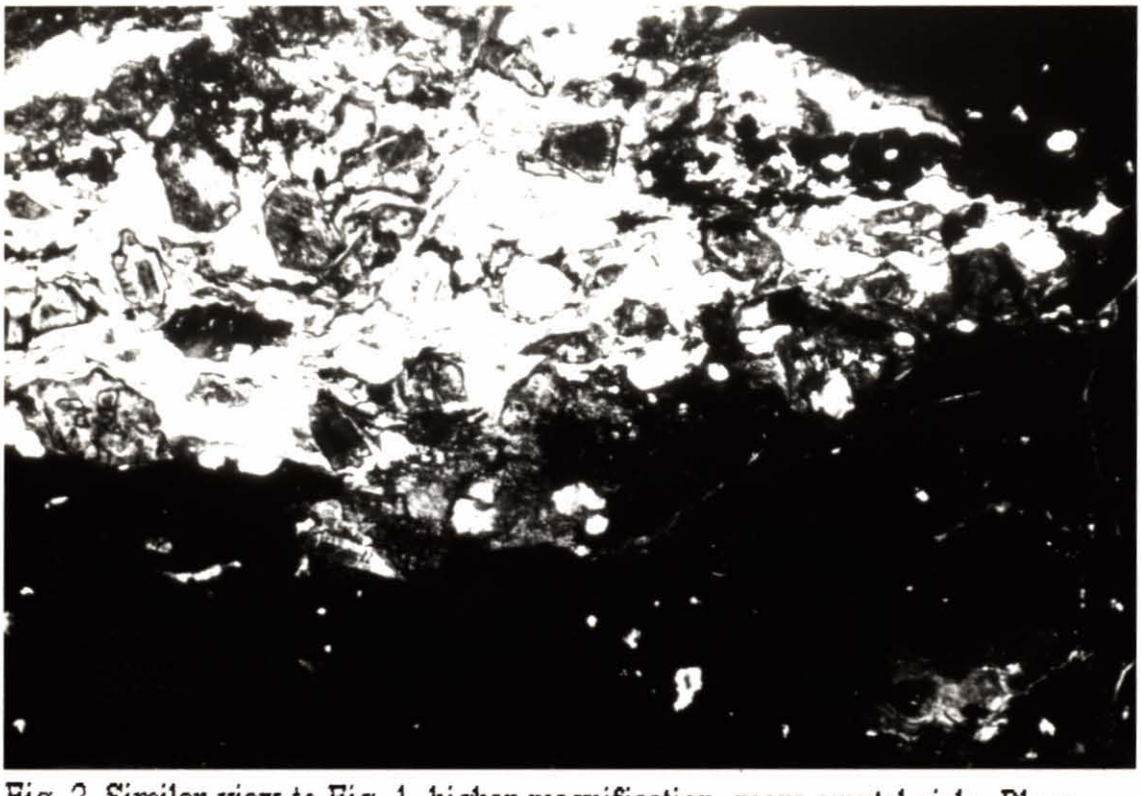


Fig. 2. Similar view to Fig. 1, higher magnification, more crystal rich.. Plane polarised light, Field of view: 1.8 X 1.2 mm.

53

695053

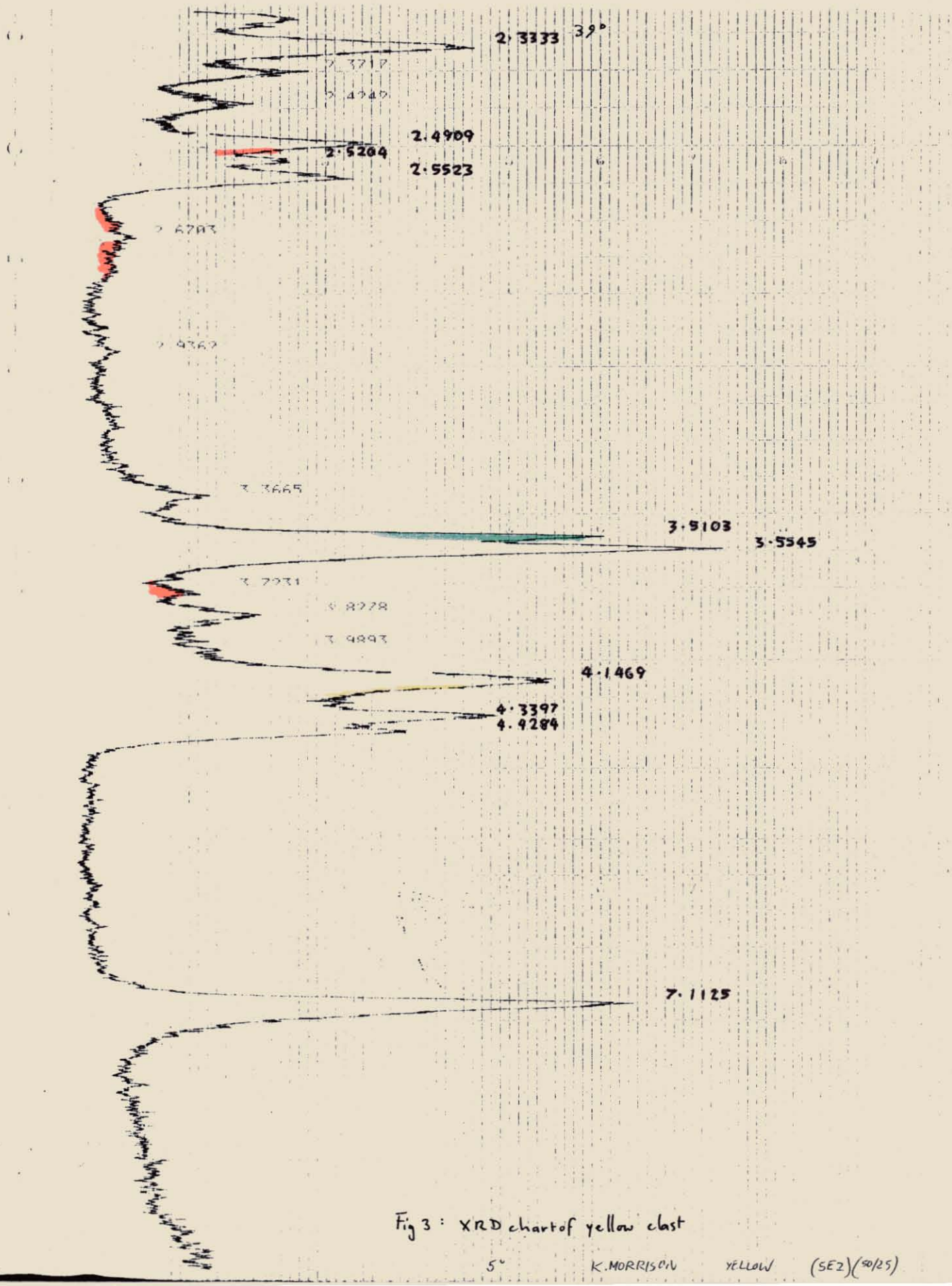


Fig 3 : XRD chart of yellow clast

5° K.MORRISON YELLOW (SE2)(50/25)

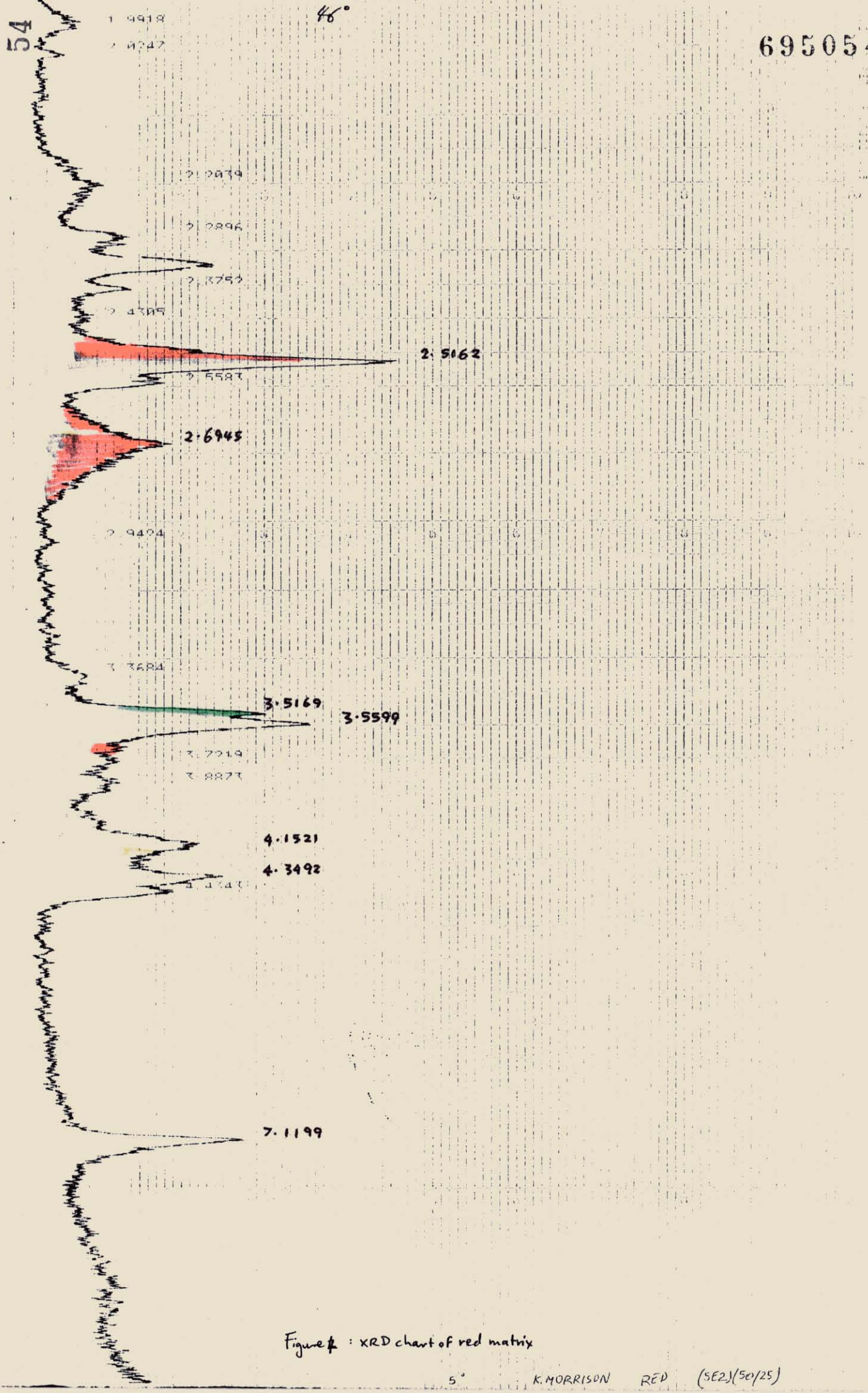


Figure 4 : XRD chart of red matrix

EL 48/87

PROJECTION: Universal Transverse Mercator (UTM).
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum (Tasmania) excepting offshore islands whose datum is mean sea level.
GRID: 1000 metre intervals of the Universal Transverse Mercator Grid, Zone 55 (Australian Map Grid), Australian National Spheroid. Grid values are shown in full at the south west corner of the map.
CONTOUR INTERVAL: 10 metres with 50 metre index contours

WORLD GEODETIC SYSTEM 1972: To convert co-ordinates from this system to Australian Geodetic Datum 1966, increase the value of latitudes by 5.3" and decrease the value of longitudes by 4.2". To obtain heights decrease satellite heights by 2 metres.

MAGNETIC VARIATION: True, Grid and Magnetic North are shown diagrammatically for the centre of this map. Magnetic North is correct for 1982 and moves easterly about 0.1° every two years.

GRID CONVERGENCE 0.5°
GRID/MAGNETIC ANGLE 13.9°

Built-up area with commercial centre
Roads maintained for continuous public use — Primary road; Route number; Secondary road; Route number; Minor road; Route number; Other roads; Bridge
Roads of restricted use or access — Vehicular track; Gate
Walking track; Bridge
Railway; Station
Light railway
Power transmission line and pylon positions
Building; Feature of special interest; Ruin; Mine
Post office; Police station; Fire station; School

SCALE 1:25 000
1 millimetre represents 25 metres

Caravan park; Camping ground
Rubbish disposal area; Cemetery
Trigonometric station; Spot elevation
Contour with value; Depression contour
Quarry or open cut mine
Broken rocky surface
Dense forest; Medium forest
Low dense vegetation; Distinctive grass
Orchard; Pine plantation
Windbreak
Swamp; Land subject to flooding
Waterfall; Rapids
Indefinite shoreline or floodbank; Levee
Tidal rocks or ledge; Offshore rock
Lighthouse; Exposed wreck
Sand; Tidal reef
Saline coastal flat; Tidal flats
Jetty; Launching ramp

BOUNDARIES shown on this map are NOT authoritative. For full particulars please consult the Registrar-General's Department or the Lands Department.
Property and land parcel boundaries are shown as at October 1982.
Areas within proclaimed towns or less than two hectares are not depicted. To give a land parcel reference, prefix parcel number with municipal number.

Municipality name
Municipality number
Municipality boundary
Ward name
Ward boundary
Town boundary
Reserve boundary
Property boundary; Land parcel boundary and number

MEAN TEMPERATURE RAINFALL
J F M A M J J A S O N D

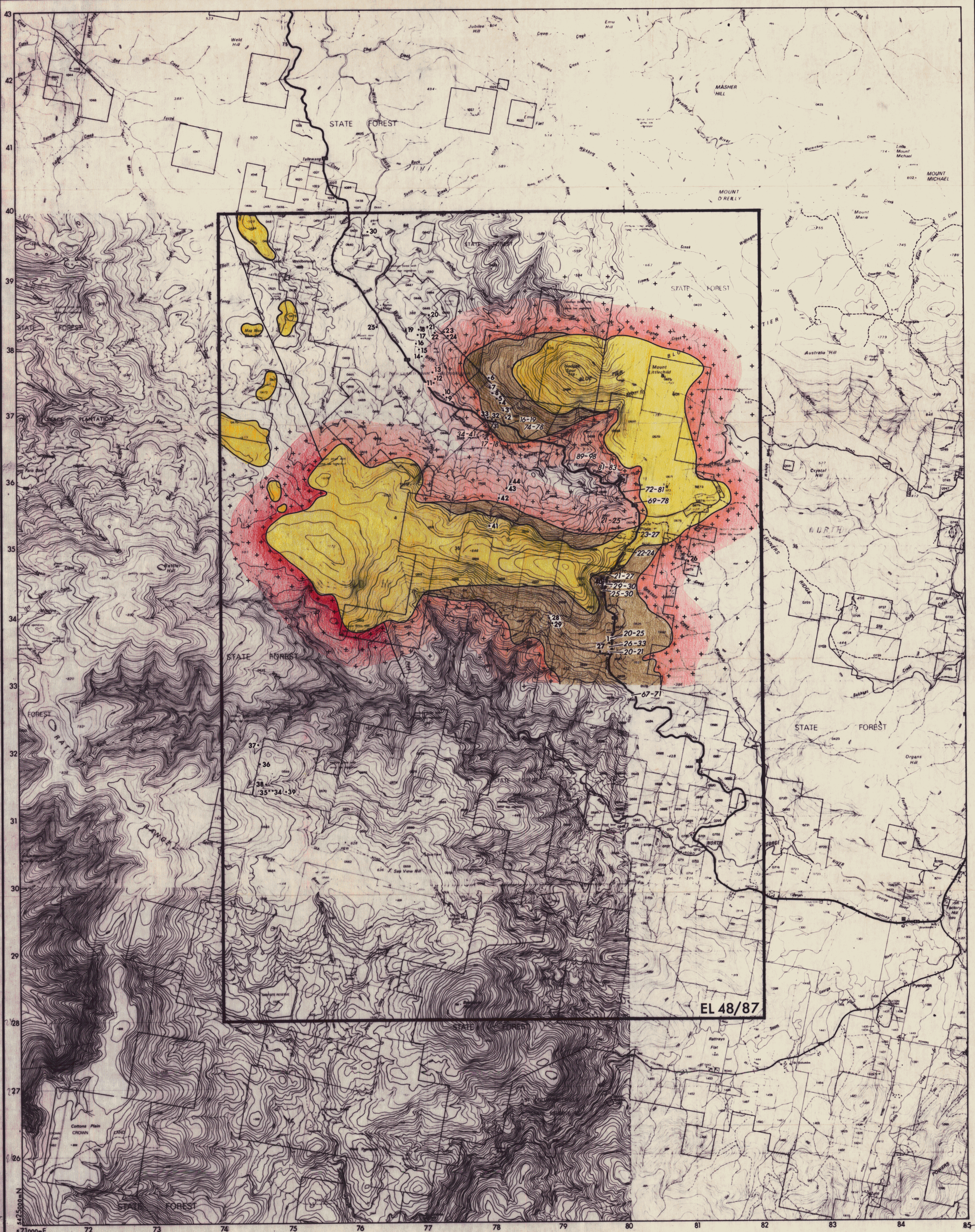
695055

88-2901

TOTTENY PTY LTD	
EL48/87- WELDBOROUGH, TASMANIA	Compiled: KCM
LOCATION MAP	Drawn: JMT
	Date: OCT. 1988
	Scale: 1: 25,000
	Fig. No. PLAN 1

5 cm

7963



PROJECTION: Universal Transverse Mercator (UTM).
HORIZONTAL DATUM: Australian Geodetic Datum 1966.
VERTICAL DATUM: Australian Height Datum (Tasmania) excepting offshore islands whose datum is mean sea level.
GRID: 1000 metre intervals of the Universal Transverse Mercator Grid, Zone 55 (Australian Map Grid). Australian National Spheroid. Grid values are shown in full at the south west corner of the map.
CONTOUR INTERVAL: 10 metres with 50 metre index contours.

WORLD GEODETIC SYSTEM 1972: To convert co-ordinates from this system to Australian Geodetic Datum 1966, increase the value of latitudes by 5.3" and decrease the value of longitudes by 4.2". To obtain heights decrease satellite heights by 2 metres.

MAGNETIC VARIATION: True, Grid and Magnetic North are shown diagrammatically for the centre of this map. Magnetic North is correct for 1982 and moves easterly about 0.1° every two years.

GRID CONVERGENCE 0.5° — GRID/MAGNETIC ANGLE 13.9°

SCALE 1:25 000 — 1 millimetre represents 25 metres

BOUNDARIES shown on this map are NOT authoritative. For full particulars please consult the Registrar-General's Department or the Lands Department.
Property and land parcel boundaries are shown as at October 1982.
Areas within proclaimed towns or less than two hectares are not depicted. To give a land parcel reference, prefix parcel number with municipal number.

LEGEND

- Tertiary basalt
- Tertiary tuff, agglomerate
- Devonian granite
- Devonian granodiorite
- •32 Sample location (all numbers with W prefix)
- 22-24 Counts per minute range over several exposures

88-2901

TOTTENY PTY LTD	
EL48/87-WELDBOROUGH, TASMANIA	Compiled: KCM
	Drawn: JMT
SAMPLE LOCATIONS AND SCINTILLOMETER READINGS	Date: OCT. 1988
	Scale: 1: 25,000
	Fig. No. PLAN 2

GEOLOGY from RINGAROOMA 1: 50,000 Sheet.

5 cm

695056

7964