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December 2001

## INVESTIGATION OF AIR POLLUTION STANDING CONFERENCE

Department for Environment, Food and Rural Affairs Report  
December 2001

**Full details of the DEFRA funded Air Quality Research  
Programme can be found on the DEFRA Website:**

<http://www.defra.gov.uk/environment/index>

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**This report is intended to provide IAPSC delegates with a brief summary of some of the projects comprising DEFRA's air quality research programme. However, it is not exhaustive. Full details of this research programme can be found on DEFRA's web site <http://www.defra.gov.uk/environment/index>**

# Monitoring Networks

## **AUTOMATIC URBAN AND RURAL AIR QUALITY MONITORING NETWORK (AURN)**

With effect from 1 April 1998, the Urban and Rural Networks have been combined under a single Central Management and Co-ordination Unit (CMCU). Casella Stanger (formerly Stanger Science & Environment) has been appointed as CMCU by the DEFRA to manage and operate the UK Automatic Urban and Rural Air Quality Monitoring Networks (AURN). The AURN currently consists of 101 monitoring stations. Following initial validation by Stanger Science & Environment, the data are reported on an hourly basis to DEFRA's Data Dissemination Unit (DDU) for transmission to CEEFAX, TELETEXT, and FREEPHONE air quality and health advice information service, the World Wide Web, and TV weather bulletins.

Casella Stanger have also prepared a Site Information Archive for the Networks, on behalf of DEFRA. The Archive can be accessed via the Internet ([www.stanger.co.uk/siteinfo/](http://www.stanger.co.uk/siteinfo/)) and provides information on each monitoring station, including a description of the site address and pollutants measured, together with a location map and photographs showing the installation and 360° around it. The Archive also provides direct links to the measured pollutant concentrations.

## **MONITORING OF AIRBORNE PARTICULATE CONCENTRATIONS AND NUMBERS IN THE UK**

Casella Stanger (formerly Stanger Science & Environment), in association with the Institute of Public and Environmental Health at the University of Birmingham, has recently been awarded a new research contract to investigate ambient concentrations and numbers of airborne particles. The study will continue work previously carried out.

Equipment to continuously measurement concentrations of fine particles ( $PM_{2.5}$ ) and particle numbers will continue at three monitoring stations where coarse particles ( $PM_{10}$ ) are also measured. These include an urban background site (London Bloomsbury), a kerbside site (London Marylebone Road) and a rural site (Harwell).  $PM_{2.5}$  is also being measured at the rural Stoke (Isle of Grain) site. Measurement of the secondary aerosol component also takes place during episodic summertime conditions. Monitoring of total particle number concentrations will be carried out at 7 locations.

Enhancements in the new study include an assessment of the 'coarse' fraction as determined by both gravimetric and TEOM samplers; monitoring of elemental/organic carbon and particulate nitrate; and an investigation of surrogate metrics for particle surface area.

## DATA QUALITY ASSURANCE AND CONTROL FOR THE AUTOMATIC URBAN MONITORING NETWORK (AUN)

The DEFRA's national automatic urban monitoring network consists of 98 multi-pollutant monitoring stations throughout the country (82 AUN and 16 London Air Quality Network sites). Forty-three of these sites are direct-funded by the Department, with the remaining sites owned mainly by local authorities and affiliated to the national network (see Table 1).

A new phase of Network expansion took place in January 2001 in order to comply with the requirements of the First European Air Quality Daughter Directive for SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and lead. This Directive came into force in the UK on July 19<sup>th</sup> 2001 with the adoption of Statutory Instrument 2001 No 2315 "The Air Quality Limit Values Regulations 2001". (Further details can be found at [www.hmso.gov.uk/si/si2001/20012315.htm](http://www.hmso.gov.uk/si/si2001/20012315.htm)).

Eleven new sites were integrated into the network as well as the addition of extra monitors at three existing sites. The locations of the new sites are given in Table 2 below. The analysers from the London Bridge Place site, which was closed in November 1999, were relocated to London Westminster (Horseferry Road) and this site commenced operation in July 2001.

**Table 2 Affiliation of new DD1 sites, July 2001**

Site	Status*	Pollutants	Start Date
Aberdeen ( <i>existing site</i> )	DF	SO <sub>2</sub>	January 2001
Grangemouth (Falkirk)	Affil	NO <sub>x</sub> SO <sub>2</sub> PM <sub>10</sub>	January 2001
Stockton-on-Tees (Yarm)	Affil	NO <sub>x</sub> SO <sub>2</sub> PM <sub>10</sub>	January 2001
Hove ( <i>existing site</i> )	Affil	SO <sub>2</sub>	January 2001
Wigan Leigh	Affil	NO <sub>x</sub> SO <sub>2</sub> PM <sub>10</sub>	January 2001
Portsmouth	Affil	NO <sub>x</sub> SO <sub>2</sub> PM <sub>10</sub>	January 2001
Canterbury	Affil	NO <sub>x</sub> PM <sub>10</sub>	January 2001
Northampton	Affil	NO <sub>x</sub> PM <sub>10</sub>	January 2001
Coventry Memorial Park ( <i>relocation of existing site</i> )	DF	PM <sub>10</sub>	February 2001
Bournemouth	Affil	NO <sub>x</sub> SO <sub>2</sub>	March 2001
Dumfries	Affil	NO <sub>x</sub>	March 2001
Wrexham	DF	NO <sub>x</sub> SO <sub>2</sub>	July 2001 (closed due to vandalism)
Inverness	DF	NO <sub>x</sub>	July 2001
Cwmbran	Affil	NO <sub>x</sub>	July 2001

\*DF = Direct funded site by DEFRA

Affil = Local Authority affiliate site

Provision of high quality data is an essential part of the Department's commitment to providing the public with rapid and reliable information on air quality. The Quality Assurance and Control Unit provides a comprehensive qa/qc programme for the network in order to ensure that the network data are accurate, reliable and fit for purpose. QA/QC activities currently undertaken by NETCEN include the commissioning of new sites, local site operator training, provision of site operator manuals, data ratification and site visits for intercalibrations and audits.

NETCEN has completed the ratification of the 6-month data set for January-June 2001, for the automatic urban network sites (excluding the London Network sites). Ratified hourly data capture for the network averaged 94% during this 6-month reporting period (see Table 3 below). This is consistent with the overall high levels of network performance seen over the last few years.

**Table 3 AUN Ratified Data Capture (%) January - June 2001**

Pollutant	O <sub>3</sub>	NO <sub>2</sub>	CO	SO <sub>2</sub>	PM <sub>10</sub>	Average
Data Capture (%)	96	93	93	94	96	94

A ratification report describing significant data quality issues identified during the 6-month reporting period January to June 2001 was published in October 2001 (AEAT/ENV/R/0842). This report is available on the Air Quality Archive web site at the following location, under the "Publications/variations" section:

[http://www.aeat.co.uk/netcen/airqual/reports/research00\\_01/304.html](http://www.aeat.co.uk/netcen/airqual/reports/research00_01/304.html)

All data from the network, both provisional and ratified, are also available on the UK Air Quality Archive Internet site at <http://www.aeat.co.uk/netcen/airqual/home.html>.

The Local Site Operator's manual has been up-dated with new operational instruction sets for gravimetric (Partisol) PM<sub>10</sub> and Horiba analysers. The new sections can be found on the UK Air Quality Information Archive web site. Select Main Archive Sections then Research Reports and under the heading Local Authority Guidance, select UK Automatic Network Site Operator's Manual and locate Part B Operational Procedures.

The electronic version of the local site operator's calibration records is now being used by over two thirds of the local site operators. This provides a faster and more efficient system for transferring calibration records between the relevant network participants. The necessary software is freely available from QA/QC Unit (contact [geoff.broughton@aeat.co.uk](mailto:geoff.broughton@aeat.co.uk)).

QA/QC Unit carried out the summer 2001 network intercalibration and site audits during July to September 2001. Results from this exercise continue to show high levels of accuracy and precision in the network. Accreditation from the United Kingdom Accreditation Service (UKAS) has been obtained for the on-site intercalibration procedures carried out by QA/QC Unit (ISO 17025).

## Automatic Urban Network Stations – August 22<sup>nd</sup> 2001

Authority Name	Site Name	Region Name - For Press & Media	Site Type	Species Measured	Grid Reference	Start Date
<b>ENGLAND</b>						
Avon	Bath Roadside+	Bath Roadside	Roadside	NO <sub>x</sub> , CO	ST375165	18/11/96
	Bristol Centre	Bristol Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	ST594732	04/01/93
	Bristol Old Market+	Bristol Roadside	Roadside	NO <sub>x</sub> , CO	ST595731	25/07/96
Berkshire	Reading	Reading	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SU727733	17/07/97
Cambridgeshire	Cambridge Roadside+	Cambridge Roadside	Roadside	NO <sub>x</sub>	TL453583	24/06/99
Cleveland	Billingham	Billingham	Urban Industrial	NO <sub>x</sub>	NZ470237	01/01/87
	Middlesbrough+	Middlesbrough	Urban Industrial	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NZ505194	21/04/95
	Redcar+	Redcar	Suburban	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NZ599246	25/06/97
	Stockton-on-Tees Yarm+	Stockton-on-Tees Yarm	Roadside	NO <sub>x</sub> , PM <sub>10</sub>	NZ419128	01/01/01
Devon	Exeter Roadside+	Exeter Roadside	Roadside	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub>	SX929918	02/07/96
	Plymouth Centre	Plymouth Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SX477546	29/09/97
Dorset	Bournemouth+	Bournemouth	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub> *	SZ123933	05/03/01
East Sussex	Brighton Roadside+	Brighton Roadside	Roadside	NO <sub>x</sub> , CO	TQ313043	10/02/98
	Hove Roadside+	Hove Roadside	Roadside	NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub> *	TQ289047	16/09/97
Essex	Southend-on-Sea	Southend-on-Sea	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ858862	24/07/00
	Thurrock+	Thurrock	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ611779	15/09/96
Greater London	London A3 Roadside	London A3 Roadside	Roadside	NO <sub>x</sub> , CO, PM <sub>10</sub>	TQ193653	20/03/97
	London Bexley+	London Bexley	Suburban	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ518763	01/05/94
	London Bloomsbury	London Bloomsbury	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ302820	23/01/92
	London Brent+	London Brent	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ200840	26/01/96
	London Bromley+	London Bromley	Roadside	NO <sub>x</sub> , CO	TQ540169	11/08/98
	Camden+	Camden Roadside	Kerbside	NO <sub>x</sub> , PM <sub>10</sub>	TQ267843	16/05/96
	London Cromwell Road 2	London Cromwell Road	Roadside	NO <sub>x</sub> , CO, SO <sub>2</sub>	TQ266791	20/05/98
	London Eltham+	London Eltham	Suburban	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	TQ440747	01/04/96
	London Hackney+	London Hackney	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO	TQ348862	06/01/97
	Haringey Roadside+	Haringey Roadside	Roadside	NO <sub>x</sub> , PM <sub>10</sub>	TQ339906	16/05/96
	London Haringey+	London Haringey	Urban Centre	O <sub>3</sub>	TQ300892	16/05/96
	London Hillingdon	London Hillingdon	Suburban	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ178506	03/07/96
	Hounslow Roadside+	Hounslow Roadside	Roadside	O <sub>3</sub> , NO <sub>x</sub> , CO	TQ175781	16/09/97

Authority Name	Site Name	Region Name - For Press & Media	Site Type	Measured Species	Grid Reference	Start Date
Greater Manchester	London N.Kensington+	London N.Kensington	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ240817	01/04/96
	London Lewisham+	London Lewisham	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub>	TQ377738	16/04/97
	London Marylebone Road	London Marylebone Road	Roadside	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ281820	17/07/97
	London Southwark+	London Southwark	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub>	TQ324785	14/02/97
	Southwark Roadside+	Southwark Roadside	Roadside	NO <sub>x</sub> , CO, SO <sub>2</sub>	TQ591768	01/04/97
	Sutton Roadside+	Sutton Roadside	Roadside	NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TQ256646	01/04/96
	London Sutton+	London Sutton	Suburban	O <sub>3</sub> , NO <sub>x</sub>	TQ278548	01/04/96
	Tower Hamlets Roadside+	Tower Hamlets Roadside	Roadside	NO <sub>x</sub> , CO	TQ521816	01/04/96
	London Wandsworth+	London Wandsworth	Urban Centre	O <sub>3</sub> , NO <sub>x</sub>	TQ264746	01/04/96
	West London	London Earls Court	Urban Background	NO <sub>x</sub> , CO	TQ251788	01/01/87
	London Westminster	London Westminster	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub>	TQ298790	17/07/01
	Bolton+	Bolton	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SD710085	03/02/97
	Bury Roadside+	Bury Roadside	Roadside	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SD809048	20/01/97
	Salford Eccles+	Salford Eccles	Urban Industrial	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SI378399	20/03/97
	Manchester Piccadilly	Manchester Piccadilly	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SI843983	18/12/95
	Manchester South+	Manchester South	Suburban	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub>	SI839858	11/12/96
	Manchester Town Hall	Manchester Town Hall	Urban Background	NO <sub>x</sub> , CO	SI838980	22/01/87
	Stockport+	Stockport	Urban Background	NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SI895903	25/11/96
	Wigan Leigh+	Wigan Leigh	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	SI662999	01/01/01
	Hampshire	Portsmouth+	Portsmouth	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	SU656036
	Southampton Centre	Southampton Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SU440130	04/01/94
Humberside	Hull Centre	Hull Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TA097288	04/01/94
	Scunthorpe+	Scunthorpe	Urban Industrial	SO <sub>2</sub> , PM <sub>10</sub>	SE905107	15/12/97
Kent	Canterbury+	Canterbury	Urban Background	NO <sub>x</sub> , PM <sub>10</sub>	TR162573	01/01/01
Lancashire	Preston	Preston	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SD552301	06/06/00
	Blackpool	Blackpool	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SD324333	08/08/00
Leicestershire	Leicester Centre	Leicester Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SK590050	04/01/94
Merseyside	Liverpool Centre	Liverpool Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SI349908	23/04/93
	Wirral Tranmere	Wirral Tranmere	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SI320867	14/05/00
Norfolk	Norwich Centre	Norwich Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	TG230089	24/07/97
	Norwich Roadside+	Norwich Roadside	Roadside	NO <sub>x</sub>	TG234078	21/06/97
Northamptonshire	Northampton+	Northampton	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	SP761645	29/01/01



Authority Name	Site Name	Region Name - For Press & Media	Site Type	Measured Species	Grid Reference	Start Date
Nottinghamshire	Nottingham Centre	Nottingham Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SK574400	02/09/96
Oxfordshire	Oxford Centre+	Oxford Centre	Roadside	NO <sub>x</sub> , CO, SO <sub>2</sub>	SP514092	15/04/96
South Yorkshire	Barnsley 12	Barnsley	Urban Background	SO <sub>2</sub>	SE342067	21/03/94
	Barnsley Gawber+	Barnsley Gawber	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub>	SE325075	07/07/97
	Rotherham Centre+	Rotherham Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub>	SK430930	20/06/97
	Sheffield Centre	Sheffield Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SK352869	01/01/96
	Sheffield Tinsley	Sheffield Tinsley	Urban Industrial	NO <sub>x</sub> , CO	SK402906	28/11/90
Staffordshire	Stoke-on-Trent Centre	Stoke-on-Trent Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SK574400	11/03/97
Tyne & Wear	Newcastle Centre	Newcastle Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NZ251649	08/03/92
	Sunderland	Sunderland	Urban Background	SO <sub>2</sub>	NZ398570	06/10/92
Warwickshire	Leamington Spa+	Leamington Spa	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SP319657	25/07/96
West Midlands	Birmingham Centre	Birmingham Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SP064868	18/03/92
	Birmingham East+	Birmingham East	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SP116889	01/12/93
	Coventry Memorial Park+	Coventry Memorial Park	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SP326796	18/02/96
	Sandwell West Bromwich+	Sandwell West Bromwich	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub>	SP003915	04/11/98
	Walsall Alumwell	Walsall Alumwell	Urban Background	NO <sub>x</sub>	SO994982	05/03/87
	Walsall Willenhall+	Walsall Willenhall	Suburban	NO <sub>x</sub>	SO978012	29/04/97
	Wolverhampton Centre	Wolverhampton Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SO914989	18/12/95
West Yorkshire	Bradford Centre	Bradford Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SE166331	28/11/97
	Leeds Centre	Leeds Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SE299343	04/01/93
<u>N.IRELAND</u>						
Belfast	Belfast Centre	Belfast Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	J339744	08/03/92
	Belfast East	Belfast East	Urban Background	SO <sub>2</sub>	J357740	06/09/89
	Belfast Clara Street+	Belfast East	Suburban	PM <sub>10</sub>	J336374	09/06/98
Derry	Derry+	Derry	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	C429172	29/04/97
<u>SCOTLAND</u>						
Aberdeen	Aberdeen Centre+	Aberdeen Centre	Urban Background	NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NJ944073	18/09/99
Dumfries & Galloway	Dumfries	Dumfries	Roadside	NO <sub>x</sub> , PM <sub>10</sub> *	NX970763	01/03/01
Edinburgh	Edinburgh Centre	Edinburgh Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NT254738	04/10/92
Falkirk	Grangemouth	Grangemouth	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	NS938810	01/01/01
Glasgow	Glasgow Centre	Glasgow Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	NS258665	03/07/96
	Glasgow City Chambers	Glasgow City Chambers	Urban Background	NO <sub>x</sub> , CO	NS595653	06/01/87

Authority Name	Site Name	Region Name - For Press & Media	Site Type	Measured Species	Grid Reference	Start Date
Highland	Glasgow Kerbside	Glasgow Kerbside	Kerbside	NO <sub>x</sub> , CO, PM <sub>10</sub>	NS587652	10/03/97
	Inverness	Inverness	Roadside	NO <sub>x</sub> , PM <sub>10</sub> <sup>+</sup>	NH662454	17/07/01
<b>WALES</b>						
Cardiff	Cardiff Centre	Cardiff Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	ST184765	12/05/92
Neath & Port Talbot	Port Talbot <sup>+</sup>	Port Talbot	Urban Background	O <sub>3</sub> , NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	SS780882	09/01/97
Swansea	Swansea Centre <sup>+</sup>	Swansea Centre	Urban Centre	O <sub>3</sub> , NO <sub>x</sub> , CO, SO <sub>2</sub> , PM <sub>10</sub>	SS655931	01/12/94
Torfaen	Cwmbran <sup>+</sup>	Cwmbran	Urban Background	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub>	ST305955	20/07/01
Wrexham	Wrexham	Wrexham	Roadside	NO <sub>x</sub> , SO <sub>2</sub> , PM <sub>10</sub> <sup>+</sup>		

+ Affiliate Site

### **Total Numbers of Monitors at 98 Urban Network Sites**

<b>NO<sub>x</sub></b>	-	<b>92</b>	<b>CO</b>	-	<b>66</b>
<b>O<sub>3</sub></b>	-	<b>56</b>	<b>SO<sub>2</sub></b>	-	<b>70</b>
		<b>PM<sub>10</sub> (TEOM)</b>	-	<b>59</b>	
		<b>PM10 (Beta Attenuation)</b>	-	<b>1</b>	
		<b>PM<sub>10</sub><sup>*</sup> (Gravimetric)</b>	-	<b>5</b>	

## DATA DISSEMINATION

Data from the national air pollution monitoring networks are collated together at the DEFRA Data Dissemination Unit (DDU). From here the data are widely distributed to the national media via faxes and e-mail. Data are available to the public from many sources; TELETEXT (page 155), a FREEPHONE information service (0800 556677) and on the Internet web site.

DEFRA <http://www.defra.gov.uk/environment/index>  
NETCEN <http://www.aeat.co.uk/netcen/airqual/>

All sources of air pollution data are automatically updated hourly.

NETCEN assumed responsibility for the DDU in April 1994 and retained the contract in 1997. Under the new contract more changes have taken place. The FREEPHONE system has been enhanced, and recently two more pollutants have been included for dissemination, namely Carbon monoxide and Respirable Particulates (PM<sub>10</sub>), taking the total number of pollutants reported to seven. In addition a new air pollution banding system was incorporated, and data are reported in terms of air pollution rather than air quality. This gives the public access to the most comprehensive air pollution monitoring data yet.

## LOCAL AUTHORITY SUPPORT

NETCEN provides advice on air quality monitoring via the Local Authority Air Monitoring Helpline funded by the Department. **Tel/Fax** 01235 463356 : **e-mail** [aqm.helpline@aeat.co.uk](mailto:aqm.helpline@aeat.co.uk).

This Helpline is able to give advice on the following:

- Types of monitoring equipment and which is best suited for your purpose.
- Where best to locate your monitoring equipment in order to make it representative and avoid interference effects.
- Frequency and method of calibration required.
- Options for data collection and validation.
- Implementing a QA/QC programme.

All advice on monitoring equipment is impartial and based upon the requirements of the latest Guidance published by the Department.

## **QA/QC UNIT FOR THE RURAL AND LONDON NETWORKS**

The National Physical Laboratory (NPL) acts as the Quality Assurance/Quality Control Unit for the 37 sites which comprise the Rural and London Networks, currently being increased by the addition of Rural Network sites in St Osyth (Essex), Dunslair Heights (Midlothian) and Northamptonshire. The UK national standards for all the network calibration gases are maintained at NPL, including a NIST-design reference ozone photometer, which is particularly important for the Rural Network. Site measurements are compared with these primary standards by field intercalibrations with transfer standards four times a year, and these results, together with other available information, are used to produce the ratified data sets in 3 month blocks. NPL has been “NAMAS”-accredited (EN 45001) for the field calibrations and instrument checks. The QA/QC Unit also continues to train and audit Local Site Operators.

NPL's role also includes the supply of calibration gas cylinders to all sites in the DEFRA automatic networks (ie the Urban, Rural and London networks), and the QA/QC Unit for the Urban Network, so that a single Reference Laboratory underpins all these measurements. All new site calibration cylinders, which are delivered under contract by BOC, have their concentrations determined directly against UK national standards at NPL. The NPL reference ozone photometer also acts as reference for all UK networks through its use to calibrate the photometers used by the other QA/QC Unit and the Equipment Service Units.

Rural and London network data is ratified and sent to the Data Dissemination Unit, and reports for data, highlighting any specific problems etc., are available.

## **THE UK AMBIENT HYDROCARBON NETWORK (NON -AUTOMATIC)**

To meet its EC measurement obligations for benzene, DEFRA have commissioned NPL to establish a network of around 35 sites around the UK, using a non-automatic pumped sampling technique. The method, developed by NPL, involves sampling for a period of a fortnight using a mass-flow-controlled pumping unit, with Local Site Operators changing and returning the samples to NPL for analysis.

The method has been trialled at four sites for around a year, in parallel with automatic analysers, and good results have been achieved. The first new units, most of which will fit within existing AURN sites, should be installed in December.

## **AIRBORNE LEAD AND MULTI-ELEMENT SURVEY**

The Airborne Lead and Multi-element survey is carried out by Casella GMSS Ltd in conjunction with Stanger Science and Environment. Lead-in-air concentrations continue to be monitored at ten urban and rural sites, and eight industrial sites. Multi-element surveys are carried out at five sites (Brent, Glasgow, Motherwell, Eskdalemuir and Leeds).

Following the closure of the Central London site (Bridge Place) it is intended that multi-element sampling will shortly be relocated to the new DEFRA automatic network site at London Westminster (Horseferry Road). The daily sulphate sampler will also be moved to this location.

As part of the new contract, determinations at the multi-element sites are also being carried out for arsenic, platinum and mercury (both particulate and vapor phase). Comparative measurements between the M-type sampler and a PM<sub>10</sub> sampler will also be carried out.

The Annual Report for 2000 is currently nearing completion, and will be shortly available via the Internet. Data indicate no exceedances of the Limit Value ( $0.5 \mu\text{g m}^{-3}$  as an annual mean) at any site, with levels of ambient lead continuing to further decline slowly following the removal of lead from petrol (with effect from January 2000).

## UK SMOKE AND SULPHUR DIOXIDE MONITORING NETWORK

This Network serves two purposes. Firstly, to monitor compliance with the relevant EC Directives on sulphur dioxide and suspended particulate matter, and secondly to provide a long-term database of smoke and SO<sub>2</sub> measurements. The Network utilises a cost-effective non-automatic technique, the 8-port sampler, to monitor suspended particulate matter (as black smoke) and SO<sub>2</sub> (as net acidity). The 164 sites throughout the UK are operated by participating Local and Unitary Authorities. Data from the Network fulfil the UK's statutory requirements for monitoring under the EC Directive on SO<sub>2</sub> and particulate matter, and are widely used in local and national air quality assessments. Both historical and recent data from this survey are also used in health effect and epidemiology studies.

Data from our database of smoke and SO<sub>2</sub> measurements are available on the Department of the Environment's Air Quality Archive on the World Wide Web, at web site:

**<http://www.aeat.co.uk/netcen/aqarchive/archome.html>**

Data are also available on request, usually free of charge. An annual report of data from this Network is produced, and is available via the above web site.

## UK NO<sub>2</sub> NETWORK

This extensive national network currently uses passive samplers (diffusion tubes) to monitor concentrations of NO<sub>2</sub> at two types of urban locations:

- **Roadside**, 1-5m from the kerb of a busy road
- **Urban Background**, > 50 from any busy road and typically in a residential area.
- Until December 2000, an **Intermediate** category, 20 - 20m from a busy road, was also included. However, this category has now been discontinued and replaced with additional Roadside sites.

The Network has two objectives:

- To objectively assess the spatial and temporal distribution of NO<sub>2</sub> in a variety of urban environments in the UK,

- To highlight areas where elevated NO<sub>2</sub> concentrations occur, and which may justify more detailed investigation using automatic monitoring techniques.

During 2000, UK annual average NO<sub>2</sub> concentrations were as follows (these statistics are provisional): 39 µg m<sup>-3</sup> at kerbside locations, 27 µg m<sup>-3</sup> at intermediate locations and 22 µg m<sup>-3</sup> at urban background locations. Annual means for all site categories have decreased since the mid 1990s.

All analytical laboratories supplying and analysing diffusion tubes for this Network must participate in the monthly programme of quality control operated under the Health and Safety Laboratories WASP scheme. Details of participating laboratories' performance in the WASP programme are available direct from the laboratories. Participation in the annual Field Intercomparison Exercise is also mandatory.

An annual report for this Network is produced. Data from 1993 onwards are available on the Department of the Environment's Air Quality Archive on the World Wide Web, at web site:

**<http://www.aeat.co.uk/netcen/aqarchive/archome.html>**

Results from the UK NO<sub>2</sub> Network Field Intercomparison Exercise, for 2000 and previous years, have been published in the National Air Quality Archive on world wide web (under Air Pollution Scientific Reports on <http://www.defra.gov.uk/environment/index>). This report details estimates of bias and precision for all laboratories taking part in the UK NO<sub>2</sub> Network, and presents guidance on how diffusion tube analysis may be improved. DEFRA have also funded investigations aimed at better defining the magnitude and cause of systematic bias in diffusion tube measurements arising from variations in preparation techniques and sampling artefacts; the results of these are also available via the web site.

## **ACID DEPOSITION MONITORING NETWORK**

The atmospheric oxidation of sulphur and nitrogen oxides produces acidifying compounds which are subsequently deposited to the ground. The UK Acid Deposition Monitoring networks were established in 1986 to quantify acid deposition in the UK by its wet and dry deposition pathways.

The networks have continued to operate smoothly during 2000 and the early part of 2001. The outbreak of Foot and Mouth disease in February has had a severe impact on the sampling programme at a number of sites and this will affect the data capture at those sites in 2001. During 2000, a new sample registration system was developed and two new ion chromatographs were purchased to analyse the 10,000 or so samples collected annually.

The emphasis of policy is now on nitrogen-containing rather than sulphur-containing species and this has driven the establishment of a monitoring network to measure the concentration of oxidised nitrogen compounds. The network, established at 12 sites during 1999 by the Centre for Ecology and Hydrology (Bush), is now operating very smoothly and providing a record with very few missing points. The establishment of the daily site at Barcombe Mills was delayed while planning permission was sought and has only been operational since April 2000. Although most of the initial problems have been overcome, the day-to-day operation of the Chemspec system has been problematic with a large number of sampling problems leading to substantial down time.

The first measurements from the new nitric acid network have been reported. These measurements will provide valuable new data on the behaviour of gaseous and aerosol species involved in

transboundary and urban air pollution. The measurement data have been used to derive the first maps of the spatial distribution of gaseous nitric acid and hydrogen chloride in the UK and of the corresponding aerosol components - nitrate and chloride. Despite the poor performance of the daily system, the results indicate several periods when elevated concentrations of nitric acid were measured.

The measurements made in the UK Acid Deposition Monitoring Networks are reported to international bodies such as UN ECE European Modelling and Evaluation Programme (EMEP) and the World Meteorological Organisation (WMO). As part of a programme of quality control and assurance of the measurement data, AEA Technology participated in the 18th laboratory intercomparison exercise organised by EMEP. The measured ion concentrations were in excellent agreement with the expected concentrations for the four samples analysed, indicating that the performance of the new ion chromatographs is very good.

The measurements made in the UK Acid Deposition Monitoring networks have been and continue to be key inputs into the expert reviews of our understanding of acid deposition provided formerly by the Review Group on Acid Rain and more recently by the National Expert Group on Transboundary Air Pollution (NEG-TAP). NEG-TAP was established to advise on transboundary air pollution issues and specifically whether the reductions in the emissions of acidifying pollutants have been effective in promoting the recovery of ecosystems affected by acid deposition.

## **RURAL SULPHUR DIOXIDE NETWORK**

Sulphur deposition has acidifying effects on freshwater, soils and vegetation. In order to assess the effects, total sulphur deposition must be estimated from both its wet and dry deposition pathways. SO<sub>2</sub> concentration fields are used in a model to estimate dry sulphur deposition fluxes. As the SO<sub>2</sub> concentration field varies from season to season, it is necessary to map both the monthly and annual mean concentrations.

The rural sulphur dioxide (SO<sub>2</sub>) network was established in 1991 to provide the data to map the SO<sub>2</sub> concentration field of the UK. At the start of 2000, the network comprised 29 sites at which concentrations of SO<sub>2</sub> were measured on a weekly basis using hydrogen peroxide bubblers and one site (Bush) at which daily measurements. Some of the sites have been monitoring SO<sub>2</sub> concentrations since the 1960s and this has enabled long-term trends to be evaluated. The concentrations of SO<sub>2</sub> in these rural locations, as elsewhere, have declined significantly since the establishment of the network.

The concentrations now being measured at some of the sites, especially the daily sites in remote areas, are at or below the Limit of Detection of the bubbler method. The determination of reliable trends could be compromised and this will make it more difficult to identify the cause of the non-linear response of ambient concentrations to change in emissions at such sites. A change in sampling method has been proposed to give a lower Limits of Detection while retaining data integrity and consistency.

An intercomparison exercise was undertaken at the Auchencorth Moss site near Edinburgh between September 1998 and May 1999 to evaluate potential replacement methods. On the basis of the intercomparison exercise, the choice of methods to replace the bubbler method was limited to the denuder or the filter pack methods on the grounds of cost, improved sensitivity, method robustness, ease of operation and the quality of the measurements. For practical reasons, it has been decided to replace the bubbler method with the filter pack method and to make fortnightly measurements. The filter pack method is now being introduced into the network. There will be the added advantage that a single method will be used to measure SO<sub>2</sub> concentrations throughout the network.

## **TOXIC ORGANIC MICROPOLLUTANTS (TOMPS) NETWORK**

The TOMPs network was originally set up in 1991 to evaluate PCDD/F, PCB and PAH levels in air and deposition at UK urban and rural areas. Measurements have been undertaken continuously in London and Manchester. Deposition monitoring ceased in 1993. A further urban site was established at Middlesbrough (1993) and rural sites at Hazelrigg near Lancaster (1993), High Muffles in North Yorkshire and Stoke Ferry in West Norfolk (1996).

Air concentrations of dioxins have declined significantly since the early 1990s. This may be related to a decline in primary dioxin sources and/ or depletion of environmental reservoirs. Measurements have also been undertaken of a range of other persistent organic pollutants, pesticides and industrial chemicals at Hazelrigg and Stoke Ferry to assess their potential for long-range transport. As the co-planar PCB compounds are acknowledged to exhibit dioxin like toxicity. Measurements of PCBs including the co-planar PCBs with dioxin like properties have restarted at the 6 sites at which dioxins are measured. Measurement of a range of other PCBs which may have other human health effects are also being carried out.

Results together with site details are available at; <http://www.aeat.co.uk/netcen/airqual/welcome.html>.

## **MONITORING AND ANALYSIS OF POLYAROMATIC HYDROCARBONS (PAH) NETWORK**

The publication of the EPAQS report on PAHs in 1999 and the probability of a EU air quality daughter directive on PAHs has led to an increased requirement to characterise the UK air pollution climate for PAHs. From 2000 the PAH measurement activities have been split from the TOMPs network as a programme with the above title. A further 10 PAH monitoring sites on top of the 15 existing in 2000 are being installed. Progress so far has led to new sites in Belfast, Birmingham, Bromley (a roadside site), Leeds, Liverpool, Newcastle,. Other sites will be installed in Brent, Cardiff, Edinburgh and Hove.

In the last year the range of PAHs monitored has increased to reflect to include a full list of those which IARC has classified as probably or possibly carcinogenic together with a number of compounds which have been suggested as indicative of particular emission sources. Results together with site details are available at; <http://www.aeat.co.uk/netcen/airqual/welcome.html>.

## **ATMOSPHERIC INPUTS TO THE NORTH SEA**

On behalf of the Department of Environment, Food and Rural Affairs AEA Technology's National Environmental Technology Centre has continued to operate a long-term measurements programme at three locations near to the east coast of the UK. These sites are at Banchory (Kincardineshire), East Ruston (Norfolk) and High Muffles/Staxton Wold (North Yorkshire). The concentrations of 10 metals, including Cd, Pb, As, Cr, Ni, Cu and Zn, have been measured in atmospheric particulate material and in rainwater at these locations.

The overall aim of this programme of measurements is to provide a quantitative assessment of pollutant concentrations. These can then be used in the identification of long-term trends and in an assessment of transboundary fluxes. The results can then be input into the debates in both the Oslo and Paris Commission (OSPARCOM) and United Nations Economic Commission for Europe (UNECE).

The spatial variations (between the three sites) in concentrations of heavy metals, especially for Cd, Pb, As and Cr in atmospheric particulate and rainwater, are consistent with those which would be expected from emission inventory data for the respective areas. The variations for Cu and Zn are less readily rationalised probably because of the nature of their use and the difficulty in sampling at locations remote from localised sources.

Atmospheric concentrations of Pb at all three east coast sites have declined in line with reductions in the estimated UK emissions between the periods 1987-1990 and 1997-2000. Reductions in annual mean air concentrations of 60% - 71% have occurred, compared with a 71% decrease in estimated emissions between the periods 1987-1990 and 1996-1999. The reductions in emissions have mainly been brought about by restrictions on the use of Pb additives in petrol together with increased in the use of unleaded petrol over this period.

Concentrations of other trace elements measured in particulate material in air have also decreased between 1987 and 1999. Although emission estimates are generally more uncertain than for Pb, annual mean air concentrations of Cd, Cr and Ni, at East Ruston and High Muffles/Staxton Wold have declined approximately in line with reductions in estimated emissions in the UK since 1987. The percentage reductions in annual mean air concentrations of Cd at these sites were 52% and 75% between the periods 1987-1990 and 1997-2000 respectively. Estimated UK emissions have declined by 61% between 1987-1990 and 1996-1999. Average annual Cr concentrations in air decreased by 11% and 49% at East Ruston and High Muffles/Staxton Wold, compared with a 44% reduction in emissions during the same periods. Corresponding Ni emissions are estimated to have reduced by 51%, while annual mean air concentrations decreased by 32% and 39% at East Ruston and High Muffles/Staxton Wold respectively.

No significant decreases in the air concentrations of Cu were observed at any of the sampling sites for the period 1997-2000 compared with the period 1987-1990 even though the reduction in the mean emissions between these periods has been estimated to be about 49%. However, copper is used extensively in agriculture, horticulture, in wood preservation and as a growth promoter in pig farming and for electrical distribution in buildings and for railway electrification. It is therefore likely that these or other uses of copper are contributing to the concentrations observed in the air.

Estimates of the inputs of metals to the North Sea and the annual average deposition at each site have been calculated. In general there is little evidence of any significant trends in the estimated atmospheric inputs of heavy metals to the North Sea. Trends in the estimates of deposition at the individual sampling sites are generally masked by the variability of the rainfall which significantly influences the calculated deposits.

## **TRACE ELEMENTS IN THE ATMOSPHERE AT RURAL LOCATIONS**

Trace elements have been measured continuously in atmospheric particulate materials at three rural locations since 1972. This has enabled long-term trends to be evaluated. The sites currently operated are at : Chilton (Oxfordshire), Styrrup (Nottinghamshire) and Wraymires (Cumbria). Atmospheric particulate material and rainwater are collected and analysed for up to 35 elements.

Current concentrations (i.e. annual means for the period 1994-1999) of the heavy metals As, Cd, Cr, Cu, Ni, Pb and Zn, in air and rainwater at these locations are comparable with measurements at other rural locations in the UK. From these measurements, current 'rural UK background' concentrations ranges of these metals in air and rainwater have been established. These have been compared with



measurements of airborne metals at urban locations in the UK. Rural concentrations are up to 5-fold lower than at urban sites.

Both atmospheric concentrations and depositions of Pb at rural sites were well correlated with estimated UK emissions to the atmosphere between 1972 and 1998. Restrictions on the use of Pb additives in petrol have substantially reduced the concentrations of airborne Pb in the rural environment. Reductions in annual mean air concentrations and annual mean depositions of 80% - 90% have occurred since the 1970s. In more recent years (since 1988), the increased usage of unleaded petrol has also contributed to these reductions.

Road transport is still the largest source of Pb emissions in the UK and is thought to be the major source of atmospheric Pb at rural locations. During 1999, the maximum annual mean air concentration was  $26 \text{ ng m}^{-3}$ , which represents only ~2% of the existing EC Directive limit value of  $2 \text{ } \mu\text{g m}^{-3}$ , or 6% of the draft Framework Directive limit value ( $0.5 \text{ } \mu\text{g m}^{-3}$ ).

Decreases in atmospheric concentrations of As, Cr, Ni, V and Zn have been measured between the periods 1972-1979 and 1994-1999. The major source of their emissions is the combustion of fossil fuels. The percentage reductions in annual mean concentrations of these metals were in the range 80% to 90% at Chilton, Styrrup and Wraymires. The changes in annual mean air concentrations were well correlated with the estimated reductions in annual total UK emissions to the atmosphere between 1972 and 1997.

## **THE UK AMBIENT HYDROCARBON AIR QUALITY NETWORK**

The UK Ambient Hydrocarbon Air Quality Network comprises 4 sites. AEA Technology has been responsible for the operation of the sites since 1 January 2001. The sites are at Marylebone Road, a kerbside location, Cardiff and Edinburgh, both urban locations and Harwell a rural location. The sites have continued to collect data on up to 27 hydrocarbons on an hourly basis.

Provisional data for benzene and 1,3-butadiene are sent to the DDU for dissemination via Ceefax/Teletext and to the archive site on the web on a daily basis. The data for the period 1 January 2001 to 30 June 2001 have been ratified. Ratified data for the period July to September 2001 will be available before the end of December 2001. Ratified data for all measured hydrocarbons and provisional data for benzene and 1,3-butadiene are available on the National Archive pages of the web at:

<http://www.aeat.co.uk/netcen/airqual/>

The data capture for the ratified data is given in the table below.

Data Capture (%) for Ratified Data for each of the of the Monitored Hydrocarbons January to June 2001				
	Cardiff	Edinburgh	Harwell	Marylebone Road
Ethane	92	94	89	79
Ethene	92	94	89	79
Propane	92	94	89	78
Propene	92	94	89	79
Ethyne	13	71	17	79
i-Butane	13	71	17	79
n-Butane	92	94	89	79
t-2-Butene	92	94	40	80
1-Butene	83	91	49	80
c-2-Butene	86	94	14	80
i-Pentane	92	94	89	80
n-Pentane	92	94	87	80
1,3-Butadiene	92	92	89	80
t-2-Pentene	88	89	20	80
c-2-Pentene	76	72	6	79
Methylpentane	92	94	80	71
Isoprene	90	61	22	60
n-Hexane	92	94	64	73
n-Heptane	88	93	59	73
Benzene	92	94	89	80
Toluene	89	94	82	79
Ethylbenzene	64	81	50	79
(m+p)-Xylene	65	84	58	79
o-Xylene	39	73	40	79
1,3,5-Trimethylbenzene	0	0	0	74
1,2,4-Trimethylbenzene	0	0	0	76

The sites at Cardiff, Edinburgh and Harwell employ Chrompack VOCAIR systems at present. Environnement VOC71M analysers will replace the Chrompack VOCAIRs from the beginning of January 2002. The existing Perkin Elmer/ATD400 analyser will remain at the Marylebone Road site to make measurements of the 27 hydrocarbons.

## Related Data Gathering Exercises

### THE NATIONAL ATMOSPHERIC EMISSIONS INVENTORY

The UK National Atmospheric Emission Inventory (NAEI) is compiled by the National Environmental Technology Centre on behalf of the Department of the Environment, Transport and the Regions' Air Quality Research Programme. It is the standard reference inventory for the UK and

includes emission estimates for a wide range of important pollutants including the greenhouse gases, regional pollutants leading to acid deposition and photochemical pollution, persistent organic pollutants and other toxic pollutants such as heavy metals. The full range of pollutants are summarised in the report. Where possible, estimates are presented for 1970-1998. However, for some pollutants there is insufficient information to produce such a significant time series and estimates are presented from 1990-1998.

The NAEI provides the UK air emission data for submission to UNECE and IPCC. Under the Framework Convention on Climate Change, the UK is committed to developing, publishing and regularly updating national emission inventories of greenhouse gases using reporting guidelines from the Intergovernmental Panel on Climate Change (IPCC). The inventories for both direct (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) and indirect greenhouse gases (nitrogen oxides, carbon monoxide and non methane volatile organic compounds) are drawn from the UK NAEI emissions data included in this report. Likewise, the NAEI provides the UK submissions on persistent organic pollutants. NAEI data are also provided to international emission inventory activities such as the European Environment Agency's CORINAIR, and EUROSTAT's inventories. The UK inventory team play an important role in the development of international guidelines by the European Environment Agency and the UNECE which aim to achieve a consistent set of good quality inventories for Europe. Within the UK the NAEI is the central database used to provide emissions data to UK Government, Local Authorities and private sector organisations. The 1 x 1 km emission estimates for the UK are being used as a starting point for many local emission inventories and emission factor data is fed into the UK's Emission Factor Database for Local Authorities.

The NAEI publishes and increasing amount of information on the internet include the latest reports, emissions data, and emission maps. Access to this site can be gained via:

<http://www.aeat.co.uk/netcen/airqual/emissions>

or

<http://www.defra.gov.uk/environment/index>

## **AIR QUALITY ARCHIVE**

The Air Quality Archive website has been operated by NETCEN on behalf of DEFRA for five years, during which time the scope of the site has expanded enormously. The homepage has recently been redesigned to improve the layout and accessibility of the information it contains, and several new sections have been added.

The site aims to provide a wide range of users with up-to-date user friendly information on current and historic air quality, and includes the following:

- Bulletins of the latest air pollution measurements, updated hourly.
- A forecast of the next 24 hours air pollution levels, updated daily.
- Background information about the monitoring networks pollutants measured, episodes and trends in air quality etc.
- The complete dataset of all measurements undertaken in the DEFRA's national networks since 1961, updated every 3 hours.

- Details of the research contracts commissioned by AEQ division of DEFRA since 1998.
- On-line databases of statistics derived from the measurements, including DEFRA bandings, and details of exceedences of national and European standards and guidelines.
- Information from the National Atmospheric Emissions Inventory giving details and summaries of emissions from the UK. A facility to find out about emissions and concentrations around your postcode, and an interactive mapping application to look at emissions spatially.
- A map server application to interactively view maps of estimated pollutant concentrations and emissions across the UK, at a 1 x 1km scale, which can be expanded around an area of interest, and data can be downloaded for each local authority.
- A search engine and site map to enable users to locate information of interest on the site.
- A reports section featuring many DEFRA air quality reports. Details are also published of all DEFRA AEQ research programme contracts.

At the beginning of this year, a new section of the site was added which provides information about the progress of Local Authorities in the Review and Assessment process and provides email contact details and web links where available.

In the coming month, a new facility will be added to the site in order to comply with Article 5 of the European Commission Daughter Directive. Users can input their postcode to receive air quality monitoring information for the zone or agglomeration in which they live.

## Forecasting and Modelling

### **GUIDANCE ON ATMOSPHERIC DISPERSION MODELLING AND STACK HEIGHT CALCULATIONS**

Casella Stanger (formerly Stanger Science & Environment), operate an independent telephone helpline service to provide guidance on dispersion modelling and stack height calculations. The service is provided on behalf of the DEFRA, and is available free of charge to all local authorities in England and Wales.

The service can provide advice on:

- the selection and use of dispersion models in the context of local air quality management; and
- the calculation of stack heights for industrial processes which fall under the local air pollution control scheme.

A report on a validation exercise for the DMRB model for review and assessment purposes has recently been published, and a model for calculation of road traffic emissions using the new TRL

factors has been prepared in association with AEA Technology. Both the report and the model can be accessed via the Model Helpdesk website ([www.stanger.co.uk/airqual/modelhlp](http://www.stanger.co.uk/airqual/modelhlp)).

The helpline service can be contacted by telephone (24 hour answering service) on 020 7902 6119 or by e-mail at [modelhelp@stanger.co.uk](mailto:modelhelp@stanger.co.uk).

## **AIR POLLUTION FORECASTING**

Detailed, region by region, forecasts of air pollution for inclusion in weather bulletins are an integral part of the Department of the Environment, Transport and the Regions and devolved administrations (DEFRA) commitment to providing the public with up-to-date, high standard information about air pollution. The air pollution information system currently uses a health based air pollutant banding system for five pollutants. Forecasts of ozone, nitrogen dioxide, sulphur dioxide, carbon monoxide and PM10 particulate matter concentrations are prepared daily by the team of air pollution scientists at NETCEN. The forecasts are based upon a combination of:

- Sophisticated models which take into account the physical and chemical dispersion characteristics of pollutants in the atmosphere.
- Latest UK and European air pollution monitoring data.
- Expert judgement of the forecasters.

The forecasters issue predictions of the “worst-case” expected pollutant levels for rural, urban and roadside locations in each of ten UK regions.

## **UK POLLUTION CLIMATE MAPPING**

There has been a significant increase in the availability of air monitoring data in the United Kingdom in recent years, with an increase in the number of monitoring sites and the range of pollutants measured. There is, however, still a requirement for a much higher spatial resolution than can be calculated by simple interpolation between monitoring sites. Maps are being prepared for a number of pollutants and include information from emission inventories in addition to air quality monitoring data.

The Pollution Climate Mapping activity is focused on providing projections of both background and roadside pollutant concentrations for 2005 and 2010 as an input to reviews of the Air Quality Strategy and EU Daughter Directive Limit Values. Current activities include mapping and site specific projections of ambient air quality for policy support. Extensive modelling work has recently been published in support of the review of the PM<sub>10</sub> objective. In addition to modelling results the consultation reports include analysis of the likely costs and health benefits of an illustrative package of measures to reduce PM<sub>10</sub> concentrations. Modelling has also been carried out to support the reviews of the objectives for CO, benzene and PAH. Work continues on the ‘Article 5’ assessments of the monitoring requirements for EU Air Quality Daughter Directives.

A number of reports are available on the air quality information website.

## **MODELLING OF TROPOSPHERIC OZONE FORMATION**

During summertime, regional scale photochemical air pollution is a widespread phenomenon across much of north-west Europe. The UK frequently experiences photochemical pollution episodes, which are characterised by high levels of ozone and other photochemical pollutants. The production of

elevated levels of ozone is of particular concern, since it is known to have adverse effects on human health, vegetation (e.g., crops) and materials. Established air quality standards for ozone are currently among the most widely exceeded of any pollutant in the UK, and the formulation of control strategies is therefore a major objective of environmental policy.

Ozone is not emitted directly into the troposphere, but is a secondary photochemical pollutant formed from the sunlight-initiated oxidation of volatile organic compounds (VOC, for example hydrocarbons) in the presence of nitrogen oxides (NO<sub>x</sub>). The control of ozone formation is thus achieved by the control of emissions of VOC and NO<sub>x</sub>. Under conditions characteristic of photochemical pollution episodes, its formation and transport can occur over hundreds of kilometres, with the ozone concentration at a given location influenced by the history of the air mass over a period of up to several days. In addition to this, the increasing levels of ozone in the free troposphere on a global scale also influence regional scale photochemical processes as a result of providing an increasing background ozone level upon which the regional and national scale formation is superimposed. This effect has to be taken into account when assessing whether proposed air quality standards for ozone are likely to be achievable. Consequently, the control of ozone is an international problem requiring solutions agreed at an international level.

The major objectives of this three year DEFRA-funded project is to develop and apply predictive models to the formation of tropospheric ozone on a range of different geographical scales (i.e. global, regional and national). This is to underpin the formulation of policy with regard to the air quality and ambient levels of ozone in the United Kingdom. The work is being carried out in collaboration with the Meteorological Office and Leeds University.

## Review Groups

### **UK INPUT TO THE UNECE TASK FORCE ON EMISSIONS INVENTORIES AND PROJECTIONS (TFEIP)**

This international project was set up in 1991 to provide guidance on the preparation of emission inventories and emission projections for all major air pollutants covered by UNECE Protocols. The Task Force is sponsored by Members of the United Nations Economic Commission for Europe (UNECE), which covers Western and Eastern Europe, Canada and the USA; it is also supported by the European Environment Agency through its Topic Centre on Air Emissions and Climate Change.

The Task Force comprises of a network of inventory experts arranged into topic-specific expert panels, namely combustion and industry; transport; agriculture and nature; emissions forecasting and verification. Through the work of these expert panels, the Task Force has developed the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook. The second edition of the Guidebook was published in 1999 and has subsequently been updated - it is available on the EEA (European Environment Agency) Internet website (see below). The Guidebook is now only officially available in electronic format and the EEA website is due to be revised and updated with a third edition of the Guidebook in December 2001.

The Task Force and the Guidebook are an important resource for anyone producing emission inventories and emission projections at the local, regional, national and international level.

The UK DEFRA currently supports the work of the TFEIP by providing the co-Chairman and Secretariat. The UK also provides the Secretariat of the Combustion and Industry Expert Panel and provides technical input into this panel.

More information about the Task Force can be found at the Secretariat's website:

<http://www.aeat.co.uk/netcen/airqual/TFEI/unece.htm>

The above website links to the official version of the EMEP/ CORINAIR Guidebook, which is available on the EEA website at:

<http://reports.eea.eu.int/EMEPCORINAIR/en>

For further information on the project itself contact Jessica Sully/Nikolas Hill at AEA Technology on 01235 463251/01235 463170 or [jessica.sully@aeat.co.uk](mailto:jessica.sully@aeat.co.uk) / [nikolas.hill@aeat.co.uk](mailto:nikolas.hill@aeat.co.uk)

## **NATIONAL EXPERT GROUP ON TRANSBOUNDARY AIR POLLUTION (NEGTAP)**

There will be continuing pressure both in the UN ECE and the EU to reduce emissions causing acidification, eutrophication and ozone formation further. These reductions are likely to become more and more expensive to achieve. It will be vital to have as accurate an assessment as possible of the likely benefits to be gained from measures already agreed, as well as those from any further emission reductions. DEFRA and the Devolved Administrations have therefore established NEGTPAP as an interdisciplinary expert group to provide such assessments. The areas that NEGTPAP will cover over its lifetime of two years will include the quantification of changes in emissions and an attempt to identify the resulting signal in atmospheric concentrations and depositions and in the chemistry and biology of UK ecosystems. The members of NEGTPAP are drawn from the DEFRA's former Review Group on Acid Rain (RGAR) and the Critical Loads Advisory Group (CLAG).

NEGTAP has recently produced a draft report for consultation. The report is available at <http://www.nbu.ac.uk/negtap/docs.htm>.