TASMANIA
DEVELOPMENT
AND RESOURCES

Mineral Resources Tasmania
REPORT 1993/12

National Mapping Accord Programme Geochronology Component: 1993–94 batch of samples

by N. J. Turner

INTRODUCTION

A programme of work has been agreed on under the National Mapping Accord by Mineral Resources Tasmania (MRT) and the Australian Geological Survey Organisation (AGSO). This programme will comprise a seismic surveying component and a geochronology component. The geochronology component is aimed at developing a better understanding of stratigraphic relationships, thereby improving the quality of the seismic interpretation.

The 1993–94 batch of geochronology samples is aimed at improving the understanding of the stratigraphy of the poorly fossiliferous and unfossiliferous pre-Middle Cambrian successions. There will be seven age determinations, although more than seven samples will be forwarded to Canberra in order to ensure that satisfactory zircon concentrates are obtained.

AGSO will produce the zircon concentrates and carry out the age determinations. Mineral Resources Tasmania will, from its mapping, identify the rock units to be dated. It will collect the samples, do thin and polished section work, do microprobe work where relevant, and carry out major and trace element analyses.

SAMPLES ALREADY FORWARDED TO AGSO

Sample details

Seven samples representing five rock units were forwarded to Lance Black at RSES on 23 June 1993. Details of the samples are given in the table below.

Specimens representing samples NS1–7 have been placed in the Department's Registered Collection under the corresponding numbers R000601–R000607. With the exception of NS5 these specimens are sufficiently large for a portion to be used for chemical analysis. Lance Black has been asked to return any material that is excess to his requirements, and this will provide an extra source for chemistry and other work.

Cooee Dolerite

Two samples (NS1, 2) were collected from the mafic igneous bodies known collectively as the Cooee Dolerite (Spry, 1957). The sample locations are shown on Figure 1.

Sample NS2 is from a fine-grained, porphyritic sill about 3 m thick which has a sharp, intrusive basal (western) contact. The sill's upper contact comprises a mixed zone

Sample	AMG co-ordinates (approximate)	1:25 000 map	Locality	Remarks	Reg. No.
NS1	407 575 mE 5 455 390 mN	Burnie	Foreshore	Medium-grained Cooee Dolerite	R601
NS2	407 600 mE 5 455 385 mN	Burnie	Foreshore	Fine-grained porphyry probably related to Cooee Dolerite	R602
NS3	358 200 mE 5 405 760 mN	Savage River	E, 10 m off track	Tonalite in Heazlewood Ultramafic Complex	R603
NS4	345 575 mE 5 392 055 mN	Meredith	Timbs Creek, south bank	Quartz-feldspar porphyry from Timbs Group in Arthur Metamorphics	R604
NS5	349 170 mE 5 389 375 mN	Livingstone	Rocky River, north bank	Fine-grained granitoid (probably cataclasite) from Bowry Formation	R605
NS6	349 170 mE 5 389 370 mN	Livingstone	Rocky River, south bank	Intensely sheared granitoid from Bowry Fm.	R606
NS7	406 140 mE 5 335 675 mN	Collingwood	Old quarry Lyell Highway	Eclogite from Franklin Metamorphic Complex	R607

Note: Sample No's NS1–7 can be found in the field note book 'Corinna' No 4 at item 1077.

some 350 mm thick of contorted pale, very fine-grained dolerite and dark mudstone. This mixed zone indicates that the sill was emplaced into wet sediments (Gee, 1977; Crook, 1979) and thus that the age of the sill is probably only a little less than the age of the enclosing sediments. Sample NS2 was collected one metre below the top of the sill.

Sample NS1 is from a medium-grained, even-grained dolerite sill about 28 m thick. The sample was collected approximately one metre above the chilled, basal (western) contact of the sill. Details of the upper contact of the sill were not recorded.

A third sample from the Cooee Dolerite may be necessary if no satisfactory zircon concentrate is derived from NS1 or NS2. The third sample should come from the narrow leucocratic veins (Spry, 1957, item f, p.90) which cut normal dolerite in the locality indicated in Figure 1. These veins appear to be similar to the felsic veins used to date dolerite bodies in Antarctica (Black *et al.*, 1991).

Bowry Formation sheared granitoid

Samples NS5 and NS6 were collected from a band of fine-grained, schistose granitoid in the Rocky River (Turner *et al.*, 1991). Sample NS5 came from the north bank, whilst NS6 came from the opposite position on the south bank, some 5–10 m away. Sample NS5 was collected adjacent to a cross cutting (E–W), probably intrusive boundary against green schist (?metabasic). This sample displays little fabric compared with NS6, which shows strong schistosity. In NS5 there are disseminated pyrite and vuggy, weathered veinlets containing chalcopyrite in the outcrop from which the sample was taken. The two samples were collected from the band of schistose granitoid because they differ texturally, and thus the characteristics of the contained zircons may differ.

ADDITIONAL SAMPLES

Introduction

In addition to the samples already forward to AGSO, it is recommended that a sample of the King Island Precambrian granite also be forwarded, plus a sample that will give an indication of the age of the Late Precambrian tholeiitic basalt suites, such as occur at Smithton and Crimson Creek.

King Island Precambrian granite

There are two favoured localities for collecting the King Island granite sample. These are:

(1) The site of sample number 1419 of McDougall and Leggo (1965). This site is said to be about 0.3 miles (0.5 km) south of the mouth of the Ettrick River on King Island's west coast. McDougall and Leggo (1965) gave the co-ordinates as 203 000 yards E, 1 072 000 yards N but this positioning is very inaccurate.

The sample site probably corresponds to an ?aplite dyke shown on Geopeko Ltd's geological sheet no. 8 – Pearshape (filed in the MRT Cartographic Drafting Room). The AMG co-ordinates of this dyke are 233 856 mE, 5 567 281 mN (approximately), and the dyke is 0.5 km south of the small, narrow bay into which the Ettrick River flows.

(2) The other favoured sample site corresponds to the old quarry from which sample number 1434 of McDougall and Leggo (1965) was obtained. Again the given coordinates of 208 000 yards E, 1 118 000 yards N are too inaccurate but the position description of about 0.7 miles (1.1 km) southeast of Wickham Lighthouse seems fairly right. Geopeko's sheet no. 1 – Wickham shows an isolated granite outcrop 0.9 km southeast of the lighthouse. This outcrop probably corresponds to the old quarry. It has the co-ordinates 237 904 mE, 5 612 479 mN.

Of the two possible sample sites on King Island, the old quarry at Wickham is preferred because arrangements can probably be made for a sample to be collected without the need for a visit to King Island by personnel from Mineral Resources Tasmania.

Late Precambrian basalt suites

The Late Precambrian tholeiitic basalt suites pose a difficult problem for U-Pb SHRIMP dating. There are no known felsic rocks associated with the basaltic volcanics, so ion probe dating may have to depend on obtaining baddelyite from the basalts themselves (Turner, 1991). Alternatively, dating may depend on obtaining synmagmatic zircon from intermediate variants of the Rocky Cape dykes. Some of the tholeiitic variants of these dykes are regarded as probably being of the same age as the Smithton Volcanics because they are chemically very similar (Brown, 1989). However, it is not clear that the intermediate variants represent the same magmatic phase as the tholeiites (Brown, 1989). A. J. Crawford (pers. comm.) considers that the intermediate variants do correspond in age to the Smithton Volcanics.

John Everard and Ralph Bottrill of Mineral Resources Tasmania are investigating basalt collected from the Smithton Volcanics for baddelyite. They are also testing intermediate variants of the Rocky Cape dykes for zircon.

Other intermediate variants of the Rocky Cape dykes that were located by Paul Lennox (Lennox *in* Brown, 1989) may be worth sampling if Everard and Bottrill are unsuccessful with their samples. Tony Brown (MRT) has resampled some of Lennox's sites and has chemical analyses (unpublished) of the rocks. Details of Lennox's samples are given below.

Field No.	AMG	Registered No.	SiO_2 (%)	Zr (ppm)
T15	363 500 mE 5 466 950 mN	80/257	58.80	221
T16	361 900 mE 5 465 900 mN	80/158	55.70	167
T20	CQ578611	80/162	59.10	228

The site of T20 seems the best for collecting a relatively large, unweathered sample.

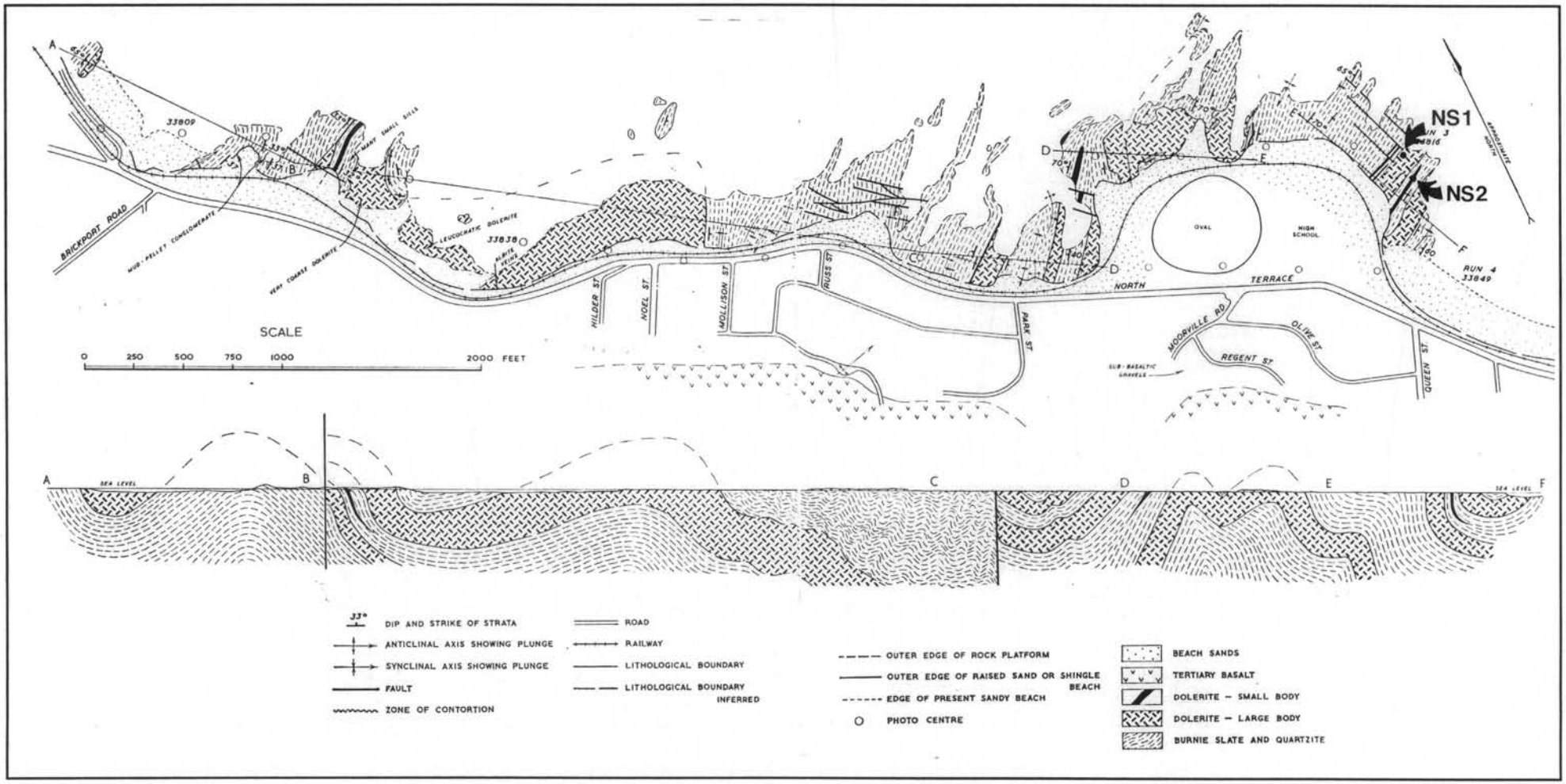

Figure 1

Precambrian sediments (Burnie Slate and Quartzite) with dolerite intrusions on the foreshore between Cooee Point and Park Point, West Burnie (from Spry, 1957). Collection locations of samples NS1 and NS2 are marked.

Weld River Diorite

If material suitable for dating the Late Precambrian basaltic suites cannot be found, then an alternative sample will be needed. Clive Calver (MRT) has located a hornblende quartz diorite in the Weld River at DN669437 which will probably give a synmagmatic zircon concentrate. There is no chemical analysis of the diorite currently available.

Field relationships of the diorite are poorly known but they should become better established when the locality is revisited for further sampling (next summer). It appears that the diorite is associated with a major fault and it may be a member of the structurally-emplaced igneous suite which includes the ultramafic rocks. Quartz in the diorite has been strained and annealed.

If the Late Precambrian basaltic suites are successfully dated then the Weld River diorite could be included in the year 3 (1995–1996) batch of check, miscellaneous and granitoid samples.

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