

COMMONWEALTH



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COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

DIVISION OF SOILS

# RAINWATER ANALYSIS

BY J. T. HUTTON

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by

J. T. HUTTON

### I. INTRODUCTION

Since March 1954, the analysis of consecutive cumulative samples of rainwater has formed part of the work of the chemistry section of the Division of Soils and the detailed results obtained on samples collected before June 30th 1957 are set out in this report.

The general significance of the results has been discussed by Hutton (1956), while consideration of the results obtained on the samples collected by the Soil Conservation Authority of Victoria has been made by Hutton and Leslie (1958). Further consideration of the results obtained on the samples collected at Mt. Burr and Mt. Crawford Forest Reserves is in preparation.

The object of this report is to bring together all results of rainwater analysis made in Adelaide from March 1954 to June 1957. The work is continuing and it is planned to publish further results at the end of the International Geophysical Year, December 1958.

### II. SAMPLES

The storage rain gauges used by the Soil Conservation Authority of Victoria to collect the samples of rain in that state have been described by Hutton and Leslie (1958). A simple plastic funnel about 8 inches diameter and a plastic flagon were used to collect the weekly cumulative samples at the Commonwealth Forest Experimental Station, Mt. Burr Forest Reserve and a standard 8 inch galvanized rain gauge was used at Mt. Crawford Forest Reserve. A galvanized funnel and storage container were also used at Whian Whian State Forest. All samples were forwarded to Adelaide in 250 ml plastic bottles.

## III. ANALYTICAL METHODS

Recent developments in flame photometry and other analytical techniques enabled the samples of rainwater to be analysed rapidly on arrival in the laboratory without having to concentrate the samples. Sodium and potassium were determined using the EEL flame photometer with 0.2 m.equiv. per litre as the strength of the standard solutions for maximum galvanometer deflection. In most cases calcium was determined with the EEL flame photometer but titration with  $N/200$  E.D.T.A. using murexide as an indicator was also used.

Titrations were used to determine total calcium plus magnesium, chloride and bicarbonates, usually on the same 50 ml aliquot. In the titration for calcium plus magnesium, the interference due to zinc was eliminated by the addition of KCN.

The electrical conductivity of all samples was determined at 20°C and used to check the sum of the cations. If the sum of the cations differed from the sum of the anions by more than 10 per cent. of either value or if the sum of the cations differed from the calculated concentration derived from the electrical conductivity by more than 10 per cent., the results were viewed with suspicion and repeated.

Details of methods and conversion of electrical conductivity to concentration are given by Hutton and Leslie (1958).

## IV. RESULTS

The results are set out in the following five tables:

- Table 1. Results of analysis of three monthly cumulative samples collected by S.C.A., Victoria during period March 1954 to August 1955 inclusive.
- Table 2. Results of analysis of monthly cumulative samples collected by S.C.A., Victoria during period September 1955 to December 1956 inclusive.
- Table 3. Results of analysis of weekly cumulative samples collected at Mt. Burr Forest Reserve, South Australia, during period September 1954 to June 1957 inclusive.
- Table 4. Results of analysis of weekly cumulative samples collected at Mt. Crawford Forest Reserve, South Australia during period May 1954 to June 1957 inclusive.

Table 5. Results of analysis of monthly cumulative samples collected at Whian Whian State Forest, New South Wales during period March 1955 to June 1957 inclusive.

Contamination was suspected in many samples and results considered unsatisfactory have not been reported, particularly where the sum of the cations differed from the sum of the anions. Some samples from Mt. Crawford were known to be contaminated with chloride ions and no chloride figures are given for them. The abnormal Na/Cl ratio of some of the samples from Whian Whian is unexplained but it is doubtful if the rain had this Na/Cl ratio.

#### IV. ACKNOWLEDGMENTS

Mr. T.I. Leslie, Soil Conservation Authority, Victoria collected and forwarded the samples from Victoria.

Mr. C.K. Pawsey, Commonwealth Forest Experimental Station, Mt. Burr collected and forwarded the samples from Mt. Burr Forest Reserve.

Mr. R.V. Woods, Woods and Forests Department, South Australia, collected and forwarded the samples from Mt. Crawford Forest Reserve.

Mr. G.B. Stirk, C.S.I.R.O. Division of Soils, Brisbane collected and forwarded the samples from Whian Whian State Forest.

Mrs. Filicia Wark and Mr. A.R.P. Clarke assisted in the laboratory at various times.

The willing assistance of all these people and their interest in the work is gratefully appreciated.

#### V. REFERENCES

- Hutton, J.T. (1956).- Aust. UNESCO Symposium on Arid Zone Climatology. Paper No. 34.
- Hutton, J.T. and Leslie, T.I. (1958).- Accession of Non-Nitrogenous Ions dissolved in Rainwater to soils in Victoria.  
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TABLE 1  
Three Monthly cumulative samples collected  
by S.C.A., Victoria.  
Autumn Collection 1954

Station	Period of Collection	Rainfall in. mm.	Na	Ca M.	Mg equiv/100 litres	K	Cl litres	HCO <sub>3</sub>	EC 20°C micromhos
Kew	9/3 - 7/6	5.55	15	7	4	0.5	16	9	33
Warragul	1/3 - 31/5	6.55	17	3	3	0.5	19	3	35
Sale	1/3 - 31/5	1.47	13	6	3	0.9	14	4	34
Bairnsdale	1/3 - 31/5	2.20		contaminated sample					
Swifts Ck.	1/3 - 31/5	-		sample lost					
Omeo	1/3 - 31/5	2.22	4	2	<1	0.4	3	2	9
Mitta Mitta	2/3 - 1/6	5.04		contaminated sample					
Tallangatta	2/3 - 1/6	4.01		contaminated sample					
Dookie	3/3 - 2/6	3.20	5	2	2	0.5	3	6	18
Elmore	3/3 - 2/6	2.82	4	3	1	0.4	2	6	14
Charlton	3/3 - 2/6	4.13	5	5	2	0.4	3	9	18
Walpeup	4/3 - 2/6	3.58		not sampled					
Mildura	-		6	9	2	0.5	5	9	26
Hopetoun	4/3 - 3/6	3.63		-					
Horsham	4/3 - 3/6	5.70	4	3	1	0.4	2	6	16
Cavendish	4/3 - 3/6	5.96	8	3	2	0.4	7	5	21
Heywood	4/3 - 3/6	7.88	21	3	4	0.5	22	4	36
Cape	5/3 - 4/6	8.78	44	10	8	0.9	51	8	74
Bridgewater	5/3 - 4/6	7.08	31	5	6	1.1	33	8	48
Warrnambool	5/3 - 4/6	4.84		contaminated sample					
Derrinallum	5/3 - 4/6	4.52	10	3	2	0.5	10	2	21
Cressy	5/3 - 8/6	8.27	7	2	2	0.5	7	2	16
Parwan	10/3 - 8/6	5.08	6	3	2	0.5	5	5	15
Beaufort	26/2 - 28/5	4.88		contaminated sample					
Kyneton	26/2 - 31/5	2.88	7	3	1	0.7	5	2	16
Seymour	1/3 - 31/5	2.88		-					



TABLE 1 (Continued) - 3.  
Three monthly cumulative samples collected  
by S.C.A., Victoria,  
Spring Collection 1954

Station	Period of Collection	Rainfall in. mm.	Na	Ca M.equiv./100	Mg litres	K	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	30/8 - 6/12	17.23	6	2	2	0.4	4	3	17
Warragul	23/8 - 29/11	11.14	13	2	3	0.4	13	3	24
Sale	23/8 - 29/11	9.42	6	1	2	0.3	6	3	15
Bairnsdale	23/8 - 29/11	13.07					contaminated sample		
Swifts Ck.	23/8 - 29/11	9.95	1	1	<1	0.1	<1	2	6
Omeo	23/8 - 29/11	10.19	1	1	<1	0.2	<1	2	6
Mitta Mitta	24/8 - 30/11	13.95	1	1	1	0.4	<1	2	6
Tallangatta	24/8 - 30/11	11.82	1	1	1	0.2	<1	2	8
Dookie	25/8 - 1/12	5.18	3	2	1	0.4	1	3	12
Elmore	25/8 - 1/12	6.37	3	2	1	0.7	2	3	13
Charlton	25/8 - 1/12	3.65	5	3	2	0.4	4	4	14
Walpou	26/8 - 2/12	3.17	6	6	3	0.7	4	10	18
Mildura	26/8 - 30/11	3.07	14	35	9	1	10	36	54
Hope town	27/8 - 2/12	2.78	6	12	4	0.7	5	14	25
Horsham	27/8 - 2/12	4.52	4	4	2	0.8	3	6	15
Cavendish	27/8 - 2/12	6.18	10	3	3	0.4	10	3	20
Heywood	27/8 - 2/12	6.23	27	3	7	0.6	28	4	45
Cape									
Bridgewater	28/8 - 3/12	4.12	92	13	21	1.9	100	11	138
Warrnambool	28/8 - 3/12	7.49	32	4	8	0.7	34	4	53
Derrinallum	28/8 - 3/12	7.18	9	3	2	0.4	8	4	17
Cressy	28/8 - 3/12	7.49	10	2	2	0.4	9	2	19
Parwan	1/9 - 6/12	10.93	4	1	2	0.3	2	1	12
Beaufort	31/8 - 3/12	8.01	4	1	1	0.3	2	2	12
Kyneton	31/8 - 4/12	10.58	2	1	1	0.2	1	1	9
Seymour	31/8 - 24/11	6.82	2	1	1	0.2	1	2	8

TABLE 1 (Continued) 4.  
Three monthly cumulative samples collected  
by S.C.A., Victoria,  
Summer Collection 1954-55

Station	Period of Collection	Rainfall in. mm.	Na M.	Ca M. equiv./100 litres	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	6/12 - 7/3	7.45	6	4	2	0.4	5	4	21
Warragul	29/11 - 28/2	7.07	8	3	2	0.2	7	4	19
Sale	29/11 - 28/2	4.55	7	2	contaminated sample				
Bairnsdale	29/11 - 28/2	6.69	11	6	3	0.6	9	4	20
Swifts Ck.	29/11 - 28/2	6.36	4	2	1	0.2	2	5	26
Onco	29/11 - 28/2	5.27	4	2	contaminated sample				10
Mitta Mitta	30/11 - 1/3	13.14	2	2	1	0.2	1	4	8
Tallangatta	30/11 - 1/3	10.44	4	2	contaminated sample				
Dookie	1/12 - 2/3	6.79	4	2	2	0.2	2	7	17
Elmore	1/12 - 2/3	7.56	3	2	2	0.2	2	6	10
Charlton	1/12 - 2/3	5.20	8	12	4	0.4	4	16	26
Walpeup	2/12 - 2/3	1.60	4	17	2	0.6	2	19	23
Mildura	1/12 - 28/2	3.78	3	6	2	0.3	1	11	14
Hopetoun	2/12 - 3/3	5.06			sample lost				
Horsham	2/12 - 3/3				contaminated sample				
Cavendish	2/12 - 3/3	2.30			contaminated sample				
Heywood	2/12 - 3/3	4.06			contaminated sample				
Cape									
Bridgewater	3/12 - 4/3	3.33	57	12	12	0.8	61	10	91
Warrnambool	3/12 - 4/3	4.96	27	8	6	0.8	29	9	49
Derrinallun	3/12 - 4/3	4.58	8	3	2	0.4	6	5	17
Cressy	3/12 - 4/3	4.81	9	3	1	0.3	7	4	19
Parwan	6/12 - 9/3	5.92	7	2	2	0.4	5	4	16
Beaufort	3/12 - 9/3	5.92	4	2	1	0.3	2	4	12
Kyneton	4/12 - 9/3	6.71	4	1	1	0.2	2	4	12
Seymour	24/11 - 9/3	8.09	3	1	1	0.4	2	4	9

TABLE 1 (Continued) 5.  
Three monthly cumulative samples collected  
by S. C. A., Victoria,  
Autumn Collection 1955

Station	Period of Collection	Rainfall in. mm.	Na M. equiv./100	Ca M. equiv./100	Mg M. equiv./100	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	7/3 - 8/6	8.11	14	6	7	0.6	14	3	38
Warragul	28/2 - 30/5	7.20	13	4	5	0.4	13	5	27
Sale	" "	5.76	9	2	3	0.4	9	5	22
Bairnsdale	" "	4.65	9	2	2	0.7	8	5	26
Swifts Ok.	" "	4.04	3	2	1	0.3	2	5	12
Omeo	" "	3.62				contaminated sample			
Mitta Mitta	1/3 - 31/5	8.73	1	<1	<1	0.1	<1	n.d.	6
Tallangatta	" "	7.97				contaminated sample			
Dookie	2/3 - 1/6	3.70	5	2	2	0.7	3	5	13
Elmore	" "	3.70	8	5	4	0.4	6	10	19
Charlton	" "	2.78	3	4	3	0.2	2	9	11
Walpeup	3/3 - 2/6	5.22	5	20	4	0.7	4	26	30
Mildura	1/3 - 31/5	2.81	5	10	4	0.4	4	15	20
Hopetoun	3/3 - 2/6	6.38	4	4	3	0.4	1	10	11
Horsham	" "	5.31	4	4	3	0.4	1	10	11
Cavendish	" "	5.31	17	3	4	0.4	17	6	31
Heywood	" "	8.44	48	6	11	0.8	52	8	72
Cape	4/3 - 3/6	8.82	26	5	7	0.5	28	7	44
Bridgewater	" "	8.25	9	4	3	0.5	9	8	20
Warrnambool	" "	4.59	10	5	5	0.4	10	9	22
Derrinallum	" "	4.78	9	5	3	0.4	9	9	20
Cressy	9/3 - 24/5	4.46	7	4	3	0.4	6	9	17
Parwan	9/3 - 7/6	5.15	6	2	3	0.4	5	6	16
Beaufort	" "	3.22	7	3	3	0.4	6	7	16
Kyneton	" "	3.52	7	3	3	0.2	6	7	16
Seymour	" "	3.52	7	3	3	0.2	6	7	16

TABLE 1 (Continued) 6.  
Three monthly cumulative samples collected  
by S.C.A., Victoria  
Winter Collection 1955

Station	Period of Collection	Rainfall in. mm.	Na	Ca M. equiv./100 litres	K	Cl litres	HCO <sub>3</sub>	EC 20°C micromhos
Kew	8/6 - 9/9	8.37	4	4	0.4	5	3	26
Warragul	30/5 - 5/9	12.85	7	2	0.3	7	4	18
Sale	" " "	4.14	6	3	0.4	6	5	16
Bairnsdale	" " "	2.62	3	1	contaminated sample	3	3	10
Swifts Cr.	" " "	2.65	3	1	0.3	3	3	10
Omeo	" " "				contaminated sample			
Mitta Mitta	31/5 - 6/9	26.06	1	<1	0.1	1	3	5
Tallangatta	" " "	22.88	2	<1	0.2	2	5	7
Dookie	1/6 - 7/9	11.62	2	1	0.4	2	4	7
Elmore	" - 29/8	6.43	3	1	0.2	3	4	9
Charlton	" " "	6.46	3	1	0.3	3	4	10
Walpeup	2/6 - 30/8	4.55	5	2	0.2	5	5	13
Mildura	1/6 - 31/8	5.19	3	3	0.2	3	7	11
Hopetoun	2/6 - 30/8	5.39	5	2	0.4	5	6	13
Horsham	" " "	9.00	5	2	0.4	5	6	13
Cavendish	" 31/8	7.96	14	2	0.4	14	5	26
Heywood	" " "	13.17	28	3	0.8	29	7	48
Cape								
Bridgewater	3/6	11.86	63	7	1.8	75	8	105
Warrnambool	" 1/9	13.22	34	3	0.8	35	6	54
Derrinallum	" " "	8.62	6	4	0.3	6	5	13
Cressy	" " "	8.03	10	2	0.3	10	5	19
Parwan	24/5 - 12/9	7.05	5	1	0.3	5	5	13
Beaufort	7/6 - 1/9	11.27	3	1	0.2	3	5	9
Kyneton	" 29/8	16.51	2	1	0.2	2	5	7
Seymour	6/6 - 7/9	10.95	3	<1	0.2	3	5	8

TABLE 2  
Monthly cumulative samples collected by S.C.A., Victoria

Station	Period of Collection	Rainfall in, mm.	September 1955						EC 20°C micromhos
			Na	Ca M. equiv./100	Mg	K	Cl litres	HCO <sub>3</sub>	
Kew	9/9 - 3/10	2.29	2	1	1	0.4	3	3	7
Seymour	7/9 - 3/10	2.94	1	1	1	0.2	2	3	7
Benalla	7/9 - 1/10	3.60	2	1	1	0.1	3	12	7
Charlton	29/8 - 23/9	2.04	3	7	3	0.2	3	4	14
Merbein	1/9 - 30/9	1.67	3	1	1	0.2	4	6	7
Walpeup	30/8 - 30/9	2.08	4	2	2	1.0	5	4	16
Longerenong	30/8 - 30/9	1.44	6	1	3	0.3	8	4	16
Coleraine	31/8 - 1/10	2.86	-	-	-	-	-	-	-
Cape	-	-	2	1	1	0.4	3	3	9
Bridgewater	12/9 - 30/9	1.45	-	-	-	-	-	-	-
Parwan	-	37	-	-	-	-	-	-	-
October 1955									
Kew	3/10 - 1/11	3.26	7	5	5	0.7	9	4	23
Seymour	3/10 - 1/11	2.69	4	2	1	0.4	4	2	11
Benalla	1/10 - 31/10	3.58	3	2	2	0.9	4	4	12
Charlton	23/9 - 31/10	2.50	5	3	1	0.5	5	4	14
Merbein	1/10 - 31/10	0.93	11	27	7	0.5	10	32	47
Walpeup	30/9 - 31/10	0.60	13	10	4	0.9	13	9	29
Longerenong	30/9 - 1/11	1.98	7	4	2	0.5	7	4	14
Coleraine	1/10 - 1/11	3.07	11	3	4	0.4	13	4	21
Cape	-	-	-	-	-	-	-	-	-
Bridgewater	30/9 - 31/10	1.87	5	1	2	0.2	5	3	10
Parwan	-	47	-	-	-	-	-	-	-



TABLE 2 (Continued) 3.

Monthly cumulative samples collected by S.C.A., Victoria

January 1956

Station	Period of Collection	Rainfall in, in.	Rainfall mm.	Na M. equiv./100	Ca M. equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	3/1 - 1/2	2.96	75	4	4	2	0.4	4	1	27
Seymour	5/1 - 1/2	1.80	46	1	1	1	0.6	1	4	14
Benalla	3/1 - 31/1	4.88	124	23	14	8	2.8	25	20	55
Charlton	4/1 - 31/1	0.22	6	14	78	3	1.7	15	78	90
Merbein	1/1 - 31/1	0.36	9	4	5	2	0.5	3	8	14
Walpeup	1/1 - 5/2	0.87	22	9	5	2	1.9	7	9	24
Longerenong	3/1 - 1/2	0.53	14	8	2	2	0.3	8	4	17
Coleraine	1/1 - 1/2	1.16	29							
Cape										
Bridgewater										
Parwan	3/1 - 1/2	1.69	43	5	2	1	0.2	4	4	13
February 1956										
Kew	1/2 - 5/3	0.01	1	190	380	230	26	200	n.d.	n.d.
Seymour	1/2 - 5/3	1.74	44	2	1	2	0.3	2	4	10
Benalla	31/1 - 2/3	1.80	46							
Charlton	31/1 - 2/3	nil								
Merbein	1/2 - 29/2	nil	15	4	5	3	0.5	3	10	13
Walpeup	5/2 - 10/3	0.61	1	30	20	40	9	20	70	70
Longerenong	1/2 - 1/3	0.01	1	35	8	10	1.4	38	9	60
Coleraine	1/2 - 1/3	0.14	4							
Cape										
Bridgewater	1/12 - 2/3	2.59	66	90	13	19	1.8	102	8	130
Parwan	1/2 - 2/3	0.03	1	70	20	20	3.0	70	20	120

TABLE 2 (Continued) 4.  
Monthly cumulative samples collected by S.C.A., Victoria

March 1956

Station	Period of Collection	Rainfall in. mm.	Na	Ca M. equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	5/3 - 29/3	1.90	4	4	6	0.2	3	4	18
Seymour	5/3 - 4/4	3.82	1	<1	<1	<0.1	1	3	4
Benalla	2/3 - 4/4	7.87	0.5	<1	<1	0.1	0.5	3	4
Charlton	2/3 - 3/4	3.29		doubtful sample					
Merbein	1/3 - 31/3	3.21	3	11	2	1.0	1	22	24
Walpeup	10/3 - 28/3	0.61	2	2	2	0.2	2	6	7
Longerenong	1/3 - 29/3	2.03	2	1	1	0.3	1	5	7
Coleraine	1/3 - 29/3	1.35	8	2	2	0.2	8	4	17
Cape Bridgewater Parwan	2/3 - 29/3	1.22	6	2	2	0.2	6	3	19
<u>April 1956</u>									
Kew	29/3 - 2/5	4.36	5	2	2	0.4	5	3	24
Seymour	4/4 - 8/5	2.77	4	1	1	0.1	5	3	10
Benalla	4/4 - 1/5	3.23		contaminated sample					
Charlton	3/4 - 30/4	1.29	8	1	3	0.3	9	3	17
Merbein	1/4 - 30/4	0.93	8	9	4	0.5	8	12	24
Walpeup	28/3 - 30/4	3.44	3	2	2	0.2	3	5	8
Longerenong	29/3 - 1/5	4.56	5	1	1	0.3	6	3	11
Coleraine	29/3 - 30/4	4.85	13	2	4	0.3	15	3	23
Cape Bridgewater Parwan	29/3 - 1/5	1.93	6	1	2	0.2	6	3	13



TABLE 2 (Continued) 6.  
Monthly cumulative samples collected by S.C.A., Victoria

July 1956

Station	Period of Collection	Rainfall in. mm.	Na	Ca M.equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	2/7 - 1/8	1.79	5	3	7	0.3	4	-	34
Seymour	3/7 - 3/8	2.25	1	<1	<0.1	1	1	1	6
Benalla	3/7 - 6/8	4.07			contaminated sample				
Charlton	29/6 - 1/8	2.84	2	<1	<1	0.2	2	-	18
Merbein	1/7 - 31/7	2.38	1	1	0.2	1	3	3	5
Walpeup	2/7 - 2/8	3.32	2	<1	1	0.2	1	2	6
Longerenong	2/7 - 1/8	1.97	3	1	2	0.2	4	1	10
Coleraine	2/7 - 1/8	2.87	6	<1	3	0.2	7	2	12
Cape	-	-							
Bridgewater	-	-							
Parwan	1/7 - 1/8	1.46	4	<1	2	0.5	5	2	13
<u>August 1956</u>									
Kew	1/8 - 31/8	2.86	7	4	4	0.4	8	-	36
Seymour	3/8 - 31/8	2.19	5	1	2	0.2	5	1	13
Benalla	15/8 - 3/9	2.14	3	<0.5	1	0.4	3	8	13
Charlton	1/8 - 30/8	1.13	9	2	2	0.2	10	13	28
Merbein	1/8 - 30/8	0.97	25	12	7	0.9	28	13	48
Walpeup	2/8 - 30/8	0.84	11	4	3	0.2	12	5	21
Longerenong	1/8 - 3/9	2.64	8	1	2	0.4	9	3	16
Coleraine	1/8 - 3/9	5.28	15	2	3	0.5	17	1	26
Cape	-	-							
Bridgewater	1/6 - 3/9	11.20	67	7	13	1.4	77	5	102
Parwan	1/8 - 1/9	2.14	8	1	2	0.3	9	1	15

TABLE 2 (Continued) 7.  
Monthly cumulative samples collected by S.C. A., Victoria  
September 1956

Station	Period of Collection	Rainfall in. mm.	Na	Ca M. equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	31/8 - 1/10	3.28	6	3	4	0.2	7	-	28
Seymour	31/8 - 1/10	2.96	2	1	1	0.1	2	3	8
Benalla	3/9 - 8/10	3.05	1	<1	<1	0.2	1	2	11
Charlton	30/8 - 30/9	1.67	2	1	2	0.1	2	21	21
Merbein	1/9 - 30/9	1.70	4	5	2	0.2	4	6	11
Walpeup	30/8 - 28/9	2.36	6	1	3	0.4	7	4	13
Longerenong	3/9 - 1/10	1.53	13	2	3	0.4	15	3	23
Coleraine	3/9 - 1/10	2.32	6	2	2	0.4	7	4	14
Cape	-	-	-	-	-	-	-	-	-
Bridgewater	-	-	-	-	-	-	-	-	-
Parwan	1/9 - 28/9	3.68	8	1	2	0.9	9	6	18
October 1956									
Kew	1/10 - 1/11	3.94	14	3	4	0.6	14	-	41
Seymour	1/10 - 1/11	2.80	2	<1	<1	0.2	2	1	8
Benalla	8/10 - 1/11	2.71	3	<1	1	0.8	1	7	9
Charlton	30/9 - 30/10	2.69	3	6	2	0.2	3	7	12
Merbein	1/10 - 31/10	1.63	2	1	1	0.4	2	2	7
Walpeup	28/9 - 1/11	2.91	2	1	1	0.4	2	2	7
Longerenong	1/10 - 1/11	2.32	9	2	2	0.5	9	3	18
Coleraine	1/10 - 1/11	3.43	9	2	2	0.5	9	3	18
Cape	-	-	-	-	-	-	-	-	-
Bridgewater	-	-	-	-	-	-	-	-	-
Parwan	28/9 - 1/11	2.89	6	1	1	0.6	6	3	13

TABLE 2 (Continued) 8.  
Monthly cumulative samples collected by S.C.A., Victoria  
November 1956

Station	Period of Collection	Rainfall in. mm.	Na	Ca M.equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
Kew	1/11 - 3/12	2.77	13	4	5	0.3	12	-	40
Seymour	1/11 - 30/11	1.21	6	1	1	0.2	6	2	14
Benalla	30/10 - 11/12	1.64	4	1	1	0.4	3	2	12
Charlton	30/10 - 30/11	0.39	12	24	9	2.3	13	30	47
Merbein	1/11 - 30/11	0.44	5	4	2	0.4	4	6	14
Walpeup	1/11 - 30/11	0.98	4	3	2	0.3	4	4	12
Longerenong	1/11 - 30/11	0.94	20	4	4	0.9	22	5	35
Coleraine	1/11 - 3/12	1.13	66	8	13	1.6	73	7	99
Cape Bridgewater	3/9 - 11/12	4.85	9	1	2	0.4	9	2	19
Parwan	1/11 - 30/11	1.00							
<u>December 1956</u>									
Kew	3/12 - 2/1	0.06	14	14	9	0.9	14	-	50
Seymour	11/12 - 3/1	0.09	12	4	4	3.9	12	13	37
Benalla									
Charlton	1/12 - 31/12	0.08	32	60	35	4.2	31	85	130
Merbein									
Walpeup									
Longerenong	30/11 - 3/1	0.36	17	6	4	1.2	17	6	32
Coleraine	3/12 - 3/1	1.70	12	2	4	0.7	11	4	22
Cape Bridgewater									
Parwan	30/11 - 3/1	0.54	15	3	4	1.2	14	5	29

TABLE 3

Weekly cumulative samples collected at Mt. Burr  
Forest Reserve, South Australia  
(Lat. 37°33'S Long. 140°24'E. Height 210 ft.)  
1954

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na. M. equiv./100 litres	Ca. M. equiv./100 litres	Mg. /100 litres	K	Cl	HCO <sub>3</sub>	EC 20°C micromhos
30/8	0.44	S.W. showers	100	15	21	5	113	10	150
6/9	1.05	S. & S.W. showers	33	5	7	2	36	5	54
13/9	0.34	S.W. showers	27	5	8	2	26	8	45
20/9	0.57	N. & W. showers	10	3	3	1	10	5	20
27/9	0.07	Lt. W. showers	141	24	30	12	135	45	220
4/10	0.10	N. & NE showers	32	19	10	11	29	50	84
11/10	0.59	W. showers	41	11	10	4	47	15	70
18/10	0.04	Lt. N. showers	140	21	59	11	145	55	240
25/10	0.71	NE & W. showers	28	12	4	1	25	13	47
1/11	0.19	Lt. W. showers	27	9	8	3	28	16	50
8/11	0.73	N.W. thunderstorm	5	4	2	1	4	7	14
15/11	0.51	W. & S.W. showers	28	14	7	2	32	14	55
22/11	0.82	V. & S.W. showers	23	8	8	2	25	11	43
13/12	1.11	N.E. & W. showers	12	5	5	2	9	9	24
20/12	0.06	Lt. W. showers	170	40	80	12	150	110	290
27/12	0.15	S.W. showers	190	100	30	17	170	150	360
<u>1955</u>									
27/1	0.04	Lt. N.W. showers	240	100	110	19	220	250	480
31/1	0.09	Lt. W. showers	120	60	n.d.	7	130	n.d.	230
8/2	0.10	Lt. N.W. showers	50	40	25	3.1	45	60	130
14/2	0.59	N. & E. showers	8	10	2	0.5	5	13	25
21/2	0.44	E. showers	7	5	1	0.8	4	9	19
14/3	0.05	Lt. W. showers	360	100	70	23	390	100	580
28/3	0.26	W. showers	13	8	2	2.3	11	20	33
4/4	0.22	N.W. & S.W. showers	100	22	20	4.7	120	29	170

TABLE 3 (Continued) 2.  
Weekly cumulative samples collected at Mt. Burr Forest Reserve,  
South Australia  
(Lat. 37°33' S. Long. 140°24' E. Height 210 ft.)  
1955 (Cont'd)

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na M.equiv./100	Ca M.equiv./100	Mg /100 litres	K	Cl	HCO <sub>3</sub>	EC 20°C micromhos
11/4	0.22	N.W. showers	23	8	6	1.3	22	19	44
18/4	2.63	Hvy. N. & W. showers	6	3	2	1.3	4	7	15
26/4	0.41	W. showers	18	4	4	1.2	20	10	37
1/5	0.40	W. showers	150	20	27	4	160	48	220
9/5	1.36	S. & S.W. showers	25	5	5	1.0	27	8	42
16/5	1.22	W. showers	31	4	6	1.5	34	12	52
23/5	1.69	S. showers	24	3	7	1.0	27	9	46
30/5	0.64	N. & W. showers	12	4	4	0.5	12	10	23
2/6	0.52	N.E. showers	3	2	2	0.3	2	4	9
6/6	0.61	W. showers	16	2	7	0.5	18	8	28
14/6	0.69	N. showers	4	2	3	0.3	3	7	10
20/6	1.83	N.E. showers	4	1	2	0.2	2	6	10
27/6	2.15	N. & S.W. showers	23	3	4	1.0	21	7	35
4/7	0.15	Lt. shower	7	5	3	1.0	4	8	19
11/7	1.43	W. & S.W. showers	15	2	8	0.6	17	9	29
18/7	1.46	S. & W. showers	16	2	8	0.5	17	9	29
25/7	0.23	N.E. & S.W. showers	12	3	7	0.8	12	12	28
1/8	0.98	S. & W. showers	32	3	11	0.9	37	9	53
8/8	2.48	Hvy. W. showers	49	5	12	1.4	57	7	79
15/8	1.05	Hvy. W. showers	75	8	17	2.0	86	8	120
22/8	1.14	Hvy. W. showers	39	5	10	1.2	47	6	65
29/8	1.40	N. showers	19	3	7	0.9	19	9	35
5/9	1.13	N. & W. showers	16	2	5	0.8	16	8	29
12/9	0.37	N. & E. showers	10	3	3	0.4	10	8	20
19/9	0.20	Lt. showers	18	6	6	1.7	18	12	36
26/9	0.66	W. showers	14	3	5	1.4	14	9	27
3/10	1.25	N. & W. showers	19	5	8	1.2	23	9	39

TABLE 3 (Continued) 3.  
Weekly cumulative samples collected at Mt. Burr Forest Reserve,  
South Australia  
(Lat. 37°33' S. Long. 140°24' E. Height 210 ft.)  
1955 (Cont'd.)

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na M. equiv./100	Ca M. equiv./100	Mg	K litres	Cl	HCO <sub>3</sub>	EC 20°C micromhos
10/10	0.77	W. showers	14	3	5	0.7	16	7	27
17/10	0.40	W. showers	54	7	18	1.9	57	18	90
24/10	0.33	N. & W. showers	56	13	16	2.2	64	18	93
31/10	0.69	N. & W. showers	33	10	12	1.0	38	15	59
7/11	0.44	W. showers	34	9	10	1.5	37	11	60
14/11	1.10	W. showers	58	10	11	1.1	64	10	91
21/11	0.11	W. showers	160	42	33	6.0	180	60	260
28/11	0.52	S. & W. showers	30	10	7	1.5	30	16	55
5/12	0.72	S. & W. showers	39	9	8	2.0	44	14	69
12/12	0.03	Lt. S. showers	100	40	15	21	100	n.d.	230
19/12	0.16	S. & N.E. showers	34	12	15	3.2	36	36	83
<u>1956</u>									
3/1	0.71	S. showers	60	19	16	1.7	68	25	110
16/1	0.24	N. W. showers	33	15	13	2.0	33	34	80
23/1	0.48	S. W. showers	23	10	8	1.6	23	17	50
6/3	0.19	N. W. thunderstorm	65	80	20	7.6	70	140	210
12/3	0.06	Lt. showers	250	60	70	12	280	160	470
19/3	0.12	Lt. showers	80	18	17	3.7	84	68	185
3/4	1.01	N. E. & N. W. showers	10	6	4	1.4	9	16	29
9/4	0.52	W. showers	12	5	3	0.8	11	13	28
16/4	2.59	Hvy. W. showers	22	4	4	0.7	24	7	37
23/4	2.53	Hvy. W. showers	48	5	11	1.3	56	6	77
29/4	0.47	W. showers	20	3	4	0.7	20	9	36

TABLE 3 (Continued) 4.  
Weekly cumulative samples collected at Mt. Burr Forest Reserve,  
South Australia.  
(Lat. 37°33' S. Long. 140°24' E. Height 210 ft.)  
1956 (Cont'd)

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na	Ca M. equiv./100	Mg litres	K	CL	HCO <sub>3</sub>	EC 20°C micromhos
7/5	0.06	Lt. S. showers	57	9	11	6.3	61	45	140
21/5	0.70	W. showers	11	3	3	0.8	11	8	24
28/5	0.69	N.W. showers	-	-	-	-	-	-	-
5/6	1.25	W. showers	17	3	3	1.0	17	9	35
11/6	0.79	Lt. W. showers	10	3	2	0.5	11	8	25
18/6	3.87	Hvy. W. & S.W. showers	27	3	5	0.9	32	7	48
25/6	0.57	W. & S.W. showers	16	2	4	0.5	17	6	27
2/7	1.64	W. showers	38	4	7	2.1	43	6	59
9/7	1.27	W. & S.W. showers	7	2	2	0.7	6	4	14
16/7	0.17	W. & S.W. showers	19	3	3	1.1	20	5	33
23/7	1.44	W. showers	9	2	3	0.5	9	3	17
30/7	1.30	W. showers	21	3	4	0.6	24	3	32
7/8	0.20	W. showers	34	5	8	1.8	39	6	58
13/8	1.73	W. showers	50	5	10	1.4	58	4	74
21/8	0.86	N.W. & S.W. showers	37	4	8	1.5	44	4	57
27/8	1.71	W. & S.W. showers	46	5	10	1.1	56	7	73
3/9	0.56	W. showers	29	3	6	0.9	33	4	46
10/9	1.41	Hvy. S. showers	18	2	4	0.7	21	4	30
17/9	0.07	Lt. W. showers	91	8	28	3.6	110	12	147
24/9	1.45	Hvy. W. showers	27	3	6	0.8	30	4	42
1/10	0.46	W. & S.W. showers	25	9	5	1.1	27	11	44
9/10	0.38	N.E. showers	5	3	2	0.5	4	7	14
15/10	0.37	W. showers	38	8	10	6.0	45	17	72
22/10	1.30	Hvy. S. showers	26	4	5	0.8	29	4	43
29/10	1.08	W. showers	19	4	5	0.8	21	6	35
31/10	0.17	S.W. showers	48	10	11	2.2	54	11	79
6/11	0.30	S.W. showers	51	10	11	1.7	58	10	81
14/11	0.15	Lt. showers	85	28	18	3.1	92	24	140

TABLE 3 (Continued) 5.  
Weekly cumulative samples collected at Mt. Burr Forest Reserve,  
South Australia  
(Lat. 37°33' S. Long. 140°24' E. Height 210 ft.)  
1956 (Cont'd)

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na	Ca M. equiv./100	Mg	K	Cl litres	HCO <sub>3</sub>	EC 20°C micromhos
21/11	0.31	8	21	9	6	1.0	21	13	38
26/11	0.13	3	67	26	14	4.2	78	27	125
1/12	0.03	1	77	25	30	6	76	88	167
8/12	0.11	3	170	50	40	9.5	188	76	310
14/12	0.86	22	9	6	3	0.6	9	9	25
21/12	0.53	13	32	10	7	1.1	36	9	57
26/12	0.05	1	97	38	24	4	100	55	180
<u>1957</u>									
7/1	0.06	2	101	48	24	5	108	68	206
24/1	0.05	1	200	80	30	26	170	150	320
7/2	0.26	7	28	22	12	2.2	25	38	71
4/3	0.26	7	45	21	17	2.4	50	42	120
11/3	0.32	8	46	18	14	1.9	53	37	110
13/3	1.17	30	4	3	2	0.3	3	5	11
18/3	0.80	20	20	5	5	0.6	22	7	38
1/4	0.08	2	65	18	27	3.5	72	45	134
15/4	0.38	10	57	16	14	2.2	64	27	117
22/4	0.54	14	27	8	7	1.1	28	13	52
29/4	1.43	36	21	5	5	0.8	22	7	37
6/5	0.98	25	83	17	21	2.1	96	16	135
13/5	0.13	3	79	17	22	3.1	90	24	135
20/5	1.12	28	22	5	6	0.7	24	7	39
27/5	0.44	11	42	6	8	1.0	47	7	66
3/6	0.07	2	32	9	17	2.7	30	28	69
17/6	0.07	2	62	32	40	5.4	60	65	160
24/6	0.34	9	5	6	3	1.0	4	n.d.	19

TABLE 4

Weekly cumulative samples collected at Mt. Crawford Forest Reserve, South Australia  
(Lat. 34° 43' S. Long. 138° 57' E. Height 1350 ft.)

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na	Ca M.equiv./100 litres	Mg	K	Cl	EC 20°C micromhos
1954								
2/5	1.14		7	4			6	
9/5	0.39		11	7			8	
15/5	0.18		16	6			10	
23/5	0.64		11	4			8	
6/6	2.16		9	4			6	
20/6	1.13		10	4			9	
1/7	0.70		4	2			4	
11/7	1.44		8	2			7	
25/7	1.48		14	3			14	
9/8	0.57		19	3			21	
22/8	0.08		41	8			26	
29/8	0.62		10	4			8	
5/9	1.16		19	4		1.5	19	
19/9	0.37		13	4		3.5	14	
3/10	0.97		8	6		1.0	7	
22/10	0.55		14	6		0.8	17	
31/10	0.83	W. showers	7	5		1.2	7	
7/11	0.16	N.E., N.W. showers	5	4		1.2	4	
14/11	0.24	N. N.W. thunderstorm	45	30		3.6	50	
21/11	0.56	S. showers	6	7		1.0	5	
5/12	0.17	N. thunderstorm	4	5		1.2	3	
12/12	1.00	N.W. showers	3	4		0.8	3	
26/12	0.39	Hvy. N.W. showers E, N.E. Thunderstorm	16	17		2.2	14	
1955								
6/2	0.35	S., S.W. showers	46	28		6.0	43	105
13/2	1.96	S.E., N.E. thunderstorm	2	4		0.5	1	16
20/2	1.14	N. showers	1	2		0.5	1	10
6/3	0.43	S.E. showers	5	5		0.7	5	24
27/3	0.43	N. thunderstorm	7	6		1.0	3	26

TABLE 4 (Continued) 2.  
Weekly cumulative samples collected at Mt. Crawford Forest Reserve, South Australia  
(Lat. 34°43'S. Long. 138°57'E. Height 1350 ft.)

Week Ending	Rainfall		Nature of rain and Weather Conditions	1955 (Cont'd)							EC 20°C micromhos
	in.	mm.		Na	Ca M.equiv./100	Mg	K litres	Cl			
10/4	0.06	2	S.W. and N.W. showers N.W. thunderstorm also S.W. showers	80	32	25	3.8	96			169
17/4	1.36	35		8	4	3	0.7	8			30
24/4	0.34	9	N. Thunderstorm N.W. & S.W. showers N. Thunderstorm S.W. & W. showers	8	6	3	0.4	9			30
1/5	0.40	10		2	2	<1	0.2	2			13
8/5	1.88	48		21	5	5	0.5	23			41
15/5	1.03	26		23	7	6	3.1	26			49
22/5	1.37	35		9	5	4	1.0	9			25
29/5	2.87	73		2	2	1	0.4	1			11
5/6	2.04	52		10	5	2	0.4	9			29
19/6	3.72	95		1	1	1	0.4	1			12
26/6	3.47	88		7	1	2	0.5	5			18
10/7	0.37	9		17	2	5	0.3	20			30
17/7	1.54	39		5	2	3	0.3	8			22
31/7	0.77	20		15	18		1.3				134
7/8	0.81	21		7	3		0.4				33
14/8	2.49	65		39	4	12	1.0				67
21/8	2.03	52		8	2	4	0.6				23
28/8	2.03	52		11	3	3	0.8				27
4/9	1.26	32	7	3	2	1.0				25	
25/9	0.27	7	7	4	5	1.3				39	
2/10	2.32	84	2	1	1	0.4		4		12	
9/10	0.74	19	4	2	2	0.5		5		17	
16/10	1.07	27	11	2	6	1.0		15		27	
30/10	0.93	24	14	5	6	1.0		17		34	
6/11	0.30	8	5	4	1	0.5		6		20	
13/11	1.20	31	27	5	3	0.9		30		50	
20/11	0.35	9	4	4	2	0.8		4		20	
4/12	1.41	36	17	6	2	0.8		18		37	

TABLE 4 (Continued) 3.  
Weekly cumulative samples collected at Mt. Crawford Forest Reserve, South Australia  
(Lat. 34° 43' S. Long. 138° 57' E. Height 1350 ft.)

1956

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na	Ca M.equiv./100	Mg litres	K	Cl	EC 20°C micromhos
2/1	0.25	S. and S.W. showers	29	8	7	2.0	35	63
22/1	0.64	N.W, S.W. showers	9	5	3	2.5	10	31
31/3	1.01	N.E. thunderstorm	15	8	8	3.5	21	46
15/4	1.03	N.W, W. showers	33	12	8	1.2	40	67
23/4	2.94	W, S.W. showers	24	4	6	1.0	27	43
30/4	0.96	E. & N.E. showers	5	2	2	0.5	5	16
16/5	1.64	N. & E. showers	2	2	1	0.5	2	13
24/5	1.89	N.W. showers	5	2	2	0.4	5	18
31/5	1.68	W. & N.W. showers	2	1	2	0.5	2	13
7/6	2.36	N. & W. showers	4	1	2	0.5	4	14
19/6	2.42	N.W. & W. showers	19	3	4	0.5	20	36
29/6	3.01	W. showers	21	3	4	0.7	22	39
5/7	1.10	S.W. & N.W. showers	11	2	2	0.5	11	28
12/7	1.45	N. & W. showers	2	1	1	0.2	2	12
24/7	1.89	E. & N.W. showers	8	2	2	0.5	8	21
31/7	1.89	S.W. & N.W. showers	13	2	3	0.4	14	29
13/8	2.25	S.W. & N.W. showers	29	3	5	1.0	32	47
20/8	1.59	S.W. & N.W. showers	13	2	3	0.5	14	26
27/8	1.26	N.W. showers	13	2	2	0.4	15	28
3/9	1.41	W. & S.W. showers	4	1	1	0.5	4	16
10/9	1.36	S.W. showers	18	2	4	0.7	21	35
24/9	1.76	W. & N.W. showers	15	2	5	0.5	16	30
3/10	0.79	N. & E. showers	7	3	4	1.8	9	24
10/10	0.42	S.E. & N.E. showers	5	3	3	0.6	6	20
18/10	1.79	N.W. & W. showers	7	2	3	0.4	8	20
12/11	1.15	N.W. & S.W. showers	15	5	4	0.9	16	33
19/11	0.24	N.W. showers	8	4	4	1.2	8	26
26/11	0.19	N.W. showers	16	11	9	1.9	16	46

TABLE 4 (Continued) 4.

Weekly cumulative samples collected at Mt. Crawford Forest Reserve,  
South Australia,  
(Lat. 34° 43' S. Long. 138° 57' E. Height 1350 ft.)

1957

Week Ending	Rainfall in. mm.	Nature of rain and Weather Conditions	Na M. equiv./100 litres	Ca Mg M. equiv./100 litres	K litres	Cl	EC 20°C micromhos
14/1	0.53	N.W. & S.W. showers	21	7	2.2	24	49
4/2	0.03	N.E. showers	130	33	30	140	250
11/3	0.18	N. showers	87	30	9.4	100	190
16/3	0.58	N. & W. showers	20	3	4.2	20	52
10/4	1.09	N.W. & S.W. Hvy. showers	23	10	2.4	27	50
21/4	0.42	N.W. showers	15	8	2.7	15	34
3/5	1.41	N.W. & S.W. Showers	32	6	1.4	37	59
18/5	0.36	N.W. & W. showers	16	6	1.7	18	51
25/5	0.09	S.W. showers	23	6	2.2	25	41
24/6	2.45	E., N.E. showers	2	3	0.5	3	12

N.B. Due to the presence of zinc from the galvanized iron rain gauge, the electrical conductivity of the Mt. Crawford samples is unduly high.

TABLE 5

Monthly cumulative samples collected at Whian Whian State Forest,  
 New South Wales.

(Lat. 28° 38' S. Long. 153° 18' E)

Month Ending	Rainfall		Na	Ca	Mg	K	Cl
	in.	mm.					
9/3/55	14	360	9	3	2	0.9	9
5/4/55	26	660	6	2	<1	0.3	6
5/5/55	36	910	12	2	2	0.6	11
14/6/55	7	180	9	2	2	0.9	5
11/8/55	7	180	10	4	<1	1.1	3
13/9/55	1.5	38	13	5	1	1.0	6
11/10/55	2	51	16	8	<1	1.7	8
8/11/55	3	76	12	8	<1	1.2	7
13/12/55	18	460	6	3	1	0.5	5
4/1/56	7	180	5	5	1	0.5	5
14/2/56	41	1040	8	2	2	1.1	7
13/3/56	42	1070	5	4	1	0.1	6
9/4/56	15	380	10	2	2	0.7	11
8/5/56	12	300	6	1	2	0.4	4
20/7/56	7	180	5	2	n.d.	0.3	3
7/8/56	1.2	30	8	2	n.d.	0.5	5
16/10/56	2.0	51	11	5	1	0.9	3
13/11/56	1.2	30	14	6	1	2.3	3
18/12/56	6	150	13	6	3	1.8	5
15/1/57	13	330	10	5	1	1.8	4
12/2/57	18	460	11	4	2	1.0	5
12/3/57	15	380	11	3	2	0.6	7
14/5/57	2.2	56	20	3	2	2	8
19/6/57	1.7	43	20	2	1	1.6	8

(N.B. Chloride figures may be in error.)

JTH/BH  
 14/2/58