REPORT 162

Catalogue of Isotopic Age Determinations on Australian Rocks, 1966-70

Compiled by

ROSALIND BENNETT, R. W. PAGE, and G. M. BLADON

DEPARTMENT OF MINERALS AND ENERGY
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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Summary

This Report is a catalogue of the age determinations carried out for almost 1000 rock samples from Australian territory and Papua New Guinea between January 1966 and December 1970. For each sample, the sample number, method of age determination, analytical data, and locality are listed; a brief evaluation of the age is included for some of the samples. Most of the determinations were made by staff of the Research School of Earth Sciences, Australian National University, and of the Bureau of Mineral Resources, in the laboratories at the University, but some of the results have been supplied by companies.

Introduction

Age determinations for Australian rocks were summarized to December 1965 by Coats (1961), White (1962), and Harding (1969). This publication is a supplement to these earlier reports: it includes some age determinations that were available before 1966 but inadvertently omitted by Harding (1969), and incorporates data that have been summarized in unpublished catalogues by Page (1968) and Bennett (1970).

Determinations made at the Australian National University (ANU) represent independent projects of the staff and students of the Research School of Earth Sciences (RSES), and of the staff of the Bureau of Mineral Resources (BMR).

The samples are listed under State and territory headings, and each source of age determinations has been assigned an abbreviated reference number, e.g. NSW 1, TAS 2; this refers the reader to the original accounts of the age-determination data, a list of which appears under the heading 'References'.

The K-Ar data for each sample are set out as follows:

Reference:	ROCK UNIT OR ROCK TYPE	
BMR No.	Type of sample analysed	Age
Sample No.	Analytical data	
	Rock type (if part of rock unit)	
	Locality	
	Latitude and longitude or grid reference	1:250 000 Sheet area
	Evaluation of age (where given)	

Where more than one value is quoted for the percentage of potassium, the final figure (in parenthesis) is the mean of the preceding values and is the one used in the age-determination calculations.

The few U-Pb-Th analyses that are catalogued are presented in a similar form to the K-Ar data; so too are the data for samples that fit Rb-Sr isochrons. The method of strontium determination, either by isotope dilution or by X-ray fluorescence, has not been recorded in this Catalogue, but where the present-day Sr^{87}/Sr^{86} was determined on an unspiked sample, the Sr^{87}/Sr^{86} value quoted in the text is followed by '(meas.)'. The initial Sr^{87}/Sr^{86} value of the sample, which is quoted after the age of the sample, may have been assumed, or deduced from an isochron; this is indicated by (A) or (I) respectively.

The aim is to present enough analytical data for the reader to evaluate the age quoted for a sample; however, no attempt has been made to report the constants used for determining the ages, for in several of the original sources they are not quoted. It must be emphasized, however, that for discussion of the limitations and for proper assessment of the results, the original report or the analyst should be consulted.

Results of C^{14} age determinations carried out on Australian samples of archaeological or geological interest are not included, but appear in *Radiocarbon,* an annual publication of the *American Journal of Science,* and in the *Australian Journal of Science,* in which Dury (1964, 1966) and Dury & Langford-Smith (1968) have compiled a series of 'checklists' of C^{14} dates determined for Australian samples.

The samples are indexed according to 1:250 000 Sheet number (Index I), and in numerical and alphabetical order of sample number (Index II). Figures 1, 2, and 3 show the locations of Sheet areas in Antarctica, Australia, and Papua New Guinea; those areas for which samples have been dated are shaded. If, for example, the reader wishes to ascertain which rocks have been analysed isotopically from north Queensland, he should consult Figure 2 and note the appropriate 1:250 000 Sheet numbers, consult the Queensland part of Index I for these numbers, and note the page reference indicated.

ACKNOWLEDGMENTS

The authors are indebted to members of RSES, and to Dr R. R. Harding, Mr E. W. Parkinson, and Mr P. R. Dunn for their assistance and advice in the collection and presentation of the age-determination results.

The Hunt Oil Company permitted the inclusion of confidential information from Lennis No. 1 well. Previously unpublished results from the ANU Ph.D. Theses of Drs V. M. Bofinger and C. Brooks are also included.

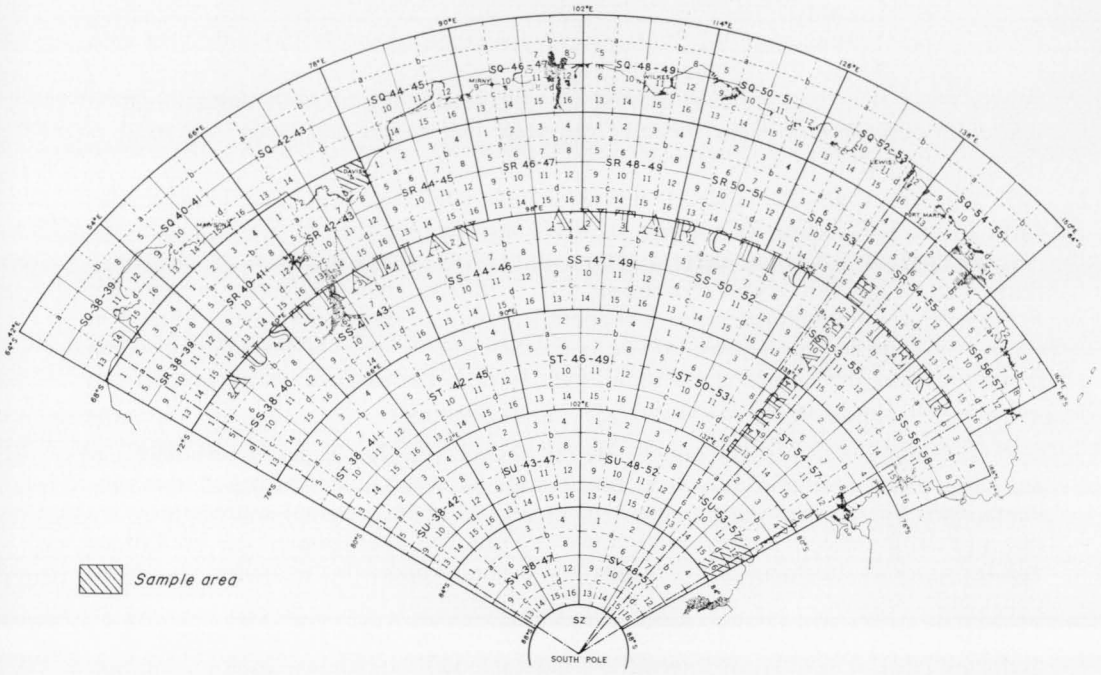

Fig. 1. 1:250 000 Sheet index of Australian Antarctica showing areas from which samples have been dated.

Antarctica

Ref: ANT 1 DOLERITE DYKES

Whole rock Rb-Sr age 1030 ± 220 m.y. Initial Sr^{87}/Sr^{86} 0.7052 ± 0.001(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5429	29.3	163.8	0.5163	0.7131
GA5430	18.9	153.0	0.3567	0.7100
GA5431	14.4	269.9	0.1540	0.7073
GA5432	26.5	153.3	0.4997	0.7121
GA5433	14.2	274.3	0.1492	0.7072
GA5434	14.3	273.9	0.1504	0.7077

GA5429, 370 m north of hydrogen shed, Davis;
lat. 68°34′30″S, long. 77°58′E R42-43/4
GA5430, GA5431, south side of Heidemann Bay, Vestfold Hills;
lat. 68°35′30″S, long. 77°57′E R42-43/4
GA5432, south side of Heidemann Bay, Vestfold Hills;
lat. 68°35′30″S, long. 77°57′30″E R42-43/4
GA5433, GA5434, south side of Heidemann Bay, Vestfold Hills;
lat. 68°35′30″S, long. 77°58′E R42-43/4
Indicated age is probably that of intrusion, but it may represent a metamorphic date.

Ref: ANT 2 MILLER FORMATION, NIMROD GROUP

Hornblende K-Ar age 618 ± 6 m.y.

GA1951 %K 0.430 $*Ar^{40}/K^{40}$ 0.0458 % atm. Ar^{40} 8.3

Quartz-epidote-hornblende schist
1 km north of Mount Ronca, Quest Cliffs, Geologists Range
Lat. 82°38′S, long. 155°15′E U 53-57/12
Metamorphic age (early Palaeozoic?)—see GA1953 (biotite) and GA1955

Ref: ANT 2 ARGOSY FORMATION, NIMROD GROUP

Hornblende K-Ar age 1043 ± 16 m.y.

GA1952 %K 0.297 $*Ar^{40}/K^{40}$ 0.0813 % atm. Ar^{40} 7.5

Quartz-biotite-hornblende amphibolite
1-m band in Nimrod Group at western end of Aurora Heights, Argosy Glacier, Miller Range
Lat. 83°08′S, long. 156° 53′E U 53-57/16
Metamorphic age of earliest-known orogeny, Nimrod Orogeny

Ref: ANT 2 ARGOSY FORMATION, NIMROD GROUP

Hornblende K-Ar age 1011 ± 9 m.y.

GA1953 %K 0.121 $*Ar^{40}/K^{40}$ 0.0782 % atm. Ar^{40} 11.6

Biotite K-Ar age 528 ± 5 m.y.

%K 6.84 $*Ar^{40}/K^{40}$ 0.0356 % atm. Ar^{40} 2.4

Same rock type and horizon as GA1952; toe of spur on north side of Argosy Glacier, Miller Range
Lat. 83°08′S, long. 156°19′E U 53-57/16
Metamorphic age of Nimrod Orogeny (1011 ± 9 m.y.); age of early Palaeozoic metamorphism (528 ± 5 m.y.)

Ref: ANT 2 MILLER FORMATION, NIMROD GROUP

Hornblende K-Ar age 1006 ± 9 m.y.

GA1954 %K 0.209 $*Ar^{40}/K^{40}$ 0.0777 % atm. Ar^{40} 7.0

Quartz-calcite-phlogopite-hornblende-diopside-skarn-pegmatite
0.8 km north of survey station G, Gerard Bluffs
Lat. 83°38′S, long. 156°17′E U 53-57/16
Metamorphic age of Nimrod Orogeny

Ref: ANT 2 MILLER FORMATION, NIMROD GROUP
Hornblende K-Ar age 504 ± 5 m.y.
GA1955 %K 0.762 *Ar^{40}/K^{40} 0.0338 % atm. Ar^{40} 10.7
Calcite-phlogopite-hornblende-diopside schist
8 km north of survey station G, Gerard Bluffs
Lat. 83°34′S, long. 157°13′E U 53-57/16
Age of early Palaeozoic metamorphism

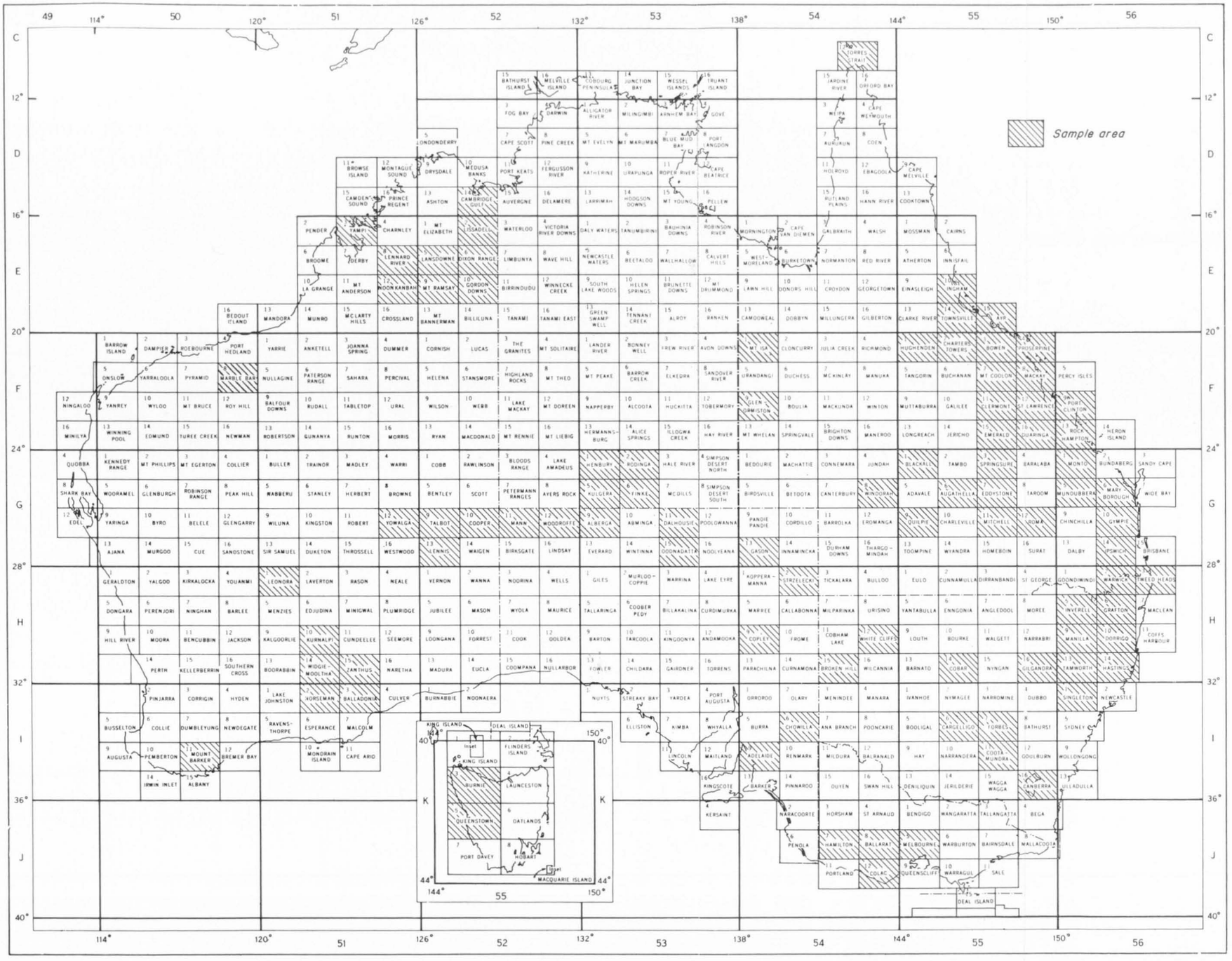

Fig. 2. 1:250 000 Sheet index of Australia showing areas from which samples have been dated.

Australian Capital Territory

Ref: ACT 1 MOUNT PAINTER PORPHYRY

Rb-Sr age 438 ± 4 m.y. Initial Sr^{87}/Sr^{86} 0.709(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA2805C	Whole rock	126.5	202.0	1.806	0.7208
	Biotite	449.8	32.8	40.48	0.9569
	Plagioclase	42.4	287.3	0.426	0.7123
GA2812	Whole rock	137.3	197.8	2.008	0.7219
	K-feldspar	301.2	279.5	3.118	0.7280
	Plagioclase A	47.9	415.8	0.333	0.7108
	Plagioclase B	50.0	412.0	0.351	0.7107
GA2811	Whole rock	143.9	194.7	2.137	0.7221
	Biotite	423.3	22.6	55.80	1.0491
GA2815	Whole rock	150.0	187.3	2.318	0.7244
GA2816	Whole rock	146.0	157.5	2.680	0.7233
	Plagioclase	52.0	369.0	0.405	0.7114
GA2805B	Whole rock	175.0	176.3	2.871	0.7262
GA2814	Vein	55.3	486.0	0.329	0.7138

Co-ordinates and precise localities not given
Age of emplacement
Canberra

Ref: ACT 1 MUGGA PORPHYRY

Rb-Sr age 423 ± 9 m.y. Initial Sr^{87}/Sr^{86} 0.709(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA2198	Whole rock	199.4	128.5	4.496	0.7377
GA2801	Vein	192.9	9.939	57.94	1.0562
GA2808A	Red vein	71.9	9.435	22.28	0.8392
GA2808C	Calcite	0.25	190.5	0.0035	0.7112
GA2808F	Whole rock	261.0	86.84	8.725	0.7618
GA2808G	Whole rock	208.1	97.33	6.199	0.7482
GA2808B	Whole rock	260.5	18.81	40.93	0.9484

Co-ordinates and precise localities not given
Age of emplacement
Canberra

Ref: ACT 1 STATE CIRCLE SHALE

Whole rock Rb-Sr age 455 ± 15 m.y. Initial Sr^{87}/Sr^{86} 0.723 ± 0.006(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86} Present	Sr^{87}/Sr^{86} Depositional
10	193.7	19.1	29.86	0.9041	0.7194
18	194.0	12.4	46.60	1.0162	0.7280
23	173.4	14.1	36.36	0.9544	0.7295
30	185.6	17.2	31.85	0.9253	0.7283
33	197.5	14.5	40.24	0.9759	0.7270
44	181.4	18.9	28.28	0.9052	0.7303
50	192.8	21.0	27.02	0.8943	0.7272
58	163.4	39.1	12.20	0.8049	0.7294
65	196.0	24.8	23.17	0.8745	0.7312
78	158.5	25.1	18.45	0.8416	0.7275
103	201.1	21.1	27.99	0.8990	0.7259
120	179.0	18.9	27.88	0.9027	0.7303
128	76.8	27.8	8.01	0.7702	0.7207
144	56.4	29.5	5.55	0.7563	0.7220

151	146.2	21.7	19.72	0.8570	0.7350
160	162.9	26.6	17.93	0.8438	0.7329
166	158.6	29.2	15.84	0.8230	0.7250
174	148.6	31.5	13.74	0.8106	0.7256
203	187.1	25.1	21.90	0.8690	0.7336
12C&P	192	43	11.42	0.7877	0.7171
13C&P	164	23	20.72	0.8472	0.7190
17C&P	178	32	15.87	0.8185	0.7203

12C&P, 13C&P, 17C&P, Etheridge Creek, eastern slopes of Black Mountain; lat. 35°15′40″S, long. 149°06′30″E Canberra

Other samples are from a borehole on Camp Hill near the type locality (numbers correspond to depth in feet in the borehole); lat. 35°18′25″S, long. 149°07′30″E Canberra

455 ± 15 m.y. is the age derived from a single regression through all the data points; it is close to the previously estimated age of deposition, 445 ± 7 m.y. Samples of the shale have significant differences in initial Sr^{87}/Sr^{86}, and two groups are recognized: one has a uniform Sr^{87}/Sr^{86} of about 0.720, the other has a Sr^{87}/Sr^{86} of 0.73 with some scatter. Regression-lines through each group have indistinguishable slopes on the isochron-diagram, and the pooled value gives an age of 440 ± 9 m.y., which might represent a time in the Ludlovian when the Silurian sequence was subjected to earth movements

New South Wales

Ref: NSW 1,5 SILLIMANITE AND GARNET SCHISTS AND GNEISSES, WILLYAMA COMPLEX

Rb-Sr age 1605 ± 35 m.y. Initial Sr^{87}/Sr^{86} 0.759 ± 0.013 (I)

		Rb (ppm)	Common Sr (ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH5	Whole rock	462.6	27.31	48.82	1.878
		452.1	26.60	48.97	1.836
	Orthoclase	775.5	60.21	37.09	1.885
		773.4	59.67	37.29	1.905
	Biotite	1208	2.767	1259.3	10.62
		1221	2.873	1224.7	10.18
BH21	Whole rock	344.3	26.33	37.97	1.636
		352.0	25.98	38.96	1.632
	Orthoclase	537.5	79.27	19.52	1.532
		540.2	82.11	18.95	1.496
BH25	Whole rock	158.6	90.53	5.044	0.8711
					0.8726 (meas.)
		157.2	94.79	4.776	0.8717
	Sericite	185.5	187.4		0.8668
		238.4	185.5	3.700	0.8686
		241.8			
BH23	Whole rock	337.6	64.90	14.98	1.100
	Sericite	475.6	127.9	10.71	1.078
		517.3	125.0	10.74	1.080
		466.3			
BH135	Whole rock	280.5	55.77	14.46	0.9506
	Sericite	297.2	65.08	13.15	0.9527
		301.6	64.82	13.39	0.9480
BH137	Whole rock	262.6	80.16	9.435	0.9615
	Sericite	231.7	90.27	7.390	0.9633
		227.3	100.91	6.485	0.9520
BH134	Whole rock	236.8	72.44	9.411	0.8978
					0.8958 (meas.)
	Sericite	322.3	101.0	9.188	0.8953
		531.1	101.9	9.002	0.8933
		318.6			
BH2	Whole rock	222.4	103.4	6.191	0.9007
					0.8990 (meas.)
	Sericite	315.0	132.1	6.863	0.9590

All samples were collected underground near Broken Hill:

BH5, orthoclase-sillimanite-garnet-biotite gneiss from No. 2 and No. 3 ore lenses, No. 17 level Zinc Corporation Ltd (ZC) Broken Hill

BH21, orthoclase-garnet-sillimanite-biotite gneiss from No. 6 level ZC Broken Hill

BH25, sericite-garnet-biotite-feldspar gneiss from No. 12 level ZC Broken Hill

BH23, muscovite-garnet schist from No. 6 level ZC Broken Hill

BH135, sericite-garnet-feldspar schist from Lord's Hill Fault zone, No. 23 level North Broken Hill Ltd (NBH) Broken Hill

BH137, sericite-sillimanite-garnet-biotite schist from No. 23 level NBH Broken Hill

BH134, sericite-garnet schist from 'Main Lode Shear', No. 23 level NBH Broken Hill

BH2, muscovite-feldspar-biotite-garnet gneiss from No. 17 level ZC Broken Hill

The age quoted is that derived from the whole-rock samples; it is the date of regional high-grade metamorphism. Lines joining orthoclase and whole-rock data-points have different slopes and cannot be interpreted as isochrons. Lines joining sericite and whole-rock data-points may be isochrons that reflect a young retrogressive event. Samples BH134 and BH135 were taken from east-west shear zones; they probably became open systems to rubidium and strontium isotopes at a later time than 1605 m.y., for their whole-rock data-points lie below the isochron

Ref: NSW 1,5 POTOSI GNEISS, WILLYAMA COMPLEX

Rb-Sr age 1690 ± 170 m.y. Initial Sr^{87}/Sr^{86} 0.710 ± 0.009(I)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH43A	Whole rock	112.1	279.8	1.153	0.7366
					0.7374 (meas.)
	Orthoclase	337.8	656.2	1.482	0.7534
		336.2	663.0	1.460	0.7524
BH43B	Whole rock	147.7	317.7	1.337	0.7417
					0.7393 (meas.)
	Orthoclase	319.3	759.5	1.210	0.7662
BH44	Orthoclase	325.1	355.0	2.637	0.7864
		324.4	359.1	2.600	0.7847
BH17	Whole rock	140.1	125.2	3.222	0.7881
					0.7872 (meas.)
		177.5	129.0	3.962	0.7860
		136.7	126.8	3.104	0.7873
	Orthoclase	405.1	206.7	5.643	0.8403
		399.4	204.3	5.628	0.8402
BH45	Whole rock	183.4	183.7	2.873	0.7779
		144.7	189.5	2.199	0.7756
		181.5	188.6	2.770	0.7776
					0.7768
GA312	Whole rock	199.2	78.92	7.267	0.8824 (meas.)
		201.0	80.25	7.210	0.8814 (meas.)
	Orthoclase	460.9	170.9	7.765	0.9365 (meas.)
		470.5	184.0	7.361	0.9360 (meas.)
	Biotite	1073	3.25	949.4	7.184

BH43, feldspar-biotite-garnet gneiss (A is medium-grained, granoblastic; B is from a leucocratic band) from the Potosi Gneiss quarry, Broken Hill Broken Hill

BH44, acid ptygmatic vein from the Potosi Gneiss quarry; lat. 31°57′50″S, long. 141°28′10″E Broken Hill

BH17, garnet-feldspar gneiss from No. 6 level Zinc Corporation Ltd, Broken Hill Broken Hill

BH45, sheared quartz-biotite-garnet schist from the Potosi Gneiss quarry Broken Hill

GA312, garnet-feldspar gneiss from the Potosi Gneiss quarry Broken Hill

The isochron is determined from the whole-rock data-points; the age is of regional high-grade metamorphism. Lines joining orthoclase and whole-rock data-points are not parallel and cannot be interpreted as isochrons

Ref: NSW 1,5 HANGING WALL BASIN (GRANITIC) GNEISS, WILLYAMA COMPLEX

Rb-Sr age 1750 m.y. (least-squares confidence interval not reported)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH11	Whole rock	298.7	52.94	16.25	1.130
		298.9	54.09	15.89	1.129
	Biotite	1328	2.837	1354	9.936
	K-feldspar	467.7	54.35	24.77	1.154 (meas.)

BH14	Whole rock	286.0	81.84		0.9200 (meas.)
		283.9	89.20	9.159	0.9208
	K-feldspar	387.5	160.7	6.94	0.9337
	Biotite	1135	4.52	729.7	5.621
BH9	Whole rock	280.3	73.15	11.03	0.9853
					0.9793 (meas.)
		298.0	70.67	12.13	1.0046
		276.3	73.06	10.88	0.9814
	K-feldspar	380.8	150.5	7.288	0.9616
		383.6	150.4	7.345	0.9592
	Biotite	1145	3.64	915.0	6.900
BH10	K-feldspar	277.0	182.0	4.382	0.8413
		275.0	185.3	4.271	0.8400
RB465	Whole rock	122.3	278.5	1.264	0.7409
GA314	Whole rock	391.3	66.68	16.88	1.127
		400.2	69.43	16.60	1.124
	Biotite	2034	3.006	1948	15.18

BH11, BH14, BH9, granitic gneiss from Block 10 Hill, Broken Hill Broken Hill

BH10, pegmatitic vein in granitic gneiss from Block 10 Hill Broken Hill

RB465, plagioclase-biotite-garnet gneiss from the 'Hanging Wall Basin', Billy-goat Hill, Broken Hill Broken Hill

GA314, granitic gneiss from just east of the De Bavay Fault; lat. 31°57′10″S, long. 141°29′40″E Broken Hill

The isochron was determined from only four whole-rock data-points; two of the K-feldspar and total-rock tie-lines may be dubiously interpreted as isochrons indicating a 'young' isotopic event. The age for this gneiss may or may not be significantly different from other gneisses in the Willyama Complex.

Ref: NSW 1,5 ALMA GNEISS, WILLYAMA COMPLEX

Rb-Sr age 1670 ± 100 m.y. Initial Sr^{87}/Sr^{86} 0.732 ± 0.036(I)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH37	Whole rock	265.3	32.72	23.33	1.308
		264.3	30.59	24.87	1.327
	K-feldspar	482.2	48.59	28.55	1.400
		472.5	47.44	28.66	1.415
BH39	Whole rock	333.9	34.32	28.04	1.389
		329.3	28.29	33.50	1.505
	K-feldspar	571.0	44.96	36.58	1.589
		572.6	44.69	36.91	1.605
BH35	Whole rock	170.0	62.60	7.814	0.9014
		171.6	61.98	7.962	0.9062
	K-feldspar	452.8	129.5	10.07	0.9798
		443.5	131.8	9.72	0.9782
GA439	Whole rock	281.8	36.89	21.99	1.234 (meas.)
		285.6	37.86	21.70	1.228 (meas.)
	K-feldspar	379.5	63.40	17.23	1.231 (meas.)
		359.7	62.96	16.44	1.231 (meas.)
	Biotite	1157			
		1182	3.813	892.8	6.979
		1081	3.192	975.5	8.093

BH37, granitic gneiss from about 4000′S, 13 000′E, ZC map (King & Thomson, 1953*), Broken Hill; lat. 31°59′S, long. 141°29′30″E Broken Hill

BH39, granitic gneiss from about 4300′S, 10 000′E, ZC map; lat. 31°59′30″S, long. 141°29′E Broken Hill

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* KING, H. F., & THOMSON, B. P., 1953—The geology of the Broken Hill district. *In* GEOLOGY OF AUSTRALIAN ORE DEPOSITS. *5th Emp. Min. Metall. Congr.* 1, 533-77.

BH35, quartz-plagioclase-garnet-cordierite granulite from about 4000′S, 13 000′E, ZC map; lat. 31°59′S, long. 141°29′30″E Broken Hill

GA439, granitic augen gneiss from about 4300′S, 6000′E, ZC map; lat. 31°59′30″S, long. 141°28′E

Both whole-rock and feldspar data-points define the isochron; thus the whole rocks and feldspars have remained closed to rubidium and strontium for the same length of time. The exception is GA439 feldspar, which lies above the isochron and may have undergone addition of radiogenic strontium or removal of rubidium

Ref: NSW 1,5 LODE PEGMATITES, WILLYAMA COMPLEX

Rb-Sr age 1650 m.y.

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}	
BH56	K-feldspar	465.4	77.50	17.29	1.162	
		456.8	75.19	17.49	1.164	
BH27	K-feldspar	600.2	186.0	9.287	0.9792	
		590.7	187.7	9.060	0.9786	
BH90	Whole rock	221.1	22.34	28.44	1.190	
					1.197	(meas.)
	K-feldspar	475.6	27.22	50.31	1.335	
		477.7	26.96	51.01	1.340	

BH56, green-feldspar pegmatite from Bendigo Rockwell Mine, Little Broken Hill Broken Hill

BH27, 'concordant' green-feldspar pegmatite from No. 12 level, Zinc Corporation Ltd, Broken Hill Broken Hill

BH90, green-feldspar pegmatite from between A and B zinc lodes, No. 14 level, New Broken Hill Consolidated Ltd, Broken Hill Broken Hill

The age, which is derived from the BH56 and BH27 feldspar data-points (the BH90 feldspar and whole-rock tie-line indicates a much younger age), may indicate an age relationship between the K-feldspar and the high-grade metamorphism

Ref: NSW 1,5 MUSCOVITE PEGMATITES, WILLYAMA COMPLEX

Rb-Sr age 1565 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.74 ± 0.14(I)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}	
BH81	Muscovite	649.0	13.12	142.8	3.892	
		640.6	14.90	123.6	3.482	
	Biotite	863.3	10.46	237.2	2.323	
		846.4	10.73	226.3	2.263	
	Sericite	608.0	13.21	132.2	3.475	
BH31	Muscovite	750.6	9.222	235.5	5.960	
		732.7	9.399	224.2	5.880	
	Microcline	270.2	45.58	17.06	1.102	(meas.)
BH85	Muscovite	578.1	9.044	184.6	4.688	
		582.4	8.867	188.4	4.748	
	Microcline	455.2	93.55	14.01	0.930	
		455.2	93.81	14.00		
	Plagioclase	42.38	97.71	1.249	0.7758	(meas.)
		42.57	97.71	1.254	0.7742	(meas.)
	Sericite	396.1	16.67	68.28	1.864	
		404.1	17.02	68.21	1.823	
BH94	Muscovite	724.4	6.97	299.0	7.248	
BH91	Muscovite	752.4	22.08	98.24	2.964	
		747.2	21.55	99.97	2.993	
BH79	Muscovite	800.8	6.402	359.9	8.698	

BH81, pegmatite from dyke 1.6 km east of Allandale Mine, Broken Hill Broken Hill

BH31, feldspar-muscovite pegmatite from dyke transgressing the Alma Gneiss Broken Hill

BH85, muscovite-quartz-feldspar pegmatite cropping out 1.6 km west of Broken Hill Broken Hill

BH94, quartz-muscovite pegmatite from No. 14 level New Broken Hill Consolidated Ltd (NBHC) Broken Hill

BH91, discordant quartz-muscovite pegmatite from near the haulage shaft, No. 16 level NBHC Broken Hill

BH79, muscovite-feldspar pegmatite from the shear zone, Allandale Mine area Broken Hill

Age of emplacement. The isochron is defined by the muscovites and BH85 plagioclase and BH31 microcline; biotite and sericite data-points do not fall on the isochron

Ref: NSW 1,5 (THACKARINGA) MUSCOVITE PEGMATITES, WILLYAMA COMPLEX

Rb-Sr age 495 m.y.

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH47	Muscovite	458.0	8.663	152.2	1.829
		455.8	8.264	158.7	1.866
	Albite				0.7927 (meas.)
BH49	Muscovite	494.6	5.684	250.4	2.518
	Albite				0.7689 (meas.)

Muscovite-albite pegmatites from shear zone at Thackaringa Broken Hill

Age of emplacement

Ref: NSW 1,5 MUNDI MUNDI GRANITE

Rb-Sr age 1520 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.81 ± 0.25 (I)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
BH70	Whole rock	370.5	14.90	71.71	2.297
					2.318 (meas.)
		371.8			
		367.4	14.81	71.39	2.325
	Microcline	851.0	37.95	64.59	2.324
			38.04		
		859.0	38.39	64.47	2.310
	Muscovite	1061	4.318	707.4	15.60
		1036	4.425	674.3	15.27
BH82	Whole rock	315.4	39.55	22.96	1.308
					1.272 (meas.)
		314.2	40.43	22.36	1.271
	Microcline	477.4	96.30	14.27	1.125
		484.2	115.00	12.12	1.127
	Muscovite	984.7	4.14	685.1	15.62
BH68	Whole rock	355.7	19.15	53.35	1.982
					1.983

BH70, muscovite-albite granite from the Brewery Well pluton, Brewery Well Broken Hill

BH82, muscovite granite from dyke (20 m wide) transgressing metasediments 2.4 km east of Allandale Mine Broken Hill

BH68, muscovite-albite granite from dyke near Brewery Well stockyards and windmill Broken Hill

Age of emplacement

Ref: NSW 1,5 BIOTITE SAMPLES, WILLYAMA COMPLEX

A Rb-Sr isochron plot of the combined biotite samples from this reference—BH5, GA312, BH11, BH14, BH9, GA314, GA439, and BH81—and from Richards & Pidgeon (1963; catalogued in Harding, 1969)—GA106, GA107, GA108, GA109, and GA111—gives an age of 530 ± 70 m.y. This is interpreted as a date of low-grade regional metamorphism controlling the biotite ages and accompanying the emplacement of pegmatite at Thackaringa

Ref: NSW 1,5 PRIMARY MUSCOVITE SAMPLES, WILLYAMA COMPLEX
A Rb-Sr isochron plot of the primary muscovites from the muscovite pegmatites—BH81, BH31, BH85, BH94, BH91, and BH79—and the Mundi Mundi Granite—BH70 and BH82—gives an age of 1520 ± 40 m.y. and initial Sr^{87}/Sr^{86} of 0.88 ± 0.21

Ref: NSW 2 GARRAWILLA LAVAS
Plagioclase K-Ar age 181 ± 5 m.y.
GA1372 %K 0.558, 0.559 (0.558) $*Ar^{40}/K^{40}$ 0.01107 % atm. Ar^{40} 5.4
Olivine basalt
Borah Creek, 12 km north of Rocky Glen, Coonabarabran-Gunnedah district
Lat. 31°02′S, long. 149°32′30″E Gilgandra
Minimum age

Ref: NSW 2 GARRAWILLA LAVAS
Whole rock K-Ar age 193 ± 10 m.y.
GA1373 %K 1.205, 1.206 (1.205) $*Ar^{40}/K^{40}$ 0.01187 % atm. Ar^{40} 2.3
Olivine basalt
16 km west-southwest of Mullally (shown as Tertiary basalt on New South Wales Department of Mines Geological Map), Coonabarabran-Gunnedah district
Lat. 31°02′S, long. 149°44′E Gilgandra
Reliable age

Ref: NSW 2 OLIVINE BASALT (WARRUMBUNGLE LAVA FLOWS)
Whole rock K-Ar age 13.8 ± 0.3 m.y.
GA1374 %K 1.083, 1.090 (1.086) $*Ar^{40}/K^{40}$ 0.000807 % atm. Ar^{40} 47.4
Oxley Highway, Coonabarabran-Gunnedah district
Lat. 31°27′30″S, long. 149°00′30″E Gilgandra
Reliable age

Ref: NSW 2 OLIVINE BASALT (WARRUMBUNGLE LAVA FLOWS)
Whole rock K-Ar age 13.5 ± 0.4 m.y.
GA1375 %K 1.23, 1.25 (1.24) $*Ar^{40}/K^{40}$ 0.000789 % atm. Ar^{40} 39.1
Oxley Highway, Coonabarabran-Gunnedah district
Lat. 31°23′S, long. 149°15′30″E Gilgandra
Reliable age

Ref: NSW 3 GABBRO
Biotite K-Ar age 23.1 m.y., 22.4 m.y.
GA1408 %K 6.933, 6.932 (6.93) $*Ar^{40}/K^{40}$ 0.001362 % atm. Ar^{40} 21.7
0.001315 23.0
Mount Warning
468 773 Tweed Heads
Probably reliable age of intrusion

Ref: NSW (Unpubl.) DOLERITE
Pyroxene K-Ar age 458 ± 25%
GA5389 %K 0.020, 0.027 (0.024) $*Ar^{40}/K^{40}$ 0.030255 % atm. Ar^{40} 78.9
Kayrunnera
Lat. 30°40′S, long. 142°33′E White Cliffs
Unreliable; the spread in the potassium determination accounts for the large uncertainty in the age

Ref: NSW 4 OLIVINE THOLEIITE
Whole rock K-Ar age 20.9 ± 2.0 m.y.
GA1958 %K 0.401, 0.401 (0.401) $*Ar^{40}/K^{40}$ 0.001299 % atm. Ar^{40} 84.4
Inverell-Copeton road
404 304 Inverell

Ref: NSW 4 NEPHELINE BASANITE
Whole rock K-Ar age 18.5 ± 1.0 m.y.
GA1959 %K 0.841, 0.842 (0.841) *Ar^{40}/K^{40} 0.001084 % atm. Ar^{40} 29.5
11 km west of Inverell
393 308 Inverell
Alteration of glass in groundmass may have been accompanied by loss of argon; thus, indicated age may have been lowered

Ref: NSW 4 ANALCITE BASANITE
Whole rock K-Ar age 20.7 ± 1.0 m.y.
GA2167 %K 2.02, 2.02 (2.02) *Ar^{40}/K^{40} 0.001239 % atm. Ar^{40} 16.3
Near Bald Knob, 6.5 km south of Armidale
471 215 Dorrigo

Ref: NSW 4 ALKALI OLIVINE BASALT
Whole rock K-Ar age 33.4 ± 1.5 m.y.
GA2168 %K 1.30, 1.30 (1.30) *Ar^{40}/K^{40} 0.001967 % atm. Ar^{40} 4.0
New England Highway, 16 km south of Glen Innes
478 299 Grafton
Indistinguishable from ages of extrusion for analcite basalt, Spring Mount (see Harding, 1969, p. 8, GA479)

Ref: NSW 4 ANALCITE-OLIVINE THERALITE
Whole rock K-Ar age 58.6 ± 2.0 m.y.
GA1966 %K 1.41, 1.43 (1.42) *Ar^{40}/K^{40} 0.003476 % atm. Ar^{40} 8.0
Lower level of Square Top intrusion, west of Nundle
410 108 Tamworth
Reliable minimum age of intrusion

Ref: NSW 4,9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)
Whole rock K-Ar age 48.7 ± 2.0 m.y.
GA1961 %K 0.863, 0.867 (0.865) *Ar^{40}/K^{40} 0.002883 % atm. Ar^{40} 35.9
Barrington Tops
446 058 Tamworth
See GA1962

Ref: NSW 4 ALKALI DOLERITE
Plagioclase K-Ar age 54.6 ± 2.0 m.y.
GA1962 %K 0.265, 0.268 (0.266) *Ar^{40}/K^{40} 0.003238 % atm. Ar^{40} 48.4
Barrington Tops
446 058 Tamworth
Alkali dolerite appears to be younger than alkali olivine basalt (GA1961), which it intrudes; therefore, the age is anomalous. Either the basalt has lost some radiogenic argon or the plagioclase of the alkali dolerite possesses some excess radiogenic argon

Ref: NSW 4 SODIC QUARTZ TRACHYTE
Whole rock K-Ar age 15.5 ± 0.6 m.y.
GA1957 %K 3.87, 3.88 (3.87) *Ar^{40}/K^{40} 0.000909 % atm. Ar^{40} 4.3
Warrumbungle Mountains
187 117 Gilgandra

Ref: NSW 4 SODA RHYOLITE (COMENDITE)
Whole rock K-Ar age 15.7 ± 0.7 m.y.
GA1956 %K 3.47, 3.49 (3.48) *Ar^{40}/K^{40} 0.000919 % atm. Ar^{40} 21.8
Top of Mount Oliver, upper Lansdowne district
537 784 Hastings

Ref: NSW 4 POTASSIC THOLEIITIC ANDESITE

Plagioclase K-Ar age 18.7 ± 1.0 m.y.

GA1960 %K 0.314, 0.318 (0.316) *Ar^{40}/K^{40} 0.001096 % atm. Ar^{40} 75.4

Ebor district

546 240 Dorrigo

Ref: NSW 4 LAMINGTON VOLCANICS (LISMORE BASALT)

Whole rock K-Ar age 22.6 ± 1.0 m.y.

GA1963 %K 1.67, 1.69 (1.68) *Ar^{40}/K^{40} 0.001326 % atm. Ar^{40} 14.9

Potassic tholeiitic andesite

Fingal Point

762 002 Tweed Heads

Ref: NSW 4 LAMINGTON VOLCANICS?

Whole rock K-Ar age 23.6 ± 1.0 m.y.

GA1965 %K 0.607, 0.609 (0.608) *Ar^{40}/K^{40} 0.001368 % atm. Ar^{40} 30.5

Olivine tholeiite

Northwest of Tabulam

553 436 Warwick

Ref: NSW 6 ORE DEPOSIT, BROKEN HILL

Galena Age 1615 m.y. Apparent (c_o = 30.1) U^{238}/Pb^{204} 8.98, Th/U 3.86

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}	
1	16.116 (DS)	15.542 (DS)	36.068 (DS)	1, Main Lode, Broken Hill
30	16.122 (0.010)	15.543 (0.004)	36.102 (0.011)	30, Centennial Mine, Broken Hill
31	16.111 (0.028)	15.526 (0.025)	36.007 (0.041)	31, Pinnacles Mine, Broken Hill
34	16.109 (0.028)	15.538 (0.025)	36.018 (0.041)	34, Main Lode, Broken Hill
44	16.131 (0.010)	15.548 (0.004)	36.125 (0.011)	44, Little Broken Hill, Broken Hill
49	16.122 (0.020)	15.531 (0.034)	36.031 (0.044)	49, Globe Mine, Broken Hill

Age corresponds to the age derived for the regional metamorphism of the high-grade schists and gneisses of the Willyama Complex; see under reference NSW 1,5

Ref: NSW 6 ORE DEPOSIT, CAPTAINS FLAT

Galena Age 337 m.y. Apparent (c_o = 30.1) U^{238}/Pb^{204} 8.98, Th/U 3.93

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}	
136	18.166 (0.005)	15.765 (0.006)	38.573 (0.023)	136, 450 level, 2550S, Canberra
141	18.159 (0.005)	15.755 (0.006)	38.531 (0.023)	141, 1230 level, 650S, Canberra
147	18.187 (0.007)	15.772 (0.001)	38.568 (0.008)	147, 2030 level, 600S, Canberra
159	18.186 (0.007)	15.767 (0.001)	38.554 (0.008)	159, 910 level, 900S, Canberra
160	18.179 (DS)	15.764 (DS)	38.578 (DS)	160, 910 level, 1700S, Canberra
162	18.179 (0.000)	15.764 (0.003)	38.554 (0.030)	162, 910 level, 450S, Canberra
165	18.189 (0.000)	15.777 (0.003)	38.594 (0.030)	165, 1550 level, 650S, Canberra

Indicated age reflects the time of ore deposition

Ref: NSW 6 ORE DEPOSIT, COBAR

Galena Age 324 m.y. Apparent ($c_o = 30.1$) U^{238}/Pb^{204} 8.97, Th/U 3.90

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}	
116	18.184	15.745	38.471	
117	18.188	15.759	38.500	
118	18.192 (0.001)	15.769 (0.003)	38.541 (0.003)	
119	18.193 (0.001)	15.771 (0.003)	38.512 (0.003)	
	116, Tharsis Mine			Cobar
	117, Great Cobar Mine			Cobar
	118, Silver Peak Mine			Cobar
	119, Queen Bee Mine			Cobar

Indicated age reflects the time of ore deposition

Ref: NSW 6 ORE DEPOSIT, COBAR

Galena Age 321 m.y. Apparent ($c_o = 30.1$) U^{238}/Pb^{204} 9.00, Th/U 3.91

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}	
242	18.212 (DS)	15.773 (DS)	38.546 (DS)	
243	18.220 (0.007)	15.781 (0.007)	38.581 (0.016)	
244	18.221 (0.007)	15.780 (0.007)	38.582 (0.016)	
245	18.221 (0.007)	15.782 (0.001)	38.574 (0.015)	
246	18.218 (0.007)	15.780 (0.001)	38.575 (0.015)	
247	18.214 (0.008)	15.772 (0.001)	38.554 (0.001)	
	CSA mine			Cobar

Indicated age reflects the time of ore deposition

Ref: NSW 6 ORE DEPOSIT, HALLS PEAK

Galena Age 80 m.y. Apparent ($c_o = 30.1$) U^{238}/Pb^{204} 8.93, Th/U 3.84

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}	
248	18.497 (0.004)	15.759 (0.002)	38.773 (0.004)	
249	18.485 (0.002)	15.748 (0.008)	38.762 (0.006)	
250	18.497 (0.002)	15.760 (0.008)	38.794 (0.006)	
251	18.490 (DS)	15.754 (DS)	38.772 (DS)	
252	18.488	15.752	38.762	
253	18.488 (0.004)	15.750 (0.002)	38.756 (0.004)	
	Halls Peak			Dorrigo

Indicated age reflects time of ore deposition

Ref: NSW 7 TWO-FELDSPAR TRACHYTE (NANDEWAR VOLCANO)

Sanidine-anorthoclase K-Ar age 20.26, 20.78 } 20.5 ± 1.0 m.y.

GA1530 %K 3.792, 3.746 (3.769) $*Ar^{40}/K^{40}$ 0.001198, 0.001221 % atm. Ar^{40} 10.8, 16.5

Lava flow 2.4 km north of Killarney gap — Manilla

Reliable minimum age of extrusion

Ref: NSW 7 TWO-FELDSPAR TRACHYTE (NANDEWAR VOLCANO)

Sanidine-anorthoclase K-Ar age 18.81, 18.48 } 18.6 ± 1.0 m.y.

GA1532A %K 5.076, 5.083 (5.080) $*Ar^{40}/K^{40}$ 0.001032, 0.001085 % atm. Ar^{40} 18.6, 14.7

Dome 1.6 km south of Bullawa Creek — Manilla

Reliable minimum age

Ref: NSW 7 ALKALI RHYOLITE (NANDEWAR VOLCANO)

Sanidine-anorthoclase K-Ar age 18.02, 18.24 } 18.1 ± 1.0 m.y.

GA1533 %K 4.770, 4.709 (4.740) $*Ar^{40}/K^{40}$ 0.001057, 0.001071 % atm. Ar^{40} 19.0, 23.5

Dome 2.4 km north of Nobby's Rocky Creek — Manilla

Reliable minimum age

Ref: NSW 7,9 MUGEARITE (NANDEWAR VOLCANO)
Whole rock K-Ar age 18.08 } 18.0 ± 1.0 m.y.
17.86 }
GA1534 %K 2.118, 2.107 (2.112) *Ar^{40}/K^{40} 0.001062 % atm. Ar^{40} 45.3
0.001048 58.2
Kaputar road 4 km west of Coryah gap Manilla
Reliable minimum age

Ref: NSW 7 ONE-FELDSPAR COSSYRITE - AEGIRINE - AUGITE - ARFVEDSONITE TRACHYTE (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.26 } 17.4 ± 0.8 m.y.
17.59 }
GA1536 %K 4.696, 4.633 (4.640) *Ar^{40}/K^{40} 0.001012 % atm. Ar^{40} 11.1
0.001032 16.9
Dome on Kaputar road 1.6 km east of upper Bullawa Creek turn-off
Manilla
Reliable minimum age

Ref: NSW 7 ALKALI RHYOLITE (NANDEWAR VOLCANO)
Sanidine-anorthoclase K-Ar age 17.26 } 17.2 ± 0.8 m.y.
17.10 }
GA1531 %K 5.473, 5.519 (5.496) *Ar^{40}/K^{40} 0.001013 % atm. Ar^{40} 28.4
0.001003 24.0
Mount Lawler Dome Manilla
Reliable minimum age

Ref: NSW 7 ONE-FELDSPAR COSSYRITE - AEGIRINE - AUGITE - ARFVEDSONITE TRACHYTE (NANDEWAR VOLCANO)
Sanidine-anorthoclase K-Ar age 17.00 } 17.0 ± 0.8 m.y.
16.96 }
GA1547 %K 5.210, 5.234 (5.222) *Ar^{40}/K^{40} 0.001057 % atm. Ar^{40} 40.0
0.000995 41.7
Foot of Mount Derian dome Manilla
Reliable minimum age

Ref: NSW 8 ALKALI ANDESITE (WARRUMBUNGLE LAVA FLOWS)
Whole rock K-Ar age 13.3 ± 0.3 m.y.
GA2931 %K 1.764, 1.769 (1.766) *Ar^{40}/K^{40} 0.000765 % atm. Ar^{40} 40.5
3.2 km south of Belar Creek crossing on Coonabarabran-Gilgandra road, Warrumbungle Mountains area
Lat. 31°23′S, long. 149°17′E Gilgandra
Age of extrusion; minimum age for duricrust

Ref: NSW 8 TRACHYTE (WARRUMBUNGLE LAVA FLOWS)
Whole rock K-Ar age 14.5 ± 0.4 m.y.
GA2933 %K 4.96, 4.97 (4.97) *Ar^{40}/K^{40} 0.000851 % atm. Ar^{40} 24.2
0.8 km east of Tooraweena-Baradine road, 19 km north of Tooraweena, Warrumbungle Mountains
Lat. 31°18′S, long. 148°52′E Gilgandra
Age of extrusion; minimum age for duricrust

Ref: NSW 8 ALKALI OLIVINE BASALT (WARRUMBUNGLE LAVA FLOWS)
Whole rock K-Ar age 13.4 ± 0.3 m.y.
GA2934 %K 1.166, 1.168 (1.167) *Ar^{40}/K^{40} 0.000787 % atm. Ar^{40} 64.3
0.8 km northeast of Belar Creek crossing on Coonabarabran-Gilgandra road, Warrumbungle Mountains. (From same lava flow as GA1374; see under reference NSW 2)
Lat. 31°23′S, long. 149°17′E Gilgandra
Age of extrusion; minimum age for duricrust

Ref: NSW 9 TRACHYTE (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.28 ± 0.2, 17.20 ± 0.2 } 17.2 ± 0.2 m.y.
GA2940 %K 4.24, 4.24 (4.24) *Ar^{40}(10^{-10}mole/g) 1.308, 1.300 % atm. Ar^{40} 5.8, 2.7
1347-m altitude, Lindesay Creek
Lat. 30°16′48″S, long. 150°09′00″E Manilla

Ref: NSW 9 MUGEARITE (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.40 ± 0.2 m.y.
GA2941 %K 2.95, 2.97 (2.96) *Ar^{40}(10^{-10}mole/g) 0.920 % atm. Ar^{40} 4.4
1317-m altitude, Lindesay Creek
Lat. 30°16′48″S, long. 150°09′00″E Manilla

Ref: NSW 9 HAWAIITE (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.68 ± 0.2, 17.58 ± 0.2 } 17.6 ± 0.2 m.y.
GA2942 %K 2.91, 2.91 (2.91) *Ar^{40}(10^{-10}mole/g) 0.920, 0.915 % atm. Ar^{40} 3.3, 4.4
1251-m altitude, Lindesay Creek
Lat. 30°16′48″S, long. 150°09′00″E Manilla

Ref: NSW 9 TRACHYTE (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.40 ± 0.2, 17.38 ± 0.2 } 17.4 ± 0.2 m.y.
GA2943 %K 2.59, 2.58 (2.59) *Ar^{40}(10^{-10}mole/g) 0.804, 0.803 % atm. Ar^{40} 5.9, 4.2
1363-m altitude, Mount Kaputar road
Lat. 30°17′18″S, long. 150°08′54″E Manilla

Ref: NSW 9 ALKALI OLIVINE BASALT (NANDEWAR VOLCANO)
Whole rock K-Ar age 17.44 ± 0.3, 17.66 ± 0.3 } 17.5 ± 0.3 m.y.
GA2914 %K 2.08, 2.08 (2.08) *Ar^{40}(10^{-10}mole/g) 0.649, 0.657 % atm. Ar^{40} 39.3, 38.5
925-m altitude, Mount Kaputar road
Lat. 30°16′42″S, long. 150°03′54″E Manilla

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 33.65 ± 0.6, 33.42 ± 0.7 } 33.5 ± 0.7 m.y.
GA2915 %K 1.43, 1.42 (1.43) *Ar^{40}(10^{-10}mole/g) 0.860, 0.854 % atm. Ar^{40} 41.1, 58.7
1160-m altitude Yarraman Creek
Samples GA2915, GA3466, GA3467, GA2913, and GA2916 were collected between lat. 31°44′00″S, long. 150°06′54″E and lat. 31°43′50″S, long. 150°09′00″E Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 31.01 ± 0.4 m.y.
GA3466 %K 1.18, 1.17 (1.18) *Ar^{40}(10^{-10}mole/g) 0.653 % atm. Ar^{40} 24.3
955-m altitude, Yarraman Creek Tamworth
Younger than other apparent ages for Liverpool volcano; sample may have lost some radiogenic argon

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 34.81 ± 0.4, 34.45 ± 0.4 } 34.6 ± 0.4 m.y.
GA3467 %K 1.16, 1.16 (1.16) *Ar^{40}(10^{-10}mole/g) 0.724, 0.718 % atm. Ar^{40} 10.4, 10.0
851-m altitude, Yarraman Creek Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 33.56 ± 0.6, 33.48 ± 0.4 } 33.5 ± 0.5 m.y.
GA2913 %K 0.97, 0.98 (0.98) *Ar^{40}(10^{-10}mole/g) 0.584 % atm. Ar^{40} 18.4
0.582 28.1
665-m altitude, Yarraman Creek Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 33.24 ± 0.6, 32.57 ± 0.4 } 32.9 ± 0.5 m.y.
GA2916 %K 0.97, 0.96 (0.97) *Ar^{40}(10^{-10}mole/g) 0.576 % atm. Ar^{40} 14.1
0.564 17.0
400-m altitude, Yarraman Creek Tamworth

Ref: NSW 9 HAWAIITE (LIVERPOOL VOLCANO)
Whole rock K-Ar age 33.43 ± 0.4, 33.18 ± 0.4 } 33.3 ± 0.4 m.y.
GA2945 %K 1.41, 1.42 (1.42) *Ar^{40}(10^{-10}mole/g) 0.847 % atm. Ar^{40} 9.8
0.841 7.1
547-m altitude, spur from Bundulla Trigonometrical Station to Yarraman Creek
Lat. 31°44′18″S, long. 150°07′30″E Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (LIVERPOOL VOLCANO)
Whole rock K-Ar age 33.38 ± 0.5, 33.41 ± 0.5, 34.12 ± 0.4 } 34.3 ± 0.5 m.y.
GA2944 %K 0.85, 0.84 (0.85) *Ar^{40}(10^{-10}mole/g) 0.537 % atm. Ar^{40} 16.4
0.507 49.6
0.518 30.7
468-m altitude, spur from Bundulla Trigonometrical Station to Yarraman Creek
Lat. 31°44′18″S, long. 150°07′30″E Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)
Whole rock K-Ar age 51.53 ± 0.7 m.y.
GA2924 %K 1.05, 1.05 (1.05) *Ar^{40}(10^{-10}mole/g) 0.974 % atm. Ar^{40} 4.1
1550-m altitude, Barrington Trigonometrical Station, Stewarts Brook
Lat. 32°02′S, long. 151°23′E Singleton

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)
Whole rock K-Ar age 50.69 ± 0.6 m.y.
GA2925 %K 1.05, 1.05 (1.05) *Ar^{40}(10^{-10}mole/g) 0.957 % atm. Ar^{40} 4.9
1550-m altitude, Barrington Trigonometrical Station, Stewarts Brook
Lat. 32°02′S, long. 151°23′E Singleton

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)
Whole rock K-Ar age 44.76 ± 0.6, 44.53 ± 0.6 } 44.6 ± 0.6 m.y.
GA2949 %K 0.99, 0.99 (0.99) *Ar^{40}(10^{-10}mole/g) 0.795 % atm. Ar^{40} 13.4
0.791 19.4
1280-m altitude, Stewarts Brook
Lat. 32°02′S, long. 151°23′E Singleton
Age discordant with ages of other basalts (GA2924, GA2925, GA2929, and GA2948) in Stewarts Brook sequence; sample may have lost radiogenic argon

Ref: NSW 9 NEPHELINE BASANITE (BARRINGTON VOLCANO)
Whole rock K-Ar age 50.81 ± 0.7 m.y.
GA2929 %K 1.20, 1.20 (1.20) *Ar^{40}(10^{-10}mole/g) 1.094 % atm. Ar^{40} 21.7
1116-m altitude, Stewarts Brook
Lat. 32°02′S, long. 151°23′E Singleton

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 52.41 ± 0.7, 52.09 ± 0.7 } 52.2 ± 0.7 m.y.

GA2948 %K 1.44, 1.47 (1.46) *Ar^{40}(10^{-10}mole/g) 1.374, 1.366 % atm. Ar^{40} 17.2, 18.2

880-m altitude, Stewarts Brook/Mount Barrington fire trail
Lat. 32°00′36″S, long. 151°21′48″E Singleton

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 47.25 ± 0.6 m.y.

GA3465 %K 1.25, 1.26 (1.26) *Ar^{40}(10^{-10}mole/g) 1.065 % atm. Ar^{40} 46.7

1330-m altitude, Sempill Creek
Lat. 31°51′42″S, long. 151°23′42″E Tamworth
Sample may have lost radiogenic argon

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 51.25 ± 0.9 m.y.

GA2903 %K 1.12, 1.12 (1.12) *Ar^{40}(10^{-10}mole/g) 1.033 % atm. Ar^{40} 5.2

1184-m altitude, Sempill Creek
Lat. 31°51′42″S, long. 151°23′42″E Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 42.57 ± 0.7, 43.48 ± 0.6 } 43.0 ± 0.7 m.y.

GA2923 %K 0.93, 0.92 (0.93) *Ar^{40}(10^{-10}mole/g) 0.708, 0.724 % atm. Ar^{40} 16.5, 11.1

Lat. 31°51′42″S, long. 151°23′42″E Tamworth
Sample may have lost radiogenic argon

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 41.20 ± 0.7, 45.60 ± 0.8 } 43.4 ± 0.8 m.y.

GA2902 %K 0.93, 0.94 (0.94) *Ar^{40}(10^{-10}mole/g) 0.693, 0.766 % atm. Ar^{40} 20.3, 6.1

1124-m altitude, Sempill Creek
Lat. 31°51′42″S, long. 151°23′42″E Tamworth
Sample may have lost radiogenic argon

Ref: NSW 9 ALKALI OLIVINE BASALT (BARRINGTON VOLCANO)

Whole rock K-Ar age 52.88 ± 0.9, 51.79 ± 0.7 } 52.3 ± 0.8 m.y.

GA2901 %K 0.30, 0.30 (0.30) *Ar^{40}(10^{-10}mole/g) 0.283, 0.277 % atm. Ar^{40} 43.0, 19.7

917-m altitude, Sempill Creek
Lat. 31°51′42″S, long. 151°23′42″E Tamworth

Ref: NSW 9 ALKALI OLIVINE BASALT

Whole rock K-Ar age 50.02 ± 4.7 m.y.

GA2900 %K 0.40, 0.39 (0.40) *Ar^{40}(10^{-10}mole/g) 0.356 % atm. Ar^{40} 92.8

885-m altitude, Sempill Creek
Lat. 31°51′42″S, long. 151°23′42″E Tamworth

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 13.6 ± 0.3, 12.9 ± 0.3 } 13.3 ± 0.6 m.y.

GA3470 %K 4.869, 4.893 $*Ar^{40}(10^{-6}g)$ 2.673, 2.520 $\%*Ar^{40}$ 84.9, 89.0

Pyroxene — K-Ar age 14.4 ± 0.7 m.y.

%K 0.118, 0.113 $*Ar^{40}(10^{-6}g)$ 0.066 $\%*Ar^{40}$ 12.8

Leucite — K-Ar age 14.9 ± 0.6, 13.4 ± 0.5, 13.7 ± 0.5 } 14.1 ± 1.4 m.y.

%K 16.10, 16.42 $*Ar^{40}(10^{-6}g)$ 9.690, 8.766, 8.941 $\%*Ar^{40}$ 95.7, 96.0, 94.6

Phlogopite concentrate — K-Ar age 12.6 ± 0.7, 14.5 ± 0.5 } 13.5 ± 2.2 m.y.

%K 3.389 $*Ar^{40}(10^{-6}g)$ 1.715, 1.960 $\%*Ar^{40}$ 9.9, 33.6

Begargo Hill
Lat. 33°31′S, long. 146°22′E — Cargelligo
Apparent ages are probably close to the time of extrusion

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 10.9 ± 0.3, 10.2 ± 0.2 } 10.6 ± 0.6 m.y.

GA3471 %K 3.901, 3.913 $*Ar^{40}(10^{-6}g)$ 1.708, 1.592 $\%*Ar^{40}$ 74.0, 84.8

Begargo Hill
Lat. 33°31′S, long. 146°22′E — Cargelligo
Apparent age may represent time of extrusion or reflect argon loss

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 9.8 ± 0.3 m.y.

GA3472 %K 5.322, 5.318 $*Ar^{40}(10^{-6}g)$ 2.070 $\%*Ar^{40}$ 53.2

Probable relict lava flow from low, dissected ridge, Bygalore
Lat. 33°30′S, long. 146°46′E — Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 12.3 ± 0.3 m.y.

GA3473 %K 5.294, 5.270 $*Ar^{40}(10^{-6}g)$ 2.592 $\%*Ar^{40}$ 49.1

Steep-sided dyke structure from Mount Bygalore (The Monument)
Lat. 33°31′S, long. 146°45′E — Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 12.5 ± 0.3 m.y.

GA3474 %K 4.558, 4.580 $*Ar^{40}(10^{-6}g)$ 2.288 $\%*Ar^{40}$ 78.9

Lava flow from small dissected volcanic complex, Gorman Hills
Lat. 33°23′S, long. 146°47′E — Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 10.1 ± 0.3 m.y.

GA3475 %K 6.074, 6.082 $*Ar^{40}(10^{-6}g)$ 2.437 $\%*Ar^{40}$ 74.2

Probable relict lava flow from crescentic, dissected ridge, Tullibigeal
Lat. 33°27′S, long. 146°39′E — Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE

Whole rock — K-Ar age 12.6 ± 0.4 m.y.

GA3476 %K 4.364, 4.366 $*Ar^{40}(10^{-6}g)$ 2.204 $\%*Ar^{40}$ 42.5

Probable remnant lava flow from crescentic ridge, Condobolin (Weebar Hill)
Lat. 33°10′S, long. 147°01′E — Forbes

Ref: NSW 10 OLIVINE LEUCITITE
Whole rock K-Ar age 11.3 ± 0.2 m.y.
12.7 ± 0.2 m.y.
GA3478 %K 4.575, 4.572 *Ar^{40}(10^{-6}g) 2.071 %*Ar^{40} 49.0
2.326 48.0
Lava flow, Lake Cargelligo
Lat. 33°17′S, long. 146°20′E Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE
Whole rock K-Ar age 11.9 ± 0.3 m.y.
GA3479 %K 5.871, 6.044 *Ar^{40}(10^{-6}g) 2.845 %*Ar^{40} 91.8
Lava flow, El Capitan
Lat. 31°11′S, long. 146°12′E Cobar

Ref: NSW 10 OLIVINE LEUCITITE
Whole rock K-Ar age 13.6 ± 0.3 m.y.
GA3480 %K 3.637, 3.638 *Ar^{40}(10^{-6}g) 1.984 %*Ar^{40} 73.1
Lava flow, Burgooney
Lat. 33°21′S, long. 146°37′E Cargelligo

Ref: NSW 10 OLIVINE LEUCITITE
Whole rock K-Ar age 10.1 ± 0.3 m.y.
GA3481 %K 4.374, 4.366 *Ar^{40}(10^{-6}g) 1.758 %*Ar^{40} 82.3
Lava flow from small volcanic complex, Flagstaff Hill
Lat. 33°47′S, long. 146°05′E Cargelligo

Ref: NSW 10 LEUCITE MONCHIQUITE
Whole rock K-Ar age 194 ± 3 m.y.
70-139 %K 1.036, 1.031 *Ar^{40}(10^{-6}g) 8.404 %*Ar^{40} 92.1
Lat. 34°34′S, long. 148°21′E Cootamundra
Probably associated with the early Jurassic volcanism in eastern New South Wales

Ref: NSW 11 OCEANITE
Plagioclase K-Ar age 7.75 ± 0.18 m.y.
7.60 ± 0.17 m.y.
BM1966/P5/8 %K_2O 0.96 *Ar^{40} (mm^3)/wt of sample(g) 0.000248 % atm. Ar^{40} 82.6
0.000243 85.6
From 670 m above sea level in the Mount Gower/Mount Lidgbird lava sequence
Lat. 31°33′30″S, long. 159°05′30″E
Age of extrusion

Northern Territory

Ref: NT 1 AMPHIBOLITE-FACIES GNEISSES

Whole rock *Rb-Sr age 1640 ± 221 m.y. Initial Sr^{87}/Sr^{86} 0.7031 ± 0.0029(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA3094	168.36	144.99	3.37669	0.78029
GA3095	159.95	155.91	2.98195	0.77544

12 to 14 km southwest of Kulgera
Localities shown on p. 381 (fig. 4) of reference NT 1 Kulgera

* This age is derived from the regression of 8 amphibolite-facies gneisses; analytical data for the other 6 samples are given under reference SA 3. Further interpretations and isochron models are tabulated on pp. 384-5 of reference NT 1

Ref: NT 2 WINNALL BEDS (HENBURY CRATER SITE) AND PERTATATAKA FORMATION (OORAMINNA NO. 1 WELL)

Whole rock Rb-Sr age 730 ± 45 m.y. Initial Sr^{87}/Sr^{86} 0.724(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
HB3	116.9	63.4	5.36	0.7788
HB4	74.8	52.6	4.13	0.7679
HB5	119.0	68.2	5.07	0.7749
HB16	113.9	61.9	5.34	0.7757
HB17	117.7	66.9	5.11	0.7743
HB18	115.1	65.8	5.08	0.7730
HB20	108.8	67.6	4.64	0.7708
HB21	133.1	75.3	5.13	0.7727
HB27	151.0	75.1	5.85	0.7826
HB27A	83.9	78.9	3.08	0.7448
HB6	52.9	38.8	3.95	0.7651
HB8	36.8	69.3	1.537	0.7435
HB9	61.1	45.0	3.94	0.7613
HB19	52.6	33.4	4.57	0.7774
GA1059A	218.2	64.3	9.75	0.8244
GA1059E	161.6	77.8	5.97	0.7853
GA1059F	195.0	69.5	8.06	0.8078

HB3, HB4, subgreywacke; east wall of main crater
HB5, HB16, HB17, subgreywacke; north wall of main crater
HB18, subgreywacke; northeast wall of main crater
HB20, subgreywacke; loose block, south wall of main crater
HB21, subgreywacke; west wall of main crater
HB27, green subgreywacke, out-thrown flap of sediment; creek bank, 100 m at 310° from rim of crater
HB27A, soil
HB6, HB19, quartzite; south wall of main crater
HB8, quartzite; top of ridge, 400 m west of Crater 10
HB9, quartzite; top of ridge, 150 m east of Crater 10
Lat. 24°35′S, long. 133°09′E Henbury
1059A, E, and F, argillite; Ooraminna No. 1 well, 160 km east of the Henbury Crater site
Lat. 24°00′06″S, long. 134°09′50″E Rodinga
The indicated age may be either that of deposition of the Winnall Beds and Pertatataka Formation or that of a predepositional event

Ref: NT 2 HENBURY CRATER GLASSES

Whole rock Rb-Sr age 675 ± 100 m.y. Initial Sr^{87}/Sr^{86} not given

	Rb*(ppm)	Sr*(ppm)	Correction Factor*	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
HB1	146.9	87.3	1.057	4.89	0.7700
HB2	161.1	97.0	1.114	4.81	0.7699
HB11	152.7	101.2	1.014	4.38	0.7653
HB28	142.5	91.8	1.015	4.51	0.7667
HB29	153.7	97.6	1.036	4.54	0.7672
HB31	146.1	99.6	1.027	4.26	0.7644
HB1213	148.2	95.0	1.078	4.50	0.7669
HB1415A	148.1	96.4	1.019	4.46	0.7660

* Corrected for dilution by meteoric iron as described in text of reference NT 2
HB1, north rim of main crater; 100 m^2 in area
HB2, 100 m north of main crater; 300 m^2
HB11, north rim of main crater; 300 m^2
HB28, 20 to 50 m at 55°T from main crater; 400 m^2
HB29, 100 m at 55°T from main crater; 300 m^2
HB31, 300 m at 75°T from main crater; 300 m^2
HB1213, 100 to 150 m north of main crater; 1000m^2
HB1415A, northeast rim 45 to 55°T; 400 m^2
Lat. 24°35′S, long. 133°09′E Henbury

Ref: NT 3 HIGH-CALCIUM AUSTRALITES

Whole rock *Rb-Sr age 255 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.7104 ± 0.0008(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
AN244	94.4	315.5	0.864	0.7135
T3313	109	154	2.073	0.7172

AN244, nearly complete core from Henbury; lat. 24°34′S, long. 133°14′E Henbury
T3313, Charlotte Waters; lat. 25°55′E, long 134°55′E Finke
* This age is derived from the regression of 9 high-calcium australites; analytical data for 8 more specimens are given under reference SA 4. The indicated age reflects the time of crystallization of the source rock

Ref: NT 4 AUSTRALITE

Whole rock K-Ar age 0.77 ± 0.01, 0.87 ± 0.03, 0.85 ± 0.02, 1.00 ± 0.01 } 0.87 ± 0.09 m.y.

GA2065 (623)	%K 1.699, 1.723	*$Ar^{40}(10^{-8}cm^3/g)$	5.22 ± 0.05	%*Ar 33.7
			0.28 ± 0.07, 5.67 ± 0.06	3.9, 41.2
			0.11 ± 0.03, 5.68 ± 0.06	2.9, 44.0
			6.83 ± 0.07	49.6

Australite-button core
Charlotte Waters Finke
Mean apparent age may reflect the time of primary melting of the australite

Ref: NT 4 AUSTRALITE

Whole rock K-Ar age 0.85 ± 0.04, 1.02 ± 0.03 } 0.94 ± 0.12 m.y.

GA2066 (623)	%K 1.640, 1.642	*$Ar^{40}(10^{-8}cm^3/g)$	5.57 ± 0.21	%*Ar 13.7
			0.04 ± 0.04, 6.68 ± 0.14	0.1, 17.8

Australite-button flange from same sample (623) as GA2065 Finke
Mean apparent age is similar to the mean apparent age for the core (GA2065), even though the flange is morphologically younger than the core

Ref: NT 4 AUSTRALITE

Whole rock K-Ar age 0.70 ± 0.02, 0.80 ± 0.02 } 0.75 ± 0.07 m.y.

GA2067 %K 1.680, 1.739 *Ar^{40}($10^{-8}$$cm^3$/g) 4.74 ± 0.07 %*Ar 27.7
(624) 0.20 ± 0.02, 5.25 ± 0.06 4.8, 46.8

Australite-button core
Charlotte Waters Finke
Mean apparent age may reflect the time of primary melting of the australite

Ref: NT 4 AUSTRALITE

Whole rock K-Ar age 0.99 ± 0.04, 1.11 ± 0.03 } 1.05 ± 0.08 m.y.

GA2068 %K 1.660, 1.667 *Ar^{40}($10^{-8}$$cm^3$/g) 0.14 ± 0.09, 6.45 ± 0.12 %*Ar 1.6, 17.7
(624) 7.36 ± 0.13 16.3

Australite-button flange from same sample (624) as GA2067 Finke
Flange (2068) is morphologically younger than core (GA2067); older apparent age of flange must be primarily a result of a higher content of radiogenic argon

Queensland

Ref: Q 1 DOLERITE
Whole rock K-Ar age 22.7 m.y. ± 3%
GA1979 %K 0.913, 0.918 (0.915) *Ar^{40}/K^{40} 0.001334 % atm. Ar^{40} 50.8
From a dyke cutting the duricrust in a quarry 32 km north of Roma on the Roma-Injune road Roma
Minimum age

Ref: Q 2 VOLCANIC ROCK
Whole rock K-Ar age 362 ± 8 m.y.
RO581 %K 2.71 *Ar^{40}/K^{40} 0.0233
From 3394.5-3396.3 m, Carlow No. 1 well
Lat. 24°50′27″S, long. 145°25′48″E Blackall
Minimum age

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 22.0 m.y., 22.1 m.y.
GA1400 %K 1.856, 1.850 (1.85) *Ar^{40}/K^{40} 0.001294 % atm. Ar^{40} 2.9
0.001303 6.0
Andesine basalt
Mount Mitchell, 1142-m elevation
Warwick 1-mile 495 193 Warwick
Probably reliable age of extrusion, c.f. GA1401, GA1403, and GA1404

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 22.3 m.y.
GA1401 %K 1.317, 1.317 (1.32) *Ar^{40}/K^{40} 0.001309 % atm. Ar^{40} 12.9
Olivine basalt
Mount Mitchell, 1015-m elevation
Warwick 1-mile 492 191 Warwick
Probably reliable age of extrusion

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 23.7 m.y.
GA1403 %K 2.314, 2.314 (2.31) *Ar^{40}/K^{40} 0.001392 % atm. Ar^{40} 60.9
Oligoclase basalt
Mount Mitchell, 695-m elevation
Warwick 1-mile 505 197 Warwick
Probably reliable age of extrusion

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 23.8 m.y., 23.9 m.y.
GA1404 %K 2.337, 2.337 (2.34) *Ar^{40}/K^{40} 0.001399 % atm. Ar^{40} 46.2
0.001403 51.5
Pyroxene trachyte
Mount Mitchell, 534-m elevation
Warwick 1-mile sheet 522 192 Warwick
Probably reliable age of extrusion

Ref: Q 3 FLINDERS TESCHENITE
Plagioclase K-Ar age 29.1 ± 1.5 m.y.
28.7 m.y.
GA1407 %K 0.2158, 0.2151 (0.216) *Ar^{40}/K^{40} 0.001712 % atm. Ar^{40} 62.4
0.001690 59.4
Analcite dolerite
Limestone Ridges
Flinders 1-mile 842 488 Ipswich
Probably reliable age of intrusion

Ref: Q 3 COMENDITE
Whole rock K-Ar age 24.7 m.y.
GA1410 %K 3.482, 3.486 (3.48) *Ar^{40}/K^{40} 0.001453 % atm. Ar^{40} 8.0
Mount Ngun Ngun, Glass House Mountains
Glass House 1-mile 106 593 Gympie
Probably reliable age of intrusion

Ref: Q 3 COMENDITE
Whole rock K-Ar age 24.9 m.y.
GA1411 %K 3.691, 3.709 (3.70) *Ar^{40}/K^{40} 0.001463 % atm. Ar^{40} 13.9
Trachyte Range, Glass House Mountains
Glass House 1-mile 129 527 Gympie
Probably reliable age of intrusion

Ref: Q 3 COMENDITE
Whole rock K-Ar age 24.7 m.y.
GA1412 %K 3.717, 3.715 (3.72) *Ar^{40}/K^{40} 0.001454 % atm. Ar^{40} 1.3
Mount Coolum
Maroochydore 1-mile 275 995 Gympie
Probably reliable age of intrusion

Ref: Q 3 COMENDITE
Whole rock K-Ar age 22.6 m.y.
GA1413 %K 3.475, 3.475 (3.48) *Ar^{40}/K^{40} 0.001327 % atm. Ar^{40} 19.4
Mount Greville
Dugandan 1-mile 627 160 Warwick
Minimum age of intrusion

Ref: Q 3 OLIVINE BASALT
Whole rock K-Ar age 63.2 m.y., 59.1 m.y.
GA5299 %K 0.2694, 0.2688 (0.269) *Ar^{40}/K^{40} 0.003757 % atm. Ar^{40} 52.2
0.003505 52.3
Mount Walker Creek, Cunningham Highway
Ipswich 1-mile 788 586 Ipswich
Minimum age of extrusion

Ref: Q 3 ANALCITE MICROSYENITE
Whole rock K-Ar age 24.0 m.y.
GA5300 %K 3.900, 3.902 (3.90) *Ar^{40}/K^{40} 0.001414 % atm. Ar^{40} 8.7
Mount Edwards, Moogerah Dam
Dugandan 1-mile 671 227 Warwick
Probably reliable age of intrusion

Ref: Q 3 QUARTZ FELDSPAR PORPHYRY
K-feldspar K-Ar age 22.6 m.y., 24.6 m.y., 23.2 m.y., 22.9 m.y.
GA5301 %K 5.508, 5.522 (5.52) *Ar^{40}/K^{40} 0.001326 % atm. Ar^{40} 6.1
0.001449 14.5
0.001364 6.2
0.001345 15.8
Vertical dyke in Mount Alford Ring Complex
Dugandan 1-mile 648 166 Warwick
Spread of ages for the one sample is too great to be reliable

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 19.4 m.y.
GA5302 %K 1.813, 1.807 (1.81) *Ar^{40}/K^{40} 0.001138 % atm. Ar^{40} 11.8
Olivine basalt
Toowoomba Municipal Quarry
Toowoomba 1-mile 064 810 Ipswich
Minimum age of extrusion

Ref: Q 3 PYROXENE TRACHYTE
Whole rock K-Ar age 24.1 m.y.
GA5304 %K 4.472, 4.511 (4.49) *Ar^{40}/K^{40} 0.001420 % atm. Ar^{40} 18.0
Mount Flinders, northern foothills
Flinders 1-mile 942 497 Ipswich
Probably reliable age of intrusion

Ref: Q 3 VESICULAR BASALT
Whole rock K-Ar age 22.1 m.y.
GA5316 %K 2.283, 2.284 (2.28) *Ar^{40}/K^{40} 0.001300 % atm. Ar^{40} 9.5
West of Nanango
Kimbia 1-mile 746 803 Gympie
Probably reliable age of extrusion

Ref: Q 3 PORPHYRITIC PITCHSTONE
K-feldspar K-Ar age 22.7 m.y., 22.6 m.y.
GA5367 %K 6.432, 6.451 (6.44) *Ar^{40}/K^{40} 0.001336 % atm. Ar^{40} 19.0
0.001329 28.6
1.6 km south of Mount Gillies
Mount Lindsay 1-mile 892 903 Warwick
Reliable age of intrusion

Ref: Q 3 RHYOLITE
Whole rock K-Ar age 23.1 m.y.
GA5368 %K 3.968, 3.951 (3.96) *Ar^{40}/K^{40} 0.001360 % atm. Ar^{40} 31.5
0.5 km north of Mount French
Dugandan 1-mile 733 263 Ipswich
Probably reliable age of intrusion

Ref: Q 3 MAIN RANGE VOLCANICS
Whole rock K-Ar age 23.2 m.y.
GA5540 %K 4.338, 4.327 (4.33) *Ar^{40}/K^{40} 0.001366 % atm. Ar^{40} 35.0
Pyroxene trachyte
5.6 km north-northeast of Cooby Creek Dam
Jondaryan 1-mile 027 072 Ipswich
Probably reliable age of extrusion

Ref: Q 3 LAMINGTON VOLCANICS (ALBERT BASALT)
Whole rock K-Ar age 20.0 m.y.
GA5541 %K 1.957, 1.963 (1.96) *Ar^{40}/K^{40} 0.001176 % atm. Ar^{40} 9.1
Olivine basalt
1.6 km south of Canungra
Springbrook 1-mile 330 215 Tweed Heads
Minimum age of extrusion

Ref: Q 3 LAMINGTON VOLCANICS (BEECHMONT BASALT)
Whole rock K-Ar age 21.8 m.y.
GA5542 %K 1.353, 1.349 (1.35) *Ar^{40}/K^{40} 0.001282 % atm. Ar^{40} 25.3
Basalt
Below Eagle Heights Member; Mount Misery, 1.6 km west of Canungra
Springbrook 1-mile 305 235 Tweed Heads
Most reliable date for the Lamington Volcanics in reference Q 3

Ref: Q 3 LAMINGTON VOLCANICS (BEECHMONT BASALT)
Whole rock K-Ar age 21.1 m.y.
GA5543 %K 1.740, 1.724 (1.73) *Ar^{40}/K^{40} 0.001240 % atm. Ar^{40} 59.9
Olivine basalt
Northern end of Beechmont Plateau, Canungra-Beechmont road
Springbrook 1-mile 363 152 Tweed Heads
Minimum age of extrusion

Ref: Q 3 LAMINGTON VOLCANICS (TOP OF BEECHMONT BASALT)
Whole rock K-Ar age 21.3 m.y.
GA5544 %K 1.277, 1.279 (1.28) *Ar^{40}/K^{40} 0.001252 % atm. Ar^{40} 28.9
Olivine basalt
0.8 km northwest of Binna Burra
Springbrook 1-mile 346 019 Tweed Heads

Ref: Q 3 MOUNT BARNEY COMPLEX (GRANOPHYRE)
Whole rock K-Ar age 23.4 m.y.
GA5545 %K 4.358, 4.313 (4.34) *Ar^{40}/K^{40} 0.001378 % atm. Ar^{40} 8.7
Margin of Mount Barney Complex; Rocky Creek
Mount Lindsay 1-mile 834 926 Warwick
Probably reliable age of intrusion

Ref: Q 'BASEMENT'
(Unpubl.) Biotite K-Ar age 1665 m.y.
GA5390 %K 5.871, 5.833 (5.85) *Ar^{40}/K^{40} 0.15621 % atm. Ar^{40} 1.7
Core from 1964 m, Netting Fence No. 1 well, 78 km west of Glenormiston
Lat. 22°56′05″S, long. 138°02′06″E Glenormiston

Ref: Q SHALE
(Unpubl.) Whole rock K-Ar age 479 ± 15 m.y.
RO695 %K 2.34, 2.35 (2.345) *Ar^{40}/K^{40} 0.0319 % atm. Ar^{40} 10.4
From Core 7, 2270m, Galway No. 1 well
Lat. 25°04′30″S, long. 142°33′41″E Windorah
Minimum age, probably unreliable

Ref: Q PORPHYRY
(Unpubl.) Analytical data not available 'Approximate true' age 420 ± 20 m.y.
From Core 9, Balfour No. 1 well
Lat. 25°32′13″S, long. 146°42′40″E Augathella

Ref: Q DACITIC VOLCANIC
(Unpubl.) Whole rock K-Ar age 187 ± 20 m.y.
Analytical data not available
From terminal core, Cunno No. 1 well, 112 km northeast of Augathella
Lat. 25°06′55″S, long. 147°04′34″E Eddystone

Ref: Q ADAMELLITE
(Unpubl.) Biotite K-Ar age 324 ± 12 m.y.
%K 6.68, 6.60 *Ar^{40}ppm 0.170, 0.166 % atm. Ar^{40} 6.5, 4.0
From Core 1, 859-863 m from basement, Scalby No. 1 well
Lat. 26°57′54″S, long. 147°23′45″E Mitchell

Ref: Q 4,5 GYRANDA FORMATION
G56/5/22 Biotite K-Ar age 239 m.y., 239 m.y.
GA5562 %K 6.759, 6.734 (6.75) *Ar^{40}/K^{40} 0.01489 % atm. Ar^{40} 2.3
0.01488 2.6
Biotite tuff
309 860 Mundubberra

Ref: Q 4,5 MARYBOROUGH BASIN GRANITE
Biotite K-Ar age 215 m.y.
GA5385 %K 7.206, 7.210 (7.21) *Ar^{40}/K^{40} 0.01332 % atm. Ar^{40} 8.4
548 705 Gympie
Probably reliable age of intrusion

Ref: Q 4,5 MARYBOROUGH BASIN GRANITE

Biotite K-Ar age 216 m.y.

GA5386 %K 7.582, 7.592 (7.59) *Ar^{40}/K^{40} 0.01336 % atm. Ar^{40} 2.7

547 706 Gympie

Probably reliable age of intrusion

Ref: Q 4,5 GRANITES

Whole rock Rb-Sr age 218 ± 16 m.y. Initial Sr^{87}/Sr^{86} 0.7035 ± 0.0008(I)

	Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5314	170.9	220.8	2.2275	0.7110
G56/6/5				0.7101 (meas.)
GA5318	120.4	285.6	1.2166	0.7076
G56/6/7				0.7077 (meas.)
GA5320	141.8	117.4	3.4780	0.7160
G56/6/14				0.7146 (meas.)
GA5321	131.7	159.2	2.3813	0.7115 (meas.)
G56/6/9				
GA5325	73.1	419.0	0.5024	0.7051 (meas.)
G56/6/12				
GA5501	152.8	54.9	8.0264	0.7297
G56/6/6				
GA5501	151.9	54.3	8.0747	0.7294
G56/6/6				0.7295 (meas.)

GA5314, granite from Mount Biggenden, 508 827 Maryborough

GA5318, Musket Flat Granite from 557 821, lat. 25°34′S, long. 152°25′E Maryborough

GA5320, granodiorite from south of Booyal, 513 858 Maryborough

GA5321, aplitic granite from south of Biggenden, 511 801 Maryborough

GA5325, Mount Perry Granite from 474 883 Maryborough

GA5501, Childers Granite from 538 858 Maryborough

Probably reliable age of intrusion

Ref: Q 4,9 RETREAT GRANITE

F55/15/9 Biotite K-Ar age 363 m.y.

GA1024 %K 7.169, 7.152 (7.16) *Ar^{40}/K^{40} 0.02339 % atm. Ar^{40} 2.4

Adamellite

Lat. 23°27′S, long. 147°31′E; 569600 2079600 Emerald

Minimum age

Ref: Q 4,9 RETREAT GRANITE

F55/15/11 Biotite K-Ar age 372 m.y.

GA1025 %K 6.284, 6.305 (6.29) *Ar^{40}/K^{40} 0.02403 % atm. Ar^{40} 3.2

Granodiorite

Lat. 23°02′S, long. 147°34′E; 576000 2129300 Emerald

Minimum age

Ref: Q 4,9 RETREAT GRANITE

F55/15/12 Biotite K-Ar age 366 m.y.

GA1026 %K 7.279, 7.227 (7.25) *Ar^{40}/K^{40} 0.02361 % atm. Ar^{40} 10.4

Adamellite

Lat. 23°09′S, long. 147°24′E; 556700 2115000 Emerald

Minimum age

Ref: Q 4,9 RETREAT GRANITE

F55/15/13 Biotite K-Ar age 363 m.y.

GA1027 %K 6.331, 6.339 (6.34) *Ar^{40}/K^{40} 0.02337 % atm. Ar^{40} 1.5

Hornblende K-Ar age 354 m.y.

%K 0.6396, 0.6358 (0.638) *Ar^{40}/K^{40} 0.02273 % atm. Ar^{40} 6.9

Diorite

Lat. 23°07′S, long. 147°27′E; 562000 2118000 Emerald

Ref: Q 4,9 RETREAT GRANITE
F55/15/8 Biotite K-Ar age 364 m.y.
GA1028 %K 6.737, 6.743 (6.74) *Ar^{40}/K^{40} 0.02343 % atm. Ar^{40} 2.2
Granodiorite
Lat. 23°29′S, long. 147°33′E; 573300 2073000 Emerald
Minimum age

Ref: Q 4,9 MOUNT MORGAN GRANITE
F56/13/10 Hornblende K-Ar age 360 m.y.
GA5339 %K 0.2920, 0.2905 (0.291) *Ar^{40}/K^{40} 0.02316 % atm. Ar^{40} 23.0
Granodiorite
Mount Morgan Mine
Lat. 23°38′S, long. 150°22′30″E; 330000 2056400 Rockhampton

Ref: Q 4,9 TOWN GRANITE
F56/13/15 Hornblende K-Ar age 357 m.y.
GA5369 %K 0.3899, 0.3872 (0.389) *Ar^{40}/K^{40} 0.02295 % atm. Ar^{40} 21.7
Diorite
Lat. 23°37′30″S, long. 150°23′30″E; 332400 2057400 Rockhampton

Ref: Q 4,9 MOUNT MORGAN GRANITE
F56/13/16 Hornblende K-Ar age 365 m.y.
GA5370 %K 0.3585, 0.3608 (0.360) *Ar^{40}/K^{40} 0.02351 % atm. Ar^{40} 31.1
Diorite
Lat. 23°39′S, long. 150°21′30″E; 328700 2054600 Rockhampton

Ref: Q 4,9 MOUNT MORGAN GRANITE
F56/13/17 Hornblende K-Ar age 370 m.y.
GA5371 %K 0.4146, 0.4156 (0.415) *Ar^{40}/K^{40} 0.02387 % atm. Ar^{40} 34.6
Diorite
Lat. 23°39′30″S, long. 150°22′E; 329700 2053200 Rockhampton

Ref: Q 4,9 TOWN GRANITE
F56/13/18 Hornblende K-Ar age 358 m.y.
GA5372 %K 0.0968, 0.0964 (0.0966) *Ar^{40}/K^{40} 0.02306 % atm. Ar^{40} 60.5
Diorite
Lat. 23°39′S, long. 150°24′E; 333100 2053900 Rockhampton

Ref: Q 4,9 ANAKIE METAMORPHICS
F55/11/2 Muscovite K-Ar age 458 m.y.
GA1040 %K 7.835, 7.822 (7.83) *Ar^{40}/K^{40} 0.03028 % atm. Ar^{40} 1.7
Schist
Lat. 22°51′S, long. 147°28′E Clermont
Minimum age

Ref: Q 4,9 ADAMELLITE
F55/3/17 Biotite K-Ar age 294 m.y.
GA1160 %K 7.481, 7.491 (7.49) *Ar^{40}/K^{40} 0.01859 % atm. Ar^{40} 2.0
Hornblende K-Ar age 294 m.y.
%K 0.3882, 0.3859 (0.387) *Ar^{40}/K^{40} 0.01859 % atm. Ar^{40} 9.1
Lat. 20°53′30″S, long. 147°12′E; 536900 2387000 Bowen

Ref: Q 4,9 ADAMELLITE
F55/3/18 Biotite K-Ar age 290 m.y.
GA1161 %K 7.545, 7.566 (7.56) *Ar^{40}/K^{40} 0.01834 % atm. Ar^{40} 2.3
Lat. 20°54′S, long. 147°10′E; 532800 2387100 Bowen

Ref: Q 4,9 GRANODIORITE
F55/3/7 Hornblende K-Ar age 327 m.y., 330 m.y.
GA5288 %K 0.4052, 0.4102, 0.4081 (0.408) *Ar^{40}/K^{40} 0.02085 % atm. Ar^{40} 10.0
0.02110 50.4
540700 2385500 Bowen
Probably reliable age of emplacement

Ref: Q 4,9 ADAMELLITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/3 Biotite K-Ar age 286 m.y., 283 m.y.
GA729 %K 5.784, 5.797 (5.79) *Ar^{40}/K^{40} 0.01803 % atm. Ar^{40} 12.0
0.01786 7.8
Biotite Rb-Sr age 286 m.y.

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
377.1	20.5	53.109	0.9285

Lat. 20°42′S, long. 147°29′E; 596400 2411200 Bowen
Age of intrusion

Ref: Q 4,9 GRANODIORITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/8 Biotite K-Ar age 276 m.y., 288 m.y., 293 m.y., 283 m.y.
GA831 %K 6.252, 6.287 (6.27) *Ar^{40}/K^{40} 0.01737 % atm. Ar^{40} 3.2
0.01819 2.7
0.01850 2.5
0.01781 8.0
Lat. 20°40′S, long. 147°12′E; 536500 2415600 Bowen
288 m.y. is probably closest to age of intrusion

Ref: Q 4,9 ADAMELLITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/1 Biotite K-Ar age 278 m.y., 281 m.y.
GA832 %K 5.668, 5.624 (5.65) *Ar^{40}/K^{40} 0.01752 % atm. Ar^{40} 6.3
0.01768 4.4
Lat. 20°27′S, long. 147°19′30″E; 552700 2441800 Bowen
Probably close to age of intrusion

Ref: Q 4,9 ADAMELLITE (INTRUDING BULGONUNNA VOLCANICS)
F55/7/1 Hornblende K-Ar age 285 m.y.
GA1073 %K 0.4921, 0.4920 (0.492) *Ar^{40}/K^{40} 0.01799 % atm. Ar^{40} 11.0
Lat. 21°12′S, long. 147°35′E; 581800 2347800 Mount Coolon
Probable age of intrusion

Ref: Q 4,9 GRANODIORITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/20 Biotite K-Ar age 280 m.y.
GA1243 %K 6.322, 6.343 (6.33) *Ar^{40}/K^{40} 0.01764 % atm. Ar^{40} 2.1
Hornblende K-Ar age 280 m.y.
%K 0.3236, 0.3277 (0.326) *Ar^{40}/K^{40} 0.01762 % atm. Ar^{40} 22.5
Lat. 20°32′30″S, long. 147°10′30″E; 532500 2430000 Bowen
Probably close to age of intrusion

Ref: Q 4,9 GRANODIORITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/23 Biotite K-Ar age 283 m.y., 289 m.y., 278 m.y.
GA5198 %K 5.647, 5.652 (5.65) *Ar^{40}/K^{40} 0.01783 % atm. Ar^{40} 2.0
0.01824 25.6
0.01746 2.5
Hornblende K-Ar age 291 m.y., 282 m.y.
%K 0.4605, 0.4631 (0.462) *Ar^{40}/K^{40} 0.01837 % atm. Ar^{40} 26.0
0.01779 10.1
Lat. 20°15′30″S, long. 147°32′E Bowen
283 and 289 m.y. are probably closest to age of intrusion

Ref: Q 4,9 GRANODIORITE (INTRUDING BULGONUNNA VOLCANICS)
F55/3/9 Hornblende K-Ar age 281 m.y., 283 m.y.
GA5292 %K 0.2341, 0.2333 (0.234) *Ar^{40}/K^{40} 0.01768 % atm. Ar^{40} 18.1
0.01784 24.2
528700 2402900 Bowen
Probably close to age of intrusion

Ref: Q 4,9 ADAMELLITE (INTRUDING BULGONUNNA VOLCANICS)

F55/3/42 Biotite K-Ar age 282 m.y.

GA5391 %K 6.588, 6.596 (6.59) *Ar^{40}/K^{40} 0.01776 % atm. Ar^{40} 7.5
546900 2440500 Bowen
Probably close to age of intrusion

Ref: Q 4,9 GRANITIC ROCKS (INTRUDING BULGONUNNA VOLCANICS)

Whole-rock Rb-Sr age 298 ± 25 m.y. Initial Sr^{87}/Sr^{86} 0.7045 ± 0.0008(I)
Whole-rock and biotite Rb-Sr age 286 ± 3 m.y.

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA729	Whole rock	131.9	214.9	1.773	0.7117
F55/3/3*					0.7131 (meas.)
	Biotite	377.1	20.5	53.109	0.9285
GA831	Whole rock	121.8	231.6	1.519	0.7108
F55/3/8*					0.7110 (meas.)
GA832	Whole rock	161.7	152.4	3.067	0.7192
F55/3/1*					0.7181 (meas.)
GA1160	Whole rock	138.0	263.5	1.511	0.7118
F55/3/17*					
GA1243	Whole rock	84.5	359.9	0.678	0.7076
F55/3/20*					0.7074 (meas.)
GA5391	Whole rock	214.4	158.2	3.917	0.7212
F55/3/42*					0.7216 (meas.)
	Biotite	1082.0	14.5	214.858	1.6106
GA5528	Whole rock	139.5	219.4	1.836	0.7123
F55/3/22					0.7121 (meas.)

* Rock types and grid references of these samples are shown above with K-Ar ages and analytical data
GA5528, granite from 567200 2411300 Bowen
Preferred age is 286 m.y.; both GA729 and GA5391 biotites give individual Rb-Sr ages of 286 m.y.

Ref: Q 4,9 BULGONUNNA VOLCANICS

Whole rock Rb-Sr age 287 ± 12 m.y. Initial Sr^{87}/Sr^{86} 0.7049 ± 0.0005(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5514	118.1	221.3	1.536	0.7105
F55/3/40				0.7112 (meas.)
	116.8	218.5	1.542	0.7112
GA5515	174.1	94.0	5.340	0.7272
F55/3/41				0.7280 (meas.)
	174.3	93.1	5.399	0.7274 (meas.)
GA5517	99.0	364.3	0.782	0.7088
F55/3/81	97.9	363.4	0.778	0.7082
GA5518	129.8	227.2	1.648	0.7117
F55/3/84				0.7118 (meas.)
GA5556	152.5	267.5	1.644	0.7119
F55/3/131				
GA5557	87.0	400.0	0.628	0.7080
F55/3/132				
GA5559	164.3	108.3	4.375	0.7232
F55/3/134				

GA5514, 546950 2438900 Bowen
GA5515, 546950 2438850 Bowen
GA5517, 564000 2408200 Bowen
GA5518, 561700 2407500 Bowen
GA5556, 538700 2394300 Bowen
GA5557, 555900 2389700 Bowen
GA5559, 573400 2429700 Bowen

Ref: Q 4,9 ADAMELLITE, DRUMMOND BASIN
F55/15/14 Biotite K-Ar age 281 m.y., 298 m.y.
GA1029 %K 6.896, 6.898 (6.90) *Ar^{40}/K^{40} 0.01773 % atm. Ar^{40} 6.9
0.01883 2.6
Hornblende K-Ar age 286 m.y., 290 m.y.
%K 0.5848, 0.5811 (0.583) *Ar^{40}/K^{40} 0.01788 % atm. Ar^{40} 14.9
0.01834 15.0
Lat. 23°31′S, long. 147°32′E; 571000 2070500 Emerald
May be correlated with the grantic rocks intruding the Bulgonunna Volcanics farther north

Ref: Q 4,9 ADAMELLITE, DRUMMOND BASIN
F55/15/15 Biotite K-Ar age 300 m.y., 297 m.y., 287 m.y., 294 m.y.
GA1030 %K 6.038, 6.063 (6.05) *Ar^{40}/K^{40} 0.01897 % atm. Ar^{40} 10.4
0.01881 2.4
0.01811 5.1
0.01860 1.8
Hornblende K-Ar age 287 m.y., 284 m.y.
%K 0.5699, 0.5720 (0.571) *Ar^{40}/K^{40} 0.01812 % atm. Ar^{40} 14.2
0.01792 18.5
Lat. 23°31′S, long. 147°31′E; 570000 2069400 Emerald
See GA1029

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE)
G56/5/5 Biotite K-Ar age 301 m.y.
GA1067 %K 7.161, 7.169 (7.17) *Ar^{40}/K^{40} 0.01906 % atm. Ar^{40} 1.8
Granodiorite
Lat. 25°13′S, long. 150°26′E; 337400 1863900 Mundubberra
Probably reliable age of intrusion

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE)
G56/5/7 Biotite K-Ar age 303 m.y.
GA1190 %K 6.116, 6.106 (6.10) *Ar^{40}/K^{40} 0.01920 % atm. Ar^{40} 2.9
Adamellite
Lat. 25°02′30″S, long. 150°26′E; 310300 1874000 Mundubberra
Probably reliable age of intrusion

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE)
G56/1/12 Biotite K-Ar age 300 m.y.
GA1251 %K 5.229, 5.250 (5.24) *Ar^{40}/K^{40} 0.01897 % atm. Ar^{40} 1.8
Hornblende K-Ar age 298 m.y.
%K 0.4364, 0.4391 (0.438) *Ar^{40}/K^{40} 0.01884 % atm. Ar^{40} 9.4
Granodiorite
Lat. 24°51′S, long. 150°28′E; 341900 1908400 Monto
Probably reliable age of intrusion

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE)
G56/5/4 Hornblende K-Ar age 294 m.y.
GA5294 %K 0.4094, 0.4072 (0.408) *Ar^{40}/K^{40} 0.01859 % atm. Ar^{40} 10.8
Granodiorite
Lat. 25°13′30″S, long. 150°26′E; 336300 1860600 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE)
G56/1/21 Biotite K-Ar age 299 m.y.
GA5361 %K 6.247, 6.226 (6.24) *Ar^{40}/K^{40} 0.01895 % atm. Ar^{40} 3.8
Granodiorite
Lat. 24°53′S, long. 150°28′E; 340500 1904600 Monto
Probably reliable age of intrusion

Ref: Q 4,9

AUBURN COMPLEX (WESTERN SIDE)

Whole rock Rb-Sr age 311 ± 29 m.y. Initial Sr^{87}/Sr^{86} 0.7040 ± 0.0007(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA1067 G56/5/5	124.9	470.4	0.767	0.7078
GA1190 G56/5/7	161.4	134.9	3.450	0.7199
GA5361 G56/1/21	97.8	533.0	0.530	0.7065
GA5554 G56/1/20	116.5	333.8	1.007	0.7083
GA5555 G56/1/22	53.8	582.6	0.267	0.7053

GA5554, granodiorite from 328200 1947200; lat. 24°32′S, long. 150°20′E Monto

GA5555, granodiorite from 321000 1898100 Monto

GA1067, granodiorite from 337400 1863900; lat. 25°13′S, long. 150°26′E Mundubberra

GA1190, adamellite from 310300 1874000; lat. 25°02′30″S, long. 150°26′E Mundubberra

GA5361, granodiorite from 340500 1904600; lat. 24°53′S, long. 150°28′E Monto

Ref: Q 4,9

URANNAH IGNEOUS COMPLEX

Whole-rock Rb-Sr age 288 ± 31 m.y. Initial Sr^{87}/Sr^{86} 0.7047 ± 0.0009(I)

Whole-rock and mineral Rb-Sr age 299 ± 8 m.y.

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA472 F55/3/12	Biotite	251.8	10.4	69.507	0.9848
GA812 F55/3/13	Whole rock	98.6	131.9	2.158	0.7140
GA1072 F55/3/11	Whole rock	111.8	121.7	2.648	0.7150
					0.7155 (meas.)
GA5269 F55/12/20	Whole rock	204.5	210.1	2.809	0.7161
					0.7168 (meas.)
GA5270 F55/12/21	Whole rock	141.9	261.4	1.566	0.7112
		142.0	261.9	1.565	
GA5289 F55/12/3	Whole rock	93.4	330.1	0.816	0.7081
GA5354 F55/3/135	Whole rock	75.4	167.6	1.298	0.7103
	K-feldspar	248.3	157.6	4.546	0.7235
	Plagioclase	13.9	271.2	0.148	0.7052
	Biotite	732.3	2.6	809.290	4.1623
GA5392 F55/3/115	Whole rock	134.8	257.0	1.513	0.7111
	Biotite	827.1	9.9	242.060	1.8235
GA5396 F55/3/114	Whole rock	152.0	233.6	1.961	0.7135
	K-feldspar	451.8	195.4	6.673	0.7334
					0.7336 (meas.)
	Biotite	1054.5	6.9	439.825	2.7068

GA472, granodiorite from 661000 2385000; lat. 20°51′S, long. 148°17′E Bowen

GA812, adamellite from 647500 2409300; lat. 20°43′S, long. 148°10′E Bowen

GA1072, adamellite from 662700 2393300; lat. 20°51′S, long. 148°18′E Bowen

GA5269, granodiorite from 220500 2162000 St Lawrence

GA5270, granodiorite from 219500 2190500 St Lawrence

GA5289, granodiorite from 207300 2234000; lat. 22°10′S, long. 149°18′E St Lawrence

GA5354, adamellite from 684500 2408500; lat. 20°42′30″S, long. 148°30′E Bowen

GA5392, granodiorite from 681100 2399000; lat. 20°46′30″S, long. 148°28′E
Bowen

GA5396, adamellite from 679800 2401700; lat. 20°46′30″S, long. 148°28′E
Bowen

The four biotite determinations indicate ages of 314 m.y. (GA5392), 309 m.y. (GA5396), 290 m.y. (GA5354), and 284 m.y. (GA472). The best minimum estimate of the age of intrusion is considered to be 305 to 310 m.y.; see K-Ar ages below

Ref: Q 4,9 AUBURN COMPLEX (WESTERN SIDE) AND URANNAH IGNEOUS COMPLEX

The combined whole-rock Rb-Sr age for the Auburn Complex (western side) and Urannah Igneous Complex is 305 ± 15 m.y., initial Sr^{87}/Sr^{86} 0.7043 ± 0.0004; this is considered to be the most reliable estimate of the Rb-Sr age for these granitic rocks

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/13 Biotite K-Ar age 270 m.y.
GA812 %K 6.935, 6.928 (6.93) $*Ar^{40}/K^{40}$ 0.01690 % atm. Ar^{40} 6.3
Adamellite
Lat. 20°43′S, long. 148°10′E; 647500 2409300 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/11 Muscovite K-Ar age 271 m.y.,281 m.y., 268 m.y.
GA1072 %K 8.273, 8.317 (8.30) $*Ar^{40}/K^{40}$ 0.01702 % atm. Ar^{40} 2.4
0.01770 1.7
0.01682 3.4
Adamellite
Lat. 20°51′S, long. 148°18′E; 662700 2393300 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/4/4 Biotite K-Ar age 235 m.y.
GA1135 %K 7.445, 7.419 (7.43) $*Ar^{40}/K^{40}$ 0.01461 % atm. Ar^{40} 2.8
Hornblende K-Ar age 235 m.y.
%K 0.7103, 0.7051 (0.708) $*Ar^{40}/K^{40}$ 0.01464 % atm. Ar^{40} 7.9
Granodiorite
Lat. 20°48′S, long. 148°32′30″E Proserpine

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/9 Biotite K-Ar age 279 m.y., 274 m.y.
GA1136 %K 7.245, 7.210 (7.23) $*Ar^{40}/K^{40}$ 0.01756 % atm. Ar^{40} 2.1
0.01721 1.2
Granodiorite
Lat. 21°13′S, long. 148°42′E; 241300 2347600 Mackay

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/10 Biotite K-Ar age 272 m.y.
GA1137 %K 6.711, 6.672 (6.69) $*Ar^{40}/K^{40}$ 0.01712 % atm. Ar^{40} 1.8
Hornblende K-Ar age 267 m.y.
%K 0.3795, 0.3834 (0.381) $*Ar^{40}/K^{40}$ 0.01674 % atm. Ar^{40} 10.2
Granodiorite
Lat. 21°14′S, long. 148°41′E; 138000 2346600 Mackay

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/11 Biotite K-Ar age 271 m.y.
GA1138 %K 6.492, 6.547 (6.52) $*Ar^{40}/K^{40}$ 0.01706 % atm. Ar^{40} 1.7
Hornblende K-Ar age 278 m.y.
%K 0.3462, 0.3480 (0.347) $*Ar^{40}/K^{40}$ 0.01750 % atm. Ar^{40} 13.2
Granodiorite
Lat. 21°17′S, long. 148°39′E; 136600 2342000 Mackay

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/24 Biotite K-Ar age 268 m.y
GA1162 %K 6.937, 6.984 (6.96) *Ar^{40}/K^{40} 0.01682 % atm. Ar^{40} 2.6
Hornblende K-Ar age 273 m.y.
%K 0.7913, 0.7914 (0.791) *Ar^{40}/K^{40} 0.01719 % atm. Ar^{40} 6.2
Diorite
Lat. 20°51′S, long. 148°17′E; 625000 2423900 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/12/9 Biotite K-Ar age 307 m.y.
GA1189 %K5.213, 5.203 (5.21) *Ar^{40}/K^{40} 0.01950 % atm. Ar^{40} 3.4
Hornblende K-Ar age 315 m.y.
%K 0.4926, 0.4737, 0.4792 (0.482) *Ar^{40}/K^{40} 0.02000 % atm. Ar^{40} 12.4
Biotite-hornblende granodiorite
Lat. 22°31′S, long. 149°23′30″E; 218100 2190200 St Lawrence

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/12 Biotite K-Ar age 281 m.y., 279 m.y.
GA5267 %K 7.606, 7.608 (7.61) *Ar^{40}/K^{40} 0.01768 % atm. Ar^{40} 3.4
0.01759 2.8
Hornblende K-Ar age 289 m.y.
%K 0.6224, 0.6256 (0.624) *Ar^{40}/K^{40} 0.01825 % atm. Ar^{40} 10.4
Granodiorite
147900 2333500 Mackay

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/12/3 Hornblende K-Ar age 302 m.y.
GA5289 %K 0.4737, 0.4746 (0.474) *Ar^{40}/K^{40} 0.01913 % atm. Ar^{40} 8.8
Granodiorite
Lat. 22°10′S, long. 149°18′E; 207300 2234000 St Lawrence

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/12/8 Hornblende K-Ar age 305 m.y.
GA5290 %K 0.4678, 0.4659 (0.467) *Ar^{40}/K^{40} 0.01931 % atm. Ar^{40} 8.1
Granodiorite
Lat. 22°31′30″S, long. 149°23′30″E; 217500 2189600 St Lawrence

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/8 Hornblende K-Ar age 289 m.y.
GA5291 %K 0.4959, 0.4965 (0.496) *Ar^{40}/K^{40} 0.01816 % atm. Ar^{40} 11.8
Granodiorite
Lat. 21°41′S, long. 149°18′E; 207000 2294100 Mackay

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/7/8 Hornblende K-Ar age 286 m.y.
GA5293 %K 0.4585, 0.4559 (0.457) *Ar^{40}/K^{40} 0.01802 % atm. Ar^{40} 10.5
Granodiorite
Lat. 21°12′S, long. 148°30′E; 683100 2346300 Mount Coolon

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/105 Biotite K-Ar age 263 m.y.
GA5327 %K 7.880, 7.883 (7.88) *Ar^{40}/K^{40} 0.01647 % atm. Ar^{40} 2.8
Hornblende K-Ar age 279 m.y.
%K 0.3854, 0.3845 (0.385) *Ar^{40}/K^{40} 0.01759 % atm. Ar^{40} 11.6
Diorite
631150 2443750 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/104 Biotite K-Ar age 265 m.y.
GA5328 %K 7.516, 7.504 (7.51) *Ar^{40}/K^{40} 0.01663 % atm. Ar^{40} 3.7
Hornblende K-Ar age 266 m.y.
%K 0.5790, 0.5766 (0.578) *Ar^{40}/K^{40} 0.01671 % atm. Ar^{40} 6.9
Diorite
626800 2446300 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/101 Hornblende K-Ar age 270 m.y.
GA5333 %K 0.9921, 0.9969 (0.995) *Ar^{40}/K^{40} 0.01698 % atm. Ar^{40} 56.8
Foliated diorite
622900 2462200 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/37 Biotite K-Ar age 268 m.y.
GA5335 %K 7.599, 7.622 (7.61) *Ar^{40}/K^{40} 0.01686 % atm. Ar^{40} 2.4
Hornblende K-Ar age 273 m.y.
%K 0.5829, 0.5790 (0.581) *Ar^{40}/K^{40} 0.01716 % atm. Ar^{40} 14.7
Granodiorite
Lat. 20°41′30″S, long. 148°07′30″E; 643000 2410900 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/87 Biotite K-Ar age 266 m.y.
GA5336 %K 7.909, 7.913 (7.91) *Ar^{40}/K^{40} 0.01666 % atm. Ar^{40} 3.6
Hornblende K-Ar age 273 m.y.
%K 1.0624, 1.0600 (1.061) *Ar^{40}/K^{40} 0.01716 % atm. Ar^{40} 5.8
Foliated diorite
612700 2458300 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/113 Biotite K-Ar age 283 m.y.
GA5346 %K 7.744, 7.736 (7.74) *Ar^{40}/K^{40} 0.01786 % atm. Ar^{40} 6.2
Diorite
683100 2397300 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/106 Biotite K-Ar age 187 m.y., 188 m.y.
GA5347 %K 7.552, 7.525 (7.54) *Ar^{40}/K^{40} 0.01146 % atm. Ar^{40} 3.7
0.01154 9.3
Adamellite
656100 2424700 Bowen
Age too low; argon lost through contact metamorphism by Hecate Granite

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/135 Biotite K-Ar age 282 m.y.
GA5354 %K 7.722, 7.682 (7.70) *Ar^{40}/K^{40} 0.01775 % atm. Ar^{40} 4.1
Adamellite
Lat. 20°42′30″S, long. 148°30′E; 684500 2408500 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/108 Biotite K-Ar age 270 m.y.
GA5379 %K 7.721, 7.767 (7.74) *Ar^{40}/K^{40} 0.01697 % atm. Ar^{40} 4.7
Gneissic granite
647800 2413700 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/115 Biotite K-Ar age 289 m.y.
GA5392 %K 7.303, 7.332 (7.32) *Ar^{40}/K^{40} 0.01827 % atm. Ar^{40} 1.7
Hornblende K-Ar age 294 m.y.
%K 0.7406, 0.7463 (0.743) *Ar^{40}/K^{40} 0.01857 % atm. Ar^{40} 28.9
Granodiorite
Lat. 20°46′30″S, long. 148°28′E; 681100 2399000 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/3/114 Biotite K-Ar age 289 m.y.
GA5396 %K 7.467, 7.462 (7.46) *Ar^{40}/K^{40} 0.01826 % atm. Ar^{40} 1.7
Adamellite
Lat. 20°46′30″S, long. 148°28′E; 679800 2401700 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/8/14 Biotite K-Ar age 268 m.y.
GA5397 %K 7.104, 7.080 (7.09) *Ar^{40}/K^{40} 0.01683 % atm. Ar^{40} 19.0
Adamellite
116400 2372900 Mackay

Ref: Q 4,9 GRANODIORITE
F55/3/95 Biotite K-Ar age 272 m.y., 269 m.y.
GA5513 %K 8.033, 8.030 (8.03) *Ar^{40}/K^{40} 0.01710 % atm. Ar^{40} 2.6
0.01690 7.3
609000 2490700 Bowen

Ref: Q 4,9 ADAMELLITE
F55/3/67 Biotite K-Ar age 270 m.y.
GA5530 %K 7.334, 7.312 (7.32) *Ar^{40}/K^{40} 0.01698 % atm. Ar^{40} 4.4
584600 2487300 Bowen

Ref: Q 4,9 ADAMELLITE
F55/3/94 Biotite K-Ar age 297 m.y., 298 m.y.
GA5534 %K 7.100, 7.100 (7.10) *Ar^{40}/K^{40} 0.01882 % atm. Ar^{40} 2.7
0.01886 8.3
656100 2475100 Bowen

Ref: Q 4,9 ADAMELLITE
F55/3/136 Biotite K-Ar age 132 m.y.
GA5560 %K 7.615, 7.661 (7.64) *Ar^{40}/K^{40} 0.007959 % atm. Ar^{40} 4.2
655900 2427800 Bowen
Argon may have been lost through contact metamorphism by Hecate Granite

Ref: Q 4,9 LIZZIE CREEK VOLCANICS
F55/3/55 Plagioclase K-Ar age 274 m.y.
GA5373 %K 0.1298, 0.1288 (0.129) *Ar^{40}/K^{40} 0.01720 % atm. Ar^{40} 66.0
Basalt
565800 2455500 Bowen
Minimum age of extrusion

Ref: Q 4,9 LIZZIE CREEK VOLCANICS
F55/3/56 Plagioclase K-Ar age 229 m.y.
GA5374 %K 0.6319, 0.6290 (0.630) *Ar^{40}/K^{40} 0.01420 % atm. Ar^{40} 14.4
Basalt
568860 2452500 Bowen
Age too low

Ref: Q 4,9 LIZZIE CREEK VOLCANICS
F55/3/68 Plagioclase K-Ar age 264 m.y.
GA5375 %K 0.2255, 0.2280 (0.227) *Ar^{40}/K^{40} 0.01653 % atm. Ar^{40} 45.6
Basalt
566700 2475000 Bowen
Minimum age of extrusion

Ref: Q 4,9 THUNDERBOLT GRANITE
F55/3/26 Biotite K-Ar age 264 m.y.
GA5252 %K 7.543, 7.508 (7.53) *Ar^{40}/K^{40} 0.01655 % atm. Ar^{40} 2.6
Biotite Rb-Sr age 260 m.y.

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
771.7	7.8	285.525	1.7988

Adamellite
619700 2457000 Bowen
Probably reliable ages of intrusion

Ref: Q 4,9 THUNDERBOLT GRANITE
F55/3/27 Biotite K-Ar age 261 m.y.
GA5253 %K 7.460, 7.416 (7.44) *Ar^{40}/K^{40} 0.01632 % atm. Ar^{40} 3.7
Granodiorite
614300 2446800 Bowen
Probably reliable age of intrusion

Ref: Q 4,9 THUNDERBOLT GRANITE
F55/3/86 Biotite K-Ar age 264 m.y.
GA5332 %K 7.357, 7.403 (7.40) *Ar^{40}/K^{40} 0.01659 % atm. Ar^{40} 2.4
Biotite Rb-Sr age 271 m.y.

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
603.5	5.8	302.016	1.9120

Adamellite
615700 2458100 Bowen
Probably reliable ages of intrusion

Ref: Q 4,9 THUNDERBOLT GRANITE
F55/3/38 Biotite K-Ar age 259 m.y.
GA5338 %K 7.475, 7.429 (7.45) *Ar^{40}/K^{40} 0.01619 % atm. Ar^{40} 4.1
Adamellite
629290 2437450 Bowen
Probably reliable age of intrusion

Ref: Q 4,9 ADAMELLITE
F55/3/125 Biotite K-Ar age 268 m.y.
GA5365 %K 7.401, 7.387 (7.39) *Ar^{40}/K^{40} 0.01686 % atm. Ar^{40} 1.7
662600 2398700 Bowen

Ref: Q 4,9 GRANODIORITE
F55/3/36 Biotite K-Ar age 268 m.y.
GA5378 %K 7.443, 7.463 (7.45) *Ar^{40}/K^{40} 0.01682 % atm. Ar^{40} 15.0
630350 2423600 Bowen

Ref: Q 4,9 THUNDERBOLT GRANITE
F55/3/109 Biotite K-Ar age 265 m.y.
GA5380 %K 7.500, 7.492 (7.50) *Ar^{40}/K^{40} 0.01664 % atm. Ar^{40} 5.0
Adamellite
630300 2432800 Bowen

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX DYKES
Whole rock Rb-Sr age 249± 15 m.y. Initial Sr^{87}/Sr^{86} 0.7058 ± 0.0015(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5502 F55/7/9A	142.0	65.6	6.267	0.7284
GA5503 F55/7/9B	130.4	54.7	6.899	0.7307 0.7318 (meas.)
GA5504 F55/7/9C	136.5	5.9	11.031	0.7447 0.7463 (meas.)
GA5505 F55/7/9D	117.2	98.3	3.445	0.7183 0.7185 (meas.)
GA5506 F55/7/9E	129.0	55.9	6.662	0.7295 (meas.)

All samples are porphyry from 674100 2374000 Mount Coolon
Probably one of the ages of dyke intrusion; compare GA5329

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX DYKE
F55/3/107 Hornblende K-Ar age 255 m.y.
GA5329 %K 0.4243, 0.4255 (0.425) *Ar^{40}/K^{40} 0.01593 % atm. Ar^{40} 15.6
Microdiorite
654000 2423100 Bowen

Ref: Q 4,9 DIORITE
F55/12/11 Hornblende K-Ar age 245 m.y.
GA1163 %K 0.8944, 0.8988 (0.897) *Ar^{40}/K^{40} 0.01528 % atm. Ar^{40} 4.8
Lat. 22°42′S, long. 149°53′E; 275200 2166100 St Lawrence
Age of intrusion of Upper Permian basic to intermediate igneous rocks in the Marlborough district; compare GA1164, GA5263, GA5264, GA5265, and GA5266

Ref: Q 4,9 DIORITE
F55/12/13 Biotite K-Ar age 249 m.y., 246 m.y.
GA1164 %K 6.789, 6.790 (6.79) *Ar^{40}/K^{40} 0.01544 % atm. Ar^{40} 42.9
0.01534 1.5
Hornblende K-Ar age 247 m.y.
%K 0.7613, 0.7618 (0.762) *Ar^{40}/K^{40} 0.01538 % atm. Ar^{40} 10.8
Lat. 22°42′S, long. 149°53′E; 275500 2167900 St Lawrence
See GA1163

Ref: Q 4,9 HORNBLENDE GABBRO
F55/12/16 Hornblende K-Ar age 247 m.y.
GA5263 %K 0.6154, 0.6138 (0.615) *Ar^{40}/K^{40} 0.01542 % atm. Ar^{40} 12.6
Lat. 22°42′S, long. 149°55′30″E; 278900 2168000 St Lawrence
See GA1163

Ref: Q 4,9 DIORITE
F55/12/17 Biotite K-Ar age 243 m.y.
GA5264 %K 7.440, 7.432 (7.44) *Ar^{40}/K^{40} 0.01512 % atm. Ar^{40} 1.8
Hornblende K-Ar age 244 m.y.
%K 0.6026, 0.5990 (0.601) *Ar^{40}/K^{40} 0.01522 % atm. Ar^{40} 14.4
Lat. 22°42′S, long. 149°53′E; 275200 2168000 St Lawrence
See GA1163

Ref: Q 4,9 GRANODIORITE
F55/12/18 Biotite K-Ar age 243 m.y.
GA5265 %K 7.433, 7.439 (7.44) *Ar^{40}/K^{40} 0.01512 % atm. Ar^{40} 2.5
Lat. 22°43′S, long. 149°54′E; 275500 2166700 St Lawrence
See GA1163

Ref: Q 4,9 DIORITE
F55/12/19 Biotite K-Ar age 241 m.y.
GA5266 %K 7.326, 7.327 (7.33) *Ar^{40}/K^{40} 0.01500 % atm. Ar^{40} 2.3
Hornblende K-Ar age 238 m.y.
%K 0.6470, 0.6482 (0.648) *Ar^{40}/K^{40} 0.01484 % atm. Ar^{40} 11.6
Lat. 22°43′30″S, long. 149°53′30″E; 275500 2166400 St Lawrence
See GA1163

Ref: Q 4,9 XENOLITHIC GRANODIORITE
F55/12/10 Biotite K-Ar age 230 m.y.
GA1053A %K 6.456, 6.476 (6.47) *Ar^{40}/K^{40} 0.01429 % atm. Ar^{40} 40.9
Hornblende K-Ar age 238 m.y.
%K 0.6753, 0.6729 (0.674) *Ar^{40}/K^{40} 0.01481 % atm. Ar^{40} 10.5
Hornblende K-Ar age 232 m.y.
GA1053B %K 0.6563, 0.6565 (0.656) *Ar^{40}/K^{40} 0.01444 % atm. Ar^{40} 17.7
1053A, matrix; 1053B, xenolith
Lat. 22°51′S, long. 149°53′E; 273600 2149500 St Lawrence
Ages fall close to or within the preferred age limits (230-235 m.y.) of intrusion of Permian-Triassic granitic rocks in the Marlborough district; compare GA1054, GA5256, GA5257, GA5259, GA5261, GA5359, GA1068, and GA1069

Ref: Q 4,9 GRANODIORITE
F55/12/12 Biotite K-Ar age 240 m.y.
GA1054 %K 7.565, 7.583 (7.57) *Ar^{40}/K^{40} 0.01498 % atm. Ar^{40} 2.9
Hornblende K-Ar age 239 m.y.
%K 0.6323, 0.6269 (0.630) *Ar^{40}/K^{40} 0.01490 % atm. Ar^{40} 13.0
Lat. 22°43′S, long. 149°53′30″E; 275500 2167000 St Lawrence
See GA1053

Ref: Q 4,9 GRANODIORITE
F55/12/14 Biotite K-Ar age 235 m.y.
GA5256 %K 7.153, 7.124 (7.14) *Ar^{40}/K^{40} 0.01459 % atm. Ar^{40} 8.9
Hornblende K-Ar age 235 m.y.
%K 0.6807, 0.6817 (0.681) *Ar^{40}/K^{40} 0.01465 % atm. Ar^{40} 8.1
Lat. 22°52′S, long. 149°54′E; 274200 2149000 St Lawrence
See GA1053

Ref: Q 4,9 GABBRO
F55/12/15 Hornblende K-Ar age 240 m.y.
GA5257 %K 0.8085, 0.7996 (0.804) *Ar^{40}/K^{40} 0.01497 % atm. Ar^{40} 7.4
Lat. 22°53′S, long. 149°53′E; 273300 2147800 St Lawrence
See GA1053

Ref: Q 4,9 GABBRO
F56/9/2 Biotite K-Ar age 237 m.y.
GA5259 %K 7.687, 7.693 (7.69) *Ar^{40}/K^{40} 0.01475 % atm. Ar^{40} 1.4
Lat. 22°48′S, long. 150°01′E; 289700 2157900 Port Clinton
See GA1053

Ref: Q 4,9 GRANODIORITE
F56/9/4 Biotite K-Ar age 232 m.y.
GA5261 %K 7.807, 7.772 (7.79) *Ar^{40}/K^{40} 0.01445 % atm. Ar^{40} 2.2
Lat. 22°46′S, long. 150°02′E; 290600 2162100 Port Clinton
See GA1053

Ref: Q 4,9 GRANODIORITE
F56/9/6 Biotite K-Ar age 235 m.y.
GA5359 %K 7.554, 7.574 (7.56) *Ar^{40}/K^{40} 0.01465 % atm. Ar^{40} 5.1
Hornblende K-Ar age 238 m.y.
%K 0.7189, 0.7200 (0.719) *Ar^{40}/K^{40} 0.01481 % atm. Ar^{40} 13.5
Lat. 22°50′S, long. 150°39′E; 359100 2157300 Port Clinton
See GA1053

Ref: Q 4,9 DIORITE
F55/16/2 Hornblende K-Ar age 236 m.y.
GA1068 %K 1.0005, 1.0006 (1.001) *Ar^{40}/K^{40} 0.01467 % atm. Ar^{40} 11.7
Lat. 23°27′30″S, long. 149°49′E; 267700 2077400 Duaringa
See GA1053

Ref: Q 4,9 ADAMELLITE
F55/16/3 Biotite K-Ar age 237 m.y.
GA1069 %K 7.350, 7.349 (7.35) *Ar^{40}/K^{40} 0.01477 % atm. Ar^{40} 2.6
Hornblende K-Ar age 240 m.y.
%K 0.9035, 0.9023 (0.903) *Ar^{40}/K^{40} 0.01493 % atm. Ar^{40} 15.8
Lat. 23°29′S, long. 149°50′E; 269300 2075500 Duaringa
See GA1053

Ref: Q 4,9 GRANODIORITE
G56/1/14 Hornblende K-Ar age 249 m.y.
GA887 %K 0.3188, 0.3151 (0.317) *Ar^{40}/K^{40} 0.01555 % atm. Ar^{40} 28.3
From Core 14, 1217 m, Mulgildie No. 1 well
Lat. 24°58′S, long. 151°08′E Monto

Ref: Q 4,9 GRANODIORITE
G56/1/1 Biotite K-Ar age 239 m.y.
GA1166 %K 7.520, 7.568 (7.54) *Ar^{40}/K^{40} 0.01489 % atm. Ar^{40} 2.6
Hornblende K-Ar age 242 m.y.
%K 0.5858, 0.5836 (0.585) *Ar^{40}/K^{40} 0.01511 % atm. Ar^{40} 14.7
Lat. 24°12′S, long. 150°45′E; 372000 1988800 Monto

Ref: Q 4,9 GRANODIORITE
G56/1/2 Biotite K-Ar age 239 m.y.
GA1167 %K 7.394, 7.377 (7.39) *Ar^{40}/K^{40} 0.01485 % atm. Ar^{40} 5.9
Hornblende K-Ar age 235 m.y.
%K 0.4398, 0.4385 (0.439) *Ar^{40}/K^{40} 0.01460 % atm. Ar^{40} 18.2
Lat. 24°08′S, long. 150°44′E; 370300 1995200 Monto

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/2 Biotite K-Ar age 235 m.y.
GA1168 %K 7.388, 7.384 (7.39) *Ar^{40}/K^{40} 0.01461 % atm. Ar^{40} 3.3
Granodiorite
Lat. 25°20′S, long. 150°34′E; 352500 1849100 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/3 Biotite K-Ar age 240 m.y.
GA1169 %K 7.409, 7.367 (7.39) *Ar^{40}/K^{40} 0.01493 % atm. Ar^{40} 2.5
Lat. 25°22′S, long. 150°33′E; 350700 1846700 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/1/8 Biotite K-Ar age 236 m.y.
GA1249 %K 6.918, 6.865 (6.89) *Ar^{40}/K^{40} 0.01470 % atm. Ar^{40} 2.3
Hornblende K-Ar age 241 m.y.
%K 0.5408, 0.5389 (0.540) *Ar^{40}/K^{40} 0.01503 % atm. Ar^{40} 14.1
Granodiorite
Lat. 24°44′S, long. 150°43′E; 369000 1923400 Monto

Ref: Q 4,9 GRANODIORITE
G56/1/10 Biotite K-Ar age 234 m.y.
GA1250 %K 7.059, 7.048 (7.05) *Ar^{40}/K^{40} 0.01455 % atm. Ar^{40} 2.0
Hornblende K-Ar age 231 m.y.
%K 0.5560, 0.5595 (0.558) *Ar^{40}/K^{40} 0.01436 % atm. Ar^{40} 25.2
Lat. 24°51′S, long. 150°49′E; 380400 1903600 Monto

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/1/9 Biotite K-Ar age 237 m.y.
GA1369 %K 6.792, 6.757 (6.77) *Ar^{40}/K^{40} 0.01473 % atm. Ar^{40} 2.3
Hornblende K-Ar age 231 m.y.
%K 0.4949, 0.4959 (0.495) *Ar^{40}/K^{40} 0.01439 % atm. Ar^{40} 10.9
Granodiorite
Lat. 24°46′S, long. 150°51′E; 383900 1919000 Monto

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/1/11 Biotite K-Ar age 249 m.y.
GA1370 %K 7.686, 7.635 (7.66) *Ar^{40}/K^{40} 0.01558 % atm. Ar^{40} 1.6
Granodiorite
Lat. 24°56′S, long. 150°36′E; 355300 1899400 Monto

Ref: Q 4,9 GRANITE
G56/5/21 Biotite K-Ar age 236 m.y.
GA5337 %K 7.747, 7.707 (7.73) *Ar^{40}/K^{40} 0.01468 % atm. Ar^{40} 3.1
Lat. 25°22′S, long. 151°07′E; 413500 1845600 Mundubberra

Ref: Q 4,9 FELDSPAR PORPHYRY
F56/13/11 Plagioclase K-Ar age 229 m.y.
GA5340 %K 0.7300, 0.7299 (0.730) *Ar^{40}/K^{40} 0.01425 % atm. Ar^{40} 12.7
From dyke cutting Mount Morgan Granite
Lat. 23°38′S, long. 150°22′30″E; 330300 2055700 Rockhampton

Ref: Q 4,9 MOONMERA GRANITE
F56/13/13 Biotite K-Ar age 237 m.y.
GA5341 %K 7.445, 7.435 (7.44) *Ar^{40}/K^{40} 0.01474 % atm. Ar^{40} 3.0
Granodiorite
Lat. 23°35′S, long. 150°23′30″E; 332000 2062600 Rockhampton

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/10 Hornblende K-Ar age 238 m.y.
GA5342 %K 0.7828, 0.7821 (0.782) *Ar^{40}/K^{40} 0.01483 % atm. Ar^{40} 12.5
Granodiorite
Lat. 25°22′S, long. 151°07′E; 413500 1845600 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/1/17 Biotite K-Ar age 250 m.y.
GA5343 %K 7.759, 7.811 (7.79) *Ar^{40}/K^{40} 0.01563 % atm. Ar^{40} 7.4
Banded adamellite
Lat. 24°58′S, long. 150°35′E; 354200 1894700 Monto

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/12 Biotite K-Ar age 229 m.y.
GA5344 %K 7.921, 7.867 (7.89) *Ar^{40}/K^{40} 0.01427 % atm. Ar^{40} 14.6
Biotite gneiss
Lat. 25°24′S, long. 150°48′30″E; 378800 1841900 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/13 Biotite K-Ar age 228 m.y.
GA5345 %K 7.586, 7.619 (7.60) *Ar^{40}/K^{40} 0.01414 % atm. Ar^{40} 10.3
Adamellite
Lat. 25°24′S, long. 150°48′30″E; 379000 1841900 Mundubberra

Ref: Q 4,9 GRANODIORITE
G56/1/15 Biotite K-Ar age 235 m.y.
GA5348 %K 6.492, 6.477 (6.48) *Ar^{40}/K^{40} 0.01465 % atm. Ar^{40} 28.8
Hornblende K-Ar age 242 m.y.
%K 0.3763, 0.3765 (0.376) *Ar^{40}/K^{40} 0.01512 % atm. Ar^{40} 41.7
Lat. 24°43′S, long. 150°59′E; 397000 1926000 Monto

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/14 Biotite K-Ar age 233 m.y.
GA5350 %K 7.577, 7.641 (7.61) *Ar^{40}/K^{40} 0.01449 % atm. Ar^{40} 9.5
Hornblende K-Ar age 239 m.y.
%K 0.7142, 0.7217 (0.718) *Ar^{40}/K^{40} 0.01488 % atm. Ar^{40} 8.0
Granodiorite
Lat. 25°25′S, long. 150°52′E; 385400 1840200 Mundubberra

Ref: Q 4,9 DIORITE
G56/5/16 Hornblende K-Ar age 245 m.y.
GA5351 %K 0.4893, 0.4909 (0.490) *Ar^{40}/K^{40} 0.01526 % atm. Ar^{40} 14.3
Lat. 25°22′S, long. 151°06′E; 410700 1846000 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/18 Biotite K-Ar age 228 m.y.
GA5352 %K 7.013, 7.037 (7.02) *Ar^{40}/K^{40} 0.1413 % atm. Ar^{40} 10.1
Hornblende K-Ar age 232 m.y.
%K 0.7253, 0.7341 (0.730) *Ar^{40}/K^{40} 0.01442 % atm. Ar^{40} 16.8
Granodiorite
Lat. 25°07′30″S, long. 150°50′30″E; 383300 1874800 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/19 Biotite K-Ar age 228 m.y.
GA5353 %K 6.836, 6.828 (6.83) *Ar^{40}/K^{40} 0.01418 % atm. Ar^{40} 11.1
Hornblende K-Ar age 233 m.y.
%K 0.7758, 0.7790 (0.777) *Ar^{40}/K^{40} 0.01446 % atm. Ar^{40} 25.5
Granodiorite
Lat. 25°02′30″S, long. 150°51′E; 384500 1885700 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/11 Biotite K-Ar age 228 m.y.
GA5357 %K 7.619, 7.605 (7.61) *Ar^{40}/K^{40} 0.01417 % atm. Ar^{40} 5.1
Biotite gneiss
Lat. 25°23′30″S, long. 150°46′30″E; 376600 1842400 Mundubberra

Ref: Q 4,9 GRACEMERE GRANITE
F56/13/5 Biotite K-Ar age 239 m.y.
GA5360 %K 7.527, 7.558 (7.54) *Ar^{40}/K^{40} 0.01487 % atm. Ar^{40} 4.9
Diorite
Lat. 23°28′S, long. 150°28′E; 341000 2087300 Rockhampton

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/15 Biotite K-Ar age 236 m.y.
GA5362 %K 7.364, 7.323 (7.34) *Ar^{40}/K^{40} 0.01468 % atm. Ar^{40} 4.1
Adamellite
Lat. 25°26′S, long. 150°55′E; 390800 1838600 Mundubberra

Ref: Q 4,9 AUBURN COMPLEX (EASTERN SIDE)
G56/5/20 Biotite K-Ar age 234 m.y.
GA5364 %K 7.144, 7.132 (7.14) *Ar^{40}/K^{40} 0.01458 % atm. Ar^{40} 5.8
Hornblende K-Ar age 232 m.y.
%K 0.7101, 0.7138 (0.712) *Ar^{40}/K^{40} 0.01443 % atm. Ar^{40} 33.4
Granodiorite
Lat. 25°06′S, long. 150°57′30″E; 396700 1876700 Mundubberra

Ref: Q 4,9 ADAMELLITE
F56/13/6 Biotite K-Ar age 238 m.y.
GA5393 %K 7.333, 7.398 (7.37) *Ar^{40}/K^{40} 0.01483 % atm. Ar^{40} 12.8
Lat. 23°33′30″S, long. 150°16′E; 318000 2064900 Rockhampton

Ref: Q 4,9 ESKDALE GRANITE
G56/14/19 Biotite K-Ar age 234 m.y.
GA5326 %K 6.150, 6.124 (6.14) *Ar^{40}/K^{40} 0.01457 % atm. Ar^{40} 4.6
Biotite Rb-Sr age 242 m.y.

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
673.4	3.9	495.200	2.4667

Adamellite
Perseverance Creek Dam Ipswich
See under 'Granites, Gayndah-Proston area'

Ref: Q 4,9 GRANITE
G56/10/9 Biotite K-Ar age 253 m.y.
GA5382 %K 5.316, 5.303 (5.31) *Ar^{40}/K^{40} 0.01581 % atm. Ar^{40} 13.2
485000 711000 Gympie
See under 'Granites, Gayndah-Proston area'

Ref: Q 4,9 RAPAKIVI GRANITE
G56/10/10 Biotite K-Ar age 245 m.y.
GA5384 %K 6.959, 6.969 (6.96) *Ar^{40}/K^{40} 0.01528 % atm. Ar^{40} 4.3
475000 748000 Gympie
See under 'Granites, Gayndah-Proston area'

Ref: Q 4,9 GRANITE
G56/6/1 Biotite K-Ar age 248 m.y.
GA5387 %K 5.849, 5.857 (5.85) *Ar^{40}/K^{40} 0.01552 % atm. Ar^{40} 3.5
Biotite Rb-Sr age 253 m.y.

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
1106.4	6.7	479.340	2.4831

Lat. 25°37′S, long. 151°31′E; 463000 816000 Maryborough
See under 'Granites, Gayndah-Proston area'

Ref: Q 4,9 GRANITES, GAYNDAH-PROSTON AREA

Whole rock Rb-Sr age 274 ± 28 m.y. Initial Sr^{87}/Sr^{86} 0.7041 ± 0.0028(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5295	90.7	172.7	1.518	0.7103
G56/6/3				0.7105 (meas.)
GA5322	172.8	94.5	5.271	0.7257
G56/6/11				0.7260 (meas.)
GA5326	203.9	73.8	7.975	0.7321
G56/14/19				0.7315 (meas.)
	198.6	72.1	7.967	0.7320
				0.7321 (meas.)
GA5382	133.2	68.6	5.596	0.7243
G56/10/9				0.7252 (meas.)
	131.7	68.0	5.605	0.7245
				0.7253 (meas.)
GA5384	204.7	88.2	6.702	0.7316 (meas.)
G56/10/10				
GA5387	240.9	56.2	12.397	0.7540
G56/6/1				0.7542 (meas.)

GA5295, granodiorite from Mount Perry Granite, Possum Creek, 456000 856000; lat. 25°15′39″S, long. 151°30′44″E Maryborough
GA5322, rapakivi granite, south of Gayndah, 455000 798000; lat. 25°46′S, long. 151°31′E Maryborough
GA5326, adamellite from Eskdale Granite, Perseverance Creek Dam Ipswich
GA5382, granite from 485000 711000 Gympie
GA5384, rapakivi granite from 475000 748000 Gympie
GA5387, granite from 463000 816000; lat. 25°37′S, long. 151°31′E Maryborough

The analytical data of GA5326 do not fit the isochron; the Eskdale Granite, from which GA5326 was taken, may be a younger intrusion (c.f. K-Ar age). The K-Ar ages determined for GA5382, GA5384, and GA5387 may result from partial argon loss during the intrusion of younger granitic rocks, such as the Eskdale Granite

Ref: Q 4 ROCKSBERG GREENSTONES

G56/14/19 Muscovite K-Ar age 244 m.y.
GA5192 %K 7.987, 8.006 (8.00) $*Ar^{40}/K^{40}$ 0.01522 % atm. Ar^{40} 4.0
Glaucophane K-Ar age 249 m.y.
%K 0.3221, 0.3235 (0.323) $*Ar^{40}/K^{40}$ 0.01556 % atm. Ar^{40} 14.3
Glaucophane schist
903 412 Ipswich

Ref: Q 4,9 'MOUNT WICKHAM RHYOLITE'

Whole rock Rb-Sr age 230 ± 15 m.y. Initial Sr^{87}/Sr^{86} 0.7055 ± 0.0007(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5519	93.2	94.4	2.852	0.7151
F55/3/143				0.7151 (meas.)
GA5520	72.6	153.7	1.363	0.7097 (meas.)
F55/3/69				
GA5521	117.9	126.2	2.692	0.7149 (meas.)
F55/3/74				
GA5522	106.1	196.9	1.556	0.7106
F55/3/75				0.7108 (meas.)
GA5523	103.0	200.2	1.486	0.7112
F55/3/76				0.7108 (meas.)
GA5524	70.6	37.3	5.452	0.7245
F55/3/72				0.7241 (meas.)
GA5525	91.9	55.1	4.800	0.7214
F55/3/78				0.7215 (meas.)
GA5532	108.6	61.2	5.133	0.7233
F55/3/16				0.7229 (meas.)

GA5519, acid dyke from 569300 2436200 Bowen
GA5520, acid volcanic from 562050 2475700 Bowen
GA5521, acid volcanic from 565100 2448600 Bowen
GA5522, acid volcanic from 565100 2448700 Bowen
GA5523, acid volcanic from 564800 2448500 Bowen
GA5524, acid volcanic from 572700 2455600 Bowen
GA5525, acid volcanic from 577200 2443700 Bowen
GA5532, adamellite from 575200 2417300 Bowen
Probably reliable age; the volcanics unconformably overlie the Lower Permian Lizzie Creek Volcanics

Ref: Q 4,9 GABBRO
F55/12/4 Pyroxene K-Ar age 220 m.y.
GA1155 %K 0.03 *Ar^{40}/K^{40} 0.01361 % atm. Ar^{40} 71.7
Lat. 22°10′S, long. 149°17′E; 193000 2228000 St Lawrence

Ref: Q 4,9 GABBRO
F55/12/1 Pyroxene K-Ar age 211 m.y.
GA1187 %K 0.0714, 0.0716 (0.072) *Ar^{40}/K^{40} 0.01303 % atm. Ar^{40} 37.0
Lat. 22°15′30″S, long. 149°19′E; 209500 2222200 St Lawrence

Ref: Q 4,9 GRANODIORITE
G56/1/3 Biotite K-Ar age 216 m.y.
GA1245 %K 7.429, 7.370 (7.40) *Ar^{40}/K^{40} 0.01340 % atm. Ar^{40} 2.6
Hornblende K-Ar age 211 m.y.
%K 0.3493, 0.3485 (0.349) *Ar^{40}/K^{40} 0.01314 % atm. Ar^{40} 29.9
Lat. 24°17′S, long. 151°07′E; 412500 1978200 Monto

Ref: Q 4,9 GRANODIORITE
G56/1/5 Biotite K-Ar age 216 m.y.
GA1246 %K 6.361, 6.355 (6.36) *Ar^{40}/K^{40} 0.01338 % atm. Ar^{40} 2.6
Hornblende K-Ar age 211 m.y.
%K 0.3516, 0.3505 (0.351) *Ar^{40}/K^{40} 0.01306 % atm. Ar^{40} 16.2
Lat. 24°25′S, long. 151°17′E; 431900 1961100 Monto

Ref: Q 4,9 GRANODIORITE
G56/1/6 Biotite K-Ar age 221 m.y.
GA1247 %K 5.493, 5.508 (5.50) *Ar^{40}/K^{40} 0.01370 % atm. Ar^{40} 2.3
Hornblende K-Ar age 219 m.y.
%K 0.3155, 0.3152 (0.315) *Ar^{40}/K^{40} 0.01357 % atm. Ar^{40} 24.6
Lat. 24°34′S, long. 151°17′E; 431900 1942700 Monto

Ref: Q 4,9 GRANODIORITE
G56/1/7 Biotite K-Ar age 220 m.y.
GA1248 %K 5.271, 5.288 (5.28) *Ar^{40}/K^{40} 0.01364 % atm. Ar^{40} 3.0
Lat. 24°34′S, long. 151°15′E; 428400 1942700 Monto

Ref: Q 4,9 PEGMATITE DYKE
F56/9/1 Muscovite K-Ar age 218 m.y.
GA5258 %K 8.612, 8.642 (8.63) *Ar^{40}/K^{40} 0.01347 % atm. Ar^{40} 2.4
Lat. 22°49′S, long. 150°01′E; 289400 2156500 Port Clinton

Ref: Q 4,9 ADAMELLITE
Biotite K-Ar age 225 m.y.
GA5282 %K 5.967, 5.931 (5.95) *Ar^{40}/K^{40} 0.01397 % atm. Ar^{40} 5.7
508000 453000 Warwick

Ref: Q 4,9 URANNAH IGNEOUS COMPLEX
F55/4/5 Biotite K-Ar age 117 m.y., 117 m.y.
GA1170 %K 7.178, 7.198 (7.19) *Ar^{40}/K^{40} 0.007079 % atm. Ar^{40} 4.2
0.007062 3.4
Granodiorite
Lat. 20°48′S, long. 148°33′30″E; 121600 2398000 Proserpine

Ref: Q 4,9 MICROGRANODIORITE
F55/11/5 Hornblende K-Ar age 123 m.y.
GA1244 %K 0.2225, 0.2219 (0.222) *Ar^{40}/K^{40} 0.007420 % atm. Ar^{40} 32.2
Plagioclase K-Ar age 116 m.y.
%K 0.2412, 0.2399 (0.241) *Ar^{40}/K^{40} 0.007013 % atm. Ar^{40} 45.4
Lat. 22°04′S, long. 148°20′30″E; 664500 2243600 Clermont

Ref: Q 4,9 GABBRO
F55/3/33 Plagioclase K-Ar age 133 m.y.
GA5272 %K 0.1127, 0.1119 (0.112) *Ar^{40}/K^{40} 0.008027 % atm. Ar^{40} 37.7
636700 2373900 Bowen
Intrudes Upper Permian and Triassic sediments

Ref: Q 4,9 HECATE GRANITE
F55/3/62 Biotite K-Ar age 125 m.y.
GA5330 %K 7.689, 7.716 (7.70) *Ar^{40}/K^{40} 0.007560 % atm. Ar^{40} 5.2
Hornblende K-Ar age 127 m.y.
%K 0.4236, 0.4233 (0.423) *Ar^{40}/K^{40} 0.007696 % atm. Ar^{40} 16.7
Granodiorite
669800 2440950 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 HECATE GRANITE
F55/3/61 Biotite K-Ar age 123 m.y.
GA5331 %K 7.466, 7.439 (7.45) *Ar^{40}/K^{40} 0.007397 % atm. Ar^{40} 3.8
Adamellite
665100 2434500 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 HECATE GRANITE
F55/3/117 Biotite K-Ar age 124 m.y.
GA5355 %K 7.384, 7.414 (7.40) *Ar^{40}/K^{40} 0.007466 % atm. Ar^{40} 3.6
Adamellite
644350 2458500 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 HECATE GRANITE
F55/3/118 Biotite K-Ar age 124 m.y.
GA5356 %K 7.574, 7.551 (7.56) *Ar^{40}/K^{40} 0.007517 % atm. Ar^{40} 15.2
Hornblende K-Ar age 126 m.y.
%K 0.5051, 0.5061 (0.506) *Ar^{40}/K^{40} 0.007585 % atm. Ar^{40} 10.9
Adamellite
648000 2445500 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 ADAMELLITE
F55/3/127 Biotite
GA5358 %K 7.464, 7.443 (7.45) *Ar^{40}/K^{40} 0.007446 % atm. Ar^{40} 13.5
624100 2411700 Bowen
Intrudes Lizzie Creek Volcanics

Ref: Q 4,9 HECATE GRANITE
F55/3/91 Biotite K-Ar age 128 m.y.
GA5398 %K 7.832, 7.865 (7.85) *Ar^{40}/K^{40} 0.007765 % atm. Ar^{40} 2.4
Adamellite
641250 2444200 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 HECATE GRANITE
F55/3/10 Biotite K-Ar age 123 m.y.
GA5399 %K 7.539, 7.599 (7.57) *Ar^{40}/K^{40} 0.007446 % atm. Ar^{40} 10.0
Granodiorite
629100 2466400 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 HECATE GRANITE
F55/3/97 Biotite K-Ar age 120 m.y.
GA5529 %K 7.545, 7.570 (7.56) *Ar^{40}/K^{40} 0.007257 % atm. Ar^{40} 8.2
Adamellite
621250 2467200 Bowen
Lower Cretaceous batholith that intrudes Lower Permian rocks

Ref: Q 4,9 ALKALI GRANITE
F55/4/2 Hornblende K-Ar age 110 m.y.
GA1142 %K 0.759, 0.761 (0.760) *Ar^{40}/K^{40} 0.006588 % atm. Ar^{40} 8.8
Lat. 20°55′S, long. 148°59′E; 170600 2384400 Proserpine

Ref: Q 4,9 ALKALI GRANITE
F55/4/3 Hornblende K-Ar age 115 m.y.
GA1154 %K 0.7873, 0.7936 (0.790) *Ar^{40}/K^{40} 0.006939 % atm. Ar^{40} 16.5
Lat. 20°54′S, long. 148°59′E; 170600 2385300 Proserpine

Ref: Q 4,9 MOUNT ABBOT IGNEOUS COMPLEX
F55/3/119 Hornblende K-Ar age 116 m.y.
GA5531 %K 0.9956, 0.9915 (0.994) *Ar^{40}/K^{40} 0.007012 % atm. Ar^{40} 31.5
Quartz syenite
600600 2480200 Bowen

Ref: Q 4,9 WHITSUNDAY VOLCANICS
F55/4/9 Whole rock K-Ar age 106 m.y., 96 m.y.
GA5394 %K 1.717, 1.711 (1.714) *Ar^{40}/K^{40} 0.006370 % atm. Ar^{40} 15.0
0.005749 23.7
Hydrothermally altered quartz-feldspar porphyry
Pentecost Island
175100 2447100 Proserpine
Probably minimum dates for age of alteration

Ref: Q 4,9 WHITSUNDAY VOLCANICS
F55/4/25 Hornblende K-Ar age 112 m.y.
GA5553 %K 0.3413, 0.3408 (0.341) *Ar^{40}/K^{40} 0.006734 % atm. Ar^{40} 43.9
Dacite
Carlisle Island Proserpine
205700 2399700

Ref: Q 4,9 PROSERPINE VOLCANICS
Whole rock Rb-Sr age 111 ± 5 m.y. Initial Sr^{87}/Sr^{86} 0.7037 ± 0.0004(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5507	113.8	199.0	1.651	0.7067
F55/4/23				0.7063 (meas.)
GA5508	51.3	242.7	0.611	0.7047
F55/4/20				0.7047 (meas.)
GA5511	165.2	49.6	9.623	0.7193
F55/4/22				0.7195 (meas.)
GA5512	152.5	41.0	10.745	0.7204
F55/4/21				0.7209 (meas.)
GA5539	154.9	73.4	6.096	0.7133
F55/4/33				0.7135 (meas.)
GA5546	97.7	161.7	1.744	0.7063
F55/4/26				0.7065 (meas.)
GA5547	148.5	51.1	8.405	0.7180
F55/4/27				0.7180 (meas.)
GA5552	45.4	199.4	0.656	0.7049
F55/4/32				

Rhyolite
GA5507 from 139500 2447800 Proserpine
GA5508 from 143800 2447900 Proserpine
GA5511 from 138900 2445100 Proserpine
GA5512 from 137800 2445200 Proserpine
GA5539 from 136600 2444100 Proserpine
GA5546 from 137400 2445500 Proserpine
GA5547 from 139200 2445200 Proserpine
GA5552 from 136400 2442200 Proserpine
Age of extrusion

Ref: Q 4,10
E55/14/44
GA5274
RAVENSWOOD GRANODIORITE COMPLEX
Biotite K-Ar age 440 m.y., 451 m.y.
%K 6.563, 6.560 (6.56) *Ar^{40}/K^{40} 0.028972 % atm. Ar^{40} 1.6
0.029780 3.0
Hornblende K-Ar age 420 m.y.
%K 0.6749, 0.6779 (0.676) *Ar^{40}/K^{40} 0.02747 % atm. Ar^{40} 4.9
Granodiorite
Road-cutting 800 m east of Mingela
Lat. 19°52′30″S, long. 146°38′30″E; 473200 2511400 Townsville
The 420 and 440 m.y. dates are minimum ages of early phase of intrusion (c.f. Rb-Sr isochron, p. 55)

Ref: Q 4,10
E55/14/1
GA5283
RAVENSWOOD GRANODIORITE COMPLEX
Biotite K-Ar age 420 m.y.
%K 6.101, 6.142 (6.12) *Ar^{40}/K^{40} 0.02750 % atm. Ar^{40} 1.4
Granodiorite
Road from Mingela to Fanning River Homestead
Lat. 19°46′S, long. 146°29′30″E; 456500 2524100 Townsville
Minimum age of intrusion

Ref: Q 4,10
E55/14/17
GA5284
OWEENEE GRANITE
Biotite K-Ar age 298 m.y.
%K 5.395, 5.415 (5.41) *Ar^{40}/K^{40} 0.01886 % atm. Ar^{40} 3.9
Granite
9.6 km along track north from Lassie Creek/Laroona Homestead road
Lat. 19°16′30″S, long. 145°52′E; 384700 2584000 Townsville
Age too low

Ref: Q 4,10
E55/14/18
GA5533
PALL MALL ADAMELLITE
Biotite K-Ar age 283 m.y.
%K 7.401, 7.371 (7.39) *Ar^{40}/K^{40} 0.01782 % atm. Ar^{40} 2.0
Adamellite
418900 2557700 Townsville
Probably reliable age of intrusion

Ref: Q 4,10
E55/14/5
GA5535
GRANODIORITE
Biotite K-Ar age 277 m.y.
%K 7.594, 7.616 (7.61) *Ar^{40}/K^{40} 0.01745 % atm. Ar^{40} 1.1
Six Mile Creek, 2.4 km east-northeast of Carey's Dam
Lat. 19°22′S, long. 146°15′30″E; 429200 2572000 Townsville
Probably reliable age of intrusion

Ref: Q 4,10
F55/2/13
GA5561
HORNBLENDE PORPHYRY
Hornblende K-Ar age 328 m.y.
%K 0.7120, 0.7122 (0.712) *Ar^{40}/K^{40} 0.02094 % atm. Ar^{40} 11.8
From dyke near Charters Towers
434000 2485300 Charters Towers
Age of intrusion

Ref: Q 4,10 HORNBLENDE PORPHYRY
F55/2/38 Hornblende K-Ar age 339 m.y.
GA5720 %K 0.7003, 0.6993 (0.700) *Ar^{40}/K^{40} 0.02169 % atm. Ar^{40} 5.4
From dyke near Charters Towers
434000 2485300 Charters Towers
Age of intrusion

Ref: Q 4,10 HORNBLENDE PORPHYRY
F55/2/39 Hornblende K-Ar age 332 m.y.
GA5721 %K 0.8561, 0.8606 (0.858) *Ar^{40}/K^{40} 0.02124 % atm. Ar^{40} 27.7
From dyke near Charters Towers
434700 2488500 Charters Towers
Age of intrusion

Ref: Q 5 BRISBANE VALLEY PORPHYRITES
Hornblende K-Ar age 218 m.y., 219 m.y.
GA5324 %K 0.4076, 0.4077 (0.408) *Ar^{40}/K^{40} 0.01348 % atm. Ar^{40} 11.7
0.01358 19.5
Hornblende porphyry
552 626 Ipswich
Probably reliable age of intrusion; dykes intrude Middle Triassic strata

Ref: Q 6 TRACHYTE
F55/15/6 Sanidine K-Ar age 20.5 m.y., 20.4 m.y., 18.3 m.y., 26.7 m.y., 26.1 m.y.
GA686D %K 5.869, 5.777 (5.82) *Ar^{40}/K^{40} 0.001204 % atm. Ar^{40} 61.0
0.001199 18.7
0.001074 49.6
0.001570 12.3
0.001535 25.7
Sanidine K-Ar age 26.9 m.y., 27.0 m.y., 24.0 m.y., 26.1 m.y., 26.8 m.y., 26.7 m.y.
GA686E %K 5.821, 5.850 (5.84) *Ar^{40}/K^{40} 0.001586 % atm. Ar^{40} 58.7
0.001581 25.4
0.001412 27.1
0.001536 14.1
0.001579 18.6
0.001571 19.1
Crystal Hill
Lat. 23°58′S, long. 148°08′E Emerald
The best estimate of the age is about 27.0 m.y.

Ref: Q 6 OLIVINE BASALT
Whole rock K-Ar age 25.7 m.y., 25.7 m.y., 26.7 m.y.
GA5158 %K 0.6971, 0.6966 (0.697) *Ar^{40}/K^{40} 0.001516 % atm. Ar^{40} 63.9
0.001510 67.7
0.001574 73.5
Lat. 24°08′S, long. 147°55′E Springsure

Ref: Q 7 LAMINGTON VOLCANICS (LISMORE BASALT)
Whole rock K-Ar age 22.9 ± 1.0 m.y.
GA1964 %K 1.73, 1.73 (1.73) *Ar^{40}/K^{40} 0.001344 % atm. Ar^{40} 12.2
Potassic tholeiitic andesite
Burleigh Heads
645 136 Tweed Heads

Ref: Q 8 ORE DEPOSIT, MOUNT ISA
Galena Age 1600 m.y. Apparent (c_o = 30.1) U^{238}/Pb^{204} 9.09, Th/U 3.91

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}
59	16.212 (0.003)	15.610 (0.001)	36.218 (0.006)
60	16.220 (0.003)	15.615 (0.001)	36.254 (0.006)
61	16.220 (0.003)	15.590 (0.005)	36.245 (0.016)
62	16.232 (0.006)	15.614 (0.004)	36.241 (0.017)
63	16.220 (0.006)	15.609 (0.004)	36.253 (0.017)

59, Black Star — Mount Isa
60, Level No. 11, No. 2 orebody — Mount Isa
61, Level No. 12, No. 5 orebody — Mount Isa
62, Level No. 9, No. 7 orebody — Mount Isa
63, Level No. 9 — Mount Isa
Indicated age reflects time of ore deposition

Ref: Q 10
F55/2/23
GA5710
BARRABAS ADAMELLITE
Biotite — K-Ar age 397 m.y.
%K 6.782, 6.835 (6.81) $*Ar^{40}/K^{40}$ 0.02580 % atm. Ar^{40} 2.9
Biotite adamellite
494900 2477600 — Charters Towers
Probably reliable age of intrusion; concordant with age derived from Rb-Sr isochron (see p. 56)

Ref: Q 10
F55/2/26
GA5712
RAVENSWOOD GRANODIORITE COMPLEX
Hornblende — K-Ar age 426 m.y.
%K 0.6036, 0.6034 (0.604) $*Ar^{40}/K^{40}$ 0.02790 % atm. Ar^{40} 6.1
Hornblende-biotite granodiorite
485600 2493500 — Charters Towers
Unreliable age; argon lost during later phase of intrusion

Ref: Q 10
F55/2/28
GA5713
RAVENSWOOD GRANODIORITE COMPLEX
Biotite — K-Ar age 397 m.y.
%K 7.015, 7.016 (7.02) $*Ar^{40}/K^{40}$ 0.02585 % atm. Ar^{40} 2.3
Biotite granite
477100 2488900 — Charters Towers
Unreliable age; argon lost during later phase of intrusion

Ref: Q 10
F55/2/37
GA5735
RAVENSWOOD GRANODIORITE COMPLEX
Biotite — K-Ar age 400 m.y.
%K 6.911, 6.866 (6.89) $*Ar^{40}/K^{40}$ 0.02605 % atm. Ar^{40} 1.6
Hornblende — K-Ar age 406 m.y.
%K 0.7249, 0.7264 (0.726) $*Ar^{40}/K^{40}$ 0.02646 % atm. Ar^{40} 3.9
Granodiorite
425000 2475000 — Charters Towers
Probably reliable ages of intrusion—late phase; concordant with age derived from Rb-Sr isochron (see p. 56)

Ref: Q 10
RAVENSWOOD GRANODIORITE COMPLEX
Whole rock Rb-Sr age 454 ± 30 m.y. Initial Sr^{87}/Sr^{86} 0.7074 ± 0.0007(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5274 E55/14/44	86.7	305.7	0.8185	0.7127
GA5599 E55/14/46	139.2	116.4	3.4595	0.7301
GA5600 E55/14/48	116.6	225.8	1.4921	0.7175
GA5701 E55/14/49	114.0	225.5	1.4607	0.7173
GA5702 E55/14/49	124.7	120.6	2.9937	0.7282
GA5707 F55/2/19	174.1	121.6	4.1437	0.7357
GA5708 F55/2/20	107.8	259.5	1.2009	0.7157
GA5711 F55/2/24	94.1	163.2	1.6663	0.7176
GA5712 F55/2/26	98.8	280.5	1.0172	0.7144
GA5713 F55/2/28	144.1	140.3	2.9715	0.7267

GA5274, granodiorite from 473200 2511400 Townsville
GA5599, granite from 475200 2507500 Townsville
GA5600, adamellite from 485700 2503700 Townsville
GA5701, adamellite from 488500 2504200 Townsville
GA5702, foliated adamellite from 430700 2499800 Townsville
GA5707, leucogranite from 496100 2489700 Charters Towers
GA5708, biotite granodiorite from 496600 2487500 Charters Towers
GA5711, biotite granodiorite from 492400 2483000 Charters Towers
GA5712, hornblende-biotite granodiorite from 485600 2493500 Charters Towers
GA5713, biotite granite from 477100 2488900 Charters Towers

Ref: Q 10 RAVENSWOOD GRANODIORITE COMPLEX (AND BARRABAS ADAMELLITE)

Whole rock Rb-Sr age 394 ± 30 m.y. Initial Sr^{87}/Sr^{86} 0.7053 ± 0.0006(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5706 F55/2/16	58.3	326.4	0.5158	0.7082
GA5709 F55/2/22	139.3	209.0	1.9259	0.7167
GA5710 F55/2/23	146.7	161.7	2.6230	0.7204
GA5735 F55/2/37	186.8	326.1	1.6550	0.7150
GA5798 E55/14/47	27.0	323.8	0.2407	0.7073
GA5799 F55/2/27	60.8	397.4	0.4417	0.7073

GA5706, granodiorite from Ravenswood Granodiorite Complex; 505750 2482400 Charters Towers
GA5709, biotite adamellite from Barrabas Adamellite; 498100 2476600 Charters Towers
GA5710, biotite adamellite from Barrabas Adamellite; 494900 2477600 Charters Towers
GA5735, granodiorite from Ravenswood Granodiorite Complex; 425000 2475000 Charters Towers
GA5798, diorite from Ravenswood Granodiorite Complex; 476400 2505500 Townsville
GA5799, quartz diorite from Ravenswood Granodiorite Complex; 501500 2483800 Charters Towers
Probably reliable age of intrusion—late phase

Ref: Q 10 OWEENEE GRANITE AND GRANITIC ROCKS OF THE KANGAROO HILLS AREA

Whole rock Rb-Sr age 330 ± 7 m.y. Initial Sr^{87}/Sr^{86} 0.7059(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5159 E55/10/1	237.8	104.4	6.5915	0.7337
	236.7	104.0	6.5907	0.7336
GA5160 E55/10/3	296.0	28.9	29.9570	0.8498
GA5161 E55/10/4	414.8	4.99	269.7955	1.9970
GA5162 E55/10/5	125.1	164.2	2.2026	0.7166
GA5163 E55/10/6	266.6	55.9	13.9174	0.7748
GA5191 E55/10/13	321.6	48.3	19.3859	0.8006
GA5284 E55/14/17	250.2	31.2	23.4320	0.8207
GA5584 E55/14/7	333.4	11.7	85.8346	1.1312

GA5585 E55/14/15	262.2	75.7	10.0534	0.7558
GA5586 E55/14/16	186.9	113.3	4.7741	0.7306
GA5587 E55/14/38	457.5	9.91	142.1393	1.3906
GA5588 E55/14/39	307.4	28.0	32.1595	0.8636
GA5800 E55/10/15	375.4	25.6	43.2652	0.9120
GA5801 E55/10/16	332.6	33.0	29.5013	0.8538

GA5159, adamellite from 388800 2638300 Ingham
GA5160, granite from 373000 2637000 Ingham
GA5161, granite from 371000 2656200 Ingham
GA5162, adamellite from 360000 2671000 Ingham
GA5163, granite from 376500 2647700 Ingham
GA5191, adamellite from 433800 2618800 Ingham
GA5284, Oweenee Granite from 384700 2584000 Townsville
GA5584, Oweenee Granite from 419000 2602000 Townsville
GA5585, Oweenee Granite from 351800 2580000 Townsville
GA5586, Oweenee Granite from 353000 2578300 Townsville
GA5587, Oweenee Granite from 409900 2616700 Townsville
GA5588, granite from 431900 2616500 Townsville
GA5800, granite from 405000 2619000 Ingham
GA5801, granite from 403900 2624800 Ingham
Reliable age of intrusion

Ref: Q 10 ADAMELLITE
E55/14/23 Biotite K-Ar age 277 m.y.
GA5725 %K 6.686, 6.685 (6.69) *Ar^{40}/K^{40} 0.01746 % atm. Ar^{40} 1.7
455400 2569900 Townsville
Probably reliable age of intrusion

Ref: Q 10 GRANODIORITE
E55/14/24 Biotite K-Ar age 290 m.y.
GA5726 %K 6.572, 6.601 (6.59) *Ar^{40}/K^{40} 0.01829 % atm. Ar^{40} 2.4
450500 2569500 Townsville
Probably reliable age of intrusion

Ref: Q 10 GRANODIORITE
E55/14/30 Biotite K-Ar age 284 m.y.
GA5727 %K 7.169, 7.131 (7.15) *Ar^{40}/K^{40} 0.01790 % atm. Ar^{40} 9.4
Hornblende K-Ar age 286 m.y.
%K 0.5560, 0.5585 (0.557) *Ar^{40}/K^{40} 0.01807 % atm. Ar^{40} 23.1
453300 2571400 Townsville
Probably reliable ages of intrusion

Ref: Q 10 GRANODIORITE
E55/14/29 Biotite K-Ar age 282 m.y.
GA5728 %K 7.273, 7.235 (7.25) *Ar^{40}/K^{40} 0.01775 % atm. Ar^{40} 1.2
Hornblende K-Ar age 290 m.y.
%K 0.5882, 0.5871 (0.588) *Ar^{40}/K^{40} 0.01831 % atm. Ar^{40} 3.8
450400 2574000 Townsville
Probably reliable ages of intrusion

Ref: Q 10 GRANODIORITE
E55/14/28 Biotite K-Ar age 280 m.y.
GA5729 %K 7.116, 7.163 (7.14) *Ar^{40}/K^{40} 0.01766 % atm. Ar^{40} 3.3
442600 2564700 Townsville
Probably reliable age of intrusion

Ref: Q 10 GRANODIORITE
E55/14/26 Biotite K-Ar age 277 m.y.
GA5730 %K 6.838, 6.858 (6.85) *Ar^{40}/K^{40} 0.01746 % atm. Ar^{40} 1.1
Hornblende K-Ar age 282 m.y.
%K 0.5572, 0.5573 (0.557) *Ar^{40}/K^{40} 0.01778 % atm. Ar^{40} 6.4
444700 2565300 Townsville
Probably reliable ages of intrusion

Ref: Q 10 GRANODIORITE
E55/14/19 Biotite K-Ar age 284 m.y.
GA5731 %K 6.701, 6.697 (6.70) *Ar^{40}/K^{40} 0.01794 % atm. Ar^{40} 2.1
Hornblende K-Ar age 279 m.y.
%K 0.6214, 0.6205 (0.621) *Ar^{40}/K^{40} 0.01757 % atm. Ar^{40} 6.0
454300 2574700 Townsville
Probably reliable ages of intrusion

Ref: Q 10 TUCKERS IGNEOUS COMPLEX
F55/2/30 Biotite K-Ar age 277 m.y.
GA5794 %K 7.529, 7.544 (7.54) *Ar^{40}/K^{40} 0.01742 % atm. Ar^{40} 6.6
Biotite granodiorite
466800 2491400 Charters Towers
Probably reliable age of intrusion

Ref: Q 10 TUCKERS IGNEOUS COMPLEX
F55/2/32 Biotite K-Ar age 282 m.y.
GA5795 %K 7.639, 7.673 (7.66) *Ar^{40}/K^{40} 0.01776 % atm. Ar^{40} 1.6
Hornblende-biotite granodiorite
460200 2487500 Charters Towers
Probably reliable age of intrusion

Ref: Q 10 TUCKERS IGNEOUS COMPLEX
F55/2/33 Biotite K-Ar age 277 m.y.
GA5796 %K 7.649, 7.670 (7.66) *Ar^{40}/K^{40} 0.01744 % atm. Ar^{40} 8.3
Biotite-quartz gabbro
460700 2488800 Charters Towers
Probably reliable age of intrusion

Ref: Q 10 BOORI IGNEOUS COMPLEX
F55/2/34 Biotite K-Ar age 278 m.y.
GA5797 %K 7.080, 7.115 (7.10) *Ar^{40}/K^{40} 0.01753 % atm. Ar^{40} 3.9
Biotite-quartz diorite
482000 2488200 Charters Towers
Probably reliable age of intrusion

Ref: Q 11 MONAZITE

Pb^{208}-Th^{232} age 1555 ± 77 m.y.
Pb^{207}-U^{235} age 1565 ± 35 m.y.
Pb^{206}-U^{238} age 1505 ± 3.3 m.y.
Pb^{207}-Pb^{206} age 1645 ± 85 m.y.

	Total U μmole/g	Total Th μmole/g	Total Pb μmole/g	Pb^{204}	Pb^{206}	Pb^{207}	Pb^{208}
MONAZITE	4.464	261.6	21.98	1	197.06	33.697	3243.1

Mica Creek pegmatite locality, southwest of Mount Isa Mount Isa
Co-ordinates not given
Concordant Pb^{208}-Th^{232} and Pb^{207}-U^{235} ages are in good agreement with earlier Rb-Sr results of 1545 m.y. for the Sybella Pegmatite (see Harding, 1969, p. 34). The low Pb^{206}-U^{238} age is probably a result of leakage of radon; the Pb^{207}-Pb^{206} age is thus predictably high

Ref: Q 12 THOLEIITIC OLIVINE BASALT
Whole rock K-Ar age 20.0 ± 0.3 m.y., 20.1 ± 0.4 m.y.
GA3126 %K 0.459, 0.459 $*Ar^{40}(10^{-10}mole/g)$ 0.1642 % $*Ar^{40}$ 54.3
0.1653 56.6
About 380-m altitude on hill 16 km south of Amby (see fig. 1, p. 22 of reference Q 12)
634 684 Mitchell
Young apparent ages; sample may have lost some radiogenic argon; compare ages for samples GA3127-32 and GA3141-2

Ref: Q 12 THOLEIITIC OLIVINE BASALT
Whole rock K-Ar age 22.4 ± 0.4 m.y.
GA3127 %K 0.420, 0.420 $*Ar^{40}(10^{-10}mole/g)$ 0.1683 % $*Ar^{40}$ 74.7
About 400-m altitude, north wall of quarry 4 km northwest of Amby (see fig. 1, p. 22 of reference Q 12)
636 704 Mitchell
Probably reliable age of extrusion

Ref: Q 12 THOLEIITIC BASALT
Whole rock K-Ar age 23.2 ± 0.4 m.y.
GA3128 %K 0.391, 0.392 $*Ar^{40}(10^{-10}mole/g)$ 0.1626 % $*Ar^{40}$ 62.2
About 400-m altitude, west wall of quarry 4 km northwest of Amby (see fig. 1, p. 22 of reference Q 12)
636 704 Mitchell
Probably reliable age of extrusion

Ref: Q 12 OLIVINE BASALT
Whole rock K-Ar age 20.3 ± 0.3 m.y., 20.8 ± 0.4 m.y.
GA3129 %K 1.098, 1.101 $*Ar^{40}(10^{-10}mole/g)$ 0.3989 % $*Ar^{40}$ 75.3
0.4080 72.1
About 500-m altitude, spur 0.8 km east of Mitchell-Tooloombilla road, 3.2 km north of turn-off to Katonga Homestead, north of Amby (see fig. 1, p. 22 of reference Q 12)
637 741 Mitchell
Young apparent ages; sample may have lost some radiogenic argon

Ref: Q 12 OLIVINE BASALT
Whole rock K-Ar age 21.0 ± 0.4 m.y.
GA3141 %K 1.008, 1.010 $*Ar^{40}(10^{-10}mole/g)$ 0.3779 % $*Ar^{40}$ 73.5
About 500-m altitude, spur 0.8 km east of Mitchell-Tooloombilla road, 3.2 km north of turn-off to Katanga Homestead, north of Amby (see fig. 1, p. 22 of reference Q 12)
637 741 Mitchell
Young apparent age; sample may have lost some radiogenic argon

Ref: Q 12 OLIVINE BASALT
Whole rock K-Ar age 23.2 ± 0.4 m.y.
GA3132 %K 0.944, 0.945 $*Ar^{40}(10^{-10}mole/g)$ 0.3921 % $*Ar^{40}$ 86.9
About 550-m altitude, spur 45 km north of Amby (see fig. 1, p. 22 of reference Q 12)
637 750 Mitchell
Probably reliable age of intrusion

Ref: Q 12 OLIVINE BASALT
Whole rock K-Ar age 23.1 ± 0.4 m.y.
GA3130 %K 0.951, 0.952 $*Ar^{40}(10^{-10}mole/g)$ 0.3923 % $*Ar^{40}$ 92.3
About 580-m altitude, hill about 1.6 km east of Mitchell-Tooloombilla road, about 1.6 km southwest of Kilmorey Homestead, 52 km north of Amby (see fig. 1, p. 22 of reference Q 12)
635 758 Mitchell
Probably reliable age of intrusion

Ref: Q 12 OLIVINE BASALT
Whole rock K-Ar age 22.1 ± 0.4 m.y.
GA3131 %K 1.001, 1.001 *Ar^{40}(10^{-10}mole/g) 0.3953 %*Ar^{40} 81.9
About 560-m altitude, Kilmorey Falls, near Kilmorey Homestead (see fig. 1, p. 22 of reference Q 12)
637 758 Mitchell
Probably reliable age of extrusion

Ref: Q 12 THOLEIITIC OLIVINE BASALT
Whole rock K-Ar age 22.9 ± 0.4 m.y.
GA3142 %K 0.577, 0.579 *Ar^{40}(10^{-10}mole/g) 0.2372 %*Ar^{40} 88.2
About 800-m altitude, waterfall 13.8 km north of Kilmorey Homestead, 60 km north of Amby (see fig. 1, p. 22 of reference Q 12)
646 764 Mitchell
Probably reliable age of extrusion

Ref: Q 13 NULLA BASALT (ALLENSLEIGH FLOW)
E55/14/78 Whole rock K-Ar age 3.95 m.y.
GA5761 %K 0.788, 0.787 *Ar^{40}/K^{40} 0.00023190 % atm. Ar^{40} 64.6
Olivine basalt
353200 2541100 (see fig. 1, p. 42 of reference Q 13) Townsville

Ref: Q 13 NULLA BASALT (ALLENSLEIGH FLOW)
E55/14/79 Whole rock K-Ar age 4.11 m.y.
GA5762 %K 1.109, 1.106 *Ar^{40}/K^{40} 0.00024132 % atm. Ar^{40} 80.4
Olivine basalt
353500 2544200 (see fig. 1, p. 42 of reference Q 13) Townsville

Ref: Q 13 NULLA BASALT (ALLENSLEIGH FLOW)
E55/14/80 Whole rock K-Ar age 4.34 m.y.
GA5763 %K 0.764, 0.763 *Ar^{40}/K^{40} 0.00025459 % atm. Ar^{40} 60.0
Olivine basalt
354400 2542900 (see fig. 1, p. 42 of reference Q 13) Townsville

Ref: Q 13 NULLA BASALT
E55/14/83 Whole rock K-Ar age 4.54 m.y.
GA5766 %K 0.632, 0.633 *Ar^{40}/K^{40} 0.00026555 % atm. Ar^{40} 51.2
Olivine basalt
347100 2535900 (see fig. 1, p. 42 of reference Q 13) Townsville
Apparent age supports field observation that GA5766 is from an earlier flow than GA5761, GA5762, and GA5763

Ref: Q 13 NULLA BASALT (KANGERONG FLOW)
E55/14/12 Whole rock K-Ar age 2.40 m.y.
GA5565 %K 1.046, 1.051 *Ar^{40}/K^{40} 0.00014093 % atm. Ar^{40} 69.0
Olivine basalt
417100 2511900 (see fig. 1, p. 42 of reference Q 13) Townsville
Probably reliable age of extrusion; concordant with GA5568

Ref: Q 13 NULLA BASALT (KANGERONG FLOW)
E55/14/52 Whole rock K-Ar age 2.37 m.y., 2.27 m.y.
GA5568 %K 1.057, 1.054 *Ar^{40}/K^{40} 0.00013916 % atm. Ar^{40} 69.9
0.00013316 62.0
Olivine basalt
411600 2512500 (see fig. 1, p. 42 of reference Q 13) Townsville

Ref: Q 13 NULLA BASALT (HANN CREEK FLOW)
F55/2/2 Whole rock K-Ar age 1.30 m.y., 1.30 m.y.
GA1146 %K 1.419, 1.417 *Ar^{40}/K^{40} 0.00007606 % atm. Ar^{40} 90.8
0.00007659 88.7
Olivine basalt
354600 2486600 (see fig. 1, p. 42 of reference Q 13) Charters Towers
Age of extrusion

Ref: Q 13 NULLA BASALT (HANN CREEK FLOW)
F55/2/12 Whole rock K-Ar age 1.24 m.y.
GA5570 %K 1.400, 1.400 *Ar^{40}/K^{40} 0.00007263 % atm. Ar^{40} 97.0
Olivine basalt
351900 2488400 (see fig. 1, p. 42 of reference Q 13) Charters Towers
Age of extrusion

Ref: Q 13 NULLA BASALT (HANN CREEK FLOW)
E55/14/56 Whole rock K-Ar age 1.29 m.y.
GA5576 %K 1.215, 1.213 *Ar^{40}/K^{40} 0.00007566 % atm. Ar^{40} 85.2
Olivine basalt
409900 2507300 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/13 Whole rock K-Ar age 1.32 m.y.
GA5566 %K 1.110, 1.112 *Ar^{40}/K^{40} 0.00007721 % atm. Ar^{40} 81.1
Olivine basalt
400800 2522500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/14 Whole rock K-Ar age 1.29 m.y.
GA5567 %K 1.070, 1.067 *Ar^{40}/K^{40} 0.00007546 % atm. Ar^{40} 82.5
Olivine basalt
400600 2522500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/53 Whole rock K-Ar age 1.28 m.y.
GA5569 %K 1.135, 1.123 *Ar^{40}/K^{40} 0.00007522 % atm. Ar^{40} 95.1
Olivine basalt
402900 2518300 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/73 Whole rock K-Ar age 1.34 m.y.
GA5756 %K 1.080, 1.081 *Ar^{40}/K^{40} 0.00007855 % atm. Ar^{40} 66.8
Olivine basalt
356700 2535500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/74 Whole rock K-Ar age 1.28 m.y.
GA5757 %K 1.226, 1.226 *Ar^{40}/K^{40} 0.00007541 % atm. Ar^{40} 56.4
Olivine basalt
356700 2535500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/75 Whole rock K-Ar age 1.26 m.y.
GA5758 %K 1.189, 1.189 *Ar^{40}/K^{40} 0.00007378 % atm. Ar^{40} 62.8
Olivine basalt
356700 2535500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/77 Whole rock K-Ar age 1.43 m.y.
GA5760 %K 1.241, 1.239 *Ar^{40}/K^{40} 0.00008367 % atm. Ar^{40} 93.8
Olivine basalt
358600 2535400 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/81 Whole rock K-Ar age 1.25 m.y., 1.27 m.y.
GA5764 %K 1.128, 1.130 *Ar^{40}/K^{40} 0.00007315 % atm. Ar^{40} 62.4
0.00007478 64.1
Olivine basalt
348800 2533900 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (BIRDBUSH FLOW)
E55/14/91 Whole rock K-Ar age 1.25 m.y.
GA5776 %K 1.088, 1.090 *Ar^{40}/K^{40} 0.00007336 % atm. Ar^{40} 90.2
Olivine basalt
414300 2513500 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (ANABRANCH FLOW)
E55/14/10 Whole rock K-Ar age 1.14 m.y.
GA5563 %K 1.175, 1.165 *Ar^{40}/K^{40} 0.00006687 % atm. Ar^{40} 69.7
Olivine basalt
425100 2509100 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 NULLA BASALT (ANABRANCH FLOW)
E55/14/11 Whole rock K-Ar age 1.10 m.y.
GA5564 %K 1.204, 1.201 *Ar^{40}/K^{40} 0.00006452 % atm. Ar^{40} 89.1
Olivine basalt
424600 2509600 (see fig. 1, p. 42 of reference Q 13) Townsville
Age of extrusion

Ref: Q 13 TOOMBA BASALT
E55/14/84 Whole rock K-Ar age 0.044 m.y.
GA5769 %K 1.680, 1.686 *Ar^{40}/K^{40} 0.000002348 % atm. Ar^{40} 98.2
Olivine basalt
413200 2513600 (see fig. 1, p. 42 of reference Q 13) Townsville
Maximum age of extrusion

Ref: Q 13 TOOMBA BASALT
E55/14/85 Whole rock K-Ar age 0.079 m.y.
GA5770 %K 1.651, 1.647 *Ar^{40}/K^{40} 0.000004647 % atm. Ar^{40} 96.1
Olivine basalt
415900 2513600 (see fig. 1, p. 42 of reference Q 13) Townsville
Maximum age of extrusion

Ref: Q 13 TOOMBA BASALT
E55/14/90 Whole rock K-Ar age 0.054 m.y.
GA5775 %K 1.647, 1.643 *Ar^{40}/K^{40} 0.000003192 % atm. Ar^{40} 95.7
Olivine basalt
416300 2513500 (see fig. 1, p. 42 of reference Q 13) Townsville
Maximum age of extrusion

Ref: Q 14 SYBELLA MICROGRANITE AND PEGMATITE

Whole-rock Rb-Sr age 1539 ± 131 m.y. Initial Sr^{87}/Sr^{86} 0.736 ± 0.033(I)
Whole-rock and microcline Rb-Sr age 1553 ± 29 m.y.
Initial Sr^{87}/Sr^{86} 0.7323 ± 0.0101(I)
Whole-rock Rb-Sr age 1574 m.y. Initial Sr^{87}/Sr^{86} 0.725 ± 0.073(I)
(regression of 3 samples marked *)

		Rb(ppm)	Common Sr(ppm)	Total Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA3383	*Whole rock	209.7	38.58	39.98	15.68	1.0712
GA3385	*Whole rock	327.1	35.20	37.33	26.80	1.3175
GA3386	*Whole rock	263.8	43.48	45.24	17.51	1.1130
		266.3	43.41	45.17	17.70	1.1146
GA3387	Whole rock	322.7	75.65	77.91	12.31	1.0046
			75.67	77.93	12.30	1.0058
GA3389	Microcline	627.5	15.01	18.93	120.62	3.3662

GA3383, microgranite from lat. 20°31′30″S, long. 139°25′30″E Mount Isa
GA3385, microgranite from lat. 20°39′00″S, long. 139°22′40″E Mount Isa
GA3386, microgranite from lat. 20°34′20″S, long. 139°21′25″E Mount Isa
GA3387, microgranite from lat. 20°47′10″S, long. 139°24′20″E Mount Isa
GA3389, pegmatite from lat. 20°48′50″S, long. 139°25′30″E Mount Isa
Apparent ages are estimates of the time of emplacement

Ref: Q 14 SYBELLA MICROGRANITE AND PEGMATITE

Pb^{206}-U^{238} system age 1573 ± 161 m.y. Initial ratio 17.530 ± 0.013(I)
Pb^{207}-U^{235} system age 1576 ± 343 m.y. Initial ratio 15.639 ± 0.013(I)
Pb^{208}-Th^{232} system age 1555 ± 146 m.y. Initial ratio 36.443 ± 0.013(I)
Pooled age of three systems 1565 ± 52 m.y.

	GA3383 (whole rock)	GA3386 (whole rock)	GA3389 (feldspar)
U(μmole/g)	0.0529	0.0209	0.00013
Th(μmole/g)	0.1794	0.0785	—
Pb(μmole/g)	0.0464, 0.0460	0.0893, 0.0905	0.5187
U^{238}/Pb^{204}	231.1, 232.5	18.60, 18.71	0.02, 0.02
U^{235}/Pb^{204}	1.677, 1.687	0.135, 0.137	0.0001, 0.0001
Th^{232}/Pb^{204}	789.2, 793.9	70.46, 70.85	—
Pb^{206}/Pb^{204}	83.04, 82.92	22.42, 22.68	17.54, 17.68
Pb^{207}/Pb^{204}	22.19, 22.13	16.08, 16.37	15.64, 15.83
Pb^{208}/Pb^{204}	100.8, 100.5	41.8, 42.8	36.4, 37.0

GA3383, microgranite from lat. 20°31′30″S, long. 139°25′30″E Mount Isa
GA3386, microgranite from lat. 20°34′20″S, long. 139°21′25″E Mount Isa
GA3389, pegmatite from lat. 20°48′50″S, long. 139°25′30″E Mount Isa
The pooled age of the three systems is consistent with the Rb-Sr determination

Ref: Q 15 BADU GRANITE
Biotite K-Ar age 294 ± 4 m.y.
69-770 %K 7.075 ± 0.002 $*Ar^{40}(cm^3/g \times 10^{-5})$ 8.95 % atm. Ar^{40} 4.2
Small island off northeast point of Hawkesbury Island
Lat. 10°21′S, long. 142°07′E Torres Strait
Probably best estimate of age of intrusion (see also age determination under reference PNG 3)

Ref: Q 15 BADU GRANITE
Biotite K-Ar age 293 ± 5 m.y.
69-771 %K 6.666 ± 0.035 $*Ar^{40}(cm^3/g \times 10^{-5})$ 8.41 % atm. Ar^{40} 2.5
Southwest part of Clarke Island
Lat. 10°13′S, long. 142°09′E Torres Strait
Age of intrusion (see also age determination under reference PNG 3)

Ref: Q 15 BADU GRANITE
Biotite K-Ar age 286 ± 3 m.v.
69-957 %K 7.055 ± 0.027 *Ar^{40}($cm^3/g \times 10^{-5}$) 8.69 % atm. Ar^{40} 2.6
North coast of Hammond Island
Lat. 10°32'S, long. 142°13'E Torres Strait
Age of intrusion (see also age determination under reference PNG 3)

Ref: Q 16 GRANODIORITE
E55/15/1 Biotite K-Ar age 266 m.y.
GA5275 %K 7.270, 7.246 (7.26) *Ar^{40}/K^{40} 0.0167 % atm. Ar^{40} 8.0
The Rocks, Arkendeith
548500 2531300 Ayr
The granodiorite is intruded by several younger igneous rocks, and the date of 266 m.y. may reflect this later activity

Ref: Q 16 DIORITE-GNEISS
E55/15/2 Hornblende K-Ar age 264 m.y.
GA5276 %K 0.4209, 0.4185 (0.420) *Ar^{40}/K^{40} 0.01653 % atm. Ar^{40} 25.6
Inkerman Shear Zone
558000 2520700 Ayr
Age may reflect movements in the shear zone

Ref: Q 16 AMPHIBOLE ROCK
E55/15/3 Amphibole K-Ar age 245 m.y.
GA5277 %K 0.1908, 0.2019 (0.201) *Ar^{40}/K^{40} 0.01528 % atm. Ar^{40} 15.6
Inkerman Shear Zone
558000 2520700 Ayr
Age may reflect movements in the shear zone

Ref: Q 16 DIORITE-GNEISS
E55/15/4 Hornblende K-Ar age 275 m.y.
GA5319 %K 0.3369, 0.3384 (0.338) *Ar^{40}/K^{40} 0.01727 % atm. Ar^{40} 18.9
Inkerman Shear Zone
558000 2520700 Ayr
Age may reflect movements in the shear zone

Ref: Q 16 ADAMELLITE
E55/15/5 Biotite K-Ar age 267 m.y.
GA5733 %K 7.014, 7.005 (7.01) *Ar^{40}/K^{40} 0.01675 % atm. Ar^{40} 4.3
Cape Cleveland
518000 2582000 Ayr
Age of intrusion

Ref: Q 16 GRANITE
E55/15/6 Biotite K-Ar age 269 m.y.
GA5579 %K 7.064, 7.117 (7.09) *Ar^{40}/K^{40} 0.01687 % atm. Ar^{40} 3.5
Mount Elliot
516000 2557000 Ayr
Age of intrusion

Ref: Q 16 GRANODIORITE
E55/15/13 Biotite K-Ar age 269 m.y.
GA5580 %K 7.177, 7.206 (7.19) *Ar^{40}/K^{40} 0.01691 % atm. Ar^{40} 1.6
Hornblende K-Ar age 281 m.y.
%K 0.5456, 0.5446 (0.545) *Ar^{40}/K^{40} 0.01773 % atm. Ar^{40} 14.4
567600 2512300 Ayr
Hornblende age is probably closer to age of intrusion than biotite age, which probably reflects loss of argon

Ref: Q 17 MUSCOVITE-GARNET SCHIST

Muscovite K-Ar age 351 m.y., 353 m.y.

GA5194 Analytical data not available
Core of Telemon Anticline
Lat. 24°19′S, long. 147°32′E Springsure
Significance of indicated ages not known

Ref: Q 17 GRANODIORITE

Biotite K-Ar age 445 m.y., 444 m.y.

GA1165 Analytical data not available

Hornblende K-Ar age 452 m.y.

Analytical data not available
Core of Telemon Anticline
Lat. 24°07′S, long. 147°32′E Springsure
Minimum age

Ref: Q 17 BASALT

Plagioclase K-Ar age 293 m.y.

GA1039 Analytical data not available
Southeast of Rooken Glen Homestead
Lat. 24°05′S, long. 147°32′E Springsure
Minimum age; plagioclase is altered and unsuitable for isotopic dating

Ref: Q 18 HORNBLENDE ADAMELLITE

F55/12/2 Hornblende K-Ar age 294 ± 5 m.y.

Analytical data not available
206 232 St Lawrence
Member of a group of intrusions having a Carboniferous-Mesozoic age

Ref: Q 19 LOLWORTH IGNEOUS COMPLEX

F55/2/10 Muscovite K-Ar age 401 m.y.

GA5285 %K 8.893, 8.895 (8.89) $*Ar^{40}/K^{40}$ 0.02613 % atm. Ar^{40} 2.3
Banded garnet-muscovite granite
46 m east of track from Deadmans Creek to Toomba-Glencoe road
Lat. 20°11′30″S, long. 145°36′30″E; 355600 2473000 Charters Towers
Age of emplacement

Ref: Q 19 LOLWORTH IGNEOUS COMPLEX

F55/1/6 Biotite K-Ar age 392 m.y.

GA5590 %K 6.254, 6.224 (6.24) $*Ar^{40}/K^{40}$ 0.02547 % atm. Ar^{40} 1.3

Muscovite K-Ar age 396 m.y.

%K 8.853, 8.848 (8.85) $*Ar^{40}/K^{40}$ 0.02577 % atm. Ar^{40} 1.2
Adamellite
296300 2456300 Hughenden
Age of emplacement

Ref: Q 19 LOLWORTH IGNEOUS COMPLEX

F55/1/31 Muscovite K-Ar age 390 m.y.

GA5596 %K 8.755, 8.736 (8.75) $*Ar^{40}/K^{40}$ 0.02533 % atm. Ar^{40} 1.5
Garnet-muscovite granite
340000 2487500 Hughenden
Age of emplacement

Ref: Q 19 LOLWORTH IGNEOUS COMPLEX

Whole rock — Rb-Sr age 401 ± 7 m.y. Initial Sr^{87}/Sr^{86} 0.7097(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5285 F55/2/10	229.7	7.8	89.9376	1.2414
GA5590 F55/1/6	122.4	262.4	1.3482	0.7168
GA5592 F55/1/13	94.4	308.4	0.8842	0.7151
GA5595 F55/1/27	143.4	225.4	1.8402	0.7220
GA5596 F55/1/31	270.1	68.0	11.5392	0.7762
GA5598 F55/2/9	207.6	41.6	14.5513	0.7968

GA5285, garnet-muscovite granite from 355600 2473000 — Charters Towers
GA5590, adamellite from 296300 2456300 — Hughenden
GA5592, biotite granite from 285800 2461100 — Hughenden
GA5595, muscovite-biotite granite from 327700 2459100 — Hughenden
GA5596, garnet-muscovite granite from 340000 2487500 — Hughenden
GA5598, garnet-muscovite granite from 356200 2470800 — Charters Towers

Age of emplacement; high initial Sr^{87}/Sr^{86} of 0.7097 suggests that anatexis or partial assimilation of older rocks occurred during the formation of the magma which produced the Complex

Ref: Q 20 CAPE RIVER BEDS

Whole rock — Rb-Sr age 483 ± 25 m.y. Initial Sr^{87}/Sr^{86} 0.7294 ± 0.004(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5783 F55/1/2	124.6	155.4	2.323	0.7435
GA5784 F55/1/4	239.3	113.6	6.119	0.7724
GA5785 F55/1/7	137.6	54.43	7.369	0.8024
GA5786 F55/1/8	302.6	47.04	18.85	0.8610
GA5787 F55/1/23	295.5	59.08	14.43	0.8287
GA5788 F55/1/25	104.4	55.85	5.420	0.7457
GA5789 F55/1/30	128.2	27.96	13.35	0.7989

GA5783, biotite gneiss from 306000 2447200 — Hughenden
GA5784, biotite gneiss from 308900 2448100 — Hughenden
GA5785, biotite schist from 284800 2452400 — Hughenden
GA5786, biotite-muscovite schist from 282900 2458200 — Hughenden
GA5787, biotite schist from 301000 2447200 — Hughenden
GA5788, granitic biotite gneiss from 334200 2450500 — Hughenden
GA5789, biotite-muscovite schist from 335200 2442100 — Hughenden

Only 4 of the samples (GA5783, GA5784, GA5786, and GA5787) lie close to a straight line; the other 3 samples have been omitted from the regression. The indicated age may be either a metamorphic or sedimentary date, for it is not clear whether the rocks remained closed systems during metamorphism

Ref: Q 21 PHYLLITE

Whole rock — K-Ar age 417 ± 25 m.y.
%K 4.17, 4.20, 4.29, 4.30 (4.24) $*Ar^{40}/K^{40}$ 0.0273
Basement, from Core 23, Buckabie No. 1 well
Lat. 26°11′40″S, long. 144°16′15″E — Quilpie
Age of basement

South Australia

Ref: SA 1 PALMER GRANITE

Rb-Sr age 490 ± 15 m.y. Initial Sr^{87}/Sr^{86} 0.7086 ± 0.0010(I)

		Rb(ppm)	Common Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA315	Whole rock	179	80.3	6.45	0.7536
		175	77.9	6.49	0.7531
	K-feldspar	412	106.0	11.22	0.7849
		415	107.7	11.14	0.7849
	Plagioclase	12.0	63.0	0.55	0.714
					0.7122
P2	Whole rock	138	103	3.86	0.7342
P5	Whole rock	144	70	5.93	0.7513
P7	Whole rock	151	52	8.35	0.7660
P5	Biotite	1191	1.81	1893	13.499
		1181	2.50	1369	9.883
		1192	2.70		
GA315	Biotite (green)	1286	2.69	1378	9.529
	Biotite (brown)	1226	6.50	544.6	3.745
		1236	6.50	549.1	3.790
P4	K-feldspar	437	100	12.59	0.7877
P5	K-feldspar	465	97	13.82	0.7946
P7	K-feldspar (1)	447	64	21.48	0.8464
	K-feldspar (2)	463	70.1	19.29	0.8357
		459	69.5	19.30	0.8373
P15	Whole rock	109	144	2.16	0.7295
PR12	Whole rock	141	109	3.68	0.7409
P14	Whole rock	163	227	1.64	0.7327
P14V	Whole rock	141	346	1.18	0.7267
H3	Whole rock	85	104	2.33	0.7372

With the exception of P15 and PR12 (Rathjen Granitic Gneiss), P14 and P14V (migmatite), and H3 (schist), which were taken from the metamorphic rocks round the granite, the samples were taken from the Palmer Granite, west of Palmer (lat. 34°51′S, long. 139°10′E)

Co-ordinates not given Adelaide

490 ± 15 m.y. is considered to be the best estimate for the age of the Palmer Granite. The grouping of GA315 whole rock and feldspars, and P2, P5, and P7 whole rocks gives an age of 497 ± 23 m.y.

Individual ages for the other samples of Palmer Granite are:

P5 biotite, 485 and 481 m.y.; GA315 biotite (green), 459 m.y.; GA315 biotite (brown), 401 and 404 m.y.; P4 K-feldspar, 453 m.y.; P5 K-feldspar, 448 m.y.; P7 K-feldspar (1), 461 m.y.; P7 K-feldspar (2), 473 and 479 m.y.

For the gneiss, migmatite, and schist, the initial Sr^{87}/Sr^{86} is higher than that for the granite; thus equilibrium between granite and its environment was not established. The Palmer Granite is considered to have been intruded into its surroundings rather than having formed by granitization or anatectic melting

Ref: SA 1 PALMER GRANITE

Biotite K-Ar age (1) 449 m.y. (2) 459 m.y.

GA315 %K (1) 7.95 (2) 7.80 $*Ar^{40}/K^{40}$ 0.0296 % atm. Ar^{40} 5.2

West of Palmer (lat. 34°51′S, long. 139°10′E)

Co-ordinates not given Adelaide

Ref: SA (Unpubl.) RO913

ACID VOLCANIC

Whole rock — K-Ar age 331 ± 15 m.y.

%K 3.34, 3.50 (3.42) *Ar^{40}/K^{40} 0.0212

From Core 18, 3648 m, Kalladeina No. 1 well

Lat. 27°39′28″S, long. 139°24′E — Gason

Indicated age is considered to represent a period of tectonism

Ref: SA 2

SHALE

		Rb-Sr age 448 ± 3 m.y. Initial Sr^{87}/Sr^{86} (see below)			
		Rb^{87}	Sr^{86}	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
9502	Whole rock	0.776	0.1222	6.35	0.7652
	HCl leach, 0.03N, 15 min.				
	Leach	0.01421	0.03055	0.465	0.7273
	Residue	0.787	0.0938	8.39	0.7784
	HCl leach, 0.3N, 15 min.				
	Leach	0.01868	0.04528	0.413	0.7260
	Residue	0.794	0.07945	9.99	0.7896
	HCl leach, 1N, 5 min.				
	Leach	0.01722	0.04541	0.379	0.7255
	Residue	0.795	0.08031	9.89	0.7884
	HCl leach, 1N, 15 min.				
	Leach	0.02019	0.04612	0.438	0.7261
	Residue	0.794	0.08005	9.92	0.7884
	HCl leach, 1N, 60 min.				
	Leach	0.02099	0.04646	0.452	0.7266
	Residue	0.800	0.07877	10.03	0.7896
	Water leach, 25 ml, 5 min.				
	Leach	0.00336	0.000185	(18.3)	0.77
	Residue	0.00351	0.000427	8.2	
	Water blank plus ion-exchange				
	μmole/100 ml	0.0000231	0.00013		
	Reagent and processing blank				
	μmole/dissolution	0.000036	0.000062		

Concentrations for the leach are expressed as μmole leach/g whole rock

		Rb^{87} (μmole/g)	Sr^{86} (μmole/g)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
9193	Whole rock	0.677	0.1360	4.980	0.7546
	Leach/g whole rock	0.02833	0.06067	0.467	0.7250
	Residue	0.681	0.0809	8.420	0.7781
9205	Whole rock	0.717	0.1265	5.667	0.7588
	Leach/g whole rock	0.02350	0.04147	0.567	0.7257
	Residue	0.729	0.08860	8.230	0.7763
9207	Whole rock	0.622	0.1372	4.531	0.7516
	Leach/g whole rock	0.01229	0.02984	0.412	0.7251
	Residue	0.631	0.1094	5.769	0.7600
9496	Whole rock	0.660	0.1614	4.090	0.7493
	Leach/g whole rock	0.02755	0.07988	0.338	0.7237
	Residue	0.693	0.08753	7.915	0.7754
9498	Whole rock	0.627	0.1638	3.815	0.7474
			0.1644		0.7475
	Leach/g whole rock	0.01961	0.08426	0.233	0.7231
	Residue	0.667	0.08607	7.751	0.7735
9191	Whole rock	0.642	0.1421	4.521	0.7516
9195	Whole rock	0.616	0.1416	4.353	0.7527
9199	Whole rock	0.690	0.1240	5.561	0.7590
9203	Whole rock	0.598	0.1342	4.457	0.7508
9506	Whole rock	0.637	0.1391	4.575	0.7512

Initial Sr^{87}/Sr^{86} 0.7234 ± 0.0004(I)—9502 leaches, residues, and whole rocks
0.7224 ± 0.0005(I)—9502, 9193, 9205, 9207, 9496, and 9498 leaches, residues, and whole rocks
0.722 ± 0.004 (I)—all whole rocks
Initial Sr^{87}/Sr^{86} for other regressions are cited in text of reference SA 2
Dullingari No. 1 well, Great Artesian Basin (sample numbers refer to depths in feet of core samples)
Lat. 28°07′55.6″S, long. 140°52′30″E Strzelecki
Minimum age of deposition

Ref: SA 3 GRANULITE-FACIES GNEISSES

Whole rock *Rb-Sr age 1383 ± 122 m.y. Initial Sr^{87}/Sr^{86} 0.7072 ± 0.0025(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA3081	112.72	493.52	0.6601	0.71776
GA3082	194.47	183.19	3.10213	0.75871
GA3083	59.54	314.49	0.54713	0.71666
GA3084	79.97	203.80	1.13550	0.72982
GA3085	15.28	1063.39	0.04150	0.70891
GA3086	73.43	225.42	0.94269	0.73054
GA3087	88.32	293.45	0.87071	0.72749
GA3088	30.00	254.01	0.34120	0.71326
GA3089	2.31	334.19	0.01998	0.70608
GA3090	4.27	418.76	0.02945	0.70441
GA3092	198.69	135.28	4.27444	0.78867
GA3093	156.89	137.35	3.32457	0.78876

GA3081—GA3088, 18 to 21 km northwest of Ernabella Mission Woodroffe
GA3089, GA3090, 19 km south of Ernabella Mission Alberga
GA3092, GA3093, 11 km and 5 km west of Ernabella Mission Alberga
Localities shown on p. 381 (fig. 4) of reference SA 3
* This age is derived from an isochron from which samples GA3082 and GA3093 have been excluded; further regressions are shown on pp. 384-5 of reference SA 3

Ref: SA 3 AMPHIBOLITE-FACIES GNEISSES

Whole rock *Rb-Sr age 1640 ± 221 m.y. Initial Sr^{87}/Sr^{86} 0.7031 ± 0.0029(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA3096	8.25	825.71	0.02884	0.70349
GA3097	7.26	337.48	0.06211	0.70351
GA3098	6.92	499.06	0.04003	0.70616
GA3099	181.72	209.53	2.51955	0.77047
GA3100	217.82	262.36	2.40782	0.75286
GA3601	153.04	377.41	1.17299	0.72640

Localities shown on p. 381 (fig. 4) of reference SA 3 Alberga
* This age is derived from the regression of 8 amphibolite-facies gneisses; analytical data for the other 2 samples are given under reference NT 1. Further interpretations and isochron models are tabulated on pp. 384-5 of reference NT 1

Ref: SA 3 ERNABELLA ADAMELLITE

Whole rock Rb-Sr age 1122 ± 98 m.y. Initial Sr^{87}/Sr^{86} 0.7106 ± 0.0014(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA2421	40.60	360.21	0.32569	0.71524
GA2422	67.96	359.64	0.54624	0.71859
GA2423	106.34	349.95	0.87889	0.72439
GA2424	85.01	356.21	0.69003	0.72156
GA2425	46.27	355.37	0.37632	0.71824
GA2426	110.65	295.37	1.08365	0.72629
GA2427	83.01	337.29	0.71156	0.72170
GA2428	77.41	351.65	0.63649	0.71952
GA2429	76.92	301.49	0.71649	0.72366
GA2430	147.01	166.92	2.55396	0.75118

Localities shown on p. 381 (fig. 4) of reference SA 3 Alberga
The Ernabella Adamellite may have originated through the regeneration of the granulite-facies gneisses

Ref: SA 3 GRANITES, MUSGRAVE RANGES

Whole rock *Rb-Sr age 1130 ± 108 m.y. Initial Sr^{87}/Sr^{86} 0.7095 ± 0.0083(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA3602	100.18	240.13	1.20739	0.73179
GA3603	157.02	170.80	2.66537	0.74995
GA3604	325.14	86.38	11.05740	0.88482
GA3605	227.70	36.94	18.54669	1.13757
GA3606	108.84	330.83	0.95140	0.72301

Localities shown on p. 381 (fig. 4) of reference SA 3 Alberga

* This age is derived from an isochron from which sample GA3605 has been excluded; further interpretations are tabulated on p. 385 of reference SA 3. Pooling all samples of Ernabella Adamellite and those of the granites (except GA3605) gives an isochron of 1123 ± 27 m.y., initial Sr^{87}/Sr^{86} 0.7104 ± 0.0011

Ref: SA 4 HIGH-CALCIUM AUSTRALITES

Whole rock *Rb-Sr age 255 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.7104 ± 0.0008(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
AN147	89.6	178.8	1.448	0.7160
AN148	91.3	220.2	1.198	0.7144
AN152	94.0	263.9	1.028	0.7139
AN156	95.6	308.1	0.896	0.7135
AN157	93.8	307.3	0.882	0.7137
AN259	92.1	131.9	2.019	0.7180
AN288	93.4	142.1	1.899	0.7173
WMC	88.1	152.1	1.674	0.7171

AN147, AN148, AN152, AN156, AN157, Bloods Creek bore; lat. 26°17′S, long. 135°00′E Dalhousie

AN259, east of Dividing Bluff Lake Eyre?

AN288, Snake Creek bore; lat. 27°05′S, long. 136°04′E Oodnadatta

WMC, William Creek; lat. 29° ± 0.1°S, long. 136.5° ± 0.1°E

* This age is derived from the regression of 9 high-calcium australites; analytical data for 2 more samples are given under reference NT 3. The indicated age reflects the time of crystallization of the source rock

Ref: SA 4 HIGH-CALCIUM AUSTRALITES AND PHILIPPINITES, AND INTERMEDIATE AUSTRALITES

Whole rock *Rb-Sr age 265 ± 20 m.y. Initial Sr^{87}/Sr^{86} 0.7101 ± 0.0004(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
H12	107.2	179.0	1.730	0.7168
H24D	102.9	234.7	1.267	0.7150
H37B	100.7	211.6	1.376	0.7152
H50	99.3	216.8	1.324	0.7158

The 4 samples whose analytical data are shown above are intermediate australites

Lake Wilson

Lat. 26°02′S, long. 129°36′E Mann

* This age is derived from an isochron defined by 23 points: the 4 intermediate australites whose analytical data are shown above; 9 of the 10 high-calcium australites (see under both reference SA 4 above and NT 3); and 10 high-calcium philippinites whose analytical data may be consulted in the original work.

Ref: SA 5 AUSTRALITE

Whole rock K-Ar age 0.93 ± 0.02, 0.79 ± 0.01, 0.87 ± 0.02 } 0.86 ± 0.07 m.y.

GA2064 %K 1.607, 1.618 *Ar(10^{-8}cm³/g) 0.06 ± 0.03, 5.94 ± 0.09 %*Ar 2.0, 37.4

— 5.08 ± 0.05 —, 50.8

5.60 ± 0.10 35.3

Core from which complete spallation of aerothermal stress shell has occurred

Lake Wilson area, Musgrave Ranges Mann

Mean apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 0.83 ± 0.03, 1.13 ± 0.02, 0.81 ± 0.10 } 0.92 ± 0.18 m.y.

GA2055 %K 1.788, 1.790 *Ar(10^{-8}cm^3/g) 0.61 ± 0.08, 5.28 ± 0.07 %*Ar 5.1, 45.6
0.35 ± 0.02, 7.68 ± 0.07 9.2, 45.8
5.77 ± 0.74 6.5

Core fragment
Florieton area 32 km northwest of Morgan Chowilla
Mean apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 0.85 ± 0.01, 0.77 ± 0.02, 0.82 ± 0.02 } 0.81 ± 0.04 m.y.

GA1991
(T80) %K 1.988, 1.991 *Ar(10^{-8}cm^3/g) 0.27 ± 0.02, 6.48 ± 0.05 %*Ar 7.0, 52.7
0.04 ± 0.02, 6.07 ± 0.07 1.4, 54.8
0.09 ± 0.03, 6.44 ± 0.06 2.3, 55.0

Core
Claypan around Pine Dam, 'Myrtle Springs' strewnfield, between Leigh Creek and Lake Torrens Copley
Mean apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 0.79 ± 0.03 m.y.

GA1994
(T107) %K 1.914, 1.922 *Ar(10^{-8}cm^3/g) 1.10 ± 0.06, 4.95 ± 0.05 %*Ar 8.4, 57.7

Core
Claypans between Boundary Dam and Pine Dam, 'Myrtle Springs' strewnfield Copley
Apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 0.85 ± 0.03, 0.97 ± 0.02 } 0.91 ± 0.09 m.y.

GA1995
(T71) %K 1.964, 1.970 *Ar(10^{-8}cm^3/g) 1.82 ± 0.09, 4.83 ± 0.07 %*Ar 11.2, 43.3
1.63 ± 0.03, 5.96 ± 0.05 23.6, 51.7

Australite-button core
Claypan around Pine Dam, 'Myrtle Springs' strewnfield, between Leigh Creek and Lake Torrens Copley
Mean apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 1.16 ± 0.04 m.y.

GA1996
(T71) %K 1.824, 1.831 *Ar(10^{-8}cm^3/g) 0.93 ± 0.16, 7.53 ± 0.16 %*Ar 10.0, 32.8
Australite-button flange from same sample (T71) as GA1995 Copley
Flange (GA1996) is morphologically younger than core (GA1995); older apparent age of flange must be primarily a result of a higher content of radiogenic argon

Ref: SA 5 AUSTRALITE
Whole rock K-Ar age 1.09 ± 0.02, 0.79 ± 0.02 } 0.94 ± 0.21 m.y.

GA1997
(T99) %K 1.899, 1.906 *Ar(10^{-8}cm^3/g) 1.43 ± 0.05, 6.82 ± 0.05 %*Ar 13.4, 63.6
1.05 ± 0.06, 4.94 ± 0.04 7.0, 59.5

Australite-button core
Claypans between Boundary Dam and Pine Dam, 'Myrtle Springs' strewnfield Copley
Mean apparent age may reflect the time of primary melting of the australite

Ref: SA 5 AUSTRALITE

Whole rock K-Ar age 1.79 ± 0.04 m.y.

GA1998 %K 1.810, 1.890 *Ar($10^{-8}cm^3/g$) 1.46 ± 0.12, 11.72 ± 0.13 %*Ar 4.8, 36.5

(T99) Australite-button flange from same sample (T99) as GA1997 Copley

Flange (GA1998) is morphologically younger than core (GA1997); older apparent age of flange must be primarily a result of a higher content of radiogenic argon

Ref: SA 5 AUSTRALITE

Whole rock K-Ar age 1.11 ± 0.03 m.y.

GA1993 %K 1.879, 1.898 *Ar($10^{-8}cm^3/g$) 0.08 ± 0.06, 7.59 ± 0.11 %*Ar 0.5, 26.7

Composite sample of small pieces of flange from australites T76, T77, T89, T107, T109, and T110

T76, T77, T89, claypan around Pine Dam, 'Myrtle Springs' strewnfield, between Leigh Creek and Lake Torrens Copley

T107, T109, T110, claypans between Boundary Dam and Pine Dam, 'Myrtle Springs' strewnfield Copley

Tasmania

Ref: TAS 1 HEEMSKIRK (RED) GRANITE

Whole-rock Rb-Sr age 346 ± 8 m.y. Initial Sr^{87}/Sr^{86} 0.7190 ± 0.0051(I)
Biotite Rb-Sr age 362 ± 10 m.y.
Whole-rock and biotite Rb-Sr age 352 ± 7 m.y.
Initial Sr^{87}/Sr^{86} 0.7192 ± 0.0021(I)

		Rb^{87} (μmole/g)	Sr^{86} (μmole/g)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA205	Whole rock	1.059	0.05137	20.61	0.8160
GA748A	Whole rock	1.046	0.05115	20.45	0.8142
					0.8159 (meas.)
GA748B	Whole rock	1.055	0.05116	20.62	0.8159
					0.8153 (meas.)
GA814A	Whole rock	1.227	0.04320	28.39	0.8624 (meas.)
GA814B	Whole rock	1.219	0.04252	28.67	0.8660 (meas.)
GA815A	Whole rock	1.271	0.02517	50.50	0.9582
GA815B	Whole rock	1.274	0.02519	50.58	0.9585
GA816A	Whole rock	1.158	0.01091	106.13	1.2299
GA816B	Whole rock	1.150	0.01078	106.72	1.2300
GA817A	Whole rock	1.074	0.05267	20.40	0.8201 (meas.)
GA817B	Whole rock	1.074	0.05243	20.49	0.8198
					0.8199 (meas.)
GA821A	Whole rock	1.027	0.08181	12.56	0.7848
					0.7850 (meas.)
GA821B	Whole rock	1.028	0.08374	12.28	0.7837
					0.7848 (meas.)
GA826A	Whole rock	0.992	0.01922	51.57	0.9622
GA826B	Whole rock	0.999	0.01933	51.67	0.9611
GA1125A	Whole rock	1.367	0.00865	157.90	1.4896
GA1125B	Whole rock	1.363	0.00869	156.78	1.4901
GA1126	Whole rock	1.376	0.01591	86.51	1.1351
GA1200	Whole rock	0.453	0.29276	1.55	0.7268 (meas.)
GA1201	Whole rock	1.182	0.04757	24.86	0.8322 (meas.)
GA205	Biotite	3.546	0.00768	461.78	3.0073
GA748A	Biotite	4.714	0.00602	782.20	4.6045
GA748B	Biotite	4.755	0.00604	787.69	4.6024
GA814A	Biotite	3.983	0.00484	823.79	4.8996
GA814B	Biotite	3.947	0.00480	822.03	4.8994
GA817A	Biotite	4.701	0.00387	1213.9	6.7553
GA817B	Biotite	4.668	0.00379	1231.7	6.7464
GA821A	Biotite	4.008	0.00460	871.52	5.1718
GA821B	Biotite	3.991	0.00460	867.82	5.1266
GA1214A	Biotite	4.775	0.0257	185.99	1.6345
GA1214B	Biotite	4.748	0.0259	183.11	1.6143

GA205, adamellite from 8340 3260 Queenstown
GA748, adamellite from 8373 3241 Queenstown
GA814, microadamellite from 8377 3232 Queenstown
GA815, porphyritic aplite from 8374 3235 Queenstown
GA816, red pegmatite from 8370 3240 Queenstown
GA817, adamellite from 8393 3280 Queenstown
GA821, marginal grey adamellite from 8373 3259 Queenstown
GA826, red aplite from 8374 3239 Queenstown
GA1125, marginal aplitic adamellite from 8474 3242 Queenstown
GA1126, red aplitic adamellite from 8460 3253 Queenstown
GA1200, augite-axinite pegmatite-aplite from 8372 3237 Queenstown
GA1201, adamellite from 8419 3286 Queenstown

GA1214, biotite nodule from 8375 3234 Queenstown

Whole-rock age modified after McIntyre, Brooks, Compston, & Turek (1966). Red granite intruded after white granites. Individual Rb-Sr ages for the biotites, assuming initial Sr^{87}/Sr^{86} of 0.719, are:

GA205, 357 m.y.; GA748A, 357 m.y.; GA748B, 355 m.y.; GA814A, 365 m.y.; GA814B, 366 m.y.; GA817A, 358 m.y.; GA817B, 352 m.y.; GA821A, 368 m.y.; GA821B, 366 m.y.; GA1214A, 354 m.y.; GA1214B, 352 m.y.

Ref: TAS 1 HEEMSKIRK (WHITE SERIES A) GRANITE

Whole-rock Rb-Sr age 353 ± 7 m.y. Initial Sr^{87}/Sr^{86} 0.7338 ± 0.0023(I)

Biotite Rb-Sr age 364 ± 42 m.y.

Whole-rock and biotite Rb-Sr age 356 ± 4 m.y.

Initial Sr^{87}/Sr^{86} 0.7330 ± 0.0017(I)

		Rb^{87} (μmole/g)	Sr^{86} (μmole/g)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA818A	Whole rock	1.117	0.05523	20.23	0.8351
					0.8346 (meas.)
GA818B	Whole rock	1.116	0.05623	19.85	0.8361
					0.8349 (meas.)
GA823A	Whole rock	1.179	0.06621	17.80	0.8177
					0.8196 (meas.)
GA823B	Whole rock	1.186	0.06626	17.90	0.8214
					0.8210 (meas.)
GA827	Whole rock	1.419	0.01504	94.40	1.1988
GA1195	Whole rock	1.482	0.03062	48.41	0.9721
GA1440	Whole rock	1.336	0.01354	98.67	1.2161
GA1441	Whole rock	1.399	0.01497	93.51	1.1931
GA1442	Whole rock	0.959	0.05751	16.67	0.8138
GA1444	Whole rock	1.152	0.06709	17.18	0.8180
GA1445	Whole rock	1.203	0.06264	19.21	0.8283
GA1449	Whole rock	1.207	0.01998	60.40	1.0268
GA1451	Whole rock	1.278	0.06891	18.54	0.8251
GA818A	Biotite	3.868	0.00713	542.46	3.3912
GA818B	Biotite	3.814	0.00707	539.23	3.3929
GA823A	Biotite	3.998	0.00274	1458.6	8.0655
GA823B	Biotite	4.030	0.00282	1430.0	7.9149
GA827	Biotite	5.054	0.00448	1126.8	6.1589
GA1195	Biotite	6.219	0.00482	1289.1	7.1381

All samples are adamellite

GA818, from 8477 3155 Queenstown
GA823, from 8455 3164 Queenstown
GA827, from 8429 3192 Queenstown
GA1195, from 8381 3235 Queenstown
GA1440, from 8444 3211 Queenstown
GA1441, from 8425 3235 Queenstown
GA1442, from 8467 3187 Queenstown
GA1444, from 8480 3201 Queenstown
GA1445, from 8480 3173 Queenstown
GA1449, from 8397 3217 Queenstown
GA1451, from 8490 3195 Queenstown

Apparent ages are those of emplacement; the high initial Sr^{87}/Sr^{86} may have resulted from contamination of the magma with radiogenic strontium from a crustal source. Assuming an initial Sr^{87}/Sr^{86} of 0.734, individual Rb-Sr ages for the biotites are:

GA818A, 353 m.y.; GA818B, 355 m.y.; GA823A, 362 m.y.; GA 823B, 361 m.y.; GA827, 346 m.y.; GA1195, 358 m.y.

Ref: TAS 1 HEEMSKIRK (WHITE SERIES B) GRANITE

Whole-rock Rb-Sr age 357 ± 6 m.y. Initial Sr^{87}/Sr^{86} 0.7408 ± 0.0036(I)
Biotite Rb-Sr age 354 ± 30 m.y.
Whole-rock and biotite Rb-Sr age 358 ± 3 m.y.
Initial Sr^{87}/Sr^{86} 0.7407 ± 0.0021(I)

		Rb(μmole/g)	Sr(μmole/g)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA819A	Whole rock	1.454	0.00725	200.47	1.7412
GA819B	Whole rock	1.461	0.00726	201.30	1.7395
GA824A	Whole rock	1.298	0.06919	18.76	0.8345
GA824B	Whole rock	1.303	0.06906	18.87	0.8349
GA1447	Whole rock	1.437	0.07368	19.51	0.8370
GA1448	Whole rock	1.214	0.01844	65.83	1.0676
GA819	Biotite	8.333	0.00220	3790.5	19.0276
GA824A	Biotite	4.327	0.01104	392.03	2.7036
GA824B	Biotite	4.239	0.01082	391.84	2.6789
GA824C	Biotite	4.243	0.01097	386.48	2.6713

GA819, porphyritic microadamellite from 8482 3152 Queenstown
GA824, porphyritic adamellite from 8485 3148 Queenstown
GA1447, adamellite from 8493 3160 Queenstown
GA1448, porphyritic microadamellite from 8486 3160 Queenstown

Whole rock age modified after McIntyre, Brooks, Compston, & Turek (1966). Apparent ages are those of emplacement; the high initial Sr^{87}/Sr^{86} may have resulted from contamination of the magma with radiogenic strontium from a crustal source. Assuming an initial Sr^{87}/Sr^{86} of 0.741, individual Rb-Sr ages for the biotites are:
GA819, 347 m.y.; GA824A, 360 m.y.; GA824B, 356 m.y.; GA824C, 359 m.y.

Ref: TAS 1 HEEMSKIRK GRANITE

Rb-Sr age 360 ± 5 m.y. Initial Sr^{87}/Sr^{86} not given

		Rb(μmole/g)	Sr(μmole/g)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA205	Biotite	3.546	0.00768	461.78	3.0073
GA748A	Biotite	4.714	0.00602	782.20	4.6045
GA748B	Biotite	4.755	0.00604	787.69	4.6024
GA814A	Biotite	3.983	0.00484	823.79	4.8996
GA814B	Biotite	3.947	0.00480	822.03	4.8994
GA817A	Biotite	4.701	0.00387	1213.9	6.7553
GA817B	Biotite	4.668	0.00379	1231.7	6.7464
GA818A	Biotite	3.868	0.00713	542.46	3.3912
GA818B	Biotite	3.814	0.00707	539.23	3.3929
GA818A	Muscovite	3.2895	0.00682	482.49	3.1436
GA818B	Muscovite	3.3053	0.00690	479.03	3.1414
GA819	Chlorite	3.319	0.00354	938.70	4.6062
GA821A	Biotite	4.008	0.00460	871.52	5.1718
GA821B	Biotite	3.991	0.00460	867.82	5.1266
GA824A	Biotite	4.327	0.01104	392.03	2.7036
GA824B	Biotite	4.239	0.01082	391.84	2.6789
GA824C	Biotite	4.243	0.01097	386.48	2.6713
GA823A	Biotite	3.998	0.00274	1458.6	8.0655
GA823B	Biotite	4.030	0.00282	1430.0	7.9149
GA827	Biotite + chlorite	5.054	0.00448	1126.8	6.1589
GA1195	Biotite	6.219	0.00482	1289.1	7.1381
GA1214A	Biotite	4.775	0.0257	185.99	1.6345
GA1214B	Biotite	4.748	0.0259	183.11	1.6143
GA1215	Enstatite	0.6900	0.0053	1307.75	7.4472
GA1216	Clinochlore	5.056	0.00333	1519.5	8.2434

GA205, adamellite (red) from 8340 3260 Queenstown
GA748, adamellite (red) from 8373 3241 Queenstown
GA814, microadamellite (red) from 8377 3232 Queenstown
GA817, adamellite (red) from 8393 3280 Queenstown
GA818, adamellite (white series A) from 8477 3155 Queenstown

GA819, porphyritic microadamellite (white series B) from 8482 3152 Queenstown
GA821, marginal grey adamellite (red) from 8373 3259 Queenstown
GA823, adamellite (white series A) from 8455 3164 Queenstown
GA824, porphyritic adamellite (white series B) from 8485 3148 Queenstown
GA827, adamellite (white series A) from 8429 3192 Queenstown
GA1195, adamellite (white series A) from 8381 3235 Queenstown
GA1214, biotite nodule from 8375 3234 Queenstown
GA1215, vein enstatite in contact zone of red granite and sediment, Kelvin's Mine, 8376 3282 Queenstown
GA1216, vein clinochlore in red granite from 8377 3284 Queenstown

A MSWD of 27.46 for the regression indicates geological variation. Individual Rb-Sr ages for the non-biotite minerals are:

GA818A muscovite, 359 m.y. Initial Sr^{87}/Sr^{86} 0.734(A)
GA818B muscovite, 362 m.y. Initial Sr^{87}/Sr^{86} 0.734(A)
GA819 chlorite, 296 m.y. Initial Sr^{87}/Sr^{86} 0.741(A)
GA827 biotite + chlorite, 346 m.y. Initial Sr^{87}/Sr^{86} 0.734(A)
GA1215 enstatite, 369 m.y. Initial Sr^{87}/Sr^{86} 0.719(A)
GA1216 clinochlore, 356 m.y. Initial Sr^{87}/Sr^{86} 0.719(A)

The chlorite (GA819) age of 296 m.y. may represent a geological event, or it may be the present-day age value in a gradual breakdown process

Ref: TAS 2 PIEMAN GRANITE

Rb-Sr age 356 ± 9 m.y. Initial Sr^{87}/Sr^{86} 0.7354 ± 0.0018(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA1127	Whole rock	317	67.3	13.56	0.8033
		317	65.5	13.93	0.8040
	Plagioclase	95.3	51.6	5.31	0.7610
	Orthoclase	544	78.0	20.5	0.8312
	Chlorite	112	8.29	39.00	0.9192
	Biotite	869	9.70	257.5	2.0122
GA1196	Whole rock	349	55.5	18.08	0.8432 (meas.)
	Plagioclase	140	37.8	10.65	0.8071 (meas.)
	Orthoclase	551	68.8	23.04	0.8607 (meas.)
	Muscovite	734	15.5	136.6	1.3592
	Chlorite	198	10.2	55.68	0.8737
GA1202	Whole rock	355	53.3	18.88	0.8285 (meas.)
	Plagioclase	97.9	28.5	9.88	0.7753 (meas.)
	Orthoclase	502	76.2	18.93	0.8253 (meas.)
	Biotite	1066	6.66	477.5	3.0743
GA1203	Whole rock	327	56.0	17.69	0.8211 (meas.)
	Muscovite	748	11.3	190.0	1.6839
GA1204	Whole rock	314	68.5	13.18	0.8044 (meas.)
	Plagioclase	65.4	21.2	8.87	0.7678 (meas.)
	Orthoclase	434	64.8	19.24	0.8138 (meas.)
	Chlorite	185	16.6	31.93	0.8826
	Biotite	1028	12.9	228.8	1.8475
GA1205	Whole rock	292	74.2	11.33	0.7938 (meas.)
	Plagioclase	65.7	56.3	3.32	0.7597 (meas.)
	Orthoclase	419	92.3	13.05	0.7991 (meas.)
	Biotite	1050	12.1	250.1	2.0015
GA1504	Whole rock	321	55.3	16.69	0.8156
					0.8146 (meas.)
GA1505	Whole rock	353	66.3	15.35	0.8060
GA1506	Whole rock	365	80.5	13.05	0.7912
					0.7926 (meas.)
GA1507	Whole rock	329	62.1	15.22	0.8088
					0.8088 (meas.)

GA1127, GA1204, GA1205, GA1504, GA1507, coarse-grained adamellite
GA1196, granite/Precambrian metasediment marginal variant
GA1202, xenolithic? constituent

GA1203, aplite from dyke within the granite
GA1505, GA1506, coarse-grained granite
Locality sketch-map shown on p. 460 of reference TAS 2 Burnie
Age of emplacement relates Pieman Granite to the Tabberabberan Orogeny. Assuming an initial Sr^{87}/Sr^{86} of 0.7354, individual Rb-Sr ages for the micas are:
GA1127 biotite, 357 ± 4 m.y.; GA1202 biotite, 353 ± 4 m.y.; GA1203 muscovite, 359 ± 4 m.y.; GA1204 biotite, 350 ± 4 m.y.; GA1205 biotite, 364 ± 4 m.y.

Ref: TAS 2 MEREDITH GRANITE

Rb-Sr age 353 ± 7 m.y. Initial Sr^{87}/Sr^{86} 0.7155 ± 0.0015((I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA1213	Whole rock	223	143	4.476	0.7367 (meas.)
	Plagioclase	103	181	1.626	0.7234
	Orthoclase	391	169	6.646	0.7490 (meas.)
	Biotite	636	5.99	305.2	2.2163

Porphyritic granite
Locality and co-ordinates not given Burnie
Age of emplacement relates Meredith Granite to the Tabberabberan Orogeny. Assuming an initial Sr^{87}/Sr^{86} of 0.715, the individual age for the biotite is 354 ± 4 m.y.

Ref: TAS 2 BISCHOFF PORPHYRY

Whole rock Rb-Sr age 349 ± 4 m.y. Initial Sr^{87}/Sr^{86} 0.715(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
PORPHYRY	938	9.09	296.9	2.1528

Quartz-feldspar porphyry
Mount Bischoff Burnie
The Bischoff Porphyry and, therefore, the Mount Bischoff mineralization are chronologically related to the Meredith Granite

Ref: TAS 2 RENISON BELL PORPHYRY

Whole rock Rb-Sr age 355 ± 4 m.y. Initial Sr^{87}/Sr^{86} 0.700(A)
350 ± 4 m.y. Initial Sr^{87}/Sr^{86} 0.730(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA1197	1204	7.84	442.0	2.8807

From greisenized dyke south of the mine treatment-plant Renison Bell
Queenstown
Age relates the Renison Bell mineralization to the Tabberabberan Orogeny

Ref: TAS 2 McIVORS HILL GABBRO

Rb-Sr age 518 ± 133 m.y. Initial Sr^{87}/Sr^{86} 0.7132 ± 0.0031(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA1198	Whole rock	85.2	163	1.502	0.7241 (meas.)
	Plagioclase	223	274	2.337	0.7300 (meas.)
	Hornblende/pyroxene	7.10	22.2	0.919	0.7205
					0.7196 (meas.)

Coarse-grained gabbro
Comstock area, west of Zeehan
Lat. 41°53′30″S, long. 145°16′E Queenstown
Age tentatively suggests that intrusion of the gabbro occurred before the Tabberabberan Orogeny, and supports the contention that the basic and ultrabasic rocks in western Tasmania were emplaced during the Cambrian

Ref: TAS 3 ORE DEPOSIT, READ ROSEBERY

Galena Age 161 m.y. Apparent ($c_o = 30.1$) U^{238}/Pb^{204} 8.93, Th/U 3.77

	Pb^{206}/Pb^{204}	Pb^{207}/Pb^{204}	Pb^{208}/Pb^{204}
71	18.377 (0.004)	15.747 (0.003)	38.476 (0.007)
72	18.372 (DS)	15.749 (DS)	38.477 (DS)
73	18.382 (0.004)	15.756 (0.003)	38.496 (0.007)
75	18.373 (0.004)	15.745 (0.001)	38.456 (0.003)
77	18.370 (0.004)	15.744 (0.001)	38.466 (0.003)
79	18.366 (0.006)	15.740 (0.006)	38.461 (0.014)
85	18.380 (0.006)	15.742 (0.006)	38.454 (0.014)

71, 2 level, A lens, 3000N Queenstown
72, 4 level, A lens, 3400N Queenstown
73, 9 level, F lens, 300S Queenstown
75, 9 level, A lens, 3750N Queenstown
77, 2 level, B lens, 2750N Queenstown
79, 11 level, A lens, 3700N Queenstown
85, 11 level, F lens, 300S Queenstown

Anomalous apparent age probably resulting from contamination by radiogenic lead from crustal sources

Victoria

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 0.81 m.y., 0.81 m.y., 0.83 m.y.
GA1017 %K 1.092, 1.096 (1.094) *Ar^{40}/K^{40} 0.0000474 % atm. Ar^{40} 44.9
0.0000471 51.9
0.0000483 48.2
Olivine basalt
Albion quarry, Alphington, near Melbourne
Lat. 37°46′30″S, long. 145°02′E Melbourne
Reliable ages of extrusion, c.f. GA1060 and GA1116

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 4.68 m.y., 4.46 m.y., 4.52 m.y.
GA1018 %K 0.970, 0.972 (0.971) *Ar^{40}/K^{40} 0.000280 % atm. Ar^{40} 19.4
0.000261 19.0
0.000265 26.7
Olivine basalt
Fowler's quarry, off Keilor Road, Essendon, near Melbourne
Lat. 37°44′30″S, long. 144°52′30″E Melbourne
Age of extrusion about 4.50 m.y., c.f. GA1062

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.63 m.y.
GA1019 %K 0.759, 0.760 (0.760) *Ar^{40}/K^{40} 0.0001542 % atm. Ar^{40} 79.8
Olivine basalt
McGrath's quarry, Braybrook, near Melbourne
Lat. 37°46′S, long. 144°51′E Melbourne
Reliable age of extrusion

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.55 m.y.
GA1020 %K 0.747, 0.752 (0.750) *Ar^{40}/K^{40} 0.000149 % atm. Ar^{40} 83.7
Olivine basalt
Albion quarry, Sunshine
Lat. 37°46′S, long. 144°49′E Melbourne
Reliable age of extrusion; c.f. GA1173

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.49 m.y.
GA1021 %K 0.743, 0.743 (0.743) *Ar^{40}/K^{40} 0.0001457 % atm. Ar^{40} 83.2
Olivine basalt
Newport quarry, Melbourne
Lat. 37°50′30″S, long. 144°52′30″E Melbourne
Probably reliable age of extrusion; c.f. GA1115

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.57 m.y., 2.49 m.y.
GA1023 %K 1.306, 1.307 (1.306) *Ar^{40}/K^{40} 0.0001500 % atm. Ar^{40} 38.2
0.0001458 48.5
Olivine basalt
Small quarry 1 km south of Dunnstown, 10 km east-southeast of Ballarat
Ballarat 1- mile 034 608 Ballarat

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 0.81 m.y., 0.77 m.y.
GA1060 %K 1.128, 1.132 (1.130) *Ar^{40}/K^{40} 0.0000475 % atm. Ar^{40} 88.8
0.000448 57.6
Olivine basalt
Albion quarry, Alphington, near Melbourne
Lat. 37°46′30″S, long. 145°02′E Melbourne
See GA1017

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.16 m.y.
GA1061 %K 0.720, 0.722 (0.721) *Ar^{40}/K^{40} 0.0001264 % atm. Ar^{40} 47.7
Olivine basalt
Merri Creek quarry, Melbourne
Lat. 37°46′S, long. 144°59′E Melbourne
Probably reliable age of extrusion; c.f. GA1171

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 4.42 m.y., 4.45 m.y., 4.52 m.y.
GA1062 %K 0.876, 0.878 (0.877) *Ar^{40}/K^{40} 0.000259 % atm. Ar^{40} 25.3
0.000260 55.0
0.000258 24.8
Olivine basalt
Fowler's quarry, off Keilor Road, Essendon, near Melbourne
Lat. 37°44′30″S, long. 144°52′30″E Melbourne
See GA1018

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 0.56 m.y.
GA1064 %K 1.125, 1.127 (1.126) *Ar^{40}/K^{40} 0.0000325 % atm. Ar^{40} 71.6
Alkali olivine basalt
Framlingham quarry, 4.2 km north-northwest of Panmure
Panmure 1-mile 632 761 Colac
Probably reliable age of extrusion; c.f. GA1172

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 3.95 m.y., 3.88 m.y.
GA1065 %K 1.158, 1.162 (1.160) *Ar^{40}/K^{40} 0.000231 % atm. Ar^{40} 49.3
0.000228 66.1
Olivine basalt
Menzel's quarry, Hamilton
Lat. 37°46′S, long. 142°03′E Hamilton
Probably reliable age of extrusion

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 3.59 m.y.
GA1066 %K 0.582, 0.584 (0.583) *Ar^{40}/K^{40} 0.000211 % atm. Ar^{40} 86.9
Olivine basalt
Ararat quarry, Ararat
593 395 Ballarat
Probably reliable age of extrusion, c.f. GA1174

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.50 m.y.
GA1115 %K 0.728, 0.732 (0.730) *Ar^{40}/K^{40} 0.0001464 % atm. Ar^{40} 90.1
Olivine basalt
Newport quarry, Melbourne
Lat. 37°50′30″S, long. 144°52′30″E Melbourne
See GA1021

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 0.81 m.y., 0.82 m.y.
GA1116 %K 1.127, 1.121 (1.124) *Ar^{40}/K^{40} 0.0000471 % atm. Ar^{40} 53.7
0.0000479 40.5
Olivine basalt
Albion quarry, Alphington, near Melbourne
Lat. 37°46′30″S, long. 145°02′E Melbourne
See GA1017

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.23 m.y.
GA1171 %K 0.812, 0.818 (0.815) *Ar^{40}/K^{40} 0.0001307 % atm. Ar^{40} 61.3
Olivine basalt
Merri Creek quarry, Melbourne
Lat. 37°46′S, long. 144°59′E Melbourne
See GA1061

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 0.586 m.y.
GA1172 %K 1.094, 1.091 (1.093) *Ar^{40}/K^{40} 0.0000342 % atm. Ar^{40} 75.8
Alkali olivine basalt
Framlingham quarry, 4.2 km north-northwest of Panmure
Panmure 1-mile 632 761 Colac
See GA1064

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 2.74 m.y.
GA1173 %K 0.662, 0.666 (0.664) *Ar^{40}/K^{40} 0.000161 % atm. Ar^{40} 90.4
Olivine basalt
Albion quarry, Sunshine
Lat. 37°46′S, long. 144°49′E Melbourne
This sample may have come from a lava flow below that from which GA1020 was collected

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 3.52 m.y.
GA1174 %K 0.646, 0.648 (0.647) *Ar^{40}/K^{40} 0.000206 % atm. Ar^{40} 86.1
Olivine basalt
Ararat quarry, Ararat
593 395 Ballarat
See GA1066

Ref: VIC 1 NEWER VOLCANICS
Whole rock K-Ar age 3.87 m.y., 3.93 m.y.
GA2095 %K 1.560, 1.561 (1.560) *Ar^{40}/K^{40} 0.000226 % atm. Ar^{40} 19.7
0.000230 20.3
Quarry 1.4 km east of Dunnstown, 11 km east-southeast of Ballarat
Ballarat 1-mile 048 617 Ballarat

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 0.86 ± 0.02 m.y.
GA2089 %K 1.802, 1.818 *Ar($10^{-8}cm^3/g$) 0.69 ± 0.02, 5.48 ± 0.05 %*Ar 19.4, 56.2
Australite-button core
New Ocean Road, 5 km north of Princetown, Port Campbell area Colac
Apparent age may reflect the time of primary melting of the australite

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 1.12 ± 0.03 m.y.
GA2090 %K 1.659, 1.661 *Ar($10^{-8}cm^3/g$) 0.41 ± 0.02, 7.00 ± 0.15 %*Ar 13.4, 26.0
Australite-button flange from same sample as GA2089 Colac
Flange (GA2090) is morphologically younger than core (GA2089); older apparent age of flange must be primarily a result of a higher content of radiogenic argon

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 1.19 ± 0.02 m.y.
GA2091 %K 1.766, 1.766 *Ar(10^{-8}cm^3/g) 1.68 ± 0.02, 6.71 ± 0.06 %*Ar 41.0, 46.2
Australite-button stress shell (about 4 mm thick) from same sample as GA2089 and GA2090 Colac
Apparent age is similar to that of flange (GA2090), and must be primarily a result of a higher content of radiogenic argon in both flange and stress shell than in core (GA2089)

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 1.01 ± 0.03, 0.93 ± 0.03, 0.92 ± 0.02 } 0.95 ± 0.05 m.y.
GA2350 %K 1.820, 1.836 *Ar(10^{-8}cm^3/g 7.40 ± 0.18 %*Ar 31.1
6.81 ± 0.20 16.0
6.70 ± 0.16 35.3
Australite-button core
Stanhope Bay, east of Warrnambool Colac
Mean apparent age may reflect the time of primary melting of the australite

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 0.81 ± 0.02, 0.81 ± 0.02, 1.02 ± 0.02, 0.70 ± 0.01, 0.94 ± 0.01, 0.78 ± 0.01, 0.86 ± 0.02 } 0.85 ± 0.11 m.y.
GA2057 %K 1.821, 1.825 *Ar(10^{-8}cm^3/g) 1.36 ± 0.07, 4.52 ± 0.05 %*Ar 8.8, 44.2
1.07 ± 0.03, 4.85 ± 0.05 12.2, 39.7
1.39 ± 0.03, 6.02 ± 0.06 22.7, 38.2
5.11 ± 0.10 25.9
6.85 ± 0.07 40.6
5.63 ± 0.07 39.9
6.25 ± 0.11 30.4
Australite-button core
Stanhope Bay, east of Warrnambool Colac
Mean apparent age may reflect the time of primary melting of the australite

Ref: VIC 2 AUSTRALITE
Whole rock K-Ar age 1.09 ± 0.03 m.y.
GA2056 %K 1.717, 1.722 *Ar(10^{-8}cm^3/g) 2.19 ± 0.09, 5.30 ± 0.12 %*Ar 9.3, 21.8
Australite-button flange from same sample as GA2057 Colac
Flange (GA2056) is morphologically younger than core (GA2057); older apparent age of flange must be primarily a result of a higher content of radiogenic argon

Western Australia

Ref: WA 1 — DING DONG DOWNS FORMATION

E52/10/6 — Whole rock — Rb-Sr age 2050 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5057	95.3	34.3	7.986	0.9308

Rhyolite

Lat. 18°05′55″S, long. 127°57′45″E — Gordon Downs

Maximum apparent age; probably close to time of emplacement

Ref: WA 1 — INTRUSIVES IN BISCAY FORMATION

Whole rock — Rb-Sr age 1537 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5055 E52/10/4	145.1	38.8	10.751	0.9250
GA5058 E52/10/7	267.8	32.0	24.042	1.2192

GA5055, sodic rhyolite from lat. 18°04′02″S, long. 127°55′58″E — Gordon Downs

GA5058, alkali microgranite from lat. 18°02′00″S, long. 127°57′30″E — Gordon Downs

Minimum estimate of age for Biscay Formation

Ref: WA 1 — SHALE, OLYMPIO FORMATION

E52/10/19 — Whole rock — Rb-Sr age 1705 m.y. Initial Sr^{87}/Sr^{86} 0.7250(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5232A	138.7	62.0	6.432	0.8822
				0.8803 (meas.)
GA5232B	380.7	36.9	29.677	1.4292
				1.4264 (meas.)
GA5232C	429.5	32.7	37.761	1.6310

From fault plane of one of the faults issuing from the Halls Creek Fault

Lat. 18°20′15″S, long. 127°50′05″E — Gordon Downs

Possible age of faulting

Ref: WA 1 — SHALE, OLYMPIO FORMATION

E52/9/23 — Whole rock — Rb-Sr age (GA5102A, C) 581 m.y. Initial Sr^{87}/Sr^{86} 1.0557(I)
(GA5102B) 1400 m.y. Initial Sr^{87}/Sr^{86} 0.701(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5102A	351.3	25.6	40.146	1.3812
GA5102B	367.3	29.5	35.781	1.4038
GA5102C	441.4	35.6	35.659	1.3448

Lat. 18°51′51″S, long. 127°14′15″E — Mount Ramsay

Age of 581 m.y. may reflect a Cambrian event, such as the extrusion of the Antrim Plateau Volcanics; 1400 m.y. is an unrelated apparent age. The scatter of data points may be explained by surface leaching

Ref: WA 1 — McINTOSH GABBRO

E52/6/53 — Pyroxene — K-Ar age 1729 m.y.

GA5221 — %K 0.085 $*Ar^{40}/K^{40}$ 0.1654 % atm. Ar^{40} 38.4

Dolerite

Lat. 17°45′35″S, long. 127°53′45″E — Dixon Range

Age may reflect a regional diastrophic event, but is a minimum estimate of the time of emplacement of the McIntosh Gabbro, c.f. GA5222

Ref: WA 1 — McINTOSH GABBRO

E52/6/54 — Pyroxene — K-Ar age 1732 m.y.

GA5222 — %K 0.165, 0.164 (0.165) $*Ar^{40}/K^{40}$ 0.1659 % atm. Ar^{40} 4.3

Dolerite

Lat. 17°45′35″S, long. 127°53′45″E — Dixon Range

Ref: WA 1 TICKALARA METAMORPHICS, MABEL DOWNS GRANODIORITE, AND McHALE GRANITE

Rb-Sr age (1) 1963 ± 46 m.y. Initial Sr^{87}/Sr^{86} 0.7017 ± 0.0016(I)
(2) 1961 ± 27 m.y. Initial Sr^{87}/Sr^{86} 0.7010 ± 0.0006(I)
(regression of 14 samples marked *)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA957 E52/6/19	*Whole rock	44.0	575.0	0.220	0.7082
GA958 E52/6/25	Whole rock	111.0	291.1	1.096	0.7344
GA959 E52/6/26	*Whole rock	31.9	182.9	0.502	0.7138
GA969 E52/6/13	*Whole rock	28.7	741.1	0.111	0.7052
GA970	*Whole rock	198.8	129.1	4.426	0.8240
E52/2/24	K-feldspar	384.2	274.7	4.021	0.8182
GA973 E52/2/13	*Whole rock	124.2	245.2	1.456	0.7423
GA975	*Whole rock	183.0	83.2	6.324	0.8749
E52/2/27	*K-feldspar	386.7	215.4	5.162	0.8440
GA976 E52/6/16	Whole rock	173.3	103.0	4.839	0.8321
GA1098 E52/2/4	*Whole rock	127.3	256.4	1.428	0.7395
GA1099 E52/2/10	Whole rock	14.8	210.1	0.203	0.7096
GA1100 E52/2/14	*Whole rock	134.3	246.8	1.564	0.7453
GA1101	*Whole rock	56.0	374.3	0.430	0.7124 (meas.)
E52/2/37	K-feldspar	206.8	629.5	0.945	0.7312 (meas.)
GA1102 E52/6/2	Whole rock	15.6	147.9	0.304	0.7065 (meas.)
GA1367	K-feldspar	257.8	442.6	1.674	0.7537
E52/6/24					0.7529 (meas.)
GA5074	*Whole rock	135.0	354.9	1.094	0.7317
E52/6/39					0.7313 (meas.)
GA5078	*Whole rock	59.4	666.8	0.256	0.7088
E52/6/43					0.7082 (meas.)
GA5079 E52/6/44	*Whole rock	129.4	140.0	2.656	0.7747
GA5097 E52/9/18	*Whole rock	125.2	152.5	2.360	0.7655
GA5150	Whole rock	53.6	595.9	0.259	0.7097
E52/6/46					0.7060 (meas.)

GA957, granodiorite from Mabel Downs Granodiorite; lat. 17°03′35″S, long. 128°14′35″E Dixon Range

GA958, biotite granite from Tickalara Metamorphics; lat. 17°08′06″S, long. 128°01′20″E Dixon Range

GA959, pyroxene granulite from Tickalara Metamorphics; lat. 17°13′40″S, long. 127°59′20″E Dixon Range

GA969, granodiorite from Mabel Downs Granodiorite; lat. 17°28′00″S, long. 128°07′58″E Dixon Range

GA970, granitic gneiss from Tickalara Metamorphics; lat. 16°52′20″S, long. 128°16′20″E Lissadell

GA973, epidote-biotite granodiorite from Tickalara Metamorphics; lat. 16°54′10″S, long. 128°11′00″E Lissadell

GA975, garnet-cordierite-biotite gneiss from Tickalara Metamorphics; lat. 16°52′40″S, long 128°17′00″E Lissadell

GA976, garnet-biotite granite from transitional? phase; lat. 17°16′50″S, long. 128°03′02″E Dixon Range

GA1098, biotite granite from Mabel Downs Granodiorite; lat. 16°47′15″S, long. 128°22′50″E Lissadell

GA1099, garnet gneiss from Tickalara Metamorphics; lat. 16°59′55″S, long. 128°14′00″E Lissadell

GA1100, gneissic granodiorite from Mabel Downs Granodiorite; lat. 16°51′55″S, long. 128°17′05″E Lissadell

GA1101, biotite granulite from Tickalara Metamorphics; lat. 16°58′00″S, long. 128°14′00″E Lissadell

GA1102, pyroxene granulite from transitional? phase; lat. 17°17′45″S, long. 128°03′00″E Dixon Range

GA1367, 'granite' from transitional? phase; lat. 17°10′25″S, long. 128°08′25″E Dixon Range

GA5074, granodiorite from McHale Granite; lat. 17°12′00″S, long. 128°17′15″E Dixon Range

GA5078, 'basic metasediment' from transitional? phase; lat. 17°58′30″S, long. 127°48′05″E Dixon Range

GA5079, biotite granulite from transitional? phase; lat. 17°58′30″S, long. 127°48′05″E Dixon Range

GA5097, granite aplite from Tickalara Metamorphics; lat. 18°31′15″S, long. 127°00′20″E Mount Ramsay

GA5150, granodiorite from McHale Granite; lat. 17°31′10″S, long. 127°56′45″E Dixon Range

The preferred age of 1961 ± 27 m.y. is regarded as a minimum estimate of the time of regional metamorphism, and of emplacement of both the Mabel Downs Granodiorite and the McHale Granite. GA970 and GA975 biotite yield data that fit an isochron from which a younger age is derived; see under 'Granites and Tickalara Metamorphics (altered samples)'. GA976 and GA1100 biotite yield data that fit an isochron from which an even younger age is derived; see under 'Granites, Whitewater Volcanics, and Castlereagh Hill Porphyry (altered samples)'

Ref: WA 1 TICKALARA METAMORPHICS

Rb-Sr age 2067 ± 29 m.y. Initial Sr^{87}/Sr^{86} 0.7036 ± 0.0010(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA958	Whole rock	111.0	291.1	1.096	0.7344
E52/6/25					
GA970	K-feldspar	384.2	274.7	4.021	0.8182
E52/2/24					
GA1099	Whole rock	14.8	210.1	0.203	0.7096
E52/2/10	Biotite	383.0	11.6	95.013	3.4796
GA1101	K-feldspar	206.8	629.5	0.945	0.7312 (meas.)
E52/2/37					
GA1367	K-feldspar	257.8	442.6	1.674	0.7537
E52/6/24					0.7529 (meas.)

Rock types and localities are shown under the age determination shown above

The age of 2067 ± 29 m.y. may reflect an apparent age of the Tickalara beds before the regional metamorphism 1961 m.y. ago (see above); alternatively it may be an apparent age resulting from loss of rubidium. GA970 biotite yields data that fit an isochron from which a younger age is derived; see under 'Granites and Tickalara Metamorphics (altered samples)'

Ref: WA 1 TICKALARA METAMORPHICS

E52/6/25 Biotite Rb-Sr age 971 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA958

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
430.6	4.7	265.327	4.3072

Biotite granite

Lat. 17°08′06″S, long. 128°01′20″E Dixon Range

Meaningless age

Ref: WA 1 BOW RIVER GRANITE AND SOPHIE DOWNS GRANITE

Rb-Sr age (1) 1874 ± 32 m.y. Initial Sr^{87}/Sr^{86} 0.7013 ± 0.0029(I)
(2) 1854 ± 14 m.y. Initial Sr^{87}/Sr^{86} 0.7029 ± 0.0015(I)
(regression of 13 samples marked*)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA963 E52/2/29	*Whole rock	296.5	65.8	12.949	1.0383
GA966 E52/6/15	*Whole rock	65.4	457.1	0.411	0.7143
GA967 E52/6/18	*Whole rock	196.1	135.6	4.158	0.8118
GA972 E52/2/7	*Whole rock	306.9	91.4	9.649	0.9569
GA974 E52/2/26	Whole rock	167.7	205.5	2.345	0.7704
GA1081	*Whole rock	49.7	557.5	0.257	0.7089
E52/6/4	Biotite	305.1	11.8	74.413	2.7092
GA1085 E52/2/5	Whole rock	219.6	106.6	5.924	0.8646
GA1086 E52/2/9	Whole rock	275.3	108.4	7.297	0.8870
GA1097 E52/2/1	Whole rock	84.4	383.2	0.633	0.7234 (meas.)
GA1104 E52/9/1	*Muscovite	1035.4	2.9	1035.900	27.7629
GA1240	*K-feldspar	248.8	202.1	3.539	0.7949
E52/2/8		245.4	202.8	3.479	0.8111
GA1242	K-feldspar	502.7	165.2	8.747	0.9235
E52/2/16	*	508.6	166.9	8.761	0.9286
GA5053 E52/10/2	*Whole rock	106.9	40.6	7.576	0.8996
GA5054 E52/10/3	*Whole rock	107.2	30.6	10.083	0.9682
GA5059 E52/10/8	*Whole rock	231.8	102.9	6.473	0.8716
GA5060 E52/10/10	*Whole rock	253.4	108.7	6.702	0.8797
GA5111	Whole rock	37.5	83.9	1.287	0.7318
E52/9/32					0.7315 (meas.)
GA5231 E52/10/18	*Whole rock	124.1	34.7	10.288	0.9733

GA963, porphyritic granite from Bow River Granite; lat. 16°45′45″S, long. 128°16′50″E Lissadell

GA966, adamellite from Bow River Granite; lat. 17°52′00″S, long. 127°44′40″E Dixon Range

GA967, porphyritic granite from Bow River Granite; lat. 17°13′30″S, long. 128°00′35″E Dixon Range

GA972, porphyritic adamellite from Bow River Granite; lat. 16°43′02″S, long. 128°12 00″E Lissadell

GA974, granite from Bow River Granite; lat. 16°57′00″S, long. 128°07′10″E Lissadell

GA1081, hornblende-biotite tonalite from Bow River Granite; lat. 17°51′50″S, long. 127°44′05″E Dixon Range

GA1085, graphic adamellite from Bow River Granite; lat. 16°01′05″S, long. 128°47′00″E Lissadell

GA1086, porphyritic granite from Bow River Granite; lat. 16°53′00″S, long. 128°04′00″E Lissadell

GA1097, granodiorite from Bow River Granite; lat. 16°59′55″S, long. 128°12′05″E Lissadell

GA1104, muscovite granite from Bow River Granite; lat. 18°33′40″S, long. 127°14′15″E Mount Ramsay

GA1240, biotite adamellite from Bow River Granite; lat. 16°48′55″S, long. 128°20′05″E Lissadell

GA1242, porphyritic granite from Bow River Granite; lat. 16°02′00″S, long. 128°52′00″E Lissadell

GA5053, granulitic granodiorite from Sophie Downs Granite; lat. 18°04′50″S, long. 127°53′10″E Gordon Downs

GA5054, graphic granite from Sophie Downs Granite; lat. 18°05′45″S, long. 127°53′00″E Gordon Downs

GA5059, porphyritic granite from Bow River Granite; lat. 18°04′15″S, long. 127°41′00″E Gordon Downs

GA5060, porphyritic granite from Bow River Granite; lat. 18°04′40″S, long. 127°40′55″E Gordon Downs

GA5111, leucogranite? from Bow River Granite; lat. 18°31′15″S, long. 126°20′45″E Mount Ramsay

GA5231, porphyritic granite from Sophie Downs Granite; lat. 18°10′25″S, long. 127°50′00″E Gordon Downs

The preferred age of 1854 ± 14 m.y. is regarded as the date of crystallization of the granite bodies. GA963, GA972, GA1085, and GA1097 mineral samples yield data that fit an isochron from which a younger age is derived, see under 'Granites and Tickalara Metamorphics (altered samples)'. GA1240 biotite and GA1086 K-feldspar yield data that fit an isochron from which an even younger age is derived; see under 'Granites, Whitewater Volcanics, and Castlereagh Hill Porphyry (altered samples)'.

Ref: WA 1
E52/6/18
GA967

BOW RIVER GRANITE
Biotite — Rb-Sr age 1368 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
742.9	5.5	388.788	7.4639

Porphyritic granite
Lat. 17°13′30″S, long. 128°00′35″E Dixon Range
Meaningless age

Ref: WA 1
E52/2/7
GA972

BOW RIVER GRANITE
Muscovite — Rb-Sr age 1784 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
871.1	12.9	193.449	5.5573

Porphyritic adamellite
Lat. 16°43′02″S, long. 128°12′00″E Lissadell
Apparent age may reflect an event leading up to a period of widespread diastrophism; see under 'Granites and Tickalara Metamorphics (altered samples)'

Ref: WA 1
E52/9/1
GA1104

BOW RIVER GRANITE
K-feldspar — Rb-Sr age 1511 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
610.6	18.7	93.800	2.6929

Biotite — Rb-Sr age 1600 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
246.7	4.1	173.171	4.5948

Muscovite granite
Lat. 18°33′40″S, long. 127°14′15″E Mount Ramsay
Meaningless ages

Ref: WA 1
E52/2/18
GA1366

BOW RIVER GRANITE
Biotite — Rb-Sr age 1486 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
1481.2	8.5	499.577	11.1306

Granite
Lat. 16°44′02″S, long. 127°55′00″E Lissadell
Meaningless age

Ref: WA 1 GRANITE
E52/9/22 Whole rock Rb-Sr age 2097 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA5101

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
107.5	63.7	4.870	0.8441

Intrudes Ding Dong Downs Formation, Cummins Range area
Lat. 18°54′10″S, long. 127°17′45″E Mount Ramsay
Maximum apparent age of intrusion

Ref: WA 1 GRANITE
E52/9/26 Whole rock Rb-Sr age 1638 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA5105

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
121.2	55.0	6.353	0.8463

Intrudes Olympio Formation, McLintock Range area
Lat. 18°49′15″S, long. 127°17′30″E Mount Ramsay
Age probably reflects a period of diastrophism; see under 'Granites and Tickalara Metamorphics (altered samples)'

Ref: WA 1 PEGMATITE
E52/9/25 Whole rock Rb-Sr age 2251 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA5104

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
278.5	11.5	69.364	2.9054

Intrudes Olympio Formation, McLintock Range area
Lat. 18°49′15″S, long. 127°16′50″E Mount Ramsay
Minimum age of intrusion

Ref: WA 1 PEGMATITE
E52/9/27 Rb-Sr age (1) 2752 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA5106 (2) 2718 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
(3) 1755 m.y. (independent of initial Sr^{87}/Sr^{86})

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
(1) Whole rock	199.2	51.6	11.091	1.1325
(2) Whole rock	201.1	51.5	11.236	1.1327
(3) Muscovite	1464.5	1.9	2180.102	54.5432

Intrudes Olympio Formation, McLintock Range area
Lat. 18°55′00″S, long. 127°14′00″E Mount Ramsay
About 2735 m.y. is the apparent age of intrusion; age of 1755 m.y. probably reflects Sr^{87} loss or rubidium gain, but it may be more reliable. In the absence of further analyses on the pegmatite unit, the age data remain quite equivocal

Ref: WA 1 RHYOLITE
E52/6/21 Whole rock Rb-Sr age 1811 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA968

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
178.6	55.4	9.274	0.9364

Dyke intruding Bow River Granite
Lat. 17°56′55″S, long. 127°47′05″E Dixon Range
Age of intrusion of rhyolite

Ref: WA 1 QUARTZ-FELDSPAR PORPHYRY
E52/6/55 Whole rock Rb-Sr age 1813 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA5223

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
163.2	65.1	7.207	0.8840

Dyke intruding McIntosh Gabbro
Lat. 17°59′55″S, long. 127°48′55″E Dixon Range
Age of intrusion of porphyry

Ref: WA 1 WHITEWATER VOLCANICS AND CASTLEREAGH HILL PORPHYRY

Rb-Sr age (1) 1788 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.7157 ± 0.0090(I)
(2) 1823 ± 17 m.y. Initial Sr^{87}/Sr^{86} 0.7121 ± 0.0034(I)
(regression of 10 samples marked *)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA956	Whole rock	523.3	24.6	61.239	2.2489
GA960	Whole rock	255.0	25.7	28.553	1.3978
D52/14/3	K-feldspar	474.8	34.0	40.136	1.7047
GA964	Whole rock	235.4	128.8	5.254	0.8389
E52/6/5					
GA965	Whole rock	242.7	113.9	6.123	0.8896
E52/6/8					
GA979	*Whole rock	508.5	34.1	42.906	1.8206
E52/2/34		516.7	33.4	44.476	1.8331
	K-feldspar	512.4	70.0	23.027	1.3151
	*Biotite	522.7	14.4	104.530	3.3805
GA1107	*Whole rock	205.5	137.0	4.312	0.8255
D52/14/4					
GA5126	*Whole rock	117.2	177.5	1.898	0.7581
E52/5/2					
GA5127	*Whole rock	204.5	163.4	3.598	0.8010
E52/5/3					
GA5148	*Whole rock	198.2	141.0	4.041	0.8150
E51/8/3					
GA5149	*Whole rock	199.7	120.4	4.769	0.8380
E51/8/4					
GA5217	*Whole rock	313.5	37.1	24.272	1.3301
E52/6/49					
GA5218	*Whole rock	311.7	64.7	13.854	1.0709
E52/6/50					
GA5219	*Whole rock	305.5	30.6	28.678	1.4495
E52/6/51					
GA5220	Whole rock	278.9	26.3	30.544	1.4599
E52/6/52					

GA956, quartz-feldspar porphyry from Castlereagh Hill Porphyry; lat. 16°59′55″S, long. 127°48′00″E Lissadell

GA960, rhyodacite from Whitewater Volcanics; lat. 15°57′20″S, long. 128°50′30″E Cambridge Gulf

GA964, granitic mylonite from Castlereagh Hill Porphyry; lat. 17°07′30″S, long. 127°47′55″E Dixon Range

GA965, feldspar porphyry from Whitewater Volcanics; lat. 17°02′54″S, long. 127°44′06″E Dixon Range

GA979, quartz-feldspar porphyry from Whitewater Volcanics; lat. 16°27′02″S, long. 128°09′02″E Lissadell

GA1107, porphyry from Whitewater Volcanics; lat. 15°58′50″S, long. 128°52′10″E Cambridge Gulf

GA5126, porphyry from Whitewater Volcanics; lat. 17°54′10″S, long. 126°25′20″E Lansdowne

GA5127, porphyry from Whitewater Volcanics; lat. 17°54′00″S, long. 126°21′30″E Lansdowne

GA5148, porphyry from Whitewater Volcanics?; Inglis Gap, Leopold Range Lennard River

GA5149, porphyry from Whitewater Volcanics?; Inglis Gap, Leopold Range Lennard River

GA5217, quartz-feldspar porphyry from Whitewater Volcanics; lat. 17°27′30″S, long. 127°35′35″E Dixon Range

GA5218, quartz-feldspar porphyry from Whitewater Volcanics; lat. 17°27′58″S, long. 127°35′35″E Dixon Range

GA5219, quartz-feldspar porphyry from Whitewater Volcanics; lat. 17°28′25″S, long. 127°35′30″E Dixon Range

GA5220, quartz-feldspar porphyry from Whitewater Volcanics; lat. 17°29′02″S, long. 127°35′25″E Dixon Range

1823 ± 17 m.y. is the preferred age of extrusion of the Whitewater Volcanics and intrusion of the Castlereagh Hill Porphyry; the two are coeval and comagmatic, and are probably differentiates of the parent magma from which the Bow River Granite was derived. GA956 K-feldspar and GA1107 biotite yield data that fit an isochron from which a younger age is derived; see under 'Granites, Whitewater Volcanics, and Castlereagh Hill Porphyry (altered samples)'

Ref: WA 1

GRANITES AND TICKALARA METAMORPHICS (ALTERED SAMPLES)

Rb-Sr age 1681 ± 63 m.y. Initial Sr^{87}/Sr^{86} 0.7025 ± 0.0042(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA954 E52/2/19	Biotite	150.7	15.2	28.445	1.3703
GA963 E52/2/29	K-feldspar	551.7	94.5	16.788	1.1027
GA970 E52/2/24	Biotite	953.2	4.6	595.541	14.2850
GA972 E52/2/7	K-feldspar	596.4	90.2	19.018	1.1428
GA975 E52/2/27	Biotite	928.8	2.6	1041.648	24.7698
GA1085 E52/2/5	K-feldspar	346.3	75.1	13.251	1.0149
GA1097 E52/2/1	K-feldspar	373.9	150.7	7.134	0.8786
GA1366 E52/2/18	K-feldspar	415.6	74.4	16.067	1.0789
GA5073 E52/6/38	Whole rock	195.6	427.7	1.314	0.7229 0.7317
GA5105 E52/9/26	Whole rock	121.2	55.0	6.353	0.8463
GA5230 E52/10/17	Whole rock	142.2	25.4	16.102	1.0762

GA954, porphyritic granite from Bow River Granite; lat. 16°52′00″S, long. 128°08′00″E Lissadell

GA963, porphyritic granite from Bow River Granite; lat. 16°45′45″S, long. 128°16′50″E Lissadell

GA970, granitic gneiss from Tickalara Metamorphics; lat. 16°52′20″S, long. 128°16′20″E Lissadell

GA972, porphyritic adamellite from Bow River Granite; lat. 16°43′02″S, long. 128°12′00″E Lissadell

GA975, garnet-cordierite-biotite gneiss from Tickalara Metamorphics; lat. 16°52′40″S, long. 128°17′00″E Lissadell

GA1085, graphic adamellite from Bow River Granite; lat. 16°01′05″S, long. 128°47′00″E Lissadell

GA1097, granodiorite from Bow River Granite; lat. 16°59′55″S, long. 128°12′05″E Lissadell

GA1366, granite from Bow River Granite; lat. 16°44′02″S, long. 127°55′00″E Lissadell

GA5073, granodiorite from McHale Granite; lat. 17°12′00″S, long. 128°17′15″E Dixon Range

GA5105, granite from McLintock Range area; lat. 18°49′15″S, long. 127°17′30″E Mount Ramsay

GA5230, porphyritic granite from Sophie Downs Granite; lat. 18°10′55″S, long. 127°49′35″E Gordon Downs

Age of widespread diastrophism — probably mostly faulting

Ref: WA 1 GRANITES, WHITEWATER VOLCANICS, AND CASTLEREAGH HILL PORPHYRY (ALTERED SAMPLES)

Rb-Sr age 1067 ± 26 m.y. Initial Sr^{87}/Sr^{86} 0.7888 ± 0.0175(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA954	Whole rock	302.0	69.6	12.473	0.9687
E52/2/19	K-feldspar	575.2	107.1	15.444	1.0235
GA1086	K-feldspar	445.4	41.0	31.200	1.2584
E52/2/9					
GA1100	Biotite	466.1	5.3	250.819	4.5340
E52/2/14		473.7	5.1	266.604	4.8329

Rb-Sr age 1038 ± 114 m.y. Initial Sr^{87}/Sr^{86} 0.8674 ± 0.5989(I) (excluding GA1107 biotite)

GA956	K-feldspar	1106.8	9.5	333.875	5.6490
GA976	Biotite	823.1	3.4	699.889	11.2762
E52/6/16					
GA1100	Biotite	466.1	5.3	250.819	4.5340
E52/2/14		473.7	5.1	266.604	4.8329
GA1240	Biotite	752.8	2.2	979.480	14.8740
E52/2/8					
GA1107	Biotite	422.2	3.6	340.310	5.6431
D52/14/4		421.1	4.5	270.050	4.5466

GA954, porphyritic granite from Bow River Granite; lat. 16°52′00″S, long. 128°08′00″E Lissadell

GA1086, porphyritic granite from Bow River Granite; lat. 16°53′00″S, long. 128°04′00″E Lissadell

GA1100, gneissic granodiorite from Mabel Downs Granodiorite; lat. 16°51′55″S, long. 128°17′05″E Lissadell

GA956, quartz-feldspar porphyry from Castlereagh Hill Porphyry; lat. 16°59′55″S, long. 127°48′00″E Lissadell

GA976, garnet-biotite granite from transitional? phase of Tickalara Metamorphics/Mabel Downs Granodiorite; lat. 17°16′50″S, long. 128°03′02″E Dixon Range

GA1240, biotite adamellite from Bow River Granite; lat. 16°48′55″S, long. 128°20′05″E Lissadell

GA1107, porphyry from Whitewater Volcanics; lat. 15°58′50″S, long. 128°52′10″E Cambridge Gulf

The weighted mean age (of all samples, including GA1107 biotite) of 1046 ± 26 m.y. (initial Sr^{87}/Sr^{86} 0.7926 ± 0.0128) is considered to reflect a diastrophic event—probably faulting—within the Halls Creek Mobile Zone

Ref: WA 1 O'DONNELL FORMATION, SPEEWAH GROUP

Glauconite Rb-Sr age 1732 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5201	494.0	2.7	532.441	13.6772
E52/5/14				
GA5202	90.4	2.7	96.406	3.0034
E52/5/15				
GA5203	530.6	6.9	219.855	6.0343
E52/5/16				

Ferruginous glauconitic sandstone

GA5201, 3 km southwest of Tunganary; lat. 17°40′25″S, long. 127°18′00″E Lansdowne

GA5202, GA5203, 12 km southwest of Tunganary; lat. 17°40′45″S, long. 127°12′50″E Lansdowne

Apparent age too low to represent time of deposition

Ref: WA 1 — VALENTINE SILTSTONE, SPEEWAH GROUP

E52/2/2 — Whole rock — Rb-Sr age 1807 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA961	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
	333.8	54.3	17.667	1.1497

E52/2/6 — Whole rock — Rb-Sr age (1) 1999 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)
GA962 — (2) 1807 m.y. Initial Sr^{87}/Sr^{86} 0.7095(A)

	219.3	181.2	3.479	0.7993
	219.3	182.2	3.461	0.7964

Tuffaceous siltstone
GA961, lat. 16°14′00″S, long. 127°57′05″E — Lissadell
GA962, lat. 16°29′00″S, long. 127°55′00″E — Lissadell
Data from the two samples define an isochron with an age of 1761 m.y. (initial Sr^{87}/Sr^{86} 0.7118), which is a minimum estimate for the time of deposition. The value of 1807 m.y. falls within the accepted limits for the time of deposition

Ref: WA 1 — CARSON VOLCANICS, KIMBERLEY GROUP

Whole rock — Rb-Sr age 1807 m.y. Initial Sr^{87}/Sr^{86} 0.7001(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5083	32.3	187.9	0.494	0.7146
E52/9/4				0.7126 (meas.)
GA5136	77.2	151.0	1.469	0.7382
E52/5/12				0.7374 (meas.)

Dolerite
GA5083, lat. 18°27′00″S, long. 126°35′30″E — Mount Ramsay
GA5136, lat. 17°26′40″S, long. 126°06′25″E — Lansdowne
Probable age of extrusion

Ref: WA 1 — WARTON SANDSTONE, KIMBERLEY GROUP

E52/9/48 — Muscovite — Rb-Sr age 1909 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA5210	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
	511.1	32.1	45.753	1.9337

Micaceous sandstone near base of formation
Lat. 17°19′55″S. long. 127°05′10″E — Lansdowne
Apparent age too high to represent time of deposition

Ref: WA 1 — WARTON SANDSTONE, KIMBERLEY GROUP

E52/9/49 — Muscovite — Rb-Sr age 1866 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA5211	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
	424.1	39.3	30.990	1.5146

Micaceous sandstone near base of formation
Lat. 17°19′55″S, long. 127°05′10″E — Lansdowne
Apparent age too high to represent time of deposition

Ref: WA 1 — PENTECOST SANDSTONE, KIMBERLEY GROUP

D52/14/7 — Glauconite — Rb-Sr age 1696 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA1008	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
	337.1	9.8	98.756	3.0571

Glauconitic sandstone
Lat. 15°45′40″S, long. 127°43′00″E — Cambridge Gulf
Apparent age is too low to represent the time of deposition

Ref: WA 1 — PENTECOST SANDSTONE, KIMBERLEY GROUP

E52/2/36 — Glauconite — Rb-Sr age 1541 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA1009	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
	336.7	20.3	51.868	1.8229

Glauconitic sandstone (near a fault)
Lat. 16°05′55″S, long. 128°09′00″E — Lissadell
Apparent age may reflect time of faulting

Ref: WA 1 PENTECOST SANDSTONE, KIMBERLEY GROUP

E52/5/18 Glauconite Rb-Sr age 1541 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5205	254.7	20.4	35.923	1.4777

Glauconitic sandstone (near a fault)
Lat. 17°26′00″S, long. 126°36′55″E Lansdowne
Apparent age may reflect time of faulting

Ref: WA 1 HART DOLERITE

Rb-Sr age 1800 ± 25 m.y. Initial Sr^{87}/Sr^{86} 0.7026 ± 0.0006(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
65/16/7047	Whole rock	93.4	138.5	1.939	0.7507
GA1241	Plagioclase	90.0	421.1	0.614	0.7182 (meas.)
E52/2/11					
GA5052	Whole rock	36.5	191.3	0.548	0.7164
					0.7167 (meas.)
GA5125	Whole rock	135.1	109.2	3.555	0.7903
E52/5/1		133.6	108.0	3.557	0.7916
GA5131	Whole rock	45.1	216.1	0.599	0.7201
E52/5/7					0.7194 (meas.)
GA5132	Whole rock	52.8	194.2	0.781	0.7234
E52/5/8					0.7225 (meas.)
GA5133	Whole rock	40.3	188.9	0.613	0.7196
E52/5/9					0.7180 (meas.)
GA5214	Whole rock	224.8	43.9	14.707	1.0966
E52/2/21		223.9	41.3	15.577	1.0996
GA5241	Whole rock	36.5	194.2	0.540	0.7176
E52/2/17					0.7198 (meas.)

65/16/7047, granophyre Lansdowne
GA1241, tholeiitic dolerite; lat. 16°20′55″S, long. 128°06′05″E Lissadell
GA5052, tholeiitic dolerite; lat. 17°10′00″S, long. 127°27′00″E Lansdowne
GA5125, granophyre; lat. 17°46′00″S, long. 126°38′45″E Lansdowne
GA5131, tholeiitic dolerite; lat. 17°45′25″S, long. 126°45′10″E Lansdowne
GA5132, tholeiitic dolerite; lat. 17°23′40″S, long. 127°16′20″E Lansdowne
GA5133, tholeiitic dolerite; lat. 17°21′30″S, long. 127°15′40″E Lansdowne
GA5214, granophyric dolerite; lat. 16°30′02″S, long. 127°55′00″E Lissadell
GA5241, granophyric dolerite; lat. 16°59′05″S, long. 127°36′35″E Lissadell
Age of intrusion

Ref: WA 1 WYNDHAM SHALE, BASTION GROUP

D52/14/8 Rb-Sr age (1) 1789 ± 58 m.y. Initial Sr^{87}/Sr^{86} 0.6963 ± 0.0074(I)
(2) 1722 ± 371 m.y. Initial Sr^{87}/Sr^{86} 0.7064 ± 0.0125(I)
(regression of whole-rock data only)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5244A	Whole rock	251.6	74.0	9.771	0.9436
					0.9416 (meas.)
GA5244B	Whole rock	263.1	69.8	10.837	0.9701
					0.9701 (meas.)
GA5244D	Whole rock	243.7	69.8	10.038	0.9517 (meas.)
GA5244E	Whole rock	287.1	73.5	11.226	0.9769 (meas.)
GA5244F	Whole rock	269.3	73.1	10.595	0.9723 (meas.)
GA5244A	Leach solid rock	243.6	68.8	10.186	0.9544
GA5244E	Leach solid rock	279.3	68.8	11.668	0.9877
GA5244A	Leach			4.288	0.8029
					0.8009 (meas.)
GA5244E	Leach			4.592	0.8184
					0.8148 (meas.)

Bastion Hill, near Wyndham
Lat. 15°27′45″S, long. 128°06′45″E Cambridge Gulf
Both ages are minimum estimates of the time of deposition

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

E52/9/41 Whole rock Rb-Sr age 1373 m.y. Initial Sr^{87}/Sr^{86} 0.72(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5120A	268.4	19.0	40.541	1.5010
GA5120B	268.9	19.0	40.695	1.5046 (meas.)

Lat. 18°21′25″S, long. 126°41′30″E Mount Ramsay
Apparent age too low to represent time of deposition

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

Whole rock Rb-Sr age 1061 m.y. Initial Sr^{87}/Sr^{86} 0.7880(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5109E E52/9/30	262.8	17.4	43.513	1.4346
GA5110F E52/9/31	305.7	16.7	52.648	1.5704

Crowhurst Gorge
Lat. 18°16′45″S, long. 126°25′45″E Mount Ramsay
Meaningless apparent age

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

Whole rock Rb-Sr age 917 m.y. Initial Sr^{87}/Sr^{86} 0.7629(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5109B E52/9/30	275.3	13.2	60.138	1.5337
GA5109D E52/9/30	283.6	10.6	76.992	1.7505
GA5110G E52/9/31	254.9	12.4	59.071	1.5211

Crowhurst Gorge
Lat. 18°16′45″S, long. 126°25′45″E Mount Ramsay
Meaningless apparent age

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

E52/9/30 Whole rock Rb-Sr age 809 m.y. Initial Sr^{87}/Sr^{86} 0.7966(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5109A	279.4	9.8	81.916	1.7233
GA5109C	254.4	11.6	63.275	1.5124

Crowhurst Gorge
Lat. 18°16′45″S, long. 126°25′45″E Mount Ramsay
Meaningless apparent age

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

Whole rock Rb-Sr age 384 ± 20 m.y. Initial Sr^{87}/Sr^{86} 1.2865 ± 0.0137(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5109A E52/9/30	279.4	9.8	81.916	1.7233
GA5110F E52/9/31	305.7	16.7	52.648	1.5704
GA5120A E52/9/41	268.4	19.0	40.541	1.5010
GA5120B E52/9/41	268.9	19.0	40.695	1.5046 (meas.)

GA5109, GA5110, lat. 18°16′45″S, long. 126°25′45″E Mount Ramsay
GA5120, lat. 18°21′25″S, long. 126°41′30″E Mount Ramsay
Apparent age may reflect a Palaeozoic event

Ref: WA 1 LIGA SHALE, CROWHURST GROUP

Whole rock Rb-Sr age 415 m.y. Initial Sr^{87}/Sr^{86} 1.1830(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5109B E52/9/30	275.3	13.2	60.138	1.5337
GA5109E E52/9/30	262.8	17.4	43.513	1.4346
GA5110G E52/9/31	254.9	12.4	59.071	1.5211

Crowhurst Gorge
Lat. 18°21′25″S, long. 126°41′30″E Mount Ramsay
Apparent age may reflect a Palaeozoic event

Ref: WA 1 MOUNT JOHN SHALE MEMBER, WADE CREEK SANDSTONE

Whole rock Rb-Sr age 1128 ± 110 m.y. Initial Sr^{87}/Sr^{86} 0.7121 ± 0.0051(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5071A E52/6/36	260.5	151.5	4.944	0.7892
GA5071B E52/6/36	109.4	70.8	4.440	0.7836
GA5072D E52/6/37	62.5	123.4	1.457	0.7347
GA5072E E52/6/37	36.1	205.3	0.505	0.7203

GA5071, lat. 17°04′45″S, long. 128°41′10″E Dixon Range
GA5072, lat. 17°04′30″S, long. 128°41′30″E Dixon Range
Probable minimum age of deposition

Ref: WA 1 MATHESON AND MADDOX FORMATIONS, GLIDDEN GROUP

Whole rock Rb-Sr age (1) 1042 ± 51 m.y. Initial Sr^{87}/Sr^{86} 0.7246 ± 0.0092(I)
(2) 1031 ± 23 m.y. Initial Sr^{87}/Sr^{86} 0.7288 ± 0.0024(I)
(regression of 4 samples marked *)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5094A E52/9/15	226.1	47.6	13.666	0.9197
GA5094B* E52/9/15	242.0	44.6	15.587	0.9548
GA5094C* E52/9/15	251.2	44.2	16.328	0.9644
GA5113A E52/9/34	65.6	43.8	4.309	0.7831
GA5113C* E52/9/34	76.5	127.1	1.729	0.7541 0.7538 (meas.)
GA5113E* E52/9/34	97.9	15.3	18.462	0.9949

GA5094, siltstone from Matheson Formation; lat. 18°25′00″S, long. 126°47′00″E Mount Ramsay
GA5113, siltstone from Maddox Formation; lat. 18°26′00″S, long. 126°46′30″E Mount Ramsay
Apparent age of 1031 ± 23 m.y. is a minimum estimate of the time of deposition

Ref: WA 1 MADDOX FORMATION, GLIDDEN GROUP

Whole rock Rb-Sr age 736 m.y. Initial Sr^{87}/Sr^{86} 0.7396(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
E52/9/34				
GA5113A	65.6	43.8	4.309	0.7831
GA5113C	76.5	127.1	1.729	0.7541 0.7538 (meas.)
GA5113F	214.6	39.5	15.598	0.8971

Siltstone
Lat. 18°26′00″S, long. 126°46′30″E Mount Ramsay
Apparent age probably reflects a late Precambrian event

Ref: WA 1 — MATHESON FORMATION, GLIDDEN GROUP

E52/9/15 — Whole rock — Rb-Sr age 732 m.y. Initial Sr^{87}/Sr^{86} 0.7780(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5094A	226.1	47.6	13.666	0.9197
GA5094D	237.8	47.3	14.455	0.9234
				0.9233 (meas.)
GA5094E	229.2	40.1	16.436	0.9468

Siltstone

Lat. 18°25′00″S, long. 126°47′00″E — Mount Ramsay

Apparent age probably reflects a late Precambrian event

Ref: WA 1 — GOLDEN GATE SILTSTONE, CARR BOYD GROUP

E52/2/42 — Whole rock — Rb-Sr age 1182 ± 89 m.y. Initial Sr^{87}/Sr^{86} 0.7193 ± 0.0197(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5245B	247.1	44.5	16.429	0.9888
GA5245D	266.3	48.3	16.312	0.9887
GA5245E	168.9	34.4	14.491	0.9619
GA5245F	187.2	36.6	15.065	0.9663
GA5245J	233.7	35.1	19.793	1.0492
GA5245I	195.0	40.0	14.362	0.9593

Near Ord River Dam

Lat. 16°07′00″S, long. 128°44′25″E — Lissadell

Probable minimum age of deposition

Ref: WA 1 — GLENHILL FORMATION, CARR BOYD GROUP

E52/2/41 — Whole rock — Rb-Sr age 1080 ± 80 m.y. Initial Sr^{87}/Sr^{86} 0.7064 ± 0.0072(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5236B	98.5	25.7	11.200	0.8698
GA5236C	150.9	122.2	3.549	0.7597 (meas.)
GA5236E	104.7	23.7	12.976	0.9040
	103.7	21.4	13.942	0.9197
GA5236H	127.9	57.5	6.461	0.8079
				0.8064 (meas.)

Shale

Lat. 16°33′02″S, long. 128°21′30″E — Lissadell

Probable minimum age of deposition

Ref: WA 1 — GLENHILL FORMATION, CARR BOYD GROUP

E52/2/41 — Whole rock — Rb-Sr age 417 ± 111 m.y. Initial Sr^{87}/Sr^{86} 0.8605 ± 0.0292(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5236A	131.5	26.9	14.444	0.9699
				0.9475 (meas.)
	130.9	27.0	13.916	0.9383
GA5236D	70.9	9.2	23.126	1.1783
	70.5	9.0	22.415	0.9906

Shale

Lat. 16°33′02″S, long. 128°21′30″E — Lissadell

Apparent age may reflect a Palaeozoic event

Ref: WA 1 — PINCOMBE FORMATION, CARR BOYD GROUP

D52/14/10 — Whole rock — Rb-Sr age 911 ± 149 m.y. Initial Sr^{87}/Sr^{86} 0.7229 ± 0.0118(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5247A	140.2	101.9	3.954	0.7742
GA5247C	222.4	107.6	5.945	0.7974
				0.7977 (meas.)
GA5247D	213.5	100.9	6.085	0.8014
GA5247F	102.9	78.8	3.759	0.7703

Shale

Lat. 15°33′00″S, long. 128°50′05″E — Cambridge Gulf

See GA5246A, B, and GA5247B, E (below)

Ref: WA 1 PINCOMBE FORMATION, CARR BOYD GROUP

Whole rock Rb-Sr age 872 ± 123 m.y. Initial Sr^{87}/Sr^{86} 0.7346 ± 0.0108(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5246A	161.1	62.4	7.419	0.8250 (meas.)
D52/14/9				
GA5246B	126.4	53.1	6.844	0.8198
D52/14/9				0.8187 (meas.)
GA5247B	217.8	126.7	4.944	0.7954
D52/14/10	216.8	125.3	4.974	0.7966
GA5247E	237.7	125.3	5.454	0.7991
D52/14/10				0.8005 (meas.)
	231.2	122.1	5.443	0.7999

Shale

GA5246, lat. 15°51′40″S, long. 128°40′00″E Cambridge Gulf

GA5247, lat. 15°33′00″S, long. 128°50′05″E Cambridge Gulf

The pooled age of samples that fit the 872 ± 123 m.y. and the 911 ± 149 m.y. isochrons is 888 ± 60 m.y.; this is considered to represent the minimum age of deposition

Ref: WA 1 MOONLIGHT VALLEY TILLITE (DUERDIN GROUP) AND LANDRIGAN TILLITE (KUNIANDI GROUP)

Whole rock Rb-Sr age 739 ± 30 m.y. Initial Sr^{87}/Sr^{86} 0.7331 ± 0.0060(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5080A	197.0	145.3	3.899	0.7744
E52/6/45				0.7719 (meas.)
GA5080B	181.7	84.3	6.199	0.8053
E52/6/45				0.8004 (meas.)
GA5080C	121.1	79.2	4.397	0.7750
E52/6/45				0.7748 (meas.)
GA5080D	192.9	101.5	5.464	0.7929
E52/6/45				0.7860 (meas.)
GA5080E	193.2	100.9	5.508	0.7978
E52/6/45				0.7966 (meas.)
GA5216B	194.9	21.4	26.196	0.9999
E52/9/50				1.0012 (meas.)
GA5216C	198.0	23.8	23.936	0.9836
E52/9/50				0.9838 (meas.)
GA5216D	221.7	38.9	16.381	0.9001
E52/9/50				

Glacial shale

GA5080, Moonlight Valley Tillite; lat. 17°04′58″S, long. 128°20′58″E Dixon Range

GA5216, Landrigan Tillite; lat. 18°35′55″S, long. 126°32′55″E Mount Ramsay

Age of glacial deposits

Ref: WA 1 MOONLIGHT VALLEY TILLITE (DUERDIN GROUP), AND LANDRIGAN TILLITE AND WIRARA FORMATION (KUNIANDI GROUP)

Whole rock Rb-Sr age 739 m.y.

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA980	223.2	78.6	8.166	0.8262
				0.8444 (meas.)
GA5085A	214.9	97.1	6.358	0.8238
E52/9/6				
GA5085B	220.8	84.7	7.491	0.9135
E52/9/6				0.8242 (meas.)
GA5086	223.8	98.2	6.552	0.8244
E52/9/7				
GA5087B	236.7	41.4	16.442	0.8813
E52/9/8				

GA5087C	234.4	38.9	17.325	0.8878
E52/9/8				
GA5118	196.5	39.9	14.172	0.8610
E52/9/39				
GA5119	140.5	57.5	7.021	0.8360
E52/9/40				
GA5216A	201.1	21.7	26.603	1.0221
E52/9/50				
GA5243	123.0	154.2	2.293	0.7796
E52/6/48				0.7790 (meas.)

Glacial shale

GA980, Moonlight Valley Tillite; co-ordinates of sampling locality not given

GA5085, GA5086, Landrigan Tillite; lat. 18°39′05″S, long. 126°33′45″E
Mount Ramsay

GA5087, Wirara Formation; lat. 18°42′15″S, long. 126°38′45″E
Mount Ramsay

GA5118, Wirara Formation; lat. 18°04′15″S, long. 126°35′50″E
Mount Ramsay

GA5119, Wirara Formation; lat. 18°05′50″S, long. 126°35′30″E
Mount Ramsay

GA5216, Landrigan Tillite; lat. 18°35′55″S, long. 126°32′55″E
Mount Ramsay

GA5243, Moonlight Valley Tillite; lat. 17°04′58″S, long. 128°20′58″E
Dixon Range

The data points fall on three separate lines drawn parallel to the 739± 130 m.y. isochron; thus, the sediment constituting the glacial shales has been derived from at least three distinct provinces

Ref: WA 1 RANFORD FORMATION (DUERDIN GROUP)

Whole rock Rb-Sr age (1) 695 ± 90 m.y. Initial Sr^{87}/Sr^{86} 0.7348 ± 0.0112(I)
(2) 686 ± 72 m.y. Initial Sr^{87}/Sr^{86} 0.7333 ± 0.0082(I)
(regression of 5 samples marked *)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA951*	212.3	119.4	5.112	0.7812
E52/6/32A*	207.9	117.7	5.080	0.7832
GA952	238.9	92.9	7.389	0.8003
E52/6/32B				
GA5062A*	118.2	40.3	8.437	0.8156
E52/10/11				
GA5062B	263.3	50.3	15.033	0.8836
E52/10/11				
GA5070A	217.6	150.7	4.150	0.7815
E52/6/35				
GA5070B	200.6	137.4	4.196	0.7867
E52/6/35				
GA5239B*	128.0	42.7	8.613	0.8138
E52/10/23				
GA5239C	136.3	35.3	11.096	0.8356
E52/10/23				0.8346 (meas.)
GA5239D	148.3	44.8	9.511	0.8367
E52/10/23				
GA5239E*	182.5	42.8	12.271	0.8511
E52/10/23				
GA5242	221.9	64.7	9.862	0.8355
E52/6/47				
GA5250	172.8	243.5	2.039	0.7458
E52/2/35				

Shale

GA951, GA952, GA5070, Osmond Range area; lat. 17°02′15″S, long. 128°24′15″E (type locality) Dixon Range

GA5062, Albert Edward Range; lat. 18°26′45″S, long. 127°50′10″E
Gordon Downs

GA5239, Albert Edward Range; lat. 18°26′15″S, long. 127°50′15″E Gordon Downs

GA5242, Osmond Range area; lat. 17°23′35″S, long. 128°17′00″E Dixon Range

GA5250, Mount Brooking area; lat. 16°03′30″S, long. 128°56′30″E Lissadell

Minimum estimates of (but probably close to) the time of deposition; synchronous with Throssell Shale

Ref: WA 1

THROSSELL SHALE (MOUNT HOUSE GROUP)

Whole rock Rb-Sr age 684 ± 85 m.y. Initial Sr^{87}/Sr^{86} 0.7288 ± 0.0130(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5137A E52/5/13	218.9	52.2	12.048	0.8422
GA5137B E52/5/13	196.6	47.1	11.992	0.8413
GA5137C E52/5/13	259.3	52.6	14.175	0.8657
GA5137E E52/5/13	149.8	43.4	9.919	0.8229
GA5213A E51/8/6	203.8	54.2	10.814	0.8330
GA5213B E51/8/6	251.8	71.5	10.128	0.8271
GA5213C E51/8/6	224.9	53.9	11.981	0.8433

GA5137, Mount Clifton; lat. 17°23′20″S, long. 126°03′00″E Lansdowne

GA5213, Mount House; co-ordinates not given Lennard River

Minimum estimate of the time of deposition; apparent age may refer to the time of diagenesis; synchronous with Ranford formation

Ref: WA 1

ELVIRE FORMATION (ALBERT EDWARD GROUP)

Whole rock Rb-Sr age (1) 607 ± 174 m.y. Initial Sr^{87}/Sr^{86} 0.7396 ± 0.0366(I)
(regression of data excluding GA5240D)

(2) 653 ± 48 m.y. Initial Sr^{87}/Sr^{86} 0.7262 ± 0.0100(I)
(regression of 5 samples marked *)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5063A* E52/10/12	120.8	37.7	9.216	0.8103
GA5063B* E52/10/12	235.8	39.8	17.051	0.8799
GA5063C E52/10/12	180.7	43.9	11.849	0.8506
GA5240A E52/10/24	187.8	34.0	15.887	0.8815
GA5240B* E52/10/24	211.1	39.2	15.466	0.8675
GA5240D E52/10/24	239.9	36.2	19.068	0.8792 (meas.)
GA5240E* E52/10/24	224.4	37.2	17.324	0.8862
GA5240G* E52/10/24	236.3	40.2	16.916	0.8801

Shale

GA5063, lat. 18°26′15″S, long. 127°51′15″E Gordon Downs

GA5240, lat. 18°25′15″S, long. 127°54′55″E Gordon Downs

Apparent age of 653 ± 48 m.y. is regarded as a minimum estimate of the time of deposition

Ref: WA 1

TIMPERLEY SHALE (ALBERT EDWARD GROUP) AND McALLY SHALE (LOUISA DOWNS GROUP)

Whole rock Rb-Sr age (1) 661 ± 75 m.y. Initial Sr^{87}/Sr^{86} 0.7316 ± 0.0155(I)
(2) 665 ± 43 m.y. Initial Sr^{87}/Sr^{86} 0.7321 ± 0.0084(I)
(regression of 6 samples marked *)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5064A E52/10/13	174.9	56.2	8.956	0.8064
GA5064B* E52/10/13	169.6	51.6	9.455	0.8187
GA5065* E52/10/14	207.0	39.9	14.892	0.8719
GA5066 E52/10/15	238.1	44.6	13.355	0.8673
GA5088* E52/9/9	230.1	39.1	16.932	0.8910
GA5089* E52/9/10	213.6	53.5	11.482	0.8403
GA5090* E52/9/11	236.0	40.9	16.602	0.8839
GA5091* E52/9/12	207.9	38.0	15.713	0.8764
GA5092 E52/9/13	217.3	44.4	14.056	0.8697
GA5093 E52/9/14	194.9	38.2	14.675	0.8714 0.8711 (meas.)
GA5117 E52/9/38	219.9	29.6	21.331	0.9233

GA5064, Timperley Shale; lat. 18°26′02″S, long. 127°53′45″E Gordon Downs
GA5065, Timperley Shale; lat. 18°25′50″S, long. 127°54′15″E Gordon Downs
GA5066, Timperley Shale; lat. 18°26′00″S, long. 127°51′50″E Gordon Downs
GA5088, McAlly Shale; lat. 18°48′00″S, long. 126°52′45″E Mount Ramsay
GA5089, McAlly Shale; lat. 18°48′15″S, long. 126°52′55″E Mount Ramsay
GA5090, McAlly Shale; lat. 18°48′50″S, long. 126°52′55″E Mount Ramsay
GA5091, McAlly Shale; lat. 18°49′00″S, long. 126°52′50″E Mount Ramsay
GA5092, McAlly Shale; lat. 18°47′15″S, long. 126°52′10″E Mount Ramsay
GA5093, McAlly Shale; lat. 18°47′35″S, long. 126°51′50″E Mount Ramsay
GA5117, McAlly Shale; lat. 18°20′30″S, long. 126°29′05″E Mount Ramsay
Minimum estimates of time of deposition of synchronous formations

Ref: WA 1

THOLEIITIC DOLERITE

E52/2/25 Pyroxene K-Ar age 2696 m.y., 2766 m.y.

GA971 %K 0.048 $*Ar^{40}/K^{40}$ 0.3502 % atm. Ar^{40} 7.4
0.048 0.3675 6.2

Lat. 16°29′05″S, long. 128°03′05″E Lissadell
Probable minimum estimates of the time of emplacement

Ref: WA 1

DOLERITE

E52/6/6 Whole rock Rb-Sr age 2320 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA1103

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
40.7	182.8	0.641	0.7210 (meas.)

Dyke intruding Lamboo Complex
Lat. 17°14′15″S, long. 128°05′10″E Dixon Range
Unreliable age

Ref: WA 1
D52/14/01
GA1105

DOLERITE
Whole rock — Rb-Sr age 1778 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
56.8	166.1	0.983	0.7246 (meas.)

Intrudes Whitewater Volcanics
Lat. 15°57′05″S, long. 128°50′45″E — Cambridge Gulf
Reliable maximum age of intrusion

Ref: WA 1
D52/14/02
GA1106

DOLERITE
Whole rock — Rb-Sr age 929 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
136.5	239.5	1.638	0.7213

Intrudes Speewah Group
Lat. 15°48′55″S, long. 128°30′20″E — Cambridge Gulf
Probable minimum age of intrusion

Ref: WA 1
E52/2/3
GA1239

QUARTZ DOLERITE
Rb-Sr age 1940 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
Biotite	426.0	5.8	210.323	6.4527
Plagioclase	14.8	413.5	0.103	0.7030
				0.7038 (meas.)

Probably intrudes Halls Creek Group
Lat. 16°23′00″S, long. 128°28′05″E — Lissadell
Minimum estimate of time of emplacement; age may reflect time of major metamorphism of Tickalara Metamorphics

Ref: WA 1
E52/6/33
GA5068

PEGMATITE
Whole rock — Rb-Sr age 1968 m.y. Initial Sr^{87}/Sr^{86} 0.701(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
37.5	127.2	0.847	0.7262
			0.7245 (meas.)

Intrudes Tickalara Metamorphics
Lat. 17°02′58″S, long. 128°16′35″E — Dixon Range
Probable age of intrusion; agrees with minimum estimate of time of regional metamorphism of Tickalara Metamorphics and emplacement of associated granites

Ref: WA 1
E52/6/26
GA959

TICKALARA METAMORPHICS
Biotite — Rb-Sr age 1747 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
412.9	15.7	75.813	2.5639

Pyroxene granulite
Lat. 17°13′40″S, long. 127°59′20″E — Dixon Range
Apparent age may reflect an event leading up to a period of widespread diastrophism; see under 'Granites and Tickalara Metamorphics (altered samples)'

Ref: WA 1
E52/2/13
GA973

TICKALARA METAMORPHICS
Biotite — Rb-Sr age 887 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
698.2	14.1	142.331	2.4671

Epidote-biotite granodiorite
Lat. 16°54′10″S, long. 128°11′00″E — Lissadell
Meaningless age

Ref: WA 1
E52/2/37
GA1101

TICKALARA METAMORPHICS
Biotite — Rb-Sr age 1364 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
523.6	9.5	158.563	3.7347

Biotite granulite
Lat. 16°58′00″S, long. 128°14′00″E — Lissadell
Meaningless age

Ref: WA 1 TICKALARA METAMORPHICS (TRANSITIONAL? WITH MABEL DOWNS GRANODIORITE)

E52/6/2 Biotite Rb-Sr age 1762 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA1102

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
360.9	5.0	206.865	5.8313

Pyroxene granulite

Lat. 17°17′45″S, long. 128°03′00″E Dixon Range

Apparent age may reflect an event leading up to a period of widespread diastrophism; see under 'Granites and Tickalara Metamorphics (altered samples)'

Ref: WA 1 MABEL DOWNS GRANODIORITE

E52/6/19 Biotite Rb-Sr age 878 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA957

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
291.2	21.8	38.417	1.1719

Granodiorite

Lat. 17°03′35″S, long. 128°14′35″E Dixon Range

Meaningless age

Ref: WA 1 MABEL DOWNS GRANODIORITE

E52/6/13 Biotite Rb-Sr age 1844 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA969

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
239.0	21.9	31.374	1.5147

Granodiorite

Lat. 17°28′00″S, long. 128°07′58″E Dixon Range

Age probably reflects time of intrusion of Bow River Granite

Ref: WA 1 MABEL DOWNS GRANODIORITE

E52/2/14 Biotite Rb-Sr age 1428 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

GA1098

Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
358.1	1.1	938.516	22.6064

Biotite granite

Lat. 16°47′15″S, long. 128°22′50″E Lissadell

Meaningless age

Ref: WA 2 ALBANY GRANITE

Rb-Sr age 1094 ± 50 m.y. Initial Sr^{87}/Sr^{86} 0.7118 ± 0.0064(I)

		Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
44887	Whole rock	310.9	79.0	11.53	0.8904
	Microcline	553.5	107.8	15.11	0.9417
44888	Whole rock	300.5	132.7	6.585	0.8164
	Microcline	523.8	213.7	7.127	0.8177
44890	Whole rock	215.3	252.7	2.461	0.7479
	Microcline	408.0	394.9	2.988	0.7586

44887, adamellite from near Upper King Bridge, over King River Mount Barker

44888, adamellite from Halifax Street Quarry, Albany town site Mount Barker

44890, granite from Halifax Street Quarry, Albany town site Mount Barker

Age of intrusion which marks the waning stages of the main orogeny in the extreme south of Western Australia

Ref: WA 2 STIRLING RANGE BEDS

Whole rock Rb-Sr age 1340 m.y. Initial Sr^{87}/Sr^{86} 0.72(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
53885	208.0	29.5	21.14	1.1225

Shale

Eastern slope of Toolbrunup, Stirling Range Mount Barker

Minimum estimate of age of deposition

Ref: WA 2 STIRLING RANGE BEDS

Whole rock Rb-Sr age 1150 ± 40 m.y. Initial Sr^{87}/Sr^{86} 0.816 ± 0.017(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
53886	234.9	27.3	26.02	1.2314
53887	299.0	33.0	20.86	1.1553
53888	299.4	18.3	51.02	1.6418
	296.6	19.6	47.57	1.5828

Shale
Eastern slope of Toolbrunup, Stirling Range — Mount Barker
Age of metamorphism

Ref: WA (Unpubl.) RO558 ANDESITE
Whole rock — K-Ar age 391 ± 16 m.y.
%K 1.16 $*Ar^{40}/K^{40}$ 0.0254
From 613.1 to 614.6 m, Lennis No. 1 well
Lat. 27°17′S, long. 126°21′E — Lennis
Minimum age of extrusion

Ref: WA (Unpubl.) RO592 VESICULAR VOLCANIC
Whole rock — K-Ar age 357 ± 12 m.y.
%K 5.82 $*Ar^{40}/K^{40}$ 0.0230
From 738 m, Yowalga No. 1 well
Lat. 26°10′12″S, long. 125°58′00″E — Yowalga
Minimum age of extrusion

Ref: WA (Unpubl.) Yowalga 1 BASALT
Whole rock — Rb-Sr age (1) 1250 m.y. Initial Sr^{87}/Sr^{86} 0.700(A)
(2) 1143 m.y. Initial Sr^{87}/Sr^{86} 0.702(A)

Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
1.8791	0.7328

From 841 m, Yowalga No. 1 well
Lat. 26°10′12″S, long. 125°58′00″E — Yowalga
Model age only; gives maximum age of crystallization of basalt

Ref: WA (Unpubl.) Yowalga 2 (2417) (2418) (2419) BASALT
Whole rock — Rb-Sr age 446 m.y. Initial Sr^{87}/Sr^{86} 0.7136(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
(2417)	76.9	95.7	2.3114	0.7280
(2418)	114.8	204.7	1.4067	0.7233
(2419)	132.5	247.3	1.5402	0.7243

From 737.0 to 737.5 m (2417 to 2419 ft), Yowalga No. 2 well
Lat. 26°10′12″S, long. 125°58′00″E — Yowalga
This Rb-Sr isochron age is based on only 3 samples and is approximate only; it may be the age of basalt crystallization

Ref: WA (Unpubl.) Yowalga 3 BASALT
Whole rock — K-Ar age 447 m.y.
Analytical data not available
From 841 m, Yowalga No. 2 well
Lat. 26°10′12″S, long. 125°58′00″E — Yowalga
Minimum age of extrusion

Ref: WA 3 QUARTZ PORPHYRY

Whole rock and biotite
Rb-Sr age 2555 ± 12 m.y. Initial Sr^{87}/Sr^{86} 0.707 ± 0.003(I)

		Rb(ppm)	Common Sr (ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
94537	Whole rock	366.5	8.73	120.7	5.08
94538	Whole rock	250.1	25.06	28.67	1.735
94539	Whole rock	183.0	48.44	10.85	1.100

94540	Whole rock	136.8	121.2	3.247	0.8254
94541	Whole rock	359.1	10.76	95.8	4.162
		356.0	11.03	92.8	4.141
	Mean	357.6	10.90	94.3	4.152
94541	Whole rock (xenolith)	1454	9.48	441.5	16.57
		1454	10.14	412.5	15.65
	Mean	1454	9.80	427.0	16.11
94541	Biotite	2421	0.605	11510	420.4
		2470	0.598	11880	426.0
	Mean	2446	0.601	11695	423.2
94541	Microcline	991	11.11	256.3	8.96
94541	Plagioclase	154.3	30.86	14.4	1.603
94541	Fluorite	11.4	7.97	4.08	1.02

Koolanooka Hills, 320 km north of Perth
Precise localities and co-ordinates not given — Perenjori?
Probable date of crystallization. Assuming an initial Sr^{87}/Sr^{86} of 0.707, the other mineral ages are: microcline, 2280 m.y.; plagioclase, 4000 m.y.; and fluorite, 5000 m.y. The microcline age may reflect the age of intrusion of nearby granite porphyry dykes dated as 2250 ± 50 m.y.

Ref: WA 4 — TOLLU VOLCANICS (INCLUDING RHYOLITE, WARBURTON RANGE)

Whole rock — Rb-Sr age 1060 ± 140 m.y. Initial Sr^{87}/Sr^{86} 0.705 ± 0.007(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
A311-1	215	106	5.98	0.7989
A311-6	211	61.0	10.29	0.8633
A311-7	204	71.0	8.48	0.8297
A311-10	91.0, 90.5	160.0	1.646	0.7287
GA1350	196	31.6	18.41	0.9577

A311-1, A311-6, A311-7, porphyritic flow-banded rhyolite from Tollu — Cooper
A311-10, basic tuff from northeast of Tollu — Cooper
GA1350, porphyritic rhyolite from the Warburton Range — Talbot
Probable age of extrusion

Ref: WA 5 — GRANULITE-FACIES ROCKS, FRASER RANGE

Whole rock — *Rb-Sr age 1328 ± 12 m.y. Initial Sr^{87}/Sr^{86} 0.7049 ± 0.0012(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA4031	0.46	95.53	0.01388	0.70289
GA4032	0.20	121.08	0.0048	0.70353
GA4033	20.39	166.07	0.3547	0.71181
GA4034	81.75	148.27	1.5966	0.73718
GA4035	135.08	119.81	3.2739	0.76577
GA4036	77.23	132.79	1.6766	0.73709
GA4037	281.04	32.86	25.5439	1.10843
GA4039	22.09	196.82	0.3242	0.71161
GA4040	290.48	70.93	12.08653	0.93357
GA4041	24.57	152.96	0.4642	0.71515
GA4061	34.89	135.75	0.74308	0.71940
GA4062	225.35	25.10	27.18169	1.20428
GA4063	205.54	49.71	12.20072	0.93237
GA4064	32.97	141.41	0.67386	0.71842
GA4065	13.89	147.42	0.27200	0.70890
GA4072	317.05	33.71	28.56949	1.23949
GA4073	1.04	225.71	0.01332	0.70396
GA4074	1.57	54.67	0.08264	0.70392

Samples are from the Mount Malcolm/Fraser Range/Simon Hill area; localities shown on p. 379 (fig. 2) of reference WA5
Norseman, Widgiemooltha Zanthus
This age is derived from an isochron from which sample GA4037 has been excluded; further interpretations are tabulated on p. 382 of reference WA 5

Ref: WA 5 GARNET-BIOTITE GNEISSES AND GRANITES, FRASER RANGE

Whole rock Rb-Sr age 1664 ± 35 m.y. Initial Sr^{87}/Sr^{86} 0.7078 ± 0.0017(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA4053	196.61	203.59	2.80626	0.77278
GA4054	167.82	217.52	2.23935	0.76076
GA4060	187.77	244.59	2.22786	0.75953
GA4068	259.99	85.32	8.97904	0.91653
GA4069	266.88	79.63	9.89786	0.94077
GA4070	160.01	147.41	3.15710	0.78214

GA4053, GA4054, GA4060, garnet-biotite gneisses from west of the Fraser Fault, at Ten Mile Rocks — Norseman

GA4068, GA4069, granite from west of the Fraser Fault, at Tadpole Rock — Zanthus

GA4070, granite from west of the Fraser Fault, near Harris Lake — Zanthus

Localities shown on p. 379 (fig. 2) of reference WA 5

The age and intercept were derived from a Model IV isochron; similar ages and intercepts of other models are tabulated on p. 382 of reference WA 5

Ref: WA 5 GNEISSES, FRASER RANGE

Whole rock Rb-Sr age 1901 ± 232 m.y. Initial Sr^{87}/Sr^{86} 0.7162 ± 0.0053(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA4042	166.79	147.23	3.30184	0.80394
GA4043	104.70	585.19	0.51773	0.73008
GA4044	93.54	65.59	4.17765	0.82857

GA4042, Eyre Highway 89-mile post — Balladonia

GA4043, Eyre Highway 92-mile post — Balladonia

GA4044, Eyre Highway 97-mile post — Balladonia

Localities shown on p. 379 (fig. 2) of reference WA 5

Ages and intercepts of other isochron models are shown on p. 382 of reference WA 5

Ref: WA 5 GNEISSES, FRASER RANGE

Whole rock Rb-Sr age 1359 ± 1229 m.y. Initial Sr^{87}/Sr^{86} 0.7091 ± 0.0588(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA4052	215.15	196.62	3.17878	0.76959
GA4058	159.07	128.12	3.60951	0.77805
GA4059	175.40	143.43	3.55494	0.77674

Newman Rock, near Eyre Highway 88-mile post — Balladonia

The large uncertainties in the age and niitial ratio result from the similar Rb/Sr ratios of the three samples, whose points lie close to the 1328 m.y. isochron for the granulite-facies rocks

Ref: WA 5 GRANITES AND GNEISSES, FRASER RANGE

Whole rock Preliminary Rb-Sr age about 1300 m.y. or younger

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA4047	275.25	276.17	3.12238	0.76072
GA4050	231.57	278.04	3.41434	0.74766
GA4051	191.74	281.90	1.97108	0.74482
GA4055	218.13	24.87	26.5293	1.19492
GA4056	252.68	241.61	3.0345	0.75792
GA4057	216.87	543.37	1.1546	0.72696

GA4047, GA4055, GA4056, GA4057, Afghan Rocks, 20 km northwest of Balladonia — Balladonia

GA4050, Eyre Highway, Balladonia — Balladonia

GA4051, track 10½ km northwest of Balladonia — Balladonia

Localities shown on p. 379 (fig. 2) of reference WA 5

More analyses are needed to define a satisfactory isochron

Ref: WA 6 NORMAL AUSTRALITES AND PHILIPPINITES

Whole rock *Rb-Sr age 100 ± 55 m.y. Initial Sr^{87}/Sr^{86} 0.7144 ± 0.0014(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
AN100	114.8	191.1	1.736	0.7162
AN102	95.5	181.3	1.521	0.7170
AN104	89.5	183.8	1.408	0.7165
AN99	109.0	171.6	1.837	0.7175
CRT	116.9	198.8	1.698	0.7157
T4214	93	197	1.364	0.7162

The 6 samples whose analytical data are shown above are normal australites
AN100, Lake Lapage; lat. 30°36′S, long. 122°12′E Kurnalpi
AN102, Lake Lefroy; lat. 31°08′S, long. 121°41′E Widgiemooltha
AN104, Seven-mile Hill Kalgoorlie?
AN99, Lake Yindarlgooda; lat. 30°41′S, long. 121°55′E Kurnalpi
CRT, Cook-Rawlinna; co-ordinates not given
T4214, Nullarbor Plain; co-ordinates not given
*This age is derived from an isochron defined by points from 14 samples comprising the normal australites whose analytical data are shown above and normal philippinites whose analytical data may be consulted in the original work

Ref: WA 7 AUSTRALITE

Whole rock K-Ar age 0.86 ± 0.02, 0.73 ± 0.02 } 0.79 ± 0.09 m.y.

GA2349 (R2525) %K 2.178, 2.196 *Ar(10^8cm³/g) 7.46 ± 0.20, 6.35 ± 0.15 %*Ar 21.1, 35.6

Australite-button core
Gravel surface of high-level creek deposit adjoining small dry lake 5 km south-southwest of Leonora Leonora
Mean apparent age may reflect the time of primary melting of the australite

Ref: WA 7 AUSTRALITE

Whole rock K-Ar age 0.90± 0.03, 0.90 ± 0.02, 0.83 ± 0.01, 0.85 ± 0.02, 0.91 ± 0.02 } 0.88 ± 0.03 m.y.

GA2054 %K 2.040, 2.050 *Ar(10^8cm³/g) 1.00 ± 0.07, 6.31 ± 0.12 %*Ar 8.5, 22.5
0.70 ± 0.03, 6.61 ± 0.05 19.0, 57.2
6.79 ± 0.06 62.7
6.96 ± 0.19 38.7
7.41 ± 0.19 58.0

Rounded core
Kalgoorlie area Kalgoorlie?
Mean apparent age may reflect the time of primary melting of the australite

Ref: WA 8 HALLS CREEK GROUP

Muscovite Rb-Sr age 1465 m.y. Initial Sr^{87}/Sr^{86} not reported

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5903 67/16/0289	1781.4	10.6	1450.84	29.08617
GA5905 66/16/0262	1388.9	8.3	1295.79	27.36110

Pegmatite
Gussys Mica Mine
2591 28392 Lennard River
Age probably reflects a metamorphic event

Ref: WA 8

WHITEWATER VOLCANICS, MOUNT DISASTER PORPHYRY, AND BICKLEYS PORPHYRY

Whole rock Rb-Sr age 1940 ± 110 m.y. Initial Sr^{87}/Sr^{86} 0.707 ± 0.005(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5621 67/16/0296	182.3	152.9	3.1760	0.79440
GA5622 66/16/0269	203.4	140.7	3.7650	0.81440
GA5623 66/16/0147	290.8	77.8	10.1130	0.98620
GA5624 66/16/0254	140.9	167.6	2.3640	0.77080
GA5922 67/16/5001	178.0	86.5	5.5560	0.85440
GA5605 66/16/0270	181.8	172.3	2.7470	0.78326
GA5612 67/16/0224	142.2	212.3	1.8340	0.75710
GA5613 67/16/0283	207.3	141.0	4.09434	0.81564

GA5621, Whitewater Volcanics from 2883 28465 Lennard River
GA5622, Whitewater Volcanics from 2966 28467 Lennard River
GA5623, Whitewater Volcanics from 2924 28433 Lennard River
GA5624, Whitewater Volcanics from 2739 28375 Lennard River
GA5922, Whitewater Volcanics from 3753 26871 Noonkanbah
GA5605, Mount Disaster Porphyry from 3008 28458 Lennard River
GA5612, Bickleys Porphyry from 3773 27907 Lennard River
GA5613, Bickleys Porphyry from 3844 27592 Lennard River

The Bow River Granite in the East Kimberley and its West Kimberley equivalents (dated as older than 1823 m.y.) intrude the Whitewater Volcanics, and 1940 ± 110 m.y. is believed to be a more accurate age of formation than the age of 1823 ± 17 m.y. determined by Bofinger (1967; see under reference WA 1) for the Whitewater Volcanics and Castlereagh Hill Porphyry

Ref: WA 8

GRANITES

Whole rock Rb-Sr age 1880 ± 160 m.y. Initial Sr^{87}/Sr^{86} 0.703 ± 0.004(I)
(9 samples marked*)
Pooled Rb-Sr age of all 14 samples, 1880 ± 50 m.y.

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5606* 67/16/0286	89.5	206.3	1.2567	0.74000 (meas.)
GA5607* 67/16/0285	233.7	115.8	5.9110	0.85238 (meas.)
GA5608* 67/16/0284	168.9	188.9	2.5979	0.77287 (meas.)
GA5609* 67/16/0292	177.6	137.1	3.7977	0.80551 (meas.)
GA5610* 67/16/0294	104.2	293.0	1.0294	0.73363 (meas.)
GA5611* 66/16/0255	120.9	266.3	1.3151	0.74000 (meas.)
GA5616* 67/16/0291	135.0	186.0	1.9399	0.76024
GA5617* 67/16/0293	106.8	281.4	1.0200	0.73533
GA5918* 67/16/3010	196	211	2.3188	0.77058
GA5919 67/16/3011	263	209	3.2879	0.79152
GA5920 67/16/4000	172	295	1.6774	0.74668

GA5923 67/16/5003	105.8	383.5	0.7981	0.72326 (meas.)
GA5924 67/16/5004	152.2	193.2	2.2861	0.75795 (meas.)
GA5925 67/16/5005	100.4		1.0226	0.72919 (meas.)

GA5606, Kongorow Granite from 2584 28408 — Lennard River
GA5607, GA5608, Kongorow Granite from 2697 28309 — Lennard River
GA5609, Kongorow Granite from 2705 28385 — Lennard River
GA5610, Kongorow Granite from 2753 28384 — Lennard River
GA5611, Kongorow Granite from 2789 28401 — Lennard River
GA5616, Lennard Granite from 2710 28236 — Lennard River
GA5617, Lennard Granite from 2743 28399 — Lennard River
GA5918, Lerida Granite from 4289 27503 — Lansdowne
GA5919, Long Hole Granite from 4180 27389 — Lansdowne
GA5920, Chaneys Granite from 4251 27326 — Mount Ramsay
GA5923, granite from Pillara Range inlier, 3778 26902 — Noonkanbah
GA5924, granite from Pillara Range inlier, 3798 26866 — Noonkanbah
GA5925, granite from Pillara Range inlier, 3751 26892 — Noonkanbah

All the data fit one of two parallel isochrons, which give identical ages and have been pooled to give a weighted mean of 1880 ± 50 m.y.

Ref: WA 8 PHYLLITES

Whole rock — Rb-Sr age 630 ± 90 m.y. Initial Sr^{87}/Sr^{86} 0.82 ± 0.02(I) (3 samples marked *)
Rb-Sr age 580 m.y. Initial Sr^{87}/Sr^{86} 0.75(A) (2 samples marked **)
Pooled Rb-Sr age of all 5 samples, 600 m.y.

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5914* 66/16/2036	55.5	27.9	5.8193	0.86649 (meas.)
GA5915* 67/16/2125	28.2	10.3	8.0209	0.88789 (meas.)
GA5916* 66/16/2038	156.3	12.2	36.6068	1.13896 (meas.)
GA5628** 67/16/0301	183.8	15.9	34.2927	1.00961 (meas.)
GA5625** 67/16/0300	111.9	22.0	14.9357	0.86265 (meas.)

GA5914, Carson Volcanics from Yampi Peninsula, 1525 29249 — Yampi
GA5915, Elgee Siltstone from Yampi Peninsula, 1226 29298 — Yampi
GA5916, Elgee Siltstone from Yampi Peninsula, 1551 29377 — Yampi
GA5628, Linesman Beds from Oscar Range, 3163 27534 — Lennard River
GA5625, Elimberrie Beds from Oscar Range, 3134 27537 — Lennard River

The ages reflect the time of dynamic metamorphism responsible for the phyllitic lineation. A reliable isochron cannot be drawn for the age of 600 m.y. and thus limits cannot be specified

Ref: WA 8 PENTECOST SANDSTONE

Whole rock — Rb-Sr age 1550 ± 100 m.y. Initial Sr^{87}/Sr^{86} 0.71 ± 0.02(I)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5909 67/16/2126	98.1	11.7	25.4843	1.22658
GA5912 67/16/2128	127.7	12.6	31.1412	1.34309
GA5913 66/16/2039	114.6	41.0	8.1980	0.87392

Phyllite

GA5909, Yampi Peninsula, 1354 29595 — Yampi
GA5912, Yampi Peninsula, 1332 29414 — Yampi
GA5913, Yampi Peninsula, 1377 29356 — Yampi

Possible age of first post-Kimberley Group metamorphism. Compare Bofinger's 3 glauconite ages for the Pentecost Sandstone (see under reference WA 1)

Ref: WA 8 WOTJULUM PORPHYRY

Whole rock — Approximate Rb-Sr age 1750 m.y. Initial Sr^{87}/Sr^{86} 0.70(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5907	387.3	44.8	26.42078	1.30792

66/16/2040

1147 29455 Yampi

See GA5908

Ref: WA 8 WOTJULUM PORPHYRY

Whole rock — Approximate Rb-Sr age 1750 m.y. Initial Sr^{87}/Sr^{86} 0.72(A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5908	370.5	48.4	23.27871	1.25845

66/16/2041

1259 29493 Yampi

The Wotjulum Porphyry may be contemporaneous with the Hart Dolerite (1800 ± 25 m.y.; see under reference WA 1)

Ref: WA 8 SPIELERS VOLCANICS

Whole rock — Rb-Sr age 365 m.y. Initial Sr^{87}/Sr^{86} 0.705 (A)
357 m.y. Initial Sr^{87}/Sr^{86} 0.73 (A)

	Rb(ppm)	Sr(ppm)	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
GA5626	148.9	2.4	199.5352	1.71804

67/16/0302 Rhyolite

Oscar Range

3139 27517 Lennard River

Probably a meaningless age; the Spielers Volcanics have been sheared, probably by the 600-m.y. dynamic metamorphism (see under 'Phyllites' above)

Ref: WA 9 COPPER HILLS PORPHYRY

Whole rock — Rb-Sr age 2880 ± 66 m.y. Initial Sr^{87}/Sr^{86} 0.7303 ± 0.0119(I)

	Rb/Sr	Rb^{87}/Sr^{86}	Sr^{87}/Sr^{86}
12753C	2.67 ± 0.05	7.98 ± 0.16	1.0690 ± 0.0012
12753B	2.80 ± 0.06	8.36 ± 0.17	1.0605 ± 0.0017
12753F	4.74 ± 0.09	14.49 ± 0.29	1.3093 ± 0.0007
12753E	5.54 ± 0.11	17.1 ± 0.3	1.4328 ± 0.0027
12753A	15.6 ± 0.60	54.5 ± 2.6	2.8555 ± 0.0036
12753D	27.2 ± 1.1	117.1 ± 4.7	5.728 ± 0.010

Copper Hills Mine

Lat. 21°40′E, long. 119°58′E Marble Bar

The age derived from the isochron may be associated with either magma generation, emplacement (and crystallization), or metasomatism (during which much of the feldspar was replaced by sericite). Two extreme interpretations are: the 2880 m.y. age reflects either (1) isotopic homogenization during crystallization or metasomatism, with the porphyry magma generated from mantle material at a time computed to be about 60 m.y. earlier, or (2) generation of the porphyry magma from older crustal material

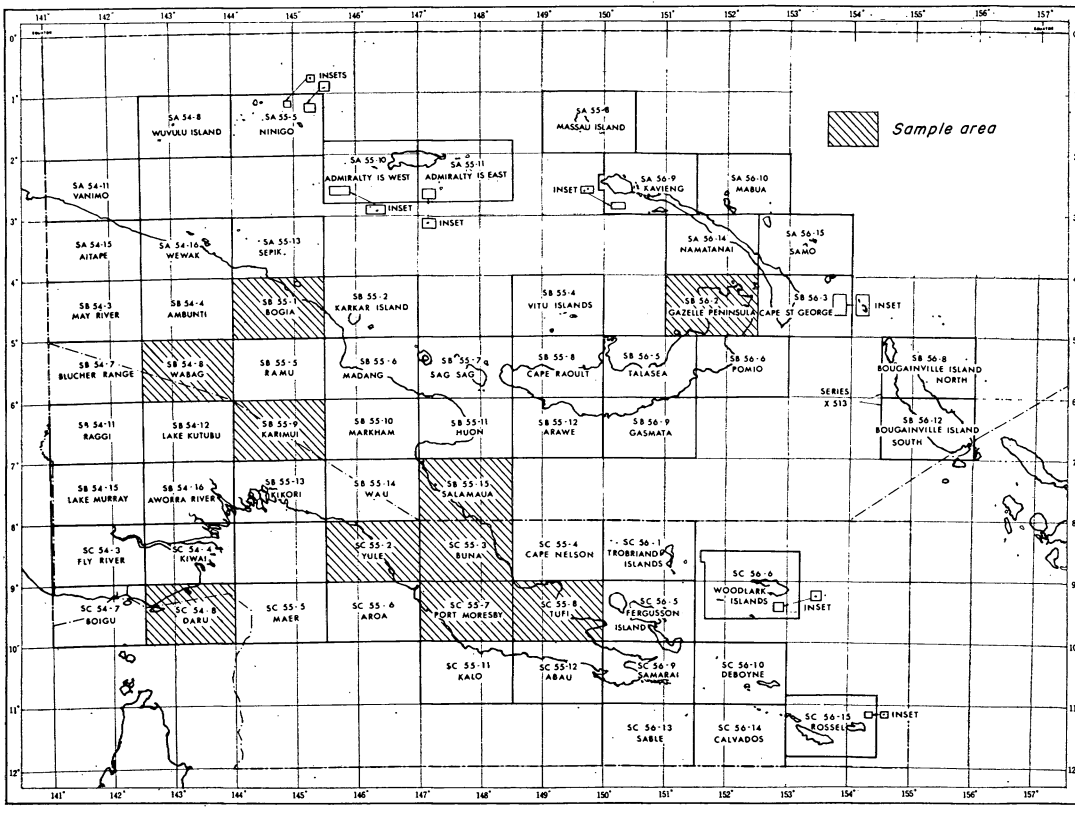

Fig. 3. 1:250 000 Sheet index of Papua New Guinea showing areas from which samples have been dated.

Papua New Guinea

Ref: PNG 1 UOIVI VOLCANICS
Whole rock K-Ar age 0.079 ± 0.01 m.y.
GA1544 %K 2.566, 2.562 (2.564) *Ar^{40}/K^{40} 0.00000461 % atm. Ar^{40} 87.3
Trachyandesite
From about 780-m altitude of south side of lava dome southwest of Uoivi
Lat. 9°08′S, long. 148°27′E Port Moresby
Probably reliable age of extrusion

Ref: PNG 1 UOIVI VOLCANICS
Whole rock K-Ar age 0.36 ± 0.04 m.y.
GA1545 %K 0.812, 0.821 (0.817) *Ar^{40}/K^{40} 0.0000211 % atm. Ar^{40} 85.5
Alkali basalt
From about 730-m altitude, half-way down explosion crater on south side of lava cone near Kawowoki
Lat. 9°08′S, long. 148°26′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 UOIVI VOLCANICS
Whole rock K-Ar age 0.343, 0.366 } 0.355 ± 0.015 m.y.
GA1133 %K 2.106, 2.089 (2.097) *Ar^{40}/K^{40} 0.0000203, 0.0000214 % atm. Ar^{40} 73.9, 62.7
Trachybasalt
From sill in Sesara Volcanics west of Gewoia at about 280-m altitude
Lat. 9°14′S, long. 148°29′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 UOIVI VOLCANICS
Whole rock K-Ar age 0.44 ± 0.04 m.y.
GA1134 %K 1.289, 1.291 (1.290) *Ar^{40}/K^{40} 0.0000257 % atm. Ar^{40} 78.9
Trachybasalt
From sill in Sesara Volcanics south of Kinjaki at about 215-m altitude
Lat. 9°16′S, long. 148°31′E Tufi
Sample may have lost some radiogenic argon

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 0.56 ± 0.06 m.y.
GA1492 %K 3.081, 3.090 (3.085) *Ar^{40}/K^{40} 0.0000329 % atm. Ar^{40} 88.3
Latite
From about 550-m altitude of scarp above Bariji River
Lat. 9°13′S, long. 148°25′E Port Moresby
Minimum age; alteration of sample places doubt on reliability of age; c.f. GA1488, GA1489, and GA1490

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 0.67, 0.67 } 0.67 ± 0.03 m.y.
GA1488 %K 1.602, 1.602 (1.602) *Ar^{40}/K^{40} 0.0000390, 0.0000391 % atm. Ar^{40} 56.6, 49.0
Doreitic basalt
From 1158-m altitude near major ridge crest of Hydrographers Range northwest of Numba
Lat. 9°00′S, long. 148°23′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 0.67 ± 0.04 m.y.
GA1490 %K 1.658, 1.661 (1.659) *Ar^{40}/K^{40} 0.0000393 % atm. Ar^{40} 48.3
Basaltic doreite
From about 1610-m altitude near major ridge crest of Hydrographers Range northwest of Numba
Lat. 9°00′S, long. 148°22′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 0.69 ± 0.04 m.y.
GA1489 %K 1.901, 1.904 (1.903) *Ar^{40}/K^{40} 0.0000402 % atm. Ar^{40} 51.0
Doreite
From about 1830-m altitude near major ridge crest of Hydrographers Range northwest of Numba
Lat. 9°00′S, long. 148°23′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 0.80, 0.77 } 0.785 ± 0.04 m.y.
GA1487 %K 1.674, 1.684, 1.699 (1.685) *Ar^{40}/K^{40} 0.0000464, 0.0000451 % atm. Ar^{40} 55.5, 41.4
Dacitic doreite
From about 1050-m altitude on subordinate ridge of Hydrographers Range northwest of Numba
Lat. 9°00′S, long. 148°23′E Port Moresby
Reliable age of extrusion

Ref: PNG 1 HYDROGRAPHERS VOLCANICS
Whole rock K-Ar age 1.45 ± 0.08 m.y.
GA1132 %K 2.712, 2.714 (2.713) *Ar^{40}/K^{40} 0.0000858 % atm. Ar^{40} 50.8
Latite
From boulder in agglomerate bed in creek section on eastern flanks of Hydrographers Range at about 185-m altitude
Lat. 9°00′S, long. 148°29′E Port Moresby
Age is consistent with stratigraphic position of the rock, which may have been derived from an older volcano than the Hydrographers volcano

Ref: PNG 1 SESARA VOLCANICS
Whole rock K-Ar age 5.44, 5.36 } 5.40 ± 0.2 m.y.
GA1483 %K 3.234, 3.241 (3.237) *Ar^{40}/K^{40} 0.000319, 0.000314 % atm. Ar^{40} 50.7, 55.0
Latitic basalt
From about 670-m altitude near major ridge crest west of Biriri
Lat. 9°15′S, long. 148°28′E Port Moresby
Possibly reliable age of extrusion, although sample may have lost some radiogenic argon; c.f. GA1486

Ref: PNG 1 SESARA VOLCANICS
Whole rock K-Ar age 5.49 ± 0.3 m.y.
GA1484 %K 3.843, 3.848 (3.845) *Ar^{40}/K^{40} 0.000322 % atm. Ar^{40} 75.2
'Leucite basalt'
From about 235-m altitude in Bariji Gorge
Lat. 9°14′S, long. 148°28′E Port Moresby
Altered rock; sample has probably lost some radiogenic argon; c.f. GA1486

Ref: PNG 1 SESARA VOLCANICS
Whole rock K-Ar age 5.57 ± 0.3 m.y.
GA1485 %K 3.558, 3.547 (3.552) *Ar^{40}/K^{40} 0.000327 % atm. Ar^{40} 75.6
'Leucite basalt'
From about 150-m altitude east of Manana
Lat. 9°15′S, long. 148°30′E Tufi
Possibly reliable age of extrusion, although sample may have lost some radiogenic argon; c.f. GA1486

Ref: PNG 1 SESARA VOLCANICS
Whole rock K-Ar age 5.75 ± 0.2 m.y.
GA1486 %K 2.191, 2.204 (2.196) *Ar^{40}/K^{40} 0.000336 % atm. Ar^{40} 10.0
Latitic picrite
From columnar-jointed lava of volcanic rock at about 180-m altitude
Lat. 9°14′S, long. 148°29′E Port Moresby
Reliable age; considered to be one of the youngest rocks of the Sesara volcano

Ref: PNG (Unpubl.) GA5477 TONALITE
Biotite K-Ar age 13.7 ± 0.2 m.y.
%K 7.38, 7.40 (7.39) *Ar^{40}/K^{40} 0.0008044 % atm. Ar^{40} 23.9
Hornblende K-Ar age 14.1 ± 0.2 m.y.
%K 0.251, 0.251 (0.251) *Ar^{40}/K^{40} 0.0008284 % atm. Ar^{40} 63.7
Headwaters of Warangoi River
Lat. 4°38′S, long. 152°07′E Gazelle Peninsula

Ref: PNG (Unpubl.) GA5416 DIORITE
Hornblende K-Ar age 55 ± 2 m.y.
%K 0.1955, 0.1958 (0.196) *Ar^{40}/K^{40} 0.003285 % atm. Ar^{40} 68.0
Oligoclase K-Ar age 50 ± 2 m.y., 51 ± 2 m.y.
%K 0.2254, 0.2276 (0.227) *Ar^{40}/K^{40} 0.002950 % atm. Ar^{40} 52.7
0.003034 59.2
274 m south of Kui village, Morobe District
Lat. 7°29′S, long. 147°13′E Salamaua

Ref: PNG (Unpubl.) GA5481 DIORITE
Plagioclase K-Ar age 53.2 ± 1.4 m.y.
%K 0.1252, 0.1264 (0.126) *Ar^{40}/K^{40} 0.003149 % atm. Ar^{40} 66.4
South arm of Morobe River, 24 km west-southwest of Morobe
Lat. 7°48′S, long. 147°24′E Salamaua

Ref: PNG (Unpubl.) GA5479 DOMARA RIVER BEDS
Whole rock K-Ar age 2.36 ± 0.05 m.y.
%K 2.100, 2.090 (2.10) *Ar^{40}/K^{40} 0.000141 % atm. Ar^{40} 64.3
Plagioclase K-Ar age 22.0 ± 0.5 m.y.
%K 0.465, 0.469 (0.467) *Ar^{40}/K^{40} 0.001291 % atm. Ar^{40} 72.6
Agglomerate
South side of Mount Avuru
Lat. 9°47′S, long. 148°42′E Tufi

Ref: PNG (Unpubl.) GA5480 DOLERITE
Pyroxene K-Ar age 116 ± 4 m.y.
%K 0.0680, 0.0669 (0.067) *Ar^{40}/K^{40} 0.007002 % atm. Ar^{40} 86.9
Lower Waria River
Lat. 8°00′S, long. 147°15′E Buna

Ref: PNG (Unpubl.) GA5478 DACITE
Biotite K-Ar age 5.3 ± 0.2 m.y.
%K 6.992, 6.997 (6.99) *Ar^{40}/K^{40} 0.000308 % atm. Ar^{40} 56.8
Dirridi Creek (tributary of Adau River)
Lat. 9°49′S, long. 148°52′E Tufi

Ref: PNG (Unpubl.) R1164 BASALT
Whole rock K-Ar age 7.0 ± 0.5 m.y.
%K 1.87, 2.07 (1.97) *Ar^{40}/K^{40} 0.00041 % atm. Ar^{40} 34.3, 22.9
From core at 2420 m, Maiva No. 1 well, 155 km (offshore) northwest of Port Moresby
Lat. 8°18′21.8″S, long. 146°08′04″E Yule
See R1179

Ref: PNG (Unpubl.) R1179

BASALT
Whole rock K-Ar age 5.2 ± 0.4 m.y.
%K 1.266, 1.267 (1.266) *Ar^{40}/K^{40} 0.00030 % atm. Ar^{40} 15.1, 14.1
From core at 2975 m, Maiva No. 1 well, 155 km (offshore) northwest of Port Moresby
Lat. 8°18′21.8″S, long. 146°08′04″E Yule
The ages of 7.0 and 5.2 m.y. are late Miocene, and are compatible with the palaeontological evidence: rich upper Miocene microfaunas are present in the 1628-2974-m interval

Ref: PNG 2 GA5630

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 13.8 ± 0.3 m.y., 13.5 ± 0.3 m.y.
%K 0.760, 0.758 (0.759) *Ar^{40}(10^{-10}mole/g) 0.187 % atm. Ar^{40} 64.2
0.183 63.1
Pyroxene K-Ar age 13.9 ± 1.7 m.y.
%K 0.0398, 0.0410 (0.0404) *Ar^{40}(10^{-10}mole/g) 0.010 % atm. Ar^{40} 97.6
Olivine basalt from near the base of the Member
Road-cutting 6.4 km west of Kompiam
Lat. 5°25′00″S, long. 143°54′20″E Wabag
Reliable ages of extrusion

Ref: PNG 2 GA5631

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 13.6 ± 0.3 m.y., 14.1 ± 0.3 m.y.
%K 0.774, 0.772 (0.773) *Ar^{40}(10^{-10}mole/g) 0.188 % atm. Ar^{40} 80.7
0.195 77.1
Olivine basalt from near the base of the Member
Road-cutting 6.5 km west of Kompiam
Lat.5°25′00″S, long. 143°54′20″E Wabag
Reliable ages of extrusion

Ref: PNG 2 GA5633

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 12.8 ± 0.2 m.y., 13.2 ± 0.2 m.y.
%K 1.007, 1.010 (1.009) *Ar^{40}(10^{-10}mole/g) 0.226 % atm. Ar^{40} 63.1
0.238 64.6
Olivine basalt from the middle to upper parts of the Member
Creek section 8 km west of Kompiam
Lat. 5°25′15″S, long. 143°53′15″E Wabag
Reliable age of extrusion

Ref: PNG 2 GA5634

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 13.0 ± 0.2 m.y., 13.1 ± 0.3 m.y.
%K 0.913, 0.922 (0.918) *Ar^{40}(10^{-10}mole/g) 0.212 % atm. Ar^{40} 59.1
0.215 78.8
Olivine basalt from the middle to upper parts of the Member
Creek section 13 km west of Kompiam
Lat. 5°25′20″S, long. 143°51′45″E Wabag
Reliable age of extrusion

Ref: PNG 2 GA5635

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 13.6 ± 0.2 m.y.
%K 0.784, 0.782 (0.783) *Ar^{40}(10^{-10}mole/g) 0.191 % atm. Ar^{40} 63.4
Olivine basalt
Sau River 9.5 km west of Kompiam
Lat. 5°25′S, long. 143°52′15″E Wabag
Reliable age of extrusion

Ref: PNG 2 GA5636

TARUA VOLCANIC MEMBER
Whole rock K-Ar age 13.1 ± 0.2 m.y., 13.4 ± 0.2 m.y.
%K 1.277, 1.282 (1.280) *Ar^{40}(10^{-10}mole/g) 0.299 % atm. Ar^{40} 49.9
0.305 57.7
Basalt from the lower part of the Member
Sau River 4.8 km west of Kompiam
Lat. 5°24′30″S, long. 143°53′30″E Wabag
Sample is altered, and may have lost some radiogenic argon

Ref: PNG 2 BURGERS FORMATION
Whole rock K-Ar age 13.4 ± 0.2 m.y.
GA5637 %K 1.634, 1.637 (1.636) *Ar^{40}(10^{-10}mole/g) 0.391 % atm. Ar^{40} 38.1
Boulder of dolerite (derived from Tarua Volcanic Member) in volcanic conglomerate
Road-cutting 13 km west of Kompiam
Lat. 5°24′45″S, long. 143°50′00″E Wabag
Age of extrusion of dolerite

Ref: PNG 2 KARAWARI CONGLOMERATE FORMATION
Whole rock K-Ar age 14.5 ± 0.2 m.y.
GA5648 %K 1.681, 1.678 (1.680) *Ar^{40}(10^{-10}mole/g) 0.434 % atm. Ar^{40} 20.2
Pyroxene andesite
Arafundi River 8 km south of Imboin village
Lat. 4°52′S, long. 144°39′E Bogia
Probably reliable minimum age of extrusion

Ref: PNG 2 KARAWARI CONGLOMERATE FORMATION
Whole rock K-Ar age 13.4 ± 0.2 m.y., 13.9 ± 0.2 m.y.
GA5654 %K 1.103, 1.113 (1.108) *Ar^{40}(10^{-10}mole/g) 0.263 % atm. Ar^{40} 39.4
0.275 56.6
Hornblende K-Ar age 17.2 ± 0.3 m.y., 17.1 ± 0.4 m.y.
%K 0.270, 0.272 (0.271) *Ar^{40}(10^{-10}mole/g) 0.083 % atm. Ar^{40} 61.3
0.083 69.4
Hornblende K-Ar age 28.2 ± 0.5 m.y.
%K 0.268, 0.267 (0.268) *Ar^{40}(10^{-10}mole/g) 0.135 % atm. Ar^{40} 45.8
Hornblende andesite
Arafundi River 5 km south of Imboin village
Lat. 4°51′S, long. 144°38′E Bogia
Mean whole-rock age is probably a reliable minimum estimate of the time of extrusion; hornblende ages probably reflect the presence of excess argon

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 12.4 ± 0.2 m.y.
GA5639 %K 5.700, 5.723 (5.712) *Ar^{40}(10^{-10}mole/g) 1.301 % atm. Ar^{40} 43.7
Brecciated lava
Daulo Pass road-cutting 3 km southwest of Daulo
Lat. 6°03′S, long. 145°13′20″E Karimui
Probably unreliable age; sample inferior for dating purposes

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 11.9 ± 0.2 m.y., 12.2 ± 0.3 m.y.
GA5640 %K 6.128, 6.114 (6.121) *Ar^{40}(10^{-10}mole/g) 1.299 % atm. Ar^{40} 37.0
1.335 42.0
Analcite K-Ar age 11.5 ± 0.2 m.y., 10.3 ± 0.2 m.y., 12.1 ± 0.2 m.y.
%K 3.566, 3.536 (3.551) *Ar^{40}(10^{-10}mole/g) 0.727 % atm. Ar^{40} 35.6
0.655 59.5
0.768 55.1
Analcite basanite
Daulo Pass, Fionoku Creek, 3 km north of Watabung
Lat. 6°03′30″S, long. 145°13′00″E Karimui
Probably unreliable ages; sample inferior for dating purposes

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 15.1 ± 0.2 m.y., 13.1 ± 0.2 m.y.
GA5641 %K 3.742, 3.759 (3.751) *Ar^{40}(10^{-10}mole/g) 1.014 % atm. Ar^{40} 36.3
0.875 45.4
Pyroxene K-Ar age 12.8 ± 0.4 m.y.
%K 0.0813, 0.0834 (0.0824) *Ar^{40}(10^{-10}mole/g) 0.018 % atm. Ar^{40} 88.8
Analcite basalt
Daulo Pass, Fionoku Creek, 3 km north of Watabung
Lat. 6°03′30″S, long. 145°13′00″E Karimui
Sample inferior for dating purposes

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 11.4 ± 0.1 m.y., 10.7 ± 0.1 m.y.
GA5642 %K 2.445, 2.454 (2.450) *Ar^{40}(10^{-10}mole/g) 0.497 % atm. Ar^{40} 25.0
0.467 44.6
Analcite basalt
Daulo Pass, Fionoku Creek, 4 km north of Watabung
Lat. 6°03′S, long. 145°13′E Karimui
Sample inferior for dating purposes

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 10.5 ± 0.3 m.y., 8.3 ± 0.1 m.y.,
8.7 ± 0.1 m.y., 9.1 ± 0.1 m.y.
GA5643 %K 1.136, 1.131 (1.134) *Ar^{40}(10^{-10}mole/g) 0.212 % atm. Ar^{40} 62.3
0.168 58.3
0.176 65.6
0.188 60.3
Analcite basalt
Daulo Pass, Fionoku Creek, 4 km north of Watabung
Lat. 6°03′S, long. 145°13′E Karimui
Sample inferior for dating purposes

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 14.9 ± 0.2 m.y., 14.8 ± 0.3 m.y.
GA5645 %K 3.286, 3.276 (3.281) *Ar^{40}(10^{-10}mole/g) 0.874 % atm. Ar^{40} 15.8
0.865 19.7
Trachyte
Daulo Pass road-cutting 3.2 km southwest of Kenangi village
Lat. 6°22′40″S, long. 145°24′00″E Karimui
Probably reliable age of extrusion; trachyte probably marks the earliest outpourings of the Daulo volcanics

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 14.6 ± 0.3 m.y.
GA5870 %K 1.801, 1.791 (1.796) *Ar^{40}(10^{-10}mole/g) 0.467 % atm. Ar^{40} 64.5
Pyroxene andesite
About 9 km south of Oliguti New Tribes Mission
Lat. 6°22′40″S, long. 145°24′00″E Karimui
Probably reliable age of extrusion

Ref: PNG 2 DAULO VOLCANICS, YAVEUFA FORMATION
Whole rock K-Ar age 15.0 ± 0.3 m.y.
GA5872 %K 1.875, 1.876 (1.876) *Ar^{40}(10^{-10}mole/g) 0.503 % atm. Ar^{40} 13.7
Andesite cobble in conglomerate interbedded with volcanics
About 13 km northwest of Oliguti New Tribes Mission
Lat. 6°10′00″S, long. 145°19′40″E Karimui
Probably reliable age of extrusion of andesite; possible maximum age for the conglomeratic sediments (Asaro conglomerate)

Ref: PNG 3 BADU GRANITE
Biotite K-Ar age 302 ± 5 m.y.
69-772 %K 6.639 ± 0.026 *Ar^{40}($cm^3/g \times 10^{-5}$) 8.68 % atm. Ar^{40} 1.8
Small island off Mabaduan village
Lat. 9°17′S, long. 142°44′E Daru
Age of intrusion (see also the 3 age determinations under reference Q 15)

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