



Cooperative Research Centre for  
Landscape Environments  
and Mineral Exploration



**Australian Government**  
Geoscience Australia



**OPEN FILE  
REPORT  
SERIES**

# **POTASSIUM-ARGON AGES OF LATE MESOZOIC AND CAINOZOIC IGNEOUS ROCKS OF EASTERN AUSTRALIA**

*D.L. Gibson*

**CRC LEME OPEN FILE REPORT 193**

**July 2007**

CRCLEME

CRC LEME is an unincorporated joint venture between CSIRO-Exploration & Mining, and Land & Water, The Australian National University, Curtin University of Technology, University of Adelaide, Geoscience Australia, Primary Industries and Resources SA, NSW Department of Primary Industries and Minerals Council of Australia, established and supported under the Australian Government's Cooperative Research Centres Program.





**Australian Government**  
Geoscience Australia



# **POTASSIUM-ARGON AGES OF LATE MESOZOIC AND CAINOZOIC IGNEOUS ROCKS OF EASTERN AUSTRALIA**

*D.L. Gibson*

**CRC LEME OPEN FILE REPORT 193**

July 2007

© CRC LEME 2007

---

CRC LEME is an unincorporated joint venture between CSIRO-Exploration & Mining, and Land & Water, The Australian National University, Curtin University of Technology, University of Adelaide, Geoscience Australia, Primary Industries and Resources SA, NSW Department of Primary Industries and Minerals Council of Australia.

*Headquarters:* CRC LEME c/o CSIRO Exploration and Mining, PO Box 1130, Bentley WA 6102, Australia

This Open File Report 193 has been produced by the CRC for Landscape Environments and Mineral Exploration.

Electronic copies of the publication in PDF format can be downloaded from the CRC LEME website: <http://crcleme.org.au?Pubs?OFRindex.html>. Information on this or other CRC LEME publications can be obtained from: <http://crcleme.org.au>

Hard copies will be retained in the Australian National Library, The J.S. Battye Library of West Australian History, and the CSIRO Library at the Australian Resources Research Centre, Kensington Western Australia.

**Reference:**

Gibson, D, 2007. Potassium-Argon Ages of Late Mesozoic and Cainozoic Igneous Rocks of Eastern Australia. *CRC LEME Open File Report 193*. pp 53.

1. Geochronology - Eastern Australia, Late Mesozoic and Cainozoic. 2. Radiogenic Techniques - Potassium - Argon Dating. 3. Geology - Igneous

ISSN: 1329-4768

ISBN: 1921039 574

**Address and affiliation of author**

**David Gibson**

Cooperative Research Centre for Landscape Environments and Mineral Exploration  
c/- Geoscience Australia  
PO Box 378,  
Canberra 2601  
ACT

Published by: CRC LEME, c/o CSIRO Exploration and Mining, PO Box 1130, Bentley, Western Australia 6102

**Disclaimer**

The user accepts all risks and responsibility for losses, damages, costs and other consequences resulting directly or indirectly from using any information or material contained in this report and attached maps. To the maximum permitted by law, CRC LEME excludes all liability to any person arising directly or indirectly from using any information or material contained in this report.

© **This report is Copyright of the** Cooperative Research Centre for Landscape Environments and Mineral Exploration, (2007), which resides with its Core Participants: CSIRO Exploration and Mining and Land and Water, The Australian National University, Curtin University of Technology, The University of Adelaide, Geoscience Australia, Primary Industry and Resources SA, NSW Department of Primary Industries and Minerals Council of Australia.

Apart from any fair dealing for the purposes of private study, research, criticism or review, as permitted under Copyright Act, **no part may be reproduced or reused by any process whatsoever, without prior written approval from the Core Participants mentioned above.**

## **PREFACE**

Late Mesozoic and Cainozoic igneous rocks, mostly in the form of basic flows and basic to acidic shallow intrusions associated with local vents and composite volcanoes are present throughout much of the highlands of Eastern Australia. By studying the degree of incision or burial since the rocks were emplaced, the ages of these rocks can in many cases give clues about the rate of landscape development. Ages of these rocks have been determined mainly by radiogenic techniques (principally K-Ar, but also Ar-Ar, U-Th, and radiocarbon), and also by Apatite Fission Track analysis. This report lists K-Ar ages of igneous rocks  $< \sim 100$  Ma from eastern Australia, along with laboratory data, details of location, and sources of data. This dataset will allow detailed investigation of landscape development throughout the region, as well as providing a set of ages and sources of data for research in other fields.

David Gibson  
Project Leader

## CONTENTS

1.	INTRODUCTION .....	2
1.1	Rationale .....	2
1.2	Sources of data .....	2
2.	DATA AND DATA QUALITY .....	3
2.1	Sample ID .....	3
2.2	Region and State .....	3
2.3	Location and elevation .....	4
2.4	Rock type and form .....	5
2.5	Laboratory data .....	5
2.6	Age, error and constants .....	6
2.7	Source of data and comments .....	6
3.	DISTRIBUTION OF SAMPLES .....	7
4.	CONCLUSIONS .....	7
5.	ACKNOWLEDGEMENTS .....	7
6.	REFERENCES .....	9

## LIST OF APPENDICES

		Page
Appendix 1	Summary of Queensland K-Ar ages	19
Appendix 2	Summary of NSW K-Ar ages	33
Appendix 3	Summary of Victorian K-Ar ages	45
Appendix 4	Summary of Tasmanian and Bass Strait K-Ar ages	51
Appendix 5	Queensland K-Ar data	On CD
Appendix 6	NSW K-Ar data	On CD
Appendix 7	Victorian K-Ar data	On CD
Appendix 8	Tasmanian and Bass Strait K-Ar data	On CD

## **ABSTRACT**

A collation of >1100 K-Ar ages of Late Mesozoic and Cainozoic (<100 Ma) igneous rocks in eastern Australia is presented in this report. Locations, ages and sources of data are included in the abbreviated tables in Appendices 1-4, organised by state. More detailed information, including laboratory analyses used to determine the ages, detailed sources of data, and comments on the samples or ages are included in Appendices 5-8, which are spreadsheets included on the enclosed CD.

# 1. INTRODUCTION

## 1.1 Rationale

Late Mesozoic and Cainozoic age basalts and other associated volcanic igneous rocks are common throughout the upland areas of eastern Australia. Some are associated with large composite volcanoes, with flows reaching hundreds of metres thick, and forming large volcanic landforms such as the Warrumbungle Ranges. At the other end of the spectrum there are lava fields, often with remnants of small flows a few hectares in area and only metres thick that originated from local fissures. In addition to extrusive rocks, plugs, sills and dykes that intrude country rock and (rarely) lavas are also locally present. These volcanics form a range of landscape features, including remnants of large volcanoes, topographically-inverted hill caps, fills within extant valleys, and broad lava plains. The preserved rocks vary from fresh to highly weathered.

Fresh samples of the Cainozoic volcanics can be dated by various techniques. The K-Ar radiogenic isotope method has been most commonly used. This uses the concentrations of the radioactive isotope  $K^{40}$  and its daughter isotope  $Ar^{40}$  to calculate an age of crystallisation of the rock or crystal within that rock, which is in almost all cases the time of extrusion or emplacement.

In many cases dating has been carried out primarily to assist igneous petrologists to unravel the history of volcanism, and to document the timing of changes of geochemistry of the volcanics. It has been shown (eg Sutherland 1983) that the ages of the large composite volcanoes decrease with increasing latitude, suggesting that they represent eruptions from a mantle hot spot over which the Australian plate has been migrating. Many lava fields do not appear to show this type of relationship. However, it has been shown that groups of flows in many areas have a similar age or groups of ages, suggesting that local volcanism took place over limited geological periods, probably from closely-related magma sources (e.g. Wellman & McDougall 1974).

The age of the volcanics can be used to make interpretations on the rate of landscape evolution, and their distribution can give clues to the palaeolandscape on which they were extruded. The volcanics are generally resistant to weathering and erosion. Many flows that originally flowed down river valleys are now preserved as topographically inverted remnants on hilltops, as the country rock around the flows has been preferentially eroded (eg Young & McDougall 1993, Bishop *et al.* 1985, Spry *et al.* 1999, Cundari & Ollier 1970, McQueen *et al.* 2007). If the amount of erosion since the time of extrusion of the volcanics, and the age of the volcanics are known, an average rate of erosion or river incision since extrusion can be determined. In addition, the configuration of the lava flows can also be used to help reconstruct the topography and configuration of drainage lines at the time of extrusion (eg Young & McDougall 1993, Brown 2006). An arbitrary cutoff of 100 Ma has been used in this compilation, as it is considered that most ages of rocks older than this will not be of use in landscape studies in Eastern Australia.

## 1.2 Sources of data

There is no central repository for K-Ar age data in Australia. However, there are many Late Mesozoic and Cainozoic ages published in journal papers and reports, from the late 1960s (when the technique became established) onwards. Amongst the early researchers, P. Wellman of ANU and the Bureau of Mineral Resources (BMR) and I. McDougall of ANU published hundreds of ages, and A. Webb of AMDEL laboratory is also associated with many other determinations. Most of the published data were collated into various national early summary reports which included both Cainozoic and older dates by BMR (now Geoscience Australia) (Harding 1969, Bennett *et al.* 1975, Bowen 1975). The Geological Survey of NSW produced a hard copy summary report of all NSW K-Ar dates up to the mid-1980s (Jones 1987), a scanned version of which is available via the DIGS website. This report is extremely cumbersome to use as samples of all ages are included, the sample numbers or ages are not sorted in any way, and there is no index of sample numbers. Where reference is made in this report to a sample from Jones's report, the page number is included. The data in this report were collated on an early computerised database which is



no longer supported, but it has been migrated into a Microsoft Excel spreadsheet. A copy of the spreadsheet was made available to the author by K. Capnerhurst Geol. Surv. NSW (written comm. 2006).

The Geological Survey of Queensland (GSQ) has made available an Excel spreadsheet of K-Ar dates and data, with numerous determinations that are not publicly available elsewhere (M. Jones GSQ written comm. 2006), with extra data from J. Beeston GSQ (written comm. 2007). Reports of the Isotope Laboratory of the University of Queensland (Green 1975, Lafferty & Golding 1985) also contain valuable unpublished information predominantly from Queensland. The Geological Survey of Victoria (now GeoScience Victoria) published a list of all radiometric age determinations made on their own samples up to the early-mid 1980s (McKenzie *et al.* 1984), collated all radiometric age determinations in Victoria up to the early 1990s (Wohlt 1993) and has provided a more up to date spreadsheet of ages (V. Morand, written comm 2007). A spreadsheet of Tasmanian ages was also made available by the Geological Survey of Tasmania (J. Everard, written comm 2006).

More general summaries of ages of provinces are presented in various synopses on Cainozoic volcanicity, such as Stephenson *et al.* (1980), Johnson (1989) and Price *et al.* (2003).

Many other age determinations have been made by researchers from Universities, Museums, State Geological Surveys and possibly mineral/petroleum exploration companies, but not published. Some of these have been made available for inclusion in this report. Some ages are awaiting publication, and the authors have asked that the ages not be made available until they are published. Lastly, there are most probably ages both published and unpublished of which I am not aware, and are thus not included in this collation.

## **2. DATA AND DATA QUALITY**

A considerable amount of data has been recorded in Appendices 1-8 apart from the actual ages of the rocks, and in many cases metadata on the sources of data, or how certain figures or locations were derived, are included. It is hoped that this will allow users to determine data accuracy, and allow additional calculations or interpretations to be made. Every care has been taken in transcribing figures, or calculating GDA 94 and MGA 94 coordinates, but it is possible that there are errors. The user is encouraged to go back to the original source of the data if there appears to be a discrepancy. Of course it is possible that the original source contains errors. In almost all cases I have not checked for internal consistency in the calculation of ages from laboratory data, or that the coordinates of the samples plot near the described location. Appendices 1-4 give basic summaries, with all data in Appendices 5-8.

### **2.1 Sample ID**

This is the main sample number or name used by the primary source for the data. In some cases, an ID was not given by the publishing authors, and a name such as the location (e.g. 'Dunkeld') or author (e.g. 'Owen1') has been used here. Where multiple age determinations have been made on the one sample, multiple entries are included in Appendices 5-8, with number 1, 2 etc recorded in the sequence number column to differentiate the various multiple determinations. Alternate sample IDs are also listed in Appendices 5-8. This situation may arise where differing field and laboratory numbers have been used for the same sample. For example some Queensland samples have both a 5 digit University of Queensland field number (sometimes with the prefix UQ) and a 3 digit University of Queensland Isotope Laboratory number (with prefix QA). Some authors have used the former, and some the latter as their published sample numbers.

### **2.2 Region and State**

Various authors have grouped the volcanic rocks into genetic provinces or regions. Most samples have been classified into one of these groups. In Victoria, the subprovinces of Price *et al.* (2003) have been used. In addition, the data are divided into state listings to reduce table sizes and facilitate the finding of samples in the tables. Bass Strait samples have been combined with Tasmania (Appendices 4 and 8).

### 2.3 Location and elevation

The general locations of the samples are as reported in the sources for the data. In many cases miles have not been converted to kilometres, as a stated distance of, say, 3 miles may imply anywhere between 2.5 and 3.5 miles, whereas the metric equivalents of 4.8 km or 5 km imply different possible ranges of distance.

Great care has been taken with determination and presentation of coordinates of samples. These are given as GDA94 lat/long in the form of degrees to 6 decimal places ( $10^{-6}$  degrees is equivalent to about 0.1 m) in Appendices 1-4, and also as GDA94 degrees minutes and seconds to two decimal places ( $10^{-2}$  seconds is in the order of 30 cm) and MGA94 grid references to the nearest metre in Appendices 5-8. Obviously the locations of samples have not been originally measured this accurately, and an indication of the accuracy of the location is given in Appendices 5-8, based on how accurately the sample location appears to have been originally recorded (e.g. degrees and minutes, degrees minutes and tenths of minutes, grid reference to the nearest 100 or 1000 m, etc.). Even this may not be the true accuracy of the sample location, depending on whether it was located by GPS reading, location of features on maps of varying scale and spatial accuracy, etc., and also the map reading skill of the collector of the samples. Most importantly, it gives an indication of whether the location is extremely general (e.g. measured to the nearest 1 minute, which is approximately 1.7 km, or 1000 m). In this situation, if the dated rock body is small, the coordinates as given may not actually fall over the rock body. It should be noted that some coordinates, although given an apparently high accuracy (e.g. to the nearest 0.1 minute, about 170 m), plot away from the features from which the samples came (e.g. quarries) by much greater amounts than the apparent accuracy of the coordinates. In most of these cases no systematic attempt has yet been made to correct these coordinates.

In nearly all cases, the location has been originally published as grid references (yard, AMG66, and in some recent cases, MGA94 grids), or AGD66 lat/longs. In many cases the grid references are given as 3 digit eastings and northings on a particular map sheet. These have been converted to zone plus 6 digit eastings and 7 digit northings by adding the requisite numeric prefixes for the map area, and adding two or three zeros. Some older publications do not state that they use yard grid references, but this becomes apparent when the grid references are compared with the general location of the sample. In particular, Lafferty & Golding (1985) present a mixture of metric and yard grid references without stating which is which. However, there has been little difficulty in determining which system has been used, and whether the grid reference is to the nearest 100 or 1000 metres or yards. It has been assumed that all published metric grid references are AMG 66, and lat/longs are AGD 66 unless otherwise stated.

The AMG66 and AGD66 coordinates have been converted to GDA94 lat/long and MGA94 grid coordinates mostly using the free software "Geod" which is available from <http://www.lands.nsw.gov.au/LPServices/Surveying/GDA/GEODSoftware.htm>, which should give an absolute accuracy of transformation of one metre or better. However, where the original coordinates are yard grid references, these locations have first been manually migrated to AGD 66 or AMG66 coordinates mostly to the nearest 1000 m or minute using old geological or topographic maps that show both yard and metric or lat/long coordinates. A column in Appendices 5-8 records the original source of location data used, and how the GDA/MGA coordinates were determined.

In some cases, sample coordinates have not been provided in the original reference. If coordinates are provided in later compilations (e.g. Jones 1987) or in unpublished data provided by Geological Surveys, these are used, although it is not known how they were determined. These coordinates have mostly not been checked against the descriptive location of the sample. Note that several sets of coordinates provided by the Geological Survey of Queensland (M. Jones GSQ written comm., 2006) for samples in the Toowoomba area have been checked for accuracy against the descriptive location and yard grid references in the original publications, and some were found to be inaccurate by up to several kilometres. Hence it is considered that other coordinates supplied by the Geological Survey of Queensland may also be inaccurate.

If no coordinates for a sample are available from any source, the coordinates for the general locality of the sample (e.g. 'Big Brother Hill') have been estimated using the Geoscience Australia place names search web facility (<http://www.ga.gov.au/map/names/>) and/or topographic maps, and used as the basis for sample coordinates.

Some published grid references appear to be incorrect due to typographic errors, for example Queensland sample QA438. The grid reference for this sample (Lafferty & Golding 1985) plots 75 km south of the stated location at Harlaxton Quarry, Toowoomba. It is apparent that there is a typographic error, as the stated northing is 503(00), but a northing of 583(00) is essentially correct for the quarry location.

Some samples have been given both lat/long and grid coordinates by the original author or later compilations. In most cases these are only rough approximations of each other. Only one set of AGD/AMG coordinates has been used to generate the GDA/MGA coordinates in the tables of this report; this source is listed in Appendices 5-8. The GDA lat/longs (dd.ddddd, degrees to six decimal places) were calculated first, then the degrees, minutes and seconds and MGA coordinates were calculated from these using the Geod software.

Elevation is as reported in the references for the samples, with feet converted to metres where necessary. No attempt has been made to intersect locations with Digital Elevation Models (DEMs) or contours on topographic maps, but it is noted that some elevations do not agree with the coordinates. It is not known in these cases whether the elevations or locations are incorrect, and the original data are presented.

## **2.4 Rock type and form**

The rock type recorded is a guide to lithology, although some sources give detailed lithology, whereas others are more generalised (e.g. 'basalt' vs. 'alkali olivine basalt'). The form of the rock body is important in determining whether it is useful for landscape analysis. Flows were extruded at the surface, and in most cases began to erode immediately after extrusion. However, flows that were part of a thicker sedimentary sequence were first buried by sediment and possibly younger flows before erosion began: many of these are recorded as 'buried flow'. Intrusions of various types are generally not useful in the determination of landscape development, unless their depth of emplacement is known. This has not been determined for any of the rocks recorded here. One sample is a basalt boulder from a topographically inverted alluvial deposit, and another is from a clast in laterite. Despite the fact that many of the age determinations are unsuitable for determining landscape history, they have been recorded here so there is a complete record which may be useful for other scientific disciplines.

## **2.5 Laboratory data**

Laboratory data include the name of the laboratory making the argon analyses, mineral phase (or whole rock) on which the analyses were made, and analyses for potassium and radiogenic argon. In all cases with laboratory and age data, I have tried to record accurately the number of significant decimal places – for example, 6.20 has not been abbreviated to 6.2. This has been achieved in Excel by formatting all cells as text, even when they contain a number. In general, two or more analyses are made for potassium for each sample, recorded as K%. For some samples, only the average of two or more analyses is available, sometimes with an indication of the spread of the analytical data given by an error of  $\pm 2\sigma$ . In some cases, potassium has been recorded as K<sub>2</sub>O%: this is recorded as given by the original publication rather than converting to K%.

Different laboratories report different argon analyses. These have generally been recorded as published, although the units of measurement have been converted to a common unit (e.g. radiogenic Ar<sup>40</sup> has been reported in units of 10<sup>-9</sup>, 10<sup>-10</sup> and 10<sup>-11</sup> moles/gram; these have all been converted to the last by multiplying the reported figures by 100 or 10 respectively). In addition, some laboratories report radiogenic argon 40 (\*Ar<sup>40</sup>), either as % or decimal (the latter data have been converted to percent), whereas others report atmospheric Ar<sup>40</sup>. In this last case, the data have been converted to radiogenic Ar<sup>40</sup> by subtracting from 100% or unity.

## 2.6 Age, error and constants

The age of a sample is determined by formulas which includes laboratory data and three constants, abbreviated here as  $\lambda_e$ ,  $\lambda_\beta$  and  $K^{40}/K_{\text{total}}$ . Prior to 1976, a set of constants which are now regarded as incorrect were used (mostly  $0.584$  or  $0.585 \times 10^{-10}/\text{yr}$ ,  $4.72 \times 10^{-10}/\text{yr}$  and  $1.19 \times 10^{-4}$  mol/mol respectively). These were replaced by constants recommended by the IUGS (Steiger & Jager 1977;  $0.581 \times 10^{-10}$  (occasionally  $0.5811 \times 10^{-10}$ ),  $4.962 \times 10^{-10}$  and  $1.167 \times 10^{-4}$  respectively). A set of tables providing correction factors for converting old ages to the new constants is provided by Dalrymple (1979). One of the constants ( $K^{40}/K_{\text{total}}$ ) may be presented as a weight rather than atomic fraction.

Two ages for each published age are presented in millions of years (Ma) in Appendices 5-8: age as originally reported, and age corrected to the IUGS constants (which in the case of post 1976 determinations, is generally the age as reported). Only the latter age is presented in Appendices 1-4. In all cases the source of the age to the new constants is given. Where this age has been determined as part of this project, the correction factor (Dalrymple 1979) used has been recorded. In most cases, an age has been published for each set of laboratory determinations. However, in some cases, only an average age from two or more determinations from the one sample is available, even where individual laboratory data are available. This average age is marked as “av”. In some cases, earlier compilations (e.g. Jones 1987) have reported only an average age, whereas two individual ages have been originally published. In this case, only the original ages have been recorded here.

Most published ages also have an error, usually expressed as  $\pm 1$  or  $2$  standard deviations ( $\sigma$ ). This refers to the accuracies of the laboratory measurements, not the suitability of the rocks for age determination. Some authors do not state whether their error figures refer to  $1$  or  $2\sigma$ . Additionally, some authors publish different error figures to those provided by the analysing laboratory – possibly based on their own interpretation of the laboratory figures. Where this has occurred, a comment is included in Appendices 5-8. The error is an estimate of the standard deviation (or two standard deviations) of the distribution of ages that would be expected if a large number of determinations were made on the one sample.

For the laboratory determined age to be accurate there must have been no leakage or gain of argon from the rock or mineral phase analysed. If Ar has leaked, the laboratory determined age will be too young; this is commonly called a minimum age. Only the freshest unaltered rocks are considered suitable for accurate dating. Many authors give an indication of the degree of alteration of the rock, and/or whether they consider a particular date to be only a minimum age. Some authors use a set of letters (A through D, with gradations such as A-, B-C) to describe the degree of alteration. These letters and comments on the degree of alteration have been recorded so the user can assess the likelihood of the age being a minimum only. Where an author has considered the age to be a minimum due to possible argon loss, the age is preceded with a ‘greater than’ sign ( $>$ ). In other rare cases, the K-Ar age is thought by the author to be too old. These ages are marked with ‘ $<$ ’.

A brief discussion of errors is included in Lafferty & Golding (1986), abridged from Dalrymple and Lanphere (1969). Lafferty & Golding (1986) give their method used to calculate errors, adapted from Cox and Dalrymple (1967), and McKenzie *et al.* (1984) also discuss errors. Formulas for calculating ages from laboratory data are included in Dalrymple (1979) and McKenzie *et al.* (1984).

## 2.7 Source of data and comments

The sources for the location, laboratory and age data are provided. In some cases, extra data above that given by the original publication are included in previously prepared compilations. The source of the extra data is generally not known, but the data are included in the tables and attributed to the compilations. The compilation of Jones (1987) (available from the Geological Survey of NSW website) is particularly difficult to use as there is no index of sample numbers. However, page number references have been added to facilitate cross-checking if needed. Important unpublished compilations are the University of Queensland Isotope Geology Reports of Green (1975) and Lafferty & Golding (1985)

(available from the University of Queensland), and Henley & Webb 1990 (available from the Geological Survey of Victoria).

Comments on the samples and data as provided by the data sources, and comments on location problems are included.

### **3. DISTRIBUTION OF SAMPLES**

The locations of the samples are summarised in Figure 1. This shows the close spatial relationship between the dated samples, and the highlands and continental divide of eastern Australia.

### **4. CONCLUSIONS**

The locations, ages and sources of data for samples of Late Mesozoic and Cainozoic volcanic rocks dated by K-Ar analysis in eastern Australia are presented in Appendices 1-4, and detailed information about the samples is given in Excel spreadsheets in Appendices 5-8 in the accompanying CD. These data were compiled to assist with determination of rates of landscape development, but will be of use to many branches of Earth Sciences.

### **5. ACKNOWLEDGEMENTS**

Thanks to the many researchers who provided previously unpublished data; their contribution is recorded in the appendices. In particular, thanks to Mal Jones and Jim Beeston from the Geological Survey of Queensland, Kevin Capnerhurst from the Geological Survey of NSW, Vince Morand from GeoScience Victoria, John Everard from the Geological Survey of Tasmania, Lin Sutherland from the Australian Museum, Peter Whitehead from James Cook University and Ian Roach from ANU, who made unpublished data available, and helped with providing references.

Janine Luckman prepared Figure 1.

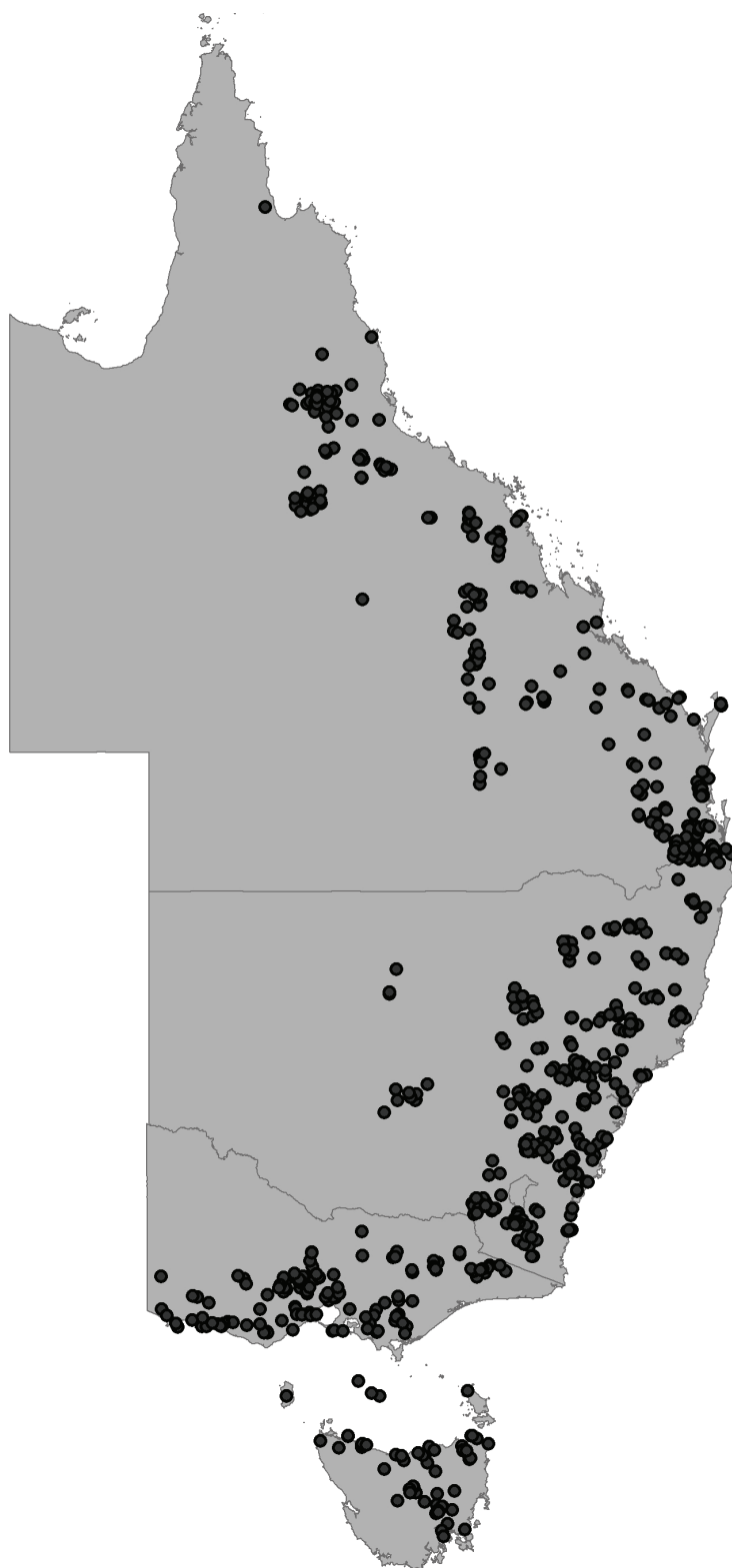


Figure 1. Location of samples.

## 6. REFERENCES

- Abele C. & Page R.W. 1973. Stratigraphic and isotopic ages of Tertiary basalts at Maude and Aireys Inlet, Victoria, Australia. *Proceedings of the Royal Society of Victoria* **86**, 143-150.
- Abell R.S. & Roach I.C. 1996. The Whinstone Basalt and landscape evolution in the Jerangle area, NSW. In Kennard JM (ed) Abstracts, 13<sup>th</sup> Australian Geological Convention, Canberra, 19<sup>th</sup>-23<sup>rd</sup> February 1996. *Geological Society of Australia Abstracts* **41**, 3.
- AMDEL 1982. K-Ar dating of basaltic rocks. AMDEL Report GS 3486/82. Unpublished Report to University of NSW.
- AMDEL 1985. K-Ar results. Unpublished Report to the Geological Survey of Queensland.
- AMDEL 1995. K-Ar dating of three basalts. AMDEL Report G871600G/95. Unpublished report to Australian Geological Survey Organisation.
- Ashley P.M. Dawson M.W. Sivell W.J. Wilson J.S. & Dunlap W.J. 2003. New data on the geology and geochronology of the area south of Tooraweenah, New South Wales. *Quarterly Notes of the Geological Survey of New South Wales* **115**, 13-32.
- Atkinson F.A. 1986. Cainozoic basaltic rocks and their relationships to stanniferous alluvial deposits in the watershed of the upper Herbert River, north Queensland. MSc thesis, James Cook University, Townsville (unpubl.).
- Aziz-ur-Rahman & McDougall I. 1972. Potassium-argon ages on the Newer Volcanics of Victoria. *Proceedings of the Royal Society of Victoria* **85**, 61-69.
- Baillie P.W. 1983. The Parmeener Super-Group at Musselroe Bay: drilling results and possible Permian volcanic rocks. *Tasmania Department of Mines Unpublished Report* **1983/58**.
- Baillie P.W. 1984. A radiometric age for volcanic rocks at Musselroe Bay, north-eastern Tasmania. *Tasmania Department of Mines Unpublished Report* **1984/46**.
- Baillie P.W. 1986a. Radiometric ages for Circular Head and the Green Hills basalts, north-western Tasmania. *Tasmania Department of Mines Unpublished Report* **1986/39**. Also Appendix E in Brown A.V. (compiler) 1982. Geological Survey Explanatory Report. Geological Atlas 1:50 000 series. Sheet 21 (7916S). Smithton. Tasmania Department of Mines, 101.
- Baillie P.W. 1986b. A radiometric age for the Moriarty Basalt, north-western Tasmania. *Tasmania Department of Mines Unpublished Report* **1986/38**.
- Baillie P. W. 1986c. Geological Survey Explanatory Report. Geological Atlas 1:50 000 series. Sheet 8516S. Eddystone. Tasmania Department of Mines.
- Baillie P.W. 1987 A Palaeocene radiometric age for basalt at Bream Creek, south-eastern Tasmania. *Tasmania Department of Mines Unpublished Report* **1987/21**.
- Baillie P.W. 1989. Radiometric ages for the Circular Head and Green Hills basalts, north-western Tasmania. In Brown A.V. Geological Survey Explanatory Report, Geological Atlas 1:50 000 Series, Sheet 21 (7916S), Smithton. Tasmania Department of Mines: 101.
- Barnbaum D. 1976. The geology of the Burrum syncline, Maryborough Basin, southeast Queensland. *Papers of the Geology Department, University of Queensland* **7(3)**, 1-45.
- Bennett R. Page R.W. & Bladon G.M. 1975. Catalogue of isotopic age determinations on Australian rocks, 1966-70. *Bureau of Mineral Resources Australia Report* **162**.
- Bishop P. Young R. W. & McDougall I. 1985. Stream profile change and longterm landscape evolution; early Miocene and modern rivers of the East Australian highland crest, central New South Wales, Australia. *Journal of Geology* **93(4)**, 455-474.
- Bowen K.G. 1975. Potassium-argon dates; determinations carried out by the Geological Survey of Victoria. *Geological Survey of Victoria Report* **1975-3**, 34pp.

- Brown A.V. 1977. Preliminary report on age determination of basalt samples from the Ringarooma 1:50 000 Sheet. *Tasmania Department of Mines Unpublished Report* **1977/25**.
- Brown A.V. 1982. Whole rock K/Ar ages of basalts. In McClenaghan M. P., Turner N.J., Baillie P.W., Brown A.V., Williams P.R. & Moore W.R. Geology of the Ringarooma-Boobyalla area. *Geological Survey of Tasmania Bulletin* **61**, 178.
- Brown M.C. 2006. Ponding and major drainage diversions by Late Palaeogene basalts, Shoalhaven River catchment, New South Wales, Australia. *Zeitschrift fur Geomorphologie* **50(4)**, 501-522.
- Brown M.C. McQueen K.G. & Taylor G. 1992. A core through the Monaro Basalt: Bega (BMR) no. 7. *Australian Journal of Earth Sciences* **39**, 555-559.
- Carr P.F. & Facer R.A. 1980. Radiometric ages of some igneous rocks from the Southern and Southwestern Coalfields of New South Wales. *Search* **11**, 382-3.
- Cayley R.A. & McDonald P.A. 1995. Beaufort 1:100 000 map geological report. *Geological Survey of Victoria Report* **104**.
- Cayley R.A. Webb A.W. & Henley K.J. 1995. Radiometric dating (K/Ar) of two samples of Newer Volcanic olivine basalt from the southwestern part of the Beaufort 1:100 000 map sheet area. *Geological Survey of Victoria Unpublished Report* **1995/15**.
- Cherry D.P & Wilkinson H.E. 1994. Bendigo, and part of Mitiamo, 1:100 000 map geological report. *Geological Survey of Victoria Report* **99**.
- Cooper J.A. Richards J.R. & Webb A.W. 1963. Some Potassium-Argon ages in New England, New South Wales. *Journal of the Geological Society of Australia* **10**, 313-316.
- Cornell C.D., Cowan W.C., Mosness T.L., Rankin J.G. & Walla R.J. 1986. Tilana-1 Final Well Report. Appendix 10. Petrology and Geochronology of Tilana 1. Modified from reports by Dr Alan Webb-AMDEL. Amoco Australia Petroleum Company (unpubl.).
- Coventry R.J. Stephenson P.J. & Webb A.W. 1985. Chronology of landscape evolution and soil development in the upper Flinders River area, Queensland, based on isotopic dating of Cainozoic basalts. *Australian Journal of Earth Sciences* **32**, 433-447.
- Cox A. & Dalrymple G.B. 1967. Statistical analysis of geomagnetic reversal data and the precision of potassium-argon dating. *Journal of Geophysical Research* **72**, 2603-2614.
- Cromer W.C. 1980. A late Eocene basalt age from northern Tasmania. *Search* **11**, 294-295.
- Cundari A & Ollier C.D. 1970. Inverted relief due to lava flows along valleys. *The Australian Geographer* **11**, 291-293.
- Dalrymple G.B. 1979. Critical tables for conversion of K-Ar ages from old to new constants. *Geology* **7**, 558-560.
- Dalrymple G.B. & Lanphere M.A. 1969. *Potassium-Argon Dating:- Principles, Techniques and Applications to Geochronology*. W.H. Freeman and Co., New York.
- Dasch E.J. & Millar D.J. 1977. Age and strontium-isotope geochemistry of differentiated rocks from the Newer Volcanics, Mt Macedon area, Victoria, Australia. *Journal of the Geological Society of Australia* **24**, 195-201.
- Dulhunty J.A. 1971. Potassium-Argon basalt ages and their significance in the Ilford-Mudgee-Gulgong region. *Journal and proceedings of the Royal Society of New South Wales* **104**, 39-44.
- Dulhunty J.A. 1972. Potassium-Argon dating and occurrence of Tertiary and Mesozoic basalts in the Binnaway district. *Journal and Proceedings of the Royal Society of New South Wales* **105**, 71-76.
- Dulhunty J.A. 1973. Potassium Argon basalt ages and their significance in the Macquarie valley, New South Wales. *Journal and Proceedings of the Royal Society of New South Wales* **106**, 104-110.



- Dulhunty J.A. 1986. Mesozoic Garrawilla lavas beneath Tertiary volcanics of the Nandewar Range. *Journal and Proceedings of the Royal Society of New South Wales* **119**, 29-32.
- Dulhunty J.A. & McDougall I. 1966. Potassium-Argon dating of basalts in the Coonabarabran-Gunnedah district, New South Wales. *Australian Journal of Science* **28**, 393-394.
- Dury G.H. Langford-Smith T. & McDougall I. 1969. A minimum age for the duricrust. *Australian Journal of Science* **31**, 362-363.
- Edwards J. 1990. Radiometric age determinations Colac 1:250 000 map sheet of the Geological Survey of Victoria. *Geological Survey of Victoria Unpublished Report* **1990/44**.
- Edwards J. Leonard J.G. Pettifer G.R. & McDonald P.A. 1996. Colac, 1:250 000 map geological report. *Geological Survey of Victoria Report* **98**.
- Edwards J. Slater K.R. & McHaffie I.W. 2001. Bendigo: 1:250 000 Map Area Geological Report. *Victorian Initiative for Minerals and Petroleum Report* **72**. Department of Natural Resources and Environment, Victoria.
- Embleton B.J.J. Schmidt P.W. Hamilton L.H. & Riley G.H. 1985. Dating volcanism in the Sydney Basin; evidence from K-Ar ages and palaeomagnetism. In Sutherland F.L. Franklin B.J. & Waltho A.E. (eds) *Volcanism in eastern Australia, with case histories from New South Wales. Geological Society of Australia, New South Wales Division Publication* **1**, 59-72.
- Evans R. 1976. A study of the basic volcanic rocks of the Maleny-Mapleton area, southeast Queensland. BSc Hons Thesis, University of Queensland.
- Everard J. L. Zhang M. Lo C.-H. O'Reilly S. Y. & Forsyth S. M. 2004. Overview of Tasmanian Cainozoic basalts. In McPhie J. & Goldrick P. (eds), *Dynamic Earth: Past, Present and Future*. 17<sup>th</sup> Australian Geological Convention, Hobart, February 2004. *Geological Society of Australia Abstracts* **73**, 74.
- Everard J.L. Sutherland F.L. & Forsyth S. M. in press. A Late Oligocene basalt from Keach Hill, near Campbell Town, and its stratigraphic significance. *Tasmanian Geological Survey Record* in press.
- Evernden J.F. & Richards J.R. 1962. Potassium-argon ages in eastern Australia. *Journal of the Geological Society of Australia* **9**, 1-49.
- Ewart A. 1982. Petrogenesis of Tertiary anorogenic volcanic series of southern Queensland, Australia, in the light of trace elements geochemistry and O, Sr and Pb isotopes. *Journal of Petrology* **23**, 344-382.
- Ewart A. & Grenfell A. 1985. Cainozoic volcanic centres in southeastern Queensland, with special reference to the Main Range, Bunya Mountains, and the volcanic centres of the northern Brisbane coastal region. *Papers of the Department of Geology, University of Queensland* **11(3)**, 1-57.
- Ewart A. Chappell B.W. & Le Maitre R.W. 1985. Aspects of the mineralogy and chemistry of the intermediate-silicic Cainozoic volcanic rocks of eastern Australia; Part 1, Introduction and geochemistry. *Australian Journal of Earth Sciences* **32**, 359-382.
- Exon N.F. Langford-Smith T. & McDougall I. 1970. The age and geomorphic correlations of deep-weathering profiles, silcrete, and basalt in the Roma-Amby region, Queensland. *Journal of the Geological Society of Australia* **17**, 21-30.
- Facer R.A. & Carr P.F. 1979. K-Ar dating of Permian and Tertiary igneous activity in the southeastern Sydney Basin, New South Wales. *Journal of the Geological Society of Australia* **26**, 73-79.
- Galloway R.W. & Webb A.W. 1979. Ages of some volcanic rocks in the Hunter Valley, NSW. *Search* **10**, 87-88.
- Gill E.D. 1957. The stratigraphical occurrence and palaeoecology of some Australian Tertiary marsupials. *Memoirs of the National Museum of Victoria* **21**, 135-199.

- Gill E.D. 1981. Potassium/argon age of basalt in the floor of Hopkins River, Allansford, SW Victoria, Australia. *Victorian Naturalist* **98**, 188-190.
- Gleadon A.J.W. & Ollier C.D. 1987. The age of gabbro at The Crescent, New South Wales. *Australian Journal of Earth Sciences* **34(2)**, 209-212.
- Godthelp H. Archer M. Cifelli R. Hand S. & Gilkeson C.F. 1992. Earliest known Australian Tertiary mammal fauna. *Nature* **356**, 514-516.
- Graham I. Hollis J. Sutherland L. & Joyce B. 2003. Insights into the newer volcanics province of Victoria. Specialist Group in Geochemistry, Mineralogy and Petrology, Field Guide, Geological Society of Australia.
- Green D.C. 1975. Isotope Geology Laboratory Report No 2, 1971-1974. University of Queensland, Department of Geology and Mineralogy.
- Green D.C. & Webb A.W. 1974. Geochronology of the northern part of the Tasman Orogenic Zone. In Denmead A.K. Tweedale G.W. & Wilson A.F. (eds) *The Tasman Geosyncline – a Symposium*. Geological Society of Australia, Queensland Division, Brisbane, 275-294.
- Green D.C. & Stevens N.C. 1975. Age and stratigraphy of Tertiary volcanic and sedimentary rocks of the Ipswich district, Southeast Queensland. *Queensland Government Mining Journal* **76(833)**, 148-150.
- Grenfell A.T. 1984. The stratigraphy, geochronology and petrology of the volcanic rocks of the Main Range, southeastern Queensland. PhD Thesis, University of Queensland.
- Griffin T.J. & McDougall I. 1975. Geochronology of the Cainozoic McBride volcanic province, northern Queensland. *Journal of the Geological Society of Australia* **22**, 387-396.
- Harding R.R. 1969. Catalogue of age determinations on Australian rocks, 1962-1965. *Bureau of Mineral Resources Australia Report* **117**, 105pp.
- Henley K.J. & Webb A. 1990. Radiometric dating on various granites and Newer Volcanics basalts. *Geological Survey of Victoria Unpublished Report* **1990/27**.
- Hollis J.D. Sutherland F.L. & Pogson R.E. 1983. High pressure minerals and the origin of Tertiary breccia pipe, Ballogie gem mine, near Proston, Queensland. *Records of the Australian Museum* **35**, 181-194.
- Jaques A.L. & Perkin D.J. 1984. A mica, pyroxene, ilmenite megacryst-bearing lamprophyre from Mt Woolooma, northeastern New South Wales. *BMR Journal of Australian Geology and Geophysics* **9**, 33-40.
- Jennings D.J. & Sutherland F.L. 1969. Geology of the Cape Portland area with special reference to the Mesozoic appinitic (?) rocks. *Tasmania Department of Mines Technical Report* **13**, 45-82.
- Jones D.G. 1987. K-Ar isotopic dates, New South Wales. *Geological Survey of NSW Report* **1986/237**.
- Johnson, R.W. (Compiler and editor) 1969. *Intraplate Volcanism in Eastern Australia and New Zealand*. Cambridge University Press, Cambridge.
- Kotsonis A. & Joyce E.B. 2003. The regolith of the Bendigo 1:100 000 map. *Victorian Initiative for Minerals and Petroleum Report* **77**. Department of Primary Industries, Victoria.
- Lafferty, S. & Golding S.D. 1985. Isotope Geology Laboratory Report No.3 1975-1984. Department of Geology and Mineralogy, University of Queensland, Brisbane, Queensland, Australia, 147pp.
- Langford-Smith T. Dury G.H. & McDougall I. 1966. Dating the duricrust in southern Queensland. *Australian Journal of Science* **29**, 79-80.
- Lovering J.F. & Richards J.R. 1964. Potassium-argon study of possible lower crust & upper mantle inclusions in deep seated intrusions. *Journal of Geophysical Research* **69**, 4895-4901.

- Mackness B.S. Whitehead P.W. & McNamara G.C. 2000. New potassium-argon basalt date in relation to the Pliocene Bluff Downs local fauna, northern Australia. *Australian Journal of Earth Sciences* **47**, 807-811.
- MacPhail M.K. & Hill R.S. 1994. K-Ar dated palynofloras in Tasmania 1: Early Oligocene, *Proteacidites tuberculatus* Zone sediments, Wilmot Dam, northwestern Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* **128**, 1-15.
- Martin H.A. Worrall L. & Charlson J. 1987. The first occurrence of the Paleocene *Lygistepollenites balmei* zone in the eastern highlands region, New South Wales. *Australian Journal of Earth Sciences* **34**, 359-365.
- McDougall I. & Gill E.D. 1975. Potassium-argon ages from the Quaternary succession in the Warrnambool-Port Fairy area, Victoria, Australia. *Proceedings of the Royal Society of Victoria*, **87**, 175-178.
- McDougall I. & Green D.C. 1982. Cretaceous K/Ar ages from north-eastern Tasmania. In McClenaghan M.P., Turner N.J., Baillie P.W., Brown A.V., Williams P.R. & Moore W.R. Geology of the Ringarooma-Boobyalla area. *Geological Survey of Tasmania Bulletin* **61**, 179-181.
- McDougall I. & Roksandic Z. 1974. Total fusion  $40\text{Ar}/39\text{Ar}$  ages using the HIFAR reactor. *Journal of the Geological Society of Australia* **21**, 81-89.
- McDougall I. & Slessar G.C. 1972. Tertiary Volcanism in the Cape Hillsborough area, north Queensland. *Journal of the Geological Society of Australia* **18**, 401-408.
- McDougall I. & Wellman P. 1976. Potassium-argon ages for some Australian Mesozoic igneous rocks. *Journal of the Geological Society of Australia* **23**, 1-9.
- McDougall I. & Wilkinson J.F.G. 1967. Potassium-argon dates on some Cainozoic volcanic rocks from northeastern New South Wales. *Journal of the Geological Society of Australia* **14**, 225-233.
- McDougall I. Allsopp H.L. & Chamalaun F.H. 1966. Isotopic dating of the Newer Volcanics of Victoria, Australia, and geomagnetic polarity epochs. *Journal of Geophysical Research* **71**, 6107-6118.
- McKenzie D. A. Nott R. J. & Bolger P. F. 1984. Radiometric age determinations. *Geological Survey of Victoria Report* **74**.
- McQueen K.G., Gonzales, O.R. Roach I.C., Pillans B.J., Dunlap W.J. & Smith M.L. 2007. Landscape and regolith features related to Miocene leucitite lava flows, El Capitan northeast of Cobar, New South Wales. *Australian Journal of Earth Sciences* **54(1)**, 1-17.
- Muller P.J. & Henry J.L. 1982. Barron River groundwater investigations. Groundwater resources of the Barron River coastal plain. *Geological Survey of Queensland Record* 1982/23.
- Murray C.G. Whitaker W.G. Wilson I.H. Hekel H.K. Grimes K.G. Cranfield L.C. Withnall I.W. Stephens A.W. Jones M.R. Hutton L.J. Green P.M. McLeod R.L. Donchak P.T.J. & Warnick J.V. 1980. Regional mapping. *Queensland Department of Mines Annual Report 1980*, 79-82.
- Murray C.G. 1981 Wilson I.H. Grimes K.G. Cranfield L.C. Withnall I.W. Stephens A.W. Bultitude R.J. Jones M.R. Hutton L.J. Donchak P.T.J. Warnick J.V. & Schneider S.E. 1981. Regional mapping. *Queensland Department of Mines Annual Report 1981*, 94-96.
- Nicholls I.A. Greig A.G. Gray C.M. & Price R.C. 1993. IAVCEI Canberra 1993 Excursion guide. Newer Volcanics Province – basalts, xenoliths and megacrysts. *Australian Geological Survey Organisation Record* **1993/58**.
- Nott J.F. 1992. Long-term drainage evolution in the Shoalhaven catchment, southeast highlands, Australia. *Earth Surface Processes and Landforms* **17**, 361-374.

- Nott J. Young R & McDougall I. 1996. Wearing down, wearing back, and gorge extension in the long-term denudation of a highland mass: quantitative evidence from the Shoalhaven catchment, southeast Australia. *Journal of Geology* **104**, 224-232.
- Odin G.S. 1982. NDS 156, Early Miocene, K-Ar/basalt, Australia. In Odin G.S. (ed) Numerical Dating in Stratigraphy, part II, 837-838. John Wiley and Sons.
- Ollier C.D. 1982. Geomorphology & tectonics of the Armidale region. In Flood P.G. & Runnegar B. (eds) New England Geology (Voisey Symposium), University of New England, Armidale, 141-147.
- Ollier C.D. 1985. Lava flows of Mt Rouse, western Victoria. *Proceedings of the Royal Society of Victoria* **97**, 167-174.
- O'Reilly S.Y. & Griffin W.L. 1984. Sr isotopic heterogeneity in primitive basaltic rocks, southeastern Australia; correlation with mantle metasomatism. *Contributions to Mineralogy & Petrology* **87**, 220-230.
- Osborne R.A.L. 1986. Cave and landscape chronology at Timor Caves, New South Wales. *Journal and Proceedings of the Royal Society of New South Wales* **119**, 55-75.
- Owen M. & Wyborn D. 1979. Geology and geochemistry of the Tantangara & Brindabella 1:100 000 sheet areas, New South Wales and Australian Capital Territory. *Bureau of Mineral Resources Australia Bulletin* **204**.
- Pain C.F. 1983. Geomorphology of the Barrington Tops area, New South Wales. *Journal of the Geological Society of Australia*, **30**, 187-194.
- Pickett J. 1984. Pre-basalt topography on Mount Tomah, New South Wales. *Quarterly Notes of the Geological Survey of New South Wales* **57**, 22-27.
- Pogson D.J. & Watkins J.J. 1998. Bathurst 1:250 000 geological sheet, SI55-8, Explanatory Notes. Geological Survey of NSW, Sydney.
- Price R.C., Nicholls I.A. & Gray C.M. 2003. Cainozoic igneous activity. In Birch W.D. (ed) Geology of Victoria. *Geological Society of Australia Special Publication* **23**, 361-375.
- Roach I.C. 1996. The formation of the Monaro Volcanic Province, Southeastern NSW, Australia. In Whitehead, P.W. (ed.) Abstracts, Chapman Conference on Long Lava Flows, James Cook University, 1996. *Contributions of the Economic Geology Research Unit*, **56**, 60-61.
- Robertson A.D. 1979. Revision of the Cainozoic geology between the Kolan and Elliott Rivers. *Queensland Government Mining Journal* **80**, 350-363.
- Robertson A.D. 1985. Cainozoic volcanic rocks in the Bundaberg-Gin Gin-Pialba area. *Papers of the Department of Geology University of Queensland* **11(3)**, 72-92.
- Robertson A.D. 1993. Bundaberg volcanic province. *Queensland Geology* **5**, 44-87.
- Robertson A.D. and Murray C.G. 1978. Olivine nephelinite from the Bundaberg area. *Queensland Government Mining Journal* **79**, 579-581.
- Robertson, A.D. & Sutherland F.L. 1993. A note on the petrology and age of basalt in the vicinity of Childers. *Queensland Government Mining Journal* **94(1096)**, 15-17.
- Robertson A.D. Sutherland F.L. & Hollis J.D. 1985. Upper mantle xenoliths and megacrysts and the origin of the Brigooda basalt and breccia, near Proston, Queensland. *Papers of the Department of Geology University of Queensland* **11(3)**, 58-71.
- Ross J.A. 1977. The Tertiary Focal Peak shield volcano, southeast Queensland – a geological study of its eastern flank. BSc Hons Thesis, University of Queensland.
- Scott M.M. 2000. Weebar Hill Leucitite. In Lyons P. Raymond O.L. & Duggan M.B. (eds), Forbes 1:250 000 Geological Sheet SI55-7, 2nd Edition, Explanatory Notes. *Australian Geological Survey Organisation Record* **2000/20**: 151-152.

- Seymour D. B. & Baillie P. W 1992. Geological atlas 1:50000 series. Sheet 7816S (20). Woolnorth. Tasmania Department of Mines.
- Sharp K.R. 2004. Cenozoic volcanism, tectonism & stream derangement in the Snowy Mountains and northern Monaro of New South Wales. *Australian Journal of Earth Sciences* **51**, 67-83.
- Singleton O.P., McDougall I. & Mallett C.W. 1976. The Pliocene-Pleistocene boundary in southeastern Australia. *Journal of the Geological Society of Australia* **23**, 299-311.
- Spry M.J. 1996. Tertiary processes on the coastal lowlands, Brooman & Tuross, south east New South Wales. BSc (Hons) thesis, ANU, Canberra.
- Spry M. Gibson D. & Eggleton R. 1999. Tertiary evolution of the coastal lowlands & the Clyde River palaeovalley in southeast New South Wales. *Australian Journal of Earth Sciences* **46**, 173-180.
- Steiger R.H. & Jager E. 1977. Subcommission on geochronology: Convention on the use of decay constants in geo- and cosmochemistry. *Earth and Planetary Science Letters* **36**, 359-362.
- Stephenson P.J. Griffin T.J. & Sutherland F.L. 1980. Cainozoic volcanism in northeastern Australia. In Henderson R.A. & Stephenson P.J. (eds) *The Geology and Geophysics of Northeastern Australia*. Geological Society of Australia, Queensland Division, Brisbane, 349-374
- Stipp J.J. & McDougall I. 1968. Potassium-argon ages from the Nandewar volcano, near Narrabri, New South Wales. *Australian Journal of Science* **31**, 84-85.
- Sutherland F.L. 1976. Cainozoic volcanic rocks: isotopic dating and implications. In Leaman D.E. Geological Survey Explanatory Report. Sheet 82 (8312S). Hobart, Geological Atlas 1:50 000 series. *Tasmania Department of Mines, Geological Survey Explanatory Report*, **111**.
- Sutherland F.L. 1983. Timing, trace and origin of basaltic migration in eastern Australia. *Nature* **305**, 123-126.
- Sutherland F. L. 1984. Cainozoic volcanic rocks. In Forsyth S. M. Geological Survey Explanatory Report. Geological Atlas 1:50 000 Series. Sheet 68 (8313S). Oatlands. Tasmania Department of Mines, 103-120.
- Sutherland F.L. 1985. Regional controls in eastern Australian volcanism. In Sutherland F.L. Franklin B.J. & Waltho A.E. (eds) *Volcanism in eastern Australia, with case histories from New South Wales*. *Geological Society of Australia, New South Wales Division Publication* **1**, 13-31.
- Sutherland F.L. 1989. Cainozoic volcanic rocks. In Forsyth S.M. Geological Survey Explanatory Report. Geological Atlas 1:50 000 series. Sheet 61 (8313 N). Interlaken. Tasmania Department of Mines.
- Sutherland F.L. 1991. Cainozoic volcanism, eastern Australia; a predictive model based on migration over multiple "hotspot" magma sources. In Williams M.A.J. de Deckker P. & Kershaw A.P. (editors) *The Cainozoic in Australia; A Re-appraisal of the Evidence*. *Geological Society of Australia Special Publication* **18**, 15-43.
- Sutherland F.L. 2003. 'Boomerang' migratory intraplate Cenozoic volcanism, eastern Australian rift margins and the Indian-Pacific mantle boundary. In: Hillis R.R. & Muller R.D. (eds) *Evolution and Dynamics of the Australian Plate*. *Geological Society of America Special Paper* **372**, 203-221 and *Geological Society of Australia Special Publication* **22**, 203-221.
- Sutherland F.L. & Fanning C.M. 2001. Gem-bearing basaltic volcanism, Barrington, New South Wales, Eastern Australia: Cenozoic evolution, based on basalt K-Ar ages and zircon fission track and U-Pb isotope dating. *Australian Journal of Earth Sciences* **48**, 221-237.
- Sutherland F.L. & Wellman P. 1986. Potassium-argon ages of Tertiary volcanic rocks, Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* **120**, 77-86.
- Sutherland F.L. Forsyth S.M. & Zwingmann H. 2002a. Bassian basalts: dating, Cenozoic biogeohistory and a new model for Tasmanian volcanism. *Geological Society of Australia Abstracts* **67**, 251.

- Sutherland F. L. Graham I. T. Everard J. L. Forsyth S. M. & Zwingmann H. 2004a. Cenozoic basalts, Tasmania: landscapes, exposures, ages, petrography, geochemistry, entrainments and petrogenesis. Geological Society of Australia Field Guide A5, 17th Australian Geological Convention, Hobart, February 2004.
- Sutherland F.L. Graham I.T. Forsyth S.M. Zwingmann H. & Everard J.L. 2006a. The Tamar Trough revisited: correlations between sedimentary beds, basalts, their ages and valley evolution, north Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* **140**, 49-72.
- Sutherland F.L. Graham I.T. Pogson R.E. Schwarz D. Webb G.B. Coenraads R.R. Fanning C.M. Hollis J.D. & Allen T.C. 2002b. The Tumbarumba basaltic gem field, New South Wales: in relation to sapphire-ruby deposits of Eastern Australia. *Records of the Australian Museum* **54 (2)**, 215-248.
- Sutherland F.L. Graham I.T. & Zwingmann H. 2004b. Late Cenozoic basalts, Uplands Province, N.E. Victoria: in relation to the newer volcanics basalts of western Victoria. *Proceedings of the Royal Society of Victoria*, **116**, 51-68.
- Sutherland F.L. Graham I.T. Zwingmann H. Pogson R.E. & Barron B.J. 2005. Belmore volcanic province, northeastern New South Wales, and some implications for plume variations along Cenozoic migratory trails. *Australian Journal of Earth Sciences* **52**, 897-919.
- Sutherland F.L. Green D.C. & Wyatt B.W. 1973. The age of the Great Lake basalts, Tasmania, in relation to Australian Cainozoic volcanism. *Journal of the Geological Society of Australia* **20**, 85-94.
- Sutherland F. L. Hendry D. F. Barron B. J. Matthews W. L. & Hollis J. D. 1996a. An unusual Tasmanian Tertiary basalt sequence, near Boat Harbour, northwest Tasmania. *Records of the Australian Museum* **48**, 131-161.
- Sutherland F.L. Robertson A.D. Barron B.J. & Pogson P.E. 1996b. The Rockhampton plume and its late Mesozoic trace. Mesozoic Geology of the Eastern Australian Plate Conference, 23-26 September, 1996, Brisbane. *Geological Society of Australia Abstracts* **43**, 519-527.
- Sutherland F.L. Stubbs D. & Green D.C. 1978. K-Ar ages of Cainozoic volcanic suites, Bowen-St. Lawrence Hinterland, North Queensland (with some implications for petrologic models). *Journal of the Geological Society of Australia* **24**, 447-460.
- Sutherland L. Graham I. Webb G. Pogson R. Giuliani G. & Fallick A. 2006b. New ruby-sapphire sources, Yarrowitch basaltic field, eastern NSW. In Graham I. (ed) SGGMP - Port Macquarie 2005: Specialist Group in Geochemistry, Mineralogy and Petrology First Biennial Conference, Port Macquarie, New South Wales, 13th - 15th July 2005. *Geological Society of Australia, Abstracts* **76**, 133-136.
- Taylor D.H. Whitehead M.L. Olshina A. & Leonard J.G. 1996. Ballarat, 1:100 000 map geological report. *Geological Survey of Victoria Report* **101**.
- Taylor D.H. Wohlt K.E. Simons B.A. Maher S. Morand V.J. & Sapurmas P. 2000. Creswick, 1:100 000 map area geological report. *Geological Survey of Victoria Report* **117**.
- Taylor G. Truswell E.M. McQueen K.G. & Brown M.C. 1990. Early Tertiary palaeogeography, landform evolution, and palaeoclimates of the southern Monaro, N.S.W., Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* **78**, 109-134.
- Tedford R.H. Banks M.R. Kemp N.R. McDougall I. & Sutherland F.L. 1975. Recognition of the oldest known fossil marsupials from Australia. *Nature* **255**, 141-142.
- Tedford R.H. & Kemp N.R. 1998. Oligocene marsupials of the Geilston Bay local fauna, Tasmania. *American Museum Novitates* **3244**, 22pp. American Museum of Natural History, New York, NY, USA.
- Tickell S.T. 1991. Radiometric dating of the Tower Hill volcano and Colac quarry. *Geological Survey of Victoria Unpublished Report* **1991/38**.

- Turnbull W.D. Lundelius J.E.L. & McDougall I. 1965. A potassium/argon dated Pliocene marsupial fauna from Victoria, Australia. *Nature* **206(4986)**, 816.
- VandenBerg A.H.M. 1992. Kilmore 1:50 000 map, geological Report. *Geological Survey of Victoria Report* **91**.
- van der Beek P. Pulford A. & Braun J. 2001. Cenozoic landscape development in the Blue Mountains (SE Australia); lithological and tectonic controls on rifted margin morphology. *Journal of Geology* **109**, 35-56.
- Vickery N.M. Dawson M.W. Sivell W.J. Malloch K.R. & Dunlap W.J. 2007. Cainozoic rocks in the Bingara to Inverell areas, northeastern New South Wales. *Geological Survey of New South Wales, Quarterly Notes* **123**, 1-31.
- Wallace D.A. 1990. Petrology and geochemistry of the Newer Volcanics of the Western Highlands of Victoria, Australia. MSc Thesis, La Trobe University, 121 pp.
- Wallace D.A. & Ollier C.D. 1990. The Cainozoic lava flows of Barfold Gorge. *Victorian Naturalist*, **103(6)**, 175-177.
- Webb A.W. & McDougall I. 1967. A comparison of mineral and whole rock potassium-argon ages of Tertiary volcanics from central Queensland, Australia. *Earth and Planetary Science Letters* **3**, 41-47.
- Webb A.W. Osborne C.R. Taylor D.H. & Cayley R.A. 1998. K-Ar geochronology of Newer Volcanics on the Ballarat 1:250 000 map sheet. *Geological Survey of Victoria Unpublished Report* **1998/10**.
- Webb A.W. Stevens N.C. & McDougall I. 1967. Isotopic age determinations on Tertiary volcanic rocks and intrusives of southeastern Queensland. *Proceedings of the Royal Society of Queensland* **79**, 79-91.
- Wellman P. 1974. Potassium-Argon ages on the Cainozoic volcanic rocks of eastern Victoria, Australia. *Journal of the Geological Society of Australia* **21**, 359-376.
- Wellman P. 1978. Potassium-Argon ages of Cainozoic volcanic rocks from the Bundaberg, Rockhampton and Clermont areas of eastern Queensland. *Proceedings of the Royal Society of Queensland* **89**, 59-64.
- Wellman P. & McDougall I. 1974. Potassium-Argon ages of the Cainozoic volcanic rocks of New South Wales. *Journal of the Geological Society of Australia* **21**, 247-272.
- Wellman P. McElhinny M.W. & McDougall I. 1969. On the polar wander path for Australia during the Cainozoic. *Geophysical Journal of the Royal Astronomical Society* **18**, 371-395.
- Wellman P. Cundari A. & McDougall I. 1970. Potassium-Argon Ages for Leucite-bearing Rocks from New South Wales. *Journal and Proceedings of the Royal Society of New South Wales* **103**, 103-107.
- Wheeler B. F. & Kjellgren G. M. 1986. Yolla-1 Final Well Report. Amoco Australia Petroleum Company (unpubl.).
- White A.J.R. Williams I.S. & Chappell B.W. 1977. Geology of the Berridale 1:100 000 sheet, 8625. New South Wales Geological Survey, Sydney, 138 pp.
- Whitehead P.W. Stephenson P.J. McDougall I. Hopkins M.S. Graham A.W. Collerson K.D. & Johnson D.P. 2007. Temporal development of the Atherton Basalt Province, north Queensland. *Australian Journal of Earth Sciences* **54**, 691-709.
- Williams I.S. Tetley N.W. Compston W. & McDougall I. 1982. A comparison of K-Ar and Rb-Sr ages of rapidly cooled igneous rocks; two points in the Palaeozoic time scale re-evaluated. *Journal of the Geological Society of London* **139**, 557-568.

- Willman C.E. Morand V.J. Hendrickx M.A. VandenBerg A.H.M. Haydon S.J. & Carney C. 1999. Omeo, 1:100 000 map area geological report. *Geological Survey of Victoria Report* **118**.
- Willmott W. F. Tresize D. L. O'Flynn M. L. Holmes P. R. & Hofmann G. W. 1988. 1:100 000 Geological Map Commentary, Cairns Region (Sheets 8064 and 8063 part). Queensland Department of Mines, Brisbane.
- Wohlt K.E. 1993. Radiometric age determination within Victoria, Australia. *Geological Survey of Victoria Unpublished Report* **1993/25**.
- Wyatt D.H. & Webb A.W. 1970. Potassium argon ages of some northern Queensland basalts and an interpretation of late Cainozoic history. *Journal of the Geological Society of Australia* **17**, 39-51.
- Wyborn D. & Owen M. 1986. Araluen, New South Wales. 1:100 000 Geological Map Commentary. Bureau of Mineral resources, Australia.
- Yim W.W.S. Gleadow A.J.W. & van Moort J.C. 1985. Fission track dating of alluvial zircons and heavy mineral provenance in northeast Tasmania. *Journal of the Geological Society of London* **142**, 351-356.
- Young R. W. 1981. Denudational history of the South Central uplands of New South Wales. *Australian Geographer* **15**, 77-88.
- Young R. W. & Bishop P. 1980. Potassium argon ages on Cainozoic volcanic rocks in the Crookwell-Goulburn area, NSW. *Search* **11**, 340-341.
- Young R.W. & McDougall I. 1982. Basalts and silcretes on the coast near Ulladulla, southern New South Wales. *Journal of the Geological Society of Australia* **29**, 425-430.
- Young R.W. & McDougall I. 1985. The age, extent and geomorphological significance of the Sassafras basalt, south-eastern New South Wales. *Australian Journal of Earth Sciences* **32**, 323-331.
- Young R. W. & McDougall I. 1993. Long-term landscape evolution: Early Miocene and modern rivers in southern New South Wales, Australia. *Journal of Geology* **101**, 35-49.
- Zwingmann H. Sutherland L. Graham I. Forsyth S. Everard J.L. & Wartho J. 2004. New K-Ar and Ar-Ar ages for NE Tasmanian basalts; implications for volcanic evolution following Tasman Sea rifting. 17th Australian Geological Convention, 8-13 Feb 2004, Hobart, Tasmania. *Geological Society of Australia Abstracts* **73**, 141.



## APPENDIX 1. SUMMARY OF QUEENSLAND K-Ar AGES

Sample	Latitude	Longitude	Age	Locality	References
8934	17.561002	145.953266	0.80	Pin Gin Hill	Whitehead <i>et al.</i> 2007
8937	17.503006	145.630549	1.01	Theresa Creek Road	Whitehead <i>et al.</i> 2007
15778	28.216667	153.200000	23.6	Surprise Rock	Ewart 1982
33037	28.333333	152.716667	24.8	Mt Lindsay	Ewart 1982
33039			25.5	Campbell's Folly	Ewart 1982
37843	26.637620	152.839796	25.2	Maleny	Ewart 1982, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
38602	26.950000	152.950000	25.6	Beerburum	Ewart 1982
38605	26.900000	152.883333	27.3	Beerwah	Ewart 1982
38652	28.183333	153.166667	20.8 20.9	Binna Burra	Ewart 1982
38678	27.783333	152.800000	27.2	Mt Blaine	Ewart 1982
38702	27.816667	152.816667	25.2	Flinders Peak	Ewart 1982
38710c	28.083333	152.533333	24.9	Mt Alford	Ewart 1982, Ewart & Grenfell 1985
38725	24.098448	148.067770	23.9	Top flow, Mt Boorambool	Ewart 1982, Lafferty & Golding 1985
38731	24.100000	148.050000	26.3	Mt Boorambool	Ewart 1982, Lafferty & Golding 1985
38739b	23.998448	148.051102	28.6	Minerva Hills	Ewart 1982, Lafferty & Golding 1985
38741			25.2	Rolleston road	Ewart 1982
38742			25.4	Rolleston road	Ewart 1982
38747	24.100000	148.050000	29.9	Mt Boorambool, base of succession	Ewart 1982
38772	26.829823	151.547912	23.2	Mt Kiangarow	Ewart 1982, Lafferty & Golding 1985
38774	26.886281	151.596519	23.6	Dandebah waterfall	Ewart 1982, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
38779	26.908338	151.636523	23.7	Dalby Road, Bunya Mountains	Ewart 1982, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
38782	26.911036	151.635484	23.5	Near base of sequence, Bunya Mountains	Ewart 1982, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
38986	24.950000	153.350000	27.4	Waddy Point	Ewart 1982, Lafferty & Golding 1985
38989	25.000000	153.366667	29.2	Indian Head	Ewart 1982, Lafferty & Golding 1985
38990	28.083333	152.533333	23.9 23.6	Mt Alford	Ewart 1982, Ewart & Grenfell 1985
200952	18.352759	144.959794	0.46		Griffin & McDougall 1975
200953	18.352759	144.959794	0.47		Griffin & McDougall 1975
265102	25.220995	152.271460	10.9 10.7 10.8	road cutting 2 km NNW Childers	Robertson & Sutherland 1993
80140021	14.231824	143.516094	3.72	150 km SE of Coen	Sutherland 1991
81304561	18.494358	144.052266	28.7		AMDEL 1985, M. Jones GSQ written comm 2006

Sample	Latitude	Longitude	Age	Locality	References
69-449	22.818453	148.134426	27.4	4 km SW Calvert Peak	Wellman 1978
69-450	22.810120	148.152759	42.0	2 km SW Calvert Peak	Wellman 1978
69-451	22.650121	148.126091	30.7 28.5	18 km N Calvert Peak, same flow as 70-1185	Wellman 1978
69-452	22.493456	147.906093	31.6	Mt Saddleback	Wellman 1978
69-454	23.300107	150.384403	67.3	18 km N Rockhampton	Wellman 1978
69-455	24.815091	152.467712	1.09	9 km E Bundaberg	Wellman 1978
70-1006	20.903162	149.049952	33.9	Cape Hillsborough	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1007	20.903162	149.049952	31.1 31.5	Cape Hillsborough	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1008	20.903162	149.049952	32.8	Cape Hillsborough	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1009	20.905384	149.049952	33.6	Cape Hillsborough	McDougall & Slessar 1972, McDougall & Roksandic 1974, M. Jones GSQ written comm 2006
70-1010	20.900940	149.046618	33.3	Cape Hillsborough	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1012	20.912607	149.035785	33.5	Cape Hillsborough	McDougall & Slessar 1972, McDougall & Roksandic 1974, M. Jones GSQ written comm 2006
70-1016	20.919551	148.999953	34.1	Pinnacle Rock	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1018	20.896495	149.035230	33.2	Cape Hillsborough	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1021	21.016496	148.938565	33.9 32.6	Mt Blackwood	McDougall & Slessar 1972, M. Jones GSQ written comm 2006
70-1182	22.826787	148.146093	30.3	4 km SW Calvert Peak	Wellman 1978
70-1185	22.650121	148.126091	36.0 34.4	18 km N Calvert Peak	Wellman 1978
70-1187	22.545122	147.826094	32.0	9 km SW Mt Saddleback	Wellman 1978
70-1188	22.493456	147.906093	31.0	Mt Saddleback	Wellman 1978
70-1192	24.838425	152.426047	0.93	11 km E Bundaberg	Wellman 1978
70-1231	25.615092	151.701065	0.62	Barambah Creek Bridge	Wellman 1978
74-64	18.250875	144.517608	0.18		Griffin & McDougall 1975
74-65	18.326585	144.647982	0.89		Griffin & McDougall 1975
74-66	18.473622	144.425457	8.03		Griffin & McDougall 1975
74-67	18.211795	145.042736	0.26 0.29	Leichardt Creek Hill	Griffin & McDougall 1975
74-68	18.414610	144.915534	0.052		Griffin & McDougall 1975
74-69	18.655459	144.585693	0.12 0.18		Griffin & McDougall 1975
74-70	18.722001	144.858708	2.33		Griffin & McDougall 1975
74-71	18.249617	144.944928	0.56		Griffin & McDougall 1975
74-72	18.543122	144.856211	1.15		Griffin & McDougall 1975

Sample	Latitude	Longitude	Age	Locality	References
74-73	18.444420	144.999416	1.35		Griffin & McDougall 1975
74-74	18.170563	144.257054	0.20		Griffin & McDougall 1975
74-75	18.434779	144.561348	1.56		Griffin & McDougall 1975
74-76	18.300605	144.665353	2.14		Griffin & McDougall 1975
74-77	18.425602	144.481050	7.49		Griffin & McDougall 1975
74-78	18.454104	144.589467	0.41		Griffin & McDougall 1975
74-79	18.482599	144.628825	2.78	Mount McMasters	Griffin & McDougall 1975
74-80	18.379583	144.852563	1.73	Mount McBride	Griffin & McDougall 1975
74-81	18.410966	144.912739	0.45		Griffin & McDougall 1975
74-82	18.687058	145.050618	0.073		Griffin & McDougall 1975
74-83	18.310546	144.740874	0.20		Griffin & McDougall 1975
74-123	18.193962	144.660161	0.38		Griffin & McDougall 1975
74-124	18.293946	144.638021	0.21 0.21	Raccourse Knob	Griffin & McDougall 1975
74-125	18.339052	144.633626	0.92		Griffin & McDougall 1975
74-126	18.765046	144.831614	0.42		Griffin & McDougall 1975
74-127	18.221494	144.851674	0.24		Griffin & McDougall 1975
AR21	24.859789	151.735075	4.86		Robertson 1993, M. Jones GSQ written comm 2006
AR22	25.049751	152.018615	64.1 64.7	Sheepstation Creek	Robertson 1993, M. Jones GSQ written comm 2006
AT-9	17.524153	145.684079	1.43	Ridge above granitic creek	Whitehead <i>et al.</i> 2007
AT12	17.267955	145.492155	2.05	Atherton	Whitehead <i>et al.</i> 2007
AT13B	17.217884	145.443667	1.66	Bones Knob	Whitehead <i>et al.</i> 2007
AT16	17.223327	145.446442	1.79	Water tank gate	Whitehead <i>et al.</i> 2007
AT 39	17.402258	145.568238	3.14	E flank, Williams Creek	Whitehead <i>et al.</i> 2007
AT 40	17.377833	145.564664	3.01	NE flank, Merragalan Rd	Whitehead <i>et al.</i> 2007
AT 53	17.607883	145.775825	1.58	Near K-Tree, Palmeston Hwy	Whitehead <i>et al.</i> 2007
AT 67	17.773401	145.658688	1.24	100m E of road. Flow from N	Whitehead <i>et al.</i> 2007
AT 70	17.585263	145.633700	1.06	Near top, Mt Father Clancy	Whitehead <i>et al.</i> 2007
BD	22.706794	145.617791	3.60 3.63	Bluff Downs	Mackness <i>et al.</i> 2000
BHC1	22.865121	147.868596	34.6	South side of Beacon Hill	Sutherland 1991
BK-112	17.304520	145.824891	0.67	Goldfields track W of saddle	Whitehead <i>et al.</i> 2007
BK-114	17.262506	145.906993	0.68	Bridge over McPauls Creek	Whitehead <i>et al.</i> 2007
BK-120	17.255265	145.905154	0.66	Tributary creek bed	Whitehead <i>et al.</i> 2007

Sample	Latitude	Longitude	Age	Locality	References
BK-122	17.342774	145.876404	1.17	Rainforest, E of The Boulders	Whitehead <i>et al.</i> 2007
BK-123	17.347350	145.886728	1.18	Edge of cane field	Whitehead <i>et al.</i> 2007
BWC1	25.031779	148.117782	27.3	Near base of Boowinda Creek flow succession, Carnarvon Gorge National Park	Sutherland 1991
CC1	18.845138	145.394436	21.6	Southern plug, 8 km W of Camel Creek Homestead	Sutherland 1991
CC2	18.843471	145.392769	21.2	Northern plug, 8 km W of Camel Creek Homestead	Sutherland 1991
CP2	22.606787	148.173090	33.0	Western margin of Campbells Creek plug, 65 km ENE of Clermont	Sutherland 1991
CQ11	24.653428	151.342727	20.7 20.3	Mt Fort William, 6 km NE Kalpower	Sutherland 1991
CQ15	24.690095	151.354393	25.2	Gin Gin Road, 4.5 km E Kalpower	Sutherland 1991
CQ76	24.926766	149.161102	26.5	5.7 km SE of Mt Aldis	Sutherland 1991
CQ78	24.961767	149.139435	26.1	7.8 km SSE of Mt Aldis	Sutherland 1991
DA1	17.036907	145.808727	0.986	Green Hill, Cairns	Murray <i>et al.</i> 1980, Willmott <i>et al.</i> 1988, Whitehead <i>et al.</i> 2007, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA2	23.348452	147.917765	28.5 26.0	Fork Lagoons	Murray <i>et al.</i> 1980, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA4	24.981744	153.351035	30.6	Middle Rocks, Fraser Is	Murray <i>et al.</i> 1980, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA5	24.965077	153.351035	19.4	Waddy Point, Fraser Is	Murray <i>et al.</i> 1980, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007a
DA6	24.631760	150.734404	25.4	Dawes	Murray <i>et al.</i> 1980, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA7	24.948427	152.167718	5.13	Hill End	Murray <i>et al.</i> 1980, Robertson 1985, Robertson 1979, Robertson & Murray 1978, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA8	23.165121	147.584463	26.3	Mount Llandillo	Murray <i>et al.</i> 1980, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA9	26.744431	151.967809	29.4	8 km S Nanango	M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007, Murray <i>et al.</i> 1981, Ewart & Grenfell 1985
DA10	26.861921	151.560113	22.0	1 km N of Dandabah camping reserve, Bunya Mountains	M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007, Murray <i>et al.</i> 1981, Ewart & Grenfell 1985
DA24	18.513099	144.096426	0.26		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA32	24.881072	151.797221	2.99		Robertson 1993, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA33	24.876493	151.789347	2.69		Robertson 1993, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA34	26.253756	151.450026	0.381		M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA35	26.251983	151.453053	0.451		M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA37	26.251961	151.451051	17.8		M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007

Sample	Latitude	Longitude	Age	Locality	References
DA38	17.641992	145.288200	3.32	Wild River	M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA39	18.073957	145.376780	5.53		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA40	18.971550	144.880220	11		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA41	19.438027	144.994680	0.636		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA42	19.530925	144.826340	7.89		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA43	19.488263	144.808815	8.81		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
DA44	18.767448	144.248658	7.85		AMDEL 1985, M. Jones GSQ written comm 2006, J. Beeston GSQ written comm 2007
Eulogie	23.872433	150.411530	68.6		Sutherland <i>et al.</i> 1996b, M. Jones GSQ written comm 2006
Garnet Gully 1	26.248426	151.451075	17.8	Garnet Gully area, Boondooma-Proston road	Robertson <i>et al.</i> 1985
Garnet Gully 2	26.248426	151.451075	0.381 0.451	Garnet Gully area, Boondooma-Proston road	Robertson <i>et al.</i> 1985
GA686A	23.965110	148.134449	27.6 24.6	Crystal Hill	Webb & McDougall, 1967
GA686B	23.965110	148.134449	28.8 28.4	Crystal Hill	Webb & McDougall, 1967
GA686C	23.965110	148.134449	28.5 26.8 27.3 27.1	Crystal Hill	Webb & McDougall, 1967
GA686D	23.965110	148.134449	21.0 20.9 18.8 27.4 26.8	Crystal Hill	Webb & McDougall, 1967
GA686E	23.965110	148.134449	27.6 27.7 24.6 26.8 27.5 27.4	Crystal Hill	Webb & McDougall, 1967
GA777	23.831768	148.034450	>33.7 >33.5		Webb & McDougall 1967, Harding 1969
GA982	24.581758	149.267772	23.0		Harding 1969
GA983	24.915090	149.534437	24.8		Harding 1969
GA984	24.848423	149.551103	24.3		Harding 1969
GA985	24.848423	149.534437	21.6 21.4		Harding 1969
GA986	24.815090	149.517770	21.0 21.3		Harding 1969
GA1031	24.131768	147.934453	27.5		Webb & McDougall 1967, Harding 1969
GA1032	24.131768	147.917787	>24.6 >23.8		Webb & McDougall 1967, Harding 1969
GA1033	24.015101	148.051117	28.4		Webb & McDougall 1967, Harding 1969
GA1034	24.015101	148.051117	27.4		Webb & McDougall 1967, Harding 1969

Sample	Latitude	Longitude	Age	Locality	References
GA1035	24.098434	148.067785	27.7	Mt Boorambool	Webb & McDougall 1967, Harding 1969
GA1036	24.098434	148.067785	28.2	Mt Boorambool	Webb & McDougall 1967, Harding 1969
GA1037	24.256755	149.884427	71.5 71.9		Harding 1969
GA1043	23.981767	148.084450	>27.2 >26.4		Webb & McDougall 1967, Harding 1969
GA1143	23.698434	148.084448	>28.5 >28.7		Webb & McDougall 1967, Harding 1969
GA1146	20.081791	145.601120	1.33 1.33		Wyatt & Webb 1970
GA1149	24.031767	148.101117	26.6		Webb & McDougall 1967, Harding 1969
GA1150A	24.031767	148.101117	23.8 26.0 25.4	Red Hill	Webb & McDougall 1967
GA1150B	24.031767	148.101117	27.1 26.6 27.4 25.9	Red Hill	Webb & McDougall 1967
GA1400	28.065066	152.384422	22.6 22.7	Mt Mitchell	Webb <i>et al.</i> 1967
GA1401	28.065066	152.384422	22.9	Mt Mitchell	Webb <i>et al.</i> 1967
GA1403	28.048399	152.401088	24.3	Mt Mitchell	Webb <i>et al.</i> 1967
GA1404	28.065066	152.417755	24.4 24.5	Mt Mitchell	Webb <i>et al.</i> 1967
GA1407	27.815647	152.727968	29.9 29.5	Limestone Ridges, W of Flinders town	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA1410	26.898117	152.941278	25.4	Glass House Mtns (Ngun Ngun)	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA1411	26.952323	152.963323	25.6	Glass House Mtns (Trachyte Range)	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA1412	26.564211	153.091215	25.4	Mt Coolum	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006, Ewart & Grenfell 1985
GA1413	28.081732	152.501087	>23.2	Mt Greville	Webb <i>et al.</i> 1967
GA1979	26.365095	148.601130	>23.3	Quarry on the Roma Injune road 20 miles north of Roma	Langford-Smith <i>et al.</i> 1966
GA3126	26.691844	148.147014	>20.5 >20.6	16 km SSW of Amby	Exon <i>et al.</i> 1970
GA3127	26.529263	148.155430	23.0	Quarry 4 km NW of Amby, north wall	Exon <i>et al.</i> 1970
GA3128	26.529264	148.155431	23.8	Quarry 4 km NW of Amby, west wall	Exon <i>et al.</i> 1970
GA3129	26.213139	148.172309	>20.8 >21.3	Spur, 800 m E of Mitchell-Tooloombilla road, 3.2 km N of Katonga homestead turnoff	Exon <i>et al.</i> 1970
GA3130	26.068855	148.150875	23.7	Hill about 1.6 km E of Mitchell-Tooloombilla road, about 1.6 km southwest of Kilmorey homestead	Exon <i>et al.</i> 1970
GA3131	26.068775	148.160871	22.7	Kilmorey Falls, near Kilmorey homestead	Exon <i>et al.</i> 1970
GA3132	26.150026	148.161674	23.8	Spur, 45 km N of Amby	Exon <i>et al.</i> 1970

Sample	Latitude	Longitude	Age	Locality	References
GA3141	26.213139	148.172309	>21.6	Spur, 800 m E of Mitchell-Tooloombilla road, 3.2 km N of Katonga homestead turnoff	Exon <i>et al.</i> 1970
GA3142	26.031913	148.250450	23.5	Waterfall 13.8 km N of Kilmorey homestead	Exon <i>et al.</i> 1970
GA5152	23.865101	148.134448	>27.4		Webb & McDougall 1967, Harding 1969
GA5158	24.131768	147.917787	26.4 26.4 27.4		Webb & McDougall 1967
GA5299	27.734642	152.676934	>64.8 >60.6	Mt Walker Creek, Cunningham Highway	Webb <i>et al.</i> 1967, Green & Stevens 1975, M. Jones GSQ written comm 2006
GA5300	28.031732	152.551086	24.6	Mt Edwards, Moogerah Dam	Webb <i>et al.</i> 1967
GA5301	28.081732	152.534420	23.2 25.2 23.8 23.5	Mt Alford	Webb <i>et al.</i> 1967
GA5302	27.546548	152.004416	>19.9	Municipal quarry, Toowoomba	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA5304	27.808369	152.820710	24.7	Mt Finders, northern foothills	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA5316	26.706499	151.678659	22.7	W of Nanango	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA5334	23.198419	150.667741	70.8	Mt Jim Crow	Harding 1969, Wellman 1978
GA5367	28.298397	152.767751	23.3 23.2	1 mile S of Mt Gillies	Webb <i>et al.</i> 1967
GA5368	28.001143	152.628778	23.7	Mt French	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA5540	27.326802	151.599493	23.8	3.5 miles NNE Cooby Creek Dam	Webb <i>et al.</i> 1967, M. Jones GSQ written comm 2006
GA5541	28.048413	153.167730	>20.5	Albert Basalt 1 mile south of Canungra	Webb <i>et al.</i> 1967
GA5542	28.015080	153.151064	22.4	Beechmont Basalt, Mt Misery, 1 mile west of Canungra	Webb <i>et al.</i> 1967
GA5543	28.081746	153.201063	>21.7	Beechmont Basalt, N end Beechmont plateau, Canungra-Beechmont road	Webb <i>et al.</i> 1967
GA5544	28.198413	153.184398	>21.9	Top of Beechmont Basalt, 0.5 miles NW of Binna Burra	Webb <i>et al.</i> 1967
GA5545	28.281750	152.701073	24.0	Margin of Mt Barney mass, Rocky Creek	Webb <i>et al.</i> 1967
GA5563	19.898467	146.217769	1.17		Wyatt & Webb 1970
GA5564	19.898467	146.234435	1.13		Wyatt & Webb 1970
GA5565	19.865134	146.151103	2.46		Wyatt & Webb 1970
GA5566	19.781801	146.001104	1.36		Wyatt & Webb 1970
GA5567	19.781801	146.001104	1.32		Wyatt & Webb 1970
GA5568	19.865134	146.101103	2.43 2.33		Wyatt & Webb 1970
GA5569	19.831801	146.017770	1.31		Wyatt & Webb 1970
GA5570	20.065139	145.584442	1.27		Wyatt & Webb 1970

Sample	Latitude	Longitude	Age	Locality	References
GA5576	19.915135	146.084437	1.32 1.38		Wyatt & Webb 1970
GA5757	19.681798	145.617765	1.31		Wyatt & Webb 1970
GA5758	19.681798	145.617765	1.29		Wyatt & Webb 1970
GA5760	19.681798	145.634431	1.47		Wyatt & Webb 1970
GA5761	19.631792	145.584451	4.06		Wyatt & Webb 1970
GA5762	19.598459	145.601117	4.22		Wyatt & Webb 1970
GA5763	19.615125	145.601117	4.46		Wyatt & Webb 1970
GA5764	19.681792	145.551118	1.28 1.30		Wyatt & Webb 1970
GA5766	19.665126	145.534452	4.66		Wyatt & Webb 1970
GA5769	19.848455	146.117779	<0.045		Wyatt & Webb 1970
GA5770	19.848455	146.134446	<0.081		Wyatt & Webb 1970
GA5775	19.848455	146.134446	<0.055		Wyatt & Webb 1970
GA5776	19.848455	146.117779	1.28		Wyatt & Webb 1970
GLD1b	20.762903	144.500075	3.45 3.38		Coventry <i>et al.</i> 1985
GLD2	20.670867	144.504464	3.29		Coventry <i>et al.</i> 1985
GLD3b	20.623520	144.477423	5.59		Coventry <i>et al.</i> 1985
GLD6	20.586175	144.394620	1.15		Coventry <i>et al.</i> 1985
GLD7	20.643432	144.419542	5.69		Coventry <i>et al.</i> 1985
GLD21	20.629651	144.590504	5.44		Coventry <i>et al.</i> 1985
GLD23	20.585940	144.564342	5.55		Coventry <i>et al.</i> 1985
GLD24	20.561854	144.651015	5.28		Coventry <i>et al.</i> 1985
GLD25/1	20.557751	144.550409	>5.90		Coventry <i>et al.</i> 1985
GLD26	20.557751	144.550409	6.31		Coventry <i>et al.</i> 1985
GLD28	20.457678	144.561582	5.57		Coventry <i>et al.</i> 1985
GLD31	20.372030	144.704660	3.25		Coventry <i>et al.</i> 1985
GLD34	20.632346	144.589502	5.45		Coventry <i>et al.</i> 1985
GRV4	17.699345	145.210494	2.96	Little Oaky Creek	Whitehead <i>et al.</i> 2007
GV-28	17.167493	145.732687	2.05	Bridge on W flank	Whitehead <i>et al.</i> 2007
GV-29	17.176453	145.720404	1.92	Old quarry, 30m above Mulgrave River	Whitehead <i>et al.</i> 2007
GV-198	17.153919	145.729959	2.15	Cliff, 26m above Mulgrave River	Whitehead <i>et al.</i> 2007
GV-199	17.153925	145.730899	2.16	Cliff, 34m above Mulgrave River	Whitehead <i>et al.</i> 2007
H2a	20.676492	144.167639	2.57		Coventry <i>et al.</i> 1985



Sample	Latitude	Longitude	Age	Locality	References
H5	20.465318	144.403373	2.64		Coventry <i>et al.</i> 1985
H9a	19.954537	144.361226	0.923		Coventry <i>et al.</i> 1985
H54	20.511148	144.159196	2.94	Mt Desolation	Coventry <i>et al.</i> 1985
H101	20.398127	144.438978	0.889		Coventry <i>et al.</i> 1985
IF 29	17.545715	145.665083	1.64	Near peak, Campbells Hill	Whitehead <i>et al.</i> 2007
IGO 1	17.620821	145.822860	1.61	“Monterosa”, above gully	Whitehead <i>et al.</i> 2007
IGO 4	17.577488	145.830678	0.64	6 km SW of Nerada Tea	Whitehead <i>et al.</i> 2007
IGO 7	17.596138	145.932332	0.80	7 km W of South Johnstone	Whitehead <i>et al.</i> 2007
IGO 8	17.443845	146.018906	0.77	9 km N of Innisfail	Whitehead <i>et al.</i> 2007
J-11	17.419057	145.400554	2.82	Plateau above Wondecla Creek	Whitehead <i>et al.</i> 2007
J-13	17.440152	145.439909	2.65	Robinson’s dam	Whitehead <i>et al.</i> 2007
J-65c	17.434827	145.340170	7.03	Costean, Western Creek	Whitehead <i>et al.</i> 2007
J-72	17.489382	145.381107	3.90	Kaban-Wondecla Rd	Whitehead <i>et al.</i> 2007
LH-51	17.451165	145.716616	1.05	Towalla Rd	Whitehead <i>et al.</i> 2007
LH-220	17.377038	145.713370	0.89	NE flank Lamins Hill	Whitehead <i>et al.</i> 2007
LH-223	17.371580	145.707761	0.95	N slope of Lamins Hill	Whitehead <i>et al.</i> 2007
LM-191	17.117500	145.687913	2.04	20m thick flow in Little Mulgrave River	Whitehead <i>et al.</i> 2007
LM-192	17.121194	145.700105	1.78	Pilba Ck – Little Mulgrave River junction	Whitehead <i>et al.</i> 2007
MTS1	24.428448	147.884441	26.6	Mt Sterculia, 40 km SW Springsure	Sutherland 1991
Murgon 1	26.233333	151.933333	29.0	near Murgon	Godthelp <i>et al.</i> 1992
MV-158	17.234613	145.771729	2.07	700m N of Kearneys Falls	Whitehead <i>et al.</i> 2007
MV-159	17.224626	145.764272	1.44	Old road cutting	Whitehead <i>et al.</i> 2007
NH1	22.581788	148.041092	34.0	North branch of Campbells Creek, Mt Hillary Station	Sutherland 1991
NHF	22.606788	148.016092	31.5	Head of Campbells Creek, Mt Hillary Station	Sutherland 1991
NJ 1	17.607084	145.792793	1.58	Douglas Ck-North Johnson River junction	Whitehead <i>et al.</i> 2007
NJ 8	17.601633	145.788117	2.17	Top of ridge, North Johnson River gorge	Whitehead <i>et al.</i> 2007
PP-1	17.653199	145.955563	3.39	Mena Creek Falls	Whitehead <i>et al.</i> 2007
PP-2	17.653199	145.955563	3.25	Mena Creek Falls	Whitehead <i>et al.</i> 2007
PR1	20.621503	144.722040	5.50		Coventry <i>et al.</i> 1985
PR1	26.298426	151.526075	16.0	Coverty Creek, 16.5 km SW Proston	Sutherland 1991, Hollis <i>et al.</i> 1983
PR2	20.570662	144.701700	5.56		Coventry <i>et al.</i> 1985

Sample	Latitude	Longitude	Age	Locality	References
PR7a	20.737374	144.545607	5.63		Coventry <i>et al.</i> 1985
QA69	25.039783	150.655394	72	Mundubbera 1:250 000 sheet	Green 1975, M. Jones GSQ written comm 2006
QA102	27.595055	152.642943	26.9	Mt Marrow, Main Roads Department quarry	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA104	26.425009	152.981634	32.8	Allandale Alkali Granite, near Mt Cooroy	Green & Webb 1974, Green 1975, M. Jones GSQ written comm 2006
QA105	26.430726	152.948096	25.8	Mt Cooroy Mangerite, ~ 6 km N Eumundi	Green & Webb 1974, Green 1975, M. Jones GSQ written comm 2006
QA107	27.198529	152.146882	24.4	Quarry E of The Bluff	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA108	27.781154	152.837076	22.9	N of Perry's Knob	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA114	27.610271	152.830276	>46.2	Bundamba	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA115	27.660368	152.682587	59.7	Jebrapilly	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA121	27.826075	152.601827	36.2	W of Warrill View	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA122	27.826075	152.601827	22.1	W of Warrill View	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA124	27.676361	152.881170	16.2	Mt Juillerat	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA125	27.635921	152.897331	48.0	Redbank Plains	Green & Stevens 1975, M. Jones GSQ written comm 2006
QA126	27.577142	153.016256	56.3	Archerfield, old quarry near aerodrome	Green & Stevens 1975, M. Jones GSQ written comm 2006
QA134	24.531777	148.351105	28	Near Springwood homestead	Green 1975
QA156	27.606446	153.101893	46.9	Kuraby NS 5, 24 m	Green & Stevens 1975, M. Jones GSQ written comm 2006, Green 1975
QA160	27.606446	153.101893	55.0	Kuraby NS 5, 55 m	Green & Stevens 1975, M. Jones GSQ written comm 2006
QA161	25.298421	152.767713	12.3	Dundowran, near Hervey Bay	Barnbaum 1976, Green 1975
QA162	25.298421	152.767713	>18.9 or >19.1	Dundowran, near Hervey Bay	Barnbaum 1976, Green 1975
QA183	17.405456	144.741921	39.8	10 km E Almaden according to Stephenson <i>et al.</i> 1980, possibly around AMG 66 grid reference 260000 8074000	Green 1975, Stephenson <i>et al.</i> 1980
QA200	27.338153	152.763485	22.2		Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA201	23.387332	147.589991	26.7	Sheep Station Knob	Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA202	23.415109	147.671934	56.2		Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA205	26.793231	152.943304	31.5		Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Evans 1976
QA206	26.769373	152.869345	28.1		Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Evans 1976
QA207	26.735905	152.905623	33.7		Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Evans 1976

Sample	Latitude	Longitude	Age	Locality	References
QA215	21.269304	148.528789	31.9	Old timber track, E side Hazlewood Creek, 7 km SSW Crediton.	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA216	21.249222	148.551706	30.9	4 km S Crediton	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA217	21.267380	148.526841	33.4	Old timber track, E side Hazlewood Creek, 7 km SSW Crediton.	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA218	21.299375	148.529774	28.4 or 34.2	W side of Hazlewood Creek, Plevna	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA219	21.652030	148.556941	>29.2	W side below cap of Mt Fort Cooper	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA220	21.648453	148.567746	13.8	Mt Fort Cooper	Lafferty & Golding 1985
QA221	21.131896	147.918358	30.0	5 km S of Byerwen homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA222	21.140643	147.887596	>23.7	8.5 km SSW of Byerwen homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA223	21.377562	148.388625	>29.0	0.5 km S of Eungella-Nebo Rd, 15 km SE of Exevale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA224	21.373353	148.405944	>18.1	Mt Andrew, 0.75 km N Eungella-Nebo Rd, 16 km SE Exevale h'stead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA225	20.962984	147.911552	22.5	10 km NW Weetalaba homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA226	20.971113	147.912082	24.3	9 km NW Weetalaba homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA227	20.940999	147.094387	54.9	Mt Dalrymple	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA228	21.007386	147.969549	23.4	5 km ENE Weetalaba homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA229	21.047966	148.057870	>29.1	9.5 km NW of Redcliffe Vale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA230	22.524371	149.255699	>50.7	N side Yatton Ck., 5 km due W of Bruce Highway, 25 km SE of Lotus Creek Roadhouse	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA231	21.418083	148.557342	>29.9	W of the Marling Spikes, 3.7 km ENE of Homevale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA232	21.414180	148.588168	35.1	2 km W of Sydney Heads	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA233	21.418083	148.557342	34.3	W of the Marling Spikes, 3.7 km ENE of Homevale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA234	20.830631	147.910272	>2.5	W side of Mt Martin	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA235	22.441174	148.954201	29.1	1.5 km SE of Sheep Station Hill, 12 km SW of Bruce Highway at Lotus Creek Roadhouse	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA236	22.435863	149.054663	>26.5	2 km E of Sheep Station Hill, 11 km SW of Bruce Highway at Lotus Creek Roadhouse	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA238	20.941474	147.032831	53.6 or 52.1	6 km W of Mt Dalrymple	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006

Sample	Latitude	Longitude	Age	Locality	References
QA239	21.764206	148.538326	>25.0	1.8 km ENE of junction of Bee and Walker Creeks, 16 km WSW of Nebo	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA240	21.389461	148.423942	31.8	Eungella-Nebo road, 8 km WNW of Homevale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA241	21.651091	148.560796	>16.7	N side of Fort Cooper	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA251	28.330488	152.970463	<35.4	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA252	28.059609	152.858600	21.3	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA253	28.321265	152.766447	22.4	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA254	28.330255	152.746023	25.8	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA256	21.443579	148.583662	>30.4	1 km ENE of summit of Mt Britten	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA257	26.933327	152.963934	26.8		Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA259	21.333350	148.000121	22.1	6.5 km NW of Redcliffe Vale homestead, Redcliffe Tableland	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA262	28.321189	152.725643	17.0	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA263	28.275840	152.633991	20.0	Warwick 1:250 000 sheet	Lafferty & Golding 1985, Ross 1977
QA287	20.848442	147.917822	3.2 3.2	N side of Mt St Martin	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985
QA288	21.334253	148.000127	21.3	6.7 km NW Redcliff Vale homestead	Sutherland <i>et al.</i> 1978, Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA314	26.830205	151.552586	23.2		M. Jones GSQ written comm 2006
QA431	28.139380	152.349319	>20.1	Pinnacle Rock, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA432	28.194143	152.491628	>22.8	Glucose Ridge, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA433	28.302262	152.440120	23.4	The Head, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA434	27.936072	152.364983	22.2	Mistake Mountain, southern Main Range. Sample is 1000 yds S of QA 441.	Lafferty & Golding 1985, Grenfell 1984
QA435	27.501085	151.843075	18.2	Gowrie Mountain, northern Main Range	Lafferty & Golding 1985, Grenfell 1984, Ewart & Grenfell 1985
QA436	27.377193	151.580269	24.0	Bloodwood Hill, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA437	27.574822	152.000807	27.3	Toowoomba Range, northern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA438	27.530302	151.965049	20.5	Harlaxton quarry, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA439	27.574854	151.991548	>19.5	Toowoomba Range, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA440	27.340511	151.568102	20.8	Malu Quarry, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA441	27.927818	152.365030	24.8	Mistake Mountain, southern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA442	28.058328	152.390511	19.4	Mt Mitchell (west peak) southern Main Range	Lafferty & Golding 1985, Grenfell 1984

Sample	Latitude	Longitude	Age	Locality	References
QA444	27.501085	151.843075	18.1	Gowrie Mountain, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA445	27.756208	152.048115	21.1	Hirstglen, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA446	27.681301	152.17752	21.4	Near Mt Whitestone, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA447	27.574822	152.000807	27.4	Toowoomba Range, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA448	28.157959	152.471428	25.5	Teviot Falls, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA449	27.911058	152.402056	25.6	Mistake Mountain, southern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA450	28.040229	152.380439	19.5	Middle Branch Creek, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA451	27.821903	152.122747	23.1	Hirstglen, northern Main Range	Lafferty & Golding 1985, M. Jones GSQ written comm 2006, Grenfell 1984
QA452	28.130495	152.379920	24.4	Hell Hole Creek Gorge, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA454	28.247598	152.328276	24.1	Rocky Creek Falls, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA456	27.250106	152.166690	34.8	Owen's Knob, northern Main Range	Lafferty & Golding 1985, Grenfell 1984, M. Jones GSQ written comm 2006
QA457	28.203207	152.501774	24.0	Mt Banbalora, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA458a	28.130449	152.369738	24.3	Hell Hole Creek Gorge, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA458b	28.130449	152.369738	24.5	Hell Hole Creek Gorge, southern Main Range	Lafferty & Golding 1985, Grenfell 1984
QA465	26.793231	152.943304	41.7	Maleny	Lafferty & Golding 1985, M. Jones GSQ written comm 2006
QA478	26.943799	152.935572	25		M. Jones GSQ written comm 2006
QA479	26.924850	152.966807	24.6		M. Jones GSQ written comm 2006
QA480	26.945600	152.925497	27		M. Jones GSQ written comm 2006
QA530	26.945600	152.925497	27.1		M. Jones GSQ written comm 2006
QA570	28.077562	152.551623	24.8		M. Jones GSQ written comm 2006
RD11	20.799320	144.282478	3.22 3.35		Coventry <i>et al.</i> 1985
RH1a	25.826755	150.922745	27.1	Mt Redhead, 46 km SW Mundubbera	Sutherland 1991
RR-216	17.429878	145.780784	1.38	Second falls Russell valley	Whitehead <i>et al.</i> 2007
RV 9	17.520599	145.562602	1.47	Ridge, Millaa Millaa lookout	Whitehead <i>et al.</i> 2007
SHLT 1	17.643610	145.457958	1.24	Shelter, Millstream Falls	Whitehead <i>et al.</i> 2007
SKC1	24.831778	147.939446	25.1	East side of plug, head of Skeleton Creek, 53 km SW Springwood homestead	Sutherland 1991
SR1	18.831802	145.972764	1.49	Stone River, 27.5 km SW of Ingham	Sutherland 1991
SR1	18.831802	145.972764	1.42	Stone River, 27.5 km SW of Ingham	Sutherland 1991

<b>Sample</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Age</b>	<b>Locality</b>	<b>References</b>
UQ20398	26.425009	152.981634	24.7	Allandale alkali Granite, near Mt Cooroy	Green & Webb 1974, M. Jones GSQ written comm 2006
UQ24205	26.430726	152.948096	23.9	Mt Cooroy Mangerite, ~ 6 km N Eumundi	Green & Webb 1974, M. Jones GSQ written comm 2006
W621B	17.434827	145.340170	7.10	Western Creek, tributary of Wild River, 8 km SW Herberton	Atkinson 1986, Whitehead <i>et al.</i> 2007

## APPENDIX 2. SUMMARY OF NSW K-Ar AGES

Sample	Latitude	Longitude	Age	Locality	References
7	32.266763	150.097822	34.1	30 km SW Merriwa	Galloway & Webb 1979
9	31.991753	151.146137	41.4	Belltrees	Galloway & Webb 1979
4543	32.968431	150.217827	53.2	Tayan Pic	Embleton <i>et al.</i> 1985
5544	33.035095	150.526156	19.6	Mt Wirraba	Embleton <i>et al.</i> 1985
5554	32.986758	150.856151	37.0	Mt Yengo	Embleton <i>et al.</i> 1985
5555	32.873424	150.857817	34.2	Mt Wareng	Embleton <i>et al.</i> 1985
5737	33.205095	150.591157	20.8	Jonathon's Nob	Embleton <i>et al.</i> 1985
5809	32.813426	150.636152	30.9 31.1	Kindarun Mtn.	Embleton <i>et al.</i> 1985
5845	32.968431	150.217827	51.6	Tayan Pic	Embleton <i>et al.</i> 1985
5854	32.821764	150.191159	57.3	Mt Touwouwan	Embleton <i>et al.</i> 1985
5873	32.821763	150.284491	45.4	Mt Midderula	Embleton <i>et al.</i> 1985
5878A	32.826763	150.352824	45.0	Mt Coricudgy	Embleton <i>et al.</i> 1985
5879	32.756762	150.406155	48.2	Mt Coriaday	Embleton <i>et al.</i> 1985
5886	32.686763	150.301156	57.1	Mt Cox	Embleton <i>et al.</i> 1985
7832	34.420649	150.776169	26.2	AIS DDH Nebo 11 approx 12 km W of Wollongong	Facer & Carr 1979, Lafferty & Golding 1985
7833	34.451206	150.706726	47.9	AIS DDH Wongawilli 14 183 m	Facer & Carr 1979, Lafferty & Golding 1985
7834	34.395648	150.826168	49.0	AIS Kemira colliery	Facer & Carr 1979, Lafferty & Golding 1985
7835	34.453984	150.695615	49.4	AIS DDH Avon 18, 152 m	Facer & Carr 1979, Lafferty & Golding 1985
7836	34.318982	150.883666	58.8	AOD DDH Cataract 1, 484 m	Facer & Carr 1979, Lafferty & Golding 1985
8588	34.710096	150.626175	63.8	11 km S of Robertson	Carr & Facer 1980
8589	34.301760	150.789501	74.0	South Bulli coal mine	Carr & Facer 1980
8590	34.801762	150.581177	101	Peppercorn Hill	Carr & Facer 1980
11275	33.781756	151.084489	46.9	Epping	Embleton <i>et al.</i> 1985
12145	32.526757	150.824480	37.9	Apple Tree Flat West	Embleton <i>et al.</i> 1985
15014/15020	29.188649	152.750113	30.88	2.5 km ENE Mookima Trig	Sutherland <i>et al.</i> 2005
15022/15023	29.230183	152.759273	20.84	2 km NE Lone Pine homestead	Sutherland <i>et al.</i> 2005
15024	29.230185	152.760302	17.81	2 km NE Lone Pine homestead	Sutherland <i>et al.</i> 2005
16866	29.269029	152.779769	19.76	SW side of Dobie Mountain	Sutherland <i>et al.</i> 2005
16973	29.199380	152.701740	19.53	1 km NW of Mookima trig	Sutherland <i>et al.</i> 2005
72840216	35.558954	148.604454	23.2	Near Shannons Flat	Owen & Wyborn 1979, Jones 1987 p 79
75840035	35.958978	148.982844	>15.2	Near Shannons Flat	Owen & Wyborn 1979, Jones 1987 p 79

Sample	Latitude	Longitude	Age	Locality	References
75840035A	35.938545	148.964598	18.2	Near Shannons Flat	Owen & Wyborn 1979, Jones 1987 p 79
75840035B	35.953609	148.980493	18.0	Near Shannons Flat	Owen & Wyborn 1979, Jones 1987 p 80
812105003	32.021424	151.275142	85.3	Mount Woolooma	Jaques & Perkin 1984, Jones 1987 p 178
69-001	34.521774	149.141195	20.5	2 km NE Bevendale	Wellman & McDougall 1974, Jones 1987 p 123
69-002	34.420107	149.127861	21.0	13 km N Bevendale	Wellman & McDougall 1974, Jones 1987 p 123
69-003	34.451770	149.467857	>36.4	Crookwell	Wellman & McDougall 1974, Jones 1987 p 123
69-004	34.490103	149.597855	>39.8	12 km E Crookwell	Wellman & McDougall 1974, Jones 1987 p 123
69-005	34.205102	149.754516	16.6	25 km N Taralga	Wellman & McDougall 1974, Jones 1987 p 124
69-006	33.878436	149.926176	17.9	21 km SSE Oberon	Wellman & McDougall 1974, Jones 1987 p 62
69-007	31.735092	150.779472	41.9	13 km NE Mt. Tingaroo at Ardglen	Wellman & McDougall 1974, Jones 1987 p 190
69-008	31.735092	150.779472	42.7 38.3	13 km NE Mt. Tingaroo at Ardglen	Wellman & McDougall 1974, Jones 1987 p 191
69-428	33.866773	149.354516	17.3	10 km N Abercrombie	Wellman & McDougall 1974, Jones 1987 p 61
69-429	33.456773	149.209513	11.8	21 km SSE Orange	Wellman & McDougall 1974, Jones 1987 p 64
69-430	31.885095	150.446146	39.3 39.2	28 km E Mt. Tingaroo	Wellman & McDougall 1974, Jones 1987 p 191
69-431	30.515095	150.077803	18.3	Mt. Kaputar	Wellman & McDougall 1974, Jones 1987 p 153
69-432	30.340082	152.164429	45.7 43.4	Doughboy Range	Wellman & McDougall 1974
69-433	30.351748	152.172763	>37.7 >37.2	1 km from 69-432	Wellman & McDougall 1974
69-434	30.360081	152.396093	18.2	6 km NE Ebor	Wellman & McDougall 1974, Jones 1987 p 112
69-435W	30.540085	151.606107	32.2 31.8	7 km SW Armidale	Wellman & McDougall 1974, Jones 1987 p 110
69-436	31.253416	151.951110	58.6 57.0	1 km NW Yarrowitch	Wellman & McDougall 1974, Jones 1987 p 146
69-437	31.128413	152.359436	72.2	1 km NNW Brushy Mtn.	Wellman & McDougall 1974, Jones 1987 p 147
69-438	31.128413	152.359436	70.4	? same flow as 69-437	Wellman & McDougall 1974, Jones 1987 p 147
69-439	31.605078	152.467773	16.4	Comboyne	Wellman & McDougall 1974, Jones 1987 p 146
69-440	31.626744	152.499439	16.3	4 km SE Comboyne	Wellman & McDougall 1974, Jones 1987 p 147
69-441	28.245079	153.234397	23.1 23.0	Albert Basalt	Wellman & McDougall 1974, Jones 1987 p 199
69-442	28.245079	153.234397	22.9	Albert Basalt	Wellman & McDougall 1974, Jones 1987 p 199
69-443	28.245079	153.234397	22.9	Hillview Rhyolite	Wellman & McDougall 1974, Jones 1987 p 199
69-444	28.245079	153.234397	>13.0	Binna Burra Rhyolite	Wellman & McDougall 1974, Jones 1987 p 198
69-445	28.265079	153.217732	21.3	Binna Burra Rhyolite	Wellman & McDougall 1974, Jones 1987 p 198
69-446	28.265079	153.217732	20.6	Hobwee Basalt	Wellman & McDougall 1974, Jones 1987 p 198
69-447	28.265079	153.217732	20.5	Hobwee Basalt	Wellman & McDougall 1974, Jones 1987 p 198
69-958	34.480097	150.401176	48.9	2 km W Bowral	Wellman & McDougall 1974, Jones 1987 p 235



Sample	Latitude	Longitude	Age	Locality	References
70-129	36.361780	149.212891	54.1 55.9	10 km NNE Hudsons Peak	Wellman & McDougall 1974, Jones 1987 p 39
70-130	36.441780	149.166227	46.3	Hudsons Peak	Wellman & McDougall 1974, Jones 1987 p 38
70-135	35.893451	148.402896	22.3	5 km N Cabramurra	Wellman & McDougall 1974, Jones 1987 p 219
70-138	35.636784	148.069563	18.7	6 km S Laurel Hill	Wellman & McDougall 1974, Jones 1987 p 219
70-253	35.995102	150.106199	29.9 31.8	10 km S Moruya	Wellman & McDougall 1974, Jones 1987 p 204
70-254	35.855101	150.149529	34.9 28.7	10 km N Moruya	Wellman & McDougall 1974, Jones 1987 p 204
70-256	35.263431	150.446183	>26.6	10 km N Ulladulla	Wellman & McDougall 1974, Jones 1987 p 205
70-893	34.925102	149.864523	45.4	10 km SW Bungonia	Wellman & McDougall 1974, Jones 1987 p 122
70-894	34.898434	149.971188	47.3	5 km S Bungonia	Wellman & McDougall 1974, Jones 1987 p 122
70-896	34.766765	150.101184	31.2	5 km NW Caoura	Wellman & McDougall 1974, Jones 1987 p 233
70-899	34.791765	150.169516	30.8	Caoura.	Wellman & McDougall 1974, Jones 1987 p 233
70-901	34.743432	150.146183	50.2	1 km SE 70-904	Wellman & McDougall 1974, Jones 1987 p 234
70-904.	34.730099	150.141183	47.1	5 km S Wingello	Wellman & McDougall 1974, Jones 1987 p 234
70-905	34.581762	150.527842	55.4	6 km W Robertson	Wellman & McDougall 1974, Jones 1987 p 236
70-1040	36.356780	149.212891	54.5	11 km NNE Hudsons Peak	Wellman & McDougall 1974, Jones 1987 p 39
70-1203	33.330108	148.651188	12.5	9 km SW Cudal	Wellman & McDougall 1974, Jones 1987 p 64
70-1205	33.625108	149.112851	11.5	17 km SW Blayney	Wellman & McDougall 1974, Jones 1987 p 65
70-1206	33.608442	148.819521	11.8 11.8	27 km WSW Blayney	Wellman & McDougall 1974, Jones 1987 p 65
70-1208	33.475105	149.546175	19.8	7 km SW Bathurst	Wellman & McDougall 1974, Jones 1987 p 62
70-1209	33.433438	149.532842	>16.8	5 km W Bathurst	Wellman & McDougall 1974, Jones 1987 p 94
70-1210	33.981775	148.814527	11.8	21 km SE Cowra	Wellman & McDougall 1974, Jones 1987 p 66
70-1211	33.950109	148.829526	11.9	18 km SE Cowra	Wellman & McDougall 1974, Jones 1987 p 66
71-262	33.591774	149.151183	12.9	2 km NE of Carcoar	Wellman & McDougall 1974, Jones 1987 p 65
71-264	33.508440	149.361178	13.0	Kings Plains, 10 km ENE Blayney	Wellman & McDougall 1974, Jones 1987 p 64
71-270	33.455105	149.549508	>17.6	5 km SSW Bathurst	Wellman & McDougall 1974, Jones 1987 p 62
74-144	35.282749	150.480980	30.0		Young & McDougall 1982, Jones 1987 p 206
74-146	35.282749	150.480980	29.3		Young & McDougall 1982, Jones 1987 p 207
81-640	35.113599	150.255353	>40.9 >41.2 46.9 47.2	On road, 1km S Sassafras	Young & McDougall 1985, Jones 1987 p 207
83-95	35.085765	150.235686	50.6, 50.9, 50.3	On plateau, 3km NW Sassafras beside Nerriga-Nowra road	Young & McDougall 1985, Jones 1987 p 208
83-98	35.099599	150.242519	>44.3 47.7	1.5km WNW Sassafras	Young & McDougall 1985, Jones 1987 p 209

Sample	Latitude	Longitude	Age	Locality	References
84-351	31.701754	151.121135	73.9 73.2	Timor caves	Osborne 1986
89-3	35.640660	148.064907	19.2	Tumbarumba region	Young & McDougall 1993
89-4	35.702260	148.031461	21.4	Tumbarumba region	Young & McDougall 1993
89-5	35.737826	147.983263	20.9	Tumbarumba region	Young & McDougall 1993
89-7	35.792597	148.010496	21.5	Tumbarumba region	Young & McDougall 1993
89-8	35.760174	148.289935	21.9	Tumbarumba region	Young & McDougall 1993
89-9	35.688411	148.255624	21.8	Tumbarumba region	Young & McDougall 1993
89-11	35.626553	148.221528	21.9	Tumbarumba region	Young & McDougall 1993
89-15	35.799343	148.251835	22.2	Tumbarumba region	Young & McDougall 1993
89-16	35.757506	148.199193	21.3	Tumbarumba region	Young & McDougall 1993
89-20	35.859287	148.115448	23.1	Tumbarumba region	Young & McDougall 1993
89-22	35.829110	148.160415	21.9	Tumbarumba region	Young & McDougall 1993
89-25	35.951569	148.080154	22.2 22.8	Tumbarumba region	Young & McDougall 1993
89-26	35.969164	148.027159	21.3	Tumbarumba region	Young & McDougall 1993
89-27	35.851133	148.119763	21.7	Tumbarumba region	Young & McDougall 1993
89-781	34.840487	150.130461	31.2	Warrigal lookout, Billy Bulloos Canyon	Nott 1992, Nott <i>et al.</i> 1996
89-782	34.811304	150.116174	28.7	Iron Pot Clearing	Nott 1992, Nott <i>et al.</i> 1996
96-716	35.477788	150.249010	28.01	Prospect Hill, Brooman	Spry 1996, Spry <i>et al.</i> 1999
96-717	35.448818	150.243388	27.44	Hilltop near Brooman	Spry 1996, Spry <i>et al.</i> 1999
97-651	33.586457	150.367669	15.1 15.0	Mt Banks	van der Beek <i>et al.</i> 2001
97-652	33.586457	150.367669	14.1 14.2	Mt Banks	van der Beek <i>et al.</i> 2001
97-653	33.596399	150.411538	20.4	Mt Caley	van der Beek <i>et al.</i> 2001
97-654	33.557880	150.423458	14.2	Mt Tomah	van der Beek <i>et al.</i> 2001
97-655	33.501900	150.376690	17.9	Mt Wilson	van der Beek <i>et al.</i> 2001
97-656	33.620704	150.409734	15.4	Mt Hay	van der Beek <i>et al.</i> 2001
7809/16	31.668110	152.389252	16.2	E margin of Mt Killabakh, Camden Haven district	Ewart <i>et al.</i> 1985, Jones 1987 p 148
7809/21	31.699356	152.523064	16.4	N side Big Nellie, 7.5 km W Hannam Vale	Ewart <i>et al.</i> 1985, Jones 1987 p 148
AL11	32.798416	150.184476	49.6	Grassy Swamp, near Mt Touwouwan	Jones 1987 p 170, O'Reilly & Griffin 1984
AL15	32.831779	150.284504	48	Base of Mt Kelgoola	Jones 1987 p 170, O'Reilly & Griffin 1984
AL39	32.915087	150.267850	50.4	Mt Coorongooba	Jones 1987 p 170, O'Reilly & Griffin 1984
Big Brother	33.646437	149.389638	40.8 40.7	Crest of Big Brother	AMDEL 1995

Sample	Latitude	Longitude	Age	Locality	References
Bondo 1	36.405540	149.119026	48.9	BMR Bega 7 corehole, ~ 20 km S of Cooma, between 65 and 75 m depth	Roach 1996, Brown <i>et al.</i> 1992
BO9	36.656097	149.218724	51.0	Mt Cooper	Taylor <i>et al.</i> 1990
BO14	36.882502	149.303795	>34.0	Strathairlie Hstd.	Taylor <i>et al.</i> 1990
BO317	36.880576	149.263349	53.2	Quarry near High Lake	Taylor <i>et al.</i> 1990
BO657	36.536838	149.373909	47.7	Amphibole Hill, 8 km ESE Nimmitabel	Taylor <i>et al.</i> 1990
BR 1	30.681784	146.351200	16.8	Byrock	Sutherland 1985
BT107	31.918905	151.332052	36.8	W slopes of Barrington Tops	AMDEL 1982, Pain 1983
C1	30.464096	152.516693	<52.9	about 14 km SE of Ebor	Gleadow & Ollier 1987, Jones 1987 p 113
CPT II	31.215119	146.201207	15.7	El Capitan	Sutherland 1983, Sutherland 1985
DR1711	32.871766	149.976162	43.6	Mt Cumbermelon	Embleton <i>et al.</i> 1985
DR10206	34.125099	150.212843	40.7	The Peak, Yerranderrie	Embleton <i>et al.</i> 1985
DR10566	33.511754	151.291149	47.4	Woy Woy south	Embleton <i>et al.</i> 1985
DR12662	31.914251	151.501341	58.7		Sutherland & Fanning 2001
DR14641	35.723451	148.206229	23.7	Jimmies Road, Granite Mountain	Sutherland <i>et al.</i> 2002b
DR14701	31.849712	151.460113	54.5		Sutherland & Fanning 2001
DR15014	29.187754	152.754230	30.9	4 km ENE Mookima Trig	Sutherland 2003
DR15024	29.223875	152.764432	20.8	2 km NE Lone Pine homestead	Sutherland 2003
DR16332	31.805970	152.353490	19.6	Bald Rock, 7 km NNW Wingham	Sutherland 2003
DR16503	31.891402	151.553518	53.3		Sutherland & Fanning 2001
DR16517	31.954788	151.422391	50.9		Sutherland & Fanning 2001
DR16575	32.287186	148.685467	20.0	'Hillside', 9 km WNW of Wongarbron	Sutherland 2003
DR16607	29.356757	153.015507	24.3	1 km SW of Banyabba	Sutherland 2003
DR16696	31.738348	152.578822	18.3	Juhle Mountain, 3 km SSW Hannan Vale	Sutherland 2003
Dunkeld	33.400793	149.501137	12.4	Quarry on basalt outlier NE Dunkeld	AMDEL 1995
Eastwood	35.879278	149.353009	21.1	Jerangle	Abell & Roach 1996, I. Roach ANU written comm 2006
FWS2	32.698422	151.059479	39.2		Embleton <i>et al.</i> 1985
G6432/86	31.752390	151.395217	54.1		Martin <i>et al.</i> 1987
GA118	36.331756	150.034549	98, 96	Central Tilba quarry	Evernden & Richards 1962, Jones 1987 p 31-32
GA389	36.315092	150.134565	97, 70	Poole's Point	McDougall & Wellman 1976, Jones 1987 p 35
GA390	36.331769	150.084540	92.9	Little Dromedary	McDougall & Wellman 1976, Jones 1987 p 32
GA479	29.798420	151.517771	35.4 35.0	Spring Mountain	Cooper <i>et al.</i> 1963, Jones 1987 p 139, Harding 1969
GA678	32.998429	150.401158	>62.8	Umbrella Creek Pipe	Lovering & Richards 1964, Jones 1987 p 185

Sample	Latitude	Longitude	Age	Locality	References
GA784	33.081767	150.034496	42.3	Airly Mt. 48 km SSW Nullo Mt.	Wellman & McDougall 1974, Jones 1987 p 185
GA830	29.567301	152.916913	61.0	Clifden No 3 well, 7500' depth	Harding 1969, Wellman & McDougall 1974, Jones 1987 p 138
GA1374	31.456767	149.009496	14.2	Oxley Highway	Dulhunty & McDougall 1966, Jones 1987 p 132
GA1375	31.381766	149.259492	13.9	Oxley Highway	Dulhunty & McDougall 1966, Jones 1987 p 132
GA1408	28.393332	153.307305	23.7 23.0	Mt Warning	Webb <i>et al.</i> 1967, Jones 1987 p 200
GA1530	30.123426	150.076158	20.79 21.33	Flow 1.5 miles N Killarney Gap.	Stipp & McDougall 1968, Jones 1987 p 154
GA1531	30.085072	150.032800	17.72 17.55	1 mile E upper Bullawa Creek turnoff	Stipp & McDougall 1968, Jones 1987 p 154
GA1532A	30.263421	150.079443	19.31 18.97	Mt Lawler Dome	Stipp & McDougall 1968, Jones 1987 p 154
GA1533	30.109909	150.119449	18.50 18.72	1 mile south of Bullawa Creek	Stipp & McDougall 1968, Jones 1987 p 154
GA1534	30.275098	150.089487	18.56 18.33	1.5 miles north of Knobby's Rocky Creek	Stipp & McDougall 1968, Wellman <i>et al.</i> 1969, Jones 1987 p 155
GA1536	30.263410	150.052795	17.72 18.05	Kaputar Road 2.5 Miles east of Coryah Gap	Stipp & McDougall 1968, Jones 1987 p 155
GA1547	30.358128	150.078087	17.45 17.41	Foot of Mt Derian Dome	Stipp & McDougall 1968, Jones 1987 p 155
GA1550	36.308556	150.073118	97.9	Mt Dromedary, quarry 0.5 km NW Central Tilba	Williams <i>et al.</i> 1982, Jones 1987 p 42
GA1956	31.694684	152.481935	16.1	Summit Mt Oliver	McDougall & Wilkinson 1967, Jones 1987 p 147
GA1957	31.369657	148.951679	15.9		McDougall & Wilkinson 1967, Jones 1987 p 133
GA1958	29.842177	151.038550	22.6	11 km SW Inverell on Inverell-Copeton road.	Wellman & McDougall 1974, McDougall & Wilkinson 1967, Jones 1987 p 149
GA1959	29.809854	150.930556	19.0	11 km W Inverell	McDougall & Wilkinson 1967, Jones 1987 p 149
GA1960	30.363378	152.385030	19.2		McDougall & Wilkinson 1967, Jones 1987 p 112
GA1961	31.867543	151.442904	>50.0	Barrington Tops	McDougall & Wilkinson 1967, Wellman <i>et al.</i> 1969, Jones 1987 p 196
GA1962	31.867543	151.442904	56.0	Barrington Tops.	McDougall & Wilkinson 1967, Jones 1987 p 196
GA1963	28.201120	153.570657	23.2	Fingal Point	McDougall & Wilkinson 1967, Jones 1987 p 200
GA1964	28.091411	153.459126	23.5	Burleigh Heads	McDougall & Wilkinson 1967, Jones 1987 p 200
GA1965	28.746317	152.430598	24.2	NW Tabulam	McDougall & Wilkinson 1967, Jones 1987 p 239
GA1966	31.464011	151.087596	60.1	Lower level of Square Top intrusion	McDougall & Wilkinson 1967, Jones 1987 p 196
GA2146	33.465095	150.634493	19.3	20 km NW Richmond	Wellman & McDougall 1974, Jones 1987 p 184
GA2147	35.251767	149.971191	44.8	Charleyong	Wellman & McDougall 1974, Jones 1987 p 80
GA2148	35.255101	149.971191	>40.8	Charleyong	Wellman & McDougall 1974, Jones 1987 p 80
GA2149	35.255101	149.974524	>40.7 >41.1	Charleyong	Wellman & McDougall 1974, Jones 1987 p 81
GA2167	30.577375	151.676637	21.2	Near Bald Knob, 6.5 km S Armidale	McDougall & Wilkinson 1967, Jones 1987 p 112
GA2168	29.885877	151.734539	34.3	New England Highway, 42.5 km N Guyra	McDougall & Wilkinson 1967, Jones 1987 p 139

Sample	Latitude	Longitude	Age	Locality	References
GA2342	35.100100	150.087855	45.9 >42.7	2 km N Nerriga	Wellman & McDougall 1974, Jones 1987 p 205
GA2343	35.100100	150.084521	>41.9 >43.0	? underlies GA2342	Wellman & McDougall 1974, Jones 1987 p 206
GA2344	35.091766	150.106188	46.7	Underlies GA2345	Wellman & McDougall 1974, Jones 1987 p 205
GA2345	35.091766	150.106188	46.8	Endrick River	Wellman & McDougall 1974, Jones 1987 p 205
GA2900	31.860085	151.396130	51.3	Sempill Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 195
GA2901	31.860085	151.396130	54.24 53.13	Sempill Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 195
GA2902	31.860085	151.396130	>42.27 >46.78	Sempill Creek	Wellman <i>et al.</i> 1969, Bennett <i>et al.</i> 1975, Jones 1987 p 195
GA2903	31.860085	151.396130	52.6	Sempill Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 194
GA2904	32.776770	149.167841	11.9	8 km E Stuart Town	Wellman & McDougall 1974, Jones 1987 p 94
GA2905	32.776770	149.167841	12.3	? same flow as GA2904	Wellman & McDougall 1974, Jones 1987 p 95
GA2906	33.293441	149.077847	11.8	3 km W Orange	Wellman & McDougall 1974, Jones 1987 p 63
GA2907	33.298441	149.084513	12.2	3 km SW Orange	Wellman & McDougall 1974, Jones 1987 p 64
GA2908	33.345108	148.982849	11.2	Mt. Canobolas	Wellman & McDougall 1974, Jones 1987 p 62
GA2909	29.715087	151.621101	33.8	11 km W Glen Innes	Wellman & McDougall 1974, Jones 1987 p 139
GA2910	31.770100	149.092833	14.2 15.2	Parramatta Mt.	Wellman & McDougall 1974, Jones 1987 p 131
GA2911	32.168436	148.619511	12.3	8 km N Dubbo	Wellman & McDougall 1974, Jones 1987 p 95
GA2912	31.435101	149.091162	14.5 15.4	Below GA2910	Wellman & McDougall 1974, Jones 1987 p 132
GA2913	31.730387	150.135893	34.36 34.44	Yarraman Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 193
GA2914	30.276762	150.066134	17.89 18.12	Mount Kaputar Road	Wellman <i>et al.</i> 1969, Jones 1987 p 156
GA2915	31.731763	150.116150	34.53 34.30	Yarraman Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 192
GA2916	31.723429	150.151149	34.11 33.42	Yarraman Creek.	Wellman <i>et al.</i> 1969, Jones 1987 p 193
GA2917	31.313417	151.717781	44.2 45.9	25 km W Yarrowitch	Wellman & McDougall 1974, Jones 1987 p 146
GA2918	32.341763	150.132823	12.2	8 km N Bylong	Wellman & McDougall 1974, Jones 1987 p 175
GA2919	32.341763	150.132823	12.9 12.2	Flow below GA2918	Wellman & McDougall 1974, Jones 1987 p 175
GA2920	32.646763	150.194490	>36.1 >34.9	9 km NW Nullo Mt.	Wellman & McDougall 1974, Jones 1987 p 176
GA2921	31.820092	150.729474	>33.8	Same flow as GA2922	Wellman & McDougall 1974, Jones 1987 p 190
GA2922	31.820092	150.729474	39.6 39.5	Mt. Tingaroo	Wellman & McDougall 1974, Jones 1987 p 190
GA2923	31.860085	151.396130	>43.68 >44.61	Sempill Creek	Wellman <i>et al.</i> 1969, Bennett <i>et al.</i> 1975, Jones 1987 p 195
GA2924	32.031752	151.384467	52.8	Stewarts Brook	Wellman <i>et al.</i> 1969, Jones 1987 p 177
GA2925	32.031752	151.384467	52.0	Stewarts Brook	Wellman <i>et al.</i> 1969, Jones 1987 p 177

Sample	Latitude	Longitude	Age	Locality	References
GA2927	35.855117	148.479559	20.9	8 km NNE Cabramurra	Wellman & McDougall 1974, Jones 1987 p 218
GA2928	35.866784	148.429561	22.1	2 km NW Kiandra	Wellman & McDougall 1974, Jones 1987 p 218
GA2929	32.031752	151.384467	52.1	Stewarts Brook	Wellman <i>et al.</i> 1969, Jones 1987 p 178
GA2930	30.448425	150.617792	15.3	10 km S Barraba, 50 km SE Mt. Kaputar	Wellman & McDougall 1974, Jones 1987 p 153
GA2931	31.381766	149.284492	13.7	2 miles S Belar Ck, Coonabarabran-Gilgandra Rd	Dury <i>et al.</i> 1969, Jones 1987 p 133-134
GA2932	31.093435	148.904494	17.0	Looking Glass Mt.	Wellman & McDougall 1974, Jones 1987 p 130
GA2933	31.298435	148.867831	14.9	0.5 miles NE of Belar Ck, Coonabarabran-Gilgandra Rd	Dury <i>et al.</i> 1969, Jones 1987 p 133-134
GA2934	31.381766	149.284492	13.8	0.5 miles E Tooraweena-Baradine Rd, 12 miles N Tooraweena	Dury <i>et al.</i> 1969, Jones 1987 p 133-134
GA2935	36.540116	148.981232	48.0 47.9	20 km SW Hudsons Peak	Wellman & McDougall 1974, Jones 1987 p 38
GA2936	36.245112	149.267888	39.8	5 km E Toll Bar Ck	Wellman & McDougall 1974, Jones 1987 p 37
GA2937	36.441780	149.167894	40.5	Hudsons Peak	Wellman & McDougall 1974, Jones 1987 p 37
GA2939	36.173450	148.726229	37.0	9 km SE Eucumbene.	Wellman & McDougall 1974, White <i>et al.</i> 1977, Jones 1987 p 36
GA2940	30.278428	150.151133	17.73 17.65	Lindesay Ck	Wellman <i>et al.</i> 1969, Jones 1987 p 155
GA2941	30.278428	150.151133	17.9	Lindesay Ck	Wellman <i>et al.</i> 1969, Jones 1987 p 156
GA2942	30.278428	150.151133	18.15 18.04	Lindesay Ck	Wellman <i>et al.</i> 1969, Jones 1987 p 156
GA2943	30.286761	150.149466	17.86 17.84	Mount Kaputar Road	Wellman <i>et al.</i> 1969, Jones 1987 p 156
GA2944	31.736763	150.126149	36.31 34.29 35.01	Spur from Bundulla Trig Station to Yarraman Ck	Wellman <i>et al.</i> 1969, Jones 1987 p 194
GA2945	31.736763	150.126149	34.31 34.05	Spur from Bundulla Trig Station to Yarraman Ck	Wellman <i>et al.</i> 1969, Jones 1987 p 194
GA2946	31.636753	151.129464	54.7 54.6	20 km S Nundle	Wellman & McDougall 1974, Jones 1987 p 191
GA2947	31.628420	151.131131	>45.0 >43.4	20 km S Nundle	Wellman & McDougall 1974, Jones 1987 p 192
GA2948	32.008419	151.364467	53.76 53.43	Stewarts Brook - Mt Barrington fire trail	Wellman <i>et al.</i> 1969, Bennett <i>et al.</i> 1975, Jones 1987 p 178
GA2949	32.031752	151.384467	>45.92 >45.69	Stewarts Brook	Wellman <i>et al.</i> 1969, Jones 1987 p 177
GA3454	33.338441	149.001182	11.7	2 km NE Mt. Canobolas	Wellman & McDougall 1974, Jones 1987 p 63
GA3455	33.340108	149.004515	11.7	Flow below GA3454	Wellman & McDougall 1974, Jones 1987 p 63
GA3456	33.345108	148.982849	11.5	? same flow GA2908	Wellman & McDougall 1974, Jones 1987 p 63
GA3457	31.278434	149.071160	16.0	Woorut Mt. 970 m	Wellman & McDougall 1974, Jones 1987 p 131
GA3458	31.270101	149.081160	16.1	Woorut Mt. 1120 m	Wellman & McDougall 1974, Jones 1987 p 131
GA3459	31.273434	149.064493	15.8	Woorut Mt. 1200 m	Wellman & McDougall 1974, Jones 1987 p 130
GA3460	33.491764	150.411164	18.2 18.1	4 km E Mt. Wilson .	Wellman & McDougall 1974, Jones 1987 p 184

Sample	Latitude	Longitude	Age	Locality	References
GA3461	33.491764	150.421163	>16.7	5 km E Mt. Wilson	Wellman & McDougall 1974, Jones 1987 p 183
GA3462	33.545099	150.421164	14.9	Mt. Tooma (Mt Tomah)	Wellman & McDougall 1974, Jones 1987 p 184
GA3465	31.860085	151.396130	>48.5	Sempill Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 194
GA3466	31.731207	150.122258	>31.8	Yarraman Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 193
GA3467	31.730660	150.131981	35.72 35.35	Yarraman Creek	Wellman <i>et al.</i> 1969, Jones 1987 p 193
GA3468	32.723430	150.259490	42.3	2 km SE Nullo Mt.	Wellman & McDougall 1974, Jones 1987 p 176
GA3469	31.278416	151.852779	48.2	11 km W Yarrowitch	Wellman & McDougall 1974, Jones 1987 p 145
GA3470	33.515124	146.367896	14.0 13.2 14.8 15.3 13.8 14.1 12.9 14.9	Begargo Hill	Wellman <i>et al.</i> 1970, Jones 1987 p 86-87
GA3471	33.515124	146.367896	11.2 10.5	Begargo Hill	Wellman <i>et al.</i> 1970, Jones 1987 p 87
GA3472	33.498453	146.767890	10.1	Bygalore	Wellman <i>et al.</i> 1970, Jones 1987 p 88
GA3473	33.515120	146.751224	12.6	Mount Bygalore (The Monument)	Wellman <i>et al.</i> 1970, Jones 1987 p 88
GA3474	33.381785	146.784554	12.8	Gorman Hills	Wellman <i>et al.</i> 1970, Jones 1987 p 88
GA3475	33.448454	146.651224	10.4	Tullibigeal	Wellman <i>et al.</i> 1970, Jones 1987 p 88
GA3476	33.165116	147.017881	12.9	Condobolin (Weebar Hill)	Wellman <i>et al.</i> 1970, Jones 1987 p 118, Scott 2000
GA3477	34.823446	148.417875	17.7	Intrusion, Jugiong,	Wellman & McDougall 1974, Jones 1987 p 92
GA3478	33.281790	146.334559	11.6 13.0	Lake Cargelligo	Wellman <i>et al.</i> 1970, Jones 1987 p 89
GA3479	31.181785	146.201207	12.2	El Capitan	Wellman <i>et al.</i> 1970, Jones 1987 p 84
GA3480	33.348454	146.617890	14.0	Burgoony	Wellman <i>et al.</i> 1970, Jones 1987 p 89
GA3481	33.781792	146.084570	10.4	Flagstaff Hill	Wellman <i>et al.</i> 1970, Jones 1987 p 89
GA3482	34.321764	150.261177	35.1	1 km N Mt. Wanganderry	Wellman & McDougall 1974, Jones 1987 p 234
GA3483	34.331763	150.264510	36.8	Mt. Wanganderry	Wellman & McDougall 1974, Jones 1987 p 233
GA3484	34.455097	150.324510	51.9 49.4	Mount Misery	Wellman & McDougall 1974, Jones 1987 p 235
GA3491	34.485097	150.404509	46.1	Below 69-958	Wellman & McDougall 1974, Jones 1987 p 235
GA3492	34.555096	150.547841	37.4	5 km NW Robertson	Wellman & McDougall 1974, Jones 1987 p 234
GA3493	35.783452	148.264562	21.6	Bago Plateau	Wellman & McDougall 1974, Jones 1987 p 234
GA3494	35.943454	148.081235	22.8	3 km N Tooma	Wellman & McDougall 1974, Jones 1987 p 219
GA3495	35.625118	148.076230	18.9 18.7	6 km S Laurel Hill, overlies 70-138	Wellman & McDougall 1974, Jones 1987 p 220
GA3496	35.095113	148.586210	21.5	Jasper Creek	Wellman & McDougall 1974, Jones 1987 p 80
GA3497	35.131779	148.342882	19.9	Honeysuckle Range	Wellman & McDougall 1974, Jones 1987 p 220

Sample	Latitude	Longitude	Age	Locality	References
GA3498	36.623448	149.107898	48.6 51.3	21 km SSW Hudsons Pk	Wellman & McDougall 1974, Jones 1987 p 32
GA3938	36.441780	149.167894	38.2 39.5 41.2	Same body as GA2937	Wellman & McDougall 1974, Jones 1987 p 37
GG11	34.576600	149.448649	21	Grabben Gullen	O'Reilly & Griffin 1984, Jones 1987 p 121
GG30	34.578402	149.448702	22	Grabben Gullen	O'Reilly & Griffin 1984, Jones 1987 p 121
GO3550	29.732922	151.368427	39.2		Vickery <i>et al.</i> 2007
GO3557	29.770761	151.407343	14.2		Vickery <i>et al.</i> 2007
GO3558	29.784661	151.371374	35.7		Vickery <i>et al.</i> 2007
GO3560	29.773870	151.063625	19.8		Vickery <i>et al.</i> 2007
GO3593	29.890718	150.486716	23.9		Vickery <i>et al.</i> 2007
GO3598	29.904159	150.487228	22.6		Vickery <i>et al.</i> 2007
Hereford Hall	35.808554	149.550098	19.1	Hereford Hall, near Jerrabattgulla Creek	Wyborn & Owen 1986
K6	31.705812	149.294183	17, 17	W bank Castlereagh River, 1.25 km upstream from Toogalan homestead, 2.1 km by road from Neilrex PO	Dulhunty 1972, Jones 1987 p 135
K7	31.627506	149.383961	14, 15	Roadside cutting, E side Binnaway-Neilrex road, 1.3 km N Piambra Rail siding	Dulhunty 1972, Jones 1987 p 135
K8	32.382982	149.490747	15.2	Fords Creek, Gulgong	Dulhunty 1971, Dulhunty 1973, Jones 1987 p 95
K9	32.404025	149.381838	14.2	Two Mile Creek, Gulgong	Dulhunty 1971, Dulhunty 1973, Jones 1987 p 95
K10	32.806846	149.747008	36.5	Mt Bocoble	Dulhunty 1971, Dulhunty 1973, Jones 1987 p 96
K12	33.027272	149.887615	>34.6	Mt Vernon	Dulhunty 1971, Dulhunty 1973, Jones 1987 p 66
K13	32.866423	149.681537	42.7	Mt Carcalgong	Dulhunty 1971, Dulhunty 1973, Jones 1987 p 96
K15	32.184288	148.622052	14.3	Newell Highway, N side Talbragar River Bridge, 2.1 km upstream Macquarie River junction	Dulhunty 1973, Jones 1987 p 96
K16	33.401697	149.501159	12.7	Dunkeld blue metal quarry 2.4 km NNE Dunkeld, 8.9 km by road from Bathurst	Dulhunty 1973, Jones 1987 p 67
K17	34.329085	149.807635	44.6	Taralga-Richlands, Taralga-Oberon road, 9.7 km from Taralga	Dulhunty 1973, Jones 1987 p 129
K25	33.644638	149.389584	52.3	Old quarry floor 9 m above base of flow, northern side of Big Brother Hill	Dulhunty 1973, Jones 1987 p 66
K44	30.084481	149.949694	22.1 av	Moema	Dulhunty 1986, Jones 1987 p 160
K45	30.257640	149.989141	20.2 av	Gowrie hillside	Dulhunty 1986, Jones 1987 p 160
KS1	36.073756	148.909108	19.2	Dry Plain, Caddigat Creek	Sharp 2004
KS5	36.028670	148.965725	30.0	SE of Jones Plain, above Murrumbidgee R ('Kuroona')	Sharp 2004
KS9	36.202630	148.911124	>29.4 >30.4	Wambrook Dolerite near Wambrook Hill	Sharp 2004
KS10	36.174962	149.004398	47.7 47.4	Bridle Hill	Sharp 2004
KS12	36.148972	148.995400	42.5	Kissops Flat	Sharp 2004



Sample	Latitude	Longitude	Age	Locality	References
KS14	36.195531	148.959884	46.0	'Peak Valley'	Sharp 2004
KS15	36.093351	149.059520	44.2	0.5 km W of 'Murrumbucca'	Sharp 2004
KS17	36.204499	149.146400	41.2	Tillabudgery Trig, 4 km NE Cooma	Sharp 2004
KS18	36.161660	148.991276	44.5	Dry Plain Road near Peak Creek	Sharp 2004
KS19	36.136566	148.927299	36.0	'Glenbernie', Dry Plain Road	Sharp 2004
KS20	36.160754	148.880093	44.6	Main Divide near 'Muniong'	Sharp 2004
KS23	36.203584	148.907811	40.6	Near Wambrook Hill	Sharp 2004
KS27	36.466859	149.264647	44.9	Gourock quarry, 29 km SW Cooma	Sharp 2004
LR1	34.523760	149.291337	19.4	1 Km S of Wheeo	Bishop <i>et al.</i> 1985, Jones 1987 p 126
LR3	34.517432	149.292253	>15.0	0.5 km S of Wheeo	Bishop <i>et al.</i> 1985, Jones 1987 p 126
LR6	34.452159	149.263258	18.4	19 km W Crookwell, 1 km NW Hanwood hstd	Bishop <i>et al.</i> 1985, Jones 1987 p 128
LR10	34.363156	149.199977	>14.4	1 km SE Table Top homestead	Bishop <i>et al.</i> 1985, Jones 1987 p 127
LR14	34.489994	149.114016	17.3	Summit of Bald Hill	Bishop <i>et al.</i> 1985, Jones 1987 p 127
LR18	34.624207	149.319179	18.7	Biala Rd, 3 km WNW Mt Martin	Bishop <i>et al.</i> 1985, Jones 1987 p 127
LR20	34.614754	149.196782	18.9	2.5 km SE Bulleys Cross	Bishop <i>et al.</i> 1985, Jones 1987 p 127
LR22	34.613997	149.137875	19.3	Mt Midgee, 3.5 km W Lachlan River	Bishop <i>et al.</i> 1985, Jones 1987 p 128
LR25	34.578402	149.448702	15.8	Summit of Great Divide, 6 km SE Grabben Gullen	Bishop <i>et al.</i> 1985, Jones 1987 p 128
LR28	34.591078	149.490498	19.6	Kialla Ck., 11 km SE Grabben Gullen	Bishop <i>et al.</i> 1985, Jones 1987 p 128
MH9	33.155090	151.071150	57.5	Mogo Hill	Embleton <i>et al.</i> 1985
N12544	31.665089	150.947802	45.5	Wallabadah Rock	Sutherland 1991, L. Sutherland Aust Museum written comm 2006
NU6	32.440087	151.212809	20.7	N of Baldy Mountain, 8 km ENE of Nundle	Sutherland 1991, L. Sutherland Aust Museum written comm 2006
Ollier 1	30.425277	151.543346	25.1	15 km NW Armidale	Ollier 1982 (pers comm from Connolly)
Owen 1	33.450000	149.000000	12.8	Cadia, 20 km SSW Orange	J. Owen, reported by Pogson & Watkins 1998
Owen 2	33.450000	149.000000	11.8	Cadia, 20 km SSW Orange	J. Owen, reported by Pogson & Watkins 1998
PP1	30.359827	152.397539	19.1	Paddy's Plain, N Dorrigo	Gleadow & Ollier 1987, Jones 1987 p 112
PR1	33.331755	151.219482	48.6	Peats Ridge	Embleton <i>et al.</i> 1985
QA461	31.479041	149.315991	13.7	Gilgandra 1:250 000	Lafferty & Golding 1985
QA463	31.479041	149.315991	17.2	Gilgandra 1:250 000	Lafferty & Golding 1985
R79413	31.513526	148.922024	15.82		Ashley <i>et al.</i> 2003
RH2	32.968418	151.736136	90.1	Little Red Head Beach	Embleton <i>et al.</i> 1985
Rocky Bridge	33.801209	149.187649	14.6	Rocky Bridge	AMDEL 1995
RP1	34.353426	150.884499	57.6	Rixons Pass	Embleton <i>et al.</i> 1985

Sample	Latitude	Longitude	Age	Locality	References
Sample 1	34.466375	149.322423	48.8	Boorowa-Crookwell road	Young & Bishop 1980, Jones 1987 p 124
Sample 2	34.466375	149.322423	50.8	Boorowa-Crookwell road	Young & Bishop 1980, Jones 1987 p 125
Sample 3	34.744560	149.608678	24.0	Quarry Hill	Young & Bishop 1980, Jones 1987 p 125
Sample 4	34.744490	149.611952	26.0	Quarry Hill	Young & Bishop 1980, Jones 1987 p 125
Sample 5	34.594637	149.492785	22.8		Young & Bishop 1980, Jones 1987 p 125
Sample 6	34.614793	149.194602	21.3		Young & Bishop 1980, Jones 1987 p 126
Sample 7	34.463386	149.140558	20.5 20.6		Young & Bishop 1980, Jones 1987p 126
Site 2	34.258435	149.716184	41.3	17 km NW Taralga	Young 1981, Jones 1987 p 124
Site 3	34.196770	149.551185	23.4	33 km NW Taralga	Young 1981, Jones 1987 p 124
TS1	32.973418	151.594472	111	Teralba rail cut	Embleton <i>et al.</i> 1985
VH2	33.011751	151.631139	92.7	Valentine Bore	Embleton <i>et al.</i> 1985
WA1	31.098418	151.501123	35	Brickclay Creek, 16 km SW Walcha	Sutherland 1991, L. Sutherland Aust Museum written comm 2006
Whinstone	35.920497	149.410745	20.3	Jerangle	Abell & Roach 1996, I. Roach ANU written comm 2006
YAR01	31.318266	151.994270	45.85	1.2 km E of Rowley Rd/Oxley Highway junction, SE of Yarrowitch	Sutherland <i>et al.</i> 2006b, L. Sutherland Aust Museum written comm 2006

### APPENDIX 3. SUMMARY OF VICTORIAN K-Ar AGES

Sample	Latitude	Longitude	Age	Locality	References
2	37.363845	143.057704	6.07	Tributary of Mt Challicum Creek	Cayley & McDonald 1995, Cayley <i>et al.</i> 1995, V. Morand Geoscience Vic written comm 2007
3	37.481607	143.100285	4.64	Ford over Fiery Ck., E of Ararat	Cayley & McDonald 1995, Cayley <i>et al.</i> 1995, V. Morand Geoscience Vic written comm 2007
1/182	37.427061	143.945326	2.39	East of Creswick	Webb <i>et al.</i> 1998, V. Morand Geoscience Vic written comm 2007, Taylor <i>et al.</i> 2000
2/84/11	37.279921	144.604694	6.19	Cobaw	V. Morand Geoscience Vic written comm 2007, Graham <i>et al.</i> 2003
4/134/8	37.329714	144.633922	8.30	Newham	V. Morand Geoscience Vic written comm 2007
69-9	37.977431	144.160659	>22.1 >22.4	Moorabool River, SE of Lethbridge	Abele & Page 1973, Odin 1982
69-10	37.977431	144.160659	>22.2	Moorabool River, SE of Lethbridge	Abele & Page 1973, Odin 1982
69-331	37.348491	144.651306	>4.66	Kings quarry, Heskett in Macedon area	Wellman 1974, Graham <i>et al.</i> 2003, Dasch & Millar 1977
69-334	37.348492	144.534641	7.00	Old Racecourse Hill, Woodend in Macedon area	Wellman 1974, Dasch & Millar 1977
69-335	37.348492	144.534641	6.81	Quarry #1, Woodend in Macedon area	Wellman 1974, Dasch & Millar 1977
69-336	37.312072	144.338200	>3.34	Spring Hill near Trentham	Wellman 1974, Graham <i>et al.</i> 2003, , Dasch & Millar 1977
69-1454	37.631828	144.417980	64.3 64.3	6 km NW of Bacchus Marsh	Wellman 1974
69-1456	37.565162	144.271315	54.8	6 km NE of Ballan	Wellman 1974
69-1457	37.685155	145.117970	18.0	2 km S of Plenty	Wellman 1974
69-1458	38.488493	144.971318	43.1	5 km W of Flinders	Wellman 1974
69-1459	38.478493	145.009651	43.7	at Flinders	Wellman 1974
69-1463	38.500158	145.186315	48.3	Phillip Island	Wellman 1974
69-1465	38.525151	145.926304	50.6	6 km SW of Leongatha	Wellman 1974
69-1466	38.491817	145.944636	39.9	2 km S of Leongatha	Wellman 1974
69-1468	38.398478	146.566291	58.9 58.6	21 km NW of Yarram	Wellman 1974
69-1469	37.078456	148.351243	42.8	18 km NNE of Gelantipy	Wellman 1974
69-1470	37.245124	148.254580	39.6	3 km S of Gelantipy	Wellman 1974
69-1471	37.245124	148.254580	>33.6	overlies 69-1470	Wellman 1974
69-1473	37.321792	148.089584	40.3	20 km SW of Gelantipy	Wellman 1974
69-1474	37.206793	148.022917	>34.8	21 km W of Gelantipy	Wellman 1974
69-1475	37.151793	147.957917	38.6	22 km W of Gelantipy	Wellman 1974, Willman <i>et al.</i> 1999
69-1476	37.021799	147.234594	34.0	10 km SE Hotham Hotel	Wellman 1974
69-1478	36.981799	147.147928	37.2	near Hotham Hotel	Wellman 1974
69-1480	37.180133	147.197930	31.1	S side of Dargo High Plains	Wellman 1974
69-1481	37.105133	147.156263	>25.8	N side of Dargo High Plains	Wellman 1974

Sample	Latitude	Longitude	Age	Locality	References
69-1485	36.861806	146.329606	38.6	8 km NE of Toombullup	Wellman 1974
69-1487	36.903474	146.267941	38.5	2 km N of Toombullup	Wellman 1974
69-1490	37.318523	141.271355	>78	SW of Harrow	McDougall and Wellman 1976
69-1491	37.228471	146.697939	32.7	6 km SE of Mt Howitt	Wellman 1974
69-1492	37.173471	146.676272	34.2	3 km E of Mt Howitt (middle)	Wellman 1974
69-1493	37.173471	146.676272	>14.1	4 km E of Mt Howitt (base)	Wellman 1974
69-1495	36.840127	147.706250	2.33	3 km north of Uplands PO	Wellman 1974, Sutherland <i>et al.</i> 2004b
69-1497	36.870146	145.612951	>6.97	14 km S of Euroa	Wellman 1974
69-1498	36.345144	145.597944	5.92	8 km W of Dookie	Wellman 1974
69-1499	38.026861	141.279699	2.53	11 km S of Dartmoor, about 1 km E of Glenelg River	Aziz-ur-Rahman & McDougall 1972
69-5663	38.004739	144.172131	>21.7	Moorabool River, E of The Pimple Hill	Abele & Page 1973, Odin 1982
69-5665	38.004739	144.172131	>21.4	Moorabool River near Lowndes Bridge	Abele & Page 1973, Odin 1982
69-5667	38.468921	144.105374	>25.7 >27.2	Aireys Inlet, Split Point	Abele & Page 1973
69-5869	38.468921	144.105374	>27.2 >27.6	Aireys Inlet, Split Point	Abele & Page 1973
70-140	38.546812	146.537961	56.1	12 km NW of Yarram	Wellman 1974
70-141	38.128478	146.391290	22.2	13 km NE of Moe	Wellman 1974
70-143	37.883480	146.099624	>19.8	35 km NE of Warragul	Wellman 1974
70-145	38.040149	145.914630	25.1	14 km N of Warragul	Wellman 1974
70-148	37.831810	146.394619	>28.6	12 km S of Aberfeldy	Wellman 1974
70-149	37.073454	148.576239	>34.5	near Tubbut Post Office	Wellman 1974
70-469	37.341824	144.681305	6.47 5.90	Brock's monument in Macedon area	Wellman 1974, Graham <i>et al.</i> 2003, Dasch & Millar 1977
70-470	37.371825	144.596307	6.30 5.72	Camels Hump in Macedon area	Wellman 1974, Graham <i>et al.</i> 2003, Dasch & Millar 1977
70-474	37.331824	144.592973	6.17 >5.43	Hanging Rock in Macedon area	Wellman 1974, Dasch & Millar 1977
70-1025	38.161816	145.866299	22.3	6 km W of Warragul	Wellman 1974
70-1026	37.750143	146.381285	>27.0	7 km S of Aberfeldy	Wellman 1974
70-1028	37.206786	148.709572	38.7	4 km SW of Bonang	Wellman 1974
70-1029	37.198453	148.706239	42.5	2 km SW of Bonang	Wellman 1974
70-1030	36.840127	147.706250	2.32	2 km N of Uplands PO	Wellman 1974, Sutherland <i>et al.</i> 2004b
70-1037	37.173471	146.676272	35.7	2 km E of Mt Howitt (top)	Wellman 1974
70-1215	37.380158	144.577974	4.31	Melbourne Hill Quarry, near Lancefield	Aziz-ur-Rahman & McDougall 1972, Graham <i>et al.</i> 2003
70-1216	38.098496	144.472987	1.66	20 km SW of Werribee	Aziz-ur-Rahman & McDougall 1972

Sample	Latitude	Longitude	Age	Locality	References
70-1217	38.139331	144.310490	2.17	Geelong Quarries, Fyansford, Geelong	Aziz-ur-Rahman & McDougall 1972
70-1218	38.140166	144.194658	2.07 2.16	Pollocksford, 10 km W Geelong	Aziz-ur-Rahman & McDougall 1972
70-1219	38.275170	143.871332	2.31	Armytage Quarry, Armytage	Aziz-ur-Rahman & McDougall 1972, Edwards <i>et al.</i> 1996
70-1220	38.405193	141.629701	3.20	Portland Harbour Trust Quarries, S of Portland	Aziz-ur-Rahman & McDougall 1972
70-1221	38.405193	141.629701	2.83	Portland Harbour Trust Quarries, S of Portland	Aziz-ur-Rahman & McDougall 1972
70-1222	37.567285	143.811608	2.56	Council Quarry, Alfredtown, Ballarat	Aziz-ur-Rahman & McDougall 1972, Taylor <i>et al.</i> 1996
70-1223	37.567285	143.811608	2.59	Council Quarry, Alfredtown, Ballarat	Aziz-ur-Rahman & McDougall 1972, Graham <i>et al.</i> 2003, Taylor <i>et al.</i> 1996
70-1224	37.681828	144.426314	4.13	1 km SW Bacchus Marsh	Aziz-ur-Rahman & McDougall 1972, Graham <i>et al.</i> 2003
70-1227	36.783472	146.359604	44.3	17 km NNE of Toombullup	Wellman 1974
70-1228	36.891807	146.316273	37.1	5 km NE of Toombullup	Wellman 1974
70-1323	37.628494	144.407980	80.9 80.5	6 km NW of Bacchus Marsh	Wellman 1974
70-1328	37.150133	147.189596	31.7	S side of Dargo High Plains	Wellman 1974
70-1330	38.139331	144.310490	1.91	Mobile Quarry, Fyansford, Geelong	Aziz-ur-Rahman & McDougall 1972
70-1331	38.143966	144.307091	2.13	Fyansford Quarry, Fyansford, Geelong	Aziz-ur-Rahman & McDougall 1972
70-1553	37.128456	148.326244	>37.2	12 km NNE of Gelantipy	Wellman 1974
70-1554	37.128456	148.326244	>34.7	same flow as 17-1553	Wellman 1974
71-85	37.631828	144.417980	61.9	6 km NW of Bacchus Marsh	Wellman 1974
72-307	38.390137	142.144150	0.320	Cape Reamur	McDougall & Gill 1975, Ollier 1985
72-312	38.397231	142.243889	0.309	Woodsewer outfall, Port Fairy	McDougall & Gill 1975, Ollier 1985
72-316	38.214238	142.160810	0.415 0.450	19km N of Port Fairy	McDougall & Gill 1975, Ollier 1985
72-317	38.390581	142.572393	2.04	8km E of Warrnambool	McDougall & Gill 1975
72-318	38.348542	142.478793	1.95 2.05	2 km N of Warrnambool	McDougall & Gill 1975, Edwards 1990
77-15	38.385876	142.587175	0.67	Allansford, 100 m S of bridge, W bank Hopkins River	Gill 1981, Gill & Sherwood 1986, Edwards 1990, V. Morand Geoscience Vic written comm 2007
77-16	38.385876	142.587175	0.70 0.58	Allansford, 100 m S of bridge, W bank Hopkins River	Gill 1981, Edwards 1990
7809/1	37.430980	144.296703	5.94	South summit of Blue Mt, Trentham	Ewart <i>et al.</i> 1985
7809/3	37.443285	144.244273	5.92	Summit of Mt Wilson, northeastern flank, 9 km SW of Trentham	Ewart <i>et al.</i> 1985
7809/5	37.327987	144.664897	6.13	Quarry 2.3 km SW of Rochford,	Ewart <i>et al.</i> 1985, Graham <i>et al.</i> 2003
7809/8	37.371337	144.250296	5.83	Summit Babbingtons Hills, 6 km W of Trentham	Ewart <i>et al.</i> 1985

Sample	Latitude	Longitude	Age	Locality	References
Barfold	37.098491	144.534637	3.12	2 km S Barfold Gorge	Wallace & Ollier 1990, Graham <i>et al.</i> 2003
Cobaw	37.266667	144.616667	6.1	Cobaw	Graham <i>et al.</i> 2003
GA1017	37.773489	145.034640	0.83 0.83 0.85	Albion quarry, Alphington	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1018	37.740157	144.876308	4.81 4.58 4.64	Fowlers Quarry, off Keilor Road, Essendon	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1019	37.765157	144.851309	2.70	McGrath's Quarry, Braybrook	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1020	37.765158	144.817976	2.62	Albion quarry, Sunshine	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1021	37.840158	144.876310	2.56	Newport quarry, Melbourne	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1023	37.602315	143.969077	2.64 2.56	Small quarry 1 km S Dunnstown, 10 km ESE Ballarat	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1060	37.773489	145.034640	0.83 0.79	Albion quarry, Alphington	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1061	37.765156	144.984640	2.22	Merri Creek quarry, Melbourne	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1062	37.740157	144.876308	4.54 4.57 4.64	Fowlers Quarry, off Keilor Road, Essendon	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1064	38.303238	142.705331	0.58	Framlingham quarry, 4.2 km NNW Panmure	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975, Edwards <i>et al.</i> 1996
GA1065	37.765185	142.051351	4.06 3.98	Menzel's quarry, Hamilton	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1066	37.299424	142.930600	3.69	Ararat quarry, Ararat	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1115	37.840158	144.876310	2.57	Newport quarry, Melbourne	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1116	37.773489	145.034640	0.83 0.84	Albion quarry, Alphington	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1141	37.732116	141.954648	4.46	Grange Burn, W of Hamilton	Gill 1957, Turnbull <i>et al.</i> 1965, Harding 1969, Ollier 1985
GA1171	37.765156	144.984640	2.29	Merri Creek quarry, Melbourne	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1172	38.303238	142.705331	0.602	Framlingham quarry, 4.2 km NNW Panmure	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975, Edwards <i>et al.</i> 1996
GA1173	37.765158	144.817976	2.81	Albion quarry, Sunshine	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA1174	37.299424	142.930600	3.61	Ararat quarry, Ararat	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975
GA2095	37.594739	143.977973	3.97 4.04	Quarry 1.4 km E Dunnstown	McDougall <i>et al.</i> 1966, Bennett <i>et al.</i> 1975, Taylor <i>et al.</i> 1996
GA3144	37.345164	143.907984	2.16	West Berry Consuls Mine, about 2 km W of Smeaton. Birch Hill	Aziz-ur-Rahman & McDougall 1972, Graham <i>et al.</i> 2003, Taylor <i>et al.</i> 2000
GA5199	38.332970	141.591644	>17.6	Portland No 3 water bore, 1714.5-1718.5 m	Harding 1969
Kangaroo Hill			2.62	Kangaroo Hill	Kotsonis and Joyce, 2003
Linton	37.713471	143.565318	5.10	Linton	Taylor <i>et al.</i> 1996, Webb <i>et al.</i> 1998
Mt Buninyong	37.650000	143.916667	4.0	Mt Buninyong	Nicholls <i>et al.</i> 1993

Sample	Latitude	Longitude	Age	Locality	References
Mt Warrenheip	37.566667	143.933333	1.0	Mt Warrenheip	Nicholls <i>et al.</i> 1993, Wallace 1990
Mt Franklin	37.250000	144.150000	0.47	Mt Franklin	Nicholls <i>et al.</i> 1993
PL-3	38.314975	141.581325	2.55	Elder Smith-Goldsborough Mort Woolstore, North Portland	Singleton <i>et al.</i> 1976
PL-5	38.312191	141.597316	2.59	Near Maretimo homestead, North Portland	Singleton <i>et al.</i> 1976
PL-7	38.326639	141.591715	2.63	Southern Farmers Woolstore, North Portland	Singleton <i>et al.</i> 1976
PL-14	38.315998	141.556167	2.55	2 km W of North Portland	Singleton <i>et al.</i> 1976
PL-16	38.177940	141.370152	2.48	N slope Mt Kincaid	Singleton <i>et al.</i> 1976
PL-18	38.042076	141.288554	2.41	Summit of Jones Ridge	Singleton <i>et al.</i> 1976
PL-19	38.041175	141.288550	2.28	Summit of Jones Ridge	Singleton <i>et al.</i> 1976
Rouse 1	37.883333	142.300000	1.82	Mt Rouse	Ollier 1985, Nicholls <i>et al.</i> 1993
Stony Creek	36.797216	147.715287	3.59	Stony Creek, north of Benambra	Sutherland <i>et al.</i> 2004b
S-2	38.035792	141.278273	2.31 2.21 2.37	Cliff on left bank of Glenelg River	Singleton <i>et al.</i> 1976
VAD5	37.669879	144.862974	>20.5	Disused quarry east of Tullamarine airport	Bowen 1975, McKenzie <i>et al.</i> 1984
VAD6	37.672932	145.117415	22.5	Disused quarry, Greensborough	Bowen 1975, McKenzie <i>et al.</i> 1984
VAD12	38.329040	145.770747	87.5	Poowong	Bowen 1975; McKenzie <i>et al.</i> 1984, V. Morand Geoscience Vic written comm 2007
VAD14	38.017673	143.406057	59.1	Lake Struan, bore	Bowen 1975, McKenzie <i>et al.</i> 1984, Edwards 1990
VAD17	38.271535	146.372165	85.2 88.4		McKenzie <i>et al.</i> 1984
VAD21	38.264911	141.941083	37.9	Codrington, bore	Bowen 1975, McKenzie <i>et al.</i> 1984
VAD23	38.509896	143.551340	28.5	Gellibrand	Bowen 1975, McKenzie <i>et al.</i> 1984, Edwards 1990
VAD35	38.534063	143.559674	<50.5	Gellibrand	McKenzie <i>et al.</i> 1984
VAD35B	38.534063	143.559674	28.1 27.7	Gellibrand	Bowen 1975, McKenzie <i>et al.</i> 1984
VAD40	38.162385	144.501320	22.5	Curlewis	McKenzie <i>et al.</i> 1984
VAD41	38.154082	141.390256	37.4 37.5	Cobboboonee, bore	McKenzie <i>et al.</i> 1984
VAD42	38.276535	146.324349	20.7 22.1	Driffield, SEC Narracan bore 3407	McKenzie <i>et al.</i> 1984
VAD49	38.023487	145.340194	22.3	Quarry at Berwick	McKenzie <i>et al.</i> 1984
VAD51	38.182923	146.347125	90.6	SEC bore 3465 299.8-300.3 m	McKenzie <i>et al.</i> 1984
VAD53	38.166257	146.341291	86.5	SEC bore 3463 145 m	McKenzie <i>et al.</i> 1984
VAD56	36.794323	144.526300	7.1	Waterfall quarry, Axedale area	McKenzie <i>et al.</i> 1984
VAD57	38.178479	146.342403	26.1	Yallourn, SEC Narracan bore 3482	McKenzie <i>et al.</i> 1984

Sample	Latitude	Longitude	Age	Locality	References
VAD60	37.503499	143.837432	2.97	Mt Rowan	McKenzie <i>et al.</i> 1984, Taylor <i>et al.</i> 1996, Graham <i>et al.</i> 2003
VAD61	37.561	143.813544	2.94	Alfredtown rubbish tip or Alfredtown quarry	McKenzie <i>et al.</i> 1984, Taylor <i>et al.</i> 1996, Graham <i>et al.</i> 2003
VAD73	37.687268	145.100463	4.6	W side of Plenty River, about 50 m N of Maroondah aqueduct	McKenzie <i>et al.</i> 1984
VAD74	37.556205	145.076628	2.18 2.24	Abandoned quarry along Donnybrook Road about 500 m W of Barber Ck	McKenzie <i>et al.</i> 1984
VAD76	37.846808	146.696281	22.2	Licola-Heyfield road	McKenzie <i>et al.</i> 1984
VAD77	38.201818	145.687969	22.2	Road cutting south of creek at Ripplebrook	McKenzie <i>et al.</i> 1984
VAD78	38.446819	145.722972	94.7 91.7	Krowera, road cutting	McKenzie <i>et al.</i> 1984
VAD79	38.130162	144.621040	39.5	Old quarry near Bellarine	McKenzie <i>et al.</i> 1984
VAD85	38.316811	146.486291	22.4	Jeffrey's quarry, Churchill	McKenzie <i>et al.</i> 1984
VAD89	38.535452	143.494397	30.4	300 m S of Junction between Carlisle River - Gellibrand road and Bunker Hill Track	McKenzie <i>et al.</i> 1984
VAD90	37.550993	144.467701	3.64 3.31	3 km S of Bullengarook	McKenzie <i>et al.</i> 1984, Graham <i>et al.</i> 2003
VAD93	37.280581	144.993832	22.5	Apex quarry, East Kilmore	McKenzie <i>et al.</i> 1984, VandenBerg 1992
VAD102a			1.64	Bendigo-St Arnaud Road, Bendigo 1:100 000 sheet	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Cherry & Wilkinson 1994
VAD103	36.974821	144.485124	4.49	Coliban flow, Metcalfe	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Graham <i>et al.</i> 2003
VAD104	37.153750	148.211874	37.0	Seldom Seen	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007
VAD106	37.173667	148.158125	40.9	Gelantipy, Bald Hill	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007
VAD110	37.077718	148.583022	45.9	Tubbut	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007
VAD118	36.807382	144.519755	4.82	Axedale quarry upper flow	Henley and Webb 1990, Edwards <i>et al.</i> 2001, V. Morand Geoscience Vic written comm 2007
VAD119	36.805149	144.521149	5.57	Axedale quarry lower basalt flow	Henley & Webb 1990, Edwards <i>et al.</i> 2001, V. Morand Geoscience Vic written comm 2007
VAD123	38.346658	143.407879	0.300 0.260	Mt. Porndon stony rise basalt	Henley & Webb 1990, Edwards <i>et al.</i> 1996, V. Morand Geoscience Vic written comm 2007
VAD124	38.369377	143.117916	1.08	Curdie River Flow	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Edwards <i>et al.</i> 1996
VAD125	38.307735	142.817635	2.19	Garvoc basalt lava ridge	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Edwards <i>et al.</i> 1996
VAD129	38.334072	142.619223	0.828	Hopkins River	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Edwards <i>et al.</i> 1996
VAD133	38.381542	142.574487	2.12	Allansford, basalt ridge	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007, Edwards <i>et al.</i> 1996
VAD134	38.378319	142.545797	1.07	Tandarook Sth.	Henley & Webb 1990, V. Morand Geoscience Vic written comm 2007
VAD136	38.317455	142.367207	0.793	Tower Hill Volcano, one of 4 small flows from scoria cones on Fairy Island	Tickell 1991, V. Morand Geoscience Vic written comm 2007
Barfold	37.098491	144.534637	3.12	Barfold, 2 km S of gorge	Wallace and Ollier 1990, Graham <i>et al.</i> 2003



#### APPENDIX 4. SUMMARY OF TASMANIAN AND BASS STRAIT K-Ar AGES

Sample	Latitude	Longitude	Age	Locality	References
1	41.985715	146.763536	22.4	Quarry east side of Lake Highway, east of Shannon Lagoon	Sutherland <i>et al.</i> 1973
2	41.855886	146.707390	22.9	Southwest Reynolds Island	Sutherland <i>et al.</i> 1973
3	41.843258	146.700220	22.3	Northwest Reynolds Island	Sutherland <i>et al.</i> 1973
4	41.902495	146.628810	23.6	Quarry, Liawenee Hill, west end of Liawenee Canal	Sutherland <i>et al.</i> 1973
5	41.989006	146.642797	24.3	Road cut, Marlborough Highway, south bank Ouse River, north Skittleball Plains	Sutherland <i>et al.</i> 1973
680916	40.7583	147.9833	93	Cape Portland	McDougall & Green 1982
72-316	41.103633	147.858788	16.3	W of Herrick	Brown 1977, Brown 1982, Sutherland & Wellman 1986
74-98	42.838966	147.344220	>23.0	Approx 100 m from head of Geilston Bay at sea level on the southern shore	Tedford <i>et al.</i> 1975, Sutherland & Wellman 1986, Tedford <i>et al.</i> 1998
Anaba	39.895294	143.975462	61.7	"Anaba", Adams Road, 12 km ENE of Currie	Sutherland <i>et al.</i> 2002a, J. Everard Geol Survey Tas written comm 2006
BH1	42.280165	147.339688	>25.0	Barwicks Hill, 3.5 km WNW of Oatlands	Sutherland & Wellman 1986
Bream Creek	42.777324	147.825313	58.5	Kellevie-Bream Creek road at Benders Hill	Baillie 1987
BT2	41.238482	147.922992	46.2	5 km SSE Weldborough	Sutherland & Wellman 1986
BT4	41.265149	147.921326	47.3	7.5 km S of Weldborough (NNE flank of Seaview Hill)	Sutherland & Wellman 1986
BT5	41.243482	147.952992	47.4	6.6 km SE of Weldborough	Sutherland & Wellman 1986
BT5	41.243482	147.952992	47.0	6.6 km SE of Weldborough	Sutherland & Wellman 1986
BW1	42.430168	147.199693	36.3	Big White Hill, 4.7 km NNE Melton Mowbray	Sutherland & Wellman 1986, Sutherland 1984
BW1368	40.860956	144.700809	14.5	Mt Cameron West	Seymour & Baillie 1992, J. Everard Tas Geol Survey written comm 2006
BW1370B	40.865527	144.704210	15.5	Mt Cameron West	Seymour & Baillie 1992, J. Everard Tas Geol Survey written comm 2006
Cape Portland	40.760553	147.956245	101.3	Cape Portland	McDougall & Green 1982
Cape Portland	40.756882	147.985691	69.9	Cape Portland	J. Everard Geol Survey Tas written comm 2006
CN1	39.571497	145.527912	22.4	Cormorant 1 well, core 11, 8100-8116 feet	Sutherland & Wellman 1986
CPJ32	40.974228	147.763211	80.40	Tomahawk River area	Everard <i>et al.</i> 2004
CR1	42.645871	147.447846	24.2	Coal River, 3 km NW of Campania	Sutherland <i>et al.</i> 1973, Green 1975, Sutherland & Wellman 1986
DHW	41.158948	146.332675	9.35	Don Heads (upper flow)	J. Everard, Geol Survey Tas written comm 2006
DR10499	41.196907	146.959596	>32.53	Batman Bridge Highway	Zwingmann <i>et al.</i> 2004, Sutherland <i>et al.</i> 2006a
DR11440	42.248500	147.213023	24.1	Wild Pig Tier	Sutherland 1989
DR16808	41.520126	147.194904	>29.37	Cocked Hat Hill	Zwingmann <i>et al.</i> 2004, Sutherland <i>et al.</i> 2006a

Sample	Latitude	Longitude	Age	Locality	References
DR17070	41.340588	147.013890	>33.74	Loch Lea, West Tamar Road	Zwingmann <i>et al.</i> 2004, Sutherland <i>et al.</i> 2006a
East Stony Head	40.987010	147.056019	101.6	East Stony Head	McDougall & Green 1982
FH1	42.280165	147.328022	>24.3	Fernleigh Hill, 4 km WNW of Oatlands	Sutherland & Wellman 1986, Sutherland 1984
Killiecrankie	39.789895	147.888944	20.0	Killiecrankie	Zwingmann <i>et al.</i> 2004, J.Everard Geol Survey Tas written comm 2006
LJ1	42.156842	146.373032	30.1	Laughing Jack Marsh, 10.3 km WSW of Bronte	Sutherland & Wellman 1986
Musselroe Bay	40.818388	148.082530	98.7	34.2-34.3 m depth in Dept of Mines borehole 1A, Musselroe Bay	Baillie 1983, Baillie 1984, Baillie 1986c
PB1	41.074291	147.159657	30.7	2.2 km NW Pipers Brook	Sutherland & Wellman 1986
PP1	42.351830	147.556353	25.6	Pencil Point, 9 km ESE of Andover	Sutherland & Wellman 1986
PWB2	41.290435	146.505704	25.9	Sassafras	Baillie 1986b
PWB4	40.766490	145.305812	12.5	The Nut (Circular Head), Stanley area	Baillie 1986a, 1989
PWB5	40.749242	145.296774	8.5	Green Hills, Stanley area	Baillie 1986a, 1989
QA157	42.808504	147.331366	30.2	Risdon Brook	Sutherland 1976, J. Everard Geol Survey Tas written comm 2006, Green 1975, Sutherland & Wellman 1986
RH1	42.371834	147.238025	27.6	Rose Hill Farm, 4 km WNW of Jericho	Sutherland & Wellman 1986
Round Lagoon	42.013681	147.213914	24.9	Round Lagoon, N of Lake Sorell	Sutherland 1989
ROW	41.177968	146.917879	46.66	Rowella DDH2, 104.5 m depth	Zwingmann <i>et al.</i> 2004, Sutherland <i>et al.</i> 2004a, 2006a
Sandhill Spur	42.391833	147.268653	24.6	Sandhill Spur, SW of Jericho	Zwingmann <i>et al.</i> 2004; Sutherland <i>et al.</i> 2004a, Sutherland 1984
SB1	42.914817	147.359125	26.5	Blinking Billy Point, Sandy Bay	Sutherland & Wellman 1986
SB4	41.946738	147.600969	27.2	Keach Hill, E of Campbell Town	Everard <i>et al.</i> in press, J. Everard Geol Survey Tas written comm 2006
SC1	40.938931	145.603728	26.3	Cassidys (Sheckleton) Creek, Boat Harbour	Sutherland & Wellman 1986, Sutherland <i>et al.</i> 1996a
SC2	40.939382	145.603720	26.4	Cassidys Ck, Boat Harbour	Sutherland <i>et al.</i> 1996a
SC3	40.933622	145.611562	14.2	Irbys Road flow, Boat Harbour	Sutherland <i>et al.</i> 1996a
Spring Hill	42.406726	147.254499	21.2	Spring Hill, 4 Km SW of Jericho	Zwingmann <i>et al.</i> 2004; Sutherland <i>et al.</i> 2004a, Sutherland 1984
St Georges Rocks	40.923498	148.330321	40.6	George Rocks	Zwingmann <i>et al.</i> 2004
ST1	42.184187	146.958491	35.4	The Haystack, Shannon Tier	Sutherland & Wellman 1986
TC1	40.939846	145.681516	13.3	Tollymore Road quarry, Table Cape	Sutherland & Wellman 1986
TSC45650	39.837072	145.807033	>54.1	Yolla 1 well 3173 m	Wheeler & Kjellgren 1986
TSC45815	39.892030	145.979655	28.3	Tilana 1 well 3066-3311 m	Webb, Appendix 10 in Cornell <i>et al.</i> 1986.
TSC46043	39.892030	145.979655	20.5	Tilana 1 well 2043-2052 m	Webb, Appendix 10 in Cornell <i>et al.</i> 1986.

Sample	Latitude	Longitude	Age	Locality	References
TSC58500	41.474680	146.085635	26.7	13.1 m depth, HEC drill hole 4558, 1.3 km ESE Wilmot Dam	Macphail & Hill 1994
TW335	41.017873	145.107316	22.9	Macguires Rd, Trowutta	J. Everard Geol Survey Tas written comm 2006
Vinegar Hill	40.758523	147.983464	102.3	Cape Portland	McDougall & Green 1982
W1-4	41.062701	147.788036	16.4	Swanee Creek via Winnaleah	Brown 1977, Brown 1982, Sutherland & Wellman 1986
W2-1	41.080724	147.787061	>11.35	NW of Winnaleah	Brown 1977
W3-1	41.072973	147.863150	16.0	Wagners Hill via Winnaleah	Brown 1977, Brown 1982, Sutherland & Wellman 1986
WCC1	41.188424	146.456389	38.1	Findlay's bore, Wesley Vale, 58 m depth	Cromer 1980
Y1295	41.127416	146.822992	24.72	Tamar Avenue DDH, George Town	Zwingmann <i>et al.</i> 2004, Sutherland <i>et al.</i> 2006a
Yolla 1	39.837072	145.807033	23.8	Yolla 1 well 2612-2621 m	Wheeler & Kjellgren 1986