Air Pollution in the UK: 2004

A report prepared by Netcen for
Defra and the Devolved Administrations

This page has been left intentionally blank

Air Pollution in the UK: 2004

A report prepared for the Department for Environment, Food and Rural Affairs, the Welsh Assembly Government, the Scottish Executive and the Department of Environment in Northern Ireland

This report has been compiled and written by Jon Bower, Jeff Lampert, Paul Willis, and Geoff Broughton of Netcen; however, the data here presented represent the end-product of the efforts of many persons and organisations in the private sector, local and central government.

August 2005

This page has been left intentionally blank

Title	Air Pollution in the UK: 2004
Customer	Defra and the Devolved Administrations
Confidentiality, copyright and reproduction	Crown Copyright
File reference	Netcen/ED48692008/Issue 1
Reference number	Netcen/ED48692008/Issue 1

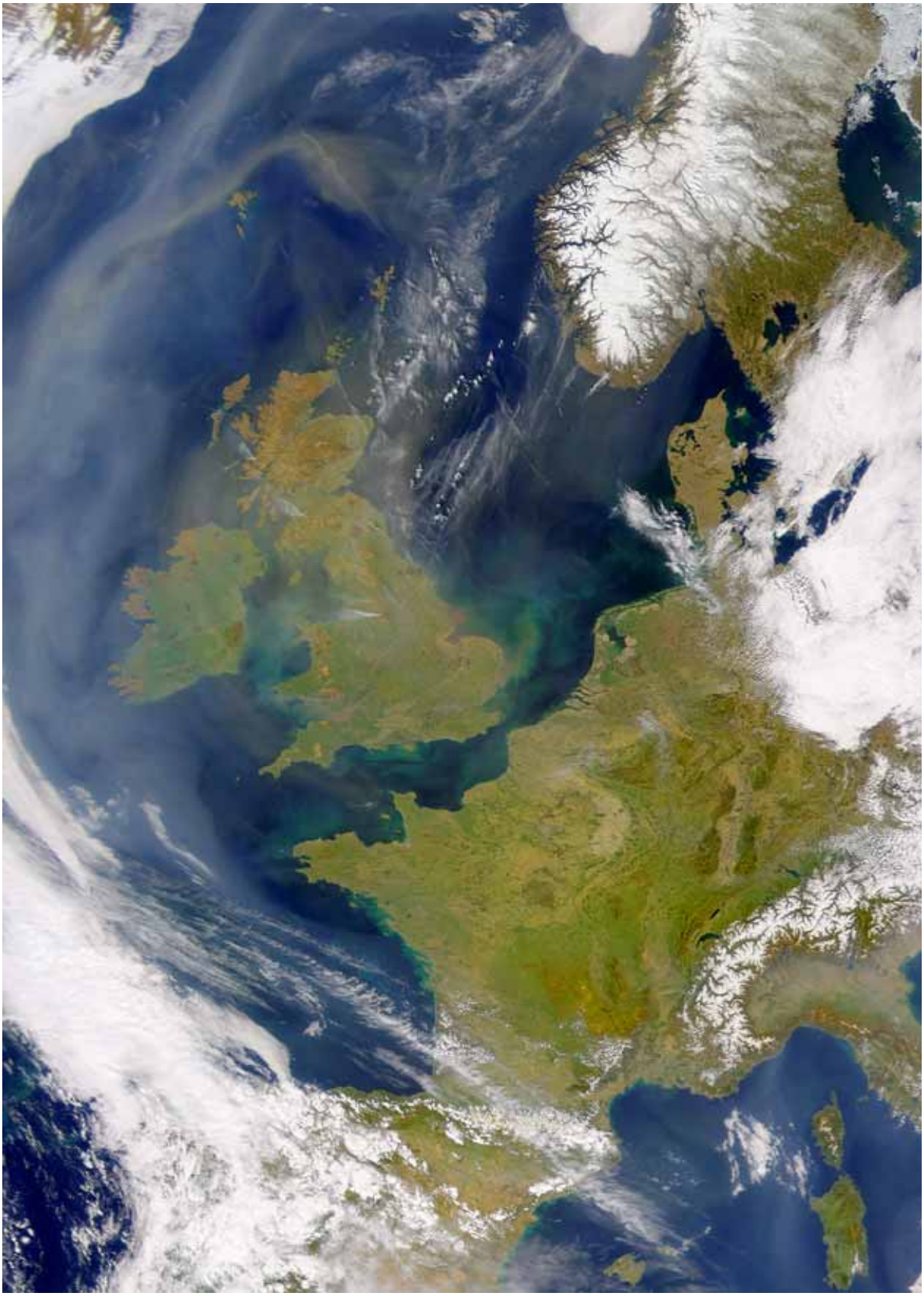
Jon Bower
National Environmental Technology Centre
551 Harwell
Didcot
Oxfordshire OX11 0QJ
England

Telephone +44(0)870 190 6416
Facsimile +44(0)870 190 6607

Netcen is an operating division of
AEA Technology plc

Netcen is certificated to ISO9001:2000 and ISO14001

Authors	Name	Jon Bower, Jeff Lampert, Geoff Broughton
Reviewed by	Name	Jon Bower, Paul Willis, Geoff Dollard
Approved by	Name	Jacquie Berry
	Date	31 August 2005



Frontispiece: Spectacular satellite image showing dust, haze and pollution shrouding the UK during the April 2003 photochemical smog episode reported in last year's report. Such episodes were less frequent, however, during 2004.

Image courtesy of the SeaWiFS Project, NASA/Goddard Space Flight Centre & ORBIMAGE, Inc.

1. Executive Summary

For those of you who are short of time…

This is the latest in a long-running series of annual reports summarising measurements from national air pollution monitoring networks operated on behalf of Defra (Department for Environment, Food and Rural Affairs) and the Devolved Administrations of Scotland, Wales and Northern Ireland. The first such document containing consolidated data and information from all the UK's Government-funded air monitoring programmes was published in 1990.

The present report includes data and analyses from the calendar year (January to December) of 2004. The pollutants featured and analysed in this report are:

- Ozone (O_3)
- Nitrogen oxides (NO_x = NO and NO_2)
- Sulphur dioxide (SO_2)
- Carbon Monoxide (CO)
- PM_{10} particles
- Benzene
- 1,3-butadiene

Because of their potential impacts on human health, welfare and natural environments, these pollutants are routinely measured at many locations throughout the UK.

The measurements reported here were made in national automatic air monitoring networks, comprising 128 stations for the year in question. These networks serve a variety of policy, regulatory, scientific research and public health objectives. These are described further herein.

In this report, we:

1. Consider current UK and European efforts to tackle air pollution, identifying the pivotal role of air monitoring in this process
2. Describe current UK air monitoring networks, their objectives and methodologies. Detailed site maps and information is also provided
3. Review current UK Air Quality Objectives and examine how and where these were exceeded during the year
4. Investigate, using detailed maps, how pollution levels vary across the country
5. Examine major periods of elevated pollution (so called pollution 'episodes') that occurred during the year
6. Assess long-term trends in order to identify how pollution levels in the atmosphere have changed over time
7. Provide in the second half of the report detailed statistical summary tables for each measured pollutant
8. Identify other published, web and media sources for information on the UK's air quality.

The report provides a comprehensive analytical picture of air pollution in the UK up to and during 2004. We will see that, overall, this year was a relatively quiet one for air pollution, particularly when compared with 2003. In particular, there were fewer summer photochemical pollution episodes, reflecting less exceptional weather conditions than those experienced during the 'heat wave' summer of 2003. Considered in the broader context of overall UK air pollution levels and trends over the last decade, we may consider 2004 to have been a more far typical and uneventful year than 2003.

CONTENTS

PART 3- Appendices

2. Introduction

The quality of the air that we breathe has an important impact on our health and quality of life. It can also have important impacts on broader global issues such as climate change. Measuring and understanding air pollution provides a sound scientific basis for its management and control. Considerable effort is therefore devoted in the UK to the systematic measurement of levels of air pollution nationwide. This effort started in earnest following the infamous coal-burning smogs of the 1950s and 60s, but has expanded massively in scope, coverage and sophistication since then.

Air quality monitoring, together with the information derived from it, should not be seen as an end in itself; rather, it offers us the best way of understanding our pollution problems, so that they can be tackled effectively at local, national and international level. Some of the actions being taken on a number of fronts in the UK and Europe are described in further detail in Section 3 of this report.

Monitoring air pollution in the UK has the following broad objectives:

- To provide a sound scientific basis for the development of cost-effective control policies and solutions
- To assess how far air quality standards, limit values and objectives are being met
- To evaluate potential impacts on population health and welfare
- To determine the impact of air pollution on ecosystems and our natural environment
- To provide the public with reliable and up-to-date information on air pollution
- To fulfil statutory air quality reporting requirements

Figure 1. The rural air monitoring station at Harwell, Oxfordshire

This report aims to provide a simple guide, written as far as possible in non-technical language, to what the latest measurements tell us about air pollution in the UK.

The report comprises three parts. The first part is primarily descriptive and analytical. In it, we'll:

- Summarise current UK and European policy efforts and initiatives to tackle air pollution (Section 3)
- Review where and how air pollution is measured in this country, examining monitoring networks, site locations and measurement techniques (Section 4)
- Examine key episodes - major periods of elevated pollution that occurred in 2004 (Section 5)
- Investigate through a series of detailed maps how pollution levels vary across the UK (Section 6)
- Assess long-term pollution trends in order to see whether pollution levels are declining over time (Section 7)
- Provide information on where and how to find out more about air pollution emissions, levels and effects in the UK (Section 4.5).

The second part of the report is statistical, providing a detailed pollutant-specific summary of measurements. From Sections 8 to 16, we provide for each pollutant measured in the automatic networks:

- Information on measurement and calibration techniques, instruments utilised, estimated accuracy and precision
- A summary of relevant UK objectives for that pollutant
- A map of UK national network measurement sites
- A detailed statistical summary of the measurements made in 2004
- Matching information on exceedences of UK Air Quality Objectives
- Time-series graphs showing variations in pollutant concentrations throughout the year at typical urban, rural and other site types
- Corresponding diurnal graphs showing typical variations in pollutant concentrations during the day
- Long-term time series showing trends in annual average measured concentrations.

In a series of Appendices, we'll also provide:

- Background information on the air pollutants measured in the national networks, their sources and effects
- Detailed maps showing the location of automatic monitoring stations in different regions of the UK
- More information on the different UK national air monitoring networks and their objectives
- A summary and analysis of UK monitoring locations showing statistically significant trends in pollution levels over time
- A full listing of current UK, European and World Health Organisation Air Quality Standards, Objectives, Limit Values and Guidelines for the major air pollutants
- An explanation of some of the terminology used, together with a discussion of measurement accuracy, trend calculation and the mathematical methods used to calculate measurement statistics throughout this report