COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1960/30

PROGRESS REPORT ON GRANITE SAMPLING PROGRAMME TO END OF FEBRUARY, 1960.

by

D.A. White.

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TABLES

Table 1. Summary of samples, concentrates, ages, chemical analyses, petrography from each State. 2

PLATES

Plate 1. Western half of Australia showing locality samples and granite areas.
Scale 1 inch to 60 miles.

Plate 2. Eastern half of Australia showing locality of samples and granite areas.
Scale 1 inch to 60 miles.

INTRODUCTION

Since the inception of the age determination programme in 1956, 433 samples - mainly granites - have been collected. 52 mica concentrates have been forwarded to Professor Hurley, Massachusetts Institute of Technology, U.S.A., and of these concentrates, 20 have been dated.

The programme has been designed to cover eventually all the granites in Australia, and as can be seen from Table 1 (below) and Plates 1, 2, 3 and 4, preliminary sampling of a substantial part of the continent has already been carried out.

SUMMARY OF PROGRESS

A summary of the progress to the end of February, 1960 is set out in Table 1.

TABLE 1.

State	Samples collected	Samples conctd.	Concentrates rejected	Concs. fwd. for age detn.	Age detn.	Chem. anal.	Petrography
W.A.	115	7	1	3	-	3	2
N.T.	38	31	-	28	20	16	32
Qld.	106	60	25	8	-	32	20
N.S.W.	112	19	4	12	-	4	3
S.A.	23	14	7	1	-	18	15
Vic.	41	-	-	-	-	-	-
Tas.	3	3	-	-	-	1	-
New Guinea	1	-	-	-	-	-	-
TOTAL:	433	134	37	52	20	74	72

Plates 1, 2, 3 and 4 show the localities of the samples in relation to the main granite areas. The outline of the granite areas was obtained from the draft compilation of the 1 inch to 40 miles scale Tectonic Map of Australia. The plates also show ages of the samples dated by Professor Hurley, and by others (see Bibliography) including Dr. Jeffery, University of Western Australia. Since about 1954 Dr. Jeffery has dated some 20 samples collected by Professor R. Prider and Dr. A. Wilson, Geology Department, University of Western Australia. An index of ages, not necessarily complete, obtained in Australia from all known sources is shown at the end of the record. This will be added to as more data is obtained.

RECORDS

Each sample collected is numbered according to its position in the International Grid, the Australian 4-Mile Grid and the order in which it is collected. For example, sample E/55/11/6: E/55 is the International grid reference, /11/ the 4 mile sheet reference and /6 of the specific sample number.

A card index of each sample and a book record showing the various stages in the concentration, chemical analyses and petrography, is maintained. This is brought up to date each month.

A duplicate of each mica concentrate and four hand specimens of each sample are held in the Museum of the Bureau of Mineral Resources.

SAMPLE PREPARATION

The samples are prepared for age determination as follows:

1. A thin section of the sample is made to study its purity and mica content. The sample is rejected if the mica is strongly chloritized or weathered. Also the occurrence of biotite, whether as single or composite grains, is noted, as this largely determines the later grinding process.

2. Sample is crushed in a 3" Jaw crusher.

3. Sample is ground in a 8" Disc grinder, ball mill or hammer mill, depending on the form of the mica crystals.

4. Sample is sieved to remove rock flour etc. The best fraction for mica concentration varies from sample to sample; generally ± 25 mess is retained.

5. Mica concentrated by using Isodynamic Separator or Carpco Roll Magnetic Separator.

6. The concentrate is split and one half stored in the Museum.

7. Hand specimens for future "total rock" determination are stored in the Museum.

FUTURE PROGRAMME

The general sampling programme will be continued in 1960 in the Pilbara area, Western Australia.

INDEX OF AGE DETERMINATIONS

WESTERN AUSTRALIA

	LOCALITY	SAMPLE	METHOD	AGE (m.y)	REFERENCE
1.	Boya (near Perth	Biotite from granite	Sr/Rb	520	Jeffery (ANZAAS) 1959-unpubl.lect.
2.	"	K. feldspar from pegmatite	K/A	520	" "
3.	"	Granite	Total rock	2500	" "
4.	"(Mahogany Ck.near Boya)	Pegmatitic muscovite & potassium feldspar	?	2500	" and letter 11/8/59. File 226/1
5.	Bruce Rock	Granite	K/A	2800	Wilson (1957)
6.	Bullfinch	?	Pb/U	2300	Prider (1955)
7.	Corrigin	Granite	K/A	2800	Wilson (1957)
8.	Doubtful Island Bay	Allanite in pegmatite schlieren in charnockite	Pb/Th/U (Uncorrected for lead isotopes)	1390	Wilson (1957)
9.	Fraser Range	Allanite in pegmatite cutting charnockite	Pb/Th/U (Uncorrected for lead isotopes)	1210	Wilson (1957)
10.	Gascoyne	Granite	K/A	1300 appr.	Wilson (ANZAAS 1959-unpubl.lect.)
11.	Greenbushes	Granite	K/A	"	"
12.	Grosmont	Lithium pegmatite	Rb/Sr	2800	Wilson (1957)
13.	Hines Hill	Biotite in pegmatite	K/A	2480 (Washington 2520 (Perth)	Jeffery (letter 22/1/59, file 226/1)
14.	Kalgoorlie	"	Pb/Th/U	2300	Prider (1955)
15.	Londonderry	Lithium pegmatites	Rb/Sr	2800	Wilson (1957)
16.	Meckering	Granite	K/A	2800	Wilson (1957)
17.	Norseman	?	Pb/Th/U	2300	Prider (1955)
18.	Ravensthorpe	Lithium pegmatite	Rb/Sr	2800	Wilson (1957)
19.	Wodgina	Muscovite "	Rb/Sr K/A	2800 2100	Jeffery (1956)
20.	Woodstock	Tanteuxenite pegmatite including Warrawoona System	Pb/U 206/238 207/235 207/206 208/232	 1900±5 2360±10 2790±25 2590±25	Greenhalgh & Jeffery (1959)
21.	Yandanooka	Granite	?	1300 app.	Wilson (ANZAAS 1959 unpubl.lecture

INDEX OF AGE DETERMINATIONS

NORTHERN TERRITORY

	LOCALITY	SAMPLE	METHOD	AGE (m.y)	REFERENCE
1.	Adelaide River	Uranite	Pb/U 206/238 207/235 207/206	 1450±30 1110±75 470±250	Greenhalgh & Jeffery (1959)
2.	Allia Creek	Mica granite	K/A	1650 (biot.) 1640 (mus.)	Hurley et. al. (1960)
3.	Barrow Creek	Mica from granite	K/A	1460	Hurley et al. (1960)
4.	Brock's Creek	Uranite	Pb/U 206/238 207/235 206/207	 576±17 627±80 816±400	Greenhalgh & Jeffery (1959)
5.	Burnside Granite	Mica granite	K/A	1520	Hurley et al. (1960)
6.	Burton Creek	Mica granite	K/A	1630	" "
7.	Cullen Granite	Mica	K/A	1695	" "
8.	Devil's Marbles	Mica granite	K/A	1540	" "
9.	Edith River (Cullen gran.)	" "	K/A	1695	" "
10.	Elkedra Homestead	" "	K/A	1430	" "
11a.	El Sharana	Uraninite	Pb/U 206/238 207/235 207/206	 605±1 447±2 1196±18	Greenhalgh & Jeffery (1959)
11b.	El Sharana mine	"	Pb/U 206/238 207/235 207/206	 388±1 447±2 766±12	
12.	Fenton Granite	Mica granite	K/A	1720	Hurley et al. (1960)
13.	Hatches Creek	Mica granite	K/A	1480	Hurley et al. (1960)
14.	Hart's Range	Muscovite pegmatite intruding Arunta Complex.	K/A	< 600	Greenhalgh & Jeffery (1959)
15.	Hart's Range	Samarskite pegmatite intruding Arunta Complex	Pb/U 206/238 207/235 207/206 208/232	 683±30 692±120 729±600 139±100	"

INDEX OF AGE DETERMINATIONS

NORTHERN TERRITORY (CONTD.)

LOCALITY	SAMPLE	METHOD	AGE (m.y.)	REFERENCE
16. Hermit Hill	Mica granite	K/A	1560	Hurley et al. (1960)
17. Jervois Granite	Mica granite	K/A	1440	" "
18. Jinka Granite	Mica	K/A	1420	" "
19. Kelly Well	Mica granite	K/A	1510	" "
20. Mt. Bundey	Mica granite	K/A	1650	" "
21. Mt. Litchfield	Mica granite	K/A	1605 (Musc.) 1595 (biot)	" "
22. Murray Downs	" "	K/A	1320	" "
23. Mosquito Creek	" "	K/A	1400	" "
24a. Palette Mine	Uraninite dispersed in sandstone	Pb/U 206/238 207/235 207/206	 683 695 729±2	Greenhalgh & Jeffery (1959)
24b. Palette Mine	Uraninite dispersed in sandstone	Pb/U 206/238 207/235 207/206	 612±2 635±7 719±30	Greenhalgh & Jeffery (1959)
24c. Palette Mine	Uraninite dispersed in sandstone	Pb/U 206/238 207/235 207/206	 500±1 507±3 533±20	Greenhalgh & Jeffery (1959)
24d. Palette Mine	"	"	509±1 506±3 494±18	" "
24e. Palette Mine	"	"	476±1 542±4 830±20	" "
25. Price's Spring Granite.	Mica granite	K/A	1695	Hurley et al. (1960)
26. Sleisbeck Mine	Uraninite	Pb/U 206/238 207/235 207/206	 305±3 370±25 816±150	Greenhalgh & Jeffery (1959)

INDEX OF AGE DETERMINATIONS

NORTHERN TERRITORY (CONTD.)

	LOCALITY	SAMPLE	METHOD	AGE (m.y.)	REFERENCE
27.	?	Mica granite	K/A	1630	Hurley et al. (1960)

QUEENSLAND

1.	Mary Kathleen Mt. Isa	Pitchblende	Pb/U	1640	Wilson (quoted by F. Hughes on 22/7/59 on File 226/1).
2.	Mica Creek, Mt. Isa	Monazite Pegamatite	Pb/U 208/232	933±12	Nier, Thompson, & Murphey (1941)
3.	Mica Creek, Mt. Isa	Monazite Pegmatite	?	1060	Holmes & Smailes (1948)

NEW SOUTH WALES

1a.	Broken Hill	Galena	Pb/U	490±250	Wilson (1955)
1b.	" "	"	"	240±275	" "
1c.	" "	"	"	210±280	" "
2.	Broken Hill	Galena	Pb/U 207/206?	1680	Wilson (1951)
3.	Thackeringa	Galena	?Pb/U	1020±150	Russell, Farquhar & Howley (1957)
4.	Thackeringa	Galena	Pb/U 206/204 208/204	430±400 308±680	Greenhalgh & Jeffery (1959)

INDEX OF AGE DETERMINATIONS

SOUTH AUSTRALIA

	LOCALITY	SAMPLE	METHOD	AGE (m.y.)	REFERENCE
1.	Crocker's Well	Davidite (granitoid country rock)	Pb/U 206/238 207/235 207/206 208/232	 1628±10 1660±25 1702±60 1252±150	Greenhalgh & Jeffery (1959)
2.	Crocker's Well	Biotite	K/A	520	" "
3.	Crocker's Well	Absite (fracture-filling)	Pb/U 206/238 207/235 207/206 208/232	 610±1 674±3 895±15 675± 5	" "
4.	Crocker's Well	Absite	Pb/U 206/238 207/235 207/206 208/232	 520 600 915 585	Kulp, Bate and Broecker (1954)
5.	Myponga	Biotite (associated with Uraninite in gneiss)	K/A	650	Greenhalgh & Jeffery (1959)
6.	Myponga	Uraninite (lode in biotite gneiss)	Pb/U 206/238 207/235 207/206	 502± 1 521± 2 609±10	"
7.	Myponga	Biotite pegmatite (in Archaean gneiss).	K/A	390	"
8.	Radium Hill	Uranium mineral	Pb/U 207/206	1730	Wilson (1951)

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AUSTRALIA
GRANITE AREAS
AND
LOCALITY OF SAMPLES
FOR AGE DETERMINATION
SCALE
MILES 100 50 0 100 200 MILES
KILOMETRES 100 50 0 100 200 KILOMETRES
REFERENCE
Granite area
•H55/4/1 Sample number - based on Australian grid (H55) 4 mile series (/4/) and order of sampling (1)
Mica concentrate made
Mica concentrate unsatisfactory for K/A. Sample retained for Total Rock
Mica concentrate sent for K/A age determination
1680 Age in million years
Pb/u Uranium-lead on pitchblende
Pb/u-Th Uranium-lead on monazite
Pb/u-Z Uranium-lead on zircon
K/A Potassium/argon
Rb/Sr Rubidium/strontium on mica
Rb/Sr-TR Rubidium/strontium on Total Rock
WESTERN AUSTRALIA
NORTHERN TERRITORY
SOUTH
BATHURST I.
MELVILLE I.
DARWIN
RUM JUNGLE(3) Pb/U-Z 1889 (GA24 A.N.U.)
MT. BUNDEY Pb/U-Z 1225 (GA15 A.N.U.)
ADELAIDE RIVER Pb/U 470-1450
EL SHARANA Pb/U 388-1196
PALETTE Pb/U 476-830
SLEISBECK Pb/U 305-816
HERMIT HILL Pb/U-Z 1991 (GA10 A.N.U.)
JOSEPH BONAPARTE GULF
Katherine
Wyndham
Victoria
Drysdale
Durack
KING SOUND
Derby
Broome
Fitzroy Crossing
Halls Creek
Tanami
The Granites
Port Hedland
Roebourne
Marble Bar
Woodstock
Nullagine
WODGINA K/A 2100 Pb/Sr 2800
WOODSTOCK Pb/U 1900-2790
Onslow
Fortescue
Ashburton
L. Disappointment
L. Mackay
L. Amadeus
Ayers Rock
Giles
Carnarvon
SHARK BAY
Gascoyne
Gladstone
Peak Hill
L. Carnegie
L. Wells
Meekatharra
Wiluna
Cue
Mt Magnet
Yalgoo
Laverton
Leonora
Mullewa
Geraldton
YANDANOOKA 1300 Mingenew
L. Barlee
Menzies
BULLFINCH GALENA 2300
GROSMONT K/A 2800
KALGOORLIE GALENA 2300
LONDONDERRY K/A 2800
HINES HILL K/A 2520(PERTH) 2480(WASHINGTON)
Southern Cross
Merredin
Coolgardie
Kalgoorlie
Widgiemooltha
FRASER RANGE 1210
NORSEMAN GALENA 2300
Norseman
Salmon Gums
Zanthus
Rawlinna
Forrest
Eucla
Eyre
Fowlers Bay
GREAT AUSTRALIAN BIGHT
BOYA BIOTITE IN GRANITE 500 (Sr/Rb) MUSCOVITE ETC IN PEGMATITE 2500 (K/A) GRANITE ("TOTAL ROCK") 2500 JEFFERY
PERTH
Northam
Beverley
Corrigin
Pinjarra
Narrogin
Wagin
Lake Grace
RAVENSTHORPE K/A Rb/Sr 2800
Bunbury
Collie
Katanning
Cape Naturaliste
Busselton
GREENBUSHES 1300
DOUBTFUL ISLAND BAY 1390
Esperance
Augusta
Pemberton
Denmark
Albany
BASS STRAIT
KING ISLAND
FLINDERS ISLAND
FURNEAUX GROUP
CAPE BARREN I.
Smithton
Burnie
Devonport
Deloraine
Launceston
St. Marys
Zeehan
Queenstown
TASMANIA
HOBART
Information brought forward to February 1960

133° 136° 139° 142° 145° 148° 151° 154° 157° 160°
11° 14° 17° 20° 23° 26° 29° 32° 35°
TORRES STRAIT
THERN
ITORY
QUEENSLAND
H AUSTRALIA
NEW SOUTH WALES
VICTORIA
BASS STRAIT
KANGAROO ISLAND
Jardine
Wenlock
Duifken Pt
Weipa
Archer R
Coen
Musgrave
Normanby
Laura
Cooktown
Mitchell
Palmer R
Mossman
Cairns
Chillagoe
Atherton
Mt. Garnet
Innisfail
Tully
Ingham
Townsville
Ayr
Bowen
Charters Towers
Burdekin
Pentland
Collinsville
Mackay
Hughenden
Julia Creek
Cloncurry
Dobbyn
Mt Isa
Selwyn
Dajarra
Urandangi
Georgina
Boulia
Winton
Longreach
Jericho
Clermont
Emerald
Springsure
Rockhampton
Mt Morgan
Gladstone
Monto
Bundaberg
Gayndah
Maryborough
Taroom
Injune
Wandoan
Mitchell
Roma
Miles
Kingaroy
Gympie
Nambour
Dalby
Glenmorgan
Toowoomba
Ipswich
BRISBANE
St George
Dirranbandi
Goondiwindi
Macintyre
Coolangatta
Stanthorpe
Lismore
Glen Innes
Inverell
Grafton
Narrabri
Gunnedah
Tamworth
Kempsey
Taree
Maitland
Newcastle
SYDNEY
Bathurst
Katoomba
Orange
Dubbo
Wellington
Condobolin
Cowra
Cootamundra
Goulburn
CANBERRA
Cooma
Moruya
Bega
Bombala
Orbost
Bairnsdale
Sale
Warragul
Wonthaggi
Wilson's Promontory
MELBOURNE
Geelong
Colac
Warrnambool
Portland
Hamilton
Ballarat
Ararat
Maryborough
Bendigo
Harcourt
Euroa
Mansfield
Benalla
Wangaratta
Beechworth
Albury
Shepparton
Echuca
Deniliquin
Swan Hill
Hay
Murrumbidgee
Balranald
Ouyen
Mildura
Wentworth
Renmark
Horsham
St. Arnaud
Nhill
Border Town
Naracoorte
Kingston
Mt Gambier
Harrow
Cobar
Bourke
Walgett
Wilcannia
Darling
Broken Hill
Milparinka
Tibooburra
Hungerford
Eulo
Quilpie
Cooper Ck
Normanton
Croydon
Georgetown
Einasleigh
Forsayth
Burketown
Nicholson
Leichardt
Gregory
Flinders
Gilbert
Norman
Roper R
Newcastle Waters
Tennant Creek
Hatches Creek
Barrow Creek
Alice Springs
Todd
Sandover
Marshall R
Hay R
Hale R
Finke
Oodnadatta
Algebuckina
Lake Eyre
Coober Pedy
Marree
L Gregory
L Blanche
L Callabonna
Lake Frome
Beltana
Woomera
Pimba
Lake Torrens
Tarcoola
L Harris
L Everard
Lake Gairdner
Quorn
Port Augusta
Whyalla
Port Pirie
Peterborough
Wallaroo
Gawler
ADELAIDE
Myponga
Victor Harbour
Olary
Crockers Well
MARY KATHLEEN 1640
KALKADOON GRANITE Pb/U ?1880 (A.N.U)
SYBELLA GRANITE MT.ISA Pb/U 933 1060
HARTS RANGE K/A <600 Pb/U 139-729
CROCKERS WELL ABSITE Pb/U 610-895 520-915 BIOTITE K/A 520 DAVIDITE Pb/U 1252-1702
RADIUM HILL DAVIDITE Pb/U 691-787 1510 URANIUM 1730
BROKEN HILL GALENA -1680 -210-490
THACKERINGA GALENA -308-430 <1020
MYPONGA BIOTITE PEGMATITE K/A 390 URANINITE Pb/U 502-609 BIOTITE K/A 650
WITHIN SHEET I55/16 ONLY FINAL FIGURE IN SAMPLE NUMBER IS SHOWN
1630 1400 1510 1540 1320 1480 1460 1430 1420 1440