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11.07.0517

27 September 1978

The Director-General,
Department of Mines & Energy
P O Box 151,
EASTWOOD 5063

GEOCHRONOLOGY OF THE OFFICER BASIN

PROGRESS REPORT NO. 1

by

A. W. Webb

Geochronology by Dr A. W. Webb

D. K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

NB both the samples analysed here came from the "Adelaidean" equivalents - from an hanger just above the Mantapella volcanics.

hjj

GEOCHRONOLOGY OF THE OFFICER BASIN

1. REVIEW OF PROGRESS

A familiarisation trip to the northeastern part of the Officer Basin, on which Amdel's Project Officer accompanied geologists of the S. A. Department of Mines & Energy, was held during late April - early May 1978. During this trip, rock samples were collected from several outcropping units in the Chambers Bluff region; the units sampled including both the sediments of the (?) Cambro-Ordovician Officer Basin and folded sediments associated with the tillites and volcanics of the Adelaide System which forms the basement to the Officer Basin in this region.

Petrographic descriptions of one specimen from each of the rock units sampled were given in Amdel Report GS 4084/78 and from this examination it was decided to carry out Rb-Sr total rock dating on two of these units. This work had a two-fold objective:

1 By dating the Adelaidean sediment (P694/78, 2.5 km SW of Chambers Bluff) it was hoped to determine the age of the folding movement that had affected the basement in this region; e.g. was it a Precambrian event or the Delamerian orogeny (c.f. Williams, 1975)? This date would give a maximum age for the deposition of the overlying sediments of the Officer Basin. If the folding was of Delamerian age, the overlying sediments must be younger than middle Ordovician and could not be as old as Cambrian.

2 A silty shale, apparently conformable beneath the Mt Chandler Sandstone and largely obscured by boulders of the sandstone on the scree slope, was correlated, tentatively, with the Observatory Hill Beds. A date on this bed, therefore, would give a minimum age for the commencement of deposition in the Officer Basin. This sample, in Report GS 4084/78, was also labelled P694/78. Since the P-system of numbering has been discontinued, no official number has been allocated, but the samples in the present Report will be referred to as P2000/78, with subsamples A to F. After completion of this initial work, it was planned to analyse samples of the Indulkana Shale (P696/78).

2. GEOCHRONOLOGY

Six subsamples, A to F, from both P694/78 and P2000/78 were analysed. The analyses are listed in Tables 1 and 2 and are shown on the $^{87}Rb/^{86}Sr$ - $^{87}Sr/^{86}Sr$ correlation diagram (Fig. 1).

2.1 (?) Observatory Hill Beds

These samples showed a wide variation in Rb/Sr ratios, which assists in the production of a precise isochron. Linear regression of the data indicated a significant scatter, in excess of experimental error, of the points about the isochron (MSWD = 19.6). A Model 2 isochron was favoured by the regression, with an age of 574 ± 34 Ma and an initial $^{87}Sr/^{86}Sr$ ratio of 0.7197 ± 0.0041.

The age of the Precambrian - Cambrian boundary is very imprecisely known. Rb-Sr dates of 594 ± 11 Ma for a late Precambrian granite and 560 ± 20 for igneous rocks within the Lower Cambrian (Lambert,1971) suggest that the age obtained for the Observatory Hill Beds must be very close to the base of the Cambrian.

2.2 Adelaidean Shales Underlying The Wantapella Volcanics

From Fig. 1 it can be seen that the Rb/Sr ratios of these samples do not have the same range as those for the Observatory Hill Beds. In addition, the samples appear to plot close to the isochron for the Observatory Hill Beds. Regression of the data produced a Model 4 isochron (MSWD = 14.1) of 651 ± 87 Ma with an initial $^{87}Sr/^{86}Sr$ ratio of 0.7105 ± 0.0103.

This result appears to be too young for the age of deposition of a sediment associated with Sturtian tillites (which might be expected to be $\geq$750 Ma). The date, therefore, probably indicates the time of folding of these sediments and if this is so, the event recorded is not the Delamerian Orogeny. The conclusion that the Delamerian Orogeny did not affect this part of South Australia is supported also by the results for the Observatory Hill Beds discussed in section 2.1.

3. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK

1 There is no evidence from the two sedimentary rock units studied to suggest that the effects of the Delamerian Orogeny extended to the northern region of South Australia. The Ordovician dates reported by Williams (1975) from Poonarunna No. 1 and Mokari No. 1 are from a region at least 350 km to the east of the Chambers Bluff locality.

2 The Adelaidean sediment, of Sturtian age, had its Rb-Sr isotopic system reset in the late Precambrian. Resetting often occurs in fine grained sediments under very mild metamorphic conditions and in the present case, the date probably reflects the time of folding of this sediment. The mildness of this event is also indicated by the absence of resetting of the K-Ar mineral systems in the gneissic basement rocks of the Everard Ranges on the northern margin of the Officer Basin, where K-Ar mineral dates fall in the 1100 - 1000 Ma age range (see Progress Reports for Project 11.07.0355; 1/1/123).

3 The present data are insufficient to distinguish statistically between the two isochrons in Fig. 1. To overcome this problem, more samples of the Adelaidean shale should be collected in an attempt to obtain a wider dispersion of Rb/Sr ratios. Until an age difference is confirmed, the possibility that P2000/78 is part of the Adelaidean basement cannot be dismissed. However, if the difference is shown to be real, the result would indicate that sedimentation in the Officer Basin commenced in very early Cambrian times. Rb-Sr dating of the Indulkana Shale may also be useful in determining the period of deposition of this sequence.

4. REFERENCES

LAMBERT, R. S. & J., 1971: The pre-Pleistocene Phanerozoic time-scale - a review in Part 1. The Phanerozoic Time-Scale - a supplement. Spec. Publ. Geol. Soc. No. 5, London, pp 9 - 31.

WILLIAMS, G.E., 1975: Northern extent of the Delamerian Orogeny. Search, 6, pp 435 - 436

TABLE 1

Rb-Sr Analyses of (?) Observatory Hill Beds

Sample No.	Rb/Sr	$^{87}Rb/^{86}Sr$	$\#^{87}Sr/^{86}Sr$
P2000/78 A	2.418	7.0287	0.7759
B	1.679	4.8731	0.7602
C	5.519	16.1664	0.8551
D	4.061	11.8493	0.8148
E	4.943	14.4528	0.8362
F	5.193	15.1978	0.8458

***

TABLE 2

Rb-Sr Analyses of Sturtian Shales near Chambers Bluff

Sample No.	Rb/Sr	$^{87}Rb/^{86}Sr$	$\#^{87}Sr/^{86}Sr$
P694/78 A	3.705	10.8051	0.8095
B	3.253	9.4782	0.8000
C	2.579	7.4988	0.7787
D	2.359	6.8570	0.7755
E	2.317	6.7326	0.7720
F	2.969	8.6438	0.7918

\# Ratios normalised to $^{88}Sr/^{86}Sr = 8.3752$
Constants used: $^{85}Rb/^{87}Rb = 2.600$
$\lambda^{87}Rb = 1.42 \times 10^{-11}\ y^{-1}$

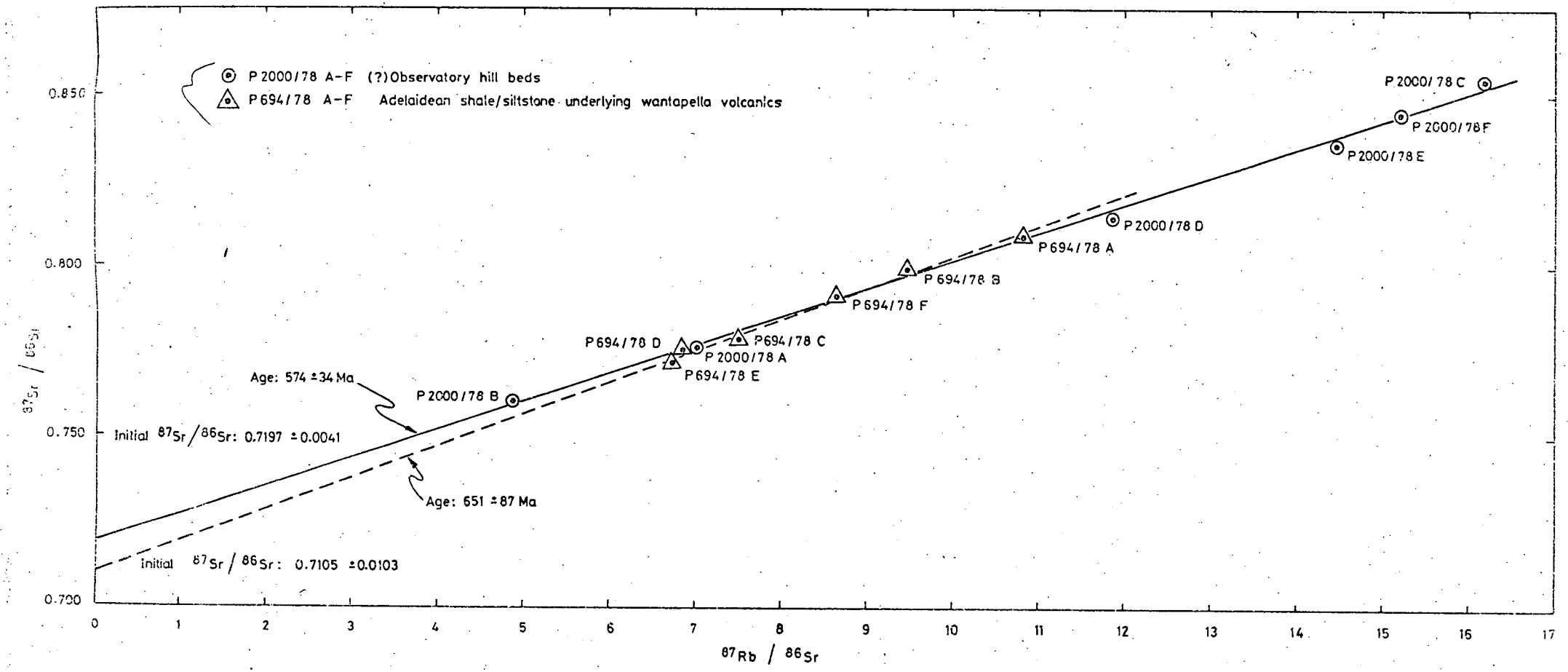

FIG. 1: Rb – Sr ISOCHRONS

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The Director-General
Department of Mines & Energy
P O Box 151
EASTWOOD

NATA CERTIFICATE

30 October 1978

GEOCHRONOLOGY OF THE OFFICER BASIN

Progress Report No. 2

by

A. W. Webb

Geochronology by Dr A. W. Webb

D. K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

hjj

GEOCHRONOLOGY OF THE OFFICER BASIN

1 REVIEW OF PROGRESS

A recommendation made in Progress Report No. 1 was that extra samples from the same locality as the Adelaidean Shale (P694/78) be collected and analysed in an attempt to increase the span in Rb/Sr ratios in this suite of samples. One sample, 5543 RS 130, was submitted and from this, two subsamples were taken. These subsamples extended the range in Rb/Sr ratio and were therefore analysed to determine their Rb and Sr isotopic compositions.

Approximate Rb/Sr ratios of 12 samples of the Indulkana Shale, from 2 closely spaced localities about 2 km ENE of Chambers Bluff, were made and 6 samples were selected for complete isotopic analysis.

The analyses of the Adelaidean shale and the Indulkana Shale are discussed in the following Sections.

2 GEOCHRONOLOGY

The analyses of the 8 samples are listed in Table 1 and the Indulkana Shale data are also plotted in Fig. 1.

2.1 Adelaidean Shale

no such stratigraphic unit.

The analyses of 5543 RS 130 A and B do not plot on the isochron for sample P694/78 (see Fig. 1 Progress Report No. 1); both fall above the isochron at a distance far greater than the normal experimental error. It is uncertain whether these samples were taken from exactly the same locality as P694/78 and it appears that 5543 RS 130 had a different initial $^{87}Sr/^{86}Sr$ ratio.

2.2 Indulkana Shale

The six analyses produced a Model 3 isochron of 460 ± 15 Ma with an initial $^{87}Sr/^{86}Sr$ ratio of 0.7128 ± 0.0022. The MSWD of 3.78 is low and indicates that there is little residual variance beyond that due to experimental error. This age corresponds to Middle Ordovician (Arenigian to Caradocian) and can be interpreted as indicating the time of deposition of the shale.

The initial ratio of 0.713 is low in the range found for sedimentary rocks and suggests that the shale was derived from a relatively young provenance. The Musgrave Block, which would have had rocks with relatively low Rb/Sr ratios and ranging in age from 1000 to 500 Ma at the time of deposition of the Indulkana Shale, is a likely source area although this hypothesis would need to be tested by palaeogeographic and sedimentological studies.

3. CONCLUSIONS

1 The uncertainty in the age of P694/78 still remains and it appears that samples from the exact locality as P694/78 will be needed to resolve this problem.

2 The Indulkana Shale is of Middle Ordovician age, over 100 million years younger than the last folding phase of the Adelaidean sediments that form the basement to the Officer Basin. Commencement of deposition in the Officer Basin must have occurred during this interval and it is anticipated that Rb-Sr dating of fine grained sediments from Wilkinson No. 1 will help in placing a more accurate age on this event.

TABLE 1

Rb-Sr Analyses

Sample No.	Rb/Sr	$^{87}Rb/^{86}Sr$	$\#^{87}Sr/^{86}Sr$
Adelaidean Shale near Chambers Bluff			
5543 RS 130 A	2.418	7.0353	0.7855
5543 RS 130 B	3.899	11.3917	0.8285
Indulkana Shale, 2 km ENE of Chambers Bluff			
P696/78 A	5.266	15.3644	0.8141
E	4.947	14.4239	0.8072
G	2.895	8.4084	0.7675
J	1.754	5.0843	0.7471
K	2.061	5.9767	0.7513
L	3.971	11.5571	0.7884

Ratios normalised to $^{88}Sr/^{86}Sr = 8.3752$

Constants Used: $^{85}Rb/^{87}Rb = 2.600$

$\lambda^{87}Rb = 1.42 \times 10^{-11}\ y^{-1}$

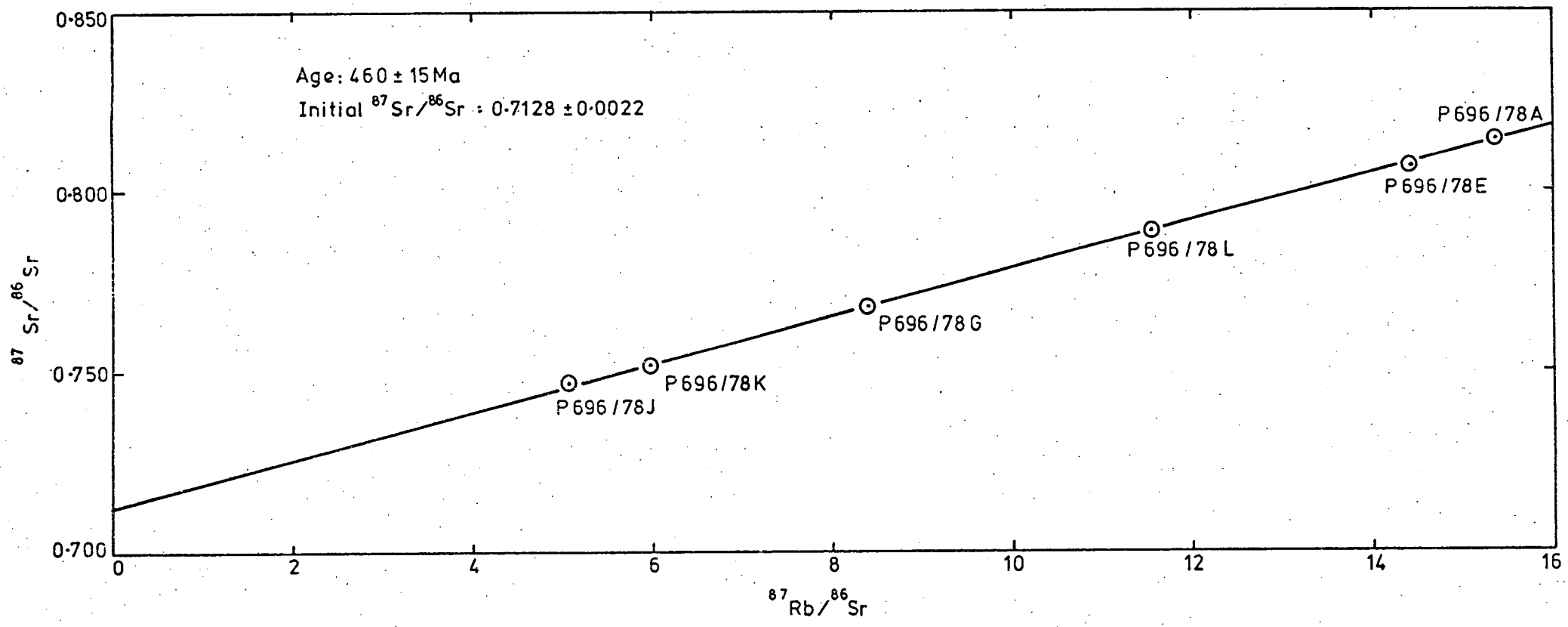

FIG. 1: INDULKANA SHALE, Rb-Sr ISOCHRON

DEPARTMENT OF MINES AND ENERGY - SOUTH AUSTRALIA

APPLICATION FOR EXAMINATION OF SPECIMENS OR SAMPLES

UNIT NUMBER			Applicant's Number	Descriptive Information; Drillhole, Survey etc.	Details of work required	Estimated Cost
1:100,000 SHEET	RS	Number				
5543	RS	130	—	Surface sample from just above Wintapella Volcanics (EVERARD)	Attention Dr Alan Webb for GEOCHRON Petrology to determine suitability for isotopic age dating — and geochron if suitable.	$530.00
					Total	

Return to.

Type of Samples: Selected volcanic samples

Disposal of Samples: P Austin, Fossil Fuels.

Name of Applicant: P Austin (via G Kreig) SADME

Address: 191 Greenhill Road, Parkside

Signed: G W Kreig (& CK Daleman) Date: 3-10-78

OFFICE USE ONLY

Submitted to AMDEL for - Analytical, Petrological, Other Examination

Firm/Estimated Price: $530.00

Charge against Project No.: ~~EC06~~ 11, 07, 05, 7

Approved: J Kelly
Director General

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590/78

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The Director-General
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD. S.A. 5063

NATA CERTIFICATE

6 November 1978

GEOCHRONOLOGY OF THE OFFICER BASIN

Progress Report No. 3

by

A.W. Webb

Geochronology by Dr. A.W. Webb

D.K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

1. EVALUATION OF SEDIMENTS FROM WILKINSON NO.1 FOR Rb-Sr DATING

Ten samples of fine grained sediment, between 379.1m and 385.0m from Wilkinson No. 1 were examined to determine their suitability for Rb-Sr geochronology. Rb and Sr concentrations are given in Table 1 where it can be seen that all samples contain abnormally high Sr levels and are therefore unsuitable for Rb-Sr dating. Thin section examination or X-ray diffraction analysis would be required to determine the source of the Sr in these samples.

TABLE 1

Rb & Sr Concentrations (by XRF)

Depth (m)	Rb (ppm)	Sr (ppm)
379.10	106	1600
379.96	92	1320
380.20	98	1810
380.61	95	636
381.06	90	1330
382.13	90	895
383.00	79	1200
383.66	72	880
384.78	55	1280
385.00	62	2190

AC 1/1/220
11.07.0517

The Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD. S.A. 5063

31 January 1979

GEOCHRONOLOGY OF THE OFFICER BASIN

Progress Report No. 4

by

A.W. WEBB

Geochronology by Dr. A.W. Webb

D.K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

GEOCHRONOLOGY OF THE OFFICER BASIN

1. REVIEW OF PROGRESS

Nine samples of drill core from between 6.22m and 11.34m depth from E.O.B. No. 12 were submitted for Rb - Sr geochronology. After preliminary examination of Rb/Sr ratios, five of these samples were selected for isotopic analysis and the results of this work are reported in the following section.

2. GEOCHRONOLOGY

The isotopic analyses are listed in Table 1 and plotted in Fig. 1. Also included in Fig. 1 is the 574 Ma isochron produced by the samples from east of Chambers Bluff (see Progress Report No. 1) and it can be seen that four of the five samples from E.O.B. No. 12 plot on this line. The fifth sample plots slightly above the line and, as it has the highest Rb-Sr ratio, tends to control the slope of the isochron for E.O.B. No. 12.

Linear regression of the five analyses produced a Model 1 isochron of (731 ± 54 Ma) with an (initial $^{87}Sr/^{86}Sr$ ratio of 0.7121 ± 0.0028). Further analyses of samples from E.O.B. No. 12 should be made to determine whether the difference in age between this isochron and that for the Chambers Bluff samples is real. If the difference can be confirmed, it would suggest that the event which caused the resetting of the Rb-Sr ages near the northern margin of the Officer Basin did not affect rocks further to the south near Mt. Johns. Correlation of the 731 Ma date with results obtained on Adelaidean sediments on the Stuart Shelf indicate that these rocks could be approximately contemporaneous with the Willochra Subgroup.

TABLE 1

Rb-Sr Analyses, E.O.B. No. 12

SAMPLE NO.	DEPTH (m)	Rb/Sr	$^{87}Rb/^{86}Sr$	$\neq$ $^{87}Sr/^{86}Sr$
5543 RS 189	6.22m	1.673	4.8570	0.7629
5543 RS 191	7.18m	1.254	3.6360	0.7499
5543 RS 194	9.29m	1.166	3.3799	0.7470
5543 RS 196	10.45m	1.038	3.0079	0.7439
5543RS 197	11.30m	1.082	3.1357	0.7447

$\neq$ Ratios normalised to $^{88}Sr/^{86}Sr = 8.3752$

Constants used: $^{85}Rb/^{87}Rb = 2.600$

$\lambda\ ^{87}Rb = 1.42 \times 10^{-11}\ y^{-1}$

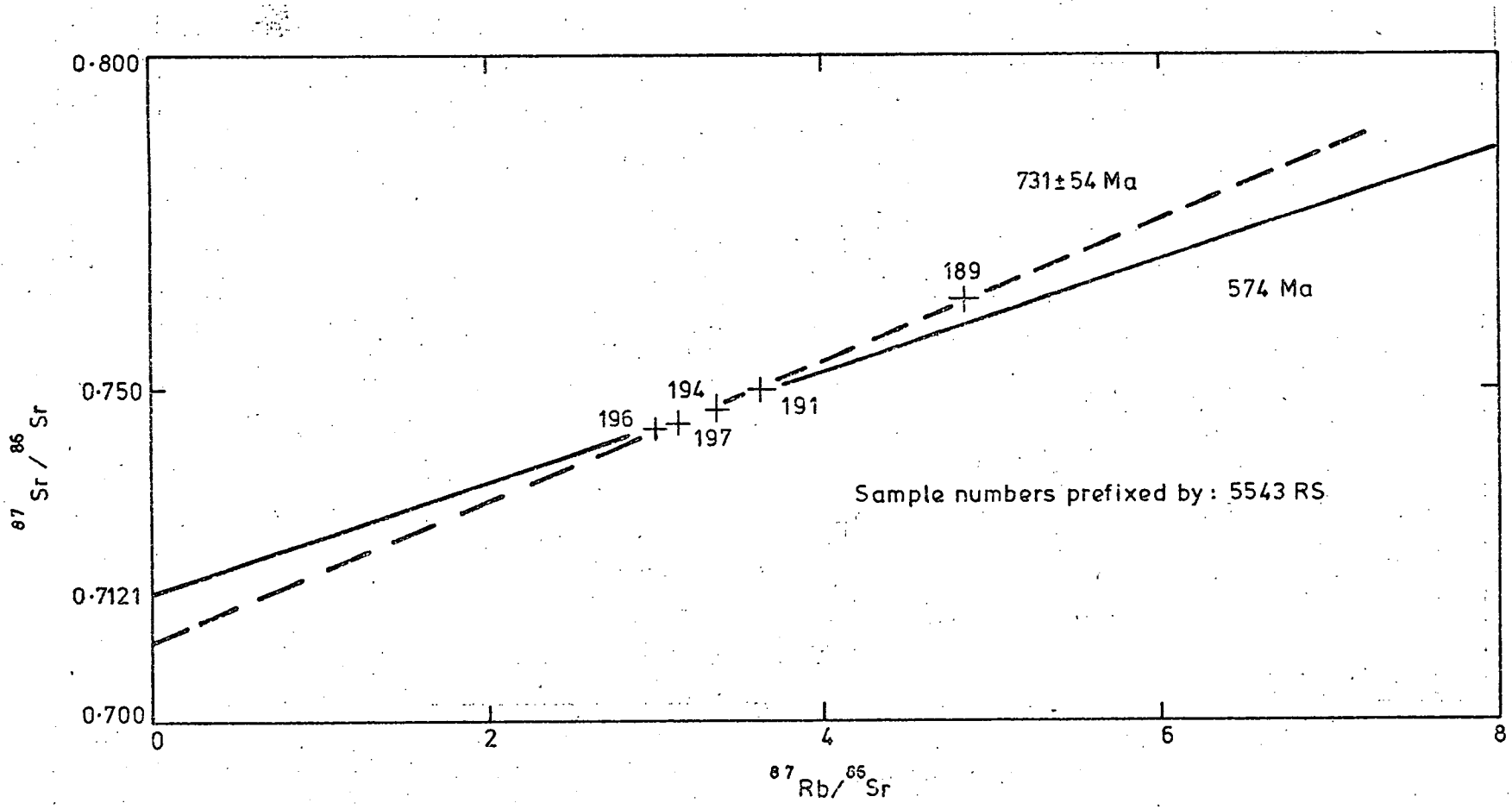

FIG.1 : E.O.B. Nº 12

DEPARTMENT OF MINES AND ENERGY - SOUTH AUSTRALIA

APPLICATION FOR EXAMINATION OF SPECIMENS OR SAMPLES

UNIT NUMBER			Applicant's Number	Descriptive Information; Drillhole, Survey etc.	Details of work required	Estimated Cost
1:100,000 SHEET	RS	Number				
5543	RS	189 ←	①	6.22 – 6.26 metres	↑	$530.00
		190	②	6.66 – 6.73 "	Geochronology	
		191 ←	③	7.18 – 7.22 "		
		192	④	7.50 – 7.56 "	(Petrology to determine	
		193	⑤	8.45 – 8.50 "	suitability for isotopic	
		194 ←	⑥	9.29 – 9.33 "	age dating — geochron.	
		195	⑦	9.81 – 9.88 "	if suitable)	
		196 ←	⑧	10.45 – 10.50 "		
↓	↓	197 ←	⑨	11.30 – 11.34 "	↓	↓
				Drillhole E.O.B. #12 "		
				EVERARD 1:250 000 sheet	Attention: Dr. A. Webb	
				lat: 27° 08' 09.6" S. (approx)		
				long: 133° 27' 22.2" E. (approx.)		
					Total	$4770.00

Type of Samples: ½ Core

Disposal of Samples: Return to I.W.N

Name of Applicant: I.W. NORTHCOTT

Address: FOSSIL FUELS DIVISION

Signed: [signature] Date: 23/10/78

OFFICE USE ONLY

Submitted to AMDEL for - ~~Analytical,~~ Petrological, Other Examination

Firm/Estimated Price: $4770.00

Charge against Project No.: 11.07.0517

Approved: [signature] Director General

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AC 1/1/220
11.07.0517
26 October 1979

The Director-General
Department of Mines & Energy,
P.O. Box 151
EASTWOOD SA 5063

GEOCHRONOLOGY OF THE OFFICER BASIN

Progress Report No. 5

by

A.W. WEBB & B.G. STEVESON

D.K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

THE GEOCHRONOLOGY OF THE OFFICER BASIN

1. REVIEW OF PROGRESS

Ten samples of shale from Byilkaoora No. 1, from depths between 157.13 m and 177.88 m were submitted for evaluation for Rb-Sr geochronology on 6 August, 1979. After examination of thin sections of the samples, two were regarded as unsuitable for dating and from the remainder, six were selected for analysis. Petrographic descriptions of two samples and the evaluation of the analytical data are given in the following sections.

2. PETROGRAPHY

Sample: A 3047 TS: 42041
Location: Byilkaoora No. 1 157.13-157.2 m
Rock Name: Ferruginous siltstone OOLARINNA MBR, OBSERVATORY HILL FORMATION.
Thin Section:

In plane polarised light the rock is a deep red colour as a result of the abundance of finely dispersed iron oxides/hydroxides. Within this material are crystals of silicates - mainly quartz and muscovite and there are silt-grade grains not more than 0.05 mm in size. Overall, the ferruginous material comprises 60-70% of the siltstone but bedding is shown by variations in the amount of this material on a scale of 1 to 8 mm.

The clearer beds contain about 60% of quartz and minor muscovite, clays, biotite and opaques. The detrital grains have been well sorted but they now tend to form a granular mosaic and there is no evidence of the extent of rounding of the quartz grains. Biotite and muscovite flakes are generally of the order of 0.1 mm in length and have a parallel alignment of the axes; the biotite is fresh and pleochroic in shades of green. Carbonate is present as ragged, indefinite patches but this mineral is a minor component only. The sample is a micaceous, ferruginous siltstone showing fine, laminar bedding. The rock is suitable for Rb-Sr whole rock geochronology.

Sample: A 3056 TS: 42050
Location: Byilkaoora No. 7. 177.78-177.88 m
Rock Name: Ferruginous siltstone OOLARINNA MEMBER, OBSERVATORY HILL FORMATION.
Thin Section:

In overall mineralogy and texture the rock is similar to that from 157.13-157.2m.

There tend to be fewer clear beds in this sample and, even in relatively pale beds, quartz and micas show red staining. Such beds appear to be less micaceous than in the other sample but this is probably a result of their being obscured by iron oxides/hydroxides. As far as can be determined the sample contains little or no carbonate.

The core sample generally has parallel, laminar bedding, but this has been disturbed in one place: here an iron-free silty bed appears to have been intruded upwards into, and through, adjacent beds causing only very local disruptions. This is probably a feature which developed when the sediments were still soft.

The rock is suitable for whole-rock Rb-Sr geochronology.

Other samples: A 3048-A3055 TS: 42042-42049
Each of these samples was briefly examined to evaluate suitability for geochronology. All are fine-grained sedimentary rocks containing varying amounts of iron oxide/hydroxide material. Two samples, A3053 and A3054 contain sufficient dispersed carbonate to indicate that they should not be used for whole-rock Rb-Sr geochronology.

3. GEOCHRONOLOGY

The Rb-Sr isotopic analyses of six samples of shale are listed in Table 1 and plotted in Fig. 1. The analyses do not define a simple straight line and several subjective selections of groups of analyses can be made which give different results. Two of these groupings are discussed below.

(1) A maximum age of the sediments can be obtained by rejecting sample A 3048. This regression still has a significantly large residual variance, possibly due to the failure of the shale to reach isotopic equilibrium during deposition, and therefore has a relatively high error. An isochron of 617 ± 138 Ma, with an initial $^{87}Sr/^{86}Sr$ of 0.7145 ± 0.0184 is obtained from these 5 samples.

../4

(2) If two samples (A3050 and A3056) are omitted, an isochron giving the minimum age is obtained. This line is a somewhat better fit than the maximum age isochron and gives an age of 524 ± 68 Ma. The initial $^{87}Sr/^{86}Sr$ is 0.7244 ± 0.0097.

There are no valid reasons for selecting either of these regressions in preference to the other and it is possible that the true age lies somewhere between the two dates. The departure from a linear relationship is common with sediments and is usually attributed to a variation in initial $^{87}Sr/^{86}Sr$ between samples. Thus, the shale is composed of a sequence of layers, each with a different initial $^{87}Sr/^{86}Sr$ and if a criterion could be found to select groups of samples whose individual members had the same intial ratio, a family of parallel (equal age) isochrons could be defined. Such an approach would involve the investigation of large numbers of samples, using X-ray diffraciton to identify the mineralogical constitution of the sample prior to selection of samples for isotopic analysis.

The six analyses reported here represent a very preliminary age investigation and provide estimates only of the likely maximum and minimum age limits.

TABLE 1

Rb-Sr Analyses, Byilkaoora No. 1

SAMPLE MARK	DEPTH (m)	Rb/Sr	$^{87}Rb/^{86}Sr$	$^{\#}{}^{87}Sr/^{86}Sr$
A 3047	157.2	2.188	6.3581	0.7726
A 3048	157.8	5.077	14.844	0.8356
A 3050	163.6	3.844	11.216	0.8146
A 3052	167.0	2.882	8.3872	0.7877
A 3055	177.1	3.018	8.7834	0.7883
A 3056	177.8	3.857	11.254	0.8142

Ratios normalised to $^{88}Sr/^{86}Sr = 8.3752$

Constants used $^{85}Rb/^{87}Rb = 2.600$

$\lambda\ ^{87}Rb = 1.42 \times 10^{-11} y^{-1}$

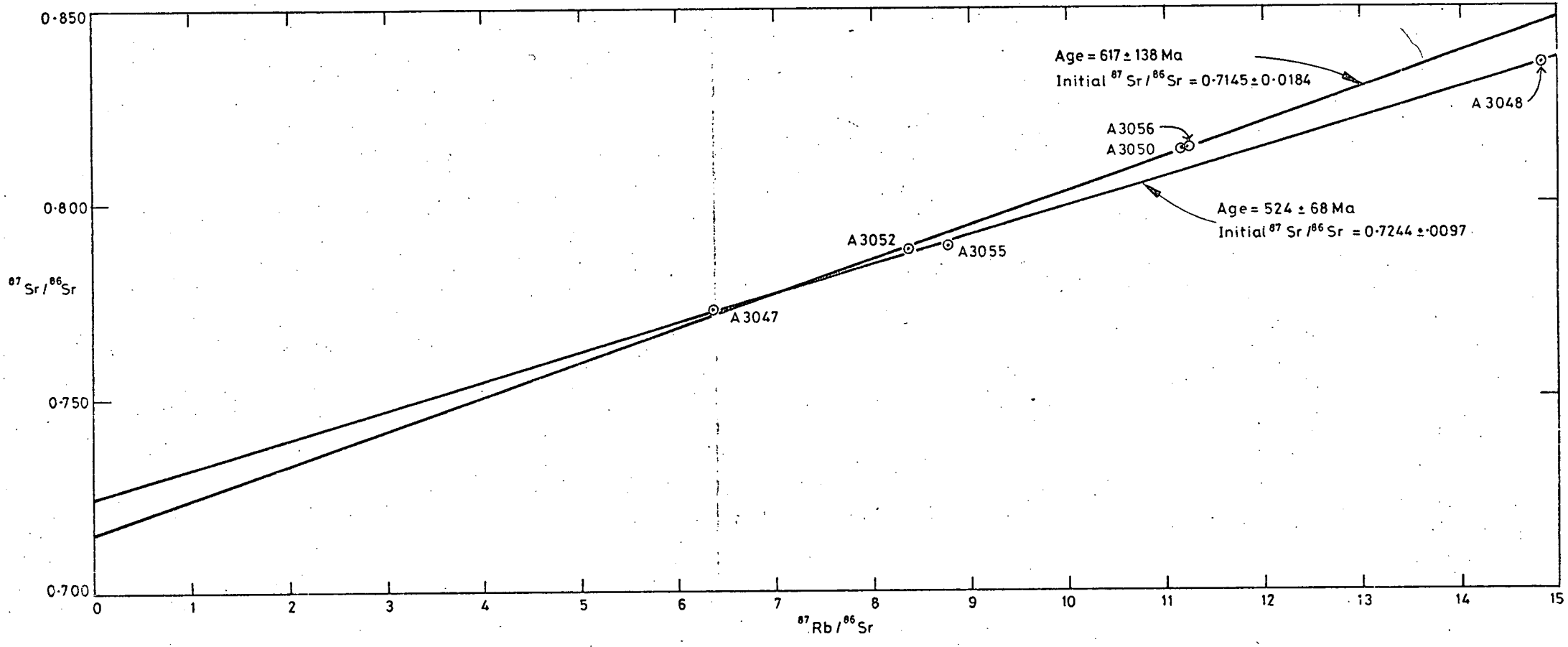

FIG 1 Rb-Sr ISOCHRONS, BYILKAOORA Nº 1

DEPARTMENT OF MINES AND ENERGY - SOUTH AUSTRALIA

APPLICATION FOR EXAMINATION OF SPECIMENS OR SAMPLES

UNIT NUMBER			Applicant's Number	Descriptive Information; Drillhole, Survey etc.	Details of work required	Estimated Cost
1:100,000 SHEET	RS	Number				
5643		A 3047 ← 79	157·13 – 157·20		BYILKAOORA **	
		A 3048 ←	157·80 – 157·89			
		A 3049	160·56 – 160·64		Rb/Sr whole-rock age	
		A 3050 ←	163·54 – 163·63		Dating and thin section	
		A 3051	164·25 – 164·33		of first and last	
		A 3052 ←	167·00 – 167·07		samples, with petrographic	
		A 3053	167·31 – 167·39		description.	
		A 3054	171·20 – 171·31			
		A 3055 ←	177·03 – 177·11		Service Work. Office Basin Studies	
		A 3056 ← 79	177·78 – 177·88		Initial petrology for suitability	100 $50 each
					only. To be referred for priority with estimate	
					from A. Webb.	
					R.D'Argaino	
			(10)		Total	$500-00

Type of Samples: DRILL-CORE

Disposal of Samples: RETURN TO

Name of Applicant: C G GATEHOUSE

Address: SADME

Signed: Colin G Gatehouse Date: 6.8.79

OFFICE USE ONLY

Submitted to AMDEL for - Analytical, Petrological, Other Examination

Firm/Estimated Price: $500-00

Charge against Project No.: 11.07.0512

Approved: R D'Argaino
Director General

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AC 1/1/220
11.07.0517
15 September 1980

The Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD SA 5063

GEOCHRONOLOGY OF THE OFFICER BASIN

Progress Report No. 6

by

A.W. WEBB

D.K. Rowley
Manager
Analytical Chemistry Division

for Norton Jackson
Managing Director

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GEOCHRONOLOGY OF THE OFFICER BASIN

1. REVIEW OF PROGRESS

An Rb-Sr age 715 ± 210 Ma was reported for fine grained sediments from 266.1 m to 281.9 m in Murnaroo No. 1 in Progress Report No. 28 for Project 1/1/126 (11.07.0356). The large error was due mainly to the restricted range of Rb/Sr ratios in the samples analysed and in an attempt to extend the range in Rb/Sr ratio, a further 10 samples were taken from above and below the original depth interval. Rb-Sr isotopic analyses were made on 3 samples whose Rb/Sr ratios lay outside the range of the previous 6 samples and the results are reported in the following section.

2. GEOCHRONOLOGY

The new Rb-Sr analyses are listed in Table 1. Regression of the 9 analyses produces a Model 3 isochron of 745 ± 87 Ma with an initial $^{87}Sr/^{86}Sr$ ratio of 0.7121 ± 0.0102. This result, although not statistically different from the original determination (715 ± 210 Ma), has a significantly reduced uncertainty and, on this evidence, must be of Proterozoic age.

TABLE 1

Rb-Sr Analyses, Murnaroo No. 1

SAMPLE MARK	DEPTH (m)	Rb/Sr	$^{87}Rb/^{86}Sr$	$^{\#}{}^{87}Sr/^{86}Sr$
A 3059	260.2	3.012	8.7819	0.8070
A 3060	261.2	3.300	9.6283	0.8142
A 3065	296.3	2.535	7.3802	0.7917

Ratios normalised to $^{88}Sr/^{86}Sr = 8.3752$

Constants used: $^{85}Rb/^{87}Rb = 2.600$

$\lambda\ ^{87}Rb = 1.42 \times 10^{-11}\ y^{-1}$

DEPARTMENT OF MINES AND ENERGY - SOUTH AUSTRALIA

APPLICATION FOR EXAMINATION OF SPECIMENS OR SAMPLES

UNIT NUMBER			Applicant's Number	Descriptive Information; Drillhole, Survey etc.	Details of work required	Estimated Cost
1:100,000 SHEET	RS	Number				
5339				MURNAROO #1	Rb/Sr WHOLE-ROCK AGE DATING	
	A	3057	255·37 – 255·47		THIN-SECTION OF FIRST AND LAST SAMPLE WITH PETROGRAPHIC DESCRIPTION.	
	A	3058	255·70 – 255·80			
	A	3059 ←	260·19 – 260·27			
	A	3060 ←	261·18 – 261·25			
	A	3061	261·61 – 261·70			
	A	3062	286·54 – 286·64			
	A	3063	288·31 – 288·42			
	A	3064	295·79 – 295·89		Service Work. Officer Basin Studies. Initial petrology for suitability study. To be referred for priority with estimates from A. Webb. K Dalgarno.	10@$50 each
	A	3065 ←	296·32 – 296·41			
	A	3066	297·22 – 297·34			
					Total	$500

(10)

Type of Samples CORE

Disposal of Samples RETURN TO

Name of Applicant C. G. GATEHOUSE

Address SADME

Signed C. G. Gatehouse Date 6th Aug 71

OFFICE USE ONLY

Submitted to AMDEL for - Analytical, Petrological, Other Examination

Firm/Estimated Price $500-00

Charge against Project No IL-07-0571

Approved K Dalgarno
Director General

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