

M.O. 280.

FOR OFFICIAL USE.

[Crown Copyright Reserved.]

METEOROLOGICAL OFFICE, AIR MINISTRY

ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION

REPORT ON OBSERVATIONS IN THE YEAR ENDING
MARCH 31st, 1925

*FORMING THE ELEVENTH REPORT OF THE COMMITTEE FOR
THE INVESTIGATION OF ATMOSPHERIC POLLUTION*

Published by the Authority of the Meteorological Committee.



L O N D O N :

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.

To be purchased directly from H.M. STATIONERY OFFICE at the following addresses :
Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1;
York Street, Manchester; 1, St. Andrew's Crescent, Cardiff;
or 120, George Street, Edinburgh;
or through any Bookseller.

1925.

Price 5s. 6d. Net.

Abridged List of Publications issued by the Meteorological Office.*

1. The Meteorological Magazine. (8vo.)

SYMONS'S Meteorological Magazine incorporated with the Meteorological Office Circular. Published monthly, first issue February 1920. 6d. per month. Annual subscription 6s. 6d., post free.

2. Handbooks, Text-books, Tables. (8vo.)

The Observer's Handbook. Approved for the use of Meteorological Observers by the Meteorological Office and the Royal Meteorological Society. (No. 191.) (*Out of print. New edition in the press.*)

The Marine Observer's Handbook. (No. 218.) Reprint of Third Edition, 1922. 5s.

Barometer Manual for the Use of Seamen. A Text-book of Marine Meteorology. (No. 61.) Tenth Edition, 1925. 1s. 6d.

The Seaman's Handbook of Meteorology. A companion to the Barometer Manual for the Use of Seamen. (No. 215.) Third Edition, 1918. 3s. 6d.

Cloud Forms according to the International Classification, with an Atlas of Photographs of Clouds. (No. 233.) Second Edition, 1921. 1s. 6d.

The Computer's Handbook. (No. 223.)—

Introduction. C.G.S. Units of Measurement in Meteorology, with their Abbreviations and their Equivalents. Second Edition, 1921. 3s. 6d.

Section II., Sub-section I.—The Computation of Wind Components from Observations of Pilot Balloons and Shell Bursts. 1920. 2s.

Section V., Sub-section 3. Tables of Correlation Co-efficients from Meteorological Papers. 1919. 4s.

(Section I., Section II., Sub-Sections 2, 3, 4, and Section V., Sub-sections 1, 2. *Out of Print.*)

A Short Course in Elementary Meteorology. By W. H. Pick, B.Sc. (No. 247. 1921.) 1s. 6d.

Meteorological Corrections for the Use of Gunners. By Capt. D. Brunt, M.A., and J. Durward, M.A. (No. 241. 1921.) 3d.

Hints to Meteorological Observers in Tropical Africa, with Instructions for taking Observations and Notes on Methods of recording Lake Levels. Second Edition, revised, 1907. (No. 162.) 9d.

Observer's Primer, being short instructions in the method of taking and reporting readings of temperature and rainfall, specially prepared for Meteorological Observers in the British Colonies. (No. 266, 1924.) 6d.

Hygrometric Tables for the Computation of Relative Humidity, Vapour Pressure and Dew Point from Readings of Dry and Wet Bulb Thermometers exposed in Stevenson Screens. (No. 265. 1924.) 1s. 6d.

2. Handbooks, Text-books, Tables. (8vo.) — continued.

Tables for the reduction of Meteorological Observations. Published by the Indian Meteorological Department. 2s.

FORECASTING:—

The Weather Map. An introduction to Modern Meteorology. (No. 225i.) (Royal 16mo.) 6th issue. 1925. (*In the press.*)

Meteorological Glossary in continuation of the Weather Map. (No. 225ii. 1918.) (Royal 16mo.) 1s.

Weather Forecasting in the Eastern North Atlantic and Home Waters for Seamen. By Commander L. A. Brooke-Smith, R.D., R.N.R. (No. 246. 1921.) 6d.

WIRELESS:—

Forecast Code for the Abbreviation of Weather Forecasts transmitted by Telegraphy or Radiotelegraphy. (No. 244. 1922.) 1s.

Particulars of Meteorological Reports issued by Wireless Telegraphy in Great Britain and by the countries of Europe and North Africa. (No. 252. 3rd edition, 1925.) 3s. 6d. (Supplements priced separately.)

New International Code for Meteorological Messages. (No. 253. 1922.) 4d.

The Wireless Weather Manual, being a Guide to the Reception and Interpretation of Weather Reports and Forecasts distributed by Wireless Telegraphy in Great Britain. (No. 255. 1922.) 9d. Supplement 2d.

3. Reports of Investigations in Dynamical and Statistical Meteorology and other Memoirs.

ATMOSPHERIC POLLUTION:—

Annual Reports of the Advisory Committee for the Investigation of Atmospheric Pollution. (4to.) Commencing 1915. 1923–24. (No. 270.) 4s.

London Fog Inquiry, 1901–03:—

Report of the Council, with report by R. G. K. Lempert, M.A. (No. 160. 1904.) (4to.) 2s. 6d.

Report by Captain Alfred Carpenter, R.N., D.S.O. (1903.) (4to.) 2s.

DYNAMICAL METEOROLOGY:—

Barometric Gradient and Wind-Force. Report by E. Gold, M.A. (No. 190. 1908.) (4to.) 2s. 6d.

The Free Atmosphere in the region of the British Isles. First Report by W. H. Dines, F.R.S., with an Introduction and Note by W. N. Shaw, F.R.S., Director. (No. 202. 1909.) (4to.) 2s. 6d.

STATISTICAL METEOROLOGY:—

Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. (No. 93. 1891.) (4to.) 12s.

METEOROLOGICAL OFFICE, AIR MINISTRY

ADVISORY COMMITTEE ON

ATMOSPHERIC POLLUTION

REPORT ON OBSERVATIONS IN THE YEAR ENDING
MARCH 31st, 1925

FORMING THE ELEVENTH REPORT OF THE COMMITTEE FOR
THE INVESTIGATION OF ATMOSPHERIC POLLUTION

Published by the Authority of the Meteorological Committee.



LONDON:

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.

To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1;
York Street, Manchester; 1, St. Andrew's Crescent, Cardiff;
or 120, George Street, Edinburgh;
or through any Bookseller.

1925.

Price 5s. 6d. Net.

* Unless otherwise indicated, the publication is by the authority of the Meteorological Committee or its predecessors. All publications, with the exception of the Daily Weather Report, are on sale through any bookseller, or directly from H.M. Stationery Office in London, Cardiff, Manchester, Edinburgh and Belfast. A complete list of publications will be forwarded on application to the Director, Meteorological Office, Air Ministry, Kingsway, London, W.C. 2.

METEOROLOGICAL OFFICE,
AIR MINISTRY

Advisory Committee on Atmospheric Pollution

REPORT ON OBSERVATIONS IN THE YEAR ENDING MARCH 31, 1925

Forming the Eleventh Report of the Committee for the
Investigation of Atmospheric Pollution

CONTENTS	
PAGE	PAGE
INTRODUCTION AND SUMMARY OF THE YEAR'S OPERATIONS	(6) Stoneware Gauge - - - - - 27
(1) Members of Committee - - - - - 4	(7) Positions of Gauges - - - - - 28
(2) Acknowledgments of Assistance - - - - - 4	(8) Observations on Deposit of Sulphates - - - - - 28
(3) Future Organization of the Inquiry - - - - - 4	SECTION 2.—RESULTS OBTAINED WITH THE AUTOMATIC FILTER
(4) Results Obtained in the Year under Review - - - - - 4	(1) Instruments in Use - - - - - 40
SECTION 1.—RESULTS OBTAINED BY THE STANDARD GAUGE	(2) Results for Blackburn and Stoke-on-Trent and Westminster - - - - - 40
(1) Number of Stations - - - - - 5	(3) Comparison of Different Days of the Week - - - - - 41
(2) Classification of Deposit into Groups A, B, C and D - - - - - 5	(4) Effect of Wind on Impurity - - - - - 42
(3) Highest and Lowest Results for the General Average, and for the Year - - - - - 25	SECTION 3.—THE JET DUST-COUNTER
(4) Comparison of Monthly Values for the Year with the Five Years' Average - - - - - 25	(1) Observations made with the Dust-Counter - - - - - 42
(5) Comparison of Summer and Winter Deposits - - - - - 26	(2) Settlement - - - - - 44
	(3) The Fog of December 9th-12th, 1924 - - - - - 45
	SECTION 4.—SPECIAL RESEARCHES - - - - - 45

INTRODUCTION AND SUMMARY OF THE YEAR'S OPERATIONS

(1) THE ADVISORY COMMITTEE AND THE TECHNICAL SUB-COMMITTEE

During the year the Committee consisted of the following:—

Appointed by the Meteorological Committee

Sir NAPIER SHAW, F.R.S., *Chairman* (to January 1925).
 Professor H. B. BAKER, F.R.S. (Royal College of Science).
 Dr. T. L. BAILEY (Chief Alkali Inspector).
 Dr. Joseph CATES (Medical Officer of Health, Surrey).
 Captain C. J. P. CAVE (Past President of the Meteorological Society).
 Mr. J. G. CLARK (Chemist—Gas Light and Coke Co.).
 Professor J. B. COHEN, F.R.S. (Professor of Organic Chemistry of University of Leeds).
 Dr. H. A. DES VŒUX (Hon. Treasurer, Coal Smoke Abatement Society).
 Dr. J. S. OWENS (Consulting Engineer), *Hon. Secretary*.
 Sir John RUSSELL, F.R.S. (Director of Rothamsted Experimental Station, Harpenden).
 Dr. G. C. SIMPSON, F.R.S. (Director of the Meteorological Office), *Chairman* (from January 1925).
 Mr. W. B. SMITH (Member of Departmental Committee on Smoke Abatement. Representative of Corporation of Glasgow).
 Mr. F. J. W. WHIPPLE (Superintendent, British Rainfall Organization).

Appointed by the Department of Scientific and Industrial Research

Dr. Margaret FISHENDEN (Fuel Research Board).

Nominated by Co-operating Municipal Authorities

Sir John ROBERTSON - Birmingham.
 Mr. A. R. TANKARD - Kingston-upon-Hull.
 Dr. J. JOHNSTONE JERVIS - Leeds.
 Dr. W. HANNA - Liverpool.
 Dr. W. J. HOWARTH - City of London.
 Mr. Henry MILLS - London County Council.
 Mr. W. OSBORN THORP - Malvern.
 Professor W. HALDANE GEE - Manchester.
 Dr. R. W. SIMPSON - Newcastle-on-Tyne.
 Dr. J. B. WILKINSON - Oldham.
 Dr. J. R. ASHWORTH - Rochdale.
 Mr. F. HAUXWELL - St. Helens.
 Mr. J. BAXENDELL - Southport.
 Mr. John FYFE - Stirling.
 Dr. G. PETGRAVE JOHNSON - Stoke-on-Trent.

Nominated by Messrs. Cadbury Bros.

Mr. J. K. BEST - Bournville.

Nominated by the Gas Department, Blackburn

Mr. G. P. MITCHELL - Blackburn.

The Committee is assisted by a Technical Sub-Committee, which consists of the following:—

Sir NAPIER SHAW, F.R.S. (*Chairman*)
 Mr. J. G. CLARK
 D. J. S. OWENS
 Sir John RUSSELL, F.R.S.
 Mr. F. J. W. WHIPPLE
 Professor W. HALDANE GEE
 Professor H. B. BAKER, F.R.S.

of the
 Advisory
 Committee,

together with—

Mr. J. H. COSTE (Chief Chemist, London County Council),
 Professor J. T. MCGREGOR MORRIS (East London College and Illuminating Engineering Society),
 Mr. L. F. RICHARDSON (Westminster Training College),

Mr. J. W. WALSH (National Physical Laboratory)

Four meetings of the Committee have been held during the year and two of the Technical Sub-Committee.

(2) ACKNOWLEDGMENTS OF ASSISTANCE

The Committee acknowledge the provisions made by the Meteorological Office, Air Ministry, as in past years, for the services of Mr. Watson and for the incidental expenses of the central establishment. They have also to convey their thanks for Professor H. B. Baker's kind help in providing a laboratory in the Imperial College of Science and Technology at South Kensington, and for the use of the ground for the visibility research.

As in previous years all other expenses for the maintenance of gauges, recorders and other instruments, and the collection and analyses of deposits have been borne by the municipal or local authorities responsible for taking observations, the results of which are recorded in this report.

It is with much regret that the Committee have to announce the death of Mr. G. M. Watson on April 9th, 1925, after a long illness. Mr. Watson was always an enthusiastic worker and the Committee feel that it will be difficult to replace him. As a result of Mr. Watson's illness and death the research work of the Committee has been practically suspended since October, 1924.

(3) FUTURE ORGANIZATION OF THE INQUIRY

The negotiations referred to in the last report to permit the continuance of the operations of the Committee have not yet been concluded, but as the investigations into atmospheric impurity are now acknowledged to be of great value from the point of view of health and in many other ways, there appears to be little doubt that a satisfactory organization will be evolved which will permit the work to be continued and possibly extended in scope.

(4) RESULTS OBTAINED IN THE YEAR 1924-25

During the current year two additional deposit gauges have been installed at Newcastle-on-Tyne

and one at Stoke-on-Trent. There are 19 authorities co-operating in collecting data from 48 different stations. It is somewhat remarkable on looking at a map showing the site of the deposit stations to see the way in which they have grouped themselves. Of the 19 authorities one is in Scotland—Glasgow—one in Northumberland—Newcastle-on-Tyne—three in the neighbourhood of London, while all the rest are grouped in the Midland area. Thus there are no deposit stations in Wales nor anywhere south of Kingston-on-Thames. There are, therefore, large areas of the country which are not represented. It is, however, satisfactory that the Midland area, which suffers most from smoke pollution, is taking a very active interest in the investigation.

SECTION 1.—RESULTS OBTAINED BY THE STANDARD GAUGE FOR THE COLLECTION OF DEPOSITED MATTER

(1) NUMBER OF STATIONS

The method of measurement of deposit by means of the standard gauge has been fully described in previous reports. Nineteen authorities have taken part in the investigation during the current year, and 48 gauges have been in operation as follows:—

Meteorological Office, London.	1.	Old type gauge.
City of London	-	1. Old type gauge.
County of London	-	7. Six old type gauges and one stoneware.
Birmingham	-	3. Old type gauges.
Blackburn	-	2. Stoneware gauges.
Bournville—Birmingham	1.	Old type gauge.
Glasgow	-	9. Old type standard gauges.
Huddersfield	-	2. One old type standard gauge and one stoneware.
Kingston-upon-Hull	-	1. Old type gauge.
Kingston-upon-Thames	1.	Stoneware gauge.
Leeds	-	4. Stoneware gauges.
Liverpool	-	1. Old type gauge.
Marple—Cheshire	-	1. Stoneware gauge.
Newcastle-on-Tyne	-	3. One old type gauge and two stoneware.
Rochdale	-	2. One old type standard gauge and one stoneware.
Rothamsted	-	1. Stoneware gauge.
St. Helens	-	1. Old type gauge.
Salford	-	3. Stoneware gauges.
Southport	-	2. Stoneware gauges.
Stoke-on-Trent	-	1. Stoneware gauge.
Wakefield	-	1. Old type gauge.

Out of the 48 stations above referred to, 44 have complete results and these are used in the discussion and classification which follows. Four stations are not included, for the following reasons:—

Newcastle-on-Tyne. Town Moor and Westgate Cemetery.—These two stations commenced observations in January, 1925, and therefore only three months' figures are available.

Rochdale.—Old type gauge. Figures are incomplete and will therefore not appear in this Report.

Salford—Ladywell Sanatorium.—Gauge was removed from Mode Wheel in July, 1924. There are therefore only nine months' observations at the Ladywell Sanatorium Station.

(2) CLASSIFICATION OF DEPOSIT INTO GROUPS A, B, C AND D

In the tables of deposit for the different stations the annual mean monthly deposit has been classified into groups A, B, C and D. The basis of this classification is given below:—

	A	B	C	D
Insoluble matter—	Less than			
Tar	5	5 to 14	15 to 24	25 or more
Carbonaceous other than tar	100	100 to 299	300 to 499	500 or more
Ash	200	200 to 599	600 to 999	1,000 or more
Soluble matter—				
Loss on Ignition	75	75 to 224	225 to 374	375 or more
Ash	150	150 to 449	450 to 749	750 or more
Total Solids	500	500 to 1499	1,500 to 2,499	2,500 or more
Sulphates (as SO ₃)	100	100 to 299	300 to 499	500 or more
Chlorine (as Cl)	30	30 to 89	90 to 149	150 or more
Ammonia (as NH ₃)	5	5 to 14	15 to 24	25 or more

Tables are given for each of the deposit stations and in these the deposits are shown in grammes per square dekametre for each month of the year. In addition the mean monthly deposit, that is the average of all the months, the summer and winter totals and the annual total, are also given.

The highest monthly deposit for the year for each station is shown in black type in the tables and the lowest in italics. In the figures for summer and winter totals and also for mean monthly deposit the figure shown in black type is the highest of all the stations and that in italics is the lowest. In selecting the figures for highest and lowest deposits for the "General Average" it must be remembered that for stations where the average appears in previous reports no repetition of the figures has been made here, but they have been taken into account in preparing Tables 1 and 3.

(Continued on page 25.)

1924-25 LONDON METEOROLOGICAL OFFICE		Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)									
			Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter			
			Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₂)	Chlor- ine (Cl)	Am- monia (NH ₃)	
April	-	64	37	389	739	153	283	1,601	116	101	9	
May	-	53	15	165	354	100	222	856	59	75	8	
June	-	56	16	205	418	95	233	967	100	51	3	
July	-	102	63	567	394	97	368	1,489	186	63	10	
August	-	38	15	149	228	80	203	675	86	28	5	
September	-	59	4	127	218	105	253	707	105	49	5	
October	-	91	18	199	300	200	223	940	116	57	5	
November	-	55	24	194	337	142	471	1,168	155	94	7	
December	-	75	15	276	442	209	540	1,482	100	67	8	
January	-	40	25	291	587	92	305	1,300	132	62	6	
February	-	57	18	238	466	126	301	1,149	119	69	7	
March	-	17	18	167	343	75	160	763	51	50	5	
Mean Monthly	-	59	22 C	247 B	402 B	123 B	297 B	1,091 B	110	64	7	
Summer Total	-	372	150	1,602	2,351	630	1,562	6,295	652	367	40	
Winter Total	-	335	118	1,365	2,475	844	2,000	6,802	673	399	38	
Annual Total	-	707	268	2,967	4,826	1,474	3,562	13,097	1,325	766	78	
FINSBURY PARK												
April	-	87	20	325	992	146	298	1,781	128	73	7	
May	-	53	9	136	323	105	193	766	196	39	6	
June	-	75	8	175	255	143	327	908	126	80	7	
July	-	113	15	266	537	146	490	1,454	151	75	11	
August	-	58	11	130	240	89	188	658	87	25	5	
September	-	70	7	109	210	91	234	651	101	46	6	
October*	-	93	19	584	2,340	409	1,169	4,521	313	170	1	
November	-	59	12	132	262	150	392	948	154	93	9	
December	-	74	16	214	365	177	343	1,115	172	92	7	
January	-	46	11	194	663	138	472	1,478	170	62	10	
February	-	69	9	115	147	152	272	695	114	97	10	
March	-	12	6	87	176	54	909	1,233	48	24	3	
Mean Monthly	-	65	11 B	171 B	379 B	127 B	374 B	1,061 B	132	64	7	
Summer Total	-	456	70	1,141	2,557	720	1,730	6,218	789	338	42	
Winter Total	-	260	54	742	1,613	671	2,388	5,469	658	368	39	
Annual Total	-	716	124	1,883	4,170	1,391	4,118	11,687	1,447	706	81	
RAVENS COURT PARK (Soot gauge)												
April	-	78	Lost	Lost	Lost	116	243	—	104	62	7	
May	-	89	7	127	365	55	268	822	119	48	9	
June	-	54	3	67	142	43	171	426	73	23	7	
July	-	82	13	182	542	122	322	1,181	162	46	10	
August	-	58	10	95	236	79	159	579	114	29	9	
September	-	67	7	91	237	86	201	622	105	41	14	
October	-	87	11	124	283	156	229	803	112	45	8	
November	-	62	9	145	332	105	275	866	90	89	12	
December	-	75	7	66	107	150	273	603	162	65	17	
January	-	46	15	156	341	82	213	807	98	49	7	
February	-	81	11	124	239	81	162	617	97	58	15	
March	-	13	14	157	275	57	100	603	44	19	6	
Mean Monthly	-	65	10 B	122 B	282 B	92 B	216 B	721 B	107	47	10	
Summer Total	-	350	40	562	1,522	385	1,121	3,630	573	187	49	
Winter Total	-	364	67	772	1,577	631	1,252	4,299	603	325	65	
Annual Total	-	714	107	1,334	3,099	1,016	2,373	7,929	1,176	512	114	

* Deposit abnormal—probably limestone from road repairs near the gauge. Figures omitted from winter total.

1924-25				Rain-fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
LONDON RAVENS COURT PARK (Stoneware gauge)					Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
					Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₃)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	-	-	-	80	10	165	419	159	217	970	70	61	7
May	-	-	-	89	3	178	328	151	229	889	77	47	13
June	-	-	-	57	5	93	125	63	131	417	29	23	3
July	-	-	-	89	13	175	328	134	197	847	92	36	7
August	-	-	-	60	2	92	154	90	88	426	45	20	5
September	-	-	-	67	6	113	231	213	434	997	188	114	28
October	-	-	-	100	19	177	235	199	359	989	100	46	11
November	-	-	-	69	17	189	245	193	425	1,069	165	118	18
December	-	-	-	87	7	144	85	242	482	960	194	83	19
January	-	-	-	51	3	166	158	131	276	734	113	54	12
February	-	-	-	93	19	161	295	186	333	994	128	60	14
March	-	-	-	13	14	156	234	60	99	563	37	Trace	Trace
Mean Monthly	-	-	-	71	10 B	151 B	237 B	160 B	273 B	821 B	103	55	11
Summer Total	-	-	-	442	39	816	1,585	810	1,296	4,546	501	301	63
Winter Total	-	-	-	413	79	993	1,252	1,011	1,974	5,309	737	361	74
Annual Total	-	-	-	855	118	1,809	2,837	1,921	3,270	9,855	1,238	662	137
SOUTHWARK PARK													
April	-	-	-	75	8	252	468	74	272	1,074	113	55	16
May	-	-	-	86	12	228	497	120	190	1,047	122	74	13
June	-	-	-	51	5	143	257	56	156	617	87	38	10
July	-	-	-	87	5	221	463	131	275	1,095	132	72	16
August	-	-	-	51	8	120	241	83	171	623	93	30	11
September	-	-	-	70	7	252	349	139	184	931	113	42	13
October	-	-	-	79	6	337	441	109	283	1,176	137	56	9
November	-	-	-	64	7	249	341	153	295	1,045	110	98	14
December	-	-	-	74	10	462	919	147	342	1,880	164	86	16
January	-	-	-	39	7	181	169	94	230	681	104	51	7
February	-	-	-	83	7	128	195	113	219	662	84	71	8
March	-	-	-	15	9	151	182	65	126	533	57	34	6
Mean Monthly	-	-	-	65	7 B	227 B	377 B	107 B	229 B	947 B	110	59	12
Summer Total	-	-	-	420	45	1,216	2,275	603	1,248	5,387	660	311	79
Winter Total	-	-	-	354	46	1,508	2,247	681	1,495	5,977	656	396	60
Annual Total	-	-	-	774	91	2,724	4,522	1,284	2,743	11,364	1,316	707	139
VICTORIA PARK													
April	-	-	-	70	6	189	395	126	282	999	125	60	6
May	-	-	-	85	7	176	436	102	285	1,006	135	60	15
June	-	-	-	54	4	116	182	86	197	585	100	37	7
July	-	-	-	106	11	232	399	190	355	1,187	160	70	23
August	-	-	-	58	6	129	288	51	213	687	106	31	11
September	-	-	-	69	4	142	220	62	278	706	131	53	9
October	-	-	-	79	5	184	229	126	317	861	150	55	13
November	-	-	-	67	10	199	250	179	401	1,039	193	96	17
December	-	-	-	75	6	230	247	172	423	1,078	203	102	7
January	-	-	-	43	10	165	187	121	297	780	127	54	7
February	-	-	-	62	8	186	237	136	274	841	89	67	10
March	-	-	-	13	8	131	239	64	123	565	56	26	3
Mean Monthly	-	-	-	65	7 B	173 B	276 B	118 B	287 B	861 B	131	59	11
Summer Total	-	-	-	442	38	984	1,920	617	1,610	5,169	757	311	71
Winter Total	-	-	-	339	47	1,095	1,389	798	1,835	5,164	818	400	57
Annual Total	-	-	-	781	85	2,079	3,309	1,415	3,445	10,333	1,575	711	128

ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION

1924-25 LONDON WANDSWORTH COMMON		Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
			Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
			Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₃)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	-	82	12	482	2,487	65	314	3,360	110	74	10
May	-	85	5	129	411	84	224	853	90	49	9
June	-	83	0	80	151	73	204	448	68	45	7
July	-	86	1	151	820	188	157	1,317	115	41	7
August	-	45	3	86	161	79	198	527	78	20	7
September	-	63	2	128	224	75	189	618	78	41	8
October	-	91	6	138	162	55	240	601	74	40	9
November	-	65	7	175	215	136	334	867	104	98	16
December	-	71	6	148	175	113	215	657	83	71	6
January	-	40	7	112	124	52	175	470	76	54	6
February	-	78	6	150	339	101	245	841	69	75	3
March	-	13	4	97	135	48	107	391	40	28	3
Mean Monthly	-	67	5 B	156 B	450 B	84 B	217 B	912 B	82	53	8
Summer Total	-	444	23	1,056	4,254	504	1,286	7,123	539	270	48
Winter Total	-	358	36	820	1,150	505	1,316	3,827	446	366	43
Annual Total	-	802	59	1,876	5,404	1,009	2,602	10,950	985	636	91
GOLDEN LANE											
April	-	77	6	313	449	307	276	1,351	200	103	31
May	-	39	6	393	589	186	340	1,514	159	69	19
June	-	42	5	338	531	167	267	1,308	155	100	13
July	-	90	7	461	655	252	721	2,096	370	115	54
August	-	47	3	305	443	208	396	1,355	168	50	21
September	-	60	4	330	499	217	435	1,485	256	56	29
October	-	91	6	302	431	217	545	1,501	287	84	25
November	-	54	4	282	385	274	458	1,403	262	120	28
December	-	75	5	226	304	320	308	1,163	194	110	24
January	-	40	6	260	372	170	340	1,148	186	97	15
February	-	58	5	580	616	280	746	2,227	336	145	28
March	-	13	5	418	617	128	290	1,458	131	70	8
Mean Monthly	-	57	5 B	351 C	491 B	227 C	427 B	1,501 C	225	93	25
Summer Total	-	355	31	2,140	3,166	1,337	2,435	9,109	1,308	493	167
Winter Total	-	331	31	2,068	2,725	1,389	2,687	8,900	1,396	626	128
Annual Total	-	686	62	4,208	5,891	2,726	5,122	18,009	2,704	1,119	295
BLACKBURN (FEVER HOSPITAL)											
		Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)									
		Rainfall		Total Insoluble		Total Soluble		Total Solids			
		1923-24	1924-25	1923-24	1924-25	1923-24	1924-25	1923-24	1924-25		
April	-	71	79	320	341	367	460	687	801		
May	-	109	202	191	238	651	287	842	525		
June	-	36	82	196	137	498	271	694	348		
July	-	124	137	212	211	461	272	673	483		
August	-	73	163	194	141	299	323	493	464		
September	-	164	129	538	179	1,000	291	1,538	470		
October	-	224	121	326	89	831	477	1,157	566		
November	-	138	47	341	987	152	244	493	1,231		
December	-	156	139	205	395	273	419	478	814		
January	-	96	31	211	227	332	1,909	543	2,136		
February	-	38	83	438	195	482	255	920	450		
March	-	41	44	150	202	224	261	374	463		
Mean Monthly	-	106	105	277	278	464	451	741	729		
Summer Total	-	577	792	1,651	1,247	3,276	1,844	4,927	3,091		
Winter Total	-	693	465	1,671	2,095	2,294	3,565	3,965	5,660		
Annual Total	-	1,270	1,257	3,322	3,342	5,570	5,409	8,892	8,751		

REPORT ON OBSERVATIONS IN THE YEAR ENDING MARCH 31, 1925

		Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)											
		Insoluble Matter			Soluble Matter			Included in Soluble Matter					
		Carbon- aceous other than Tar		Total Solids	Loss on Ignition		Ash	Sulphates (SO ₃)		Chlorine (Cl)	Ammonia (NH ₃)		
		Tar			5 yr. 1924-25	1924-25		5 yr. 1924-25	1924-25			5 yr. 1924-25	1924-25
April	-	55	69	180	187	352	412	1,283	1,828	1,283	1,828	1,283	1,828
May	-	34	49	141	168	296	408	1,593	2,592	1,593	2,592	1,593	2,592
June	-	24	48	110	115	257	304	906	2,421	906	2,421	906	2,421
July	-	70	96	13	13	312	351	1,232	2,063	1,232	2,063	1,232	2,063
August	-	44	54	162	188	323	323	1,064	1,445	1,064	1,445	1,064	1,445
September	-	53	59	116	162	240	354	1,058	1,258	1,058	1,258	1,058	1,258
October	-	17	91	132	199	392	402	1,282	1,445	1,282	1,445	1,282	1,445
November	-	39	59	132	182	351	407	1,100	1,258	1,100	1,258	1,100	1,258
December	-	55	79	106	129	316	495	824	1,022	824	1,022	824	1,022
January	-	53	64	106	153	331	309	1,075	1,111	1,075	1,111	1,075	1,111
February	-	41	67	98	29	264	260	897	1,013	897	1,013	897	1,013
March	-	29	14	135	136	312	384	1,157	1,345	1,157	1,345	1,157	1,345
Mean Monthly	-	43	62	135	136	312	384	1,157	1,345	1,157	1,345	1,157	1,345
Summer Total	-	280	375	808	914	1,691	2,152	7,444	9,331	7,444	9,331	7,444	9,331
Winter Total	-	234	374	807	718	2,053	2,460	6,436	6,813	6,436	6,813	6,436	6,813
Annual Total	-	514	749	1,615	1,632	3,744	4,612	13,880	16,144	13,880	16,144	13,880	16,144
BLACKBURN TECHNICAL COLLEGE													
April	-	62	55	711	711	532	738	2,284	3,346	2,284	3,346	2,284	3,346
May	-	102	157	521	512	522	614	2,592	2,592	2,592	2,592	2,592	2,592
June	-	66	83	25	22	508	641	2,204	2,063	2,204	2,063	2,204	2,063
July	-	132	133	18	18	687	667	2,304	2,212	2,304	2,212	2,304	2,212
August	-	159	162	381	412	751	686	2,480	2,117	2,480	2,117	2,480	2,117
September	-	123	139	381	452	596	306	1,814	1,798	1,814	1,798	1,814	1,798
October	-	80	93	271	271	505	413	1,594	1,323	1,594	1,323	1,594	1,323
November	-	107	78	298	298	424	314	1,346	1,334	1,346	1,334	1,346	1,334
December	-	143	131	273	258	620	627	1,670	1,531	1,670	1,531	1,670	1,531
January	-	84	75	290	284	520	520	1,560	1,678	1,560	1,678	1,560	1,678
February	-	126	195	321	258	580	580	1,508	1,551	1,508	1,551	1,508	1,551
March	-	45	43	321	380	352	275	1,460	1,640	1,460	1,640	1,460	1,640
Mean Monthly	-	102	112	394	394	543	532	1,903	1,918	1,903	1,918	1,903	1,918
Summer Total	-	644	729	1,959	1,959	3,596	3,652	13,676	13,957	13,676	13,957	13,676	13,957
Winter Total	-	585	615	1,771	1,771	2,926	2,729	9,158	9,057	9,158	9,057	9,158	9,057
Annual Total	-	1,229	1,344	3,730	3,730	6,522	6,381	22,834	23,014	22,834	23,014	22,834	23,014

Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)																					
BIRMINGHAM																					
ASTON																					
Rainfall in mm.			Insoluble Matter			Soluble Matter			Total Solids			Included in Soluble Matter									
Tar			Carbon- aceous other than Tar			Ash			Loss on Ignition			Ash									
5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	5 yr.	1924- aver.	25	
April	-	64	66	10	7	182	164	530	614	107	320	276	1,226	1,084	133	133	30	28	5	6	
May	-	85	130	10	11	183	193	637	527	89	321	412	1,239	1,261	163	215	24	31	7	8	
June	-	79	41	5	6	361	172	746	428	63	77	748	1,006	1,178	75	88	74	73	3	3	
July	-	87	80	9	8	243	204	951	828	133	105	327	295	1,663	1,440	167	144	32	26	6	
August	-	54	78	10	6	210	142	760	397	101	93	287	331	1,368	969	127	137	20	27	5	
September	-	59	72	8	8	196	124	459	378	93	86	301	275	1,057	871	125	135	19	25	4	
October	-	60	99	7	8	149	194	425	385	98	88	294	388	973	1,063	132	169	20	27	6	
November	-	33	51	29	8	182	182	374	321	88	104	241	258	914	873	127	138	18	26	4	
December	-	66	71	8	8	170	165	346	320	105	106	279	301	908	900	148	154	28	25	5	
January	-	53	49	9	9	148	145	371	303	103	121	277	290	908	868	123	126	28	36	6	
February	-	51	61	9	9	151	172	396	276	101	158	247	302	904	797	117	143	22	27	3	
March	-	33	20	11	8	168	128	518	280	82	70	196	148	976	634	94	66	21	21	3	
Mean Monthly	-	60	68	10	8	195	160	523	436	96	103	270	288	1,095	995	128	137	23	25	5	5
Summer Total	-	428	467	52	46	1,375	999	3,849	3,406	579	586	1,704	1,766	7,559	6,803	790	852	139	150	31	32
Winter Total	-	296	351	73	50	968	926	2,430	1,825	577	647	1,534	1,687	5,583	5,135	741	796	137	155	26	23
Annual Total	-	724	818	125	96	2,343	1,925	6,279	5,231	1,156	1,233	3,238	3,453	13,142	11,938	1,531	1,648	276	305	57	55
CENTRAL																					
April	-	75	73	15	12	311	253	821	605	141	160	386	344	1,674	1,374	189	162	50	49	12	14
May	-	62	141	14	14	362	243	1,068	734	139	167	436	510	2,019	1,668	201	265	59	53	20	20
June	-	53	36	18	9	315	180	879	554	118	84	300	226	1,630	1,053	161	98	48	20	14	4
July	-	103	80	13	10	329	157	832	430	145	119	434	394	1,753	1,110	203	156	50	38	14	10
August	-	72	88	13	11	322	180	837	572	130	104	398	440	1,700	1,107	180	195	32	39	10	11
September	-	51	55	21	26	370	449	1,039	1,160	165	208	458	637	2,053	2,430	233	323	30	38	11	11
October	-	60	103	14	13	359	209	984	620	168	197	387	359	1,912	1,398	202	203	34	36	9	8
November	-	45	48	14	12	302	210	727	546	142	129	399	352	1,582	1,249	210	174	39	50	16	5
December	-	99	82	21	14	346	164	684	446	174	129	533	386	1,758	1,139	267	181	60	41	12	10
January	-	57	52	11	10	281	178	740	537	158	139	425	379	1,615	1,243	213	147	48	61	7	5
February	-	64	81	14	10	257	182	658	511	154	257	390	403	1,467	1,363	208	212	46	52	6	6
March	-	26	24	13	11	283	204	747	532	174	106	287	243	1,444	1,096	138	115	39	42	5	4
Mean Monthly	-	64	72	15	13	319	217	835	604	146	150	403	390	1,717	1,373	200	186	45	43	11	9
Summer Total	-	416	473	94	82	2,009	1,462	5,476	4,055	838	842	2,412	2,551	10,829	8,992	1,167	1,199	269	237	81	64
Winter Total	-	351	390	87	70	1,822	1,147	4,540	3,192	910	957	2,421	2,122	9,778	7,488	1,238	1,032	266	282	55	38
Annual Total	-	767	863	181	152	3,831	2,609	10,016	7,247	1,748	1,799	4,833	4,673	20,607	16,480	2,405	2,231	535	519	136	102

BIRMINGHAM SOUTH-WESTERN		Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)																		
		Rainfall in mm.			Insoluble Matter			Soluble Matter			Included in Soluble Matter									
		Tar		Carbon- aceous other than Tar	Ash		Loss on Ignition	Ash		Total Solids	Sulphates (SO ₃)		Chlorine (Cl)		Ammonia (NH ₃)					
		5 yr. aver.	1924- 25		5 yr. aver.	1924- 25		5 yr. aver.	1924- 25		5 yr. aver.	1924- 25	5 yr. aver.	1924- 25		5 yr. aver.	1924- 25			
April	-	-	72	-	-	79	-	247	-	79	-	656	-	125	-	18	-	6	-	
May	-	-	49	-	-	103	-	303	-	71	-	683	-	79	-	11	-	7	-	
June	-	-	59	53	3	73	64	194	166	69	42	546	447	96	60	9	11	6	2	
July	-	-	106	85	3	104	84	167	45	137	76	690	479	148	87	22	17	9	4	
August	-	-	84	85	4	74	95	125	213	100	110	581	770	107	143	15	21	7	5	
September	-	-	60	91	3	50	49	115	101	64	73	437	475	80	80	8	7	4	3	
October	-	-	63	107	3	49	56	125	133	65	64	431	496	74	92	16	17	3	2	
November	-	-	37	55	4	63	54	144	160	47	71	407	454	65	66	11	11	7	1	
December	-	-	76	97	4	40	23	87	60	56	57	369	299	90	62	16	7	3	4	
January	-	-	62	57	3	31	32	83	100	57	46	338	348	67	49	16	18	2	1	
February	-	-	61	90	4	41	18	132	50	70	116	451	76	95	13	18	3	3	3	
March	-	-	36	28	5	68	72	223	140	65	43	520	375	63	45	12	10	2	2	
Mean Monthly	-	-	64	75	3	65	55	161	117	69	70	506	459	89	78	14	14	4	3	
Summer Total	-	-	430	314	19	483	292	1,151	525	474	301	3,593	2,171	635	370	83	56	39	15	
Winter Total	-	-	335	434	23	292	255	775	643	360	397	2,482	2,423	429	409	84	81	14	13	
Annual Total	-	-	765	748	42	775	547	1,926	1,168	834	698	6,075	4,594	1,064	779	167	137	53	28	
BOURNVILLE BIRMINGHAM																				
April	-	-	94	-	9	130	-	-	186	164	-	216	705	-	50	-	37	-	2	
May	-	-	140	-	11	220	-	-	263	206	-	245	945	-	51	-	43	-	2	
June	-	-	57	-	7	169	-	-	130	132	-	135	573	-	35	-	37	-	2	
July	-	-	85	-	6	185	-	-	172	237	-	180	780	-	34	-	36	-	2	
August	-	-	72	107	10	124	185	375	225	116	202	145	830	89	52	22	36	4	1	
September	-	-	77	85	10	97	145	299	171	139	148	262	61	92	33	46	32	2	2	
October	-	-	94	113	8	115	145	79	171	169	113	206	589	64	33	45	51	2	1	
November	-	-	54	54	7	65	164	103	250	107	155	118	645	66	46	53	46	38	2	
December	-	-	81	94	7	5	196	121	191	108	150	166	658	43	87	38	43	2	2	
January	-	-	70	63	8	176	99	129	116	101	105	162	576	38	73	36	41	2	1	
February	-	-	18	100	5	121	128	103	182	103	175	128	460	33	94	32	31	1	1	
March	-	-	29	27	6	76	75	140	69	139	66	119	480	36	27	33	17	1	1	
Mean Monthly	-	-	62	85	8	114	145	185	168	123	150	168	598	55	57	38	36	2	1	
Summer Total	-	-	149	568	20	221	1,034	671	1,147	255	1,089	407	1,574	181	255	68	221	6	11	
Winter Total	-	-	346	451	41	37	691	811	867	728	716	936	3,207	260	435	236	215	10	7	
Annual Total	-	-	495	1,019	61	912	1,736	1,482	2,014	983	1,805	1,343	4,781	441	690	304	436	16	18	

1924-25 GLASGOW ALEXANDRA PARK	Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
		Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
		Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₂)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	46	9	193	288	73	253	816	178	59	14
May	42	2	160	468	46	121	797	74	22	7
June	50	2	142	383	37	239	803	105	35	10
July	73	12	119	338	214	391	1,074	165	61	15
August	90	6	100	229	50	167	552	152	36	14
September	76	10	63	185	171	321	750	154	46	14
October	69	10	115	225	179	214	743	123	35	12
November	50	29	149	216	124	246	764	109	36	11
December	107	10	161	175	174	391	851	215	89	30
January	97	14	122	202	179	440	957	279	172	24
February	57	12	99	142	161	276	690	108	59	23
March	23	7	99	170	105	182	563	79	53	6
Mean Monthly	65	10 B	127 B	247 B	126 B	270 B	780 B	145	59	15
Summer Total	377	41	777	1,891	591	1,492	4,792	828	259	74
Winter Total	403	82	745	1,070	922	1,749	4,568	913	444	106
Annual Total	780	123	1,522	2,961	1,513	3,241	9,360	1,741	703	180
BELLARH PARK										
April	44	14	154	341	186	317	1,012	159	29	15
May	95	3	90	276	160	431	960	202	25	16
June	44	7	104	267	219	445	1,042	131	17	18
July	76	3	74	160	235	470	942	152	29	10
August	76	2	82	252	76	275	687	153	23	14
September	89	2	52	116	152	304	626	154	41	10
October	70	19	104	148	208	272	751	127	27	10
November	71	8	85	230	132	315	770	190	34	6
December	106	15	107	88	239	351	800	264	72	16
January	104	5	77	186	210	417	895	509	216	42
February	67	8	63	184	40	239	534	178	43	17
March	27	11	109	250	128	248	746	156	47	7
Mean Monthly	72	8 B	92 A	208 B	166 B	340 B	814 B	192	50	15
Summer Total	424	31	556	1,412	1,028	2,242	5,269	951	164	83
Winter Total	445	66	545	1,086	957	1,842	4,496	1,364	439	98
Annual Total	869	97	1,101	2,498	1,985	4,084	9,765	2,315	603	181
BLYTHSWOOD SQUARE										
April	47	14	108	166	207	335	830	122	64	21
May	89	42	337	900	172	291	1,742	150	68	14
June	47	6	81	214	70	253	624	100	60	10
July	72	9	238	371	441	838	1,897	136	95	18
August	71	16	163	344	263	391	1,177	134	136	33
September	83	40	438	183	275	470	1,406	248	77	16
October	70	11	191	421	182	419	1,224	175	39	14
November	57	21	186	341	231	308	1,087	139	39	12
December	112	16	154	187	94	302	753	281	115	26
January	95	16	133	241	170	509	1,069	298	176	24
February	56	15	125	221	118	190	669	120	54	21
March	25	11	85	175	63	185	459	115	43	6
Mean Monthly	69	18 C	187 B	309 B	190 B	374 B	1,078 B	168	81	18
Summer Total	409	127	1,365	2,178	1,428	2,578	7,676	890	500	112
Winter Total	415	90	874	1,526	858	1,913	5,261	1,128	466	103
Annual Total	824	217	2,239	3,704	2,286	4,491	12,937	2,018	966	215

1924-25 GLASGOW BOTANIC GARDENS	Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
		Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
		Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₂)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	42	13	312	884	225	433	1,867	217	36	13
May	92	6	207	723	155	470	1,561	192	54	12
June	44	9	107	282	182	358	938	121	76	8
July	80	6	90	293	266	457	1,112	209	26	9
August	97	7	103	338	292	700	1,434	143	32	10
September	84	10	90	261	433	478	1,272	210	41	11
October	70	18	92	595	412	224	1,341	96	25	12
November	75	14	241	365	173	413	1,206	238	29	13
December	108	17	96	174	85	543	915	284	75	8
January	100	15	59	246	277	456	1,053	243	215	28
February	69	4	94	197	102	512	909	179	31	10
March	30	6	118	324	193	288	929	208	40	5
Mean Monthly	74	10 B	134 B	390 B	233 C	444 B	1,211 B	195	52	12
Summer Total	439	45	909	2,781	1,553	2,896	8,184	1,092	205	63
Winter Total	452	74	700	1,901	1,242	2,436	6,353	1,248	415	76
Annual Total	891	119	1,609	4,682	2,795	5,332	14,537	2,340	620	139
QUEEN'S PARK										
April	51	12	94	234	125	181	646	110	34	7
May	95	8	117	326	107	284	842	126	30	12
June	48	6	83	217	47	220	573	85	74	8
July	65	5	73	161	310	442	991	143	21	10
August	73	5	53	113	75	229	475	102	19	9
September	108	5	46	108	97	357	613	136	75	11
October	71	9	79	193	234	267	782	111	23	12
November	70	6	89	247	197	229	768	161	23	11
December	116	9	57	70	139	411	686	201	75	27
January	100	8	82	133	203	293	719	198	203	25
February	81	7	69	139	130	254	599	129	49	20
March	26	11	77	157	113	157	515	115	41	3
Mean Monthly	75	8 B	77 A	175 A	148 B	277 B	684 B	135	51	13
Summer Total	440	41	466	1,159	761	1,713	4,140	702	193	57
Winter Total	464	50	453	939	1,016	1,611	4,069	915	414	98
Annual Total	904	91	919	2,098	1,777	3,324	8,209	1,617	607	155
RICHMOND PARK										
April	47	19	244	455	192	184	1,094	120	39	19
May	86	13	190	556	88	269	1,116	137	33	19
June	53	5	116	404	142	326	993	191	30	12
July	70	5	75	258	214	482	1,034	128	30	14
August	73	3	106	273	56	237	675	165	22	14
September	85	3	159	429	121	343	1,055	160	46	21
October	72	22	190	373	295	1,254	178	33	21	
November	64	17	186	356	207	1,083	205	232	17	
December	140	18	138	162	218	334	870	225	65	14
January	97	15	112	241	320	420	1,108	189	170	24
February	76	9	123	212	276	265	885	204	77	15
March	25	15	124	358	151	194	842	187	47	6
Mean Monthly	74	12 B	147 B	340 B	197 B	305 B	1,001 B	174	69	16
Summer Total	414	48	890	2,375	813	1,841	5,967	901	200	99
Winter Total	474	96	873	1,702	1,546	1,825	6,042	1,188	624	97
Annual Total	888	144	1,763	4,077	2,359	3,666	12,009	2,089	824	196

1924-25 GLASGOW RUCHILL PARK				Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
					Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
					Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₃)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	-	-	-	57	4	154	294	88	185	725	127	43	14
May	-	-	-	101	17	210	825	136	291	1,479	249	72	14
June	-	-	-	52	3	57	118	52	235	465	53	19	7
July	-	-	-	81	7	64	132	121	254	578	119	34	11
August	-	-	-	86	4	79	190	48	311	632	123	34	14
September	-	-	-	83	20	46	145	92	282	585	167	30	11
October	-	-	-	70	12	85	257	245	277	876	157	23	13
November	-	-	-	80	11	162	240	120	278	811	117	34	8
December	-	-	-	109	11	96	96	89	327	619	209	74	18
January	-	-	-	101	19	80	110	324	312	845	209	209	20
February	-	-	-	72	8	64	120	100	223	515	139	45	20
March	-	-	-	33	15	55	124	254	363	811	86	48	5
Mean Monthly	-	-	-	77	11 B	96 A	221 B	139 B	278 B	745 B	146	55	13
Summer Total	-	-	-	460	55	610	1,704	537	1,558	4,464	838	232	71
Winter Total	-	-	-	465	76	542	947	1,132	1,780	4,477	917	433	84
Annual Total	-	-	-	925	131	1,152	2,651	1,669	3,338	8,941	1,755	665	155
TOLLGROSS PARK													
April	-	-	-	47	19	134	330	290	487	1,260	149	51	17
May	-	-	-	101	12	159	604	114	437	1,326	159	30	16
June	-	-	-	49	12	124	378	249	378	1,141	164	27	8
July	-	-	-	65	11	110	430	166	330	1,047	156	24	9
August	-	-	-	79	2	88	288	189	517	1,084	195	14	9
September	-	-	-	82	4	69	144	106	385	708	163	38	16
October	-	-	-	75	17	87	184	273	309	870	132	24	10
November	-	-	-	59	10	163	506	146	259	1,084	175	39	16
December	-	-	-	112	16	93	138	143	366	756	232	77	17
January	-	-	-	91	8	106	178	272	460	1,024	275	186	16
February	-	-	-	71	6	145	323	87	459	1,020	199	38	7
March	-	-	-	23	8	109	234	137	253	741	161	41	5
Mean Monthly	-	-	-	71	10 B	116 B	311 B	181 B	387 B	1,005 B	180	49	12
Summer Total	-	-	-	423	60	684	2,174	1,114	2,534	6,566	986	184	75
Winter Total	-	-	-	431	65	703	1,563	1,058	2,106	5,495	1,174	405	71
Annual Total	-	-	-	854	125	1,387	3,737	2,172	4,640	12,061	2,160	589	146
VICTORIA PARK													
April	-	-	-	46	12	133	361	119	303	928	150	33	17
May	-	-	-	91	3	124	342	135	398	1,002	176	45	14
June	-	-	-	39	6	106	268	139	280	799	119	14	5
July	-	-	-	47	20	296	514	331	285	1,446	191	23	8
August	-	-	-	72	12	140	219	89	359	819	126	28	7
September	-	-	-	80	25	298	427	265	559	1,574	210	56	19
October	-	-	-	63	23	163	348	523	468	1,525	164	47	15
November	-	-	-	68	9	110	210	173	352	854	125	46	14
December	-	-	-	97	12	79	56	198	390	735	138	68	24
January	-	-	-	97	8	92	180	221	366	867	322	213	14
February	-	-	-	62	6	72	162	568	431	1,239	207	58	22
March	-	-	-	29	14	49	135	75	229	502	113	36	6
Mean Monthly	-	-	-	66	13 B	138 B	268 B	236 C	369 B	1,024 B	170	56	14
Summer Total	-	-	-	375	78	1,097	2,131	1,078	2,184	6,568	972	199	70
Winter Total	-	-	-	416	72	565	1,091	1,758	2,236	5,722	1,069	468	95
Annual Total	-	-	-	791	150	1,662	3,222	2,836	4,420	12,290	2,041	667	165

Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)															
HUDDERSFIELD (COOPER BRIDGE) Old type gauge		Rainfall in mms.		Insoluble Matter			Soluble Matter			Included in Soluble Matter					
				Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash	Total Solids.	Sulphates (SO ₂).	Chlorine (Cl).	Ammonia (NH ₃).			
		1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25
April	-	30	43	232	227	375	880	135	38	27	38	30	27	38	30
May	-	40	97	143	232	286	761	138	30	32	30	30	32	30	32
June	-	61	73	94	246	246	662	119	41	32	41	41	32	41	32
July	-	72	108	135	156	462	874	146	42	38	42	38	38	14	78
August	-	54	103	197	156	425	875	215	38	33	38	33	33	33	78
September	-	42	49	76	296	385	704	185	23	51	23	51	27	54	27
October	-	48	27	60	527	540	1,320	389	20	76	20	76	46	46	46
November	-	66	113	116	321	367	915	249	66	49	66	49	66	33	16
December	-	46	100	205	312	476	997	190	49	33	49	33	33	16	16
January	-	36	154	162	321	367	905	187	42	15	42	15	15	—	—
February	-	13	89	194	161	410	1,245	132	40	68	40	68	14	14	68
March	-	26	30	73	214	748	330	146	41	27	41	27	21	21	5
Mean Monthly	-	45	79	147	268	359	844	202	41	49	41	49	27	40	40
Summer Total	-	168	451	861	1,409	1,547	4,290	619	115	236	74	236	74	288	288
Winter Total	-	235	416	750	1,644	2,072	5,143	1,203	252	298	165	298	165	154	154
Annual Total	-	403	867	1,611	2,412	2,998	7,596	1,822	367	534	239	534	239	442	442
HUDDERSFIELD DEIGHTON (Stoneware gauge)															
April	-	37	81	324	141	183	733	85	28	11	28	85	25	25	25
May	-	147	107	451	380	437	1,381	212	85	—	85	212	24	24	24
June	-	60	109	352	99	197	761	85	42	—	42	85	6	6	6
July	-	106	186	256	126	226	804	68	55	28	55	99	28	28	28
August	-	68	112	310	141	223	801	61	35	8	35	61	8	8	8
September	-	51	95	296	59	240	393	44	24	4	24	44	4	4	4
October	-	65	113	242	169	226	848	85	24	7	24	85	5	5	5
November	-	125	208	517	332	436	1,555	127	119	7	119	127	7	7	7
December	-	59	118	333	450	182	1,089	142	42	10	42	142	10	10	10
January	-	60	117	760	173	365	2,000	66	99	15	99	66	15	15	15
February	-	35	134	341	132	353	2,556	97	83	17	83	97	17	17	17
March	-	26	57	169	99	114	663	71	28	8	28	71	8	8	8
Mean Monthly	-	66	81	515	187	235	1,185	80	63	9	63	80	9	15	15
Summer Total†	-	225	436	2,085	326	1,254	5,187	173	114	15	114	173	15	81	81
Winter Total	-	370	455	3,583	1,355	1,326	7,855	547	342	67	342	547	67	87	87
Annual Total	-	595	891	5,668	1,681	2,580	13,042	720	456	82	456	720	82	168	168
* 1924-25. Gauge tampered with.															
† Three months only, 1923-24.															

* 1924-25. Gauge tampered with.

† Three months only, 1923-24.

LEEDS YORK ROAD		Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)																					
		Rainfall in mms.			Insoluble Matter				Soluble Matter				Included in Soluble Matter										
					Tar		Carbon- aceous other than Tar		Ash		Loss on Ignition		Ash		Total Solids			Sulphates (SO ₃)		Chlorine (Cl)		Ammonia (NH ₃)	
							3 yr. aver.	1924- 25	3 yr. aver.	1924- 25			3 yr. aver.	1924- 25				3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25
April	-	43	34	12	12	201	187	408	373	94	102	218	190	933	864	83	67	63	61	10	9		
May	-	81	83	9	15	232	254	403	437	362	150	257	267	1,263	1,123	71	83	87	83	12	10		
June	-	27	41	10	14	169	209	322	386	77	90	150	175	728	874	63	73	40	49	4	6		
July	-	78	77	7	5	233	203	409	355	106	93	216	240	971	896	79	74	57	62	9	8		
August	-	76	61	9	10	188	213	384	447	170	104	195	238	946	1,012	94	44	53	73	8	6		
September	-	59	62	6	2	182	142	325	291	186	143	180	212	879	790	94	48	74	75	8	8		
October	-	55	73	15	13	158	141	318	306	116	145	205	218	812	823	146	85	84	73	9	11		
November	-	41	50	9	13	170	146	237	224	87	95	178	161	681	73	72	79	88	72	8	11		
December	-	72	60	12	4	184	168	300	287	180	151	288	229	964	839	112	79	88	72	8	10		
January	-	42	49	11	11	154	192	262	317	146	176	271	283	845	979	63	89	90	117	5	8		
February	-	67	92	10	7	175	179	342	271	104	74	214	175	845	706	101	114	93	110	15	7		
March	-	23	19	11	7	154	168	301	344	94	131	163	135	723	785	55	36	57	56	8	6		
Mean Monthly	-	55	58	10	9	183	184	334	337	144	121	211	210	882	861	86	72	71	75	9	8		
Summer Total	-	364	358	53	58	1,205	1,208	2,251	2,289	995	682	1,216	1,322	5,720	5,559	484	389	374	403	51	48		
Winter Total	-	300	343	68	55	995	994	1,760	1,749	727	772	1,319	1,201	4,870	4,771	550	475	472	493	53	53		
Annual Total	-	664	701	121	113	2,200	2,202	4,011	4,038	1,722	1,454	2,535	2,523	10,590	10,330	1,034	864	846	896	104	101		
LEEDS																							
HEADINGLEY																							
April	-	49	38	3	7	34	46	52	57	76	92	117	100	282	302	56	79	33	42	5	7		
May	-	79	84	4	8	45	56	47	45	91	151	161	201	347	461	51	40	47	50	7	7		
June	-	36	51	6	9	58	65	44	51	76	92	149	92	333	309	50	35	29	31	3	5		
July	-	87	73	2	3	35	34	45	19	116	103	154	198	352	357	64	10	20	37	13	10		
August	-	75	64	3	1	59	15	45	39	99	129	151	90	357	254	86	35	39	45	11	3		
September	-	65	71	3	2	44	27	46	46	68	36	109	114	270	209	77	24	42	43	3	3		
October	-	51	71	3	2	25	20	44	45	83	99	101	85	256	251	43	43	49	56	3	2		
November	-	43	56	1	1	17	19	33	47	71	101	103	84	225	252	43	35	37	39	3	4		
December	-	68	65	2	1	25	40	31	55	74	59	135	137	266	292	42	31	50	52	5	5		
January	-	44	55	2	2	27	49	40	64	77	88	133	175	279	378	40	43	175	71	2	3		
February	-	69	99	1	2	21	25	41	38	89	79	119	149	271	293	51	61	63	89	3	6		
March	-	25	17	5	1	27	34	57	29	62	51	100	67	250	176	42	24	37	29	2	2		
Mean Monthly	-	58	62	3	3	35	36	44	42	82	90	128	124	291	295	54	39	42	49	5	5		
Summer Total	-	391	381	21	30	275	243	279	221	526	603	841	795	1,942	1,892	384	223	210	248	42	35		
Winter Total	-	300	363	14	9	142	187	246	278	456	477	691	691	1,547	1,642	261	237	293	336	18	22		
Annual Total	-	691	744	35	39	417	430	525	499	982	1,080	1,532	1,486	3,489	3,534	645	460	503	584	60	57		

LEEDS HUNSLET	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)																			
	Rainfall in mms.	Insoluble Matter			Soluble Matter			Included in Soluble Matter			Total Solids	Included in Soluble Matter								
		Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash	Sulphates (SO ₃)	Chlorine (Cl)	Ammonia (NH ₃)											
3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25	3 yr. aver.	1924- 25							
April	50	36	27	14	270	260	956	862	185	117	548	372	1,986	1,625	232	150	90	69	13	13
May	54	85	17	14	372	553	645	383	173	204	432	323	1,641	1,477	214	143	97	93	12	13
June	36	36	16	13	163	303	497	481	179	100	268	272	1,063	1,169	97	93	52	50	7	11
July	84	72	6	5	224	180	674	491	153	172	356	387	1,413	1,235	128	96	63	64	11	11
August	78	55	8	12	242	246	637	565	179	99	311	319	1,317	1,241	116	79	45	55	14	8
September	57	61	9	9	213	387	848	1,761	129	170	299	333	1,498	2,660	122	131	49	79	13	22
October	47	74	11	10	208	223	531	674	129	133	323	471	1,202	1,511	137	192	75	81	10	18
November	45	45	9	5	167	157	353	503	147	206	367	474	1,047	1,339	160	215	90	76	34	14
December	73	62	13	5	207	283	435	679	192	149	364	459	1,211	1,575	179	194	90	74	15	13
January	42	49	13	9	174	217	480	583	197	266	498	577	1,362	1,652	214	231	100	142	8	17
February	67	94	7	4	267	201	734	507	174	329	389	376	1,571	1,417	168	223	92	103	10	21
March	24	19	10	7	213	182	532	376	151	69	375	119	1,282	693	168	76	76	65	10	9
Mean Monthly	54	57	12	9	227	266	610	650	156	168	378	373	1,382	1,466	161	152	77	79	13	14
Summer Total	353	345	83	67	1,484	1,929	4,258	4,543	878	862	2,215	2,006	8,918	9,407	909	692	396	410	70	78
Winter Total	298	343	63	40	1,236	1,257	3,065	3,262	990	1,152	2,316	2,476	7,669	8,187	1,026	1,131	523	541	87	92
Annual Total	651	688	146	107	2,720	3,186	7,323	7,805	1,868	2,014	4,531	4,482	16,587	17,594	1,935	1,823	919	951	157	170
PARK SQUARE																				
April	47	31	15	14	130	90	413	270	153	188	267	276	978	838	122	125	60	63	3	5
May	53	84	17	12	222	249	802	576	123	134	269	253	1,438	1,224	117	101	63	93	6	6
June	34	45	21	14	186	190	399	517	113	118	216	163	935	1,002	74	68	54	50	3	4
July	93	83	12	10	190	216	450	331	159	301	865	468	1,176	1,326	111	126	79	100	8	11
August	77	61	8	11	167	163	435	426	124	160	260	296	998	1,056	92	97	80	117	6	5
September	59	59	6	9	176	178	480	502	75	71	214	231	947	991	77	53	77	47	3	4
October	49	73	7	8	188	170	434	565	100	110	217	234	946	1,087	81	100	80	88	4	4
November	52	54	9	7	141	163	344	416	143	125	223	212	860	923	87	78	92	76	4	4
December	74	67	10	5	158	199	545	691	112	107	287	307	1,112	1,309	133	71	120	100	6	4
January	45	56	10	10	144	226	350	523	116	151	291	410	911	1,320	103	143	104	134	26	71
February	68	91	10	4	168	143	484	429	123	148	278	342	1,063	1,066	114	146	97	102	8	4
March	23	19	6	5	102	124	327	321	89	99	184	707	708	656	75	55	40	54	2	7
Mean Monthly	56	60	11	9	164	176	455	464	119	143	256	275	1,005	1,067	90	97	79	85	6	10
Summer Total	363	363	79	70	1,071	1,086	2,979	2,622	747	972	1,591	1,687	6,467	6,437	587	570	413	470	29	35
Winter Total	311	360	52	39	901	1,025	2,484	2,945	683	740	1,480	1,612	5,600	6,361	493	593	533	554	40	89
Annual Total	674	723	131	109	1,972	2,111	5,463	5,567	1,430	1,712	3,071	3,299	12,067	12,798	1,080	1,163	946	1,024	69	124

1924-25		Rain-fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)										
			Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter				
			Tar	Carbon-aceous other than Tar	Ash	Loss on Ignition	Ash		Sul-phates (SO ₃)	Chlor-ine (Cl)	Am-monia (NH ₃)		
KINGSTON-UPON-HULL													
April	- - -	38	16	263	488	202	387	1,356	149	84	12		
May	- - -	45	12	229	428	194	330	1,193	160	55	9		
June	- - -	59	15	175	420	223	448	1,281	220	75	11		
July	- - -	67	9	249	564	227	489	1,538	217	90	13		
August	- - -	60	15	186	312	204	356	1,073	212	70	14		
September	- - -	48	11	281	409	204	343	1,248	217	61	13		
October	- - -	80	14	471	711	439	857	2,492	381	85	18		
November	- - -	43	10	280	427	233	485	1,435	220	46	6		
December	- - -	73	7	418	211	212	458	1,306	234	73	9		
January	- - -	28	13	132	179	166	248	738	97	70	8		
February	- - -	57	13	249	474	204	390	1,330	185	89	10		
March	- - -	35	16	370	708	181	395	1,670	282	104	12		
Mean Monthly	- -	53	13 B	275 B	444 B	224 B	432 B	1,388 B	215	75	11		
Summer Total	- -	317	78	1,383	2,621	1,254	2,353	7,689	1,175	435	72		
Winter Total	- -	316	73	1,920	2,710	1,435	2,833	8,971	1,399	467	63		
Annual Total	- -	633	151	3,303	5,331	2,689	5,186	16,660	2,574	902	135		
KINGSTON-UPON-THAMES													
April	- - -	105	59	144	509	189	226	1,127	76	47	13		
May	- - -	106	17	122	203	156	193	691	72	26	1		
June	- - -	76	4	44	72	89	100	309	37	17	3		
July	- - -	111	4	87	52	83	263	489	89	36	1		
August	- - -	66	4	133	19	26	164	346	41	23	1		
September	- - -	93	7	76	100	50	183	416	47	26	1		
October	- - -	118	10	86	147	269	227	739	133	19	4		
November	- - -	89	4	79	127	267	528	1,005	141	170	6		
December	- - -	78	13	77	107	116	240	553	84	57	6		
January	- - -	60	8	59	80	153	372	672	92	59	7		
February	- - -	120	16	91	200	290	290	887	124	84	6		
March	- - -	11	20	139	385	69	91	704	41	13	0		
Mean Monthly	- -	86	14 B	95 A	167 A	146 B	240 B	662 B	81	48	4		
Summer Total	- -	557	95	606	955	593	1,129	3,378	362	175	20		
Winter Total	- -	476	71	531	1,046	1,164	1,748	4,560	615	402	29		
Annual Total	- -	1,033	166	1,137	2,001	1,757	2,877	7,938	977	577	49		
LIVERPOOL													
April	- - -	48	22	809	1,835	221	491	3,378	228	79	25		
May	- - -	104	22	404	827	332	457	2,042	214	88	25		
June	- - -	99	24	309	629	259	298	1,519	181	49	19		
July	- - -	94	20	398	876	280	430	2,004	238	66	35		
August	- - -	144	21	323	508	289	519	1,660	292	92	34		
September	- - -	101	16	440	1,343	244	569	2,612	244	101	22		
October	- - -	98	24	340	696	236	472	1,768	209	59	22		
November	- - -	46	16	247	552	192	293	1,300	134	49	13		
December	- - -	85	29	291	536	271	407	1,534	221	78	20		
January	- - -	39	26	320	678	401	509	1,934	220	153	16		
February	- - -	121	35	314	628	363	460	1,800	158	137	25		
March	- - -	17	14	261	630	279	352	1,536	198	66	10		
Mean Monthly	- -	83	22 C	371 C	811 C	281 C	438 B	1,923 C	211	85	22		
Summer Total	- -	590	125	2,683	6,018	1,625	2,764	13,215	1,397	475	160		
Winter Total	- -	406	144	1,773	3,720	1,742	2,493	9,872	1,140	542	106		
Annual Total	- -	996	269	4,456	9,738	3,367	5,257	23,087	2,537	1,017	266		

1924-25 NEWCASTLE-ON-TYNE CITY ROAD*		Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)										
			Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter				
			Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₃)	Chlor- ine (Cl)	Am- monia (NH ₃)		
April†	-	-	-	—	—	—	—	—	—	—	—	—	
May	-	-	-	134	47	817	933	401	481	2,679	220	104	28
June	-	-	-	70	39	840	1,373	224	322	2,798	164	60	9
July	-	-	-	123	39	1,135	1,394	518	936	4,022	279	184	28
August	-	-	-	75	24	661	994	209	314	2,202	149	72	17
September	-	-	-	66	15	500	668	225	291	1,699	150	66	12
October	-	-	-	81	55	747	749	209	290	2,050	180	51	15
November	-	-	-	26	18	548	707	145	266	1,684	132	31	10
December	-	-	-	57	31	454	482	240	354	1,561	168	45	11
January	-	-	-	49	93	753	1,235	177	365	2,623	206	45	10
February	-	-	-	65	51	1,333	1,555	221	428	3,588	312	51	10
March	-	-	-	41	138	218	3,675	349	855	5,235	522	57	8
Mean Monthly	-	-	72	50	728	1,259	265	446	2,740	226	70	14	
				D	D	D	C	B	D	B	B	B	
Summer Total -	-	-	468	164	3,953	5,362	1,577	2,344	13,400	962	486	94	
Winter Total -	-	-	319	387	4,053	8,403	1,341	2,558	16,741	1,520	280	64	
Annual Total -	-	-	787	551	8,006	13,765	2,918	4,902	30,141	2,482	766	158	
TOWN MOOR†													
April	-	-	-	—	—	—	—	—	—	—	—	—	
May	-	-	-	—	—	—	—	—	—	—	—	—	
June	-	-	-	—	—	—	—	—	—	—	—	—	
July	-	-	-	—	—	—	—	—	—	—	—	—	
August	-	-	-	—	—	—	—	—	—	—	—	—	
September	-	-	-	—	—	—	—	—	—	—	—	—	
October	-	-	-	—	—	—	—	—	—	—	—	—	
November	-	-	-	—	—	—	—	—	—	—	—	—	
December	-	-	-	—	—	—	—	—	—	—	—	—	
January	-	-	-	57	30	236	293	204	250	1,013	129	72	11
February	-	-	-	57	37	97	113	80	68	395	41	28	3
March	-	-	-	50	14	80	95	102	119	410	40	35	9
Mean Monthly	-	-	—	—	—	—	—	—	—	—	—	—	
Summer Total -	-	-	—	—	—	—	—	—	—	—	—	—	
Winter Total -	-	-	—	—	—	—	—	—	—	—	—	—	
Annual Total -	-	-	—	—	—	—	—	—	—	—	—	—	
WESTGATE CEMETERY†													
April	-	-	-	—	—	—	—	—	—	—	—	—	
May	-	-	-	—	—	—	—	—	—	—	—	—	
June	-	-	-	—	—	—	—	—	—	—	—	—	
July	-	-	-	—	—	—	—	—	—	—	—	—	
August	-	-	-	—	—	—	—	—	—	—	—	—	
September	-	-	-	—	—	—	—	—	—	—	—	—	
October	-	-	-	—	—	—	—	—	—	—	—	—	
November	-	-	-	—	—	—	—	—	—	—	—	—	
December	-	-	-	—	—	—	—	—	—	—	—	—	
January	-	-	-	56	61	337	353	344	423	1,518	231	83	11
February	-	-	-	69	74	111	265	431	278	1,159	174	64	12
March	-	-	-	63	3	164	277	250	400	1,094	214	64	11
Mean Monthly	-	-	—	—	—	—	—	—	—	—	—	—	
Summer Total -	-	-	—	—	—	—	—	—	—	—	—	—	
Winter Total -	-	-	—	—	—	—	—	—	—	—	—	—	
Annual Total -	-	-	—	—	—	—	—	—	—	—	—	—	

* Old type gauge. † Results lost owing to change of site. New site 100 yards from old. ‡ Stoneware gauge.

Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)																															
ROTHAMSTED	Rainfall in mms.			Insoluble Matter			Soluble Matter			Included in Soluble Matter																					
	Tar			Carbonaceous other than Tar			Ash			Loss on Ignition			Ash			Total Solids			Sulphates (SO ₃)			Chlorine (Cl)			Ammonia (NH ₃)						
	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25	1924-25	5 yr. aver.	1924-25		
April	50	82	—	—	65	77	107	185	203	343	168	429	543	1,034	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
May	49	95	—	—	88	99	107	108	111	188	96	119	402	514	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
June	27	47	—	—	66	5	117	36	77	101	102	117	356	259	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
July	87	111	—	—	90	141	220	571	211	308	137	119	659	1,139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
August	49	59	—	—	74	66	74	34	104	201	88	22	340	323	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
September	64	86	—	—	59	78	67	90	134	67	113	107	373	342	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
October	61	115	—	—	44	27	75	67	113	228	132	147	364	469	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
November	42	—	—	—	32	—	73	—	78	—	205	147	388	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
December	72	120	—	—	55	78	104	144	196	526	176	202	532	950	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
January	43	56	—	—	41	85	85	152	299	835	169	224	594	1,296	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
February	50	87	—	—	52	51	100	85	89	85	191	230	432	451	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
March	37	23	—	—	38	22	72	56	113	78	161	37	384	793	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Mean Monthly	53	80	—	—	59	66	100	136	143	269	145	159	447	631	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Summer Total	326	480	—	—	442	466	692	1,022	834	1,208	704	913	2,673	3,610	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Winter Total	305	401	—	—	262	263	509	504	888	1,752	1,034	840	2,694	3,359	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Annual Total	631	881	—	—	704	729	1,201	1,526	1,722	2,960	1,738	1,753	5,367	6,969	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
MARPLE																															
CHESHIRE	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	3 yr. aver.	1924-25	1924-25	
April	47	—	6	—	70	—	—	56	103	170	—	94	329	56	47	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
May	106	—	3	—	103	—	—	29	170	191	—	150	455	262	53	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
June	80	—	0	—	50	—	—	9	191	256	—	74	324	106	47	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
July	127	—	6	—	65	—	—	47	—	—	—	115	—	489	126	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
August	146	—	9	—	176	—	—	21	161	—	—	161	—	529	103	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
September	76	—	15	—	173	—	21	27	409	121	161	100	650	191	59	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
October	111	122	8	—	103	62	6	35	132	147	154	109	373	353	91	259	88	97	3	2	2	2	2	2	2	2	2	2	2	2	
November	81	40	9	—	92	35	120	12	147	15	217	32	585	706	78	35	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
December	106	92	—	—	76	65	47	35	191	65	138	73	432	238	138	150	73	63	3	3	3	3	3	3	3	3	3	3	3	3	
January	92	53	6	—	53	29	26	24	191	29	156	77	452	159	—	103	47	68	3	3	3	3	3	3	3	3	3	3	3	3	
February	26	147	15	18	94	62	212	20	53	194	153	103	527	397	64	182	64	117	3	6	6	6	6	6	6	6	6	6	6	6	
March	21	41	6	—	44	56	221	52	67	59	138	103	476	270	65	31	62	57	2	2	2	2	2	2	2	2	2	2	2	2	
Mean Monthly	90	—	8	—	79	—	—	37	126	—	—	98	—	341	71	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Summer Total	582	—	39	—	637	—	—	189	—	1,002	—	695	—	2,562	408	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Winter Total	437	495	44	30	462	309	632	178	781	509	926	497	2,845	716	432	447	22	20	20	20	20	20	20	20	20	20	20	20	20	20	
Annual Total	—	1,077	—	69	—	946	—	367	—	1,511	—	1,192	—	4,085	855	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ROCHDALE (Stoneware gauge)	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)			
	Rainfall in mms.	Insoluble Matter	Soluble Matter	Total Solids
	1924-25	1924-25	1924-25	1924-25
April	49	2,442	519	2,961
May	152	2,050	533	2,583
June	60	2,078	301	2,379
July	116	2,589	326	2,915
August	176	1,860	1,020	2,880
September	122	1,875	600	2,475
October	143	880	893	1,773
November	68	835	365	1,200
December	147	822	595	1,417
January	97	1,054	573	1,627
February	187	888	936	1,824
March	48	1,891	462	2,353
Mean Monthly	114	1,605	594	2,199
Summer Total	675	12,894	3,299	16,193
Winter Total	690	6,370	3,824	10,194
Annual Total	1,365	19,264	7,123	26,387

1924-25 ST. HELENS	Rainfall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)						
		Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter
		Tar	Carbonaceous other than Tar	Ash	Loss on Ignition	Ash		
April	46	43	789	1,212	196	323	2,563	157
May	136	28	328	424	375	476	1,631	237
June	66	5	188	234	133	298	858	470
July	110	5	59	75	219	274	632	117
August	148	11	193	276	297	445	1,222	226
September	102	20	399	689	210	479	1,797	265
October	93	14	119	304	278	556	1,271	271
November	40	8	692	1,117	127	245	2,189	131
December	84	7	343	555	277	311	1,493	195
January	42	10	211	325	106	233	885	110
February	120	5	10	14	210	420	659	283
March	27	12	202	287	88	142	731	79
Mean Monthly	81	15	320	500	209	344	1,388	205
Summer Total	608	112	1,956	2,910	1,430	2,295	8,703	1,472
Winter Total	286	51	1,567	2,588	876	1,487	6,569	786
Annual Total	894	163	3,523	5,498	2,306	3,782	15,272	2,258

STOKE-ON-TRENT	Rainfall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)						
		Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter
		Tar	Carbonaceous other than Tar	Ash	Loss on Ignition	Ash		
April	70	172	243	324	350	1,089	122	73
May	76	112	192	145	132	581	47	42
June	79	90	178	218	163	649	81	47
July	106	174	236	240	228	878	91	53
August	127	107	131	220	153	611	52	45
September	77	106	162	128	153	549	64	43
October	107	143	205	125	152	625	63	64
November	36	—	157	98	132	492	58	22
December	72	—	99	126	116	493	66	58
January	57	32	152	127	94	168	573	83
February	79	35	88	147	122	143	535	63
March	23	54	66	266	79	131	596	62
Mean Monthly	74	128	181	159	171	639	71	50
Summer Total	515	761	1,142	1,275	1,179	4,357	457	313
Winter Total	374	121	653	1,028	878	3,314	395	291
Annual Total	889	1,535	2,170	1,909	2,057	7,671	852	604

* Results useless—figures omitted from winter totals.

SALFORD MODE WHEEL	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)											
	Insoluble Matter				Soluble Matter				Included in Soluble Matter			
	Rainfall in mm		Tar		Carbon- aceous other than Tar		Ash		Loss on Ignition		Total Solids	
	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25
April	—	37	—	17	—	430	—	493	—	109	—	1,301
May	—	117	—	34	—	579	—	544	—	246	—	1,672
June	—	20	—	26	—	249	—	427	—	111	—	1,264
July*	—	104	—	103	—	235	—	682	—	198	—	1,344
August	—	107	—	155	—	166	—	155	—	218	—	1,344
September	—	109	—	12	—	398	—	338	—	246	—	1,344
October	—	116	—	131	—	358	—	370	—	218	—	1,344
November	—	118	—	43	—	354	—	370	—	218	—	1,344
December	—	106	—	89	—	605	—	687	—	218	—	1,344
January	—	88	—	42	—	712	—	1,183	—	218	—	1,344
February	—	23	—	151	—	412	—	436	—	218	—	1,344
March	—	36	—	35	—	427	—	278	—	218	—	1,344
Mean Monthly	—	83	—	27	—	451	—	510	—	181	—	1,497
Summer Total	—	340	—	68	—	1,498	—	1,278	—	773	—	4,822
Winter Total	—	487	—	491	—	3,013	—	3,821	—	1,040	—	10,149
Annual Total	—	827	—	271	—	4,511	—	5,099	—	1,813	—	14,971

SALFORD RECENT SQUARE	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)											
	Insoluble Matter				Soluble Matter				Included in Soluble Matter			
	Rainfall in mm		Tar		Carbon- aceous other than Tar		Ash		Loss on Ignition		Total Solids	
	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25
April	—	40	—	25	—	652	—	611	—	97	—	1,571
May	—	123	—	22	—	444	—	580	—	208	—	1,501
June	—	95	—	11	—	466	—	228	—	180	—	1,057
July	—	103	—	25	—	369	—	352	—	197	—	1,131
August	—	145	—	36	—	347	—	272	—	261	—	1,160
September	—	107	—	31	—	477	—	388	—	311	—	1,374
October	—	124	—	25	—	424	—	410	—	264	—	1,409
November†	—	41	—	19	—	391	—	369	—	110	—	1,058
December	—	110	—	96	—	377	—	544	—	231	—	1,429
January	—	80	—	17	—	288	—	543	—	303	—	1,490
February	—	24	—	159	—	430	—	488	—	222	—	1,256
March	—	38	—	17	—	480	—	477	—	72	—	1,410
Mean Monthly	—	92	—	22	—	453	—	383	—	163	—	1,228
Summer Total	—	588	—	150	—	2,747	—	2,431	—	1,090	—	7,619
Winter Total	—	376	—	89	—	1,939	—	2,088	—	868	—	6,994
Annual Total	—	1,102	—	267	—	5,433	—	4,597	—	1,958	—	14,754

* Gauge removed to Ladywell Sanatorium in July 1924.

† November 1923—water lost.

WAKEFIELD	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)											
	Insoluble Matter				Soluble Matter				Included in Soluble Matter			
	Rainfall in mms.		Tar		Carbon- aceous other than Tar		Ash		Loss on Ignition		Total Solids	
	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25
April	36	—	29	—	221	—	323	—	794	—	2,093	—
May	—	107	—	32	—	258	—	350	—	1,267	—	3,010
June	—	93	—	49	—	245	—	239	—	588	—	1,542
July	—	73	—	17	—	193	—	351	—	653	—	1,954
August	—	67	—	13	—	162	—	272	—	551	—	1,636
September	—	71	—	19	—	207	—	490	—	495	—	1,883
October	—	87	—	22	—	193	—	320	—	796	—	2,181
November	—	53	—	24	—	212	—	264	—	745	—	2,004
December	—	53	—	27	—	207	—	293	—	834	—	2,238
January	—	43	—	34	—	258	—	498	—	856	—	2,529
February	—	24	—	24	—	207	—	420	—	737	—	1,767
March	—	24	—	32	—	183	—	368	—	323	—	1,912
Mean Monthly	—	68	—	25	—	213	—	349	—	706	—	2,042
Summer Total	—	447	—	159	—	1,286	—	2,025	—	4,134	—	12,118
Winter Total	—	366	—	145	—	1,266	—	2,163	—	4,334	—	12,388
Annual Total	—	813	—	304	—	2,552	—	4,188	—	8,468	—	24,506

SALFORD (COUNTY BOROUGH)	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)											
	Insoluble Matter				Soluble Matter				Included in Soluble Matter			
	Rainfall in mms.		Tar		Carbon- aceous other than Tar		Ash		Loss on Ignition		Total Solids	
	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25	1923- 24	1924- 25
April	66	37	78	24	287	—	451	—	159	—	1,166	—
May	—	98	32	32	404	—	644	—	380	—	1,698	—
June	—	17	18	35	351	—	461	—	77	—	1,110	—
July	—	103	37	29	380	—	506	—	184	—	1,291	—
August	—	134	—	29	398	—	582	—	228	—	1,533	—
September	—	93	30	25	408	—	572	—	143	—	1,513	—
October	—	113	37	58	354	—	539	—	316	—	1,597	—
November	—	112	38	21	345	—	423	—	154	—	1,385	—
December	—	101	90	24	294	—	419	—	332	—	1,410	—
January	—	87	44	19	108	—	543	—	271	—	1,400	—
February	—	21	145	20	301	—	370	—	219	—	999	—
March	—	38	39	24	308	—	459	—	110	—	1,149	—
Mean Monthly	—	77	86	25	321	—	477	—	162	—	1,337	—
Summer Total	—	377	560	135	1,830	—	2,539	—	978	—	6,778	—
Winter Total	—	472	477	145	1,707	—	2,715	—	972	—	7,940	—
Annual Total	—	849	1,037	280	3,537	—	5,254	—	1,950	—	14,718	—

SOUTHPORT WOODVALE MOSS						Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)					
						Rainfall in mms.	Total Insoluble		Total Soluble		Total Solids
						1924-25	1924-25		1924-25		1924-25
April	-	-	-	-	-	47	37	172		209	
May	-	-	-	-	-	91	148	245		393	
June	-	-	-	-	-	95	22	151		173	
July	-	-	-	-	-	115	75	61		136	
August	-	-	-	-	-	122	65	244		309	
September	-	-	-	-	-	96	300	481		781	
October	-	-	-	-	-	116	94	348		442	
November	-	-	-	-	-	39	361	219		580	
December	-	-	-	-	-	88	174	93		267	
January	-	-	-	-	-	39	104	224		328	
February	-	-	-	-	-	107	94	267		361	
March	-	-	-	-	-	18	126	136		262	
Mean Monthly	-	-	-	-	-	81	133	220		353	
Summer Total	-	-	-	-	-	566	647	1,354		2,001	
Winter Total	-	-	-	-	-	407	953	1,287		2,240	
Annual Total	-	-	-	-	-	973	1,600	2,641		4,241	

1924-25 SOUTHPORT HESKETH PARK					Rain- fall in mms.	Grammes per Square Dekametre (Metric Tons per Hundred Square Kilometres)								
						Insoluble Matter			Soluble Matter		Total Solids	Included in Soluble Matter		
						Tar	Carbon- aceous other than Tar	Ash	Loss on Ignition	Ash		Sul- phates (SO ₃)	Chlor- ine (Cl)	Am- monia (NH ₃)
April	-	-	-	-	53	7	59	71	111	192	440	109	47	Trace
May	-	-	-	-	138	10	172	188	206	172	748	111	42	7
June	-	-	-	-	54	1	21	14	74	40	150	39	15	Trace
July	-	-	-	-	117	3	92	44	87	76	302	125	24	8
August	-	-	-	-	122	Trace	26	25	49	122	222	50	84	Trace
September	-	-	-	-	128	4	107	82	159	173	525	79	108	Trace
October	-	-	-	-	107	4	105	96	64	160	429	55	75	Trace
November	-	-	-	-	40	7	50	75	69	98	299	37	47	Trace
December	-	-	-	-	107	5	147	132	134	187	605	96	86	Trace
January	-	-	-	-	56	—	13	33	195	260	501	47	127	Trace
February	-	-	-	-	97	6	94	94	48	72	314	69	78	1
March	-	-	-	-	26	4	118	102	39	97	360	26	43	Trace
Mean Monthly	-	-	-	-	87	4	84	80	103	137	408	70	65	1
						A	A	A	B	A	A			
Summer Total	-	-	-	-	612	25	477	424	686	775	2,387	513	320	15
Winter Total	-	-	-	-	433	26	527	532	549	874	2,508	330	456	1
Annual Total	-	-	-	-	1,045	51	1,004	956	1,235	1,649	4,895	843	776	16

Referring to this table, we can now compare the monthly values for the whole year with the 5 years' average.

Rainfall.—Out of 33 stations the rainfall in the current year was lower than the average in 5 and higher in 27, while in 1 station it was equal to the average.

Tar.—Out of 30 stations the deposit of tar was lower than the average in 19, higher in 5 and equal to the average in 6.

Insoluble Carbonaceous Matter.—Out of 31 stations the deposit for the current year was lower than the average in 14 and higher in 17.

Insoluble Ash.—Out of 31 stations the deposit was lower than the average in 18 and higher in 13.

Soluble Loss on Ignition.—Out of 31 stations this was lower than the average in 15 and higher in 16.

Soluble Ash.—Out of 31 stations the deposit was lower than the average in 20 and higher in 11.

Total Deposit.—Out of 33 stations the deposit was lower than the average in 21 and higher in 12.

Sulphates.—Out of 30 stations the deposit was lower than the average in 18 and higher in 12.

Chlorine.—Out of 30 stations the chlorine was lower than the average in 18, higher in 10 and equal to the average in 2.

Ammonia.—Out of 30 stations the deposit was lower than the average in 15, higher in 10 and equal to the average in 5.

The conditions shown in Table 2 are only very slightly different from the previous year, with the exception of rainfall where in 27 stations out of 33 it was above the average.

(5) COMPARISON OF SUMMER AND WINTER DEPOSITS

In Table 3 the incidence of deposit at the different stations is compared, based upon the total for the six months of the summer and winter respectively. The letters "S" and "W" in the first column refer to summer and winter and the table gives the station with the highest and lowest deposits of each of the elements of pollution in the summer and winter respectively.

TABLE 3.—Highest and Lowest Results for the Summer and Winter of the Current Year based on Summer and Winter Totals.

	General Average	1924-25
S Most rainfall	Blackburn — Technical College.	Blackburn Fever Hospital.
S Least "	London — Wandsworth Common.	Huddersfield—Cooper Bridge.
W Most "	Blackburn — Technical College.	Rochdale.
W Least "	London — Wandsworth Common.	London — Finsbury Park.
S Most tar	Liverpool	Newcastle - on - Tyne.

	General Average	1924-25
S Least tar	Birmingham — S. Western.	Birmingham — S. Western.
W Most "	Southport — Hesketh Park.	Newcastle - on - Tyne.
W Least "	Newcastle-on-Tyne Blackburn — Technical College.	Leeds—Headingley.
S Most carbonaceous	Leeds — Headingley.	Newcastle - on - Tyne.
S Least "	Blackburn — Technical College.	Leeds—Headingley.
W Most "	Leeds—Headingley	Newcastle - on - Tyne.
W Least "	Newcastle-on-Tyne	Leeds—Headingley.
S Most insoluble ash	Leeds—Headingley	Liverpool.
S Least "	Blackburn — Technical College.	Marple.
W Most "	Leeds—Headingley	Newcastle - on - Tyne.
W Least "	Birmingham—Central.	Marple.
S Most volatile salts	Leeds—Headingley	Wakefield.
S Least "	Glasgow — Blythswood Square.	Birmingham — S. Western.
W Most "	Bournville — Birmingham.	Wakefield.
W Least "	London — Southwark Park.	Birmingham — S. Western.
S Most soluble ash	Leeds—Headingley	Wakefield.
S Least "	Blackburn	Marple.
W Most "	Rothamsted	Wakefield.
W Least "	St. Helens	Marple.
S Most deposit	Leeds—Headingley	Blackburn—Technical College.
S Least "	Rochdale	Leeds—Headingley.
W Most "	Leeds—Headingley	Newcastle - on - Tyne.
W Least "	Leeds—Headingley	Marple.
S Most sulphates	London — Southwark Park.	Wakefield.
S Least "	Leeds—Headingley	Leeds—Headingley.
W Most sulphates	London — Southwark Park.	Wakefield.
W Least "	Leeds—Headingley	Leeds—Headingley.
S Most chlorine	St. Helens	Wakefield.
S Least "	Birmingham — S. Western.	Birmingham — S. Western.
W Most "	St. Helens	Wakefield.
W Least "	Birmingham — S. Western.	Birmingham — S. Western.
S Most ammonia	London — Golden Lane.	Huddersfield—Cooper Bridge.
S Least "	Leeds — Park Square.	Bournville—Birmingham.
W Most "	Liverpool	Huddersfield—Cooper Bridge.
W Least "	Birmingham — S. Western.	Southport Hesketh Park.

TABLE 4.—Comparison of Mean Monthly Deposit for Summer (April–September) and Winter (October–March) of the Current Year.

Summer deposit greater indicated by S.
Winter deposit greater indicated by W.

STATION	Rainfall	Insoluble		Soluble	Included in Soluble Matter	TOTAL SOLIDS	Sulphate (SO ₃)	Chlorine (Cl)	Ammonia (NH ₃)
		Tar	Carbonaceous other than Tar	Loss on Ignition	Ash				
LONDON :—									
Meteorological Office	S	S	S	W	W	W	W	W	S
Archbishop's Park	W	S	S	S	W	S	W	W	W
Finsbury Park	S	S	S	S	W	S	W	W	S
Ravenscourt Park									
Soot	W	W	W	W	W	W	W	W	W
Stoneware	S	W	W	S	W	W	W	W	W
Southwark Park	S	W	W	S	W	W	W	W	S
Victoria Park	S	W	W	S	W	W	W	W	S
Wandsworth Common.	S	W	S	S	W	S	S	W	S
Golden Lane	S	=	S	S	W	S	W	W	S
BIRMINGHAM :—									
Aston	S	W	S	S	W	S	S	W	S
Central	S	S	S	S	W	S	S	W	S
South Western	W	W	S	W	W	W	W	W	S
BLACKBURN :—									
Technical College	S	W	S	S	S	S	W	W	W
Fever Hospital	W	W		S	W				
Bournville—									
Birmingham	S	S	S	S	S	S	W	S	S
GLASGOW :—									
Alexandra Park	W	W	S	S	W	S	W	W	W
Bellahouston Park	W	W	S	S	S	S	W	W	W
Blythswood Square	W	S	S	S	S	S	W	S	S
Botanic Gardens	W	W	S	S	S	S	W	W	W
Queen's Park	W	W	S	S	W	S	W	W	W
Richmond Park	W	W	S	S	W	S	W	W	S
Ruchill Park	W	W	S	S	W	W	W	W	W
Tolleross Park	W	W	W	S	S	S	W	W	S
Victoria Park	W	S	S	S	W	S	W	W	W
HUDDERSFIELD :—									
Cooper Bridge	W	S	S	S	W	S	W	W	S
Deighton	W	S	W	W	W	W	W	W	W
Kingston-upon-Hull	S	S	W	W	W	W	W	W	S
Kingston-on-Thames	S	S	S	W	W	W	W	W	W
LEEDS :—									
Headingley	S	S	S	W	S	S	W	W	S
Hunslet	S	S	S	S	W	S	W	W	W
Park Square	S	S	S	W	S	S	W	W	W
York Road	S	S	S	S	W	S	W	W	W
Liverpool	S	W	S	S	W	S	S	W	S
Marple	S	S	S	S	S	S	S	W	S
Newcastle-on-Tyne	S	W	W	W	S	W	W	S	S
Rochdale	W	S			W	S			
Rothamsted	S	S	S	S	W	S	S	S	S
St. Helens	S	S	S	S	S	S	S	S	S
SALFORD :—									
Regent Square	S	S	S	S	S	S	S	W	W
County Borough	S	S	S	S	S	S	S	W	W

STATION.	Rainfall	Insoluble		Soluble	Included in Soluble Matter	TOTAL SOLIDS	Sulphate (SO ₃)	Chlorine (Cl)	Ammonia (NH ₃)
		Tar	Carbonaceous other than Tar	Loss on Ignition	Ash				
Southport—Hesketh Park	S	W	W	W	S	W	W	S	S
Woodvale Moss	S		W		S	W			
Stoke-on-Trent	S	S	S	S	S	S	S	S	S
Wakefield	S	S	S	W	W	S	W	W	S

We may now compare the incidence of deposit at the different stations in summer and in winter. Referring to Table 4 :—

Rainfall.—Out of 44 stations, the winter rainfall was higher in 16 while the summer was higher in 28.

Tar.—Out of 36 stations, the winter deposit of tar was greater in 15, while the summer deposit was greater in 20. The deposits were equal in one station—Golden Lane, London.

Carbonaceous Matter.—Out of 40 stations, the deposit was greater in winter in 9 and in summer in 31.

Insoluble Ash.—Out of 41 stations the winter deposit was greater in 11 and the summer in 30.

Soluble Loss on Ignition.—Out of 41 stations, the winter deposit was greater in 24 and the summer deposit in 17.

Soluble Ash.—Out of 41 stations, the winter deposit was greater in 21 and the summer in 20.

Total Deposit.—Out of 44 stations the winter deposit was higher in 16 and the summer in 28.

Sulphates.—Out of 40 stations, the winter deposit was higher in 29 and the summer in 11.

Chlorine.—Out of 40 stations, the winter deposit was higher in 35, while in 5 only was the deposit higher in summer.

Ammonia.—Out of 40 stations, in 17 the winter deposit was the higher and in 23 the summer deposit.

(6) STONEWARE GAUGE

Twenty stoneware gauges are now in operation including the experimental gauge in Ravenscourt Park, while 28 of the original standard gauges are in use.

(7) POSITIONS OF GAUGES

In previous annual reports (First, Second and Third) maps have been included showing the positions of the deposit gauges in a number of localities. Since this was done additional stations have been established for observations with the deposit gauge, generally with the new pattern stoneware collecting vessel.

In addition several automatic filters are now in regular use, as referred to later in this report.

In the following maps the positions of the respective observation stations not previously published are shown. In the case of London and Glasgow the maps are included to show the positions of the automatic filters, although similar ones showing the positions of the deposit gauges have been published in earlier reports. The deposit gauges are indicated by large rings and the automatic filters by small.

(8) OBSERVATIONS ON DEPOSIT OF SULPHATES

A rather curious relation appears to exist between the amount of sulphate deposited from the air and the amount of total impurity. It appears from an examination of the figures available that, roughly speaking, the greater the total impurity deposited from the air the lower is the percentage of sulphates. The accompanying Table 5 has been prepared to illustrate this point and three stations have been taken with very varying total impurities, that is, London—Golden Lane, Newcastle-on-Tyne and Malvern. It is remarkable to observe the high percentage of sulphur in the country station at Malvern Wells.

As representative of the soot pollution the carbonaceous matter has also been given in the table and there appears to be a definite inverse relation between the percentage of carbonaceous matter and that of sulphates.

TABLE 5.—Relation of Sulphur Deposit to Total Impurity

Metric Tons per Hundred Square Kilometre

Station	Sulphates as SO ₃		Carbonaceous matter		Total solids		Sulphates as percentage of total solids		Carbonaceous matter as percentage of total solids	
	Sum-mer	Win-ter	Sum-mer	Win-ter	Sum-mer	Win-ter	Sum-mer	Win-ter	Sum-mer	Win-ter
1917-18—										
London—Golden Lane -	1206	1110	1374	1500	7902	7632	15.3	14.6	17.4	19.7
Newcastle-on-Tyne -	1464	918	3180	2190	15426	9540	9.5	9.6	20.6	23.0
Malvern - - -	444	318	120	42	1854	1272	23.9	25.0	6.5	3.3
1919-20—										
London—Golden Lane -	924	1032	1368	1632	6366	7254	14.5	14.1	21.4	22.5
Newcastle-on-Tyne -	—	1146	—	1866	—	8940	—	12.8	—	20.9
Malvern - - -	780	504	108	84	2214	1536	35.2	32.9	4.9	5.5
1920-21—										
London—Golden Lane -	744	870	1776	1662	7038	6654	10.6	13.1	25.2	25.0
Newcastle-on-Tyne -	762	780	2523	1962	10848	9024	7.0	8.6	23.3	21.8
Malvern - - -	246	420	96	84	1122	1908	21.9	22.0	8.6	4.4
1921-22—										
London—Golden Lane -	614	836	2198	1709	6935	7023	8.8	11.9	31.7	24.4
Newcastle-on-Tyne -	750	845	2592	3055	11066	10277	6.8	8.2	23.2	29.8
Malvern - - -	354	394	108	71	1292	1419	27.4	27.8	8.4	5.0

Metric tons per 100 square kilometres multiplied by:—

0.0256 = English tons per square mile

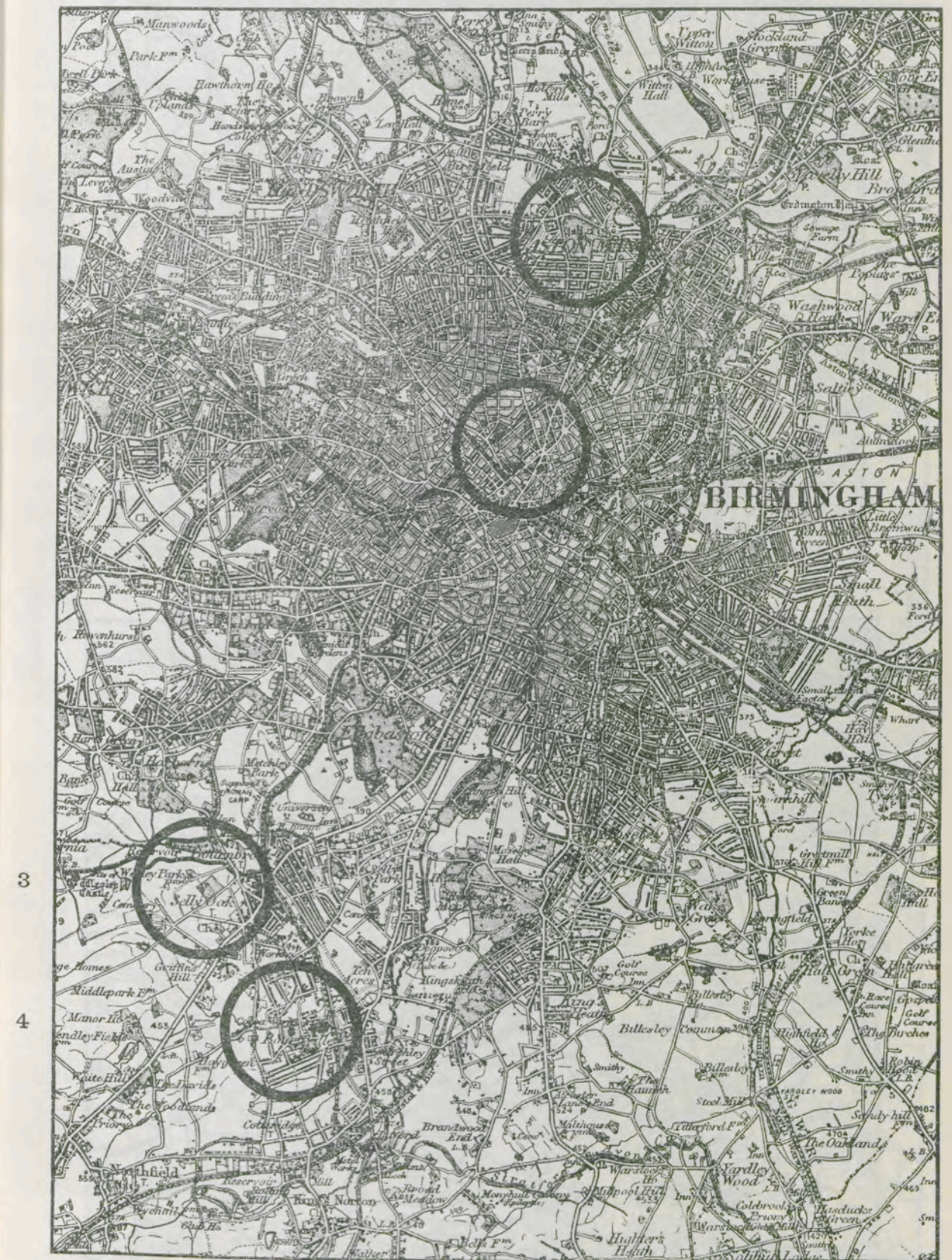
0.09 = lbs. per acre.

(Continued on page 40.)

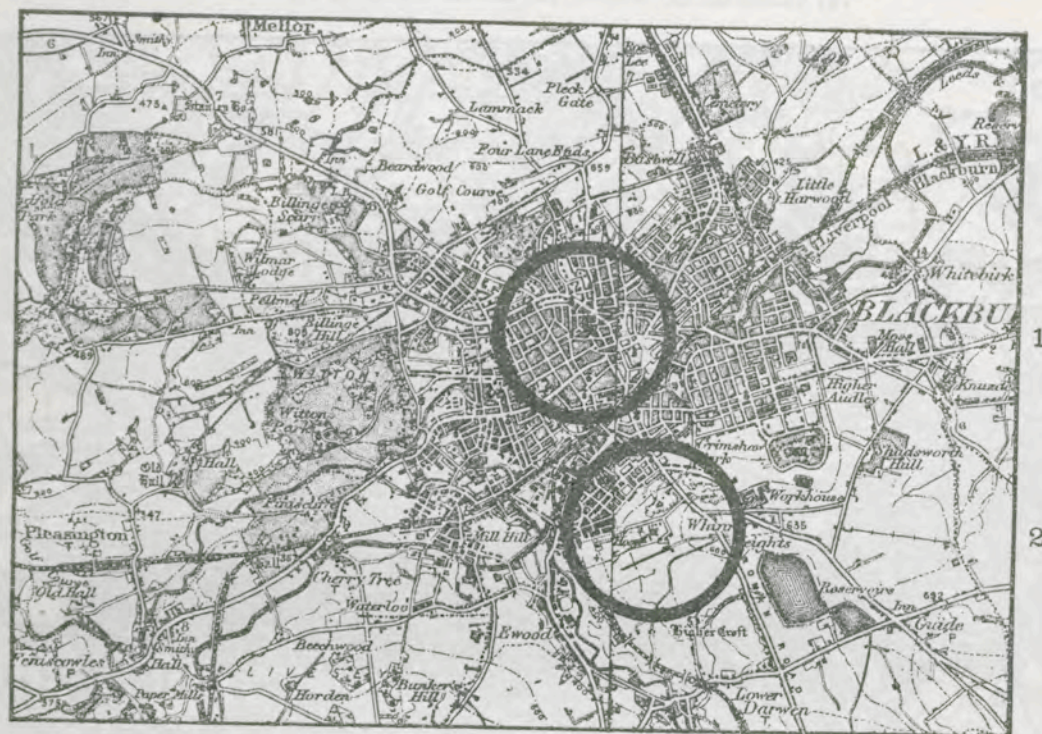


BIRMINGHAM

(1) CENTRAL, (2) ASTON, (3) SOUTH-WESTERN, (4) BOURNVILLE



BLACKBURN—(1) TECHNICAL COLLEGE, (2) FEVER HOSPITAL



HUDDERSFIELD—(1) COOPER BRIDGE, (2) DEIGHTON



GLASGOW

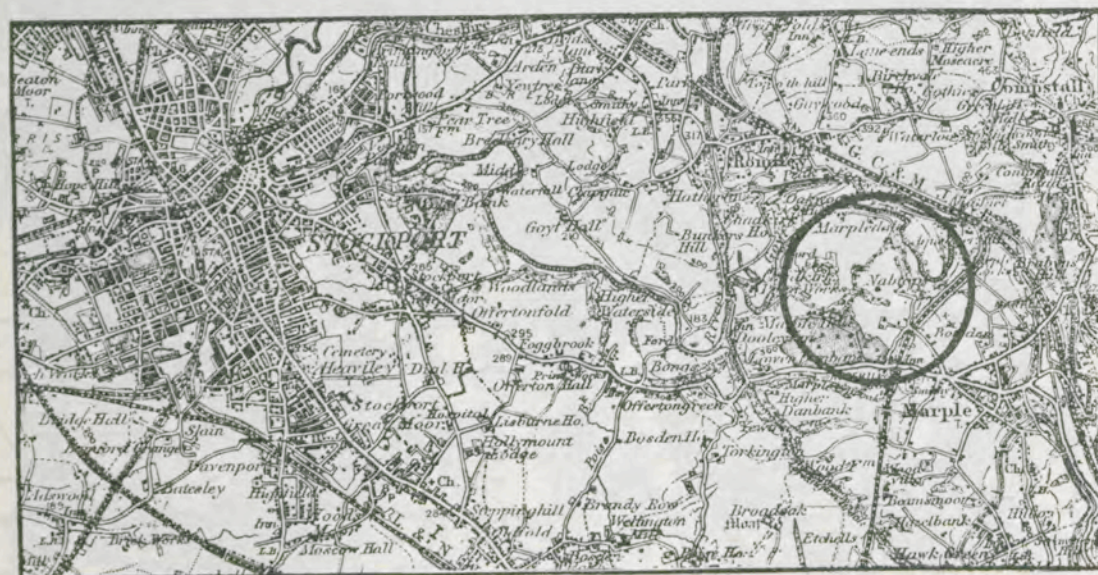
(1) ALEXANDRA PARK, (2) BELLAHOUSTON PARK, (3) BLYTHWOOD SQUARE, (4) BOTANIC GARDENS, (5) RICHMOND PARK, (6) RUEHILL PARK, (7) QUEEN'S PARK, (8) TOLLCROSS PARK, (9) VICTORIA PARK



KINGSTON-UPON-THAMES

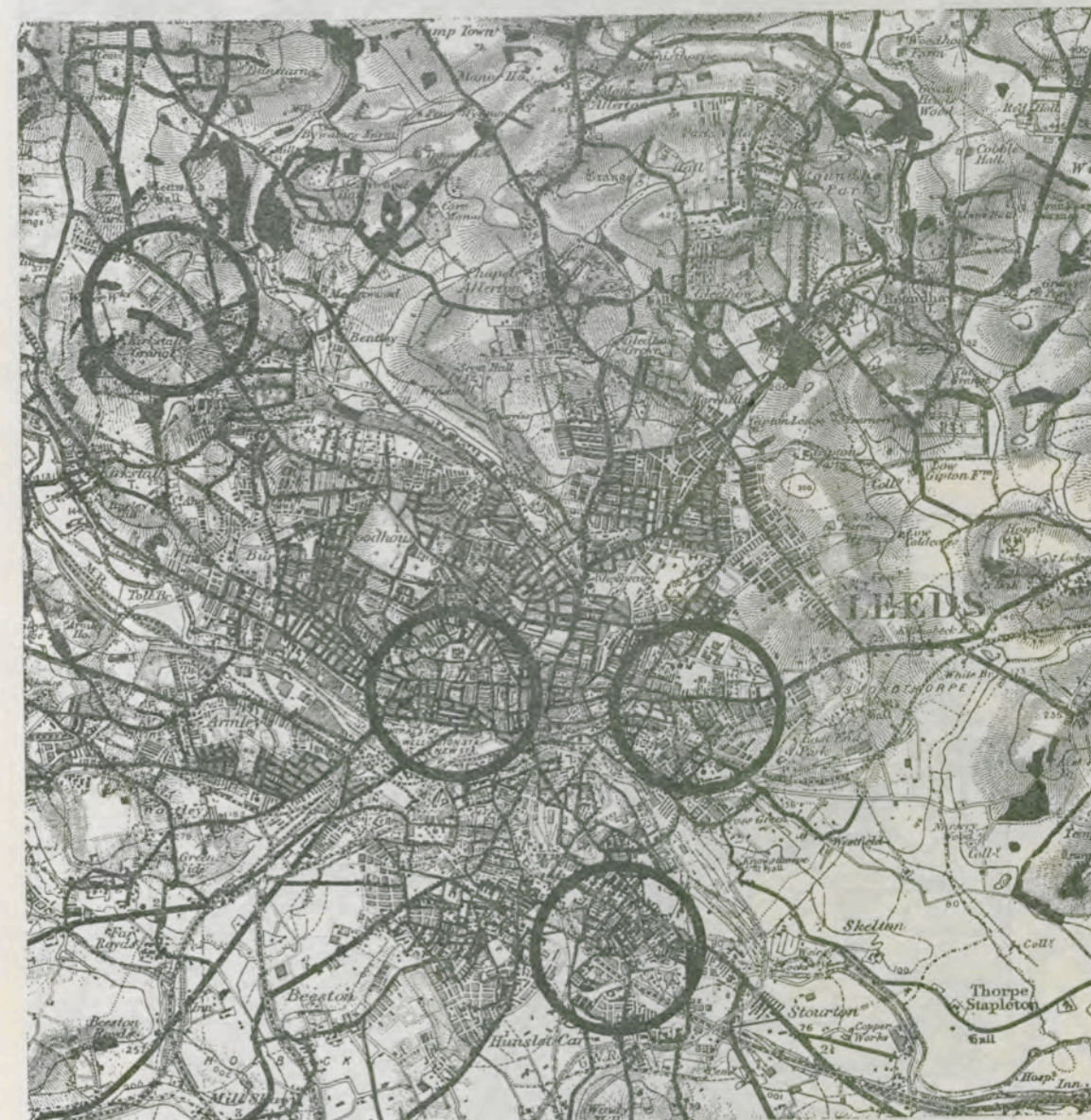


MARPLE

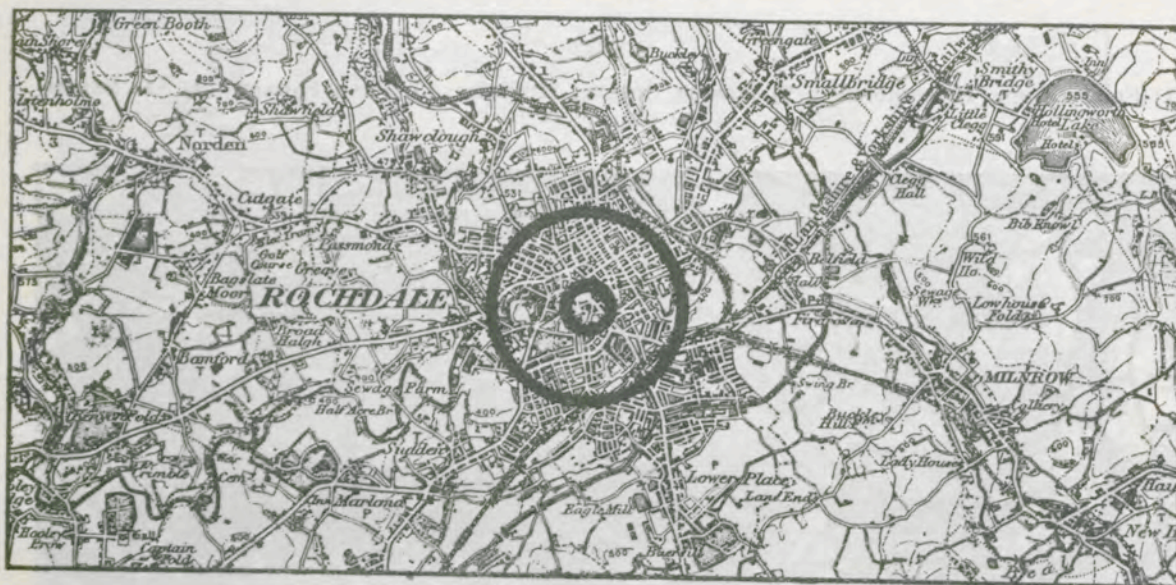


LEEDS

(1) FILTER BEDS, HEADINGLEY ; (2) POWELL STREET, HUNSLET ; (3) PARK SQUARE ; (4) ALL SAINTS CHURCH, YORK ROAD



ROCHDALE



ROTHAMSTED



SALFORD—(1) LADYWELL SANATORIUM, (2) MODE WHEEL, (3) REGENT SQUARE

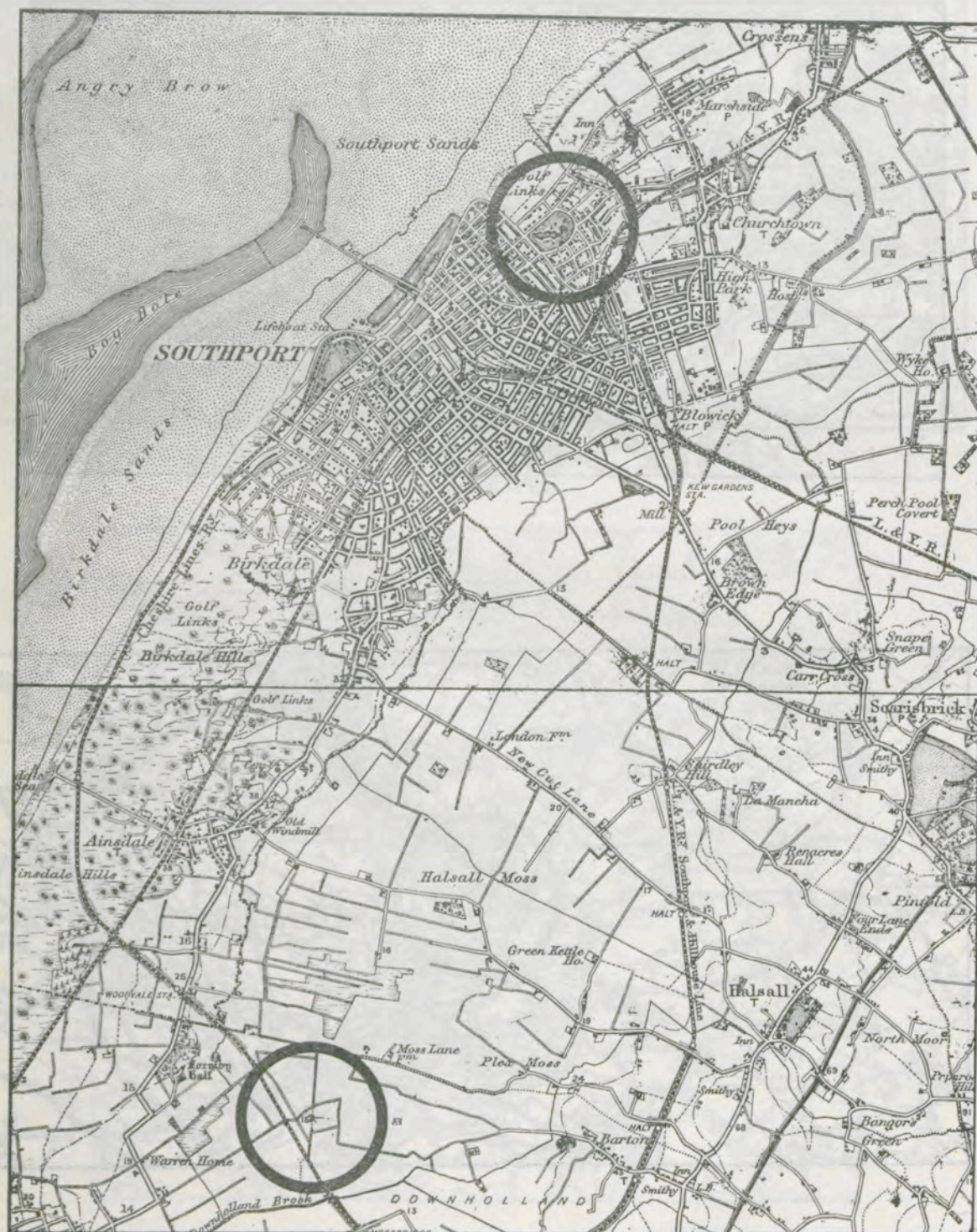


WAKEFIELD



SOUTHPORT

(1) HESKETH PARK; (2) WOODVALE MOSS



2

STOKE-UPON-TRENT—(1) HANLEY SEWAGE WORKS, (2) TUNSTALL SEWAGE WORKS



1

(Continued from page 28.)

Looking at the winter figures for Golden Lane for the year 1921-22 we have a total deposit of 179.8 tons, a sulphur percentage of 11.9 and carbonaceous 24. At Malvern, with a deposit of 36.3 tons the sulphur percentage was 27.8 and the carbonaceous 5. It is evident that we have here some factor calling for an explanation. It may be assumed that the origin of the sulphates at Malvern is from fires and probably from distant cities. Why then should the sulphate increase in concentration relative to the other constituents as the distance it travels increases? Have we here a selective deposit by which the sulphur impurities remain longer in suspension than the carbonaceous and insoluble dust? Evolution of sulphur acids from fires must be in fairly constant quantity and cannot depend upon the smoke emission. Thus, when the sulphur content of the deposit is given as a percentage of the total it is reasonable to expect that it will show an inverse relation to that total; for example, if we take an extreme case of no smoke being emitted, the quantity of sulphur remaining the same, it will form an extremely high percentage of the total deposit, as the products being soluble come down with the rain. On the other hand, should solid matter be emitted, such as soot and ash, this will tend to reduce the percentage of sulphur when taken on the whole deposit.

In support of this is the fact that although the percentages of sulphates at Malvern are excessively high the actual quantities are very low. For example, in the summer of 1921-22, Malvern had 27.4 per cent of sulphates, accounted for by a total sulphate deposit of 354 metric tons per 100 square kilometres. Newcastle had a percentage of 6.8, but a deposit of 750 metric tons per 100 square kilometres, and London 8.8 per cent and 614 metric tons per 100 square kilometres.

It has also to be remembered that the sulphur referred to now is that which is deposited from the air and since the greater the amount deposited the less will be left behind, we may be observing Nature's method of purifying the air by causing a rapid deposit of the sulphur impurities which would otherwise remain suspended in the air. When the impurities have drifted so far from their source as to have only the very finest particles in suspension there is little or no tendency to settlement unless it is aided in some way. It is known that condensation of water to form rain commences upon hygroscopic nuclei and it appears not improbable that a selective action may go on by which the deposit of sulphur salts from the air takes precedence of the less soluble and less hygroscopic impurities.

This is a point calling for investigation into the facts, as it appears possible to explain it on the basis either of the sulphur travelling further than the other impurities, or possibly that when smoke is reduced by burning smokeless fuels which contain sulphur, the ratio of sulphur to soot in the air increases.

SECTION 2.—RESULTS OBTAINED WITH AUTOMATIC FILTER

(1) INSTRUMENTS IN USE

No new instruments have been installed during the current year.

Curves are shown for Blackburn, Stoke-on-Trent and Westminster. Blackburn and Stoke-on-Trent appeared in last year's report and Westminster curves in several past reports but it has been thought advisable to show the Westminster curves here again as the similarity of each year's curves is striking.

In all these curves the days have been divided, as previously, into weekdays, Saturdays and Sundays, while a general division has been made into days of much smoke haze or "Z" days, and those without any abnormal haze. The use of the symbol "Z" to indicate hazy days was explained in the *Tenth Annual Report* as it has been felt that the use of the word "fog" as applied to smoke haze is somewhat misleading. In all the curves shown the three lower lines are for the ordinary days, the three upper for "Z" days.

(2) RESULTS FOR BLACKBURN AND STOKE-ON-TRENT AND WESTMINSTER

Referring now to Blackburn (Fig. 1), perhaps the most striking thing is the inclination towards a double maximum of impurity for week-days and Saturdays, which is absent on the Sunday curves. This has been already referred to in the *Tenth Report*, the first maximum probably being due to industrial and the second mainly to domestic smoke.

The summer curves for Blackburn (Fig. 2) show much the same characteristics as the winter, except that there is less impurity and the double maximum is not so well marked. The Sunday maximum in the summer occurs at 10 a.m., while the week-day maximum is about 7.15 a.m., Greenwich Mean Time. These times are delayed in the winter curves so that the week-day maximum occurs about 8.15 a.m. while the Sunday maximum is at 11 a.m., but this is due to the change from Summer Time.

In studying these curves allowance must be made for the number of Saturdays and Sundays being necessarily less than week-days. Thus the curves for Saturdays and Sundays are likely to be less regular. The Blackburn curves show a well-marked rise in the afternoon commencing about 1 p.m., and reaching a maximum about 6 p.m., after which the reduction becomes fairly steady until a little after midnight.

The Stoke-on-Trent curves are somewhat irregular (Fig. 3 and 4), more particularly in the afternoon. This was observed in the curves for last year and referred to in the *Tenth Report* as probably due to the nature of the industry carried on. The same general characteristics are observable as in other cities; the period of least impurity in the early hours of the morning, followed by a rise to a maximum in the forenoon, which maximum is delayed on Sundays, and the fall in the afternoon; all these are evident.

SUSPENDED IMPURITY IN THE AIR

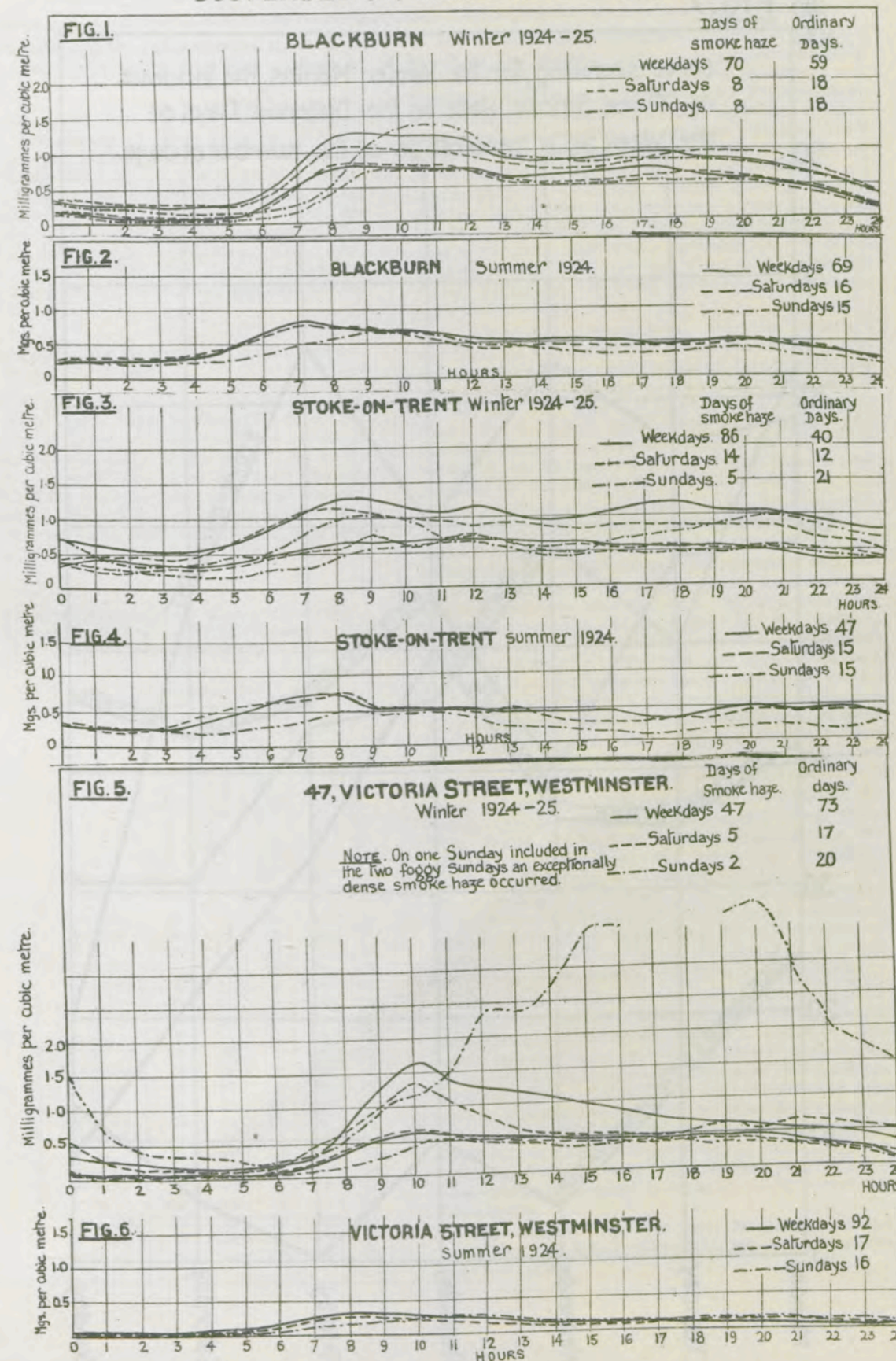
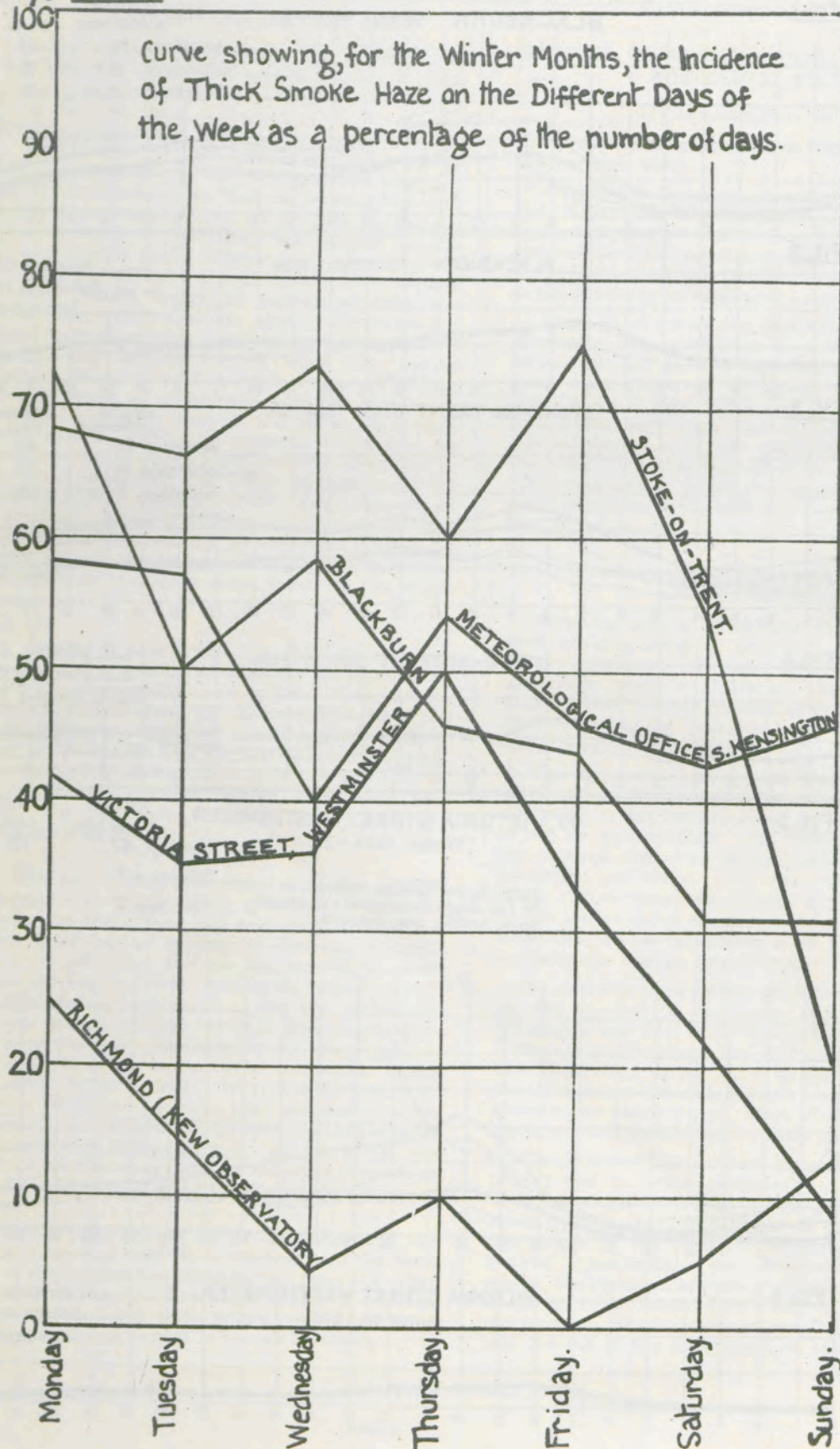


FIG. 7.



The same remarks apply to the summer and winter curves, the irregularity being very well marked in both.

The curves shown here for Westminster (Figs. 5 and 6) are very similar to those given in previous reports. The very high Sunday curve is not to be taken as representative as it is due to an abnormally dense smoke haze on one of the two Sundays included. On that particular Sunday (January 11th, 1925) the highest shade on the scale for the automatic filter was exceeded, a very rare occurrence. This, combined with the fact that only two Sundays are included in the days of smoke haze, accounts for the very abnormal curve.

(3) COMPARISON OF DIFFERENT DAYS OF THE WEEK

A curve is given in Fig. 7 similar to Fig. 5 in the Tenth Report, with which it should be compared. The object is to bring out the incidence of smoke haze on the different days of the week. As in the Tenth Report, a table has been prepared showing for each day of the week the total number of observations available, the number of thick smoke hazes on that particular day, and the percentage of such days which had thick smoke haze. This is shown in Table 6.

TABLE 6.—Table showing for the Winter Months the Incidence of thick Smoke Haze on the different days of the Week, that is of days ranking as "Z"

		London				
		Victoria Street	Meteorological Office, South Kensington	Kew Observatory, Richmond	Blackburn	Stoke-on-Trent
Monday	Total No.	24	19	20	26	25
	Z days	10	11	5	19	17
	%	42	58	25	73	68
Tuesday	Total No.	23	23	14	26	26
	Z days	8	13	2	13	17
	%	35	57	14	50	66
Wednesday	Total No.	25	25	23	26	26
	Z days	9	10	1	15	19
	%	36	40	4	58	73
Thursday	Total No.	24	24	19	26	25
	Z days	12	13	2	12	15
	%	50	54	10	46	60
Friday	Total No.	24	24	17	25	24
	Z days	8	11	0	11	18
	%	33	46	0	44	75
Saturday	Total No.	23	23	20	26	26
	Z days	5	10	1	8	14
	%	22	43	5	31	54
Sunday	Total No.	22	24	24	26	26
	Z days	2	11	3	8	5
	%	9	46	13	31	19

It will be simpler to examine the curves in Fig. 7:— In all of the stations there is a general tendency towards fewer thick smoke hazes on Saturdays and Sundays while between Mondays and Fridays there is not any very definite indication that haze is more frequent on one day than on another. In last year's curve for Victoria Street there was a definite maximum on Wednesdays; this has now disappeared and the maximum is on Thursdays. Stoke-on-Trent showed a fairly steady fall from Monday to the following Sunday; this fall is not now repeated and does not commence until Saturday. Similarly, in the other stations it cannot be said that there is an indication of any particular day being more subject to smoke haze than another.

The tendency towards fewer hazes on Saturdays and Sundays was noticeable in last year's curves and there appears to be a reasonable explanation for this since on Saturdays factories are usually closed down for half the day, while on Sundays they are mostly closed for the whole day. Thus on Saturdays and Sundays we have a great reduction of the amount of industrial smoke emitted and therefore there is less material for the manufacture of smoke haze.

To avoid the complication introduced by Summer Time, the change to which was made on April 13th, and back again on September 21st, the days in April before Summer Time came into operation and the days in September after the return to Greenwich Mean Time have been omitted. In this connexion it may be pointed out that since all the evidence indicates that the systematic variations in suspended impurity throughout the day are due to human activities it would be a disturbing factor if two groups of days were included in the same curves during one of which groups such activities were timed an hour earlier than in the other. It has therefore been thought best to omit the few days before the beginning and after the end of Summer Time.

It is to be noted, however, that all times in the curves have been reduced to Greenwich Mean Time. This should be kept in mind in interpreting the results. For example, the week-day maximum shown in Blackburn as occurring at 7.15 a.m. G.M.T. was actually at 8.15 Summer Time, or, in other words, so far as the inhabitants of Blackburn are concerned, having set the clocks to Summer Time, the week-day maximum appears to be at the same time in the summer as in the winter, according to their clocks.

The results of the automatic recorders at Kew Observatory and the Meteorological Office, South Kensington, are shown in Tables 7, 8 and 9. The figures given are averages of a number of days shown on the left-hand margin and represent milligrammes per cubic metre. Table 7 is for ordinary summer days without abnormal haze at Kew and the Meteorological Office; Table 8 is for ordinary winter days without abnormal haze for the same stations, while Table 9 is for days of smoke haze, that is days on which the shade number exceeded 4, or 1.28 milligrammes per cubic metre.

The distribution over the 24 hours is not materially different in these stations, as can be seen from the tables.

(4) EFFECT OF WIND ON IMPURITY

The impurity derived from the smoke of chimneys must have its concentration profoundly affected by the wind velocity as this will determine the amount of dilution which the smoke undergoes. The smoke from a chimney becomes mixed with the air owing to the turbulence of the latter. If there were no turbulence and the wind blew in perfect stream line motion we should have long streams of smoke passing down wind and with little lateral or vertical spread. In such a case the length of stream produced from an hour's smoke would be obviously a function of the wind velocity. The smoke from a large city drifts down wind and has not much opportunity of dilution by lateral spread except at the margins of the smoke drift owing to the large area of the source, while the degree of vertical spread is limited by the condition of the air as regards turbulence, convection currents and more profoundly by the variations in the lapse rate or vertical temperature gradient.

As it appeared that useful information might be given on this subject if a large number of observations on suspended impurity could be plotted against wind velocities the figures for 1921-24, obtained from the automatic recorder at 47, Victoria Street, were tabulated for the winter days only, in order to eliminate errors due to seasonal variation in smoke production. The wind velocities at Kew were supplied by the Meteorological Office, and the mean values of the suspended matter for all the observations at particular wind velocities were plotted against the wind velocity in metres per second; the result was a curve as shown in Fig. 8. The point of observation being at Westminster was fairly centrally situated and there was thus a large smoke producing area on all sides. For this reason no account was taken of wind direction as it was assumed that the amount of smoke produced was sensibly the same in all directions around Westminster. This, though not strictly true, is probably sufficiently accurate not to introduce any important error. The quantities plotted both for wind velocities and impurity were averages for each day and doubtless errors were introduced by neglecting the lag in establishing steady conditions when the wind velocity changed during the day; for example, during a very light wind it would take the smoke from the outer parts of the city a much longer time to reach the point of observation than it would during winds of higher velocity, and the assumption was made in this graph that steady conditions had been established. This is likely to cause a more erratic distribution for the low wind velocities than for the higher velocities, since the period required for establishing a steady state is greater with the lower than with the higher. The figure, however, is somewhat remarkable in giving a fairly smooth curve, the equation to which is:—

$$I = \frac{0.55}{V} + 0.27$$

I being the concentration of impurity in milligrammes per cubic metre and V the wind velocity in metres per second.

It is remarkable that this curve indicates a variation of the concentration of impurity inversely as the first power of the velocity of the wind and not as some higher power of the velocity, which one would expect if there had been a free lateral and vertical spread of the smoke as well as the stretching out downwind. For the present it will be sufficient to give the actual results found from the graph and it is evident what a profound effect the wind velocity has upon smoke concentration. When the wind drops below 1 metre per second or $2\frac{1}{4}$ miles per hour in winter a smoke haze, or fog in London appears almost inevitable under present conditions.

If we examine the horizontal part of the curve and consider the limiting factors, it is evident that however high the velocity of the wind the impurity can never reach a zero value if there is any smoke production. On the other hand, considering the vertical part of the curve where it approaches zero wind velocity, it appears certain that the condition when the wind has no velocity can give no definite maximum value to the impurity except that governed by the total possible emission of smoke in the immediate vicinity of the point of observation. Under these conditions one would expect the relation to break down and other factors to govern the quantity of impurity. If there is no wind whatever then there is no machinery to remove the smoke and it must simply collect in a pall over the chimney producing it, spreading somewhat owing to turbulence due to its own emission and gradually settling towards the ground. The concentration at any point then would be determined by the rate of emission of smoke and its rate of settlement, provided observations be taken sufficiently near the chimney to be within the area of settlement. In the limiting case the smoke concentration over a chimney must go on increasing until the amount removed by settlement is equal to the amount added by the chimney, a condition which seems to be approached sometimes during a thick smoke haze in London.

SECTION 3.—THE JET DUST COUNTER

(1) OBSERVATIONS MADE WITH THE DUST COUNTER

It has not been possible to make regular observations of atmospheric dust with the dust counter but certain records of special interest may be referred to:—

In July, 1924, during a voyage across the Atlantic, dust records were taken at intervals from the bow of the ship, to make sure that no impurity was trapped from the ship itself, and some of these are of peculiar interest. On July 31st, while entering the Gulf of St. Lawrence a white haze was visible ahead, the wind was in the west and blowing strong, with bright sunshine. The haze was very definite and lay near the water level between the ship and the south shore of the Gulf. No haze was visible astern. Two records taken from the bow of s.s. *Caronia* proved on subsequent examination to consist of crystalline matter. These crystals were not all of the same shape, some rectangular tablets, some square. They were evidently very hygroscopic, since of two records mounted on the same slide and

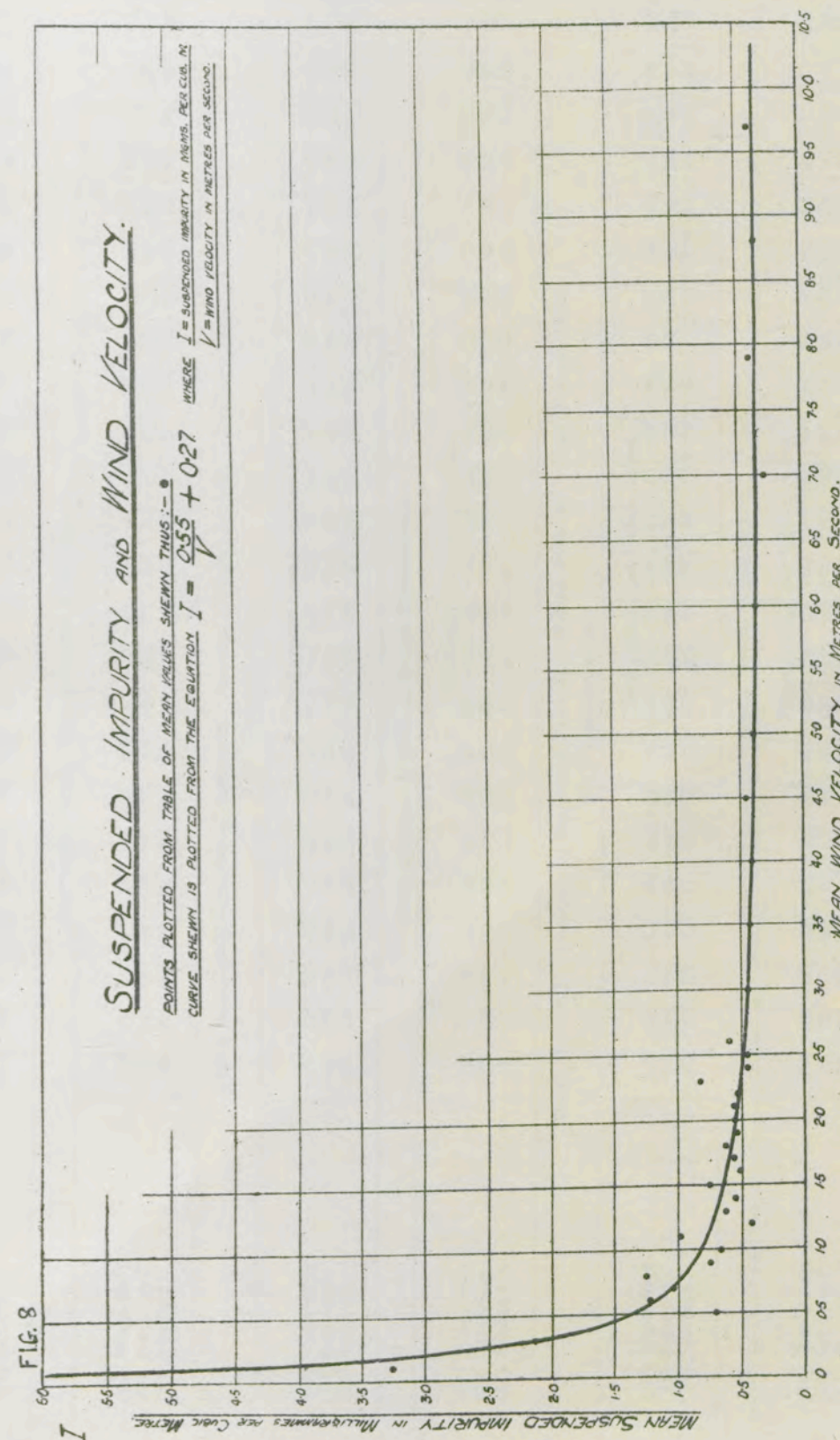


TABLE 7.—Hourly Variations of Suspended Impurity. Summer, 1924. Ordinary Days

Hours.	KEW OBSERVATORY																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
(107) Week-days -	.17	.17	.19	.20	.23	.29	.34	.35	.33	.30	.29	.28	.25	.25	.25	.25	.27	.26	.28	.30	.30	.26	.23	.20
(25) Saturdays -	.21	.19	.18	.17	.21	.28	.28	.29	.29	.29	.24	.24	.23	.24	.24	.26	.28	.29	.31	.31	.31	.24	.23	.22
(21) Sundays -	.24	.20	.17	.18	.18	.18	.23	.26	.32	.35	.33	.32	.23	.20	.17	.17	.20	.20	.21	.27	.26	.23	.18	.17

METEOROLOGICAL OFFICE, SOUTH KENSINGTON

(63) Week-days -	.09	.07	.07	.07	.14	.20	.35	.38	.30	.23	.22	.17	.14	.15	.16	.15	.29	.25	.20	.19	.16	.14	.13	.12
(19) Saturdays -	.08	.04	.04	.04	.05	.24	.35	.45	.40	.32	.27	.25	.20	.17	.17	.15	.17	.17	.20	.20	.21	.17	.17	.12
(16) Sundays -	.08	.08	.08	.06	.04	.04	.14	.20	.32	.20	.18	.12	.16	.12	.12	.10	.12	.08	.06	.12	.08	.06	.06	.06

TABLE 8.—Hourly Variation of Suspended Impurity. Winter, 1924-25. Ordinary Days

Hours.	KEW OBSERVATORY																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
(83) Week-days -	.19	.17	.15	.15	.17	.19	.27	.34	.39	.39	.35	.33	.34	.34	.35	.35	.37	.39	.41	.42	.37	.32	.26	.22
(19) Saturdays -	.12	.07	.08	.08	.10	.15	.24	.35	.39	.35	.35	.34	.32	.34	.35	.34	.34	.35	.34	.37	.34	.34	.26	.13
(21) Sundays -	.17	.14	.15	.15	.15	.18	.20	.30	.40	.40	.40	.36	.38	.38	.36	.34	.35	.36	.32	.34	.32	.29	.27	.24

METEOROLOGICAL OFFICE, SOUTH KENSINGTON

(57) Week-days -	.13	.10	.10	.10	.13	.17	.38	.60	.67	.62	.56	.56	.56	.55	.56	.54	.57	.61	.63	.56	.53	.42	.29	.19
(13) Saturdays -	.07	.03	.03	.04	.04	.15	.32	.61	.64	.54	.49	.47	.52	.52	.54	.52	.52	.54	.64	.61	.52	.39	.25	.22
(13) Sundays -	.17	.15	.12	.17	.12	.15	.27	.39	.59	.61	.59	.61	.54	.54	.54	.59	.67	.64	.61	.57	.44	.32	.29	.20

TABLE 9.—Hourly Variation of Suspended Impurity. Winter, 1924-25. Days of Smoke Haze

Hours.	KEW OBSERVATORY																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
(10) Week-days -	.67	.54	.51	.54	.54	.42	.42	.54	.74	.66	.69	.86	.64	.61	.67	.70	.67	.77	.80	.90	.93	.96	.86	.80
(1) Saturdays -	.64	.96	.64	.64	.64	.64	.64	.64	.64	.64	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96
(3) Sundays -	.32	.21	.21	.21	.11	.21	.32	.43	.43	.43	.43	.64	.75	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96

(58) Week-days -	.34	.31	.33	.33	.33	.37	.59	1.06	1.20	1.06	.98	.93	.90	.84	.90	.84	.95	.97	1.00	.99	.98	.77	.61	.47
(10) Saturdays -	.42	.32	.29	.29	.29	.42	.67	1.09	1.31	1.12	.96	.90	.86	.86	.93	.93	.93	1.02	1.02	.96	.96	.80	.70	.70
(11) Sundays -	.39	.26	.20	.20	.20	.29	.40	.70	.90	.87	1.02	.92	.96	.93	.96	1.07	1.25	1.42	1.60	1.51	1.28	.93	.73	.44

METEOROLOGICAL OFFICE, SOUTH KENSINGTON

taken at the same time, one which had its cover glass cracked had, at the time of examination, a record consisting almost entirely of liquid drops with one or two crystals and one mould cell; also a very few fine dust particles. These drops on warming developed fern-like crystals. The other record on the same slide also consisted entirely of liquid drops but each drop contained a fairly well-developed crystal, some square and some rectangular. At the time of taking these the humidity was tested by Mr. M. A. Giblett with an Assmann psychrometer, the dry bulb temperature was 55.5°F. , the wet 50.8°F. , giving a relative humidity of approximately 71 per cent. Since these crystals were evidently hygroscopic it would be of interest to know whether they existed in the air at the time of taking the records as liquid drops or as dry crystals. This appears to be a question of their affinity for water. There is little doubt that they were derived from sea salt and their presence would probably act as a predisposing cause for fog.

On Tuesday, August 5th, while crossing Lake Ontario, a haze was visible somewhat similar to that described above. It was white, but as the sun set behind the haze it became darker and somewhat purple in colour, while the sun showed red through it. The sky was clear and it was a warm, sunny day. There was not sufficient wind to ripple the water on the Lake. At 7 to 8 p.m. two dust records were taken from the top deck of the steamer and on examination these were found to consist mainly of dust with a few needle-shaped crystals and a few tabular six-sided plates. As there were plenty of sources of smoke, such as the lake steamers and the cities around the margin, there is little doubt that the dust particles were derived from these sources. The number of such found in the air was approximately 178 per cubic centimetre.

A few records taken during a visit to Madrid in October, 1924, may be of interest.

On the journey a record was taken in one of the railway carriages of the Sud Express and gave 13,000 particles of dust per cubic centimetre. These were mostly black irregular pieces about 0.5 micron diameter. There were some translucent and coloured particles and a few transparent spheres. Much of this dust no doubt was derived from the compartment, while the smoke of the locomotive also contributed to it. In Madrid a group of records were taken in the Paseo del Prado which gave indications of a curious hourly variation; the number of tests made is not sufficient to justify any definite conclusions but on two days these gave indications of the same distribution. The dust particles were very few in the morning and included a certain number of transparent spheres about 0.7 micron diameter, numbers of large irregular translucent particles 7 or 8 microns diameter—probably road dust, and a large number of small particles similar to those found in London. This record was taken at 8.20 a.m., and there were 420 particles per cubic centimetre. Some spheres were coloured red. At noon the number had risen to 550 per cubic centimetre. At 3.20 p.m. they fell to 149, rising again until at 7.20 p.m.

the number was 2,500, while at 10.40 p.m. it was between 750 and 1,000 per cubic centimetre.

The minimum about 3 o'clock may correspond with the Spanish custom of a siesta in the afternoon, while the great rise in the number towards the evening was probably due to the increased traffic in the streets. It was noticeable that in the morning the particles contained many spheres and only a few translucent irregular particles; towards evening the spheres almost disappeared and the number of translucent irregular particles increased greatly. There is little doubt that these large irregular translucent particles were derived from street dust.

In the *Ninth Annual Report* a description was given of records obtained in Algarve in the south of Portugal in April, 1922, which were taken during a haze on a bright sunny day. The suspended matter obtained in these records consisted practically entirely of crystals of soluble hygroscopic salts.

On April 9th, 1925, another group of records was taken by Dr. Owens at the same place, that is near the sea coast at Vila Real de Santa Antonio. At the time of taking the records it was bright and sunny with a strong wind from SW. by W., that is, coming from the sea. Early in the morning it had been dull, and raining; there was a well-marked haze visible against distant hills. Seven records were taken and on examination it was found that the material trapped was almost entirely crystalline. In some of them the crystals were well formed and of various shapes, hexagonal, square and needle-shaped. The records were mounted upon paper rings on ordinary microscope slides, and on warming slightly all the crystals were converted into drops of liquid, which on further warming developed again into crystals. In this case it was evident that the crystals were hygroscopic and that the first warming evaporated water from the paper ring; this was then absorbed by the crystals and given off again on further warming.

It is somewhat remarkable that after three years the records obtained at this place were almost identical with those obtained in 1922. There is little doubt that they consist of sea salts.

(2) SETTLEMENT

The rate of settlement of particles of smoke from the air, in the absence of aggregation, depends upon their diameter, and as the average diameter of suspended smoke particles is between $\frac{1}{2}$ and 1 micron the rate of fall is excessively slow. Some observations on the number of particles settling in a given time were made by Dr. Owens during a fog on January 11th, 1925. A microscope cover glass was exposed at Cheam in Surrey, about 11 or 12 miles south-west of London. It was left for 20 minutes and then removed and the number of solid particles which had settled upon a measured area of the cover glass was counted. It was found that the rate at that time, when there was a dense fog combined with a large amount of suspended solid matter, was 70,000 to 80,000 particles per square centimetre per minute. A dust record taken at the same time showed 15,000 or 16,000 particles per cubic centimetre. The

records were taken at 3.20 p.m., and at that time the extreme limit of visibility was 18 to 19 yards. The suspended solid particles found in the dust record were very irregular in size and shape, the maximum being 1.5 microns diameter and the average 0.7 to 0.8 micron. There were a few large drops of yellow, oily-looking liquid, probably tar. The experiment on settlement was made from 4.37 to 4.55 p.m., that is for 18 minutes, and the particles counted under a $\frac{1}{8}$ -in. objective. The number of particles found on the first cover glass indicated a settlement of 80,000 per square centimetre per minute. A second cover glass was exposed for 20 minutes from 5.4 to 5.24 p.m., and again counted under a $\frac{1}{8}$ -in. objective. The number of particles settling per square centimetre per minute on this was 75,000. The average size of the particles was about $\frac{1}{2}$ micron, but some reached $1\frac{1}{2}$ microns in diameter and there were quite a number of aggregates. If we assume that the density of the particles is equal to 1 and that the average diameter is 0.8 micron the velocity of settlement will be 0.003 centimetres per second and the number falling on one square centimetre per minute should be 2,880. The remarkable thing here is that the actual number which settled was greatly in excess of the theoretical number based upon a velocity of settlement of the individual particles derived from Stokes's law, indicating that some other factor was operating to bring the particles down. That there was an unusual deposit during this fog was shown by the appearance of the roads the following day, when the fog had gone. The pools of water had oily, iridescent films, while the road surface had a dark film of deposit. The site of a mat on a verandah was marked by a square of comparatively clean tiles, all around being much darker.

Another test of rate of settlement was made on January 12th, 1925. There was a dense smoke haze in London on that day and a record taken with the dust counter at 11 a.m. showed about 27,000 particles per cubic centimetre. The diameters of these ranged from about $\frac{1}{2}$ micron up to 3 or 4 microns, the average being 1 micron. A cover glass exposed at Westminster for 20 minutes at 2 p.m., while the smoke haze was still dense, gave a deposit at the rate of 1,200 particles per square centimetre per minute. This is a very low figure and it is given for what it is worth. It is evident that a breeze blowing over the cover glass might invalidate the experiment; it is a much lower figure than should be the case for settlement in still air, even without any aggregation.

(3) THE FOG OF DECEMBER 9th-12th 1924

During the period of widespread fog between December 9th and 12th, 1924, London suffered from the usual combination of smoke and water fog which we have learnt to expect under such conditions at present. The following observations were made bearing upon the nature of the fog over London. A dust record taken at Cheam, about 11 miles south-west of London on December 11th, at 8.45 a.m., using 50 cubic centimetres of air, showed a dust

trace from the sides of which were large numbers of dried-up stream beds, the trace itself showed indications of a large quantity of water having impinged upon the glass. The number of dust particles was between 4,000 and 5,000 per cubic centimetre, with an average diameter of about $\frac{1}{2}$ micron. The limit of visibility at the time was about 70 yards.

On going to London a second record was taken at noon when the fog was about at its worst and this showed little or no evidence of water and no lateral streams, while the number of dust particles was about 27,000 per cubic centimetre, and the diameters from 2 microns down, a large proportion being over 1 micron.

There was thus, roughly, 50 times as much impurity by weight in the London fog, while there was a much larger amount of water at Cheam. The small size of the particles at Cheam points to the grading effect of settlement, while on the morning of the 11th, the roads in the neighbourhood were covered with a thin oily-looking film, showing that active settlement was going on.

It appears justifiable to infer from the above that the "London Particular" is formed rather by a replacement of water particles by smoke than by the dirtying of the condensed water by smoke, and this appears a reasonable result to expect from the higher temperature of the air over London. It further appears improbable that water vapour would condense round oily soot particles when there are ample numbers of hygroscopic nuclei present.

Several times it has been observed that during a white fog at Cheam the limit of visibility was less than in London, while the number of soot particles in London was invariably greater. It is hardly possible to get an improvement of visibility by adding smoke particles to the air unless there is a coincident reduction of the water particles.

SECTION 4.—SPECIAL RESEARCHES

Owing to the unfortunate illness and subsequent death of Mr. G. M. Watson, the visibility research has been suspended during the past winter, and the same applies to the experiments with the vapour pressure hygrometer, referred to in the *Ninth Report*. It is hoped that these researches will be resumed during the coming winter.

There are many questions connected with atmospheric pollution which call for investigation; a few of these are given below:—

1. Observations by lumeter and cube method and by contrast photometer on light obstruction by fogs.
2. Correction of lumeter and cube method for colour of light.
3. The selective absorption of light by impurity.
4. Loss of daylight, as distinct from sunshine, due to impurity.
5. The development of methods for measuring sulphur pollution in connexion with stone decay in cities and in the open country, also injury to vegetation.

6. Examination of London fogs :—

- (a) Dust counter observations.
- (b) Collection of solid impurity for analysis.
- (c) Estimation of tar and relation of domestic to factory smoke.
- (d) Spectrographic analysis of suspended matter.

7. Microchemical analysis of impurity in the air.

8. The crystallographic analysis of atmospheric dust.

9. Measurement of water in fog, and investigations into the replacement of water by smoke impurities in large cities.

10. Observations on horizontal distribution of impurity.

11. Observations on the vertical distribution of impurity.

12. Effect of wind velocity on concentration of suspended matter in city air.

13. Drift of impurities from cities.

14. Selective deposit in relation to distance from the source.

15. The effect of rain and snow in bringing down impurity, selective action.

This list will serve to indicate the scope of the inquiry. It must not, however, be thought that it is limited to the particular points specified, as new aspects of the problem and its bearing upon the well-being of the community are constantly coming to light. It is only by careful investigation into all aspects of atmospheric pollution that we can hope to understand the many ways in which the impurities of the air make themselves felt.

Abridged List of Publications issued by the Meteorological Office.*

3. Reports of Investigations in Dynamical and Statistical Meteorology and other Memoirs—continued.

STATISTICAL METEOROLOGY—continued.

The Trade Winds of the Atlantic Ocean. By M. W. Campbell Hepworth, C.B., Commr. R.N.R., J. S. Dines, B.A., and E. Gold, M.A. (No. 203. 1910.) (4to.) 3s.

AERONAUTICS :—

Report on Wind Structure. (8vo.) No. 4. 1912-13. 1s. 6d.

From the Reports of the Advisory Committee for Aeronautics. [Numbers 1, 2 and 3 are out of print as separate copies.]

GEOPHYSICAL MEMOIRS (4to):

VOL. II. :—

No. 16. Aids to Forecasting: Types of Pressure Distribution, with Notes and Tables for the Fourteen Years 1905-18. By E. Gold, F.R.S. (No. 220f. 1920.) 2s. 6d.

No. 17. Simultaneous Values of Magnetic Declination at Different British Stations. By C. Chree, Sc.D., LL.D., F.R.S. (No. 220g. 1921.) 2s.

No. 18. Observations on Radiation from the Sky and an Attempt to determine the Atmospheric Constant of Radiation. By W. H. Dines, F.R.S. (No. 220h. 1921.) 1s. 3d.

No. 19. Hurricanes and Tropical Revolving Storms. By Mrs. E. V. Newnham, M.Sc., with an Introduction on the Birth and Death of Cyclones by Sir Napier Shaw, Sc.D., F.R.S. (No. 220i. 1922.) 12s. 6d.

No. 20. Variations in the Levels of the Central African Lakes Victoria and Albert. By C. E. P. Brooks, M.Sc. (No. 220j. 1923.) 1s. 6d.

VOL. III. :—

No. 21. Pyrheliometer Comparisons at Kew Observatory, Richmond, and their bearing on data published in the Geophysical Journal. By R. E. Watson, B.Sc. (No. 254a. 1923.) 2s.

No. 22. Absolute Daily Range of Magnetic Declination at Kew Observatory, 1858-1900. By C. Chree, Sc.D., LL.D., F.R.S. (No. 254b. 1923.) 2s. 6d.

No. 23. The Climatology of Glasgow. By L. Becker, Ph.D. (No. 254c. 1925.) 10s.

No. 24. The Distribution of Thunderstorms over the Globe. By C. E. P. Brooks, M.Sc. (No. 254d. 1925.) 2s.

No. 25. Surface and Geostrophic Wind Components at Deerness, Holyhead, Great Yarmouth and Scilly. By S. N. Sen, M.Sc. (No. 254e. 1925.) 2s.

No. 26. Classification of Synoptic Charts for the North Atlantic, 1896-1910. By E. V. Newnham, B.Sc. (No. 254f. 1925.) 6s.

3. Reports of Investigations in Dynamical and Statistical Meteorology and other Memoirs—continued.

PROFESSIONAL NOTES (8vo):

VOL. III. :—

No. 27. A Gazetteer of Meteorological Stations of the First, Second and Third Order (Introduction and Specimen Pages). By H. N. Dickson, C.B.E., M.A., D.Sc. (No. 245g. 1922.) 4d.

No. 28. Comparison of the Anemometer Records for Shoeburyness and the Maplin Lighthouse. By N. K. Johnson, B.Sc., and S. N. Sen, M.Sc. (No. 245h. 1922.) 6d.

No. 29. On the Formation of Thunderstorms over the British Isles in Winter. By E. V. Newnham, B.Sc. (No. 245i. 1922.) 6d.

No. 30. Diurnal Variation of Temperature as affected by Wind Velocity and Cloudiness. A discussion of Observations on the Eiffel Tower. By Captain J. Durward, M.A. (No. 245j. 1922.) 4d.

No. 31. The Relation between Height reached by a Pilot Balloon and its Ascending Velocity. By J. Wadsworth, M.A. (No. 245k. 1923.) 3d.

No. 32. A Note on the Upper Air Observations taken in North Russia in 1919. By W. H. Pick, B.Sc. (No. 245l. 1923.) 3d.

No. 33. The Diurnal and Seasonal Variations of Fog at certain stations in England. By F. Entwistle, B.Sc. (No. 245m. 1923.) 6d.

No. 34. How to observe the Wind by Shooting Spheres upward. By L. F. Richardson, B.A., F.Inst. P. (No. 245n. 1924.) 9d.

No. 35. Report on Observations of Atmospheric Electricity and Terrestrial Magnetism made at Kew, Stonyhurst and Eskdalemuir Observatories, on the occasion of the Solar Eclipse, April 8th, 1921. By C. Chree, Sc.D., LL.D., F.R.S.; H. W. L. Absalom, B.Sc.; and E. Taylor, M.A., B.Sc. (No. 245o. 1924.) 9d.

No. 36. On the Inter-Relation of Wind Direction with Cloud Amount and Visibility at Cahir-civeen, Co. Kerry. By L. H. G. Dines, M.A., and P. I. Mulholland, B.Sc. (No. 245p. 1924.) 1s.

No. 37. Pressure Type in Relation to Fog Frequency at Scilly during Summer Months. By E. G. Bilham, B.Sc. (No. 245q. 1924.) 6d.

No. 38. Measurement of Upper Wind Velocities by Observations of Artificial Clouds. By C. D. Stewart, B.Sc. (No. 245r. 1924.) 9d.

No. 39. Upper Air Circulation of the Atlantic Ocean. By E. W. Barlow, B.Sc. (No. 245s. 1925.) 6d.

No. 40. Ground Day Visibility at Cranwell, Lincolnshire, during the period 1st April, 1920, to 31st December, 1923. By W. H. Pick, B.Sc. (No. 245t. 1925.) 3d.

VOL. IV. :—

No. 41. Upper Air Temperatures in Egypt. By E. V. Newnham, B.Sc. (No. 273a. 1925.) 3d.

Abridged List of Publications issued by the Meteorological Office.

4. Observations and Data for Stations generally in the United Kingdom.

**Daily Weather Report*. (4to.) Issued in three Sections. 1. British Section. 2. International Section. 3. Upper Air Section. Subscription 13s. per quarter for two or three sections, 6s. 6d. per quarter for one section. Single copies of any of the reports, price 1d. each.

†*Weekly Weather Report*. (4to.) 9d. per week. Annual Subscription, including Introduction and Guide to Tables. 40s. post free.

‡*Monthly Weather Report*. (4to.) 9d. per month. Annual subscription, including Introduction and Annual Summary. 10s. post free.

§*BRITISH METEOROLOGICAL AND MAGNETIC YEAR BOOK* from 1908-1921. (4to.)

Part I.—*Weekly Weather Report*.

Part II.—*Monthly Weather Report, with an Annual Summary*.

(Parts I. and II. issued as separate publications from the commencement of 1922. See under Weekly and Monthly Weather Reports.)

Part III.—(1) *Daily Readings* at eight stations of the First and Second Orders. 6d. per issue of a month. Annual Volumes, from 1913 to 1921, 5s. each. The issue terminated with the volume for 1921.

|| (2) *Geophysical Journal*. Daily Values of Meteorological and Magnetic Data for Cahirciveen (Valencia Observatory), Richmond (Kew Observatory) and Eskdalemuir; Electrical data for Richmond and Eskdalemuir; Seismological data for Eskdalemuir; Wind Components for Holyhead, Scilly, Orkney, and Yarmouth; and the results of observations in the upper air. Monthly numbers and Annual Volumes commencing 1911. Latest Volume published 1921. 20s.

|| Part IV.—*Hourly Values from Autographic Records*: Hourly Readings of Terrestrial Magnetism at Eskdalemuir Observatory; Summaries of the Results obtained in Terrestrial Magnetism, Meteorology, and Atmospheric Electricity at the Meteorological Office Observatories. Commencing 1911. Latest Volume published 1920. 15s.

Part V.—*Réseau Mondial*. Monthly and Annual Summaries of Pressure, Temperature and Precipitation at Land Stations, generally two for each ten-degree square of Latitude and Longitude. Commencing 1910. Charts—1910, 8s. 6d.; 1911, 3s. 6d. Tables—1910, 15s.; 1911 to 1913, each 7s. 6d.; 1914, 18s.; 1915, 24s.; 1916 and 1917, each 22s. 6d.; 1918, 21s.

4. Observations and Data for Stations generally in the United Kingdom—continued.

Observatories' Year Book. (4to.) Commencing 1922. In continuation of Parts III. (2) and IV. of the British Meteorological and Magnetic Year Book. 1922 vol. £3 3s.

British Rainfall. (8vo.) Published annually from 1864. Vol. for 1923, 15s.

AVERAGES:—

The Book of Normals of Meteorological Elements for the British Isles for periods ending 1915. (No. 236.) (8vo.):—

Section I. Monthly Normals for Stations of Temperature, Rainfall and Sunshine. 2s.

Section II. Weekly, Monthly, Quarterly, and Seasonal Normals for Districts. 9d.

Section III. Maps of the Normal Distribution of Temperature, Rainfall, and Sunshine for the British Isles. 1s. 6d.

Section IV. (a) Range of Variation of Temperature and Rainfall; (b) Frequency Tables for Hail, Thunder, Snow, Snow Lying and Ground Frost. 3s. 6d.

Section V. Monthly Normals of Rainfall. 4s.

5. Reports of International Meetings. (8vo.)

International Codex of Resolutions adopted at Congresses, Conferences, and at Meetings of the Permanent International Committee, 1872-1907. (No. 200.) 1s. 3d.

Codes of Signals adopted and recommended by the International Meteorological Committee, 1910-13, for Storm Warnings, together with a list of the Maritime Weather Signals at present in use in the Various Countries of the Globe. (No. 206.) Fourth Edition, 1913. 4d.

Reports of Proceedings at International Meetings. [25 reports were issued between 1872 and 1912. Prices ranging from 6d. to 3s.]:—

1913. Rome. Tenth Meeting of Committee. (No. 216.) 2s.

1919. London. (No. 237.) 1s.

1919. Paris. (No. 239.) 3s.

1920. London. Third Meeting of Weather Telegraphy Commission. (No. 242.) 5s.

1921. London. Eleventh Meeting of Committee. (No. 248.) 4s. 6d.

1921. London. Fourth Meeting of Weather Telegraphy Commission. (No. 251.) 1s. 6d.

* Obtainable only from the Meteorological Office. Applications should be addressed to the Director, Meteorological Office, Air Ministry, Kingsway, London, W.C. 2. Cheques, &c., should be made payable to the Secretary, Air Ministry, and crossed "Bank of England, a/c of H.M. Paymaster General."

† The publication of the Weekly Weather Report began in February 1878. From 1908 to 1921 it was published as Part I. of the British Meteorological and Magnetic Year Book.

‡ The publication of the Monthly Weather Report began in 1884. After 1887 it was published as a supplement to the Weekly Weather Report and formed Part II. of the British Meteorological and Magnetic Year Book from 1908 to 1921.

§ The publication of geophysical data (terrestrial magnetism, atmospheric seismology, and solar radiation) for the Observatories at Richmond (Kew Observatory), Eskdalemuir, Falmouth, and Cahirciveen (Valencia), began in Parts III. and IV. of the Year Book as from January 1911. The title of the publication from 1908 to 1910 was "The British Meteorological Year Book."

|| From 1922 the Geophysical Journal and Hourly Values, Geophysical Section, are incorporated in a new publication entitled "Observatories' Year Book."