

Report

**QA/QC Data Ratification Report for the  
Automatic Urban and Rural Network,  
April – June 2003**

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

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UNRESTRICTED

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Jane Vallance-Plews

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Jane Vallance-Plews  
AEA Technology  
National Environmental Technology Centre  
Culham E4/26  
Abingdon  
Oxfordshire OX14 3ED  
Telephone 0870 190 6587  
Facsimile 0870 190 6607

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	<b>Name</b>	<b>Signature</b>	<b>Date</b>
<b>Author</b>	Jane Vallance-Plews		
<b>Reviewed by</b>	Ken Stevenson		
<b>Approved by</b>	Geoff Dollard		

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# 1 Introduction

This quarterly report covers the Quality Assurance and Control (QA/QC) activities undertaken by **netcen** to ratify automatic monitoring data from Defra and the Devolved Administrations' urban and rural air quality monitoring network (AURN) for the period April to June 2003. During this period there were 119 monitoring sites in the Network of which 83 are urban sites, 22 rural network sites and 14 sites in the London Air Quality Monitoring Network (LAQN) which are affiliated into the national network. The following information is contained in this report:

Section 1	Introduction including recent changes that have taken place in the network and a general overview of network performance.
Section 2	Generic data quality issues and recommendations for improving or resolving these issues.
Section 3	Site specific issues.
Section 4	Reasons for data loss at sites where data capture falls below 90%
Section 5	Data capture statistics for April - June 2003 presented in a table.
Appendix A1	Recommendations for replacing or up-grading equipment (compiled in conjunction with CMCUs).
Appendix A2	List of critical sites in the AURN.
Appendix A3	Equipment Replacement Programme.

## 1.1 Recent Changes in the Network

An overview of the main changes relating to sites in the AURN between January to October 2003 is presented below with a summary given in Table 1.1.

### **Liverpool Centre/Liverpool Speke**

The Liverpool Centre site was closed on 23<sup>rd</sup> September 2002 for health and safety reasons and was relocated approximately 10 miles away to the vacated hydrocarbon site in Speke. A new set of analysers was installed in April and the site resumed operation on 20<sup>th</sup> May 2003 following QA/QC Unit's commissioning audit.

### **London Southwark**

NO<sub>2</sub> monitoring at London Southwark ceased on 20<sup>th</sup> October 2002 due to analyser breakdown. The analyser was considered to be beyond economical repair therefore a new analyser was purchased by the Local Authority and installed on 4<sup>th</sup> April 2003.

### **Edinburgh Centre**

The Edinburgh Centre site is currently being relocated and a replacement mobile station owned by Edinburgh City Council has been providing data since April 2002 during the relocation. The mobile station was closed from November 2002 and re-started on 20<sup>th</sup> April 2003 after a 5-month delay due to repair of the ground near the site. QA/QC Unit carried out a site commissioning audit on 20<sup>th</sup> April 2003. In the meantime the original site has been relocated approximately 1 mile away to Richmond Gardens. The site is being equipped with new analysers as part of the network equipment up-grading programme and the ESU is in the process of assembling the new rack of analysers.

### **Hounslow Roadside/Brentford Roadside**

Hounslow Roadside site was closed on November 16<sup>th</sup> 2002 because the building in which the monitors were housed was being sold. The site has been relocated to a cabin at the roadside of the A4 adjacent to the M4 flyover. The sample inlet is approximately 10 metres closer to the kerbside than the previous site. Because the site is now located outside the

building where the previous monitoring equipment was housed it has been re-named Brentford Roadside. Monitoring at this new location started on 20<sup>th</sup> June 2003 and the site was commissioned by QA/QC Unit during the summer intercalibration exercise in July 2003. There are, however, no data from this site during this period as data could not be scaled satisfactorily until the first reliable calibration in August 2003.

#### Reading Centre/Reading New Town

The monitoring station at Reading Centre closed on 6<sup>th</sup> February 2003 as the lease for the site had expired. Consequently there are no data for this site during this period. The site was relocated to a cemetery approximately 1 mile away and has been named Reading New Town. There was a long delay in the relocation of this site due to power supply problems. These have now been resolved and the site commenced operation on 17<sup>th</sup> October 2003.

#### London Westminster

Gravimetric PM<sub>10</sub> sampling started on 19<sup>th</sup> February 2003. At QA/QC Unit's commissioning audit however, it was discovered that a component was missing from the analyser resulting in internal sampling. The repair was carried out and PM<sub>10</sub> monitoring recommenced on 19<sup>th</sup> March 2003.

#### Brighton Roadside PM<sub>10</sub>

Gravimetric PM<sub>10</sub> (Partisol) monitoring commenced at Brighton Roadside on 28<sup>th</sup> February 2003. This site is located approximately 30m further along the pavement from the "Brighton Roadside" automatic site so it has been given a separate site name "Brighton Roadside PM<sub>10</sub>".

#### DD3 Requirements

Additional ozone and rural NO<sub>x</sub> analysers have recently been installed in the network in order to comply with the Third Daughter Directive (DD3) which came into force on 9<sup>th</sup> September 2003. Progress on the affiliation of the DD3 analysers is given in Table 1.1 and discussed in more detail in Section (2.1)

**Table 1.1 Changes to the AURN between January to October 2003**

Sites	Date Commenced	Pollutants
<b>New sites</b>		
Brentford Roadside	20/6/03	NO <sub>2</sub> CO
Liverpool Speke	20/5/03	NO <sub>2</sub> SO <sub>2</sub> CO O <sub>3</sub> PM <sub>10</sub>
Brighton Roadside PM <sub>10</sub>	28/2/03	PM <sub>10</sub> (Gravimetric)
Reading New Town	17/10/03	NO <sub>2</sub> SO <sub>2</sub> CO O <sub>3</sub> PM <sub>10</sub>
<b>Additional CO monitoring (DD2)</b>		
Grangemouth	17 <sup>th</sup> January 2003	CO
<b>Additional Gravimetric PM<sub>10</sub> (Partisol) monitoring</b>		
London Westminster	Started 19 <sup>th</sup> February 2003	PM <sub>10</sub>
Brighton Roadside PM <sub>10</sub>	Started 28 <sup>th</sup> February 2003	PM <sub>10</sub>
<b>Additional O<sub>3</sub> and/or NO<sub>x</sub> (DD3)</b>		
Portsmouth	Commenced 15 <sup>th</sup> April 2003	O <sub>3</sub>
Cwmbran	Commenced 30 <sup>th</sup> April 2003	O <sub>3</sub>
Somerton	Commenced 28 <sup>th</sup> April 2003	NO <sub>x</sub>
Bournemouth	Commenced 27 <sup>th</sup> Feb 2003	O <sub>3</sub>
Northampton	Commenced 17 <sup>th</sup> March 2003	O <sub>3</sub>
Wigan Leigh	Commenced 15 <sup>th</sup> May 2003	O <sub>3</sub>
Aberdeen	Commenced 1 <sup>st</sup> August 2003	O <sub>3</sub>
Aston Hill	Commenced 21 <sup>st</sup> Oct 2003	NO <sub>x</sub>
Yarner Wood	Commenced 16 <sup>th</sup> Sept 2003	NO <sub>x</sub>

Sites	Date Commenced	Pollutants
High Muffles	Commenced 20 <sup>th</sup> Oct 2003	NO <sub>x</sub>
Bush	Commenced 6 <sup>th</sup> Oct 2003	NO <sub>x</sub>
Glazebury	Delayed due to site power supply up-grading	NO <sub>x</sub>
<b>Monitoring suspended</b>	<b>Data loss</b>	
Grangemouth – site up grade	1 <sup>st</sup> Aug 2002 – 17 <sup>th</sup> Jan 2003	All
Edinburgh mobile site re-instated on 20 <sup>th</sup> April 2003. Permanent site in place awaiting installation of equipment.	Mobile unit closed 19 <sup>th</sup> November 2002 to 20/4/03. Mobile unit re-instated 20/4/03	All
Liverpool Centre closed. Relocated to Liverpool Speke	Closed from 23 <sup>rd</sup> September 2002. Liverpool Speke started 20 <sup>th</sup> May 2003	All
Reading Centre closed. Relocated to Reading New Town	Closed 6 <sup>th</sup> February 2003. Reading New Town site started 17 <sup>th</sup> October 2003.	All
Hounslow Roadside closed. Relocated to Brentford Roadside.	Closed 16 <sup>th</sup> November. Brentford Roadside started 20 <sup>th</sup> June 2003	All
Southwark Roadside NO <sub>x</sub>	NO <sub>x</sub> analyser off site from 20 October 2002 to 4 April 2003	NO <sub>x</sub>

## 1.2 Overview of Network Performance

Ratified hourly average data capture for the network averaged 92.0% for all pollutants (O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO and PM<sub>10</sub>) during the 3-month reporting period April to June 2003. (See Table 1.2 below). The average data capture for CO was slightly below target at 88.5%. The reasons for CO data loss were varied but these were mainly due to sampling/pump faults, analyser malfunction and analysers being off-line awaiting repair or site relocation. If the two sites with 0% data capture for this period (Brentford Roadside due to site relocation and Norwich Centre due to high noise response) were excluded, then the average CO data capture would have been satisfactory at 90.8%.

**Table 1.2 AURN Ratified Data Capture (%) April - June 2003**  
(Using the start date of any new site)

Pollutant	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Average
<b>Data Capture (%)</b>	<b>88.5</b>	<b>90.2</b>	<b>94.9</b>	<b>93.3</b>	<b>94.1</b>	<b>92.0</b>

Overall, 330 out of the 397 analysers (83%) achieved data capture levels above the required 90% target during this reporting period (see Table 1.3).

**Table 1.3 Number of Analysers with Data Capture below 90% April - June 2003**

	Total Number Of Analysers	Analysers with Data Capture < 90%	Analysers with Data Capture < 80%
CO	76	16	13
NO <sub>2</sub>	98	21	12
O <sub>3</sub>	80	8	6
PM <sub>10</sub>	68	9	8
SO <sub>2</sub>	75	13	8
<b>All sites</b>	<b>397</b>	<b>67 (17%)</b>	<b>47 (12%)</b>



All data capture figures given in this report now include the gravimetric PM<sub>10</sub> data. Note that there are two PM<sub>10</sub> instruments at Northampton a TEOM and gravimetric PM<sub>10</sub> (Partisol). Data from the Northampton TEOM instrument have been used to calculate the data capture. QA/QC Unit has developed data ratification procedures for the gravimetric analysers and an additional section on gravimetric PM<sub>10</sub> data ratification has been included in this report (Section 4.1).

A more detailed breakdown of the hourly data capture statistics for each site is presented in Section 5, Table 5.1. In total, 25 out of the 119 network sites (21%) had an average data capture rate below the required 90% level for the April – June 2003 period. (See Table 1.4). The main site operational and QA/QC issues giving rise to data capture below the required 90% level are summarised in Section 4.

**Table 1.4 Sites with Average Data Capture < 90%, April – June 2003**  
(Data capture calculated from site start date)

Site	Status	Average Data Capture (%)
<b>England</b>		
Birmingham East	Affiliate	69.2
Brentford Roadside	Affiliate	0
Coventry Memorial Park	Affiliate	89.5
Glazebury	Defra	58.7
Haringey Roadside	Affiliate	86.6
Leamington Spa	Affiliate	84.4
London A3 Roadside	Defra	85.8
London Bloomsbury	Defra	76.9
London Hackney	Affiliate	88.2
London Hillingdon	Defra	87.2
Middlesbrough	Affiliate	88.8
Northampton PM <sub>10</sub> (Grav)	Affiliate	50.5
Norwich Centre	Affiliate	73.9
Plymouth Centre	Defra	87.7
Sandwell West Bromwich	Affiliate	89
Sheffield Tinsley	Defra	67.5
Somerton	Affiliate	48.9
Southwark Roadside	Affiliate	70.2
Stockport Shaw Heath	Affiliate	85.1
West London	Defra	87.8
<b>Northern Ireland</b>		
Lough Navar	Defra	65.5
<b>Scotland</b>		
Edinburgh Centre	Defra	69.7
Glasgow Centre	Defra	78.3
Strath Vaich	Defra	86.9
<b>Wales</b>		
Cardiff Centre	Defra	68.2

Netcen carried out the summer intercalibration and site audits at 118 operational urban and rural sites during July-October 2003. One network site (Reading Centre) was not operational at the time of the audit as it was being relocated. Results from this intercalibration exercise have been used to assess the accuracy and consistency of the

data for this reporting period. Full details of the summer 2003 intercalibration will be reported in conjunction with the next data ratification report (January 2004).

QA/QC Unit's data ratification and intercalibration reports are available on the Air Quality Archive at the following address:

[http://www.airquality.co.uk/archive/reports/reports.php?action=category&section\\_id=5](http://www.airquality.co.uk/archive/reports/reports.php?action=category&section_id=5)

and also on the AURN project information hub web site\*.

<http://www.aeat.co.uk/com/AURNHUB/index.html>.

The AURN Hub also contains copies of CMCU's quarterly reports for the AURN and LAQN affiliated sites. The Hub has recently been up-dated with QA/QC Unit's and Defra's new telephone contact numbers.

### 1.3 Annual Report and LSO Manual

The first in a series of annual data ratification reports has been produced for the AURN which provides a review of network performance and QA/QC Unit's main activities during 2002. This report is currently waiting approval from Defra and will be made available to all network participants in the near future.

QA/QC Unit has also up-dated the AURN Site Operator's manual and a draft was sent to various organisations for consultation. Comments received have been incorporated into the manual and final checking is being undertaken prior to printing. The complete manual and CD will be distributed to the LSOs at the annual LSO meeting scheduled for December 8<sup>th</sup> 2003. The manual will also be made available electronically via the Air Quality Archive and AURN hub web sites.

### 1.4 AURN Equipment Replacement Programme

A major programme began during the summer 2003 to replace aged and/or problematic equipment in the AURN. This programme has been funded by Defra and the DAs and is being managed by CMCU (Casella Stanger). Primarily, older equipment has been replaced at the original EUN and rural network sites. To date, replacement equipment has been installed at 32 out of the 40 selected sites. QA/QC Unit has undertaken commissioning audits and training where appropriate once installation of the new equipment has been completed. A table showing all of the sites where new and replacement equipment has been installed and commissioned is given in Appendix A3.

Additional O<sub>3</sub> and rural NO<sub>x</sub> analysers have also been installed at existing sites in the network in order to meet the requirements of the third Daughter Directive (See Section 2.1).

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\* Password protected site: username and password available from [Jane.vallance-plews@aeat.co.uk](mailto:Jane.vallance-plews@aeat.co.uk)

## 2 Generic Data Quality Issues

### 2.1 Progress on Monitoring Requirements of the EU Daughter Directives

In order to comply with the third Daughter Directive (DD3 implementation date 9<sup>th</sup> September 2003), an additional 6 ozone and 7 rural NO<sub>x</sub> monitors were required at a number of existing sites in the network. Further details on the third Daughter Directive can be found at:

<http://www.defra.gov.uk/environment/consult/air-23daughter/index.htm>

The majority of these analysers have now been installed and commissioning audits carried out by QA/QC Unit (See Table 2.1). There are only two sites where outstanding issues have delayed the installation of the analysers. It is still to be decided at which site in the Scottish Borders zone (Eskdalemuir or Dunslair Heights) to install the NO<sub>x</sub> and PM<sub>10</sub> analysers. The site power supply at Glazebury still needs to be up-graded in order to accommodate the additional analysers.

**Table 2.1 Progress on Installation of Analysers for DD3, October 2003**

Site	Pollutant	Installed	Start Date	Comment
Wigan Leigh	O <sub>3</sub>	Yes	15/05/2002	Completed
Bournemouth	O <sub>3</sub>	Yes	27/02/2003	Completed
Northampton	O <sub>3</sub>	Yes	13/03/2003	Completed
Portsmouth	O <sub>3</sub>	Yes	15/04/2003	Completed
Cwmbran	O <sub>3</sub>	Yes	29/04/2003	Completed
Somerton	NO <sub>x</sub>	Yes	29/04/2003	Completed
Aberdeen	O <sub>3</sub>	Yes	29/07/2003	Completed
Yarner Wood	NO <sub>x</sub>	Yes	16/09/2003	Completed. LSO refresher training provided
Bush	NO <sub>x</sub>	Yes	13/10/03	Completed
High Muffles	NO <sub>x</sub>	Yes	20/10/03	Completed
Aston Hill	NO <sub>x</sub>	Yes	21/10/03	Completed
Eskdalemuir/ Dunslair Heights	NO <sub>x</sub> +PM <sub>10</sub>	Awaiting agreement		Either site acceptable – awaiting agreement
Glazebury	NO <sub>x</sub>	No		Awaiting site power up-grade. CMCU to advise when audit/training required.

In order to satisfy the requirements of DD3 there are also plans to commission 4 new direct-funded NO<sub>x</sub> and O<sub>3</sub> sites at the following locations:

- Brighton Preston Park (Brighton/Worthing/Littlehampton agglomeration)
- Fort William (Highland zone)
- Ashington (North East zone)
- Leominster (Midlands zone).

Progress on the affiliation of these new sites is given in Table 2.2.

Future network expansion is planned with the integration of an existing site at Market Harbrough (East Midlands zone) measuring NO<sub>x</sub>, O<sub>3</sub> and high sensitivity CO.

**Table 2.2 New DD3 Monitoring Stations, October 2003**

New Site	Pollutants	Progress to date	Expected integration date
Brighton Preston Park	O <sub>3</sub> and NO <sub>x</sub>	Plans to install equipment in existing park building agreed. Installation can now proceed.	01/01/04
Fort William	O <sub>3</sub> and NO <sub>x</sub>	Land lease negotiations on-going. Planning permission to follow once lease agreed.	01/03/04
Ashington	O <sub>3</sub> and NO <sub>x</sub>	Land lease negotiations nearly complete. 3 alternative sites for consideration identified and under investigation	01/03/04
Leominster	O <sub>3</sub> and NO <sub>x</sub>	Land lease negotiations on-going. Application for planning permission to follow. 2 alternative sites for consideration identified and under investigation.	01/03/04

## 2.2 PM<sub>10</sub> Episodes

There continue to be more exceedences of the 50 µg/m<sup>3</sup> standard recorded in 2003 than there were in the equivalent months of 2002. Most monitoring sites recorded exceedences in August 2003 during the hot weather and associated photochemical pollution and in some cases this continued well into September. The London Marylebone Road site continues to record far more exceedences than anywhere else across the UK.

Many of the UK monitoring stations have already *provisionally* recorded more than 20 exceedences of the daily mean PM<sub>10</sub> standard in the first 9-months of 2003, easily more than they did in the whole of 2002.

The following sites have already exceeded the Air Quality Objective of 35 days > 50µg/m<sup>3</sup>, to be achieved by 31/12/2004:

- 133 days - London Marylebone Road (Kerbside)
- 77 days - Scunthorpe (Industrial)
- 51 days - Cardiff Centre (Construction)
- 46 days - Glasgow Kerbside (Kerbside)
- 44 days - Bury Roadside (Roadside)
- 42 days - Stockton-on-Tees Yarm (Industrial)
- 40 days - Camden Roadside (Kerbside)
- 39 days - Port Talbot (Industry)
- 36 days - Thurrock (Construction/local source)
- 36 days - Belfast Centre (Urban Centre)

Further information on the extent and duration of the episodes and monthly PM<sub>10</sub> exceedence statistics are presented on the Air Quality Archive and AURN hub at <http://www.aeat.co.uk/com/AURNHUB/aunhubPUBLIC-399.htm>.

## 2.3 Data Capture for Critical Sites in Zones and Agglomerations

In order to meet the requirements of the Daughter Directives, any zone or agglomeration<sup>†</sup> with an exceedence of the limit value must be formally reported to the Commission. The critical sites are those which, if data capture falls below 90%, there will be insufficient data for the whole zone or agglomeration. In most cases the critical sites are those where there is only one site in the zone or agglomeration. However, for some pollutants (especially ozone) monitoring is required at several sites in each zone or agglomeration and hence these may all need to be classified as critical sites for that pollutant. The list of the critical sites in the Network has been revised to reflect the requirements of the First, Second and Third Daughter Directives (see Appendix A2). In total 61 sites have been identified as critical for DD1, DD2 or DD3. (25 sites in agglomerations and 36 in zones).

Critical sites with less than 90% data capture during the 6-month period January to June 2003 are given in Table 2.3. Reasons for data loss at these sites are given in Section 4. In total 29 sites did not meet the required 90% data capture for one or more of the critical pollutants during the first 6 months of 2003. Sites which already have data capture below 80% during this first half of the year will not achieve the 90% data capture target for 2003.

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<sup>†</sup> A definition of zones and agglomerations can be found under "Article 5 Assessment Zones and Agglomerations Monitoring Maps" at <http://www.defra.gov.uk/environment/airquality/index.htm>

**Table 2.3 Critical Sites in Agglomerations and Zones with <90% data capture, January - June 2003**  
(Data capture calculated from 1<sup>st</sup> January to 30<sup>th</sup> June 2003)

Site	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Comments
<b>Critical Sites in Agglomerations</b>						
Belfast Centre	89.4	✓	✓			
Blackpool	✓	✓	88.7	✓	88.1	
Bournemouth	✓	✓	68.4	✓	✓	O <sub>3</sub> started 27/2/03
Brighton Roadside PM <sub>10</sub>			-	68	-	PM <sub>10</sub> started 28/2/03
Bristol Centre		89.9	✓	✓	✓	
Cardiff Centre	79.5	81.7	84.1	82.4	80.9	Site switched off due to air conditioning problems
Coventry Memorial Park	✓	✓	✓	80.5	✓	
Edinburgh Centre	20.9	38.8	38.5	38.2	38.8	Closed for relocation
Glasgow Centre		25.1	✓		69.1	
Hove Roadside			-	-	✓	
Hull Freetown	71.4	✓	✓	81.1	✓	Empty CO cylinder
Leicester Centre	✓	✓	✓	79.5	✓	
Liverpool Speke	22.5	22.5	22.5	22.4	17.5	Site started 21 <sup>st</sup> May 2003
Newcastle Centre	✓	86.9	✓	✓	✓	
Nottingham Centre	✓	✓	✓	✓	✓	
Portsmouth	✓	✓	42.4	✓	78.5	
Preston	✓	✓	✓	✓	✓	
Reading Centre	18.7	18.6	18.7	18.6	18.7	Closed on 6/2/03 for relocation
Sheffield Centre				✓		
Southampton Centre	✓	✓	✓	✓	✓	
Southend-on-Sea	75.2	71.8	75.6	70.4	67.6	Temperature/power faults
Stoke-on-Trent Centre	88.5	✓	✓	✓	✓	
Swansea	✓					
Wirral Tranmere	✓	✓	✓	✓	✓	
<b>Critical Sites in Zones</b>						
Aberdeen	✓	✓	-	✓	✓	
Aston Hill	-	-	✓	-	-	
Barnsley Gawber	✓	✓		-		
Bush Estate	-	-	✓	-	-	
Canterbury	-		-	✓	-	
Cwmbran	✓	83.4	34.4	✓	88.2	
Derry	✓	✓	88.4	✓	✓	
Dumfries	✓	✓	-	✓	-	
Glazebury	-	-	78.5	-	-	
Grangemouth	77.2	✓	-	✓	✓	CO started 17/1/03
Great Dun Fell	-	-	✓	-	-	
High Muffles	-	-	✓	-	-	
Inverness		✓	-	89.5	-	
Ladybower	-	✓	✓	-		
Leamington Spa	✓	67.8	✓	✓	86	
Lough Navar	-	-	57.5		-	
Narberth	-		85.1			
Northampton	✓	✓	55.6	✓	✓	O <sub>3</sub> started 13/3/03

Site	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Comments
Norwich Centre		✓	✓			
Oxford Centre	✓		-	-	✓	
Plymouth Centre				✓		
Scunthorpe	-	-	-	✓		
Sibton	-	-	✓	-	-	
Somerton	-	0	✓	-	-	NO <sub>x</sub> rejected until 31 July 03
Stockton-on-Tees Yarm	✓	84.5	-	✓	-	
Strath Vaich	-	-	✓	-	-	
Sunderland	-	-	-	-	✓	
Thurrock		✓	✓			
Wicken Fen	-	64.4	✓	-		
Wigan Leigh	✓	87	✓	✓	✓	
Wrexham	✓	✓	-	✓	✓	
Yarner Wood	-	-	✓	-	-	
Number of Sites < 90%	9	14	14	10	10	

Key  Pollutant not critical at this site  
 ✓ Data capture for critical pollutant >90%  
 - not monitored

Note that critical sites where monitoring has not yet commenced are not included in the above table.

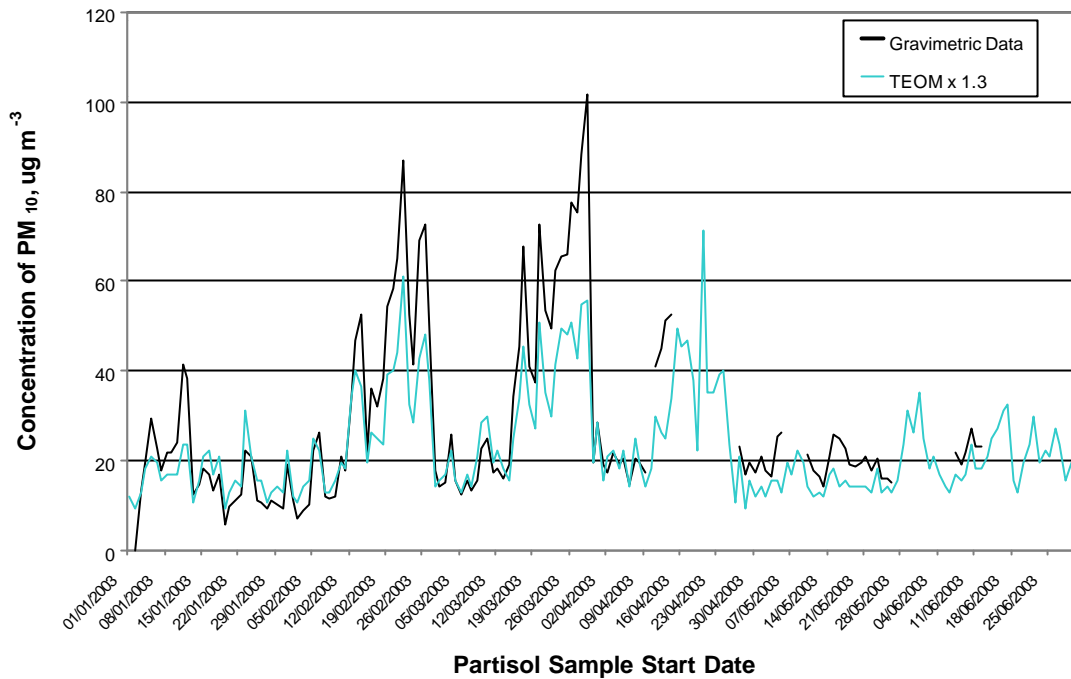
#### RECOMMENDATION

Every effort should be made to ensure that data capture is maximised for the critical sites. LSOs and ESUs should undertake call-outs and repairs as soon as possible to avoid unnecessary data loss at these sites.

## 2.4 Gravimetric PM<sub>10</sub> Data Ratification

Gravimetric PM<sub>10</sub> analysers (Partisols) are located at seven sites in the network (Bournemouth, Northampton, Wrexham, Dumfries, Inverness, London Westminster and Brighton Roadside PM<sub>10</sub>). PM<sub>10</sub> monitoring commenced at London Westminster on 19<sup>th</sup> February 2003 and at Brighton Roadside PM<sub>10</sub> on 28<sup>th</sup> February 2003.

The gravimetric PM<sub>10</sub> analyser at Northampton is also co-located with a TEOM analyser which provides a useful check that both techniques are operating correctly. Gravimetric PM<sub>10</sub> concentrations and the daily mean TEOM scaled by 1.3 at Northampton are shown in Figure 2.1. The Partisol has always shown good agreement with the TEOM and continues to do so, although there were significant differences in the peak values during the high pollution episodes in February and March 2003. Due to operational problems the gravimetric PM<sub>10</sub> data capture has been very low (50%) at Northampton during this reporting period. (See Section 4.1)



**Figure 2.1 Partisol and TEOM (x1.3) Concentrations at Northampton (Jan-June 2003)**

Data capture for the gravimetric PM<sub>10</sub> (Partisol) analysers for this period (April to June 2003) and the 6-month period January to June 2003 is given in Table 2.4. Six out of the seven operational gravimetric PM<sub>10</sub> analysers met the required 90% data capture target for this reporting period. The average data capture for the gravimetric PM<sub>10</sub> analysers during January to June 2003 was 89%. Details of data loss associated with each site are given in Section 4.1.

**Table 2.4 Gravimetric PM<sub>10</sub> Data Capture (%) January – June 2003**  
(Calculated from site start date)

Site	Data Capture (%) April - June 2003	6-months Data Capture (%) January – June 2003
Bournemouth	98.9	96.7
Brighton Roadside PM <sub>10</sub>	100	100
London Westminster	94.5	75
Northampton	50.5	74
Dumfries	100	96.1
Inverness	97.8	89.5
Wrexham	98.9	91.7
Average	91.5	89.0

In previous ratification reports QA/QC Unit recommended that remote collection of instrument diagnostics and alarms would be beneficial, since as much as 2 weeks (4%) data can be lost between sites visits. CMCU are currently in the process of making arrangements for the Partisol analysers to be connected to a telemetry system and telephone lines are being installed at the stations.



Remote dial-up facilities have been operational at Brighton Roadside PM<sub>10</sub> site since September 2003 and CMCU are now able to check the unit operation and download the data remotely. The advantages are already apparent as the LSO no longer needs to undertake the time-consuming process of manually writing down the filter numbers and exposure data, and remote collection of the data also cuts out any stages where transcription errors could possible occur.

As this is a new operational function within the network, QA/QC Unit has considered the possible data quality issues which could occur with data retrieval via telemetry and has recommended the following checks are undertaken by CMCU and the LSOs:

### RECOMMENDATIONS

1. CMCU procedures should ensure that the upload of filter identification numbers always happens before each magazine change is due.
2. As a check CMCU could e-mail the relevant site operator with the "filter ID numbers uploaded" when this is done. The LSO then knows he/she can change the magazine.
3. At the site the LSO should check that the ID number of the first filter in the new magazine has been uploaded and is in sequence.
4. A daily check of the Partisol status and any error codes should be carried out by CMCU.
5. Brighton Roadside should be used as a "test case" over the next few months so procedures can be "fine tuned" before telemetry is implemented at the other sites.

These recommendations will be incorporated into the Partisol operating instruction set in the new edition of the LSO manual.

## 2.5 NO<sub>2</sub> Converter Efficiencies

Seven converter failures were identified during QA/QC Unit's Summer 2003 intercalibration exercise. Of these four were considered to be borderline and there was no resulting effect on data quality or capture. Details of these converter faults and the resulting effect on data quality are given in Table 2.5 below.

**Table 2.5 Converter faults identified at the Summer 2003 Intercalibration**

Site	Test Date	Converter Efficiency	Effect on Data Quality
London Bromley	19/8/03	93%	None – borderline case.
Derry		94.5%	None – borderline case. Converter was replaced at service on 11/9/03.
Preston		91% (high conc) 95.7% (low conc)	None – passed the low NO <sub>2</sub> concentration test.
Wicken Fen		93%	Data rejected from 18 <sup>th</sup> June until service on 22 <sup>nd</sup> August due to ozonator problems combined with low converter efficiency.
Glasgow Centre		86%	Data rejected from 17 <sup>th</sup> February to 6 August due to low converter efficiency and erratic step changes in response sensitivity. (6 months). The converter was replaced at service on 6/8/03.

London Hillingdon	30/6/03	83% (high conc) 92% (low conc)	Data rejected from 14 <sup>th</sup> May until 7 <sup>th</sup> July 2003 due to low converter efficiency and drift in response caused by moisture in the reaction chamber (3 months). The converter was replaced at service on 7/7/03.
Narberth		86%	1-minute NO <sub>2</sub> calibration data have are being examined to determined effect of low converter efficiency on data quality. Data currently remain provisional from 1/3/03. Converter was replaced at service on 22/8/03.

## RECOMMENDATION

The ESUs have replaced or repaired the converters at the above sites during the summer 2003 service exercise to ensure satisfactory performance of the analysers.

It is recommended, however, that the ESU's undertake a 3-month converter test at the sites where the converter efficiency was below 90% e.g. London Hillingdon, Glasgow Centre and Narberth.

LSOs should continue to pay careful attention to the short-term stability of the NO<sub>2</sub> calibration response and notify the CMCU if a declining NO<sub>2</sub> span response is recorded during the calibration. Full details of this check can be found in the "Trouble-shooting" section of the Site Operator's Manual.

(<http://www.aeat.co.uk/netcen/airqual/reports/lsoman/lsoman.html>)

## 2.6 Ozone Outliers

22 out of 80 ozone analysers (27%) tested were identified as outliers during QA/QC Unit's summer 2003 intercalibration exercise (see Table 2.6). This is an improvement from the previous Winter intercalibration where 34 outliers were identified (43%). Where appropriate, the data from these sites have been rescaled accordingly during the ratification process.

**Table 2.6 Ozone outliers identified at the Summer 2003 Intercalibration**

Site	Summer 2003 Audit date	Outlier (%)
Aberdeen	29/7	+5.3
Barnsley Gawber	27/8	-13
Belfast Centre	27/8	+20
Bradford Centre	21/8	+8
Edinburgh Centre	28/7	+6.5
Glazebury	14/7	+9
Great Dun Fell	30/7	-6.5
Harwell	10/7	+16
Liverpool Speke	5/8	+5.6
London Brent	7/7	-6.9
London Hackney	30/7	-5.8
London Haringey	4/7	-6.3
London Lewisham	14/8	+11
London Southwark	12/8	-10

Lough Navar	10/9	-9.5
Lullington Heath	19/8	+11%
Norwich Centre	12/8	-16
Preston	29/7	-6.1
Sibton	9/7	+26
Stoke-on-Trent	21/7	-10
Strath Vaich	31/7	+19
Wigan Leigh	4/8	+22
Wirral Tranmere	1/8	-35

A few sites could not be tested on the scheduled audit date due to high concentration O<sub>3</sub> episodes taking place e.g. at Bournemouth, Wicken Fen, and London Teddington. These sites were either re-visited by QA/QC Unit or calibrated before the service by the ESUs.

## 2.7 TEOM k<sub>0</sub>

All TEOM instruments tested during the Summer 2003 intercalibration were found to be operating with calibration constants (k<sub>0</sub>) within the acceptable ± 2.5% deviation. Other operational problems effecting TEOM operation were, however identified as given in Table 2.7 below:

**Table 2.7 TEOM Issues identified at the Summer 2003 Intercalibration**

Site	Problem identified at audit
London A3 Roadside	Rain jar found broken
Swansea	Main flow -14%
Nottingham Centre	Failed leak test and main flow -17%
Southampton Centre	Teom vandalised end of July

## 2.8 Auto-Calibration Run-ons

This problem is seen when auto-calibration gas introduced between 0045 and 0115 remains in the instrument until about 0200. The ambient measurements between 0130 and 0200 are therefore invalid and must be removed during data ratification. This problem can occur if the solenoid valves in the pneumatic system do not close fully after the zero and span cycle. Calibration gas may then leak into the instrument during the ambient measurement period. This problem can be a serious source of data loss resulting in one hour out of twenty-four being lost, which is 4% of the annual data capture.

The ESUs have investigated this problem at many of the sites and thorough cleaning of the solenoid valves has, in most cases, resolved the problem. The sites showing a problem with the autocalibration over-run are given in Table 2.8. Any autocalibration run-on data that look visibly significant have been deleted from these data sets during ratification, resulting in a loss of an additional hour of data each day (4% data loss).

**Table 2.8 Estimate of Spike or Dip due to Auto-calibration Run-on (15-minute average)**

Site	Gas	Over-run (ppb)
Birmingham Centre	NO <sub>2</sub>	6 ppb
Birmingham East	NO <sub>2</sub>	5 ppb
Blackpool	NO <sub>2</sub>	3 ppb

Site	Gas	Over-run (ppb)
	<b>O<sub>3</sub></b>	<b>5 ppb</b>
Bournemouth	NO <sub>2</sub>	2 ppb
Brighton Roadside	NO <sub>2</sub>	4 ppb
<b>Bristol Centre</b>	<b>CO</b>	<b>0.1 ppm</b>
	NO <sub>2</sub>	4 ppb
<b>Cardiff Centre</b>	<b>NO<sub>2</sub></b>	<b>6 ppb</b>
	SO <sub>2</sub>	1 ppb
Coventry Memorial Park	NO <sub>2</sub>	4 ppb
Cwmbran	SO <sub>2</sub>	1 ppb
<b>Derry</b>	NO <sub>2</sub>	3 ppb
	<b>O<sub>3</sub></b>	<b>5 ppb</b>
<b>Glasgow City Chambers</b>	<b>NO<sub>2</sub></b>	<b>5 ppb</b>
Hull Freetown	NO <sub>2</sub>	4 ppb
Leicester Centre	NO <sub>2</sub>	4 ppb
<b>Lullington Heath</b>	<b>NO<sub>2</sub></b>	<b>9 ppb</b>
Narberth	NO <sub>2</sub>	4 ppb
Newcastle Centre	CO	0.05 ppm
Norwich Centre	NO <sub>2</sub>	3 ppb
Preston	NO <sub>2</sub>	4 ppb
	SO <sub>2</sub>	-1 ppb
Redcar	NO <sub>2</sub>	2 ppb
Rochester	NO <sub>2</sub>	2 ppb
Sheffield Centre	NO <sub>2</sub>	4 ppb
Southampton Centre	CO	0.05 ppm
	NO <sub>2</sub>	4 ppb
St Osyth	NO <sub>2</sub>	4 ppb
Stoke-on-Trent	NO <sub>2</sub>	3 ppb
<b>West London</b>	<b>NO<sub>2</sub></b>	<b>8 ppb</b>
Wigan Leigh	SO <sub>2</sub>	1 ppb
Wirral Tranmere	NO <sub>2</sub>	3 ppb
	SO <sub>2</sub>	-1 ppb

## RECOMMENDATION

The CMCU and ESUs should continue to monitor the situation and initiate service visits to clean/repair solenoid valves were necessary. In particular the large autocalibration run-ons at Birmingham Centre (NO<sub>2</sub>), Birmingham East (NO<sub>2</sub>), Blackpool (O<sub>3</sub>), Bristol Centre (CO), Cardiff Centre (NO<sub>2</sub>), Derry (O<sub>3</sub>), Glasgow City Chambers (NO<sub>2</sub>), Lullington Heath (NO<sub>2</sub>) and West London (NO<sub>2</sub>) should be investigated at the forth-coming Winter service exercise.

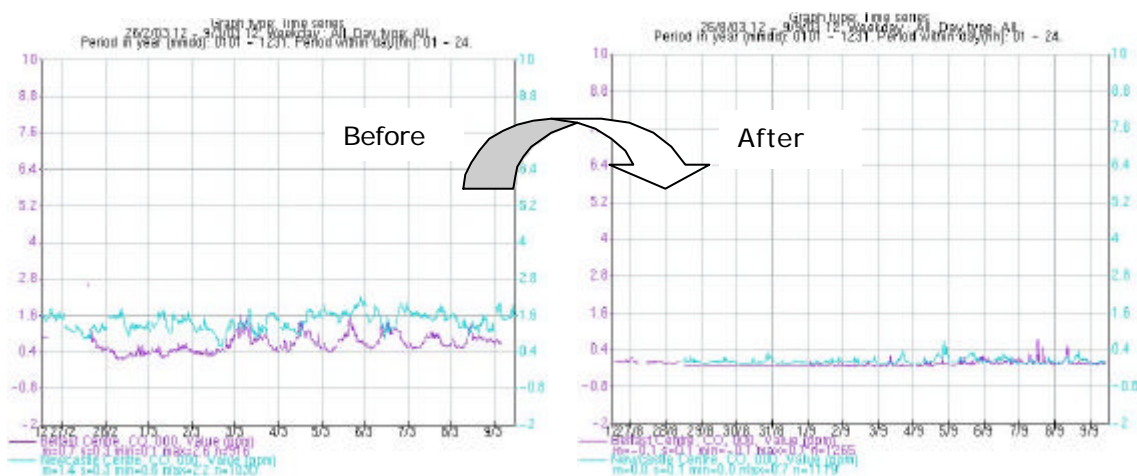
# 3 Site Specific Issues

## 3.1 Belfast Centre, Liverpool and Newcastle CO

CMCU has expressed concern over the “suppressed” ambient CO levels since the new Monitor Labs CO analysers were installed as part of the equipment replacement programme at Belfast Centre, Newcastle Centre and Liverpool Speke. Figure 3.1 shows the 15-minute average CO profiles for a short period 6 months before the equipment was replaced and for a 14 day period after the new instruments were installed at Belfast (up-graded 1<sup>st</sup> May) and Newcastle (up graded 16<sup>th</sup> April). Site investigations have been carried out by the ESU, however no obvious reason for the suppressed response has been found. QA/QC Unit carried out site commissioning audits after the new equipment was installed and these were found to be satisfactory. The same effect on CO levels appears when the analysers were changed at Liverpool Speke (up-graded 16<sup>th</sup> April) but is not so obvious at Hull Freetown (upgraded 23 July) and Southampton (up-graded 22 August).

### RECOMMENDATION

This issue is currently under investigation by the ESU and CMCU are awaiting feed back. If no further information can be obtained, QA/QC Unit has recommended a period of duplicate monitoring at one of the sites. In the meantime CO data from these sites are being considered as provisional.



(Data supplied by Casella Stanger)

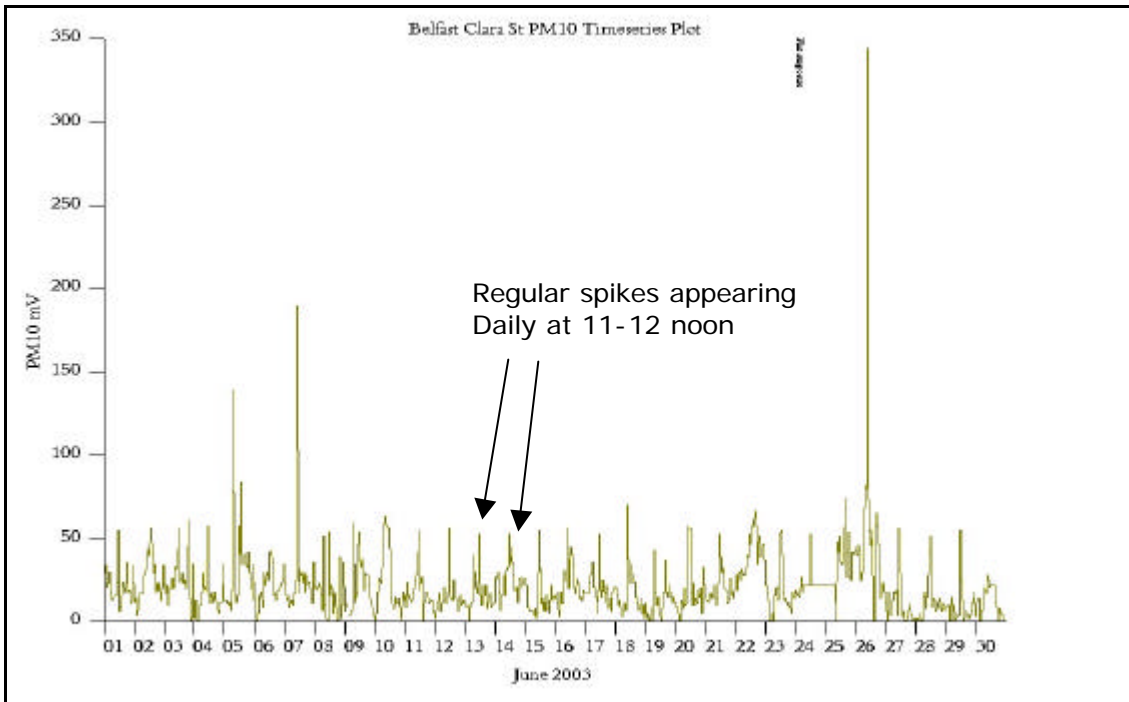
**Figure 3.1** “Suppressed” CO response after change of analyser

## 3.2 Belfast Clara Street BAM

During the ratification of the Belfast Clara Street BAM PM<sub>10</sub> data, it was noticed that spurious periods of data were recorded during June, with regular spikes of 40-50µg/m<sup>3</sup> occurring daily from 11:15 to 12:00 noon. (See Figure 3.2). This problem has been seen in the past (1998/9) but has not appeared again in recent data sets until now. The spikes have been rejected although there is not yet a clear explanation for their occurrence.

**Recommendation**

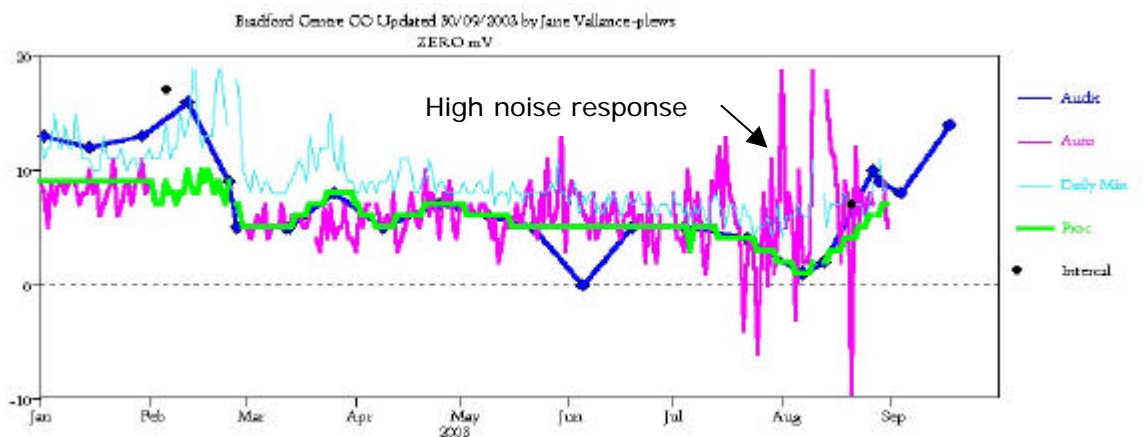
ESU to investigate the reason for the regular response spikes and/or advise whether these data are genuine.



**Figure 3.2 Belfast Clara Street BAM (mV data). Spurious daily 50mV spikes throughout June 2003.**

**3.3 Bradford Centre CO**

Increased baseline noise and response instability has been seen in the provisional data from July 2003 onwards which is likely to have a significant impact on data quality and capture. (See Figure 3.3)



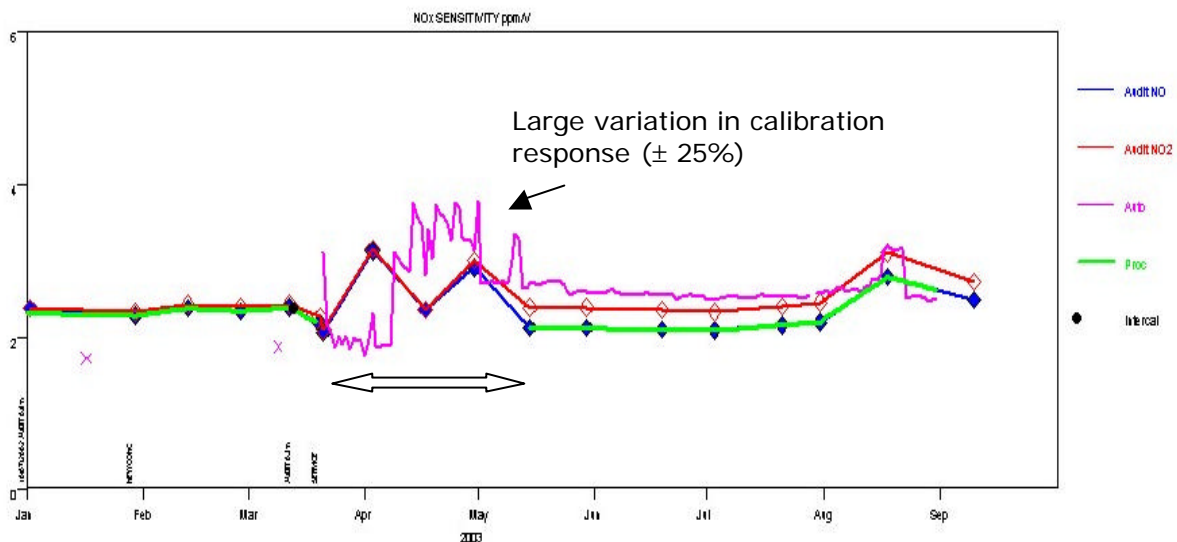
**Figure 3.3 Bradford Centre CO increased zero baseline noise**

**Recommendation**

ESU to investigate/repair Bradford CO high response noise.

### 3.4 Leamington Spa NO<sub>x</sub>

Eight weeks of NO<sub>x</sub> data have been deleted at Leamington Spa due to unacceptably large variations in calibration response ( $\pm 25\%$ ) from after the ESU service in mid March until the first stable calibration on 15<sup>th</sup> May 2003. (See Figure 3.4). The fault was rectified by the ESU in early May 2003.

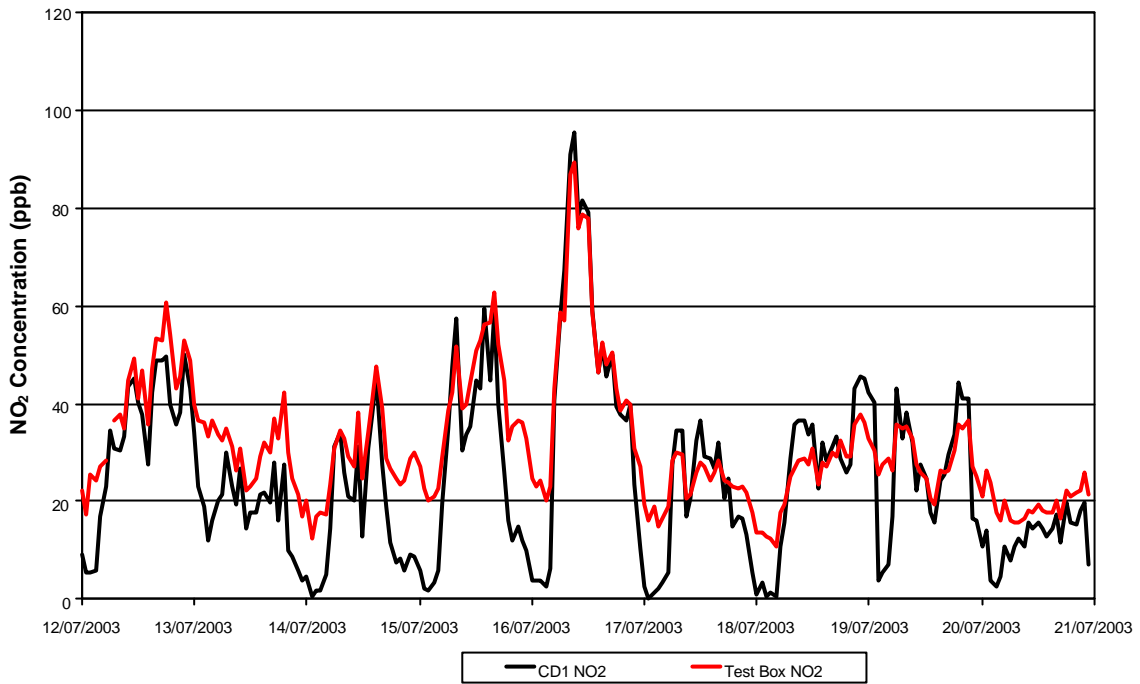


**Figure 3.4 Leamington Spa NO<sub>x</sub> unstable calibration response**

### 3.5 Camden Roadside NO<sub>x</sub>

In March 2003, ERG noticed inconsistencies between the NO<sub>2</sub> concentrations measured at Camden Roadside and other near-road measurements in the London Network. Routine service by the ESU and QA/QC Unit audits did not identify any obvious problems and ERG therefore installed a duplicate analyser at the site from 12<sup>th</sup> to 20<sup>th</sup> July. Results from the period of parallel monitoring showed a noticeable deviation in NO<sub>2</sub> measurements. The original site analyser appeared to be under-estimating the low concentration measurements and over-estimating the peak concentrations. As seen in Figure 3.5, the NO<sub>2</sub> concentrations measured by the site analyser usually reached zero ppb during low concentration periods, whereas the duplicate analyser maintained a background concentration of around 15-20ppb, as typically expected in this location. Peak NO<sub>2</sub> concentrations measured by the site analyser however, appeared higher than the duplicate analyser. The original analyser was removed from site and investigations by the ESU suggested that the problem was due to a yellowish deposit on the reaction cell window.

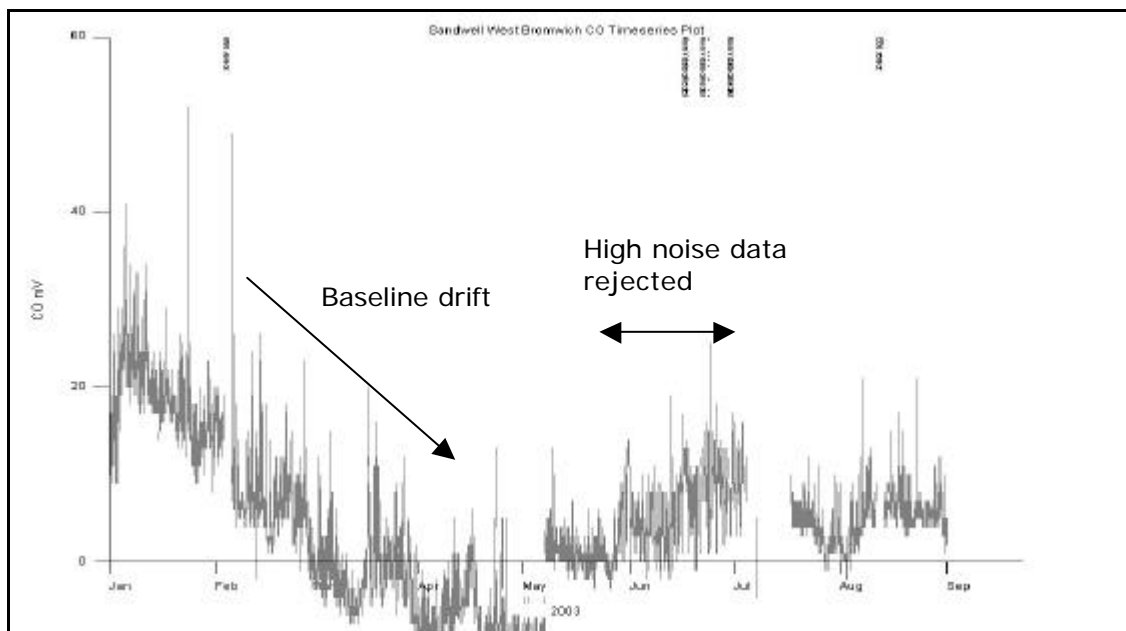
ERG has provided a detailed report of the investigations carried out and data analysis to determine the effect on data quality. Their study suggests that the problem may have started to manifest itself as far back as April 2002. Preliminary analysis of the data carried out by ERG suggests that the effect on measurements is subtle and would not affect assessment of the annual mean and concentrations around the hourly limit values for NO<sub>2</sub>. However, use of measurements for detailed modelling of short-term concentrations or diurnal variations may produce misleading results. Final assessment of the data will be carried out by QA/QC Unit in conjunction with ERG, once the investigations by the ESU have been completed. In the meantime, results from the duplicate analyser are being used to report data from this site.



**Figure 3.5** NO<sub>2</sub> concentrations from Camden Roadside co-located analysers (Data and graph supplied by ERG)

### 3.6 Sandwell West Bromwich CO

The performance of the CO analyser at Sandwell West Bromwich has shown baseline drift from January to May and high noise response during June 2003. (See Figure 3.6). The baseline drift has not affected data capture as this has been corrected for during the ratification process. Six weeks data have, however, been deleted due to excessive response noise from 31<sup>st</sup> May until the fault was repaired on 17<sup>th</sup> July 2003.



**Figure 3.6** Sandwell West Bromwich CO baseline drift and response noise



### 3.7 Stockport Shaw Heath CO

A problem with zero truncation (also called baseline clipping) was observed with the CO instrument at Stockport Shaw Heath during mid May to mid August 2003 when an unexplained step change in the zero baseline occurred. (See Figure 3.7). Over 3 months data have been rejected during the period when the output fell below the baseline cut-off. The instrument baseline was adjusted back up to 20 mV in August 2003.

#### Recommendation

CMCU and the LSO should carefully monitor the zero calibration response in order to check that the baseline does not suddenly drop to zero mV again.

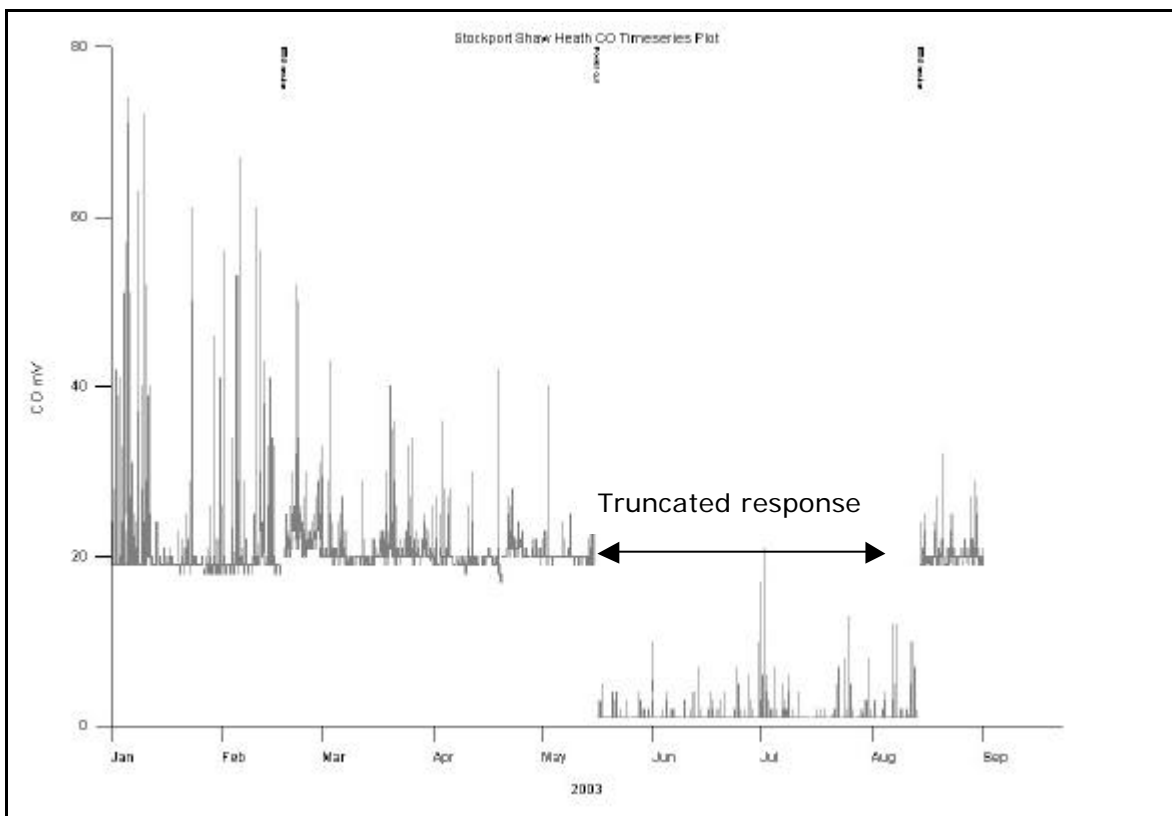
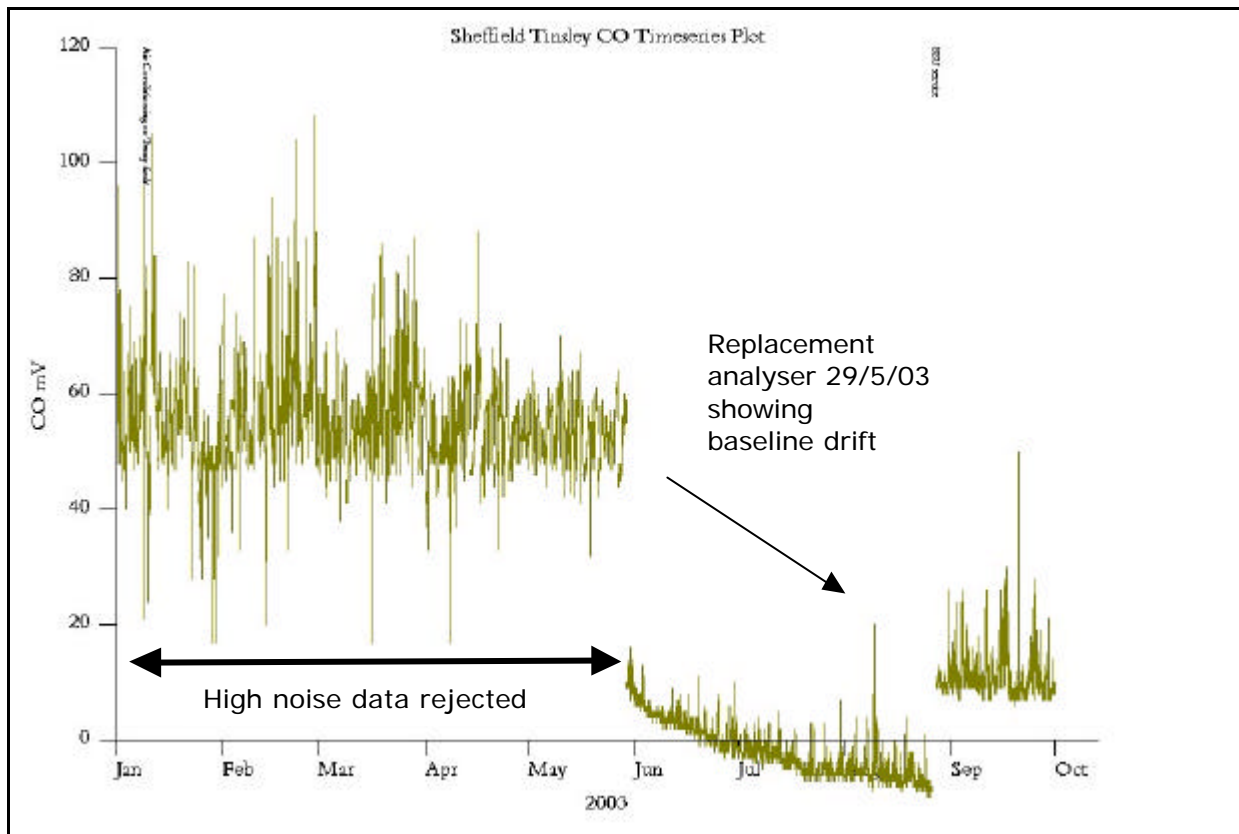


Figure 3.7 Stockport Shaw Heath truncated CO response May-August 2003.

### 3.8 Sheffield Tinsley CO

The CO analyser at Sheffield Tinsley has shown high response noise and spurious large negative spikes since January 2003 (see Figure 3.8). CMCU were advised of the problem and a replacement analyser was installed on 29<sup>th</sup> May 2003. However, data from the new analyser showed considerable baseline drift due to unstable temperatures in the cabin. Temperature control within the site was restored again by September and the analyser response stabilised satisfactorily. Comparison of the data before and after the analyser was replaced showed that the high levels of response noise measured during the first half of the year had a significant effect on data quality and consequently all data from January 1<sup>st</sup> until May 29<sup>th</sup> 2003 have now been deleted.



**Figure 3.8 Sheffield Tinsley CO high noise response January-June 2003**

### 3.9 London Bloomsbury PM<sub>10</sub>

This problem was reported in detail in the previous data ratification report (January to March 2003). All data were deleted from 25<sup>th</sup> June 2002 until 21<sup>st</sup> May 2003 (11 months) due to an unexplained offset in the PM<sub>10</sub> baseline which corresponded with the replacement of the TEOM control unit on 25<sup>th</sup> June 2002. A new TEOM model AB was installed at the site on 21<sup>st</sup> May 2003 and since then preliminary data from the site indicates that measured PM<sub>10</sub> concentrations have now returned to the original levels expected.

### 3.10 London Bloomsbury NO<sub>x</sub> switching valve fault

This problem was also reported in detail in the previous ratification report (January –March 2003). A leak in an internal solenoid switching valve lead to an erroneously high NO response resulting in deletion of NO and NO<sub>2</sub> data from 5<sup>th</sup> March 2002 until 14<sup>th</sup> April 2003 (13 months). Due to the nature of the fault, the NO<sub>x</sub> data for this period were unaffected and these data therefore remain on the archive.

As a result of this problem, QA/QC Unit developed new audit criteria to help routinely identify any potential valve leaks based on the NO response of the site/audit NO<sub>2</sub> cylinders. These tests were carried out for the first time during the Summer 2003 intercalibration exercise. If a NO response of > 10ppb was recorded then ESUs were advised to leak test and clean the NO<sub>x</sub> analyser switching valve. Full details of these test results will be reported with the summer 2003 intercalibration results.

## 4 Sites with Data Capture Below 90%

The following section provides a summary of the main site operational problems which have resulted in data capture below the required 90% level during the reporting period April to June 2003 (Table 4.1). The number of days and hours of data lost for each cause is also given. In some cases the data gap extends beyond this three-month reporting period.

**Table 4.1 Sites with data capture below 90% April to June 2003**  
(Using the start date of any new site or end date of site closed)

Data Capture (%)	Start date	End date	Reason	Comments	Days	Hours	
<b>ENGLAND</b>							
<b>Birmingham East</b>							
CO	51.5%	17-Feb-03	14-May-03	Instrument fault	Motor seized. Analyser removed to workshop for repair. Box re-installed 27 <sup>th</sup> March but further fault until repair on 14 <sup>th</sup> May. New set of analysers installed on 18 <sup>th</sup> September.	86.1	2066
<b>Brentford Roadside</b>							
General							
CO	0.0%	01-Jan-03	28-Aug-03	No calibrations	Site relocated from Hounslow Roadside. Monitoring at new site commenced on 20 <sup>th</sup> June 2003. CO regulator faulty so no calibrations possible. Data were rejected as no scaling factor.	240.0	5760
NO <sub>2</sub>	0.0%	01-Jan-03	31-Jul-03	No calibrations	Response drift and data deleted until first good calibration in August.	212.0	5088
<b>Bristol Centre</b>							
CO	83.0%	10-Apr-03	14-Apr-03	Pump fault	Flow fault and pump replaced.	4.1	98
		14-Jun-03	21-Jun-03	Air conditioning	General problems with air conditioning and fluctuating rack temperatures effecting CO analyser response.	7.7	1
<b>Bury Roadside</b>							
SO <sub>2</sub>	74.5%	04-Apr-03	04-Apr-03	Communication fault	Telemetry fault.	0.4	9
		28-May-03	19-Jun-03	Instrument fault	UV lamp out of alignment. High noise and negative data rejected.	22.2	532
<b>Coventry Memorial Park</b>							
NO <sub>2</sub>	89.7%	24-Apr-03	25-Apr-03	Response drift	Large change in response sensitivity.	1.0	24
		26-Jun-03	30-Jun-03	Logger/PC fault	No data. System rebooted.	4.0	95
PM <sub>10</sub>	72.6%	23-Apr-03	13-May-03	Instrument fault	Teom tapered element broken.	20.2	485
		18-Jun-03	18-Jun-03	Unstable response	Spurious data after routine filter change	0.5	13
		26-Jun-03	30-Jun-03	Logger/PC fault	No data. System rebooted	4.0	95

<b>Data Capture (%)</b>	<b>Start date</b>	<b>End date</b>	<b>Reason</b>	<b>Comments</b>	<b>Days</b>	<b>Hours</b>
<b>Glazebury</b>						
O <sub>3</sub> 58.7%	06-May-03	12-Jun-03	Instrument fault	On-going problems with power supply effecting response. Erratic, intermittent and negative data rejected. Improves after replacement analyser installed on 12 June 2003.	37.5	899
<b>Haringey Roadside</b>						
NO <sub>2</sub> 76.1%	19-May-03	09-Jun-03	Air Conditioning	Analyser switched off as air conditioning fault was effecting its response.	21.5	515
<b>Hull Freetown</b>						
PM <sub>10</sub> 83.3%	03-Apr-03	04-Apr-03	Instrument fault	Filter overloaded.	1.0	25
	30-Apr-03	13-May-03	Vandalism	Teom vandalised.	13.2	316
SO <sub>2</sub> 87.9%	27-May-03	06-Jun-03	Instrument fault	Chopper motor fault.	10.2	244
<b>Ladybower</b>						
SO <sub>2</sub> 79.0%	29-Apr-03	18-May-03	Communications fault	Telephone line and modem fault. Modem replaced. SO <sub>2</sub> data not recoverable from logger cartridge. (other channels were ok)	18.7	448
<b>Leamington Spa</b>						
NO <sub>2</sub> 50.6%	19-Mar-03	15-May-03	Unstable response	Data rejected due to excessive changes in calibration response sensitivity ( $\pm 25\%$ ). See Section 3.4	56.9	1365
SO <sub>2</sub> 74.9%	27-May-03	18-Jun-03	Instrument fault	High noise and response drift due to a UV lamp fault	22.1	530
<b>Leicester Centre</b>						
PM <sub>10</sub> 74.3%	01-Apr-03	23-Apr-03	Unstable response	Data rejected due to upward drift in response. New Teom unit installed on 23 <sup>rd</sup> April 2003.	22.5	539
	23-Jun-03	23-Jun-03	Unstable response	Water ingress due to heavy rain.	0.3	7
<b>Liverpool Speke</b>						
SO <sub>2</sub> 77.3%	01-Jan-03	30-May-03	Site relocation	Site relocated from Liverpool Centre. Monitoring at new site started 21/5/03. SO <sub>2</sub> photomultiplier tube power supply fault until 30 <sup>th</sup> May 2003.	149.0	3577
<b>London A3 Roadside</b>						
NO <sub>2</sub> 59.0%	02-Apr-03	09-May-03	Response drift	Large NO <sub>x</sub> sensitivity drift due to vacuum chamber and pump fault. Pump replaced 9 <sup>th</sup> May. Spurious high concentrations deleted during this period.	37.0	887
<b>London Bexley</b>						
NO <sub>2</sub> 88.9%	03-Apr-03	09-Apr-03	Air conditioning	Air conditioning fault following power cut. Elevated hut temperatures caused analyser pump to trip out. Sample system	5.8	138

Data Capture (%)	Start date	End date	Reason	Comments	Days	Hours	
				purged due to contamination by permeation tube.			
	30-Apr-03	02-May-03	Instrument fault	Moly converter temperature fault. Replacement analyser installed.	2.4	57	
	15-Jun-03	16-Jun-03	Power cut	Power cut caused air conditioning unit to fail giving elevated hut temperatures. Air conditioning unit re-wired to prevent further problems.	1.0	23	
<b>London Bloomsbury</b>							
General			Site relocation	Site closed from 4 <sup>th</sup> February due to relocation. Site re-opened on 5 <sup>th</sup> March.			
NO <sub>2</sub>	76.6%	04-Feb-02	14-Apr-03	Instrument fault	Leaking solenoid valve inside analyser causing low NO response from 5 March (site re-started).	434.0	10413
		28-May-03	04-Jun-03	Air conditioning	Power cut due to air conditioning fault	7.6	182
PM <sub>10</sub>	36.0%	25-Jun-02	21-May-03	Instrument fault	Unexplained TEOM offset. (See section 3.9)	330.0	7922
		28-May-03	04-Jun-03	Air conditioning	Power cut due to air conditioning fault.	7.4	177
<b>London Eltham</b>							
O <sub>3</sub>	74.2%	07-Apr-03	08-Apr-03	ESU service	Service	0.9	22
		23-Apr-03	24-Apr-03	Flat response	Flat response following LSO calibration.	1.1	27
		19-May-03	09-Jun-03	Instrument fault	High noise data rejected. Due to detector and amplification board fault.	20.9	502
<b>London Hackney</b>							
NO <sub>2</sub>	73.2%	02-Apr-03	26-Apr-03	Air Conditioning fault	Air conditioning unit malfunction leading to increased cabin temperature triggering a fault alarm on the analyser.	24.0	576
<b>London Hillingdon</b>							
NO <sub>2</sub>	47.1%	03-Apr-03	03-Apr-03	Communication fault	Telemetry fault.	0.4	9
		14-May-03	09-Jul-03	Converter fault	Converter low at audit on 30 <sup>th</sup> June. Data rejected from 14 <sup>th</sup> May due to a response drift caused by moisture in the reaction chamber and an ozone generator fault until the converter was replaced at service on 9 <sup>th</sup> July.	56.1	1347
<b>London N. Kensington</b>							
CO	73.0%	09-Apr-03	02-May-03	Sampling fault	Split tube between pump and flow restrictor replaced	23.5	565
		08-Jun-03	09-Jun-03	Flat response	No data	0.5	11
		11-Jun-03	11-Jun-03	ESU service	Service	0.3	7
NO <sub>2</sub>	80.8%	25-May-03	11-Jun-03	Instrument fault	Faulty chopper motor replaced and optics cleaned. Data deleted until first good calibration after repair.	17.1	410

Data Capture (%)		Start date	End date	Reason	Comments	Days	Hours
<b>London Teddington</b>							
NO <sub>2</sub>	84.8%	01-Apr-03	02-Apr-03	ESU service	Service	1.2	28
		07-May-03	19-May-03	Pump fault	Flow fault. Pump diaphragm replaced.	12.4	298
<b>London Wandsworth</b>							
NO <sub>2</sub>	87.8%	13-Mar-03	11-Apr-03	Pump fault	NO <sub>x</sub> pump fault caused severe response sensitivity drift. Pump diaphragm replaced.	29.4	706
<b>London Westminster</b>							
O <sub>3</sub>	87.6%	15-Apr-03	23-Apr-03	Sampling fault	Low flow and increased hut temperature effecting baseline stability.	8.5	204
		30-May-03	30-May-03	Temperature fault	Analyser fault alarm as site overheating.	0.3	7
		31-May-03	01-Jun-03	Temperature fault	As above.	0.5	13
		14-Jun-03	14-Jun-03	Temperature fault	As above	0.3	6
		15-Jun-03	15-Jun-03	Temperature fault	As above	0.3	8
		16-Jun-03	16-Jun-03	Temperature fault	As above	0.3	8
SO <sub>2</sub>	83.0%	14-Apr-03	28-Apr-03	Instrument fault	Increased hut temperature causing response instability.	14.5	348
<b>Middlesbrough</b>							
General					Building work on adjacent site continued throughout this period. New analysers (except NO <sub>x</sub> ) installed at service on 18 <sup>th</sup> February 2003.		
CO	65.2%	10-Apr-03	09-May-03	Instrument fault	Data rejected due to faulty infrared detector and intermittent data retrieval. Replacement analyser installed.	29.4	705
		24-Jun-03	25-Jun-03	Instrument fault	Original analyser re-installed after repair and overnight stability established.	0.8	19
<b>Norwich Centre</b>							
CO	0.0%	18-Mar-03	20-Aug-03	Response noise	High noise data rejected until new analyser installed in August.	155.0	3716
SO <sub>2</sub>	85.0%	06-Apr-03	06-Apr-03	Power cut	Power cut.	0.3	6
		17-Apr-03	29-Apr-03	Instrument fault	Fault due to a bad connection on bench signal cable. Printed circuit boards replaced.	12.6	302
<b>Plymouth Centre</b>							
NO <sub>2</sub>	84.6%	14-Jun-03	18-Jun-03	Air conditioning	Temperature fault causing intermittent data gaps.	3.6	86
		20-Jun-03	21-Jun-03	Air conditioning	Temperature fault causing intermittent data gaps.	0.3	8
		21-Jun-03	01-Jul-03	Air conditioning	Air conditioning fault resulting in elevated cabin temperature effecting NO <sub>x</sub> analyser response.	10.0	240

Data Capture (%)	Start date	End date	Reason	Comments	Days	Hours	
O <sub>3</sub>	55.4%	08-May-03	09-May-03	No mV data	Air conditioning unit replaced on 1 July 2003.	0.8	19
		16-May-03	24-Jun-03	Manifold fault	Data gap after LSO calibration. Spurious low data rejected. Manifold rain collector full of water. Analyser response levels returned to normal when emptied.	39.5	949
<b>Portsmouth</b>							
SO <sub>2</sub>	59.3%	25-May-03	15-Jul-03	Operator error	Internal sampling. SO <sub>2</sub> found disconnected from manifold at audit on 15 July 2003.	51.1	1226
<b>Sandwell West Bromwich</b>							
CO	64.7%	30-May-03	17-Jul-03	High noise	Unstable zero and noisy response. Repaired on 17 <sup>th</sup> July. (See section 3.6)	48.5	1164
<b>Sheffield Tinsley</b>							
CO	35.6%	01-Jan-03	29-May-03	High noise	All high noise and negative response data rejected from 1 January 2003 until a new analyser was installed and 29 <sup>th</sup> May. Site temperature control improved from September. (See section 3.8)	148.0	3563
<b>Somerton</b>							
NO <sub>2</sub>	0.0%	01-Jan-03	31-Jul-03	Communication fault	NO <sub>x</sub> analyser installed for DD3 compliance on 29 <sup>th</sup> April. All data deleted due to baseline noise and unstable response until the service on 31 July 2003.	212.0	5088
<b>Southend-on-Sea</b>							
PM <sub>10</sub>	78.1%	02-Apr-03	04-Apr-03	High noise	Filter not seated correctly.	1.9	45
		28-Apr-03	16-May-03	High noise	Filter not seated correctly.	17.7	424
<b>Southwark Roadside</b>							
CO	14.1%	02-Apr-03	03-Apr-03	ESU service	Service	1.2	29
		15-Apr-03	30-Jun-03	Monitoring suspended	IR source fault. Unable to source replacement part due to age of analyser. Monitoring suspended until LA has funds available for new analyser.	76	1827
<b>Stockport Shaw Heath</b>							
CO	48.7%	15-May-03	14-Aug-03	Truncated response	CO zero baseline truncation. Data rejected until service in August. (See Section 3.7)	91.0	2185
<b>Stockton-on-Tees Yarm</b>							
NO <sub>2</sub>	87.9%	28-May-03	04-Jun-03	Air conditioning	General problem with data collection throughout this period due to increased hut temperatures effecting NO <sub>x</sub> analyser performance. This resulted in frequent short periods	7.3	174

Data Capture (%)	Start date	End date	Reason	Comments	Days	Hours
				of missing data (6-12 hours). Portable air conditioning unit working from 26 <sup>th</sup> June 2003.		
	09-Jun-03	10-Jun-03	Air conditioning	As above. Air conditioning unit installed.	0.4	9
	10-Jun-03	11-Jun-03	Air conditioning	As above	0.5	12
	12-Jun-03	12-Jun-03	Air conditioning	As above	0.5	13
	15-Jun-03	15-Jun-03	Air conditioning	As above	0.6	14
	17-Jun-03	17-Jun-03	Air conditioning	As above	0.3	6
	22-Jun-03	23-Jun-03	Air conditioning	As above	0.5	12
	23-Jun-03	23-Jun-03	Air conditioning	As above. Air conditioning unit correctly configured and working effectively.	0.4	9
<b>Stoke-on-Trent Centre</b>						
CO	82.2%	06-Apr-03	06-Apr-03	Communication s fault	No mV data	0.3 6
		21-May-03	03-Jun-03	Instrument fault	Chopper motor blade and inductive sensor fault.	13.1 314
		18-Jun-03	20-Jun-03	Instrument fault	CO analyser replaced.	2.5 59
<b>Thurrock</b>						
SO <sub>2</sub>	84.8%	21-May-03	03-Jun-03	Instrument fault	High noise data deleted due to UV lamp and photomultiplier tube faults.	13.5 324
<b>West London</b>						
CO	82.5%	01-Apr-03	02-Apr-03	ESU service	Service.	1.3 30
		24-Apr-03	30-Apr-03	Unstable response	Data deleted due to drifting response and automatic step changes in the zero baseline.	6.5 155
		30-May-03	07-Jun-03	Unstable response	Drifting response as above. Replacement analyser installed.	8.0 192
<b>Wicken Fen</b>						
NO <sub>2</sub>	85.4%	18-Jun-03	22-Aug-03	NO <sub>x</sub> converter fault	Data deleted due to ozonator problems and low converter efficiency (93%) identified at audit on 11/8.	65.0 1561
<b>Wigan Leigh</b>						
NO <sub>2</sub>	74.8%	22-Apr-03	14-May-03	Logger fault	Data polling error. Logger being repeatedly reset and one hour out.	22.2 532
<b>Wolverhampton Centre</b>						
CO	66.8%	20-May-03	21-May-03	Pump fault	Pump repair	0.8 20
		28-May-03	26-Jun-03	Unstable response	Data rejected due to high noise and response instability.	28.5 685
<b>NORTHERN IRELAND</b>						
<b>Belfast Centre</b>						
SO <sub>2</sub>	72.8%	30-Apr-03	01-May-03	Service	New set of analysers installed at service.	1.0 25.
		03-Jun-03	26-Jun-03	Instrument fault	UV lamp fault. Lamp replaced.	23.3 560
<b>Lough Navar</b>						



<b>Data Capture (%)</b>	<b>Start date</b>	<b>End date</b>	<b>Reason</b>	<b>Comments</b>	<b>Days</b>	<b>Hours</b>
O <sub>3</sub> 31.0%	24-Apr-03	25-Jun-03	Internal sampling	Low data rejected due to a leaking solenoid valve. UV lamp also replaced on 24 <sup>th</sup> June.	62.7	1504
<b>SCOTLAND</b>						
<b>Aberdeen</b>						
NO <sub>2</sub> 83.1%	16-Jun-03	16-Jul-03	Instrument fault	Data rejected due to low NO <sub>x</sub> channel response. Photomultiplier tube replaced.	30.0	721
<b>Edinburgh Centre</b>						
CO 41.5%	01-Jan-03	22-May-03	Monitoring suspended and unstable CO response	Site closed for relocation. Mobile trailer site (belonging to Council) re-started on 20 <sup>th</sup> April. CO data rejected until 22 <sup>nd</sup> May due to high noise and unstable zero baseline.	142.0	3401
	08-Jun-03	09-Jun-03	Unstable response	High noise and unstable response	0.3	6
	11-Jun-03	11-Jun-03	Power cut	Power cut.	0.3	6
NO <sub>2</sub> 77.2%	19-Nov-02	20-Apr-03	Monitoring suspended	Mobile site restarted 20 <sup>th</sup> April.	153.0	3663
	11-Jun-03	11-Jun-03	Power cut	Power cut.	0.3	6
O <sub>3</sub> 76.5%	19-Nov-02	20-Apr-03	Monitoring suspended	Mobile site restarted 20 <sup>th</sup> April.	153.0	3663
	11-Jun-03	11-Jun-03	Power cut	Power cut.	0.3	6
PM <sub>10</sub> 76.1%	19-Nov-02	20-Apr-03	Monitoring suspended	Mobile site restarted 20 <sup>th</sup> April.	153.0	3663
	11-Jun-03	11-Jun-03	Power cut	Power cut.	0.3	6
SO <sub>2</sub> 77.1%	19-Nov-02	20-Apr-03	Monitoring suspended	Mobile site restarted 20 <sup>th</sup> April.	153.0	3663
	11-Jun-03	11-Jun-03	Power cut	Power cut	0.3	6
<b>Glasgow Centre</b>						
NO <sub>2</sub> 0.0%	17-Feb-03	06-Aug-03	NO <sub>x</sub> converter	Converter efficiency low (86%) at audit on 4 July and spurious step changes in response sensitivity were recorded. Converter replaced at service on 6 <sup>th</sup> August.	170.0	4078
<b>Grangemouth</b>						
CO 73.6%	01-Apr-03	24-Apr-03	Baseline truncated	Data rejected due to zero baseline truncation. Baseline offset adjusted up, but response dropping again in July.	23.5	564
<b>Strath Vaich</b>						
O <sub>3</sub> 86.9%	22-Apr-03	03-May-03	Communication fault	Site operation disrupted by storm. Logger corruption and modem fault. Modem replaced on 3 May.	10.7	257
	23-Jun-03	23-Jun-03	Communication fault	Telemetry fault.	0.3	6
<b>WALES</b>						
<b>Cardiff Centre</b>						

	<b>Data Capture (%)</b>	<b>Start date</b>	<b>End date</b>	<b>Reason</b>	<b>Comments</b>	<b>Days</b>	<b>Hours</b>
CO	67.9%	04-Apr-03	01-May-03	Switched out-of-service	Air conditioning unit malfunction resulting in elevated cabin temperatures. Analysers switched off until a new air conditioning unit was installed on 1 May.	27.0	647
		03-May-03	03-May-03	Unstable response	Data rejected - erratic output	0.3	6
		10-Jun-03	10-Jun-03	Unstable response	Data rejected - erratic output	0.4	9
		17-Jun-03	17-Jun-03	Unstable response	Data rejected - erratic output	0.3	7
NO <sub>2</sub>	66.8%	04-Apr-03	01-May-03	Switched out-of-service	Air conditioning fault	26.8	644
O <sub>3</sub>	71.1%	05-Apr-03	01-May-03	Switched out-of-service	Air conditioning fault	26.0	624
PM <sub>10</sub>	67.7%	05-Apr-03	01-May-03	Switched out-of-service	Air conditioning fault	26.0	624
		30-May-03	02-Jun-03	Sampling fault	Blocked flow splitter	3.1	74
SO <sub>2</sub>	67.4%	04-Apr-03	01-May-03	Switched out-of-service	Air conditioning fault	26.9	645
<b>Cwmbran</b>							
SO <sub>2</sub>	82.1%	03-Jun-03	14-Jun-03	Unstable response	Spurious data quality after step change in baseline.	11.3	270
		16-Jun-03	16-Jun-03	Unstable response	Low data rejected	0.3	8

## 4.1 Gravimetric PM<sub>10</sub> Sites with Data Capture Below 90%

This section gives details of the main operational problems which have resulted in gravimetric PM<sub>10</sub> data capture below the required 90% level during the reporting period April to June 2003. Casella Stanger has supplied the measured data and, since mid January 2003, they have also undertaken the filter weighing and calculated the particulate concentrations.

The gravimetric PM<sub>10</sub> analysers performed well during this period with six out of the out of the seven sites achieving data capture above 90%. The reasons for data loss at the one site (Northampton) with data capture below 90% are given below:

### Northampton (Data Capture 51.6%)

This was a problematic quarter for Northampton, with over 6 weeks of data loss. The Partisol unit stopped working on several separate occasions throughout April to June. The LSO or ESU has not yet been able to identify the reason for the fault. Similar problems occurred last summer, resulting in reduced data capture. Investigations carried out last year revealed that the temperature probe had been disconnected and a standard temperature of 25°C and pressure of 760 mmHg had been entered.

Month	Comment	Data Loss
April	10 <sup>th</sup> no filter exposed.	1 day
April	16 <sup>th</sup> – 26 <sup>th</sup> unit stopped	10 days
May	5 <sup>th</sup> – 10 <sup>th</sup> , unit stopped	6 days
May	27 <sup>th</sup> filter cut on inside edge.	1 day
May	28 <sup>th</sup> May – 6 <sup>th</sup> June unit stopped	10 days
June	13 <sup>th</sup> – 19 <sup>th</sup> , unit stopped	7 days
June	21 <sup>st</sup> – end of ratification period. Unit stopped.	10 days

### Recommendation

ESU to investigate and report the reason for the intermittent malfunction of the Partisol at Northampton. As this is the only co-located TEOM/Partisol site in the network it is important to ensure that data capture is maximised. Priority should be given to installing telemetry for the Partisol in order to allow daily checking of the analyser's operation status.

### Dumfries and Inverness

High data capture was achieved at these sites between 1<sup>st</sup> April and 30<sup>th</sup> June. However, the error codes 'R' (filter temperature range) and 'P' (elapsed sample period) were often reported, affecting most days.

### Recommendation

The Partisols at Dumfries and Inverness may need attention and should be checked by the ESU before data loss occurs.

## 5 Ratified Data Capture Statistics

Table 5.1 provides the ratified data capture figures for each site for the 3-month period April to June 2003. Data capture values below 90% are shown in the shaded boxes.

**Table 5.1 AURN Ratified Data Capture (%) for April to June 2003**  
(Using the start date of any new site or end date of site closed)

SITE	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Site Average
ENGLAND						
Barnsley 12	-	-	-	-	99.5	99.5
Barnsley Gawber	97.2	96.7	97.3	-	97.2	97.1
Bath Roadside	96.3	96.1	-	-	-	96.2
Billingham	-	99.6	-	-	-	99.6
Birmingham Centre	99.5	94.8	99.5	99.6	99.1	98.5
Birmingham East	51.5	95.4	99.5	0	99.5	69.2
Blackpool	90.5	92.2	92.9	98.5	96	94
Bolton	92.3	98.3	98.4	98.6	98.4	97.2
Bottesford	-	-	97.3	-	-	97.3
Bournemouth	99.8	95	99.9	98.9	99.5	98.6
Bradford Centre	98.4	93.8	92.2	98.6	98	96.2
Brentford Roadside	0	0	-	-	-	0
Brighton Roadside	99.3	94.6	-	-	-	97
Brighton Roadside PM <sub>10</sub>	-	-	-	100	-	100
Bristol Centre	83	90.2	94.8	90.4	94.6	90.6
Bristol Old Market	99	99.1	-	-	-	99.1
Bury Roadside	97.9	98.4	99	99	74.5	93.7
Cambridge Roadside	-	98.6	-	-	-	98.6
Camden Kerbside	-	99.4	-	99.4	-	99.4
Canterbury	-	99.7	-	98.8	-	99.2
Coventry Memorial Park	95.1	89.7	95.2	72.6	94.9	89.5
Exeter Roadside	97.2	99.3	99.3	-	99.5	98.8
Glazebury	-	-	58.7	-	-	58.7
Great Dun Fell	-	-	99.9	-	-	99.9
Haringey Roadside	-	76.1	-	97	-	86.6
Harwell	-	98.1	98.1	-	98.1	98.1
High Muffles	-	-	98.5	-	-	98.5
Hove Roadside	99.3	99.3	-	-	99.1	99.2
Hull Freetown	99	94.7	99.3	83.3	87.9	92.8
Ladybower	-	98	97.9	-	79	91.6
Leamington Spa	98.2	50.6	98.9	99.5	74.9	84.4
Leeds Centre	92.3	90.4	98.8	99.6	98.6	95.9
Leicester Centre	99	95.4	99.6	74.3	99.4	93.5
Liverpool Speke	99.5	99.3	99.5	99.1	77.3	94.9
London A3 Roadside	99.4	59	-	99	-	85.8
London Bexley	95.8	88.9	98.4	99.2	92.6	95
London Bloomsbury	90.3	76.6	90.1	36	91.4	76.9
London Brent	99.4	99.4	90.3	99.5	99.5	97.6

SITE	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Site Average
London Bromley	94.9	98.4	-	-	-	96.6
London Cromwell Road 2	99.4	98.9	-	-	99.3	99.2
London Eltham	-	99.7	74.2	99.7	99.5	93.3
London Hackney	96.8	73.2	94.6	-	-	88.2
London Haringey	-	-	99.7	-	-	99.7
London Hillingdon	92.3	47.1	98.6	98.7	99.1	87.2
London Lewisham	-	99.6	93	-	99.8	97.5
London Marylebone Road	99.5	99.4	99.5	98.9	90.2	97.5
London N. Kensington	73	80.8	98.7	99.1	99.3	90.2
London Southwark	98.7	95.6	98.7	-	98.8	98
London Teddington	-	84.8	98.1	-	98.4	93.8
London Wandsworth	-	87.8	99.2	-	-	93.5
London Westminster	95	91.6	87.6	94.5	83	90.3
Lullington Heath	-	95.3	99.5	-	98.4	97.7
Manchester Piccadilly	99.3	99.5	99.6	99.5	99.5	99.5
Manchester South	-	99.6	99.7	-	99.3	99.5
Manchester Town Hall	99.4	99.5	-	-	-	99.4
Middlesbrough	65.2	96.4	94.2	95.4	92.6	88.8
Newcastle Centre	95.1	95.1	96.7	96	97	96
Northampton	99.7	99.7	94.2	99.9	99.7	98.6
Northampton PM <sub>10</sub> (Grav)	-	-	-	50.5	-	50.5
Norwich Centre	0	91.8	96.4	96.5	85	73.9
Norwich Roadside	-	99.5	-	-	-	99.5
Nottingham Centre	99.1	98.1	99.1	93.8	96.9	97.4
Oxford Centre	99.7	94.9	-	-	99.5	98
Plymouth Centre	99.5	84.6	55.4	99.4	99.5	87.7
Portsmouth	99	98.9	99.8	99	59.3	91.2
Preston	99.4	95.1	99.6	99.4	95.1	97.7
Reading						
Redcar	99.5	97.1	99.7	99.5	98.3	98.8
Rochester	-	96.8	99.6	99.6	98.6	98.7
Rotherham Centre	-	98.7	99.5	-	95.1	97.7
Salford Eccles	97.8	97	97.7	97.4	97.6	97.5
Sandwell West Bromwich	64.7	93.8	99.2	-	98.4	89
Scunthorpe	-	-	-	98.4	94.8	96.6
Sheffield Centre	99.6	95.4	99.7	98.9	91.3	97
Sheffield Tinsley	35.6	99.5	-	-	-	67.5
Sibton	-	-	99.8	-	-	99.8
Somerton	-	0	97.8	-	-	48.9
Southampton Centre	95.3	95.3	99.5	98.9	99.6	97.7
Southend-on-Sea	95.2	95.1	95.7	78.1	95.2	91.9
Southwark Roadside	14.1	98.3	-	-	98.2	70.2
St Osyth	99.3	95.1	99.2	-	-	97.9
Stockport Shaw Heath	48.7	97.8	-	97.8	96.2	85.1
Stockton-on-Tees Yarm	99.9	87.9	-	99.6	-	95.8
Stoke-on-Trent Centre	82.2	95	99.1	99.2	99	94.9
Sunderland	-	-	-	-	99.6	99.6
Thurrock	98.2	99.6	99.6	99.3	84.8	96.3
Tower Hamlets Roadside	99.2	99.5	-	-	-	99.3

SITE	CO	NO <sub>2</sub>	O <sub>3</sub>	PM <sub>10</sub>	SO <sub>2</sub>	Site Average
Walsall Alumwell	-	98.7	-	-	-	98.7
Walsall Willenhall	-	97.1	-	-	-	97.1
West London	82.5	93.2	-	-	-	87.8
Weybourne	-	-	100	-	-	100
Wicken Fen	-	85.4	99.3	-	99.2	94.6
Wigan Leigh	96.6	74.8	96.3	97.6	95.3	92.1
Wirral Tranmere	99.1	94.9	99.2	97.7	91.4	96.5
Wolverhampton Centre	66.8	99.1	99.3	99.3	99.4	92.8
Yarner Wood	-	-	98.7	-	-	98.7
<b>NORTHERN IRELAND</b>						
Belfast Centre	97.4	98.3	97.4	99.1	72.8	93
Belfast Clara St	-	-	-	97.2	-	97.2
Belfast East	-	-	-	-	99.7	99.7
Derry	98.4	94.6	93.6	98.2	98.6	96.7
Lough Navar	-	-	31	99.9	-	65.5
<b>SCOTLAND</b>						
Aberdeen	99.9	83.1	-	100	99.6	95.6
Bush Estate	-	-	99.7	-	-	99.7
Dumfries	99.5	98.8	-	100	-	99.4
Edinburgh Centre	41.5	77.2	76.5	76.1	77.1	69.7
Eskdalemuir	-	-	98.8	-	-	98.8
Glasgow Centre	99.4	0	99.4	99.5	93.5	78.3
Glasgow City Chambers	99.3	95.1	-	-	-	97.2
Glasgow Kerbside	99.5	99.5	-	97.1	-	98.7
Grangemouth	73.6	99.6	-	99.6	99.6	93.1
Inverness	99.1	99.4	-	97.8	-	98.8
Strath Vaich	-	-	86.9	-	-	86.9
<b>WALES</b>						
Aston Hill	-	-	99.5	-	-	99.5
Cardiff Centre	67.9	66.8	71.1	67.7	67.4	68.2
Cwmbran	99.8	92.2	98.9	99.8	82.1	94.6
Narberth	-	92.6	96.5	94	96.4	94.8
Port Talbot	-	94.4	99.6	98.9	99.6	98.1
Swansea	99.5	98.4	98.7	99.5	98.4	98.9
Wrexham	99.6	99.7	-	98.9	99.7	99.5
Number of sites	76	98	80	68	75	
<b>Network Mean (%)</b>	<b>88.5</b>	<b>90.2</b>	<b>94.9</b>	<b>93.3</b>	<b>94.1</b>	<b>92</b>

Sites and instruments established between 01/04/2003 and 30/06/2003

Site	Status	Instruments	Start Date
Portsmouth	Affiliate	O <sub>3</sub>	15/04/2003
Somerton	Affiliate	NO <sub>2</sub>	28/04/2003
Cwmbran	Affiliate	O <sub>3</sub>	29/04/2003
Liverpool Speke	Affiliate	CO SO <sub>2</sub> NO <sub>2</sub> O <sub>3</sub> PM <sub>10</sub>	21/05/2003
Brentford Roadside	Affiliate	CO NO <sub>2</sub>	20/06/2003

# Appendix A1

As requested by the Department, QA/QC Unit has provided a list of suggestions for equipment that may need replacing or up grading in the network. The following provides a summary of the list and the actions taken to date. Recommendations have been prioritised from October 2000 as follows:

Priority	Definition	Time-scale
High*	Immediate action necessary to avoid compromising data capture/quality or safety	Within 2 weeks
Medium	Essential but not immediate	3-6 months
Low	Desirable but not essential	As appropriate

\*Note – QA/QC Unit's practice is to notify CMCU immediately of any high priority issues at the time of the event.

	Recommendations: October 1998	Action
1	Replace old teflon-coated sample manifolds at former SUN sites	Completed
2	Replace long sample line at Manchester Town Hall	Completed
3	Use of 1 micron sample filters on API ozone analysers	In-hand at Defra sites
4	Fitting all AUN sites with ladder securing clips	In hand
5	Improving access to PM <sub>10</sub> head at Scunthorpe (Affiliate site)	No action
6	Safer access to Walsall Alumwell	Railings installed
7	Installing temperature probes at sites without air-conditioning	Access to temp data from Ambirack sites now possible
Recommendations: April 2000		
8	Consideration could be given to up-grading the "older generation" Ambirack system at Coventry in view of the problems identified at the audit.	Site relocated and analysers up-graded (February 2001)
Recommendations: October 2000		Priority
9	The site at Walsall Alumwell should be moved from school roof to ground level in order to improve site access and safety.	Medium
10	Safer access to PM <sub>10</sub> head at Scunthorpe	Medium
11	Safer access to PM <sub>10</sub> head at Stockport. Check that the recent fire damage to the next door building has not reduced the structural integrity of the shared flat roof.	Medium
12	The CO analyser at Birmingham Centre is very noisy (outside the ±0.5ppm acceptance level) and should be considered for replacement/up-grade	Medium
Recommendations April 2001		Priority
13	Up-grade or repair noisy CO analyser at Birmingham Centre	Medium
Recommendations October 2001		Priority
14	Up-grade or repair noisy CO analyser at Hull Centre	Medium
		Action
		New instrument installed March 01
		Site temporarily closed. Re-opened at Hull Freetown 8/11/02

	<b>Recommendations May 2002</b>	<b>Priority</b>	<b>Action</b>
None			
	<b>Recommendations November 2002</b>	<b>Priority</b>	<b>Action</b>
15	Up-grade or repair noisy CO analyser at Reading (Ambirak)	Critical Site	Repaired July 02
16	Up-grade or repair CO analyser (Environnement SA) at Liverpool (response noise and drift).	Critical Site	Site Closed
17	Up-grade or repair noisy analyser at Coventry Memorial Park (SO <sub>2</sub> , and CO – Ambirak)	Critical Site	Scheduled for Winter Service
18	Up-grade or repair noisy PM <sub>10</sub> analyser (TEOM) at Leicester Centre	Critical Site	To be replaced
19	Add remote dial up facility to collect instrument diagnostics for all Partisol analysers in the Network	Critical Sites	Phone lines installed – in hand
	<b>Recommendations February 2003</b>	<b>Priority</b>	<b>Action</b>
20	Sunderland SO <sub>2</sub> baseline response cycling	Medium	ESU investigated but no fault found. On-going
21	Investigate/repair SO <sub>2</sub> analyser at Glasgow Centre (random step changes in sensitivity)	Critical Site	On-going
22	Repair/replace Narberth SO <sub>2</sub> analyser (response instability)	High	On-going
	<b>Recommendations April 2003</b>	<b>Priority</b>	<b>Action</b>
23	ESU to carry out a 3-month converter test at Sheffield Centre, London A3 Roadside, Bournemouth and Wolverhampton Centre.	Medium	Converters replaced by ESUs
24	Investigation of auto calibration run-on problem at sites identified in Table 2.7	Medium	Carried out at service
25	Investigate/repair unstable SO <sub>2</sub> analyser at Narberth or replace analyser.	High	ESU visit 13/2/03 to repair. Ageing Ambirack needs up-grading
26	Investigate/repair SO <sub>2</sub> analyser at Glasgow Centre (random step changes in sensitivity)	Critical Site	UV lamp replaced 21/3/03
27	Casella Stanger and QA/QC Unit are currently working in conjunction to carry out a programme of site up-grades involving equipment replacement at a number of original EUN sites and rural sites in the network.	Some priority sites for new analysers have been identified	See Appendix A3
	<b>Recommendations July 2003</b>	<b>Priority</b>	<b>Action</b>
	A major programme to install new equipment is underway.		See details in Appendix A3
	<b>Recommendations October 2003</b>		
28	New Horiba analysers at Birmingham East are configured for daily autocalibrations using site cylinders. It is recommended that gas usage is monitored carefully. If necessary autocalibrations may need to be re-configured for once every 3 days.		
29	Coventry Memorial Park CO noisy response from April onwards. Recommend priority site for installing new analysers (Horiba).	Critical Site	



# APPENDIX A2

## CRITICAL SITES IN THE AURN (October 2003)

**Table A1 Critical Sites in Agglomerations**

Site Name	Agglomeration	Critical Pollutants		
		DD1	DD2 <sup>7</sup>	DD3
Belfast Centre	Belfast Urban Area	NO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Wirral Tranmere	Birkenhead Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Blackpool	Blackpool Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Bournemouth+	Bournemouth Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Brighton Preston Park	Brighton/Worthing/Littlehampton			NO <sub>2</sub> <sup>6</sup> O <sub>3</sub> <sup>6</sup>
Brighton Roadside PM <sub>10</sub> +	Brighton/Worthing/Littlehampton	PM <sub>10</sub>		
Hove Roadside+	Brighton/Worthing/Littlehampton	SO <sub>2</sub>		
Bristol Centre	Bristol Urban Area	PM <sub>10</sub> SO <sub>2</sub>		NO <sub>2</sub> O <sub>3</sub>
Cardiff Centre	Cardiff Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Coventry Memorial Park+	Coventry/Bedworth	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Edinburgh Centre	Edinburgh Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Glasgow Centre	Glasgow Urban Area	SO <sub>2</sub>		NO <sub>2</sub> O <sub>3</sub>
Hull Freetown	Kingston upon Hull	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Leicester Centre	Leicester Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Liverpool Speke	Liverpool Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Nottingham Centre	Nottingham Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Portsmouth+	Portsmouth Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Preston	Preston Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Reading New Town	Reading/Wokingham Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Sheffield Centre	Sheffield Urban Area	PM <sub>10</sub>		
Southampton Centre	Southampton Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Southend-on-Sea	Southend Urban Area	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Swansea+	Swansea Urban Area		CO	
Stoke-on-Trent Centre	The Potteries	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Newcastle Centre	Tyneside	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>

"+" indicates Affiliate site"

Note 2: PM<sub>10</sub> monitored by Gravimetric and TEOM

Note 3: DD3 Critical as Rural Background station

Note 4: If NO<sub>2</sub> at Shrewsbury/Leominster is Suburban then NO<sub>2</sub> at Leamington Spa is no longer critical for DD1

Note 6: Not Affiliated/Monitoring yet. Target date 09 September 2003

Note 7: Addresses CO, Benzene not included here

**Table A2 Critical Sites in Zones**

Site Name	Zone	Critical Pollutant		
		DD1	DD2 <sup>7</sup>	DD3
Grangemouth+	Central Scotland	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	
Bush Estate	Central Scotland			NO <sub>2</sub> O <sub>3</sub>
Ladybower	East Midlands			NO <sub>2</sub> O <sub>3</sub>
Northampton+	East Midlands	NO <sub>2</sub> PM <sub>10</sub> <sup>2</sup> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Sibton	Eastern			O <sub>3</sub> <sup>3</sup>
Norwich Centre	Eastern			NO <sub>2</sub> O <sub>3</sub>
Wicken Fen	Eastern			NO <sub>2</sub> O <sub>3</sub>
Thurrock	Eastern			NO <sub>2</sub> O <sub>3</sub>
Fort William	Highland			NO <sub>2</sub> <sup>6</sup> O <sub>3</sub> <sup>6</sup>
Strath Vaich	Highland			O <sub>3</sub> <sup>3</sup>
Inverness	Highland	NO <sub>2</sub> PM <sub>10</sub>		
Ashington	North East			NO <sub>2</sub> <sup>6</sup> O <sub>3</sub> <sup>6</sup>
Stockton-on-Tees Yarm+	North East	NO <sub>2</sub> PM <sub>10</sub>	CO	
Sunderland	North East	SO <sub>2</sub>		
Aberdeen+	North East Scotland	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Aston Hill	North Wales			NO <sub>2</sub> O <sub>3</sub>
Wrexham	North Wales	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	
Great Dunn Fell	North West & Merseyside			O <sub>3</sub> <sup>3</sup>
Wigan Leigh+	North West & Merseyside	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Glazebury	North West & Merseyside			NO <sub>2</sub> <sup>6</sup> O <sub>3</sub>
Lough Navar	Northern Ireland			O <sub>3</sub> <sup>3</sup>
Derry+	Northern Ireland	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Eskdalemuir	Scottish Borders			NO <sub>2</sub> <sup>6</sup> O <sub>3</sub>
Dumfries	Scottish Borders	NO <sub>2</sub> PM <sub>10</sub>	CO	
Canterbury+	South East	PM <sub>10</sub>		
Oxford Centre+	South East	SO <sub>2</sub>	CO	
Narberth	South Wales			O <sub>3</sub> <sup>3</sup>
Cwmbran+	South Wales	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Somerton	South West			NO <sub>2</sub> O <sub>3</sub>
Yarner Wood	South West			NO <sub>2</sub> O <sub>3</sub>
Plymouth Centre	South West	PM <sub>10</sub>		
Shrewsbury/Leominster	West Midlands			NO <sub>2</sub> <sup>4&amp;6</sup> O <sub>3</sub> <sup>6</sup>
Leamington Spa+	West Midlands	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
Barnsley Gawber+	Yorkshire & Humberside	NO <sub>2</sub>	CO	NO <sub>2</sub> O <sub>3</sub>
High Muffles	Yorkshire & Humberside			NO <sub>2</sub> O <sub>3</sub>
Scunthorpe+	Yorkshire & Humberside	PM <sub>10</sub>		

**Total of 61 Critical Sites ( 25 in Agglomerations and 36 in Zones)**

**51% of network stations critical under one or more Daughter Directives**

"+" indicates Affiliate site"

Note 2: PM<sub>10</sub> monitored by Gravimetric and TEOM

Note 3: DD3 Critical as Rural Background station

Note 4: If NO<sub>2</sub> at Shrewsbury/Leominster is Suburban then NO<sub>2</sub> at Leamington Spa is no longer critical for DD1

Note 6: Not Affiliated/Monitoring yet. Target date 09 September 2003

Note 7: Addresses CO, Benzene not included here

# APPENDIX A3

## AURN EQUIPMENT REPLACEMENT PROGRAMME - October 2003

<b>PART A Replacement at Critical Defra Sites</b>						
	Site	New Instrument	Scheduled w/c	Installed	QA/QC commissioned	Notes
1	Blackpool Centre	TEOM	11/08/2003	yes	yes 16/9	<b>Completed</b>
2	Glasgow Centre	TEI 43C SO <sub>2</sub> }	04/08/2003	yes	Yes 6/10	<b>Completed</b>
3	Preston	Modified SO <sub>2</sub> bench fitted	31/7/2003	yes	Yes 16/9	<b>Completed</b>
4	Wirral Tranmere	Modified SO <sub>2</sub> bench fitted	1/7/2003	Yes	Yes 15/9	<b>Completed</b>
5	Reading New Town	Ambirak CO bench		Yes	Yes 9/10	<b>Completed</b>
6	Sunderland	API M100 SO <sub>2</sub>	14/08/2003	Yes	Yes 17/10	<b>Completed</b>
7	Plymouth	TEI 43C SO <sub>2</sub> TEOM	21/07/2003	Yes	Yes 22/9	<b>Completed</b>
<b>PART B Replacement at Non-Critical Defra Sites</b>						
8	Glasgow Kerbside	TEOM	04/08/2003	Yes	Yes 6/9	<b>Completed</b>
9	London A3	TEOM	07/07/2003	Yes	Not completed	<b>Analyser failed commissioning tests. Site to be re-visited.</b>
10	London Hillingdon	TEI 43C SO <sub>2</sub> TEOM	14/07/2003	Yes	Yes 24/9	<b>Completed</b>
11	Wolverhampton	TEI 43C SO <sub>2</sub>	04/08/2003	Yes	Yes 20/10	<b>Completed</b>
<b>PART C Replacement at Critical Affiliate Sites</b>						
12	Coventry Memorial Park	HORIBA NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO (TEOM)		No	TBA	<b>Horiba to upgrade during next 2 months TEOM not up-graded*</b>
13	Aberdeen	TEOM	28/07/2003	Yes	Yes 8/10	<b>Completed</b>
<b>PART D Replacement of Original EUN Network</b>						
14	London Bloomsbury	API NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM	09/07/2003	yes	Yes 25/9	<b>Completed. TEOM replaced by ETI on 21/5/03.</b>
15	Bristol Centre	API NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM	21/07/2003	yes	Yes 22/9	<b>Completed</b>
16	Edinburgh	API NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM		no	no	<b>Relocation not yet complete - will eventually be upgraded by ET</b>
17	Cardiff Centre	API NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM	18/08/2003	yes	Yes 22/9	<b>Completed</b>
18	Birmingham Centre	API NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO (TEOM)	08/09/2003	yes	Yes 7/10	<b>Completed TEOM not up-graded*</b>
19	Newcastle	ML NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO, TEOM	25/04/2003	yes	Yes 15/5	<b>Completed</b>
20	Liverpool Speke	ML NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO, TEOM	16/4/2003	yes	Yes 20/5	<b>Completed</b>
21	Belfast Centre	ML NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO, TEOM	01/05/03	yes	Yes 21/5	<b>Completed</b>
22	Southampton	ML NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM	04/08/2003	yes	Yes 6/10	<b>Completed</b>
23	Hull	ML NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM	21/07/2003	yes	Yes 16/10	<b>Completed. TEOM replaced by ETI on 13/5/03. Others replaced during service.</b>
24	Leeds	HORIBA NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM		No	TBA	<b>Normal ETI service - others will be upgraded by Horiba</b>
25	Leicester	HORIBA NO <sub>x</sub> , SO <sub>2</sub> , O <sub>3</sub> , CO TEOM		TEOM only	TBA	<b>TEOM replaced by ETI on 23/4/03. Others</b>

						<i>will be upgraded by Horiba</i>
26	Ambirack Sites	HORIBA NOx, SO2, O3, CO		No	TBA	<i>Unidentified as yet</i>
27	Ambirack Sites	HORIBA NOx, SO2, O3, CO		No	TBA	<i>Unidentified as yet</i>
<b>PART E Replacement of Aged Rural Network Equipment</b>						
28	Aston Hill	API M400 O3 (NOx DD3)	28/07/2003	yes	Yes 7/10	<i>Completed and LSO training provided</i>
29	Bush	API M400 O3 (NOx DD3)	14/07/2003	yes	Yes 7/10	<i>Completed</i>
30	Eskdalemuir	API M400 O3 (NOx DD3)	04/08/2003	No	TBA	<i>Awaiting decision on installation</i>
31	Glazebury	API M400 O3 (NOx DD3)	30/06/2003	No	TBA	<i>Awaiting power supply upgrade</i>
32	Great Dun Fell	API M400 O3	04/08/2003	yes	TBA	
33	Harwell	API M400 O3, NOx, SO2	14/07/2003	Yes	Yes 22/9	<i>Completed</i>
34	High Muffles	API M400 O3 (NOx DD3)	25/08/2003	Yes	Yes 5/8	<i>Completed</i>
35	Ladybower	API M400 O3, NOx, SO2	28/07/2003	yes	Yes 1/9	<i>Completed and LSO training provided</i>
36	Lough Navar	API M400 O3	TBC	Yes	Yes 10/9	<i>Completed</i>
37	Sibton	API M400 O3	14/07/2003	Yes	Yes 30/9	<i>Completed</i>
38	Strath Vaich	API M400 O3	28/07/2003	Yes	Not completed	<i>New analyser not working at audit. Needs to be re-visited</i>
39	Wicken Fen	API M400 O3, NOx, SO2	18/08/2003	Yes	Yes 29/9	<i>Completed</i>
40	Yarner Wood	API M400 O3 (NOx DD3)	21/07/2003	yes	Yes 22/9	<i>Completed and LSO training provided.</i>
<b>DD3 Requirements</b>						
	<b>DD3 Requirements</b>		<b>Scheduled</b>	<b>Installed</b>	<b>Commissioned</b>	
1	Portsmouth	O <sub>3</sub>	27/02/2003	Yes	15/4/2003	<i>Completed</i>
2	Cwmbran	O <sub>3</sub>		Yes	29/4/2003	<i>Completed</i>
3	Somerton	NOx		Yes	28/4/2003	<i>Completed</i>
4	Aberdeen	O <sub>3</sub>		Yes	29/7/2003	<i>Completed</i>
5	Northampton	O <sub>3</sub>		Yes	13/3/2003	<i>Completed</i>
6	Bournemouth	O <sub>3</sub>		Yes	27/2/2003	<i>Completed</i>
7	Aston Hill	NOx	28/07/2003	Yes	14/8/2003	<i>Completed</i>
8	Bush	NOx	14/07/2003	Yes	6/10/2003	<i>Completed</i>
9	Eskdalemuir	NOx		No	TBA	<i>Awaiting decision on Scottish Borders site</i>
10	Glazebury	NO <sub>x</sub> (+ PM <sub>10</sub> to be installed)	30/06/2003	No	TBA	<i>Awaiting power supply upgrade</i>
11	High Muffles	NO <sub>x</sub>	14/07/2003	Yes	7/8/2003	<i>Completed</i>
12	Yarner Wood	NO <sub>x</sub>	30/06/2003	yes	25/7/2003	<i>Completed</i>
13	Wigan Leigh	O <sub>3</sub>	15/5/2002	yes	15/5/2002	<i>Completed at same time as DD2 CO</i>

TBA = to be arranged

w/c = week commencing

\* TEOM not yet up-graded as new TEOM AB analysers deployed on FDMS tests at Belfast and Harwell