

Committee on the Medical Effects of Air Pollutants report May 1992-December 1993 and Advisory Group on the Medical Aspects of Air Pollution Episodes activities report 1990-1993.

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**Committee on the Medical Effects
of
Air Pollutants**

Report May 1992 - December 1993

and

**Advisory Group on the Medical Aspects
of
Air Pollution Episodes**

Activities Report 1990 - 1993

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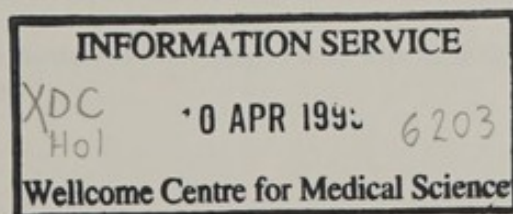
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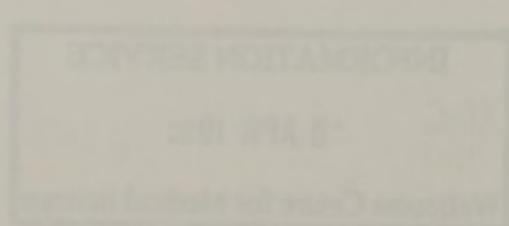
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Committee on the Medical Effects
of
Air Pollution
Report May 1992 - December 1993

Advisory Group on the Medical Aspects
of
Air Pollution
Activities Report 1990-1993



Foreword by the Chief Medical Officer



In keeping with the Government's policy of making the work of Expert Advisory Committees more accessible to the public, we publish the first report of the activities of the Committee on the Medical Effects of Air Pollutants (COMEAP). We also take this opportunity to draw attention to the work of the Advisory Group on the Medical Aspects of Air Pollution Episodes (MAAPE) which has already published three reports.

Members of the Committee and the Advisory Group are independent experts drawn from academia, industry and independent consultancies, and are appointed for a three-year term in the first instance. Membership is reviewed every three years to ensure that it continues to comprise a balanced and appropriate range of medical and scientific expertise. From time to time other experts are also invited to address the Committee and Advisory Group, in the light of advances in relevant science.

I am grateful for the work of the Committee and the Advisory Group and the excellent quality of the advice they have provided. This is highly regarded, not only by the Department of Health, but also by the other Government Departments that seek their opinion.

I look forward to continuing to work with these Groups in the interests of the health of the nation.

K Calman

Foreword by the Editor

The first volume of the series was published in 1980 and since that time the series has grown to include a wide range of subjects and authors.

It is a pleasure to announce the publication of this volume, which is the first in the series to be published in paperback.



The author of this volume is a leading expert in the field and his work has been widely cited in the literature. This volume is a valuable contribution to the field and will be of interest to a wide range of readers.

The series is published by the publisher and is available in both hardcover and paperback editions. The paperback edition is particularly attractive for those who are looking for a more affordable option.

The publisher is pleased to announce the publication of this volume and is confident that it will be well received by the readers of the series.

The publisher is also pleased to announce the publication of the next volume in the series, which is expected to be published in the near future.

The publisher is grateful to the author for his contribution to the series and to the readers for their interest in the series.

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**Committee on the Medical Effects
of
Air Pollutants (COMEAP)**

Preface



Professor S Holgate, (Chairman) MD DSc FRCP

The Committee on the Medical Effects of Air Pollutants was established in May 1992 and forms a part of the Government's continuing commitment to study the effects of environmental factors upon health. The creation of this Committee reflects the importance with which the Department of Health regards air pollution. Its remit is:

At the request of the Department of Health:

- (a) To assess, and advise Government on, the effects upon health of air pollutants both in outdoor and indoor air, and to assess the adequacy of the available data and the need for further research.
- (b) To co-ordinate with other bodies concerned with the assessment of the effects of exposure to air pollutants and the associated risks to health and to advise on new scientific discoveries relevant to the effects of air pollutants upon health.

The Committee has provided advice on specific questions and has also played a role as a forum for expert discussions and the formation of a consensus view on the health effects of air pollutants. This advice has aided the Expert Panel on Air Quality Standards (established by the Department of the Environment in 1992) in recommending health based ambient air quality standards for the UK. Close links have been maintained with other Department of Health Committees including the Committee on Carcinogenicity.

I have found it stimulating and challenging to take on the job of chairing this Department of Health committee and I am pleased that we have been able to address a number of topics of importance in our first year and a half. I look forward, with enthusiasm, to the Committee's work over the coming years.

Stephen Holgate

Committee on the Arts

Air Pollution



The Committee on the Arts has been studying the impact of air pollution on the arts and has found that there is a significant correlation between air quality and the health of artists and the quality of their work.

The Committee has recommended that the government should take steps to reduce air pollution in order to protect the health of artists and the quality of their work.

The Committee has also recommended that the government should provide financial support for artists who are affected by air pollution.

The Committee has also recommended that the government should provide information to artists about the health effects of air pollution and the steps they can take to protect themselves.

The Committee has also recommended that the government should provide information to the public about the health effects of air pollution and the steps they can take to protect themselves.

Introduction

1.1 This report identifies the main activities of the Committee and the advice which the Committee has provided to Government during the period from its formation in 1992 to the end of 1993. The Committee met five times during that period. The advice provided has been in a number of forms, most often communicated to Government Departments by the Committee's Secretariat following discussion at meetings of the Committee. This advice has been used by the Departments as an input to their work of formulating advice to the public and developing policy.

Asthma

2.1 On 23 October 1992, DH asked the Committee to consider the evidence for trends in the prevalence of asthma, and in mortality from the disease. Members commented on the difficulty of maintaining consistent diagnostic criteria for the disease, and that without these very careful interpretation of the data was required. Changes in diagnostic criteria had occurred over the past 20 years. The Committee's view was that the evidence supported an upward trend, although the rate of the increase was not clear. International comparisons, with asthma increasing in a wide range of countries, meant that it was not at all obvious whether there might be a common factor responsible for the increase. Suggestions made by Members included maternal smoking, changes in diet, and air pollution (exposure to both outdoor and indoor pollutants may be important); genetic factors were also important.

2.2 The meeting agreed to set up a sub-group to consider the relationship of asthma to air pollution further, with the following terms of reference:

To advise on:

- (a) Trends in asthma in the United Kingdom
- (b) The relationship of air pollution to such trends
- (c) Possible mechanisms by which air pollutants might affect trends in asthma
- (d) Gaps in the database
- (e) Specific research recommendations.

The sub-group was established in 1993 and is expected to report at the end of 1994. Its membership is given in Annex B.

2.3 At the meeting on 22 October 1993, the Committee discussed the report prepared earlier in 1993, for the Medical Research Council's Committee on Toxic Hazards in the Environment and Workplace, by the working group on the Environmental Determinants of Asthma. The Committee noted the importance of distinguishing between the induction of asthma, as opposed to the exacerbation or promotion of an attack. Members felt that research on the former might have to concentrate on the intrauterine environment and early childhood.

Benzene

3.1 On 29 May 1992 the Committee considered the health advice that might be offered to the public on exposure to benzene in the general environment. The Committee concluded that it was long-term exposure to benzene, and therefore long-term average concentrations, that were likely to be of greatest importance in determining the health effects. The use of 1-hour average concentrations was of relevance in traffic and air quality management and other planning measures rather than as a basis for health advice.

3.2 At the meeting of the Committee on 9 July 1993, Members considered the suggestion that benzene might be a significant cause of childhood leukaemia. They noted that no studies in the literature provided any strong and direct support for this hypothesis, and considered that the epidemiology (urban/rural incidence and age profile) and medical evidence (that occupational studies have associated benzene exposure with myeloid leukaemia which is very rare in children, the major childhood leukaemia being lymphoid leukaemia) suggested that it was unlikely to be correct.

3.3 The Committee also considered the need for advice on the health effects of benzene, and what form that advice should take. Members were keen that any advice should be simple to follow and should avoid the use of jargon.

3.4 The Committee provided a statement of advice on the health effects of benzene.

Advice on the health effects of benzene

3.4.1 Benzene is a commonly occurring chemical found in petrol and it is also produced by the combustion of fuel in the engines of motor vehicles. Petrol engine exhausts are the prime source of benzene in atmospheric air although cigarette smoke is a larger source of benzene exposure for smokers.

3.4.2 Long-term occupational exposure to benzene at concentrations a thousand times greater than those typically found in urban air in the UK has been shown to increase the risk of certain types of leukaemia in adults: its use in industry is therefore strictly controlled. Although it is not possible to define an absolutely safe level of exposure to benzene, levels in outdoor air encountered in the UK are considered by COMEAP and the Department's Committee on Carcinogenicity to present a very low risk to health.

3.5 The Expert Panel on Air Quality Standards (EPAQS), taking into account all the available evidence of the health effects of benzene and information on outdoor levels, subsequently recommended to the Department of the Environment an air quality standard of 5 parts per billion (ppb) (running annual average concentration). Since benzene is a genotoxic carcinogen and, in principle, exposure to such substances should be kept as low as practicable, EPAQS also recommended that this standard be reduced to the lower level of 1 ppb in the long term.

Carbon Monoxide

4.1 On 23 October 1992, the Committee discussed the health effects of carbon monoxide. Members concluded that the modelling of these effects was difficult, as the uptake and elimination of carbon monoxide varied with physiological factors. It was agreed that those with ischaemic heart disease were the most sensitive group but that, even in members of this group, exposure to ambient levels of carbon monoxide would be unlikely to give rise to levels of carboxyhaemoglobin which would produce ill effects. In smokers, the ambient exposure would add little to that associated with smoking. It should be recalled that carbon monoxide equilibrates across the lung and therefore at ambient concentrations a heavy smoker will, whilst not smoking, be losing rather than gaining carbon monoxide.

Eye irritation

5.1 At its meeting on 9 July 1993, the Committee heard a presentation from Mr Dennis Swanston on the effects of air pollutants on the human eye. This covered the pharmacological mechanisms involved, and the factors which determine the extent to which damage may be caused to the eye. Defence mechanisms were also considered. In discussion of the presentation the Committee agreed with Mr Swanston that the precise mechanisms by which air pollutants produce eye irritation have not yet been clearly established.

Hay fever

6.1 Also at the meeting on 9 July 1993, the Committee heard a presentation from Dr Penny Fitzharris and Dr Mike Ashmore on the way in which hay fever develops as a disease, and on panel studies during 1990 and 1991 designed to investigate whether air pollutants could modify the relationships between pollen exposure and the severity of a range of symptoms of hay fever. The results suggested that hay fever symptoms might be worse on days of high ozone concentrations, but Dr Ashmore cautioned that a causal relationship with ozone could not be assumed, as other variables might be involved. In particular, meteorological factors (temperature and wind speed) might be important.

Health Advice - telephone line

7.1 At its meeting on 22 October 1993, the Committee was asked to contribute to an evaluation of the Department of the Environment Air Quality Information Line (0800-556677) which provides a recorded message of information and advice on levels of air pollutants and their effects on health. The Helpline was set up in October 1990 and provides, without charge, information of levels of air pollutants and advice on the effects on health of exposure to such levels. Advice on how exposure might be limited is also provided. The text of the health advice provided on the Helpline is given below. The Committee commented on the need to balance a proper appreciation of the complexities and uncertainties with the need for clear advice that people could follow, and endorsed steps to increase public awareness of the issues. They asked the Secretariat to pursue these points with the Department of the Environment, for possible discussion at a future meeting.

7.2 Current text of health advice provided on Air Quality Helpline (September 1994):

"The following advice on health applies only on days when air quality is poor or very poor. If you have a breathing problem, such as asthma or bronchitis, you may feel a little uncomfortable on these days. You might cough and feel some pain when breathing deeply. It might help to increase your treatment temporarily - you should talk to your doctor about your options.

One general way you can help reduce the effects is to avoid strenuous or outdoor activity when air quality is poor. Also, if children suffer from asthma, they may be more comfortable not taking part in games when air quality is poor; but there is no need to keep them away from school."

Measurement of lung function

8.1 On 9 July 1993, the Committee was asked for advice on the interpretation of the results of the various tests of lung function used to determine the effects of air pollutants upon the respiratory system. The Committee was also asked whether any one test could be recommended in preference to all others for use in this area. Having considered a number of

possible approaches - including FEV₁, Peak Flow, and specific airway conductance measurements - the Committee concluded that no single method could be recommended in all circumstances. Peak Flow and FEV₁ measurements were relatively easy and repeatable, and thus could be the measurements most suitable for a range of studies, but more sophisticated measurements might be more appropriate in some cases, particularly when small changes in distal airway function were to be studied.

8.2 Members noted that changes in lung function were likely to be of greater significance among asthmatics and others with impaired lung function, than for those not suffering from such disease. They felt that, in interpreting studies, changes in lung function should be considered in that context. Transient changes were clearly different from permanent changes due to lung damage but, for the former, changes of, for example, 5% in individuals, were not likely to be of health significance. The importance of a shift in average (population) levels of lung function was also considered. It was recognised that, although such shifts might be small, important effects could occur at the lower end of the distribution curve and the effect on individuals with impaired lung function would be proportionally greater.

Monitoring of exposure to air pollutants

9.1 On 23 October 1992, the Committee discussed the monitoring of exposure of populations "at risk" of adverse health effects. Members commented that arrangements for monitoring and assessing of exposure to air pollution in the UK were inadequate in terms of accurate prediction of effects upon health. In particular, they suggested that there was a need for the results of local authority monitoring and DoE monitoring to be brought together.

9.2 On 12 February 1993, the Committee was invited to comment on implications of the work of the Quality of Urban Air Review Group (QUARG), which had published its first report *Urban Air Quality in the United Kingdom* in January 1993. Members noted that QUARG had identified the need for better coordination of local authority monitoring.

Open cast coal mining

10.1 The Committee has considered the suggestion that open-cast coal mining could have a deleterious effect on the health of those living close to the workings. Following discussion at its meetings on 23 October 1992 and 12 February 1993, the Committee agreed a statement of advice on a study on open-cast coal mining.

Advice on Open-Cast Mining

10.1.1 It was accepted by the Committee that little work had been done on the effects of open-cast coal mining upon the health of local residents, especially those with respiratory disorders which might make them more susceptible to the effects of inhaled particles.

10.1.2 A study by Temple (1992) was considered and it was agreed that the results reported were consistent with an association between the opening of an open-cast mine and an increase in asthma consultations. However, the Committee considered that local awareness of the opening of the mine and concern about its possible effects upon health were plausible explanations of the association and that further work would be needed to sustain a causal hypothesis.

Ozone

11.1 On 23 October 1992, the Committee discussed the health advice that might be offered regarding exposure to ozone. The Committee based its views on the report on ozone by the Advisory Group on the Medical Aspects of Air Pollution Episodes (MAAPE) published in 1991. The Committee recognised that developments had occurred in ozone toxicology and made use of updating papers prepared by the Secretariat. Members considered the more important health effects that result after shorter and longer periods of exposure, and the relative merits of expressing any action levels as 1-hour or 8-hour averages. They asked the Secretariat to consider the consistency of advice, in particular in relation to the work of the Expert Panel on Air Quality Standards (EPAQS).

11.2 The Committee further reviewed the position on health advice at its meeting on 22 October 1993 and agreed a statement of advice on the health effects of ozone which was provided to the Department of Health. This was prepared on the basis of advance information on the EPAQS recommendation on an air quality standard for ozone. EPAQS subsequently recommended to the Department of the Environment an air quality standard for ozone in the UK of 50 parts per billion as a running 8-hour average.

Advice on health effects of ozone

11.2.1 Ozone is a powerful oxidising agent produced by photochemical reactions from primary pollutants emitted by motor vehicles and industrial sources. In high concentrations it may produce lung damage though, at levels likely to be encountered in the UK, long-term effects are unlikely to occur. Levels in summer may produce transient respiratory effects in sensitive individuals taking exercise out of doors.

11.2.2 Ozone concentrations are monitored continuously and provided as hourly averages; these will be averaged over rolling eight-hour periods. The standard is likely to be breached on warm summer days when ozone levels rise. The value recommended for the standard is lower than that adopted in the recent EC Directive on ozone. The purpose of the eight-hour standard is to protect health and to encourage reduction of the output of chemicals which contribute to ozone formation. Information already provided on the basis of one-hour average concentrations will continue to be provided on the free telephone Helpline (0800 556677) to allow individuals to take action to avoid or reduce effects.

Particles

12.1 On 23 October 1992, the Committee discussed the health effects of exposure to small particles. Members agreed that the published studies of mortality effects were consistent in demonstrating an association between low levels of particulate air pollution and mortality, but noted that no convincing evidence of a causal relationship had been produced. Members particularly noted that meteorological factors and measures of pollutants could not be assumed to be independent of each other, nor could their effects.

12.2 Members' opinions differed on the significance of the published studies which had examined the effects of low levels of particles on morbidity and indices of lung function. Some felt that, while the associations found were weak, there was some evidence to support the assertion that effects occurred at levels below existing air quality standards. Others felt that the data were unconvincing and no such conclusion could be drawn.

12.3 The Committee also discussed the most appropriate measure of particulate pollution. They did not conclude that any one measure had been clearly established to be the best, but emphasised that in all published work the method of measurement should be carefully specified.

12.4 On 22 October 1993, the Committee agreed to form a sub-group on particulate matter which would prepare a report for consideration by the Committee. The membership of the sub-group is given at Annex C.

Its terms of reference are to advise on:

- (a) The current state of knowledge of effects of variations in mass concentrations of suspended particles upon health (excluding occupational exposures).
- (b) The value of the measure of particle levels used by the Expanded Urban Network monitoring sites (PM10) as an index or indicator of levels of airborne particles of significance to health.
- (c) Gaps in current understanding and the need for future research.

This sub-group was established in 1993 and is expected to report in early 1995.

12.5 At its meeting on 22 October 1993, the Committee considered the chemical composition of fine airborne particles in the UK. They noted that both sampling and analytical techniques differed between reported studies, so that it was never easy to compare the results. Few if any studies commented on the presence of organic matter in samples although it was likely that many particles were of heterogeneous composition. Fungal spores might also be present as a major component.

12.6 At the same meeting, the Committee considered the latest reports on the links between levels of fine particulate matter and health effects. The Committee considered that, while much of the published material showed relationships, it was important to consider all the evidence in a way that some commentators had failed to do. Adequate control of confounding factors is the main problem in interpreting some studies. Without a comprehensive survey, the conclusions could be misleading.

12.7 At the same meeting, the Committee considered what health advice should be given on the effects of fine particles. Members noted that the sub-group on particles was still considering the issue but, at the request of the Department of Health, provided a statement of advice (given below). This indicates how the Committee felt that Departments should approach the issue of control of the levels of fine particles and its relative importance as against other airborne pollutants. In doing so, the Committee recognised that the issues surrounding fine particles are complex, and that Members may need to review the position when the sub-group has finished its work.

Advice on particulate pollution

12.7.1 DH has asked for advice from COMEAP on this issue and the Committee is awaiting a report from its sub-group on particles before providing this advice. However, in the interim, there appears to be sufficient evidence from studies conducted in a number of countries to give cause for concern about the possible effects of current levels of fine particles upon health. This is a complex area and it is not yet clear what role changes in low levels of particles play vis-a-vis changes in levels of other pollutants and temperature and humidity in causing the changes in indices of morbidity and mortality recorded in a number of studies. Despite these difficulties, which will be addressed in detail by the COMEAP sub-group on particles, reductions in levels of fine particles should be welcomed, such an approach being in line with the precautionary approach adopted by the Government on questions of possible effects of a range of toxic substances.

Sensitive Groups

13.1 At its meeting on 12 February 1993, the Committee considered what specific health advice was required for those members of the public who are in some way particularly sensitive to air pollutants. Members commented that there needed to be a clear division between the identification of high risk groups, which might be important in formulating general public health advice, and the specific advice for those who might be affected by air pollutants. For the latter, the effects on the individuals targeted would need to be considered carefully. It would be important that individuals should be in a position to take steps which would prevent a significant effect upon their health and that the curtailment of activity produced should not be counter-productive. This was considered to be especially important with regard to asthmatic children.

13.2 The Committee noted that the issue of advice relevant to babies and young children would need further consideration.

Research

14.1 The Committee first considered research priorities at its meeting on 23 October 1992. Members commented on the importance of maintaining a balance between laboratory studies and epidemiological work, particularly since existing work showed some inconsistencies between results from the two types of study. Also important was the need to assess the magnitude of public health outcomes in any work. The Committee also provided more detailed comments on possible research areas suggested by the Department of Health.

14.2 In discussing indices of lung function on 9 July 1993, the Committee commented that the development of new methods for such measurements would assist future research studies.

14.3 At its meeting on 22 October 1993, the Committee discussed DNA adducts and their potential use as a marker for exposure to air pollutants. It concluded that this technique was potentially of considerable importance, but more work would be needed to develop the technique before its applicability was clear.

**Advisory Group on the Medical Aspects
of
Air Pollution Episodes (MAAPE)**

Advisory Group on the Medical Aspects

of

Air Pollution Episodes (MAAPE)

Preface



Professor A Tattersfield MD FRCP

The Advisory Group on the Medical Aspects of Air Pollution Episodes was established in September 1990 to examine the likely health effects of exposure to such episodes of elevated levels of air pollutants as occur in the UK and the need for advice.

Professor Stephen Holgate was the first Chairman of the Group and led it during the production of the reports on Ozone and on Sulphur Dioxide, Acid Aerosols and Particulates. I took over the Chairmanship in June 1992 and since then we have produced a further report on the Oxides of Nitrogen, published by HMSO in December 1993. The conclusions and recommendations of these reports are summarised briefly in the following pages. A further report on the interactive effects of air pollutants is in preparation.

Chairing the Advisory Group has been an exciting and challenging task. All the Members have contributed extensively to the published reports and it has been gratifying to lead a group with such disparate yet focused expertise.

Anne Tattersfield



Figure 1: Description of the diagram.

The diagram illustrates the relationship between the variables X and Y. It shows a clear positive correlation, where as X increases, Y also tends to increase. This relationship is supported by the data points plotted on the graph.

The data points are scattered around a central trend line, indicating some variability in the data. However, the overall pattern remains consistent, showing a strong positive linear relationship between the two variables.

The results of the analysis suggest that the variables X and Y are highly interdependent. This finding is crucial for understanding the underlying mechanisms that govern their interaction.

Conclusion

Introduction

1.1 The Advisory Group on Medical Aspects of Air Pollution Episodes (MAAPE) was established in 1990 with the specific terms of reference:

To consider whether advice about personal protective measures during air pollution episodes should be given by Central Government and, if so, what that advice should be, to whom it should be addressed, and the criteria which should be adopted for the issuing of any advice.

The Advisory Group was first asked to consider these questions with regard to the episodes of elevated ozone concentrations which have occurred in the UK during hot summer weather before progressing to consider sulphur dioxide and nitrogen dioxide.

Ozone

2.1 The Advisory Group's conclusions on ozone were made public in May 1991 with the publication of the full report in August 1991. The conclusions of the Group were brought to the attention of doctors in England by means of a letter from the Chief Medical Officer (CMO).

2.2 The main conclusion of the report was that changes in lung function may occur in people during such episodes of elevated ozone concentration as are found in parts of the UK during periods of hot summer weather. These changes are unlikely to produce irreversible lung damage though individuals who are sensitive to ozone may experience respiratory symptoms, including cough and discomfort on deep inspiration, whilst taking vigorous exercise out of doors. Although individuals with asthma or other respiratory disorders appear to be no more likely than healthy individuals to be sensitive to ozone, the effects of ozone may be more troublesome in individuals who already have some impairment of lung function.

2.3 The group advised that during episodes of elevated ozone concentration, a reduction in outdoor exercise during the latter part of the afternoon would ameliorate the effects in those who are sensitive.

2.4 The Advisory Group recommended that advice should be made available by means of:

The Meteorological Office incorporating information on ozone levels in its weather forecasts when peak hourly concentrations in excess of 100 ppb are anticipated.

The provision of information on the effects of ambient levels of ozone as part of the recorded message currently available on the Air Quality Helpline set up by DoE and the Meteorological Office, so that those who are particularly sensitive to ozone will be in a position to take steps to reduce exposure.

2.5 The Advisory Group made a number of recommendations for further research particularly on interactions between ozone and other pollutants and on the effects of ozone on patients with respiratory problems.

Sulphur dioxide

3.1 The Advisory Group then considered sulphur dioxide, acid aerosols and particulates as its second task and this report was published in October 1992. The conclusions of the Group were again brought to the attention of doctors in England by means of a letter from the CMO.

3.2 The main conclusion of the report was that individuals who do not suffer from respiratory disease will not be affected by such episodes of elevated concentrations of sulphur dioxide as occur in the UK. However asthmatic patients are more sensitive to sulphur dioxide and, in some parts of the UK, levels of sulphur dioxide regularly exceed those at which effects of clinical significance, including tightness of the chest, coughing and wheezing, have been demonstrated in such individuals. These effects are acute and reversible.

3.3 The group recommended that advice should be made available, particularly to those most likely to be affected, when hourly average concentrations of sulphur dioxide are in the range of 125 ppb (357.5 $\mu\text{g}/\text{m}^3$) to 400 ppb (1144 $\mu\text{g}/\text{m}^3$) and further recommended that a warning should be issued when hourly average concentrations of sulphur dioxide exceed or are expected to exceed 400 ppb (1144 $\mu\text{g}/\text{m}^3$). At these levels many asthmatics may experience significant changes in indices of lung function, and symptoms including tightness of the chest, coughing and some breathlessness. These effects may be of sufficient severity to make it advisable for asthmatics to limit exposure, and increase their treatment in consultation, if necessary, with their doctors. Such effects are likely to be mild for the majority of patients and there is no evidence that they have any lasting effect on asthma. Those not suffering from respiratory diseases are not expected to experience any adverse health effects.

3.4 MAAPE recommended that advice should be made available by means of the provision of information on the effects of ambient levels of sulphur dioxide as part of the recorded message currently available on the Air Quality Helpline set up by the Department of Environment (DoE) and the Meteorological Office. It was further recommended that the point of transition from the "Poor" to "Very Poor" band be lowered from 500 ppb (1430 $\mu\text{g}/\text{m}^3$) to 400 ppb (1144 $\mu\text{g}/\text{m}^3$) and that a warning be issued, with revised advice on the Helpline, when Air Quality passes or is expected to pass into the Very Poor band.

3.5 Regarding suspended particulate matter, the Advisory Group concluded that in comparison with conditions in the UK in the 1950s and 1960s, levels of (non-specific) particulate material were low and were not thought to pose a significant threat to health. However, the Advisory Group commented that little monitoring of particulates regarding composition or the mass of particulates per unit volume of air (gravimetric concentration) is undertaken in the UK and thus this conclusion must be regarded as tentative. The situation regarding particulates is now being reviewed by the COMEAP subgroup.

3.6 With respect to acid aerosols the Advisory Group concluded that there were insufficient data available regarding acid aerosol levels, particularly in urban areas, to allow any assessment of likely effects to be made. The Group strongly recommended that methods for monitoring ambient levels of acidity (hydrogen ion concentration) be developed and a basic monitoring network be established.

3.7 MAAPE noted that data were lacking in a number of areas and recommended further research including:

Research on interactions between sulphur dioxide and related pollutants, and also with other pollutants eg nitrogen dioxide, ozone.

Epidemiological research into the effects of low levels of these pollutants on the prevalence of respiratory disease and on the incidence of asthma attacks.

Oxides of nitrogen

4.1 The Advisory Group's third report covered the oxides of nitrogen and this was published in December 1993. The conclusions of the Group were also highlighted by means of an article in "CMO's Update", sent to all doctors in England in 1994.

4.2 The report concluded that the available evidence indicates that individuals not suffering from respiratory disease will be unaffected by such episodes of elevated concentrations of nitrogen dioxide as occur in the UK. When studied in the laboratory there is no consistent difference in sensitivity to nitrogen dioxide between asthmatic patients and normal individuals. However some recent epidemiological studies have indicated that people suffering from respiratory disorders, including asthma, may experience a worsening of their symptoms when ambient levels of nitrogen dioxide and associated pollutants are raised.

4.3 The conclusion that few effects are likely to occur at levels of nitrogen dioxide encountered outdoors in the UK, led the Advisory Group to the recommendation that health warnings and advice regarding nitrogen dioxide episodes should only be issued in exceptional circumstances.

4.4 It was recommended that information on levels of nitrogen dioxide continue to be provided via the telephone Helpline service and that when nitrogen dioxide levels enter the "Very Poor" band (over 300 ppb, $564 \mu\text{g}/\text{m}^3$) there should be health advice to those suffering from respiratory disorders, including asthma. Only in the unlikely event that the levels exceed 600 ppb ($1128 \mu\text{g}/\text{m}^3$) should there be a warning, possibly accompanied by a press release.

4.5 MAAPE commented that data were found to be lacking in a number of areas and concluded that there was a clear need for further research, including research into the interactions between nitrogen dioxide and other pollutants, such as ozone and sulphur dioxide.

Mixtures of air pollutants

5.1 The Advisory Group is now considering the health effects of interactive combinations of pollutants and is expected to make its fourth and final report in spring 1995.

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Professor A Dayan MD FRCP FRCPATH FFPM CBiol FIBiol

J E Doe BSc PhD

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Professor A J Newman Taylor OBE MSc FRCP FFOM

D Purser BSc PhD

R J Richards BSc PhD DSc

Professor A Seaton MD FRCP FFOM

Professor A E Tattersfield MD FRCP

R E Waller BSc

M L Williams BSc PhD (until December 1992)

Secretariat

R L Maynard BSc MB BCh MRCPATH CBiol FIBiol (Medical)

A Wadge BSc PhD CBiol MIBiol (Scientific)

T G Howe BA (Administrative) (until September 1993)

Ms C Douglas (Administrative) (from November 1993)

Miss J Cumberlidge BSc MSc (Minutes)

ANNEX B

COMEAP: Sub-group on Asthma and Air Pollution

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Professor A J Newman Taylor OBE MSc FRCP FFOM

D Strachan MSc MD MRCP MFPHM MRCPGP

T Tetley BSc PhD

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COMEAP: Sub-group on Particles

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J Fintan Hurley MA

D Lamb BSc MB BS PhD FRCPATH

J McAughey BSc

D G Upshall BSc PhD

Advisory Group on the Medical Aspects of Air Pollution Episodes (MAAPE)

MEMBERSHIP *(during the period of this report)*

Chairman

Professor S T Holgate (from September 1990 to June 1992)

Professor A E Tattersfield MD FRCP (from June 1992)

Members

Professor H R Anderson MD MSc FFPHM

Dr M Ashmore BSc PLD

Professor S T Holgate MD DSc FRCP

R J Richards BSc PhD DSc

R E Waller BSc

M L Williams BSc PhD (until December 1992)

J S Bower BSc (from January 1993)

Co-opted for Second Report

Professor J G Widdicombe MA DPhil DM FRCP

Co-opted for Third Report

K Miller ChemEng MSc PhD FRCPATH

Secretariat

R L Maynard BSc MB BCh MRCPATH CBiol FIBiol (Medical)

Mrs K M Cameron BSc MSc (Scientific) (until March 1993)

J B Greig MA DPhil (Scientific) (from April 1993)

T G Howe BA (Administrative) (until September 1993)

Ms C Douglas (Administrative) (from November 1993)

Miss J Cumberlidge BSc MSc (Minutes)

**Committee on the Medical Effects of Air Pollutants
and
Advisory Group on Medical Aspects of Air Pollution
Episodes**

MEMBERS' INTERESTS (*Declaration of interests during the period of this report*)

*COMMITTEE ON MEDICAL EFFECTS OF AIR POLLUTANTS

†MEMBER OF PARTICLES SUB-GROUP ‡MEMBER OF ASTHMA SUB-GROUP

#ADVISORY GROUP ON MEDICAL ASPECTS OF AIR POLLUTION EPISODES

Member	Personal		Non-personal		
	Company	Interest	Company	Interest	
Prof S T Holgate (Chairman*)#	ICI (Zeneca)	Consultant	Allergene	} Consultant Grant-funded research	
	Fisons	Consultant	CIBA Geigy		
	Upjohn	Consultant	MSD		
	Bayer	Consultant	BOC		
	Pfizer	Consultant	Sandoz		
	Laboratorios Almiral (Spain)	Consultant	ICI		
	Burroughs- Wellcome	Consultant	Bayer/Miles		
	CIBA Geigy	Consultant	Glaxo		
		Napp Lab.			
Prof A Tattersfield (Chairman#)*	Merck Human Health Division (Merck & Co)	Member of Board of Merck	Glaxo	} Grant-funded research	
		International Advisory Council (MEDAC)	Astra Fisons Pharm- aceuticals		
	British Gas plc	Shareholder	Genentech Inc		} Occasional consultancy
			Fujisawa		
			Marion Merrell		
			Dow		
			Bayer		
			Rhone-Poulenc		
	Smith Kline	Occasional consultancy			
	Beecham	Occasional consultancy			
		3M Health Care			
Prof H R Anderson**	British Gas plc	Shareholder	NONE	NONE	
	London Electricity	Shareholder			
	Thames Water	Shareholder			
Dr M Ashmore#	TBV Science	Consultancy	NONE	NONE	
Dr J G Ayres*	Fisons plc Various pharmaceutical companies	Medical Adviser	EA (Electrical Authority)	Research Fellowship	
		Fees for drug studies	BLF/Fisons	Research Grant	
			Allen & Hanburys	Research Grant	
J Bower#	NONE	NONE	NONE	NONE	
Dr M L Burr*	NONE	NONE	Seven Seas Novex Pharma Ltd	Research grant	
Dr R L Carter*	Shell plc	Shareholder	NONE	NONE	

Member	Personal		Non-personal	
	Company	Interest	Company	Interest
Prof B Corrin*	3i	Shareholder	NONE	NONE
	Abbey National	Shareholder		
	British Gas	Shareholder		
	British Airways	Shareholder		
	British Telecom	Shareholder		
	National Power	Shareholder		
	Powergen	Shareholder		
	Rolls Royce	Shareholder		
	Thames Water	Shareholder		
	TSB	Shareholder		
	Vodafone	Shareholder		
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	Cantab Pharm- aceuticals Ltd	Consultant		
	Rhone Poulenc SA	Consultant		
	ML Labs	Consultant		
	SK Beecham Pharmaceuticals	Consultant		
	Sandoz			
	Pharma AG	Consultant		
	British Gas	Shareholder		
	British Petroleum	Shareholder		
	British Steel	Shareholder		
	British Telecom	Shareholder		
	Eurotunnel	Shareholder		
	Glaxo	Shareholder		
	London Electricity	Shareholder		
	National Power	Shareholder		
	Powergen	Shareholder		
	Scottish Power	Shareholder		
	Thames Water	Shareholder		
	TI Group	Shareholder		
Dr J E Doe*	Zeneca Ltd	Employee	ICI plc	Laboratory retained as toxicology consultancy by ICI plc
Prof R K Griffiths*	Hawthorne Consultants	Director	University of Birmingham	Various research grants related to air pollution
Prof R M Harrison*	Associated Octel Company Ltd	Consultant	NONE	NONE
J Fintan Hurley*†	Institute of Occupational Medicine	Employee	Various pharmaceutical companies	Occupational medicine consultancy
Dr D Lamb*†	NONE	NONE	NONE	NONE
Mr J McAughey*†	NONE	NONE	NONE	NONE
Dr Klara Miller#	BIBRA International	Employee	NONE	NONE

Member	Personal		Non-personal	
	Company	Interest	Company	Interest
Prof A Newman Taylor*	Proctor and Gamble	Consultant	NONE	NONE
	Glaxo	Shareholder		
	Shell			
	ICI			
	Zeneca			
	Water Company	Consultant Chest Physician		
	RAF			
British Airways				
Dr D Purser*	Department of Environment - Building Research Establishment	Employee	NONE	NONE
Dr R Richards*#	Xenova Ltd	Research	NONE	NONE
Prof A Seaton*	Soap and Detergent Industry Association	Chairman	NONE	NONE
	Bayer plc	Medical Advisory Committee		
		Occupational Medicine		
	Rolls Royce	Consultancy		
	Scottish Power	Shareholder		
	Hydro Electric	Shareholder		
Dr D Strachan‡	Abbey National Building Society	Shareholder	NONE	NONE
Dr T Tetley‡	NONE	NONE	NONE	NONE
Dr D G Upshall†	NONE	NONE	NONE	NONE
R E Waller*#	Seeboard	Shareholder	NONE	NONE
	Scottish Hydro-Electric	Shareholder		
	Scot Power	Shareholder		
Professor J A Warner‡	First London Allergy Clinic	Shareholder	NONE	NONE
	Glaxo	Research Grants to conduct trials of their products		
	Allen & Hanburys			
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	Astra			
	Pharmaceuticals			
	UCB Pharma			
	Gore			
	Vorwerk			
	Miele			
	Powergen			
Professor J G Widdicombe#	NONE	NONE	NONE	NONE
Dr M L Williams*	British Telecom	Shareholder	NONE	NONE

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