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AUSTRALIAN ATOMIC ENERGY COMMISSION
RESEARCH ESTABLISHMENT
LUCAS HEIGHTS

AAEC TRITIUM LIST NO. 3
1977-1978

by

G.E. CALF
R.C. STOKES

June 1979

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ABSTRACT

Details are given of the concentration of the environmental isotope tritium in monthly precipitation samples taken at 16 stations, situated throughout Australia, during the period 1977-1978.

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The following descriptors have been selected from the INIS Thesaurus to describe the subject content of this report for information retrieval purposes. For further details please refer to IAEA-INIS-12 (INIS: Manual for Indexing) and IAEA-INIS-13 (INIS: Thesaurus) published in Vienna by the International Atomic Energy Agency.

ATMOSPHERIC PRECIPITATIONS; RADIOACTIVITY; RADIATION MONITORING;
SAMPLING; TRITIUM; AUSTRALIA

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1. INTRODUCTION

Since 1970, monthly precipitation samples have been collected for the Australian Atomic Energy Commission from sixteen stations in Australia. This report is the third AEC Tritium List; previous publications included data from 1970 to 1974 [Calf, Seatonberry, Smith & Stokes 1976] and from 1975 to 1976 [Calf, Smith & Stokes 1977].

Precipitation survey stations are shown in Figure 1.



FIGURE 1

2. STATION DATA

Basic information, including latitude, longitude and altitude are given for each location for which the tritium activity is reported.

3. SAMPLE ANALYSIS

Samples are composites from the total precipitation at a station during one calendar month and were assayed using methods reported by Calf, Seatonberry & Smith [1975]. The tritium concentration, given in

tritium units (TU), has been corrected for decay to the last day of the sampling month. One TU is defined as one atom of tritium per 10^{18} atoms of hydrogen and is equivalent to 7.2 disintegrations per minute or 3.24 picocuries per litre of water. All results have an estimated standard deviation of 8.5 per cent or 0.4 TU, whichever is the larger.

4. RESULTS

Yearly weighted means for tritium, weighted by the total amount of precipitation, have been calculated where all values are available:

$$\text{Weighted mean} = \frac{\sum(\text{monthly precipitation} \times \text{monthly tritium concentration})}{\sum(\text{monthly precipitation})}$$

5. ACKNOWLEDGEMENTS

We wish to acknowledge the assistance of the Department of Science - Bureau of Meteorology, the Water Resources Commission of NSW and the Irrigation and Water Supply Commission of Queensland, in collecting the samples and relaying the relevant monthly precipitation values.

6. REFERENCES

- Calf, G.E., Seatonberry, B.W. & Smith, L.W. [1975] - The Measurement of Natural Levels of Tritium in Water. AAEC/E373.
- Calf, G.E., Seatonberry, B.W., Smith, L.W. & Stokes, R.C. [1976] - AAEC Tritium List No.1 1970-1974. AAEC/E377.
- Calf, G.E., Smith, L.W. & Stokes, R.C. [1977] - AAEC Tritium List No.2 1975-1976. AAEC/E414.

TABLES 1-16
MONTHLY TRITIUM PRECIPITATION DATA

The following reference symbols apply to all tables in this set:

- (a) Precipitation in mm.*
- (b) TU = tritium unit.*
- (c) Calculated where all results are available.*



ADELAIDE

Station: 023034

Latitude: 34 57S

Longitude: 138 32E

Altitude: 7.6 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	56	rain	14.0
	02	11		11.2
	03	33		6.1
	04	24		6.5
	05	36		5.6
	06	55		7.3
	07	20		9.4
	08	25		14.0
	09	47		16.2
	10	48		11.3
	11	30		14.6
	12	15		14.8
Sum		400		
Weighted Mean (c)				10.9
1978	01	2	rain	-
	02	4		-
	03	7		4.8
	04	37		9.6
	05	47		5.3
	06	85		7.6
	07	98		7.7
	08	60		11.8
	09	79		17.3
	10	21		8.2
	11	44		15.0
	12	16		5.1
Sum		500		
Weighted Mean (c)				

ALICE SPRINGS

Station: 015590

Latitude: 23 49S

Longitude: 133 54E

Altitude: 542.0 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	14	rain	19.2
	02	140		5.4
	03	40		4.6
	04	0		-
	05	11		12.7
	06	0		-
	07	0		-
	08	0		-
	09	21		12.3
	10	25		13.3
	11	110		13.0
	12	11		-
Sum		372		
Weighted Mean (c)				
1978	01	126	rain	10.4
	02	2		-
	03	20		11.1
	04	0		-
	05	61		7.2
	06	31		9.7
	07	82		5.2
	08	18		11.3
	09	15		16.4
	10	28		13.3
	11	24		14.1
	12	22		16.0
Sum		429		
Weighted Mean (c)				

BRISBANE

Station: 040223

Latitude: 27 26S

Longitude: 153 05E

Altitude: 2.1 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	34	rain	9.1
	02	121		7.2
	03	72		4.9
	04	44		4.4
	05	66		3.9
	06	18		5.3
	07	8		4.1
	08	8		7.2
	09	7		8.1
	10	43		6.7
	11	142		6.9
	12	62		12.1
Sum		625		
Weighted Mean (c)				6.8
1978	01	76	rain	5.1
	02	95		4.9
	03	210		6.3
	04	58		4.7
	05	56		5.7
	06	27		9.9
	07	47		6.3
	08	54		8.3
	09	90		9.0
	10	42		7.1
	11	94		8.6
	12	226		6.2
Sum		1075		
Weighted Mean (c)				6.6

BUNDABERG

Station: 039015

Latitude: 24 52S

Longitude: 152 21E

Altitude: 13.7 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	97	rain	6.3
	02	138		3.2
	03	280		3.6
	04	45		4.2
	05	78		2.9
	06	15		4.4
	07	21		4.5
	08	11		-
	09	2		-
	10	12		7.4
	11	79		6.9
	12	6		-
Sum		784		
Weighted Mean (c)				
1978	01	127	rain	3.6
	02	145		4.0
	03	111		4.9
	04	22		5.5
	05	101		2.7
	06	65		4.9
	07	152		4.2
	08	63		3.5
	09	51		5.5
	10	19		-
	11	143		3.9
	12	139		8.0
Sum		1138		
Weighted Mean (c)				

CAMPBELLTOWN

Station: 068081

Latitude: 34 07S

Longitude: 150 49E

Altitude: 65.0 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	75	rain	10.8
	02	182		4.5
	03	87		5.4
	04	8		7.2
	05	79		7.4
	06	69		6.6
	07	0		-
	08	18		17.7
	09	40		17.3
	10	7		11.7
	11	13		11.6
	12	35		12.6
Sum		613		
Weighted Mean (c)				8.0
1978	01	215	rain	10.1
	02	15		4.9
	03	305		4.4
	04	53		5.5
	05	84		4.9
	06	222		4.3
	07	13		10.7
	08	17		10.2
	09	58		14.7
	10	40		9.5
	11	104		10.0
	12	110		7.6
Sum		1236		
Weighted Mean (c)				7.0

CHARLEVILLE

Station: 044021

Latitude: 26 25S

Longitude: 146 17E

Altitude: 303.9 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	74	rain	12.1
	02	87		5.0
	03	161		3.5
	04	27		9.4
	05	69		5.7
	06	25		8.4
	07	1		-
	08	1		2.5
	09	3		-
	10	11		12.2
	11	9		14.9
	12	15		15.9
Sum		483		
Weighted Mean (c)				
1978	01	74	rain	10.4
	02	24		14.5
	03	11		9.7
	04	7		16.9
	05	87		5.1
	06	44		6.6
	07	89		-
	08	73		11.5
	09	65		12.7
	10	21		7.2
	11	33		-
	12	22		13.6
Sum		550		
Weighted Mean (c)				

CLAREDALE*

Station: 033011

Latitude: 19 35S

Longitude: 147 24E

Altitude: 9.7 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	103	rain	3.4
	02	286		3.1
	03	370		2.6
	04	37		3.0
	05	164		5.2
	06	0		-
	07	1		-
	08	4		10.7
	09	0		-
	10	0		-
	11	38		5.2
	12	64		4.9
Sum		1067		
Weighted Mean (c)				
1978	01	363	rain	3.7
	02	148		4.2
	03	25		3.9
	04	89		4.4
	05	65		2.4
	06	28		2.9
	07	45		4.1
	08	36		4.2
	09	40		4.5
	10	20		6.6
	11	53		4.8
	12	170		-
Sum		1083		
Weighted Mean (c)				

* The precipitation figures are for Ayr, which is situated 28 km from Claredale. No precipitation figures for Claredale are available.

DARWIN

Station: 014015

Latitude: 12 25S

Longitude: 130 52E

Altitude: 28.6 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	533	rain	5.3
	02	408		6.0
	03	1014		5.0
	04	148		4.0
	05	29		3.9
	06	0		-
	07	0		-
	08	0		-
	09	3		2.9
	10	19		4.7
	11	39		7.2
	12	194		6.9
Sum		2387		
Weighted Mean (c)				5.3
1978	01	508	rain	5.8
	02	279		7.3
	03	88		5.0
	04	66		4.4
	05	5		5.0
	06	0		-
	07	7		5.2
	08	0		-
	09	22		4.2
	10	245		4.1
	11	269		7.4
	12	245		7.2
Sum		1734		
Weighted Mean (c)				6.6

HOBART

Station: 094029

Latitude: 42 53S

Longitude: 147 20E

Altitude: 55.2 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	48	rain	16.5
	02	37		8.4
	03	91		10.9
	04	15		8.2
	05	37		6.1
	06	42		5.0
	07	64		6.1
	08	18		9.8
	09	41		8.8
	10	22		12.2
	11	69		11.8
	12	11		10.6
Sum		495		
Weighted Mean (c)				9.7
1978	01	37	rain	14.9
	02	87		6.9
	03	14		6.5
	04	32		5.0
	05	49		7.3
	06	51		2.8
	07	44		4.9
	08	109		7.8
	09	14		14.0
	10	25		14.5
	11	94		12.1
	12	52		8.6
Sum		608		
Weighted Mean (c)				8.4

LONGREACH

Station: 036031

Latitude: 23 26S

Longitude: 144 16E

Altitude: 190.5 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	60	rain	10.3
	02	244		5.1
	03	59		4.8
	04	48		-
	05	95		4.9
	06	0		-
	07	3		4.6
	08	1		-
	09	4		10.0
	10	1		-
	11	2		9.7
	12	31		11.2
Sum		548		
Weighted Mean (c)				
1978	01	73		7.9
	02	25		11.2
	03	23		8.7
	04	3		-
	05	18		4.8
	06	4		12.1
	07	112		5.7
	08	25		8.4
	09	40		13.3
	10	72		5.9
	11	10		9.1
	12	56		11.4
Sum		461		
Weighted Mean (c)				

MACKAY

Station: 033119

Latitude: 21 07S

Longitude: 149 13E

Altitude: 30.8 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	141	rain	3.4
	02	419		4.3
	03	346		2.2
	04	222		2.7
	05	174		3.1
	06	11		4.5
	07	7		-
	08	1		-
	09	7		4.5
	10	2		4.7
	11	71		4.4
	12	133		6.7
Sum		1534		
Weighted Mean (c)				
1978	01	140	rain	3.7
	02	419		3.4
	03	170		3.1
	04	45		3.0
	05	116		3.7
	06	19		3.3
	07	109		2.7
	08	48		4.1
	09	23		3.3
	10	40		2.7
	11	73		4.9
	12	207		5.0
Sum		1409		
Weighted Mean (c)				3.7

MELBOURNE

Station: 086071

Latitude: 37 49S

Longitude: 144 58E

Altitude: 34.7 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	75	rain	17.7
	02	30		10.2
	03	27		14.6
	04	64		7.2
	05	60		7.7
	06	109		8.6
	07	47		7.4
	08	24		17.5
	09	85		14.5
	10	22		13.2
	11	36		13.2
	12	26		9.7
Sum		605		
Weighted Mean (c)				11.4
1978	01	52	rain	10.9
	02	41		8.7
	03	80		7.9
	04	58		9.5
	05	111		7.7
	06	26		8.6
	07	53		10.7
	08	93		10.1
	09	46		18.6
	10	69		15.0
	11	128		12.3
	12	110		13.8
Sum		867		
Weighted Mean (c)				11.2

NARRABRI

Station: 053030

Latitude: 30 20S

Longitude: 149 45E

Altitude: 212.4 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	152	rain	10.1
	02	220		7.3
	03	137		-
	04	78		8.1
	05	162		7.2
	06	19		7.1
	07	1		-
	08	9		14.3
	09	24		12.2
	10	20		15.2
	11	59		12.4
	12	29		13.5
Sum		910		
Weighted Mean (c)				
1978	01	224	rain	10.3
	02	16		-
	03	47		6.9
	04	3		-
	05	65		5.6
	06	92		9.3
	07	64		7.1
	08	51		11.7
	09	88		-
	10	41		14.0
	11	97		9.5
	12	84		10.7
Sum		872		
Weighted Mean (c)				

PERTH

Station: 009021

Latitude: 31 55S

Longitude: 115 58E

Altitude: 17.1 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	5	rain	5.6
	02	10		8.6
	03	6		4.4
	04	1		-
	05	111		6.1
	06	86		6.4
	07	85		6.9
	08	193		7.3
	09	30		6.5
	10	75		5.9
	11	12		7.6
	12	1		-
Sum		615		
Weighted Mean (c)				
1978	01	3	rain	12.5
	02	32		8.6
	03	16		12.5
	04	18		9.6
	05	124		5.3
	06	195		5.9
	07	236		5.4
	08	23		6.8
	09	101		8.2
	10	43		4.3
	11	20		12.7
	12	12		12.4
Sum		823		
Weighted Mean (c)				6.5

RYDE*

Station 066062

Latitude: 33 52S

Longitude: 151 12E

Altitude: 92.0 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	111	rain	12.1
	02	161		5.5
	03	251		4.4
	04	24		8.7
	05	128		7.6
	06	103		7.5
	07	9		8.2
	08	22		16.6
	09	47		15.9
	10	9		13.7
	11	35		12.6
	12	25		9.0
Sum		925		
Weighted Mean (c)				7.9
1978	01	220	rain	10.4
	02	10		6.0
	03	255		4.6
	04	132		4.8
	05	123		5.3
	06	314		5.8
	07	18		21.6
	08	35		9.3
	09	112		13.1
	10	90		7.9
	11	95		7.3
	12	95		10.3
Sum		1499		
Weighted Mean (c)				7.5

*The precipitation figures are for Sydney Regional Office, which is situated 12 km from Ryde. No precipitation figures for Ryde are available.

TOOWOOMBA

Station: 041103

Latitude: 27 35S

Longitude: 151 56E

Altitude: 675.0 m

Year	Month	Precipitation (a)	Type	TU (b)
1977	01	132	rain	4.5
	02	132		6.0
	03	174		6.0
	04	67		5.1
	05	116		4.9
	06	17		4.3
	07	2		-
	08	10		-
	09	11		9.2
	10	58		11.2
	11	138		7.8
	12	11		13.5
Sum		868		
Weighted Mean (c)				
1978	01	194	rain	5.1
	02	70		8.7
	03	82		6.7
	04	65		7.8
	05	56		4.3
	06	80		7.4
	07	91		6.5
	08	87		6.9
	09	99		8.1
	10	56		8.5
	11	132		8.6
	12	222		9.2
Sum		1234		
Weighted Mean (c)				7.4

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