

# **Report of the Sheffield, Rotherham & District Smoke Abatement Committee : 9th (1938/39)**

## **Contributors**

Sheffield, Rotherham & District Smoke Abatement Committee.

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AG. 4462

PUBLIC HEALTH ACT, 1936.  
PUBLIC HEALTH (SMOKE ABATEMENT) ACT, 1926.



# REPORT

of the

Sheffield, Rotherham & District  
Smoke Abatement Committee

for the year

1st APRIL, 1938—31st MARCH, 1939.



*NINTH ANNUAL REPORT.*



TOWN HALL,  
SHEFFIELD.



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TOWN HALL,  
SHEFFIELD.

## MEMBERS OF THE COMMITTEE.

### *Representing the Sheffield City Council.*

Alderman J. A. LONGDEN, J.P.

Councillor W. ASBURY, J.P. (Chairman).

„ J. GREEN.

„ F. LLOYD, J.P.

„ H. SLACK.

### *Representing the Rotherham County Borough Council.*

Alderman F. HARPER, J.P. (Deputy-Chairman).

„ G. C. BALL.

### *Representing the Rotherham Rural District Council.*

Councillor S. E. HOWLETT.

### *Representing the Stocksbridge Urban District Council.*

Councillor D. A. TRUMAN.

### *Representing the Rawmarsh Urban District Council.*

Councillor E. JACKSON.

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## OFFICERS OF THE COMMITTEE.

*Hon. Secretary* .. .. TOWN CLERK, SHEFFIELD (E. B. Gibson).

*Hon. Treasurer* .. .. CITY TREASURER, SHEFFIELD (A. B. Griffiths.  
F.I.M.T.A., F.S.A.A.).

*Hon. Medical Officer* .. .. MEDICAL OFFICER OF HEALTH, SHEFFIELD  
(J. Rennie, M.D., D.P.H.).

*Hon. Auditor* .. .. ACCOUNTANT AUDITOR, SHEFFIELD  
(W. S. Blackhurst, A.S.A.A.).

*Chief Smoke Inspector* J. LAW.

*Smoke Inspectors* .. .. H. STENTON.  
W. H. LEVITT.  
J. H. HOARE.  
S. C. BEAUMONT.

REPORT  
of the  
Sheffield, Rotherham and District  
Smoke Abatement Committee  
for the year 1st April, 1938—31st March, 1939.

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The Committee have pleasure in presenting their Ninth Annual Report.

**Meetings.**

There have been twelve meetings of the Committee, all of which were held in the Town Hall, Sheffield.

**Staff.**

Of the staff of five, the Sheffield Corporation who employ the Chief Smoke Inspector and three of the Inspectors, and the Rotherham Corporation who employ the other Inspector, agreed that the services of such Inspectors be loaned to the Committee who accepted responsibility for the consequent financial commitments.

There has been no change on the staff during the year.

**Reports on Observations Made.**

Reports of the Chief Smoke Inspector on the observations taken in respect of various Boiler Chimneys, were submitted at each meeting of the Committee. In the majority of cases authority was given for the service of Abatement Notices, the other cases being dealt with as indicated later in this Report under the heading "Proceedings—Boiler Chimneys."

Reports were also submitted in regard to Combination and Furnace Chimneys where emissions of smoke from the chimneys concerned were excessive and, in accordance with the arrangement made with the Local Manufacturers' Committee, information as to these cases was supplied to the Secretary of such Committee, with a view to that Committee taking action thereon. In addition, where in such cases flagrant breaches of the "Standard" laid down were made, the Smoke Committee requested their Secretary to send special letters to the offenders, a copy of the letter in each case being sent to the Secretary of the Manufacturers' Committee.

Statistical Reports were submitted and the tabulated figures shown below are the totals for the year.

No. of chimneys observed .. ..	10,505
No. of minutes smoke emitted .. ..	17,328
Average minutes smoke per observation	1.65
No. of Notices served .. ..	98
No. of intimations served .. ..	563
No. of complaints answered .. ..	98
No. of Advisory visits .. ..	867
No. of chimneys raised .. ..	19
No. of chimneys erected .. ..	30
No. of chimneys demolished .. ..	32

For each district this is further divided as follows :—

	Sheffield	Rotherham	Rotherham Rural Dist.	Rawmarsh	Stocksbridge
No. of chimneys observed ..	7,793	1,524	359	272	557
No. of minutes smoke emitted .. ..	11,927½	2,696	816	672	1,216½
Average minutes smoke per observation ..	1.5	1.7	2.2	2.4	2.2
No. of Notices served ..	63	22	2	6	5
No. of intimations served ..	359	133	2	20	47
No. of complaints answered	72	17	2	—	2
No. of Advisory visits ..	499	178	45	49	96
No. of chimneys raised ..	16	3	—	—	—
No. of chimneys erected ..	24	5	—	—	1
No. of chimneys demolished	25	1	4	2	—

#### Proceedings. Boiler Chimneys.

During the year twelve cases were reported to the Committee, penalties having been imposed previously in two cases, the other ten having emitted excessive smoke after the service of Abatement Notices. It was agreed that further observations should be taken in regard to 5 cases, as the firms concerned had promised to carry out reconstruction work. In one case a warning letter was sent to the company concerned. Proceedings were instituted in three cases, a Magistrate's Order being obtained in two cases and an adjournment granted in the other case in order that the company might carry out the necessary reconstruction work to abate the nuisance.

### Atmospheric Pollution.

There are eight deposit gauges in the area, showing the records of atmospheric pollution, five in Sheffield, two in Rotherham and one at Stocksbridge, such gauges being indicated on the Regional Map. Six are considered as "fixed" gauges, the other two, at present situated at Dore and Stocksbridge, being used as "mobile" gauges, for the purpose of ascertaining the variation of deposits. In comparing the amount of solid matter deposited there is little doubt about the position of the gauges in relation to industrial areas, the pollution shown being about three times as heavy as that recorded in residential areas. A slight decrease is shown throughout the area, with the exception of the Ewden gauge, and it would appear that the utilisation of gas and electricity for industrial purposes has now begun to have a definite bearing on the problem of the reduction of pollution. It will be interesting to note whether there will be a further reduction next year.

The following tables show the monthly returns issued during the year :—

#### Monthly Record of Solid Matter, in Tons per Square Mile.

Month	Sheffield				Ewden	Rotherham		Stock-bridge
	Attercliffe	Nether Green	Surrey Street	Dore		Technical College	Oakwood	
1938								
April .. ..	24·58	5·54	14·74	4·32	4·18	21·08	4·02	20·31
May .. ..	34·37	7·43	30·81	13·24	7·65	29·46	23·20	18·62
June .. ..	26·32	10·12	19·63	9·15	7·85	16·86	16·50	7·15
July .. ..	22·87	8·00	17·47	6·47	7·01	14·66	13·88	12·65
August .. ..	33·87	11·78	26·79	11·56	9·03	22·54	20·28	20·21
September .. ..	26·82	6·80	21·20	6·70	9·57	21·40	15·96	29·59
October .. ..	36·01	14·27	27·35	12·00	20·65	27·19	17·97	19·67
November .. ..	33·70	8·23	25·57	7·64	12·50	21·58	13·85	11·61
December .. ..	41·01	6·84	18·61	6·57	4·48	20·73	12·71	23·45
1939								
January .. ..	33·03	13·17	48·34	10·89	10·24	23·35	16·33	27·40
February .. ..	23·04	5·64	19·18	4·09	5·19	19·41	9·96	12·11
March .. ..	38·59	9·46	31·44	6·57	20·01	23·21	15·76	28·17
Total for year	374·21	107·28	301·13	99·20	118·36	261·47	180·42	230·94
Average .. ..	31·19	8·94	25·09	8·35	9·86	21·79	15·04	19·24

In conjunction with the pollution deposit gauges at the fixed stations, gauges are also installed for the measurement of ultra-violet rays by the Acetone Methylene Blue Test.

N.B.—According to the maker of the apparatus a quartz tube filled with Acetone Methylene Blue Solution exposed for one hour at a distance of one yard from a carbon arc lamp (25 amperes) gives a reading of one unit. Glass "check" tubes were used in conjunction with the quartz tubes and the results were recorded.



Daily readings were taken and below are shown the various averages of the units recorded at the various stations :—

### Average Units per Day.

Month	SHEFFIELD						ROTHERHAM			
	Attercliffe		Nether Green		Surrey Street		Technical College		Oakwood Hall Sanatorium	
	Quartz	Glass	Quartz	Glass	Quartz	Glass	Quartz	Glass	Quartz	Glass
1938										
April ..	0.77	0.62	1.20	0.93	1.07	0.93	0.93	0.60	1.23	0.73
May ..	0.93	0.70	1.71	1.11	1.70	1.20	1.60	1.10	1.70	1.10
June ..	1.15	0.70	2.36	1.53	2.33	1.66	2.30	1.40	2.40	1.60
July ..	1.11	0.61	1.84	0.88	2.00	1.40	1.67	0.96	2.03	1.13
August ..	1.93	1.18	2.35	1.18	2.26	1.35	1.87	1.06	2.32	1.26
September ..	0.96	0.66	1.06	0.80	1.23	1.03	1.06	0.56	1.30	0.70
October ..	0.80	0.42	0.92	0.71	1.00	0.80	0.84	0.55	1.06	0.67
November ..	0.58	0.30	0.93	0.63	0.76	0.60	0.70	0.43	0.93	0.53
December ..	0.32	0.21	0.45	0.22	0.38	0.19	0.41	0.19	0.54	0.29
1939										
January ..	0.29	0.22	0.35	0.22	0.25	0.22	0.25	0.19	0.35	0.19
February ..	0.50	0.32	0.64	0.44	0.64	0.42	0.50	0.32	0.67	0.42
March ..	0.66	0.45	0.69	0.37	0.77	0.64	0.58	0.28	0.70	0.42

### Ashworth Meter.

This method of Ultra-Violet Ray recording is simple to operate and gives records on the poorest of days, whereas the Acetone Methylene Blue method scarcely functions during the winter months. The apparatus consists of a water-tight metal case with a special glass of known transmission, namely, 3,600 angstrom units, fitted in the cover. Underneath this glass is a step wedge piece made of wire gauze, together with one or two gauze screens which cover a piece of sensitized paper. The intensity of the Ultra-violet light makes exposure spots through the wedge on to the paper. These are recorded and tabulated.

### AVERAGE UNITS PER DAY.

	1938-9.
April .. .. .	29.6
May .. .. .	58.64
June .. .. .	55.3
July .. .. .	54.22
August .. .. .	65.80
September .. .. .	59.43
October .. .. .	33.64
November .. .. .	21.43
December .. .. .	8.64
January .. .. .	11.90
February .. .. .	23.57
March .. .. .	31.83

### **Sulphur Determination.**

Records for the determination of sulphur in the atmosphere were taken by the volumetric and lead peroxide methods at Surrey Street, Sheffield, and by the latter method at the College of Technology, Rotherham; Ewden Waterworks; Handsworth and Dore, Sheffield. With the volumetric method which has been running continuously for over eight years at Surrey Street, it was found that the acidity of the atmosphere varied inversely with the wind velocity, abnormal deposits occurring during fog and heavy humid atmospheric conditions.

The lead peroxide method, having proved itself reliable and convenient, was adopted by the Department of Scientific and Industrial Research as a standard of measurement. In comparing these records the industrial areas were again outstanding against the residential ones for sulphur content as with solid matter deposited.

The records of the five gauges in operation are shown in graph form on the Chart on page 15.

### **Research Work.**

Research work was continued by the Joint Advisory Committee under the Chairmanship of Professor R. V. Wheeler, D.Sc., F.I.C., of the Department of Fuel Technology of the Sheffield University, in accordance with the following Programme :—

1. Supplemental data to that referred to in the last Annual Report, in regard to representative boiler and furnace coals in use in Sheffield and Rotherham.
2. Similar trials to those made in respect of small boiler plants, to be made on a heavily-loaded hand-fired Lancashire boiler.
3. Similar tests on a mechanically stoked boiler.
4. A fundamental study of the oxidation of coals.

The cost of research work for the year ending 1st September, 1939, was estimated at £500, such amount being guaranteed by the Sheffield Rotherham and District Smoke Abatement Committee, but it was anticipated that the Department of Scientific and Industrial Research, through the British Iron and Steel Federation, and the Local Manufacturers Committee would each contribute towards such expenditure.

### **Metallurgical Processes. Suggested Repeal of Qualified Exemption.**

The Committee accepted the offer of the Local Manufacturers' Committee to arrange for Mr. E. C. Evans, technical expert of the British Iron and Steel Federation, to visit Sheffield and investigate the conditions which he found to exist at Works where smoke is emitted in excessive quantities, and make a report with recommendations for the improvement of such conditions.

Mr. Evans carried out his investigation and his Report (copy of which had been forwarded to the Manufacturers' Committee) was considered by the Statutory Committee. The Committee agreed that the Report did not deal with the question in the way in which they expected he would deal with it, that the Manufacturers' Committee be informed the Statutory Committee were not satisfied with such Report, and that the Report had not modified their view that it was desirable Section 1 (1) (e) of the Public Health (Smoke Abatement) Act, 1926—now Section 109 of the Public Health Act, 1936—should be repealed forthwith.

Subsequently a deputation from the Manufacturers' Committee attended the Statutory Committee in regard to such Report. The deputation agreed to recommend that the Manufacturers' Committee should reverse their former policy and make efforts, within reasonable limits, to induce hitherto recalcitrant firms (whether members of the Associations or not) to co-operate with the Statutory Committee in regard to the diminution of smoke in metallurgical processes. The Statutory Committee accepted the offer, and agreed that a list of the offending firms should be furnished to the Manufacturers' Committee, in order to see whether the "pressure" to be brought to bear by the latter Committee on the firms concerned would have any effect, such arrangement to be limited to a period of 12 months.

#### **Burning Spoil Banks.**

The Committee agreed to support the Resolution of the Conference of the National Smoke Abatement Society, welcoming the Bill introduced into the House of Commons with the object of dealing with burning spoil banks, and urging the Government to give full and immediate support in making legislation effective. They requested the Members of Parliament for the area covered by the Committee to give their support to the Bill.

#### **Examinations of the City and Guilds of London Institute.**

The Committee were requested to co-operate with the Institute in making more widely known the examinations and in this connection the Institute were requested to include in the examinations a practical test at the boiler face.

#### **Royal Sanitary Institute. Smoke Inspectors' Examination.**

The Committee approved of the Chief Smoke Inspector accepting the invitation of the Royal Sanitary Institute to act as Examiner for Smoke Inspectors.

#### **Royal Sanitary Congress.**

At the invitation of the Royal Sanitary Institute the Chief Smoke Inspector gave a Paper on "Atmospheric Pollution" at the Royal Sanitary Congress in July, 1939.

### **National Smoke Abatement Society.**

The Chairman (Councillor W. Asbury) and the Chief Smoke Inspector (Mr. J. Law) were appointed delegates to the Annual Conference of the National Smoke Abatement Society held in Cardiff, December 1st-3rd, 1938, and their report on such Conference, together with a Report of the Proceedings of the Conference, were submitted to the Committee.

### **Department of Scientific and Industrial Research.**

The Medical Officer of Health, Rotherham, (Dr. W. Barr), was appointed to attend the meetings of the Standing Conference of Co-operating Bodies on the investigation of Atmospheric Pollution, held in London, on the 30th May, and 28th November, 1938.

A Report of the Department entitled "The investigation of Atmospheric Pollution Report on observations in the year ended 31st March, 1937, Twenty-third report" was submitted.

### **Standards as to Smoke Emission.**

The Standards to which the Committee's Inspectors work are as follows :—

Where there are 1 or 2 boilers attached to a chimney—  
2 minutes per half hour.

Where there are 3 boilers attached to a chimney—  
3 minutes per half hour.

Where there are 4 or more boilers attached to a chimney—  
4 minutes per half hour.

Where there are 1 or more boilers and 1 or more furnaces attached  
to one chimney—  
4 minutes per half hour.

### **Membership and Contributions to other Bodies.**

The Committee are members of the Standing Conference of Co-operating Bodies of the Department of Industrial and Scientific Research and contribute an annual amount of £55 to the Department.

They are also affiliated to the National Smoke Abatement Society to whom they make an annual contribution of £25.

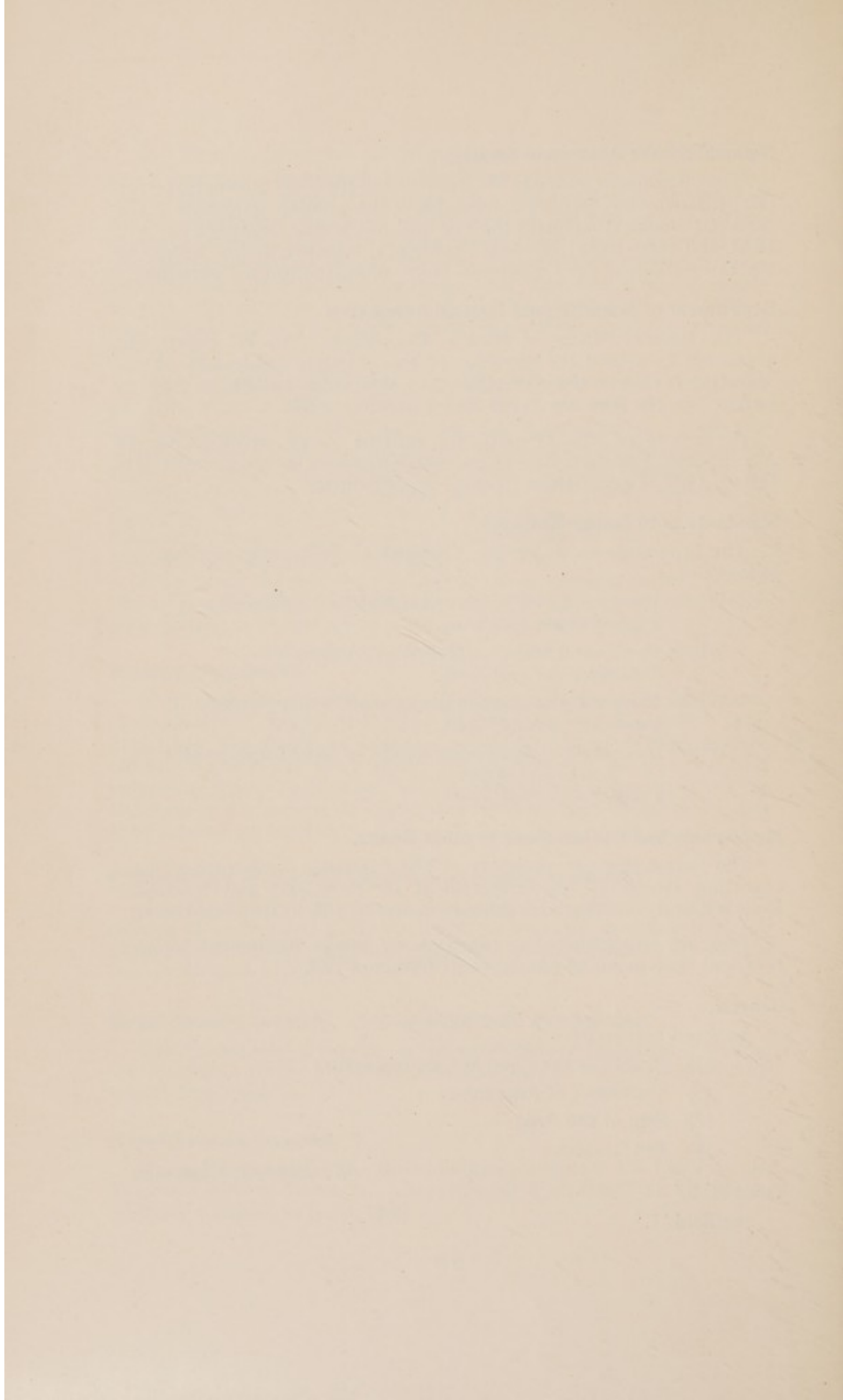
### **General.**

Annexed hereto are—

- (1) Report of the Chief Smoke Inspector.
- (2) Statement of Accounts.
- (3) Map of the Area.
- (4) Ten Graphs.

W. ASBURY, Chairman.

Town Hall,  
Sheffield, 1.

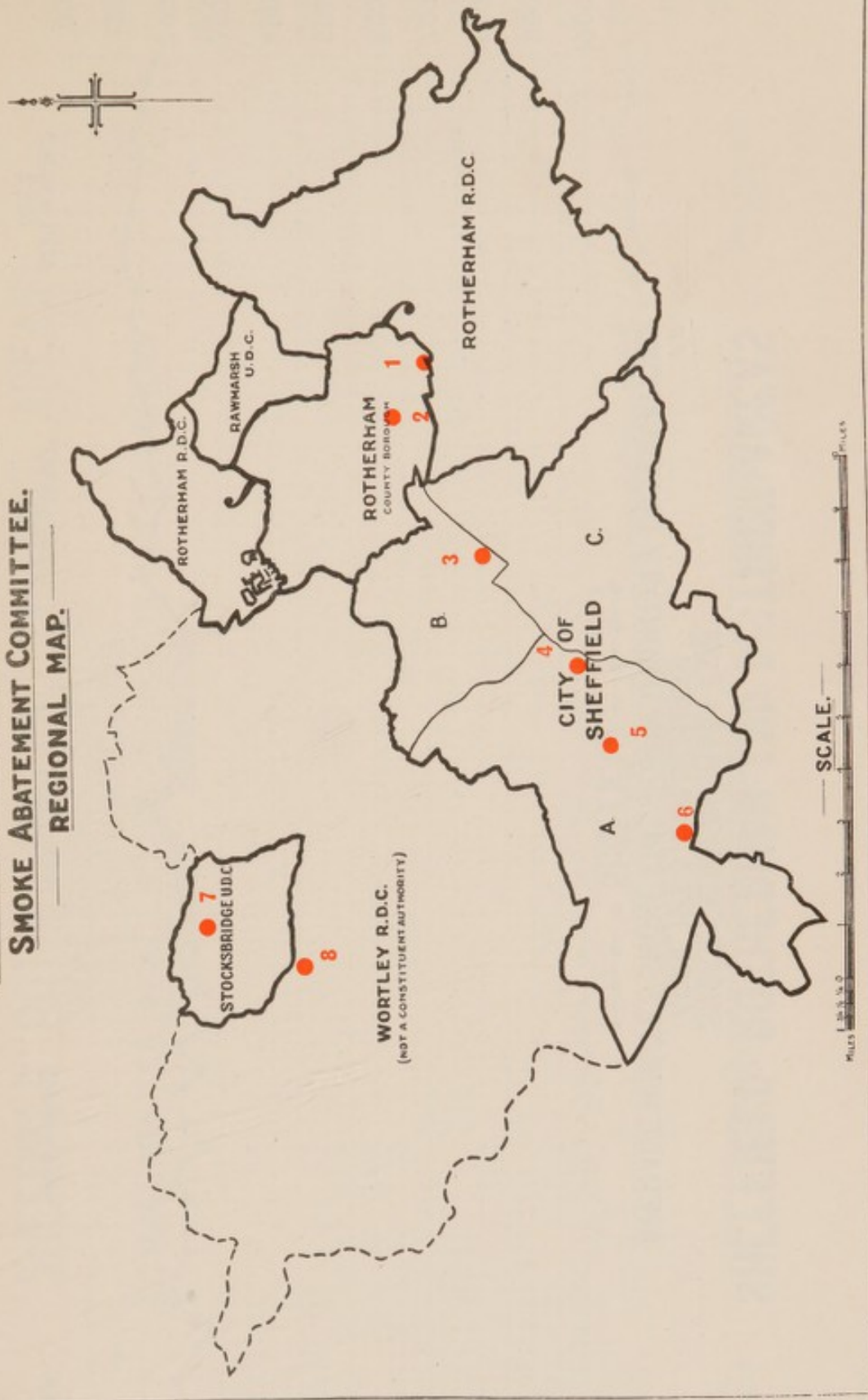


# SITES OF POLLUTION GAUGES.

1. OAKWOOD HALL SAN<sup>M</sup>
2. TECHNICAL COLLEGE
3. ATTERCLIFFE
4. SURREY STREET
5. NETHER GREEN
6. DORE
7. STOCKSBRIDGE
8. EWDEN

## SHEFFIELD - ROTHERHAM AND DISTRICT SMOKE ABATEMENT COMMITTEE.

### REGIONAL MAP.



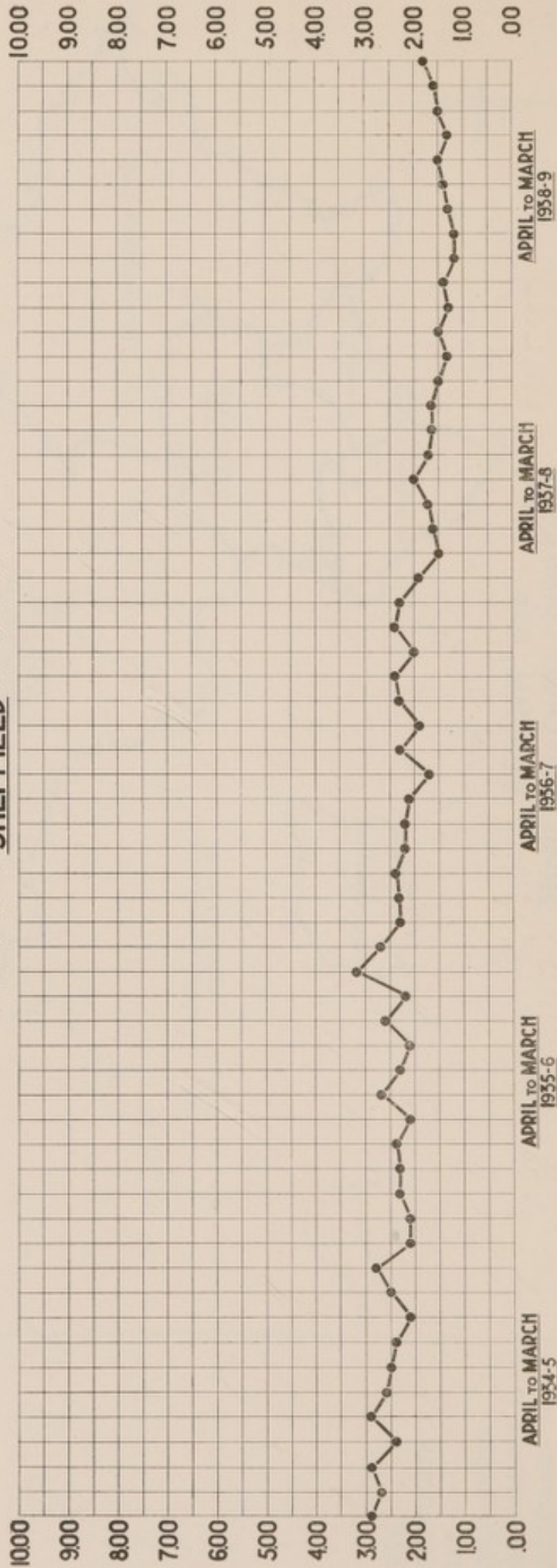
# SHEFFIELD ROTHERHAM AND DISTRICT AREAS

SMOKE EMISSION CHART FOR

APRIL 1934 TO MARCH 1939

AVERAGE MINUTES SMOKE EMISSION PER MONTHLY OBSERVATIONS

●—●—● SHEFFIELD ●—●—●



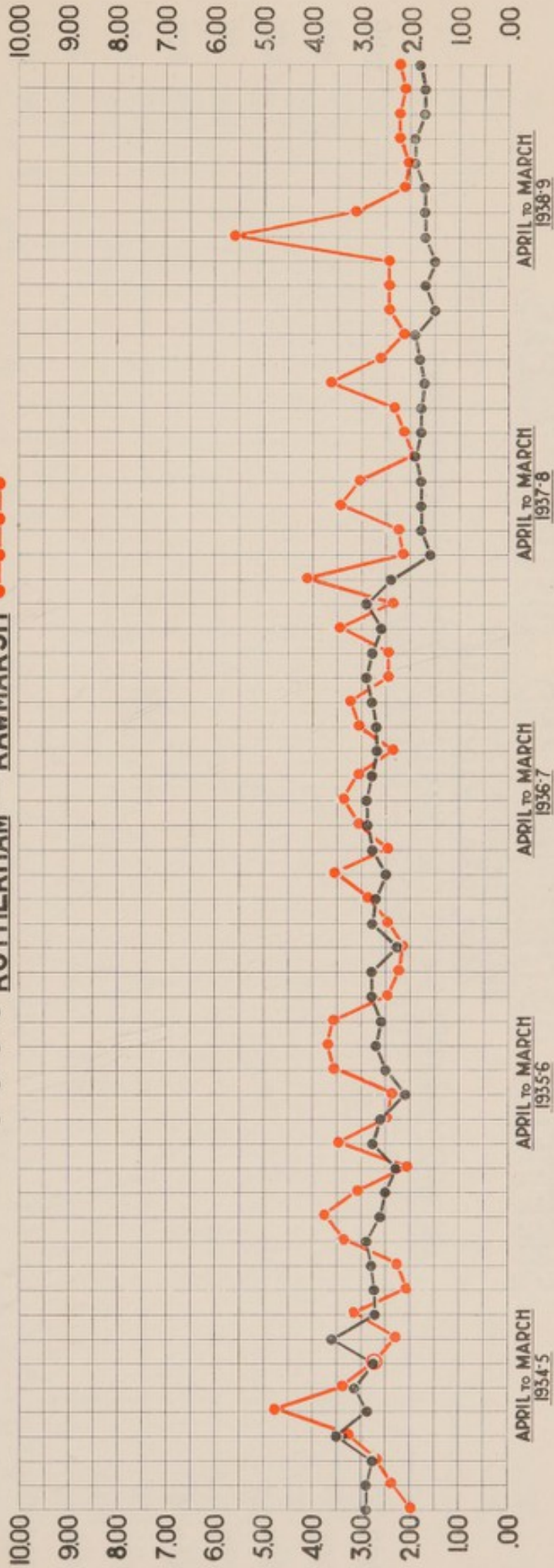
# SHEFFIELD ROTHERHAM AND DISTRICT AREAS

SMOKE EMISSION CHART FOR

APRIL 1934 TO MARCH 1939

AVERAGE MINUTES SMOKE EMISSION PER MONTHLY OBSERVATIONS

●---● ROTHERHAM — RAWMARSH ●---●





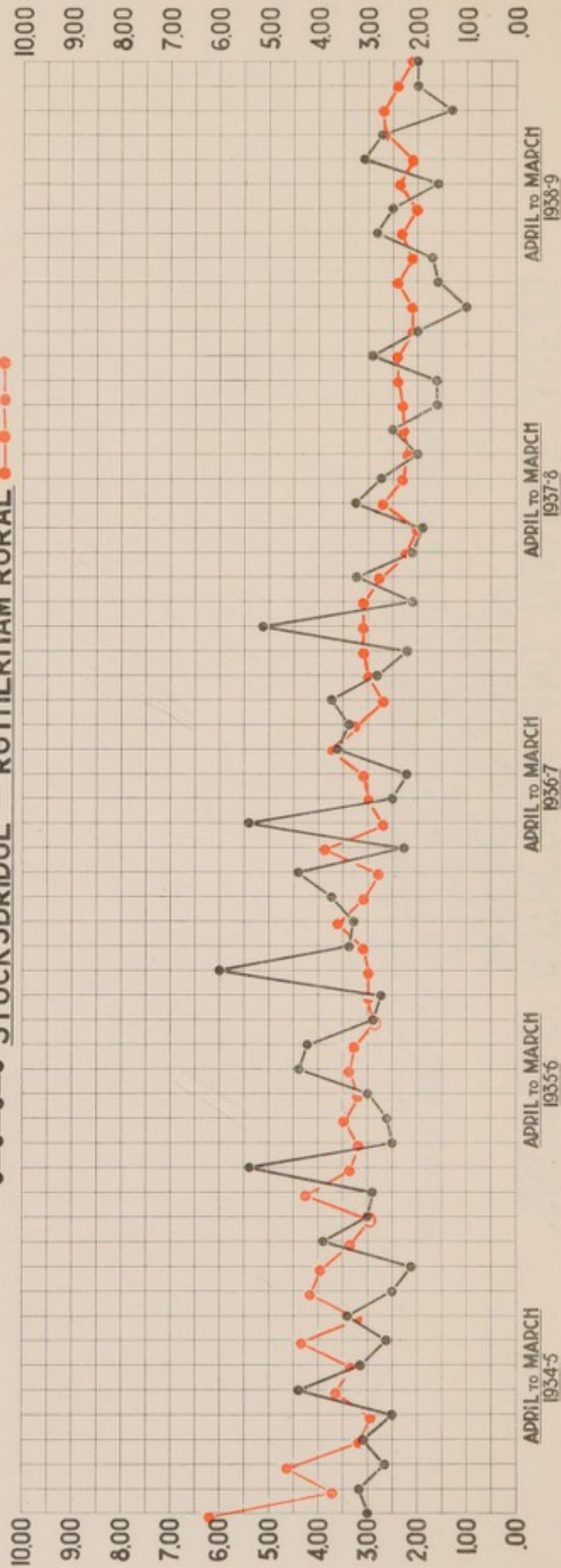
# SHEFFIELD ROTHERHAM AND DISTRICT AREAS

SMOKE EMISSION CHART FOR

APRIL 1934 TO MARCH 1939

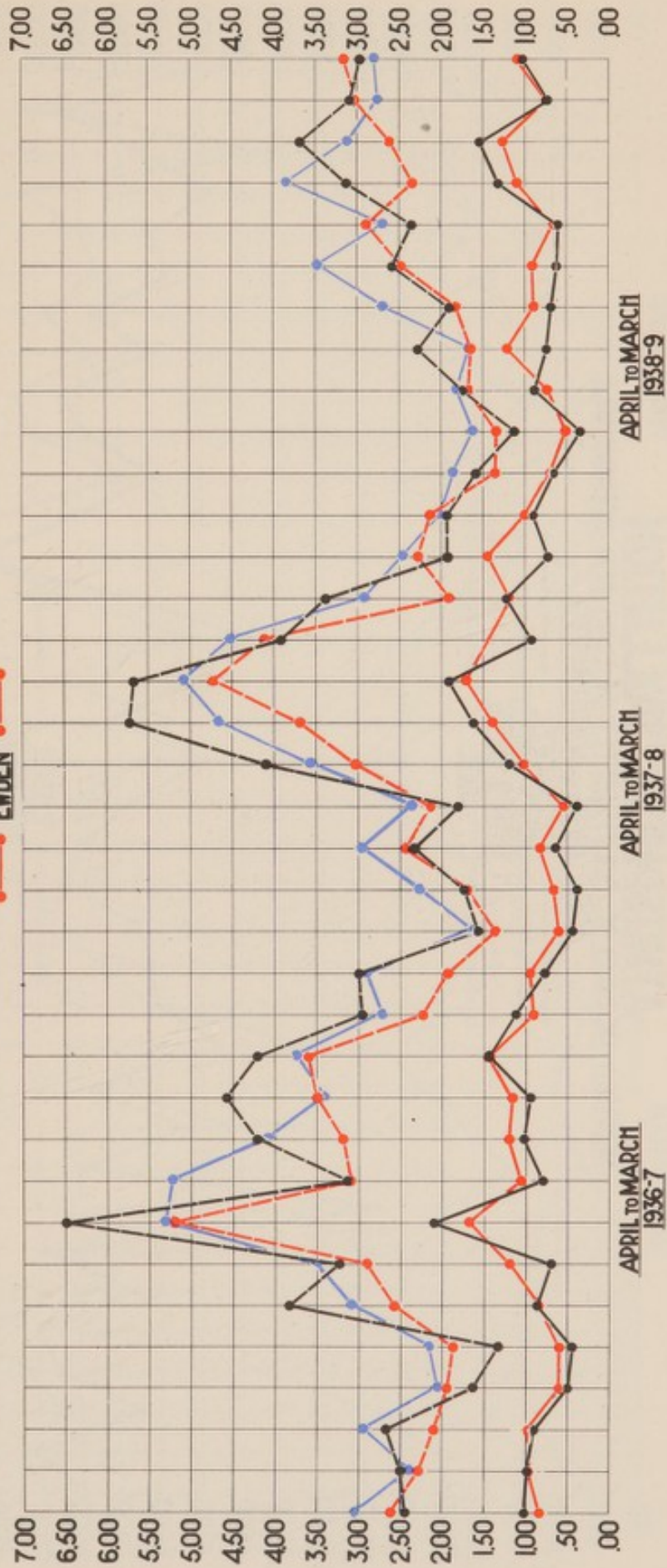
AVERAGE MINUTES SMOKE EMISSION PER MONTHLY OBSERVATIONS

●---● STOKESBRIDGE — ROTHERHAM RURAL ●---●



**SULPHUR DETERMINATION: LEAD PEROXIDE METHOD**  
**MILLIGRAMS OF SO<sub>2</sub> PER 100 SQUARE CENTIMETRES: DAILY AVERAGE**  
**APRIL 1936 to MARCH 1939**

- TECHNICAL COLLEGE
- SURREY STREET
- HANDSWORTH
- DORE
- EWDSN

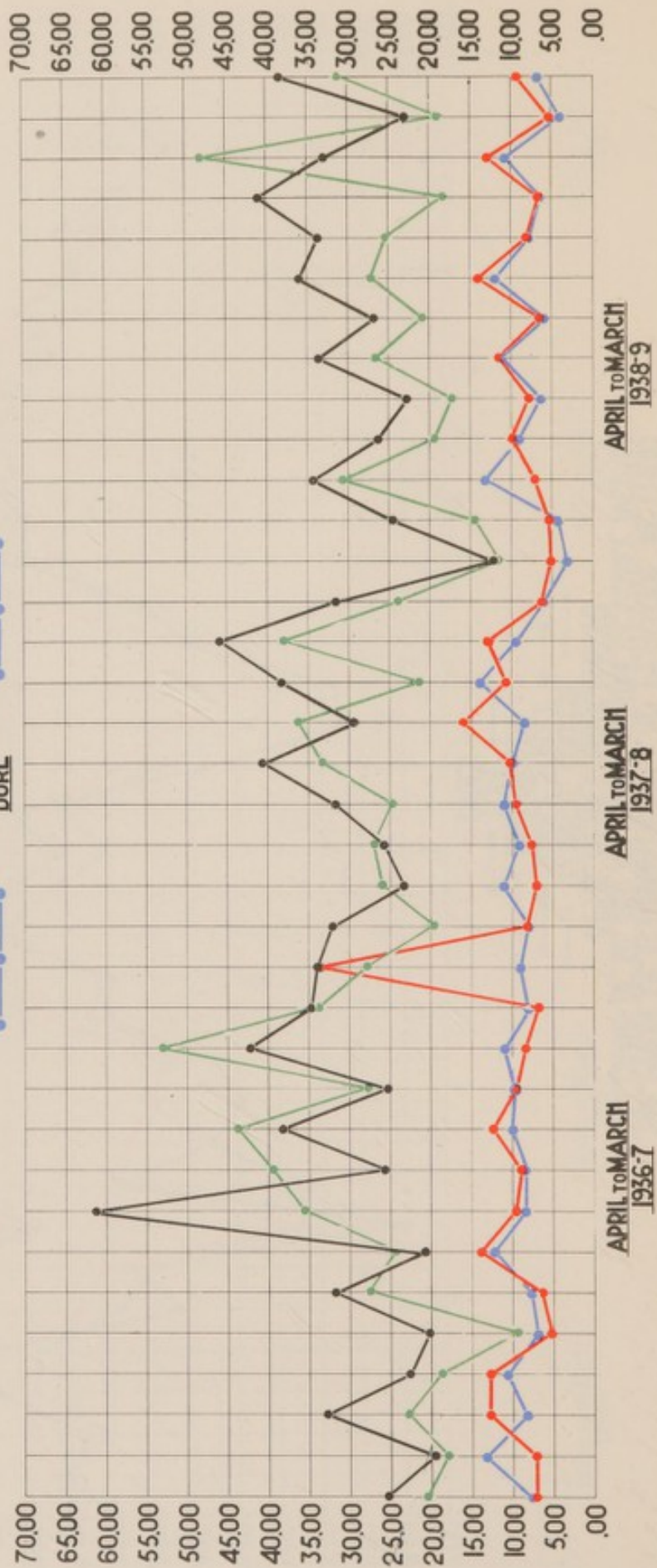


# ATMOSPHERIC POLLUTION

MONTHLY RECORD OF SOLID MATTER IN TONS PER SQUARE MILE

APRIL 1936 TO MARCH 1939

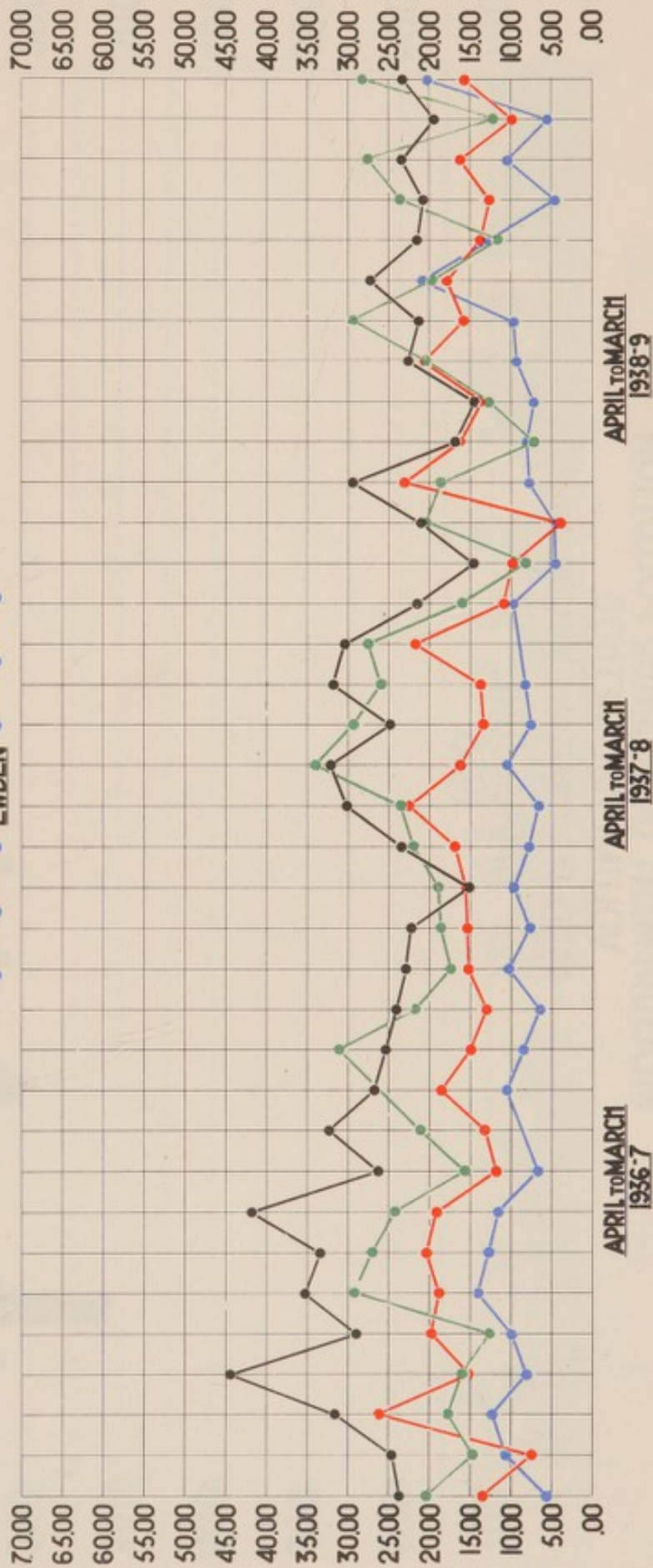
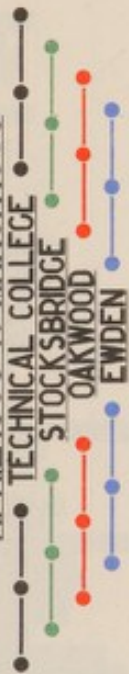
- ATTERCLIFFE
- SURREY STREET
- NETHER GREEN
- DORE



# ATMOSPHERIC POLLUTION

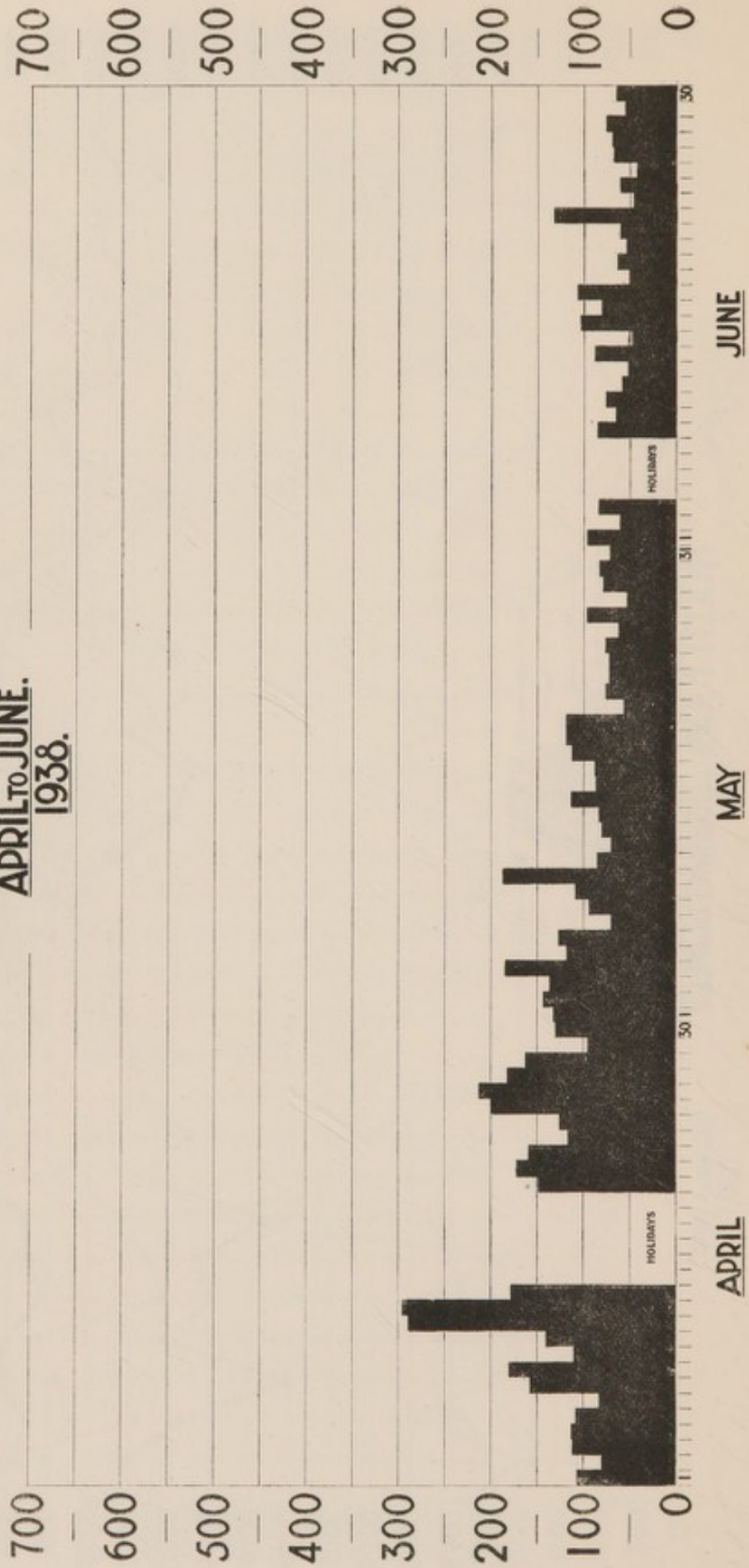
MONTHLY RECORD OF SOLID MATTER IN TONS PER SQUARE MILE

APRIL 1936 TO MARCH 1939



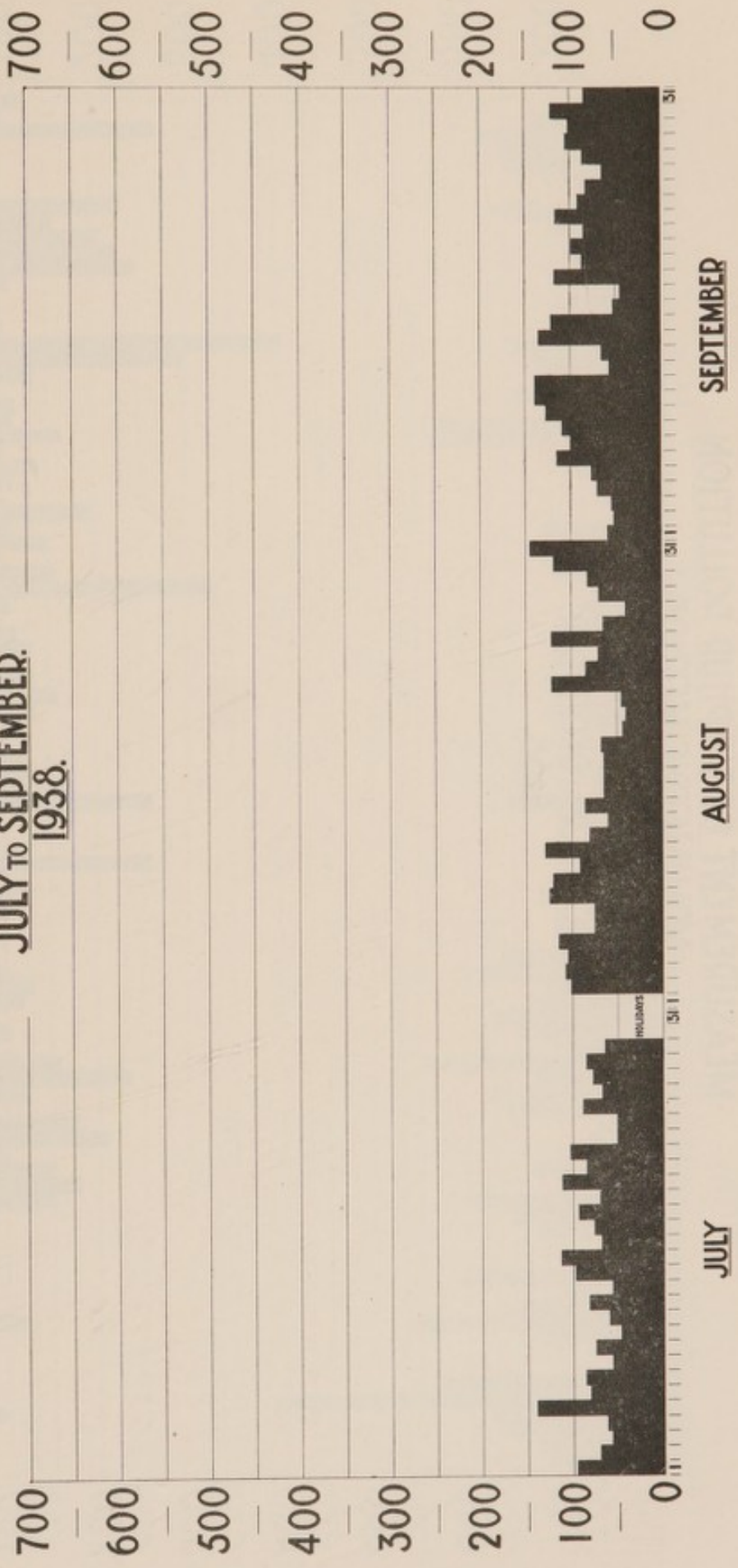
**MEASUREMENT OF SULPHUR POLLUTION  
VOLUMETRIC METHOD.  
PARTS PER THOUSAND MILLION.**

**APRIL TO JUNE.  
1938.**



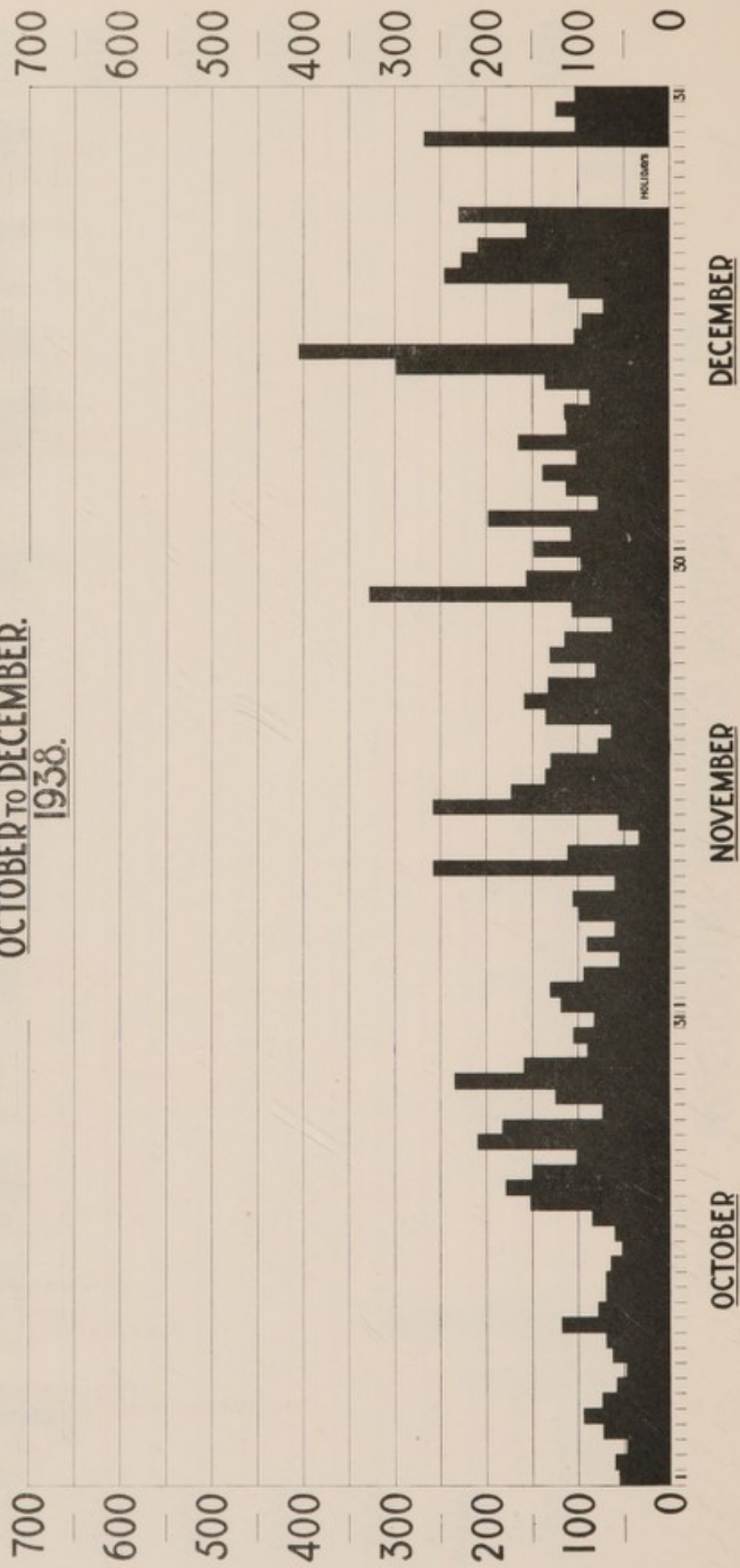
**MEASUREMENT OF SULPHUR POLLUTION  
 VOLUMETRIC METHOD.  
 PARTS PER THOUSAND MILLION.**

**JULY TO SEPTEMBER.  
 1938.**



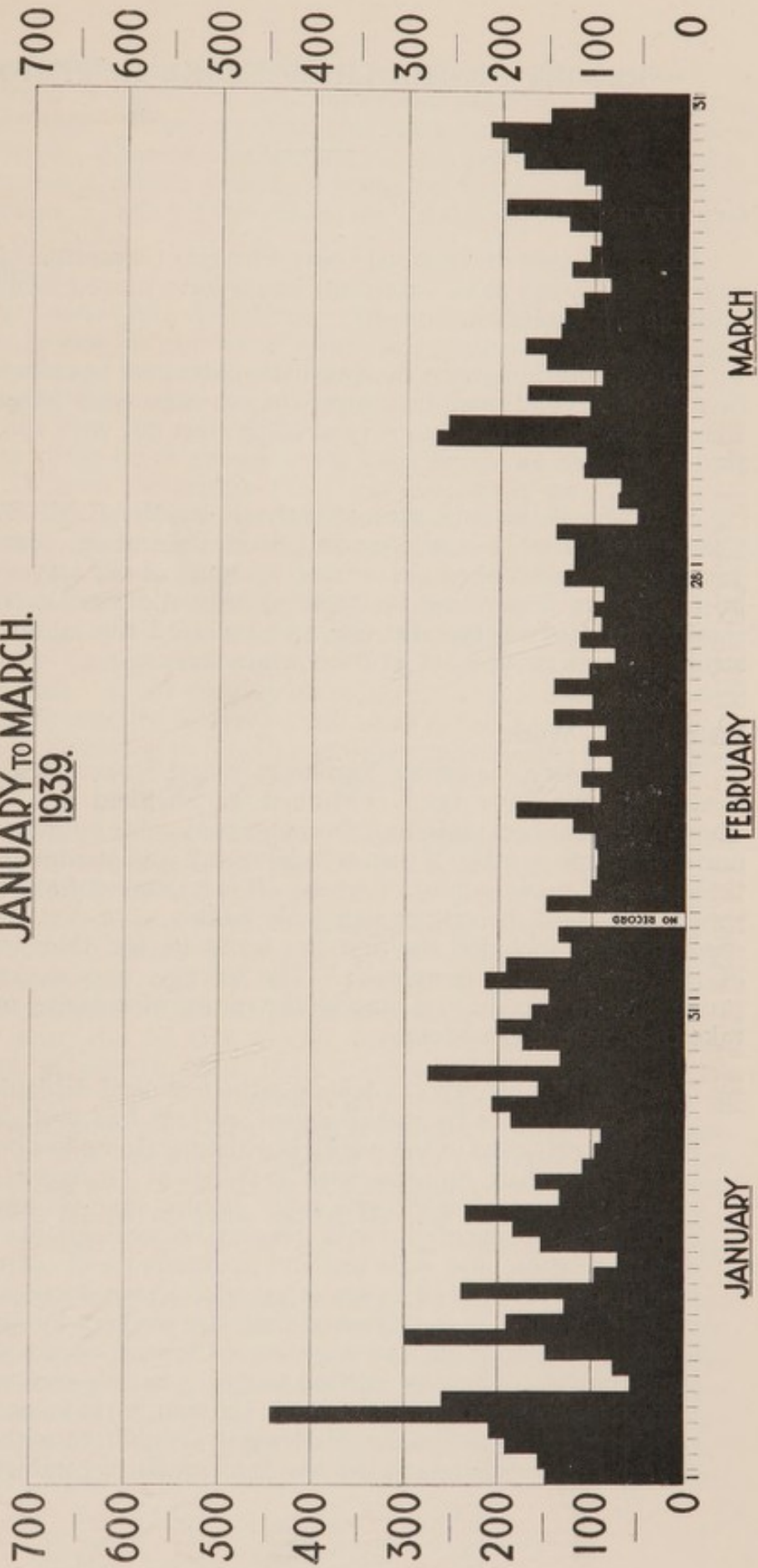
**MEASUREMENT OF SULPHUR POLLUTION  
VOLUMETRIC METHOD.  
PARTS PER THOUSAND MILLION.**

**OCTOBER TO DECEMBER,  
1938.**



**MEASUREMENT OF SULPHUR POLLUTION  
VOLUMETRIC METHOD.  
PARTS PER THOUSAND MILLION.**

**JANUARY TO MARCH  
1939.**





## REPORT OF THE CHIEF SMOKE INSPECTOR.

---

GENTLEMEN,

The ninth year of Regional control by this Committee is the one in which perhaps the most important issues have moved forward toward a satisfactory solution.

Trade conditions were disappointing, the year opening with a lull in trade and conditions not improving as they were expected to do. Reconstruction of furnaces is proceeding, but not with the expedition that was hoped for.

A survey of the area was carried out by Mr. E. C. Evans, Chief Technical Adviser to the Iron and Steel Federation, commencing in January and finishing in September, a report of the survey being submitted to the Committee for their consideration in December. The survey was fairly comprehensive and included the many and varied steel processes carried out at the various works.

### **Instructional Work.**

The efficiency classes for Furnacemen and Stokers held during the winter months have been continued at Sheffield and Rotherham. Though the numbers attending showed considerable improvement, there remains a large number of men who have not yet attempted to improve their knowledge of combustion work. It is estimated that five thousand men are engaged directly or indirectly in this work, but the classes to date have not included the first five hundred, less than ten per cent. of the total number employed. The lectures and works visits are proving fairly popular and may be the means of inducing more men to take these instruction classes.

Mr. Evans in his report, dealing with technical difficulties, states, "Sheffield in its metallurgical workers has probably some of the best craftsmen in the world, but their training has been directed to working their furnaces with a sufficient 'factor of safety' to ensure that no loss of efficiency occurs due to unsatisfactory atmosphere, particularly with respect to steel quality, minimum decarburisation, and scale loss and maintenance of output. If any modification of furnace design or practice is introduced which would mitigate smoke, it is necessary that the workers be satisfied that after suitable training and experience the new system will give the same results as they are getting to-day. In this connection, there is room for considerable extension in the training of furnace operators as adopted by the Smoke Abatement Committee with a view to developing knowledge on the basic principles of combustion.

It would be helpful if technical assistance could be given from time to time in connection with the special problems of the smaller manufacturers. To some extent this has been done by the officers of the Smoke Abatement Committee, and appreciation has often been expressed of the assistance given by them and the spirit of co-operation in which their duties are conducted."

### **Boiler Chimneys.**

Nine years ago it was stated that "the unique part of the question of boiler smoke was the number of hand-fired Lancashire boilers in use. Mechanically stoked water-tube boilers were very much in the minority and auto-stoked Lancashire boilers very little used."

Since that time much progress has been made, water-tube boilers have been installed at certain factories, and many of the existing Lancashire boilers have been converted for mechanical stoking. Hand-fired boilers are now in the minority, but it cannot be stated that entire smokelessness has been achieved in this manner. The fuel and air supplies are uniformly provided to the furnaces, higher furnace temperatures can be maintained, and in most cases the difficulty of maintaining steam pressure during cleaning time has been overcome, but the "human element" is not entirely eliminated. It has been noted that firemen who are used to working hand-fired boilers find it difficult to allow mechanical stoking to function in its normal manner, the tendency being to persist in "dragging" and "poking" the fuel bed.

Colliery boiler chimneys continue to cause nuisance from smoke, due to the heavy fluctuating loads, the low grades of fuel used, and the difficulty in dealing with the clinker and ash. Many methods have been tried in order to overcome these difficulties—the use of retort or stepped grates, the fitting of moving firebars, in order to make the furnaces self-cleansing, and the use of pre-heated air to improve combustion. Mechanised methods have made rapid strides during recent years, both down the pit and on the surface, but in this respect the boiler houses appear to have been forgotten. These methods are demanding higher steam temperatures and pressures, so that different appliances for disposing of these low-grade fuels becomes very important. Sooner or later, the mining engineer will have to realise that water-tube boilers fitted with chain grates or using pulverised fuel will be the types of steam generators most suited for this work, and until these changes are brought about smoke nuisance at collieries will continue.

For central heating and vertical boilers, the use of Underfeed type stokers has been advanced to some extent, no less than sixteen different companies advocating their general use. The increased price of coke has helped the sale of these appliances, the makers being able to show considerable saving in fuel costs. The stokers are not self-cleaning, nor are they smokeless. The majority of them are pressure controlled and, unfortunately, when the control is operated, the fan is stopped, so that

no air can enter the furnace during this period and nuisance is caused until such times as the fan is re-started by the control. Undoubtedly, these stokers give higher efficiencies and better results than when the appliances are hand-fired with either coke or coal, and their more extended use is certain.

During the year, ninety-eight notices were served on various works for excessive smoke emission from boilers, and twelve cases were reported to the Committee for prosecution.

### **Metallurgical Processes.**

Reconstruction work on all types of furnaces continues, but the rate of progress is much too slow. It was hoped that the survey of the Chief Technical Adviser for the Iron and Steel Federation, Mr. E. C. Evans, would give an added impetus to this work and that he would specify where definite improvement could be made and in what form. However, his report was made in the form of a general survey of conditions without giving any definite plan for the future except to ask for an extension of time in order to carry out the work and further co-operation from the Committee and the staff. Some of his statements and figures are of considerable interest and worthy of recording. In order to obtain a general idea of the progress made since 1929, a conference of the fuel and principal metallurgical officers was called, and details in the modifications in plant and processes with the object of reducing smoke were tabulated as follows :—

- (1) The substitution of raw coal firing by town's gas.
- (2) The substitution of raw coal firing by producer gas.
- (3) The substitution of hand firing by automatic stoking.
- (4) Electric heating for certain special products with controlled atmosphere.
- (5) Closer supervision of operating staff and more effective fuel control.

He states that the possibilities of using pulverised fuel have been fully investigated and plant is in course of erection, but it has been pointed out that pulverised fuel has been in constant use for the past seven years and its use is extending rapidly for process work.

Very heavy capital expenditure had been incurred in plant directed toward smoke mitigation and improved control, amounting for four firms alone to approximately one million pounds during the past five years. It was admitted that re-organisation had not yet been completed, and it was estimated that, provided trade conditions allowed, a further two to five years would be required before schemes under consideration and already prepared could be completed. Gas consumption has increased by 300%, the figures given being as follows—

1929	..	two and a half thousand million cubic feet.
1937	..	seven thousand million cubic feet.

The reduction in the coal consumption figures per ton of finished product is as follows—

From 42.5 cwts. in 1929 to 24.3 cwts. in 1937, a saving of nearly 43% of fuel per ton of finished product.

These figures are somewhat startling and definitely prove that there is an economic side to this reconstruction problem, apart from the reduction of smoke. Why the manufacturers should have any hesitation in carrying out necessary work when results of this kind can be shown is not easy to understand.

It is stated that during 1937 over 200,000 tons more coal were used than in 1929 due to the increased demand for steel, and that it had necessitated the starting up of old and admittedly inefficient coal-consuming plant, much of which had been shut down for years. This position is only temporary and is being rapidly corrected as plant is re-organised and improved to meet the new conditions.

Some smaller firms, however, had not made the same progress as the larger firms. These works are located for the most part in densely populated residential areas and are often concerned with heat treating and annealing processes in furnaces having low chimneys giving off considerable volumes of black smoke. This has been the complaint made by the Smoke Abatement Committee, that these smaller firms were relying on the provisional exemption granted under the Public Health Act and were not prepared to carry out any reconstruction unless they were compelled.

Mr. Evans points out that the supplies of coke oven gas are limited in their application and are wholly inadequate to meet the present needs of the metallurgical industries in the district. He states that seven thousand million cubic feet of gas used in 1937 only represent about 6 per cent. of the total fuel used in the industry.

Producer gas is used to a considerable extent in the larger works, but it is not likely that any marked extension in the use of this fuel is to be expected in the case of the smaller works.

Pulverised fuel is being used to an increasing extent, but the cost, as compared with that of raw coal, and the replacement of existing furnaces militates against its general adoption in the smaller units.

Reviewing the problem of the small steel producer, it is stated that solid fuel must be the principal fuel used. Any modification of existing practice must, if the works are to remain in operation, be cheap, fully proven and able to give with certainty the same results as are being obtained in present practice so far as steel quality and output are concerned. Automatic stoking and the introduction of secondary air have not always proved successful, but no reason is given why this should be so.

One of the most difficult problems in the area is the fact that the management in the smaller works are not able to dictate to the workmen about furnace operations. Furnaces are carelessly overcharged, secondary air is seldom used, and no systematic method appears to be in operation. A common sight at many works is "flaming" at the chimney top, where the volatile from the fuel is not ignited until reaching the atmosphere and the heat is lost to the furnace.

In dealing with Technical Problems, Mr. Evans states that it cannot be claimed that the problems of producing quality steels in all cases with smokeless combustion have been completely solved. Low temperature heat treating or annealing in coal-fired furnaces with elimination of smoke can still be regarded as not generally solved. In many cases solutions have been found at the larger firms, and it should be of advantage to the community as a whole if in questions of smoke abatement the experience of all could be made available to each.

The Smoke Abatement staff are unanimous in their opinion that, if progress is to be made on right lines, there should be a fuel officer appointed who could devote the whole of his time to the smaller works in order to advise and convey the various known methods of overcoming these difficulties. They have tried a little to assist in this matter, but have not sufficient time to carry the matter through in order to ensure its success.

During the year, 465 intimations were sent to manufacturers with regard to excessive smoke emitted from Combination and Furnace Chimneys. The main source of pollution in this area is due to smoke from these chimneys, and it would appear that the time has now arrived when greater pressure in the form of coercion should be brought to bear on the owners of these chimneys who persistently cause nuisance in this manner.

#### **Coke Oven Plants.**

Complaints continue to be made of nuisance, particularly with regard to the emission of "green gas" during charging periods and vapour from the quenching of the coke. Various times have been quoted as being adequate for recharging purposes, older plants six minutes per oven and modern plants two minutes per oven. Though we have tried to adhere to these standards, conditions are bad, for there is an oven being recharged about every forty minutes. For smoke abatement purposes each battery of ovens should be counted as one chimney and not as at present, each oven.

Regarding the quenching of the coke, when this takes place at ground level the conditions are appalling. At Stocksbridge, near Sheffield, there are times when all traffic on the Manchester-Sheffield road is held up until the vapour has cleared, it being impossible to pass through it.

We do claim a measure of improvement in working conditions of coke ovens in the area, but there remains ample opportunity for further improvement and it would appear that some further legislation is necessary, particularly with regard to quenching.

### **Burning Tips and Spoil Banks.**

This form of nuisance appears to be on the increase, and one or two tips that showed no signs of overheating are now definitely on fire. A Bill was promoted in Parliament during the year, specifying that colliery spoil banks which are on fire shall be a Statutory nuisance liable to be dealt with under Section 92 of the Public Health Act, but no definite method was set down in the Bill. This Bill has since passed all its readings and will become operative next year, but whether it will be of any great assistance remains to be seen.

It has been stated that the extended use of mechanical cutting and the demand for cleaner coals has been responsible for the increased firing on these tips, but the recent method of conical tipping has been the dominant factor in this respect. A special committee of technical engineers from the collieries in South Yorkshire has been formed to investigate and deal with this form of nuisance, and it will be found when their reports is published that overheating is more prevalent where this form of tipping is in operation than with Ridged or Flat Topped tips.

Lumpy material should be crushed before being disposed of so that it will pack close and exclude the air, but a system of layering with given thicknesses of material and intermediate layers of inert material would prove more effective than many of the alleged remedial methods that are at present being tried out.

### **Dust and Fume Nuisances.**

There is a very considerable improvement in the arrestment methods of dust extractors from factories in the area, few complaints having been received during the year, and it would appear that the manufacturers are now arranging for effective arrestment methods to be fitted to their extractors when they are installed.

There have been complaints of fumes from extractors dealing with cellulose spraying plants, but these have been effectively dealt with.

### **Refuse Burning.**

Again an appeal is made to all residents to regard the comfort of one's neighbours by refraining from causing nuisance in this manner. Wet green garden refuse cannot be fired and disposed of without causing an amount of nuisance, and it is much more satisfactory to bury the same in trenches if possible. Many complaints have been made during the year of the indiscriminate burning of garden and trade refuse and it would appear that some method of control is essential, similar to that

in operation in other cities—a byelaw making it an offence to burn refuse of any kind within a hundred yards of any dwellinghouses or premises.

### **Domestic Smoke.**

There is no legislation to deal with this form of nuisance, but considerable pollution is caused in this manner by the many thousands of domestic chimneys in the area. As people appear to be becoming "smoke conscious," it is thought that they might begin their smoke abatement campaign in their own homes by reducing as much as possible the pollution caused by their own domestic fires.

In this area, alternatives to solid fuel can be purchased at prices that compare favourably with those of any other city, in fact, can be regarded with envy by many other areas. The daily task of the housewife is one continual drive to keep down dust and smuts which cover the walls, furniture and floors, but many of them fail to realise that their own domestic fires are the cause of a considerable amount of the dust and smuts. In addition, the carrying of coal into the house and the removal of ashes out increases the daily task considerably. The more extended use of electricity and gas for heating and cooking is helping to reduce this pollution, but much greater efforts are necessary in this direction. If every housewife resolved to abolish the open fires in her home, the result would be a reduction of considerable dirt and labour. If this is not practicable, the reduction of the number of solid fuel fires to one would reduce the amount of dirt considerably, and if that one fire was used to burn smokeless fuel a vast improvement could be shown in the condition of the atmosphere.

The area can become clean only if every individual will do his or her share in helping to make it so. In this respect, the various Local Authorities can assist by introducing into their Housing Schemes methods of smokeless heating and cooking. At the present time, houses are being constructed with old-fashioned methods of heating, which in a few years' time may have to be re-constructed because public opinion will demand that the heating appliances shall be of a smokeless nature. A special appeal is made to consider this matter thoroughly and to see if some progress can be made in this direction.

### **Pollution Recording.**

The pollution figures for the year show a general reduction throughout the area. Whether this is due to the lull in trade conditions, to the great amount of reconstruction which has been carried out, or to climatic conditions prevailing, it is not possible to state. It is hoped, however, that the definite reduction is a sign of encouragement for the work done and that the next few years will show further reductions.

Sulphur records also show reductions during the year, which is hopeful.

One particular fact is noted, that during November the usual prolonged fog period did not take place.

Graphs are again reproduced to show the proportion of pollution and of sulphur found in the industrial areas in comparison to those of residential areas, which are very pronounced. Though, as an industrial area, possibly the most intensive in Great Britain, the pollution statistics are not heavy, there is room for considerable improvement.

In conclusion, the year has been one of particular interest because progress has been made with regard to pollution from industrial processes and it has been shown that all this work can be carried out with a minimum of pollution and that in doing so definite reductions can be made in the cost of production. It is hoped that the smaller manufacturers who have not yet made serious efforts to put their works in order will consider doing so as soon as possible in order to help the work of the Department and to obviate the necessity of coercion with regard to the same.

I am, Gentlemen,

Your obedient Servant,

JAMES LAW,

Chief Smoke Inspector.



SHEFFIELD, ROTHERHAM AND DISTRICT

Income and Expenditure Account for the

1938.			EXPENDITURE.	1939.		
£	s.	d.		£	s.	d.
1,374	19	1	Salaries of Inspectors .. .. .	1,455	16	8
2	10	8	Employers' Contribution, Health, Pensions and Unemployment Insurance..	3	2	10
68	14	11	Superannuation—Equivalent Charge ..	72	15	11
2	16	2	Workmen's Compensation and Third Party Insurance .. .. .	3	1	6
43	0	2	Travelling Expenses of Inspectors ..	39	13	9
21	5	8	Motor Car Hire .. .. .	33	5	3
17	19	7	Deputation Expenses .. .. .	14	0	8
43	11	3	Printing, Stationery and Advertising ..	34	3	7
235	3	4	Research Work .. .. .	226	0	0
222	2	6	Fees of City Analyst .. .. .	228	12	0
17	1	1	Apparatus .. .. .	16	17	5
55	0	0	Subscription to the Department of Scientific and Industrial Research ..	55	0	0
25	0	0	Subscription to the National Smoke Abatement Society .. .. .	25	0	0
20	7	8	Postages and Disbursements .. .. .	20	13	10
2,150	3	7		2,228	3	5
48	0	8	BALANCE—Being Income in excess of Expenditure .. .. .	—		
£2,198	4	3		£2,228	3	5

LIABILITIES.			BALANCE SHEET,		
	£	s. d.	£	s. d.	
Sundry Creditors .. .. .			565	14	4
Income and Expenditure Account :—					
Balance at 31st March, 1938 .. ..	74	18 6			
LESS—Expenditure in excess of Income for year ended 31st March, 1939 ..	7	0 10			
			67	17	8
			£633	12	0

City Treasurer's Office,  
Town Hall, Sheffield, 1.  
2nd June, 1939.

SMOKE ABATEMENT COMMITTEE.

Year Ended 31st March, 1939.

1938.		INCOME.		1939.	
£	s. d.	£	s. d.	£	s. d.
		Contributions from Constituent Authorities :—			
1,807	15 0	Sheffield County Borough Council .. .. .			
		1,825	12 6		
230	13 3	Rotherham Do. .. .. .			
		234	6 8		
83	1 0	Rotherham Rural District Council .. .. .			
		82	10 3		
38	8 8	Rawmarsh Urban District Council .. .. .			
		38	1 4		
23	4 3	Stocksbridge Do. .. .. .			
		25	10 9		
				2,206	1 6
15	2 1	Bank Interest .. .. .			
				15	1 1
—		BALANCE—Being Expenditure in excess of Income.. .. .			
				7	0 10
<hr/>		<hr/>			
£2,198	4 3	£2,228 3 5			
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as at 31st MARCH, 1939.

ASSETS.		£	s. d.
Cash Balance—31st March, 1939—			
In hands of Bankers	.. .. .	633	12 0
<hr/>		<hr/>	
		£633	12 0
		<hr/>	

