

Report

QA/QC Data Ratification Report for the Automatic Urban and Rural Network, April-June 2005

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in Northern Ireland

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**QA/QC Data Ratification Report for the
Automatic Urban and Rural Network,
April-June 2005**

Stewart Eaton

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Stewart Eaton
 AEA Technology
 National Environmental Technology Centre
 Building 551
 Harwell
 Didcot
 Oxfordshire
 OX11 0QJ

Tel: 0870 1906465
 Fax: 0870 1906377

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	Name	Signature	Date
Authors	Stewart Eaton		
Reviewed by	Paul Willis		
Approved by	Ken Stevenson		

Executive Summary

Netcen carries out the quality assurance and control (QA/QC) activities for the Automatic Urban and Rural Monitoring Network (AURN) on behalf of the UK Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (DAs). This report provides a review of data ratification issues and QA/QC audit results for the 3-month period April-June 2005 .

The network has undergone significant changes since it was first established in 1992. Site numbers have increased to 125 sites to date, of which 63 are Local Authority owned sites which are affiliated to the national network. The further addition of another 2 new sites in 2005 will bring the total number of AURN sites to 127.

In general this has been a good 3-month period for the AURN with a network average data capture of 91% being achieved. This is reasonably consistent with the overall data capture figure for the previous quarter (94%).

Although overall network data capture was high at 91%, there were a number of critical site/analysers that missed the 90% threshold for the period, and concern must be expressed for these sites in meeting the 90% annual data capture target. The main reasons for data loss at these sites have been provided and these were predominantly due to instrument faults, response instability or sites out of service for relocation or refurbishment. A summary of recommendations given in this report to help improve network performance is given in Appendix A4.

QA/QC Unit continues to maintain a watching brief on new methodologies and technical advances in air quality measurement in order to keep pace with any changes that may be required in the coming years, particularly in view of the recently published European CEN standards. New long-term data checking tools have been incorporated into the routine data ratification process and further measures to assist with the identification of consistent poorly performing sites are being developed.

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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-June 2005. During this period there were 125 monitoring sites in the Network of which there are 89 urban sites, 22 rural sites and a further 14 sites in the London Air Quality Monitoring Network (LAQN) which are affiliated into the national network. There are currently 62 defra-funded sites and 63 affiliate sites. Three sites (Belfast Clara Street, Northampton PM₁₀ and Brighton Roadside PM₁₀) measure PM₁₀ only and are included as individual sites in the total of 125, although Northampton PM₁₀ is co-located with the Northampton AURN site, and Brighton Roadside PM₁₀ is close to the Brighton Roadside AURN site. The Blackpool site was recommissioned on 13 June following a long period of closure due to relocation.

- 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 2005 and for the complete year so far are presented in tables.

- Appendix A1 Recommendations for replacing or up-grading equipment
- Appendix A2 List of critical sites in the AURN.
- Appendix A3 Inventory of Department-owned equipment used by QA/QC Unit.
- Appendix A4 Summary of recommendations

1.1 Recent Changes in the Network

This section gives an overview of the main changes that have recently taken place in the network, including site closures, relocations or the addition of any new sites to the network. A summary of changes in the AURN for the period is given in Table 1.1.

QA/QC Unit has been working closely with Casella Stanger and the Local Authorities regarding the following site commissionings and relocations:

Norwich Roadside

In early February 2005, short notice was given to vacate the office where the Norwich Roadside NO_x analyser was located. The equipment was quickly relocated to a similar roadside location at City Hall. The new site was renamed Norwich Roadside Forum and monitoring commenced following the commissioning audit on April 1st 2005.

Blackpool

The site at Blackpool ceased operation on 10th November 2004 due to redevelopment in the area. The housing has been moved to a new location at Stanley School and the station was recommissioned on 13 June 2005.

Middlesbrough

The site at Middlesbrough has been relocated due to redevelopment in the area around the school. Groundwork started in early December 2004, giving rise to elevated PM₁₀ concentrations. Another suitable site, 17 metres from the existing location, has been identified and the monitoring cabin was moved on 19th May 2005.

Stockport Shaw Heath

There are plans to demolish the building housing the Stockport Shaw Heath site. The LSO is currently investigating the possibility of setting up a site across the road, using a groundhog enclosure.

Bradford Centre

This site has been relocated by approximately 15m during August 2005. The locations are considered to be equivalent so no new site name is necessary.

Bristol Centre

This site is expected to close shortly pending relocation.

Leominster

The Leominster site was commissioned on 18 July 2005. This site measures NO_x and ozone.

Cardiff

The site was removed in May for refurbishment; the site was out of commission until October.

DD3 Requirements

Installation of additional ozone and rural NO_x analysers at existing sites in the network in order to comply with the Third Daughter Directive (DD3) is now complete.

Three of the four new sites required for compliance with the Third Daughter Directive (DD3) have now been commissioned. The one remaining, Fort William, is scheduled for commissioning later in 2005.

A site measuring ozone in Lerwick, Shetland, commenced on 25 May 2005. The CMCU have reported that data from this site may have been unreliable, and ratification of the data will be carried out along with the July-September period. Any QA/QC issues from this site will be presented in the next quarterly report. It is anticipated that PM₁₀ and PM_{2.5} analysers will be installed at the rural site at Auchencorth Moss (near Edinburgh) during 2005.

Changes to the network during the period April-June 2005 are summarised in Table 1.1

Table 1.1 Changes to the AURN between April-June 2005

Sites	Date Commenced	Pollutants
New site		
Blackpool Marton (replaced previous Blackpool site)	13 June 2005	CO NO ₂ O ₃ PM ₁₀ (TEOM) SO ₂
Norwich Roadside Forum (replaced Norwich Roadside)	1 April 2005	NO ₂
Lerwick	25 May 2005	O ₃
Relocated sites		
Bath Roadside	15 May 2005	CO NO ₂
Middlesbrough	19 May 2005	CO NO ₂ O ₃ PM ₁₀ (TEOM) SO ₂
Replacement equipment		
Leeds Centre	4 May	CO NO ₂ O ₃ PM ₁₀ (TEOM) SO ₂
Southend on Sea	29 July (old site decommissioned 27 June)	CO NO ₂ O ₃ PM ₁₀ (TEOM) SO ₂
Norwich Centre	14 July (old site decommissioned 29 June)	CO NO ₂ O ₃ PM ₁₀ (TEOM) SO ₂

1.2 Overview of Network Performance

Ratified hourly average data capture for the network averaged 91% for all pollutants (O₃, NO₂, SO₂, CO, PM₁₀ and PM_{2.5}) during the 3-month reporting period April to June 2005 (see Table 1.2 below). Three pollutants (CO, NO₂ and SO₂) had average data captures of below the required 90% during this quarter. The annual average network data capture for the calendar year 2004 was 93%.

Table 1.2 AURN Ratified Data Capture (%) April-June 2005

(Using the start date of any new site)

Data Capture (%)	CO	NO ₂	O ₃	PM ₁₀	PM _{2.5}	SO ₂	Network Average
Q1 Jan-Mar 2005	92.4	93.0	94.2	95.0	96.8	90.8	94.0
Q2 April-June 2005	88.0	89.7	95.1	93.0	95.6	88.9	91.0

Overall, 330 out of the 419 analysers (79%) achieved data capture levels above the required 90% target during this reporting period (See Table 1.3). The figures shown in Table 1.3 also demonstrate that the level of network performance has been fairly consistently maintained across all analyser types in the network, except for NO₂ and SO₂ analysers, where numbers of analysers below 90% have increased this quarter.

Table 1.3 Number of Analysers with Data Capture below 90%

Total Number of Analysers		Analysers with Data Capture <90%	
		Q1 Jan-Mar 2005	Q2 Apr-Jun 2005
CO	79	19	22
NO ₂	109	19	31
O ₃	87	11	10
PM ₁₀	64	7	9
PM _{2.5}	4	0	1
SO ₂	76	10	16

In total, 34 out of the 125 operational network sites (27%) had an average data capture rate below the required 90% level for the April-June 2005 period. These sites are listed in 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. A summary of the main recommendations made in this report to help improve network performance is given in Appendix A4.

Table 1.4 Sites with Average Data Capture < 90%, April-June 2005
(Data capture calculated from site start date)

Site	Owner	Site Average Data Capture (%)
England		
Barnsley Gawber	Affiliate	79.6
Bath Roadside	Affiliate	79.4
Birmingham Centre	defra	85.3
Brentford Roadside	Affiliate	75.7
Exeter Roadside	Affiliate	85.7
Hull Freetown	defra	77.0
Ladybower	defra	88.6
Leeds Centre	defra	89.5
London Bloomsbury	defra	81.8
London Brent	Affiliate	82.2
London Bromley	Affiliate	88.9
London Eltham	Affiliate	82.4
London Hackney	Affiliate	73.7
London Hillingdon	Affiliate	88.8
London Westminster	defra	82.1
Lullington Heath	defra	89.6
Manchester Piccadilly	defra	78.9
Manchester South	Affiliate	33.1
Northampton	Affiliate	79.6
Norwich Centre	defra	88.8
Reading New Town	defra	67.2
Rotherham Centre	Affiliate	60.0
Sibton	defra	82.6
Stockport Shaw Heath	Affiliate	55.7
Stoke-on-Trent Centre	defra	77.7

Site	Owner	Site Average Data Capture (%)
Sunderland Silkworth	Affiliate	74.3
West London	defra	86.1
Wirral Tranmere	defra	84.7
N Ireland		
Belfast Centre	defra	87.1
Scotland		
Bush Estate	defra	68.7
Strath Vaich	defra	79.4
Wales		
Cardiff Centre	defra	42.0
Cwmbran	Affiliate	79.6
Narberth	defra	85.0

The summer intercalibration was completed in September 2005. Results from this intercalibration exercise have been used to assess the accuracy and consistency of the data for this reporting period. Details of the summer 2005 intercalibration will be provided in the next ratification report in January 2006.

1.3 LSO Manual

Copies of the Local Site Operator's manual on disc (CD) were distributed to the network participants at the annual LSO meeting in December 2004. If LSOs have not received a copy or further copies are required please contact Andy.Cook@aeat.co.uk. The manual is also available electronically on the following web sites:

AURN Hub <http://www.aeat.co.uk/com/AURNHUB/lsoman.html>

Air Quality Archive <http://www.aeat.co.uk/netcen/airqual/reports/lsoman/lsoman.html>

1.4 AURN Hub Updates

The AURN project information hub website is located at¹:

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

The site is regularly up-dated and some of the more recent information includes:

- Up-dated site lists (July 2005) and critical site list (October 2005)
- Monthly PM₁₀ (Gravimetric) exceedences up to September 2005
- QA/QC Unit's data ratification and annual report, January-March 2005
- Recent Management Unit reports (April-June 2005)

The Hub has continued to provide a valuable source of information for interested organisations-see Figure 1.1

¹ Password protected site: username and password available from Jeff.Lampert@aeat.co.uk

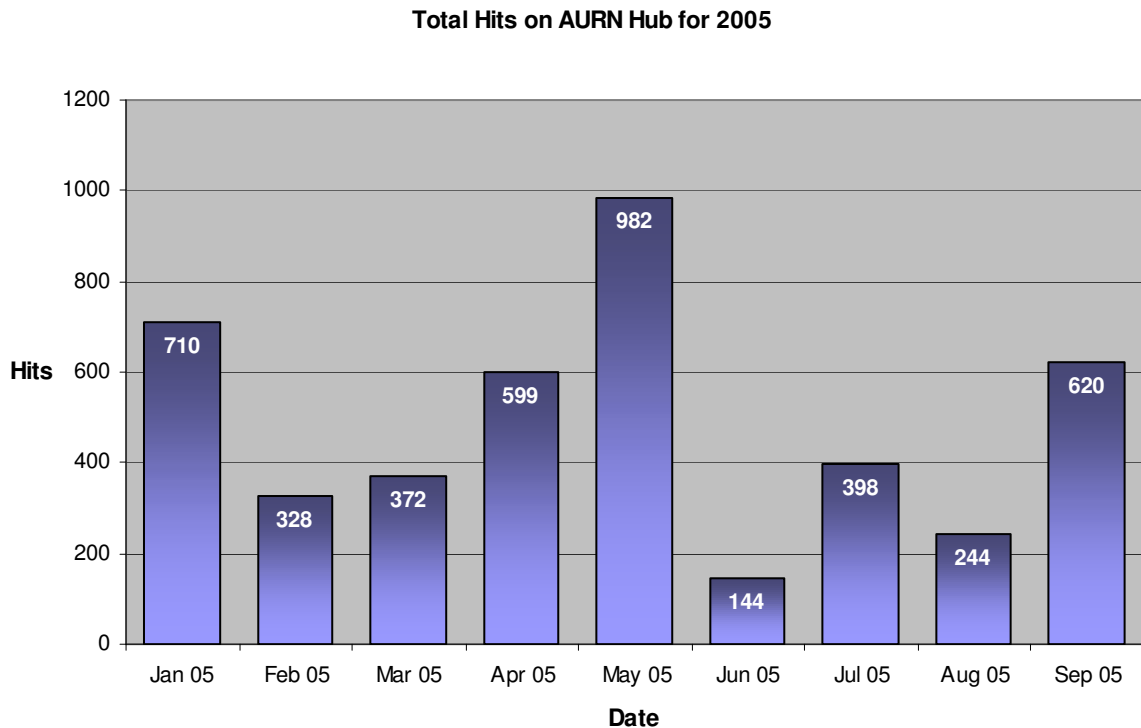


Figure 1.1 AURN Hub Monthly Usage Statistics January-September 2005

2 Generic Data Quality Issues

2.1 Progress on Monitoring Requirements of the EU Daughter Directives

Installation of all of the additional NO_x and O₃ analysers at existing sites required to comply with the third Daughter Directive (DD3) has now been completed. Further details on the third Daughter Directive can be found at:

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

Progress is underway to install the remaining site needed to meet the requirements of DD3 at Fort William. It is anticipated that this site will be operational in late 2005.

2.2 Data Capture for Critical Sites in Zones and Agglomerations

In order to meet the requirements of the Daughter Directives, any zone or agglomeration² 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

² 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>

(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 necessary to meet the requirements of the first, second and third Daughter Directives is given in Appendix A2. In total 61 sites (184 analysers) have been identified as critical for DD1, DD2 or DD3 (25 sites in agglomerations and 36 in zones).

Data capture for all 61 of the critical sites during the 3-month period April to June 2005 is given in Section 5, Table 5.2. The critical sites with less than 90% total data capture and the main reasons for data loss at these sites are given in Table 2.1 below. In total, 41 out of the 185 critical site analysers (22%) did not meet the required 90% data capture during the period April-June 2005.

Table 2.1 Critical sites with <90% data capture, January-June 2005

Network Data Capture for 01/01/2005 to 30/06/2005 From start date of any new site

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	SO ₂	Site Average	Principle reason for loss
England								
Barnsley Gawber	Affiliate	70.3	74.5	96.8	-	93.7	83.8	Poor analyser performance
Blackpool Marton	DEFRA	8.7	8.7	8.7	9.0	8.7	8.7	Closed for relocation
High Muffles	DEFRA	-	82.9	88.3	-	-	85.6	Analyser fault, internal sampling
Hull Freetown	DEFRA	60.0	94.4	98.2	97.5	83.8	86.8	Faults related to aircon failure
Northampton	Affiliate	99.5	13.9	95.0	98.0	99.4	81.2	NOx analyser switching valve
Reading New Town	DEFRA	65.3	92.5	94.8	96.3	51.5	80.1	Noisy SO ₂ and CO
Sibton	DEFRA	-	-	88.5	-	-	88.5	Analyser fault
Stoke-on-Trent Centre	DEFRA	93.1	93.4	94.0	97.3	3.6	76.3	Very noisy SO ₂
Sunderland Silksworth	Affiliate	-	86.2	78.0	-	-	82.1	IZS faults; power failure
Scotland								
Bush Estate	DEFRA	-	44.7	97.2	-	-	70.9	Poor NOx analyser performance
Strath Vaich	DEFRA	-	-	87.4	-	-	87.4	Comms problems
Wales								
Cardiff Centre	DEFRA	69.1	69.4	69.2	60.1	65.4	66.6	Removed for refurbishment
Cwmbran	Affiliate	21.7	99.2	99.3	99.2	97.2	83.3	CO scaling problem
Narberth	Affiliate	-	90.8	53.8	76.2	94.8	78.9	Ozone analyser leak, TEOM flows

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.

2.3 Gravimetric PM₁₀ Data Ratification

Gravimetric PM₁₀ analysers (Partisols) are located at seven sites in the network (Bournemouth, Northampton, Wrexham, Dumfries, Inverness, London Westminster and Brighton Roadside PM₁₀). The gravimetric PM₁₀ analyser at Northampton is also co-located with a TEOM analyser, which provides a useful check that both techniques are operating correctly. Gravimetric PM₁₀ concentrations and the daily mean TEOM scaled by 1.3 at Northampton for the 6-month period January-June 2005 are shown in Figure 2.1.

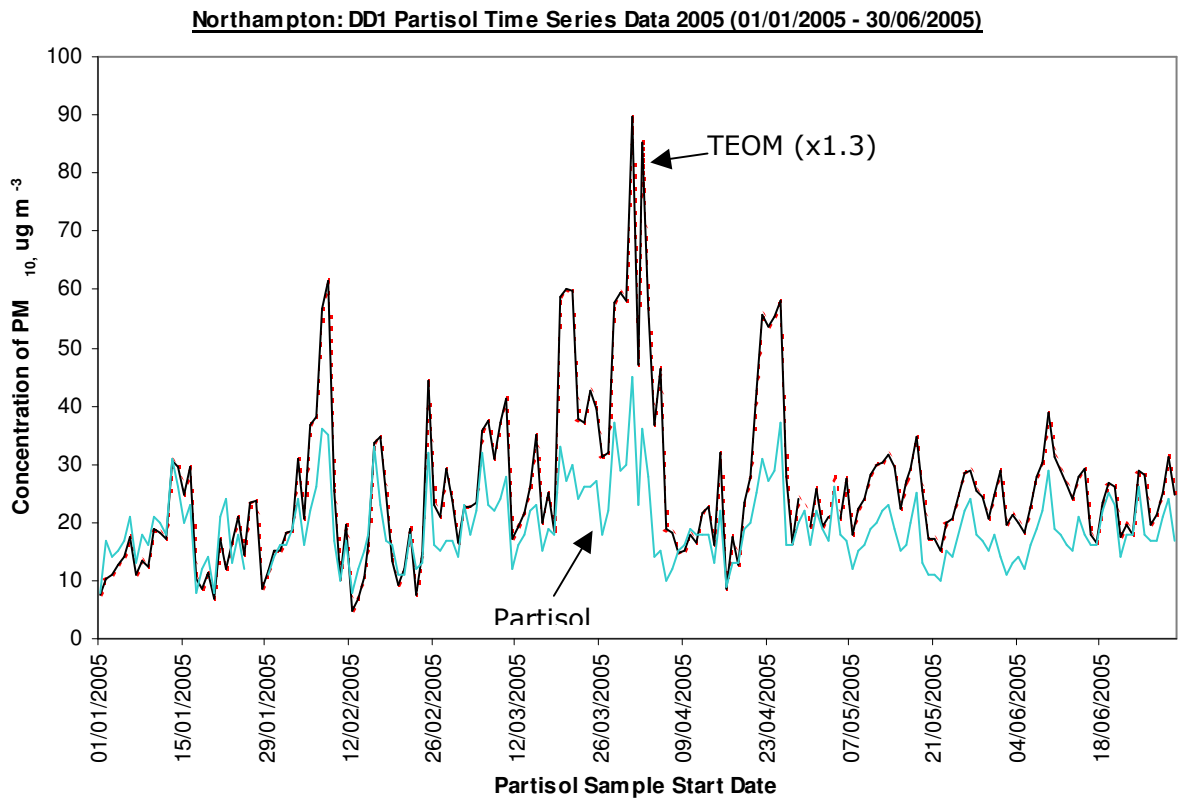


Figure 2.1 Partisol and TEOM (x1.3) Concentrations at Northampton (January-June 2005)

The Northampton site has collocated Partisol and TEOM analysers. The data for 2004 showed generally good agreement between the two measurement methods, however during the period 1 April to 30 June 2005, the Partisol has indicated six exceedences of the daily objective compared to none by the TEOM. In the whole of 2004, there were 8 daily exceedences as measured by the Partisol at this site, compared to one by the TEOM. It is thought that the difference in exceedences measured by the two methods may be due to

increasing proportion of secondary, volatile species at higher PM₁₀ concentrations; these being lost in the heated TEOM inlet. Further analysis of these data is currently being carried out to confirm this.

Data capture for the gravimetric PM₁₀ (Partisol) analysers for the period April-June 2005 is given in Table 2.3. All seven sites exceeded the 90% data capture target in this quarter. Bournemouth is the one remaining Partisol unit that still needs to be connected to telemetry via a separate mobile phone system, as the existing line is not compatible with the Partisol software.

Casella Stanger has supplied the measured data, undertaken the filter weighing and calculated the particulate concentrations.

Table 2.3 Gravimetric PM₁₀ Data Capture (%) April-June 2005

Site	3-months Data Capture (%) April-June 2005	6-months Data Capture (%) January-June 2005
Bournemouth	97.8	96.7
Brighton Roadside PM ₁₀	97.8	90.6
London Westminster	94.5	92.8
Northampton	96.7	98.3
Dumfries	96.7	97.2
Inverness	97.8	93.9
Wrexham	91.2	87.3
Average	96.1	94.4

2.4 NO_x Converter Efficiencies

The summer 2005 intercalibration exercise identified seven converter failures. This was worse than the previous audit when two converter faults were reported. A summary of all the converter faults and the resulting effect on data quality is given in Table 2.3 below.

Table 2.3 Converter faults identified at the Summer 2005 Intercalibration Exercise (July-September 2005)

Site	Audit date	Converter Efficiency	Resulting Effect on Data Quality
High Muffles	14 Sept 05	109%	Temporary analyser at audit; data from this analyser has been deleted
Manchester Piccadilly	5 July 05	92%	Data rejected 24 Jan-13 July 2005
Manchester South	5 July 05	93%	Data rejected 31 Jan-13 July 2005
Northampton	30 June 05	134%	Data rejected 26 Jan-19 July 2005
Preston	6 Sept 05	91%	Data remains provisional
Redcar	10 Aug 05	91%	Data deleted 9 March-31 July 2005
Wolverhampton	1 Aug 05	94%	None-marginal failure

Recommendations

The ESUs should have already replaced or repaired the faulty converters listed in Table 2.3 during the Summer 2005 service exercise in order to ensure satisfactory performance of the analysers.

The LSOs should continue to pay careful attention to the short-term stability of the NO₂ calibration response and notify CMCU if a declining NO₂ span is recorded during the calibration. (See trouble-shooting section of the LSO manual for further details).

QA/QC Unit has been taking measures to ensure procedures used in the AURN will comply with any CEN requirements before they become mandatory. The finalised CEN standards set a requirement to ensure that the NO_x converter efficiency is better than 98% for type approval and better than 95% in field operation. NO₂ data will have to be rescaled for converter efficiencies between 95-100%, but rejected if below 95%. These are more stringent requirements than currently used where "borderline failures" are accepted. It is, therefore, especially important that the borderline cases also get adequate attention at the service in order to ensure they are set up to operate satisfactorily for the next 6-month period.

Recommendation

We recommend that all NO_x analysers should be set up after service with converters operating at 98% or above. This will help to ensure that the converter efficiency remains at a satisfactory level for the next 6-month period ahead.

In order to ensure consistent procedures are adopted throughout the network, QA/QC Unit have recently developed a NO_x converter efficiency calculator spreadsheet, which can be used by the Equipment Support Units as part of their routine 6-monthly service exercise. The spreadsheet provides instructions for testing converters according to CEN methodology and will calculate and warn of results outside acceptable limits. This converter efficiency calculator will shortly be issued to Equipment Support Units for use in the field.

2.5 Ozone Outliers

Final results showed that 17 out of 87 ozone analysers tested (20%) were identified as outliers during QA/QC Unit's summer 2005 intercalibration exercise (See Table 2.4). This is an improvement the previous winter intercalibration where 27% of the analysers tested were identified as outliers. Where appropriate, the data from these sites have been rescaled accordingly during the ratification process.

Table 2.4 Ozone outliers identified at the winter 2005 intercalibration

Site	Deviation
Barnsley Gawber	-10%
Bury	+7%
Leamington Spa	+17%
Hackney	+20%
London Haringey	-36%
Lewisham	-22%
Derry	+12%
Eskdalemuir	-11%
Narberth	+13%

Site	Deviation
Bolton	+7%
Hull	+9%
Liverpool	+8%
Plymouth	+28%
Hillingdon	-8%
Belfast	+7%
Lough Navar	+18%
Strath Vaich	+12%

2.6 TEOM k_0 and Flow Rates

None of the 67 TEOM instruments tested during the summer 2005 intercalibration were found to be operating with a calibration constant (k_0) outside the acceptable $\pm 2.5\%$ deviation. However, the following three TEOM analysers were also found to be operating outside of the expected flow rates during the audits. These were at:

- Haringey (main and total flows $>-10\%$)
- Northampton TEOM (total $>-10\%$)
- Stockport (main $+20\%$, total -30%)
- Narberth (main $>-10\%$)

The Stockport PM_{10} data have been deleted as a result of the flow problems; however, the data from the other three sites have been retained.

2.7 Auto-Calibration Run-ons

Autocalibration "run-on" is a generic problem affecting many analysers in the network and is due to autocalibration gas leaking into the sampling system during the ambient measurement period immediately after the autocalibration cycle. The problem can be identified by examining the diurnal variation of pollutant concentrations for the individual sites. Invalid measurements (usually between 01:30 and 02:00) have been removed during data ratification. This can be a serious source of data loss resulting in one hour out of twenty four being deleted, which is 4% of the annual data capture. At some sites significantly more data are being lost resulting in data capture below the 90% data capture target for the period.

The ESUs have investigated the autocalibration run-ons at many of the sites and tried different ways to resolve the problem including thorough cleaning of the solenoid valves and installation of permapure driers. In most cases this has improved the situation but it has not always eliminated the problem completely. The 38 sites showing continuing problems with the autocalibration run-on during April to June 2005 are given in Table 2.5. Any autocalibration run-on data that look visibly significant have been deleted from these data sets during ratification. The Reading SO_2 and Sunderland Silksworth ozone problems appear to be caused by the calibration timings being out of sequence.

**Table 2.5 Estimate of Spike or Dip due to Auto-calibration Run-on
(15-minute average) April-June 2005**

NO₂ April to June 1 hour lost unless specified

Aston Hill 0.3 ppb
 Barnsley Gawber 2 ppb
 Belfast Centre 7 ppb
 Billingham 3 ppb
 Birmingham Centre 7 ppb
 Bournemouth 4 ppb
 Bradford 4 ppb May to June
 Brighton Preston Park 7 ppb 2 hours lost
 Bush Estate 1.8 ppb June
 Derry 3 ppb
 Dumfries 4 ppb
 Eskdalemuir 1.6 ppb 2 hours lost
 Exeter Roadside 6 ppb
 Glasgow City Chambers 7 ppb
 Glazebury 4.1 ppb
 Harwell 3.3 ppb 2 hours lost
 Hull Freetown 5 ppb
 Ladybower 3.7 ppb
 Leamington Spa 5 ppb
 London Teddington 3 ppb
 London Westminster 4 ppb
 Lullington Heath 2.1 ppb
 Manchester Town Hall 4 ppb April to May
 Market Harborough 3.4 ppb 2 hours lost
 Middlesbrough 3 ppb
 Narberth 2.5 ppb 2 hours lost
 Norwich Centre 2 ppb
 Norwich Forum Roadside 3 ppb
 Preston 4 ppb
 Reading New Town 5 ppb
 Somerton 0.7 ppb 2 hours lost
 Southampton 4 ppb
 Southend-on-Sea 5 ppb
 St Osyth 2.4 ppb
 Stockport Shaw Heath 2 ppb April to May
 Stoke-on-Trent Centre 4 ppb
 Wirral Tranmere 3 ppb
 Wrexham 4 ppb

Ozone April to June 1 hour lost unless specified

Southend-on-Sea -3 ppb Zero run-on
 Wirral Tranmere -3 ppb Zero run-on

SO₂ April to June 1 hour lost unless specified

Narberth 0.3 ppb

Recommendations

ESU to investigate and minimise effect where possible, especially at sites with large autocalibration run-ons or where data loss is in excess of 1 hour.

QA/QC Unit and CMCU are currently arranging meetings with the Equipment Support Units to discuss the autocalibration run-ons and to identify ways to resolve the problem. Solutions to the problems have been identified in many cases, and the necessary hardware upgrades are being installed either at routine services, or through call-outs.

In the meantime, we recommend that the autocalibration devices be adjusted at the problem sites to reduce the concentration of the span gas. It is strongly advised that NO₂ autocalibration span concentrations of less than 200ppb (urban sites) and 100ppb (rural sites) are used throughout the network.

3 Site Specific Issues

3.1 Redcar

The site at Redcar has shown some variation in calibration results for CO and SO₂ during this quarter. This is due to incorrect calibration gas flow settings during some calibrations, producing poor results. It is of considerable concern that the calibration values for these analysers are so heavily dependent on calibration gas flow. The variation (for CO) is shown in Figure 3.1

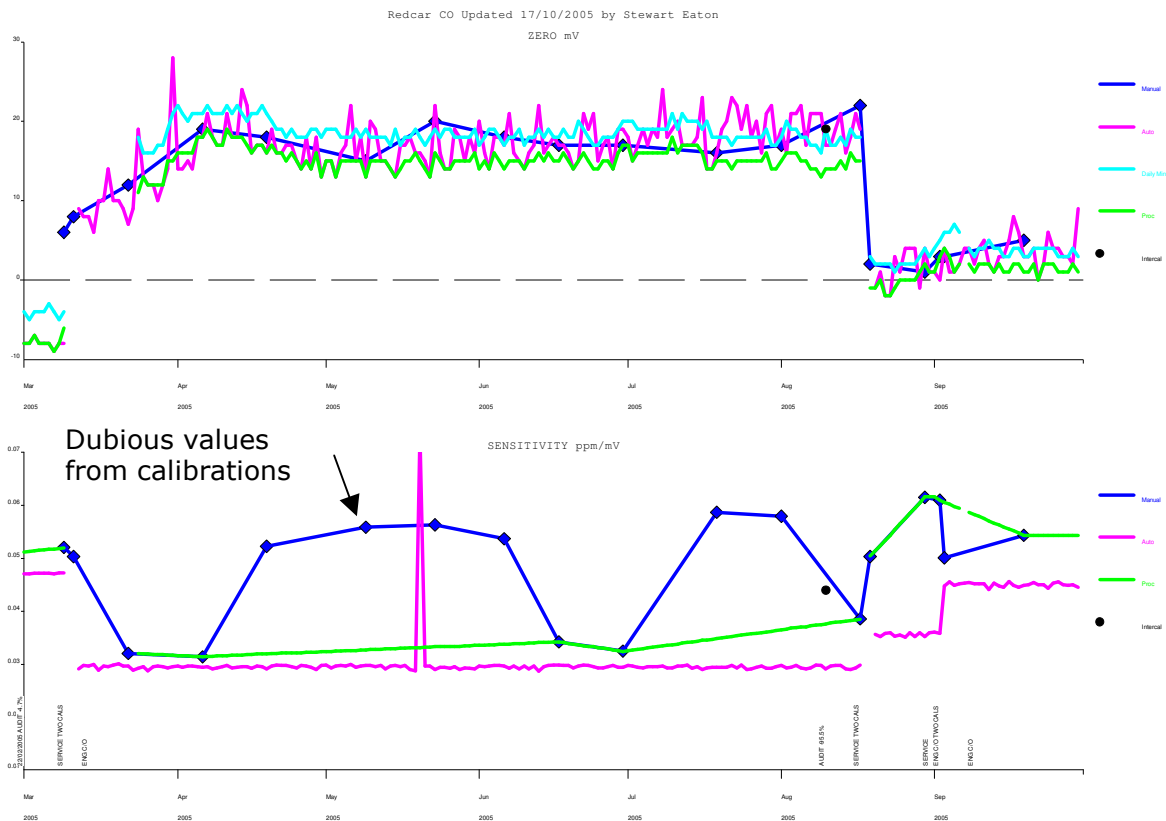


Figure 3.1 Calibration plots for Redcar CO

Recommendation

The ESU have been instructed to check the calibration gas system, and to provide the LSO with guidance on correct gas flowrates

3.2 Bush NO_x

As a result of several instrument faults, the NO_x analyser at Bush was replaced on 16 February, (new converter 17 March), 12 April, 28 September and 5 October. The analyser installed on 12 April was subsequently discovered to leak, and so data were deleted from 20 May to 28 September. This is a critical site for NO₂, and the poor analyser performance, together with frequent replacements (and consequent lack of QA/QC data) have resulted in a substantial loss of data from this site.

Recommendation

The ESU is recommended to pay closer attention to the operational status of the NO_x analyser at this site. More on-site tests would improve the information available to the QA/QC unit for data ratification purposes

3.3 Narberth O₃

The ozone analyser at Narberth showed an unusually low period up to the service on 7 February. At the QA/QC visit in January, the analyser was shown to be 12.8% low; however in July, the analyser was overreading by 13%. Even when rescaled, the ambient data appeared to be unreliable. The QA/QC unit made a special visit to the site to determine the problem, and the ozone analyser was found to have a serious leak. Hence, all data from 21 May 2005 to the service on 26 August have been deleted at this site.

Recommendation

The poor performance of this analyser is cause for considerable concern, and it is strongly recommended that the ozone analyser is replaced as soon as possible, or as a minimum, a duplicate instrument installed to allow data collection to restart at this critical site. It is noted that the ESU has made a significant effort to identify and rectify problems at this site.

This site has now become a fully-funded defra site as of 1 April 2005. The LSO and ESU arrangements remain unchanged.

3.4 Southend-on-Sea PM₁₀

It was noticed by the new ESU that the air conditioning heat exchanger unit on the roof blows air directly at the PM₁₀ inlet. On startup of the air conditioning, a brief period of elevated PM₁₀ concentration can be observed on the analyser; this is sufficiently short-lived so as not to be visible in 15-minute or hourly averaged data. It is likely, however, that the PM₁₀ concentration may be affected by the air being blown through the

exchanger, and so it is recommended that the air conditioning unit be repositioned so that the air flow does not compromise the PM₁₀ sampling.

Southend-on-Sea is a relatively unusual installation and it is not thought this problem exists at other sites.

Recommendation

It is recommended that the air conditioning equipment on the roof be relocated so the PM₁₀ inlet is no longer adversely affected.

3.5 Other Analysers Highlighted in Recent Reports

Several analysers have been highlighted recently as being of concern to the QA/QC unit. An update is given in Table 3.1

Table 3.1 Status of Analysers Highlighted in Previous Reports

Site	Analyser	Fault	Current status
Manchester Piccadilly Manchester South Stoke-on-Trent	SO ₂	High noise	A hardware upgrade for these analysers has been identified, and appears to improve data. The ESU has instigated a rolling programme to upgrade analysers. The situation will be closely monitored.
Salford Eccles	All channels	Autocalcs causing logger to lock up	The autocalcs have been reinstated and the fault has not recurred.
Various	Rural ozone analysers	Temporary instruments installed which have no autocalcs	Awaiting progress

Recommendation

QA/QC Unit would like to seek clarification from the Equipment Support Unit/manufacturer as to the current situation regarding the reason for the problems and what plans are in place to resolve them. We recommend that immediate attention is given to this issue as the majority of these instruments are located at critical sites.

3.6 Analyser Status

It is noted that the API analysers at Dumfries, Inverness and Wrexham are logged using external loggers rather than the internal logging system. This prevents direct connection to the analysers from outside, so the instrument status may not be checked. The ability to directly access the analyser diagnostics may prevent wasted effort on behalf of the ESU and therefore minimise analyser downtime in the event of malfunction.

Recommendation

It is recommended that the external loggers be replaced with RS232 switches so as to allow remote diagnosis.

3.7 Building Works at Sites

The QA/QC unit frequently receive reports of building or other works close to monitoring sites, which may produce unrepresentative pollutant levels for a short period of time. This is particularly relevant for PM₁₀ and PM_{2.5}.

For the period 1 April-30 June, reports of such local works have been received for the following sites:

- Leeds
- Middlesbrough
- Nottingham

Building work is also anticipated at Cwmbran and Stockport Shaw Heath.

4 Sites with Data Capture Below 90%

4.1 Sites with Low Data Capture

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-June 2005 (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 2005
(Using the start date of any new site or end date of site closed)

01/04/2005 to 30/06/2005 Gaps in 15-minute table >= 6 hours and data capture <= 90%

Pollutant	Data Capture	Data Start date	Data End date	Reason	Comments	No of days	No of hrs
England							
Barnsley Gawber							
CO	50%	03-Apr-05	03-Apr-05	No mV data collected	No data after the autocal	0.3	6
		25-Apr-05	27-May-05	High noise	High noise and instability	32.6	783
NO2	81%	03-Apr-05	03-Apr-05	Unstable response		0.3	6
		04-May-05	05-May-05	Unstable response		1.2	29
		08-May-05	17-May-05	Unstable response		10	240
		29-May-05	01-Jun-05	Unstable response		2.6	63
Bath Roadside							
CO	80%	27-Apr-05	15-May-05	Switched out-of-Service	ENG C/O Site relocation	18.3	440
NO2	79%	27-Apr-05	15-May-05	Switched out-of-Service	ENG C/O Site relocation	18.3	440
Birmingham Centre							
CO	79%	28-Mar-05	15-Apr-05	Instrument fault	Source fault	18	433

		14-May-05	14-May-05	Communication fault		0.7	16
		20-May-05	23-May-05	Power cut		2.5	61
		25-May-05	26-May-05	Power cut		0.5	13
		07-Jun-05	08-Jun-05	Power cut		0.6	14
NO2	77%	28-Mar-05	13-Apr-05	Instrument fault	PMT fault	16.5	397
		14-May-05	14-May-05	Power cut		0.7	17
		20-May-05	23-May-05	Power cut		2.5	61
		25-May-05	26-May-05	Power cut		0.5	13
		07-Jun-05	08-Jun-05	Power cut		0.6	14
SO2	90%	28-Mar-05	01-Apr-05	ESU Service	Service 6 Monthly Service Visit. Powercuts during Service.	4.4	106
		06-Apr-05	07-Apr-05	ESU Service		1.1	27
		09-Apr-05	11-Apr-05	ESU Service		2	49
		13-Apr-05	13-Apr-05	ESU Service		0.5	13
		14-May-05	14-May-05	Power cut		0.7	16
		20-May-05	23-May-05	Power cut		2.5	61
		25-May-05	26-May-05	Power cut		0.6	15
		07-Jun-05	08-Jun-05	Power cut		0.6	14
Bradford Centre							
NO2	82%	29-Mar-05	02-Apr-05	Instrument fault	Step change in response	4	95
		09-Apr-05	13-Apr-05	Rapid zero or sensitivity drift	Zero drift after power cut	4.5	108
		23-Apr-05	25-Apr-05	Power cut	LSO C/O Road works have cut site power cable	2.6	63
		16-May-05	20-May-05	Instrument fault	faulty flow sensor	4.1	98
		29-May-05	29-May-05	Communication fault	Site comms problems	0.5	12
Brentford Roadside							
CO	52%	21-Mar-05	14-May-05	Instrument fault	Unstable baseline	54	1297
Bury Roadside							
NO2	84%	17-Apr-05	29-Apr-05	Instrument fault	Flow problem after Service	12.8	306
		28-May-05	28-May-05	Monitoring suspended	power cut	0.8	20
SO2	78%	28-May-05	06-Jun-05	Instrument fault	ENG C/O faulty lamp PCB troubles after a power cut.	9	216
		20-Jun-05	06-Jul-05	Rapid zero or sensitivity drift	PMT wiring fault.	16.4	394
Canterbury							
NO2	85%	08-Apr-05	21-Apr-05	Sampling fault	Unusually high data between 2 calibrations	13	313
Exeter Roadside							
NO2	52%	05-Apr-05	16-May-05	Sampling fault	Pump fault & ozone gen fault	41.2	989
High Muffles							
NO2	86%	06-Apr-05	07-Apr-05	ESU Service	Service	1.1	26
		19-Jun-05	02-Jul-05	Instrument fault	Analyser offscale	12.9	309
Hull Freetown							

CO	24%	22-Apr-05	26-Aug-05	Air Conditioning or Temperature fault	Air conditioning had been turned off	126	3032
SO2	71%	01-Apr-05	04-Apr-05	ESU Service	Service	3.5	83
		09-Jun-05	31-Jul-05	Unstable response	Unstable baseline	53	1272
Ladybower							
NO2	85%	06-Apr-05	07-Apr-05	ESU Service	Service	1.2	28
		19-Jun-05	28-Jun-05	Power cut	Suspected lightning strike	8.9	213
SO2	88%	06-Apr-05	07-Apr-05	ESU Service	Service	1.2	28
		12-Jun-05	16-Jun-05	Pump fault	ENG C/O Fitted a new pump	4.5	107
		19-Jun-05	24-Jun-05	Power cut	ENG C/O Had internal temp problem after thunderstorm	4.8	115
Leeds Centre							
PM10	54%	15-Feb-05	12-May-05	Switched out-of-Service	ENG C/O Site decommissioned. Horiba instrument will be installed	86	2064
London Bloomsbury							
CO	77%	27-May-05	06-Jun-05	Power cut	air con tripped power	10	239
		18-Jun-05	28-Jun-05	Power cut	air con tripped power	10	241
		30-Jun-05	01-Jul-05	Air Conditioning or Temp fault	ENG C/O AC fault. Site had tripped out.	0.6	14
NO2	83%	27-May-05	31-May-05	Power cut	air con tripped power	4.1	98
		18-Jun-05	28-Jun-05	Power cut	air con tripped power	10	241
		30-Jun-05	01-Jul-05	Air Conditioning or Temp fault	ENG C/O AC fault. Site had tripped out.	0.6	14
O3	81%	26-May-05	31-May-05	Power cut	air con tripped power	4.9	118
		17-Jun-05	28-Jun-05	Power cut	air con tripped power	11	263
		30-Jun-05	01-Jul-05	Power cut	ENG C/O AC fault. Site had tripped out.	0.6	14
PM10	84%	27-May-05	31-May-05	Power cut	air con tripped power	4	97
		18-Jun-05	28-Jun-05	Power cut	air con tripped power	10	241
		30-Jun-05	01-Jul-05	Power cut	ENG C/O AC fault. Site had tripped out.	0.5	12
PM25	84%	27-May-05	31-May-05	Power cut	air con tripped power	4.1	98
		18-Jun-05	28-Jun-05	Power cut	air con tripped power	10.1	243
		30-Jun-05	01-Jul-05	Power cut	ENG C/O AC fault. Site had tripped out.	0.5	12
SO2	82%	25-May-05	31-May-05	Instrument fault	Baseline skipped	5.9	142
		18-Jun-05	28-Jun-05	Power cut	air con tripped power	10	241
		30-Jun-05	01-Jul-05	Power cut	ENG C/O AC fault. Site had tripped out.	0.6	14
London Brent							
CO	29%	27-Apr-05	31-Jul-05	Instrument fault	Sticking valve	95.7	2297
NO2	84%	17-May-05	31-May-05	Instrument fault	Molycon failure.	14	336
London Bromley							
CO	88%	20-Jun-05	23-Sep-05		ENG C/O Fixed logger bootup fault	95.7	2297
		20-Jun-05	03-Aug-05	Instrument fault	Instrument dead. Removed from site	44.8	1074
London Eltham							
NO2	87%	25-Apr-05	05-May-05	Instrument fault	Pressure fault.	9.2	221

PM10	48%	15-Apr-05	01-Jun-05	High noise	ENG C/O Amplifier board calibrated.	47.3	1134
London Hackney							
CO	27%	25-Apr-05	30-Jun-05	Instrument fault	Call out: unresponsive since reconfiguration	66.4	1593
London Harlington							
PM10	86%	21-May-05	01-Jun-05	Unstable response	Spurious data following data gap; improves after filter change.	11.5	276
London Hillingdon							
CO	80%	25-Apr-05	05-May-05	Pump fault	ENG C/O replaced pump.	10.4	249
		27-May-05	03-Jun-05	Air Conditioning or Temp fault	ENG C/O Air con repair	7	169
O3	90%	03-May-05	05-May-05	Sampling fault	ENG C/O Sample pump replaced	1.8	42
		27-May-05	03-Jun-05	Air Conditioning or Temp fault	ENG C/O Air con repair	7	167
London Teddington							
NO2	81%	19-Apr-05	20-Apr-05	ESU Service	Service	1.2	28
		13-May-05	25-May-05	Instrument fault	Chopper fault.	12.6	302
London Westminster							
CO	57%	23-May-05	31-Jul-05	High noise	mV data drifting + step change and noisy.	70	1679
NO2	73%	10-Jun-05	01-Aug-05	Instrument fault	PMT valve and pump fault.	52.5	1259
Lullington Heath							
NO2	75%	23-Mar-05	12-Apr-05	Flat response	NO ch. output low after LSO cal until eng visit.	20	480
		20-May-05	21-May-05	Flat response	Flat NO signal	0.9	21
		26-May-05	26-May-05	Flat response	Flat NO signal	0.4	9
		24-Jun-05	30-Jun-05	Flat response	Spurious data	6.5	157
Manchester Piccadilly							
NO2	0%	24-Jan-05	13-Jul-05	NO2 converter fault	Converter 92% at audit	170	4078
Manchester South							
NO2	0%	31-Jan-05	13-Jul-05	NO2 converter fault	Converter 92% at audit	163	3909
Middlesbrough							
NO2	90%	18-May-05	23-May-05	Monitoring suspended	ENG C/O Decommission site for relocation	5.2	124
Northampton							
NO2	0%	26-Jan-05	19-Jul-05	NO2 converter fault	NOx switching valve fault	174	4180
Norwich Centre							
NO2	55%	29-Apr-05	31-May-05	Logger fault	Electronics fault	33	791
		25-Jun-05	06-Jul-05	Unstable response	Drifting response	11.1	266
Nottingham Centre							

CO	80%	23-Mar-05	04-Apr-05	Instrument fault	Noisy	12.1	291
		17-Jun-05	04-Jul-05	Instrument fault	CO Analyser fault- factory rework	17.1	410
NO2	85%	18-Jun-05	06-Jul-05	Air Conditioning or Temp fault	Analysers signal affected by site temperature	18.5	443
SO2	86%	18-Jun-05	07-Jul-05	ESU Service		18.8	452
Oxford Centre Roadside							
CO	86%	04-Apr-05	13-Apr-05	Instrument fault	ENG C/O CO Converter temperature fault	9.1	219
		25-Apr-05	26-Apr-05	No mV data collected	No data collected	1.3	32
		12-May-05	13-May-05	No mV data collected	No data collected	0.9	22
		29-Jun-05	30-Jun-05	No mV data collected	No data collected	1	23
Preston							
CO	83%	10-Mar-05	14-Apr-05	Pump fault	Replaced pump at Service.	35.4	850
		29-Jun-05	01-Aug-05	High noise	Very noisy signal	33.4	802
Reading New Town							
CO	42%	23-Mar-05	15-Apr-05	Instrument fault	Three way valve fitted.	24	575
		28-Apr-05	28-Apr-05	High noise	ENG C/O Cal. post	0.4	9
		25-May-05	06-Jul-05	High noise	Very noisy	42	1008
SO2	14%	04-Apr-05	08-Apr-05	ESU Service		4.2	101
		18-Apr-05	12-Jul-05	Unstable response	Data unstable	85	2041
Redcar							
NO2	0%	09-Mar-05	19-Aug-05	NO2 converter fault	Low converter (91%)	163	3918
O3	76%	09-Mar-05	22-Apr-05	Instrument fault	Problem with 3-Way Z/S valve following Service	44.5	1067
PM10	89%	03-Apr-05	03-Apr-05	Instrument fault		0.3	6
		17-Apr-05	18-Apr-05	Instrument fault		0.5	12
		21-Apr-05	22-Apr-05	Instrument fault	ENG C/O TEOM "F" status code displayed. Cleared filter blockage	0.7	17
		13-Jun-05	21-Jun-05	Instrument fault	ENG C/O Investigate filter fault	8	192
Rotherham Centre							
O3	90%	16-Apr-05	19-Apr-05	Logger fault	logger problem	2.8	67
		07-May-05	11-May-05	Logger fault	ENG C/O hot swop logger fitted - faulty switch replaced	4.8	115
		17-Jun-05	17-Jun-05	Communication fault	comms problem	0.6	15
SO2	0%	01-Jan-05	30-Jun-05	Unstable response	Cyclic response temp related	181	4344
Salford Eccles							
NO2	87%	27-Apr-05	27-Apr-05	No mV data collected		0.3	7
		18-Jun-05	28-Jun-05	Unstable response	Spurious data up to calibration on 28 June	10.4	250
Scunthorpe Town							
SO2	89%	02-Apr-05	11-Apr-05	Unstable response	Kicker fault	8.5	204
		19-May-05	19-May-05	Unstable response	Unstable data: new lamp fitted	0.4	10
Sibton							
O3	83%	08-May-05	10-May-05	Unstable response	Call out: Intermittent fault giving flat data	1.3	32

		24-May-05	07-Jun-05	Unstable response	Spurious data	13.7	329
		29-Jun-05	30-Jun-05	Power cut		0.4	10
Somerton							
NO2	90%	01-Apr-05	02-Apr-05	Power cut		1.1	26
		16-Apr-05	16-Apr-05	Power cut		0.5	12
		18-Jun-05	18-Jun-05	Power cut		0.7	17
Southend-on-Sea							
NO2	89%	25-Jun-05	11-Jul-05	Instrument removed for repair	ESU decommissioned equipment	16.8	402
Stockport Shaw Heath							
CO	41%	14-Apr-05	07-Jun-05	Unstable response	unstable data due to chopper fault	54.1	1299
NO2	82%	31-Mar-05	14-Apr-05	Spurious data	Period of spurious high NO2	14	336
PM10	0%	26-Jan-05	19-Aug-05	Low flow rate	Rejected 26/1-18/8 -low flow at Audit 7/7	205	4920
Stoke-on-Trent Centre							
CO	90%	22-Jun-05	05-Jul-05	Instrument fault	Noise after repair	13.5	325
SO2	7%	01-Jan-05	24-Jun-05	Instrument fault	Unacceptable zero baseline drift.	175	4188
Sunderland Silksworth							
NO2	80%	26-Mar-05	07-Apr-05	Power cut		11.8	283
		03-May-05	10-May-05	Power cut		6.8	163
		20-May-05	24-May-05	Power cut		3.7	88
		04-Jun-05	04-Jun-05	Power cut		0.3	6
O3	68%	26-Mar-05	18-Apr-05	Instrument fault	IZS causing data loss	22.8	548
		03-May-05	10-May-05	Power cut		6.8	163
		20-May-05	24-May-05	Power cut		3.7	88
		04-Jun-05	04-Jun-05	Power cut		0.3	6
West London							
CO	86%	25-Apr-05	26-Apr-05	ESU Service		1.1	27
		05-May-05	16-May-05	Temperature fault	Overheating	11.5	277
NO2	87%	25-Apr-05	26-Apr-05	ESU Service		1.1	27
		20-Jun-05	01-Jul-05	Instrument removed for repair	heat sink compound fault	11.2	268
Wirral Tranmere							
CO	80%	11-Apr-05	29-Apr-05	Pump fault	Drift after Service flow variations.	18	431
PM10	81%	11-Apr-05	13-Apr-05	ESU Service	Service Nox solenoid valves replaced (autocal run on problem)	2.5	59
		23-May-05	06-Jun-05	Pump fault	Spurious data	14.5	348
SO2	78%	11-Apr-05	01-May-05	Instrument fault	Service & Analyser problems	19.6	471
N Ireland							
Belfast Centre							
CO	90%	05-May-05	14-May-05	Logger fault	ENG C/O Replaced faulty Odessa logger	8.5	205
NO2	82%	03-Apr-05	06-Apr-05	Pump fault	Pump was diconnected	3.6	86
		05-May-05	14-May-05	Logger fault	ENG C/O Replaced faulty Odessa	8.6	207

				logger		
O3	88%	05-May-05 16-May-05	Logger fault	ENG C/O Replaced faulty Odessa logger	10.5	252
PM10	89%	07-Apr-05 07-Apr-05	No mV data		0.5	11
		05-May-05 14-May-05	Logger fault	ENG C/O Replaced faulty Odessa logger	8.5	204
SO2	88%	05-May-05 16-May-05	Logger fault	ENG C/O Replaced faulty Odessa logger	10.5	252
Scotland						
Bush Estate						
NO2	40%	16-Feb-05 12-Apr-05	Instrument fault	Cooler failure	55.1	1322
		18-Apr-05 19-Apr-05	Switched out-of-Service	Site left out of service after calibration	1	24
		20-May-05 30-Sep-05	High noise	Noisy response-analyser leak	134	3206
Strath Vaich						
O3	79%	03-May-05 05-May-05	ESU Service	Service	2	48
		22-May-05 08-Jun-05	Communication fault	ENG C/O Fixed comms	16.5	395
Wales						
Cardiff Centre						
CO	42%	09-May-05 27-Sep-05	Switched out-of-Service	Site removed for refurbishment	141	3390
NO2	42%	09-May-05 30-Sep-05	Switched out-of-Service		144	3460
O3	42%	09-May-05 27-Sep-05	Switched out-of-Service		141	3391
PM10	42%	01-Jan-05 29-Sep-05	Switched out-of-Service		272	6528
SO2	42%	09-May-05 27-Sep-05	Switched out-of-Service		141	3386
Narberth						
O3	54%	25-Apr-05 26-Apr-05	Instrument fault	ENG C/O	1.2	28
		21-May-05 26-Aug-05	Instrument fault	Continuing problem with analyser flow	97.2	2333
Port Talbot						
SO2	83%	24-May-05 24-May-05	Communication fault	Possible power cut	0.4	9
		08-Jun-05 08-Jun-05	Communication fault	no data collected	0.3	8
		09-Jun-05 09-Jun-05	Communication fault	No data collected	0.3	8
		13-Jun-05 27-Jun-05	Instrument removed for repair		14.2	341
Swansea						
NO2	88%	11-Apr-05 11-Apr-05	Power cut		0.4	10
		03-May-05 09-May-05	Power cut		5.8	140
		19-Jun-05 22-Jun-05	Power cut		3.5	83
		29-Jun-05 29-Jun-05	Power cut		0.4	10

Eng C/O-Engineer call-out
LSO C/O-LSO call-out

5 Ratified Data Capture Statistics

Table 5.1 provides the ratified data capture figures for each site for the 3-month period April-June 2005. Data capture values below 90% are shown in the shaded boxes.

Table 5.1 Ratified Network Data Statistics April to June 2005
(Using the start date of any new site or end date of site closed)

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	PM ₂₅	SO ₂	Site Average
England								
Barnsley 12	DEFRA	-	-	-	-	-	99.4	99.4
Barnsley Gawber	Affiliate	50.0	81.0	97.0	-	-	90.4	79.6
Bath Roadside	Affiliate	79.5	79.3	-	-	-	-	79.4
Billingham	DEFRA	-	96.8	-	-	-	-	96.8
Birmingham Centre	DEFRA	79.1	77.4	90.2	90.2	-	89.8	85.3
Birmingham Tyburn	Affiliate	99.4	99.3	99.4	98.9	-	99.4	99.3
Blackpool Marton	DEFRA	91.9	92.4	91.9	96.3	-	92.2	92.2
Bolton	Affiliate	98.9	98.9	98.9	98.8	-	98.9	98.9
Bottesford	Affiliate	-	-	98.4	-	-	-	98.4
Bournemouth	Affiliate	99.7	95.5	99.8	-	-	99.7	98.7
Bradford Centre	DEFRA	95.3	81.7	95.8	95.1	-	95.6	92.7
Brentford Roadside	Affiliate	52.2	99.2	-	-	-	-	75.7
Brighton Preston Park	DEFRA	-	93.0	98.5	-	-	-	95.7
Brighton Roadside	Affiliate	98.8	98.8	-	-	-	-	98.8
Bristol Centre	DEFRA	99.4	99.5	99.6	99.2	-	99.1	99.4
Bristol Old Market	Affiliate	99.9	99.5	-	-	-	-	99.7
Bury Roadside	Affiliate	92.8	84.3	98.4	98.3	-	77.7	90.3
Cambridge Roadside	Affiliate	-	99.8	-	-	-	-	99.8
Camden Kerbside	Affiliate	-	95.5	-	99.6	-	-	97.5
Canterbury	Affiliate	-	85.4	-	99.8	-	-	92.6
Coventry Memorial Park	DEFRA	99.5	99.4	99.3	99.6	-	99.5	99.4
Exeter Roadside	Affiliate	91.9	52.0	99.4	-	-	99.5	85.7
Glazebury	DEFRA	-	95.4	99.7	-	-	-	97.6
Great Dun Fell	DEFRA	-	-	99.5	-	-	-	99.5
Haringey Roadside	Affiliate	-	97.8	-	93.5	-	-	95.7
Harwell	DEFRA	-	93.3	98.9	99.7	99.7	98.9	98.1
High Muffles	DEFRA	-	86.0	95.1	-	-	-	90.6
Hove Roadside	Affiliate	99.6	99.3	-	-	-	92.2	97.0
Hull Freetown	DEFRA	23.6	91.9	99.4	98.9	-	71.3	77.0
Ladybower	DEFRA	-	84.8	92.9	-	-	88.1	88.6
Leamington Spa	Affiliate	98.5	94.4	97.6	98.4	-	98.5	97.5
Leeds Centre	DEFRA	98.9	95.8	99.0	54.4	-	99.2	89.5
Leicester Centre	DEFRA	99.0	98.9	99.0	99.0	-	98.9	99.0
Liverpool Speke	Affiliate	97.2	97.0	97.1	96.9	-	97.1	97.1
London A3 Roadside	DEFRA	99.3	99.1	-	99.1	-	-	99.2
London Bexley	Affiliate	97.8	95.3	100.0	94.0	-	99.0	97.2
London Bloomsbury	DEFRA	77.3	83.1	81.4	84.0	83.7	81.5	81.8
London Brent	Affiliate	28.8	83.8	99.7	99.3	-	99.6	82.2
London Bromley	Affiliate	87.7	90.2	-	-	-	-	88.9
London Cromwell Road 2	DEFRA	99.3	99.3	-	-	-	99.3	99.3
London Eltham	Affiliate	-	87.3	97.1	47.7	-	97.7	82.4
London Hackney	Affiliate	27.0	97.9	96.3	-	-	-	73.7
London Haringey	Affiliate	-	-	99.7	-	-	-	99.7

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	PM ₂₅	SO ₂	Site Average
London Harlington	Affiliate	98.2	98.3	98.4	86.4	-	-	95.3
London Hillingdon	DEFRA	80.2	91.3	89.9	91.2	-	91.5	88.8
London Lewisham	Affiliate	-	98.6	99.7	-	-	92.3	96.9
London Marylebone Road	Affiliate	99.6	99.3	99.6	99.2	98.9	98.9	99.3
London N. Kensington	Affiliate	99.5	99.5	93.0	99.4	-	99.4	98.1
London Southwark	Affiliate	99.2	99.6	99.6	-	-	99.7	99.5
London Teddington	Affiliate	-	80.9	98.5	-	-	98.3	92.6
London Wandsworth	Affiliate	-	99.2	92.0	-	-	-	95.6
London Westminster	DEFRA	57.0	73.4	99.5	-	-	98.4	82.1
Lullington Heath	DEFRA	-	74.5	98.2	-	-	96.2	89.6
Manchester Piccadilly	DEFRA	98.7	0.0	98.6	98.7	-	98.8	78.9
Manchester South	Affiliate	-	0.0	99.3	-	-	0.0	33.1
Manchester Town Hall	DEFRA	99.1	96.7	-	-	-	-	97.9
Market Harbourough	DEFRA	99.4	94.0	99.5	-	-	-	97.6
Middlesbrough	Affiliate	91.3	90.0	94.0	92.8	-	93.9	92.4
Newcastle Centre	DEFRA	99.5	99.4	99.4	99.5	-	93.4	98.2
Northampton	Affiliate	99.7	0.0	99.1	99.5	-	99.6	79.6
Norwich Centre	DEFRA	97.3	54.7	97.3	97.3	-	97.3	88.8
Norwich Forum Roadside	Affiliate	-	93.7	-	-	-	-	93.7
Nottingham Centre	DEFRA	80.4	85.0	99.3	99.0	-	86.1	90.0
Oxford Centre Roadside	Affiliate	85.9	94.0	-	-	-	97.1	92.3
Plymouth Centre	DEFRA	99.5	99.3	99.6	96.8	-	99.6	99.0
Portsmouth	Affiliate	99.6	99.7	99.7	99.8	-	99.7	99.7
Preston	DEFRA	82.8	90.1	96.6	96.7	-	96.9	92.6
Reading New Town	DEFRA	41.8	90.6	95.0	94.6	-	13.8	67.2
Redcar	Affiliate	99.5	0.0	76.2	89.3	-	99.8	73.0
Rochester	Affiliate	-	99.7	99.6	97.4	99.9	93.5	98.0
Rotherham Centre	Affiliate	-	90.3	89.6	-	-	0.0	60.0
Salford Eccles	Affiliate	96.8	86.6	96.9	96.3	-	96.8	94.7
Sandwell West Bromwich	Affiliate	99.4	99.6	99.6	-	-	99.7	99.6
Scunthorpe Town	Affiliate	-	-	-	98.7	-	89.3	94.0
Sheffield Centre	DEFRA	99.6	99.6	99.4	99.5	-	99.6	99.5
Sheffield Tinsley	DEFRA	99.7	99.5	-	-	-	-	99.6
Sibton	DEFRA	-	-	82.6	-	-	-	82.6
Somerton	Affiliate	-	89.7	96.6	-	-	-	93.2
Southampton Centre	DEFRA	99.6	91.7	99.6	98.4	-	99.5	97.8
Southend-on-Sea	DEFRA	95.3	88.9	91.5	95.1	-	91.8	92.5
Southwark Roadside	Affiliate	90.0	99.4	-	-	-	99.5	96.3
St Osyth	DEFRA	94.1	95.1	99.3	-	-	-	96.2
Stockport Shaw Heath	Affiliate	40.5	82.2	-	0.0	-	100.0	55.7
Stockton-on-Tees Yarm	Affiliate	99.8	99.6	-	99.7	-	-	99.7
Stoke-on-Trent Centre	DEFRA	89.6	94.5	98.8	98.5	-	7.1	77.7
Sunderland	DEFRA	-	-	-	-	-	99.0	99.0
Sunderland Silksworth	Affiliate	-	80.4	68.2	-	-	-	74.3
Thurrock	Affiliate	99.5	93.5	99.3	98.3	-	99.2	97.9
Tower Hamlets Roadside	Affiliate	98.9	99.7	-	-	-	-	99.3
Walsall Alumwell	DEFRA	-	99.9	-	-	-	-	99.9
Walsall Willenhall	Affiliate	-	96.4	-	-	-	-	96.4
West London	DEFRA	85.6	86.5	-	-	-	-	86.1
Weybourne	Affiliate	-	-	97.3	-	-	-	97.3
Wicken Fen	DEFRA	-	99.6	99.5	-	-	91.4	96.9
Wigan Centre	Affiliate	98.8	99.4	98.7	98.9	-	99.3	99.0
Wirral Tranmere	DEFRA	79.9	91.7	93.3	80.7	-	78.0	84.7
Wolverhampton Centre	DEFRA	98.7	97.5	98.7	99.1	-	98.7	98.5
Yarner Wood	DEFRA	-	99.6	98.2	-	-	-	98.9
N Ireland								

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	PM ₂₅	SO ₂	Site Average
Belfast Centre	DEFRA	89.7	81.8	87.6	89.0	-	87.6	87.1
Belfast Clara St	Affiliate	-	-	-	100.0	-	-	100.0
Belfast East	DEFRA	-	-	-	-	-	99.8	99.8
Derry	Affiliate	97.2	93.9	97.7	97.1	-	97.5	96.7
Lough Navar	DEFRA	-	-	99.9	99.4	-	-	99.6
Scotland								
Aberdeen	Affiliate	97.9	97.9	97.8	97.5	-	97.7	97.8
Bush Estate	DEFRA	-	40.2	97.2	-	-	-	68.7
Dumfries	DEFRA	99.1	95.0	-	-	-	-	97.0
Edinburgh St Leonards	DEFRA	99.7	98.9	94.0	97.6	-	99.5	97.9
Eskdalemuir	DEFRA	-	92.6	98.7	-	-	-	95.6
Glasgow Centre	DEFRA	98.3	99.3	94.5	99.7	-	96.6	97.7
Glasgow City Chambers	DEFRA	97.3	92.1	-	-	-	-	94.7
Glasgow Kerbside	DEFRA	96.7	97.7	-	95.9	-	-	96.8
Grangemouth	Affiliate	99.5	98.8	-	99.5	-	99.3	99.2
Inverness	DEFRA	98.4	98.6	-	-	-	-	98.5
Lerwick	DEFRA	-	-	95.3	-	-	-	95.3
Strath Vaich	DEFRA	-	-	79.4	-	-	-	79.4
Wales								
Aston Hill	DEFRA	-	94.1	98.2	-	-	-	96.2
Cardiff Centre	DEFRA	41.9	41.9	42.0	42.0	-	41.8	42.0
Cwmbran	Affiliate	0.0	99.9	100.0	99.7	-	98.6	79.6
Narberth	Affiliate	-	93.2	53.7	98.4	-	94.6	85.0
Port Talbot	Affiliate	-	98.8	95.6	96.5	-	82.5	93.3
Swansea	Affiliate	98.4	87.5	98.6	98.4	-	98.4	96.3
Wrexham	DEFRA	98.7	94.5	-	-	-	98.7	97.3
Number of sites		79	109	87	64	4	76	122
Number of sites < 90%		22	32	10	9	1	16	37
Network Mean (%)		88.0	88.4	95.1	93.0	95.6	88.9	91

Table 5.2 provides the ratified data capture figures for each site for the 6-month period January-June 2005.

Table 5.2 Ratified Network Data Statistics January to June 2005
(Using the start date of any new site or end date of site closed)

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	PM ₂₅	SO ₂	Site Average
England								
Barnsley 12	DEFRA	-	-	-	-	-	98.4	98.4
Barnsley Gawber	Affiliate	70.3	74.5	96.8	-	-	93.7	83.8
Bath Roadside	Affiliate	88.7	88.6	-	-	-	-	88.7
Billingham	DEFRA	-	96.8	-	-	-	-	96.8
Birmingham Centre	DEFRA	84.9	81.3	90.9	91.1	-	90.7	87.8
Birmingham Tyburn	Affiliate	99.4	99.3	99.4	99.2	-	99.4	99.3
Blackpool Marton	DEFRA	91.9	92.4	91.9	96.3	-	92.2	92.9
Bolton	Affiliate	98.1	98.1	98.1	98.0	-	98.2	98.1
Bottesford	Affiliate	-	-	99.0	-	-	-	99.0
Bournemouth	Affiliate	98.3	94.1	98.3	-	-	98.3	97.2
Bradford Centre	DEFRA	88.5	85.5	94.3	95.0	-	94.9	91.6

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	PM ₂₅	SO ₂	Site Average
Brentford Roadside	Affiliate	69.7	99.4	-	-	-	-	84.5
Brighton Preston Park	DEFRA	-	95.9	98.4	-	-	-	97.2
Brighton Roadside	Affiliate	91.9	98.8	-	-	-	-	95.3
Bristol Centre	DEFRA	98.0	97.9	98.1	97.7	-	97.5	97.8
Bristol Old Market	Affiliate	99.2	98.9	-	-	-	-	99.1
Bury Roadside	Affiliate	73.9	86.9	95.3	95.4	-	84.8	87.3
Cambridge Roadside	Affiliate	-	95.8	-	-	-	-	95.8
Camden Kerbside	Affiliate	-	92.5	-	99.5	-	-	96.0
Canterbury	Affiliate	-	91.8	-	99.1	-	-	95.4
Coventry Memorial Park	DEFRA	98.8	98.9	98.7	99.0	-	98.8	98.8
Exeter Roadside	Affiliate	90.5	72.7	98.6	-	-	98.7	90.1
Glazebury	DEFRA	-	94.8	99.0	-	-	-	96.9
Great Dun Fell	DEFRA	-	-	98.9	-	-	-	98.9
Haringey Roadside	Affiliate	-	95.4	-	91.7	-	-	93.6
Harwell	DEFRA	-	90.2	97.1	97.9	97.7	97.1	96.0
High Muffles	DEFRA	-	82.9	88.3	-	-	-	85.6
Hove Roadside	Affiliate	98.0	95.1	-	-	-	94.3	95.8
Hull Freetown	DEFRA	60.0	94.4	98.2	97.5	-	83.8	86.8
Ladybower	DEFRA	-	87.5	95.0	-	-	93.3	91.9
Leamington Spa	Affiliate	98.1	94.0	94.6	98.3	-	98.2	96.6
Leeds Centre	DEFRA	85.4	84.9	86.4	52.2	-	86.6	79.1
Leicester Centre	DEFRA	97.7	98.0	97.9	97.8	-	98.0	97.9
Liverpool Speke	Affiliate	98.3	98.1	98.2	98.0	-	98.2	98.2
London A3 Roadside	DEFRA	98.2	98.1	-	98.1	-	-	98.1
London Bexley	Affiliate	95.8	96.3	97.1	95.6	-	97.6	96.5
London Bloomsbury	DEFRA	87.1	89.8	89.1	90.5	90.3	89.2	89.3
London Brent	Affiliate	28.0	83.6	95.1	98.6	-	96.2	80.3
London Bromley	Affiliate	93.5	94.2	-	-	-	-	93.8
London Cromwell Road 2	DEFRA	96.5	98.6	-	-	-	98.6	97.9
London Eltham	Affiliate	-	89.8	98.1	66.8	-	98.3	88.2
London Hackney	Affiliate	63.0	98.5	97.4	-	-	-	86.3
London Haringey	Affiliate	-	-	99.7	-	-	-	99.7
London Harlington	Affiliate	98.9	98.9	99.0	92.7	-	-	97.4
London Hillingdon	DEFRA	88.5	94.1	86.7	94.2	-	94.2	91.5
London Lewisham	Affiliate	-	99.0	99.6	-	-	95.9	98.2
London Marylebone Road	Affiliate	99.5	99.2	99.3	99.1	99.2	99.1	99.2
London N. Kensington	Affiliate	93.5	92.2	96.0	99.1	-	99.2	96.0
London Southwark	Affiliate	98.7	98.9	98.4	-	-	98.0	98.5
London Teddington	Affiliate	-	90.1	99.1	-	-	98.9	96.0
London Wandsworth	Affiliate	-	99.3	95.7	-	-	-	97.5
London Westminster	DEFRA	77.4	85.4	97.1	-	-	98.2	89.5

Lullington Heath	DEFRA	-	79.1	97.7	-	-	96.4	91.1
Manchester Piccadilly	DEFRA	97.6	12.7	97.7	97.8	-	60.6	73.3
Manchester South	Affiliate	-	13.1	96.8	-	-	0.0	36.6
Manchester Town Hall	DEFRA	88.5	95.3	-	-	-	-	91.9
Market Harborough	DEFRA	98.8	93.3	98.9	-	-	-	97.0
Middlesbrough	Affiliate	94.1	91.5	95.6	94.3	-	95.5	94.2
Newcastle Centre	DEFRA	96.5	94.4	96.4	96.6	-	93.2	95.4
Northampton	Affiliate	99.5	13.9	95.0	98.0	-	99.4	81.2
Norwich Centre	DEFRA	97.1	71.0	93.5	97.0	-	97.1	91.2
Norwich Forum Roadside	Affiliate	-	93.7	-	-	-	-	93.7
Norwich Roadside	Affiliate	-	95.9	-	-	-	-	95.9
Nottingham Centre	DEFRA	83.8	90.5	98.0	97.9	-	91.3	92.3
Oxford Centre Roadside	Affiliate	92.5	96.5	-	-	-	98.2	95.7
Plymouth Centre	DEFRA	98.1	98.0	77.8	96.7	-	98.2	93.8
Portsmouth	Affiliate	98.3	98.5	98.7	98.3	-	98.3	98.4
Preston	DEFRA	79.1	91.1	98.1	97.7	-	98.3	92.9
Reading New Town	DEFRA	65.3	92.5	94.8	96.3	-	51.5	80.1
Redcar	Affiliate	89.3	36.1	71.8	92.7	-	97.3	77.4
Rochester	Affiliate	-	96.7	98.6	97.6	97.6	95.6	97.2
Rotherham Centre	Affiliate	-	93.6	93.4	-	-	0.0	62.3
Salford Eccles	Affiliate	92.5	68.1	93.7	93.6	-	93.6	88.3
Sandwell West Bromwich	Affiliate	93.8	94.9	94.8	-	-	86.8	92.6
Scunthorpe Town	Affiliate	-	-	-	97.4	-	93.7	95.6
Sheffield Centre	DEFRA	97.2	83.7	98.3	98.3	-	97.8	95.1
Sheffield Tinsley	DEFRA	99.0	95.8	-	-	-	-	97.4
Sibton	DEFRA	-	-	88.5	-	-	-	88.5
Somerton	Affiliate	-	90.0	93.5	-	-	-	91.7
Southampton Centre	DEFRA	97.9	92.4	98.4	97.9	-	97.5	96.8
Southend-on-Sea	DEFRA	96.1	90.7	94.3	95.1	-	94.0	94.1
Southwark Roadside	Affiliate	93.9	98.8	-	-	-	98.9	97.2
St Osyth	DEFRA	96.2	94.6	98.8	-	-	-	96.5
Stockport Shaw Heath	Affiliate	51.6	87.3	-	13.6	-	98.7	62.8
Stockton-on-Tees Yarm	Affiliate	99.1	99.1	-	99.0	-	-	99.1
Stoke-on-Trent Centre	DEFRA	93.1	93.4	94.0	97.3	-	3.6	76.3
Sunderland	DEFRA	-	-	-	-	-	97.9	97.9
Sunderland Silksworth	Affiliate	-	86.2	78.0	-	-	-	82.1
Thurrock	Affiliate	98.0	95.2	98.2	97.7	-	98.0	97.4
Tower Hamlets Roadside	Affiliate	86.0	99.1	-	-	-	-	92.6
Walsall Alumwell	DEFRA	-	99.1	-	-	-	-	99.1
Walsall Willenhall	Affiliate	-	75.8	-	-	-	-	75.8
West London	DEFRA	92.4	92.9	-	-	-	-	92.6
Weybourne	Affiliate	-	-	96.8	-	-	-	96.8
Wicken Fen	DEFRA	-	98.9	98.9	-	-	94.2	97.3

Wigan Centre	Affiliate	98.9	96.7	98.8	93.3	-	99.3	97.4
Wirral Tranmere	DEFRA	89.8	95.6	96.6	90.1	-	86.8	91.8
Wolverhampton Centre	DEFRA	96.5	96.8	97.3	97.6	-	85.8	94.8
Yarner Wood	DEFRA	-	97.6	98.3	-	-	-	97.9
N Ireland								
Belfast Centre	DEFRA	93.5	89.5	92.5	92.9	-	92.4	92.1
Belfast Clara St	Affiliate	-	-	-	92.9	-	-	92.9
Belfast East	DEFRA	-	-	-	-	-	99.1	99.1
Derry	Affiliate	96.6	92.9	78.9	96.5	-	87.4	90.4
Lough Navar	DEFRA	-	-	99.7	99.3	-	-	99.5
Scotland								
Aberdeen	Affiliate	98.9	96.6	98.8	98.6	-	98.6	98.3
Bush Estate	DEFRA	-	44.7	97.2	-	-	-	70.9
Dumfries	DEFRA	95.6	94.6	-	-	-	-	95.1
Edinburgh St Leonards	DEFRA	98.9	97.3	95.9	97.5	-	98.6	97.7
Eskdalemuir	DEFRA	-	94.0	99.1	-	-	-	96.5
Glasgow Centre	DEFRA	90.9	98.1	95.8	98.3	-	96.6	95.9
Glasgow City Chambers	DEFRA	90.2	94.8	-	-	-	-	92.5
Glasgow Kerbside	DEFRA	97.5	97.9	-	96.8	-	-	97.4
Grangemouth	Affiliate	99.4	99.1	-	99.4	-	99.3	99.3
Inverness	DEFRA	98.3	98.5	-	-	-	-	98.4
Lerwick	DEFRA	-	-	95.3*	-	-	-	95.3
Strath Vaich	DEFRA	-	-	87.4	-	-	-	87.4
Wales								
Aston Hill	DEFRA	-	96.8	98.8	-	-	-	97.8
Cardiff Centre	DEFRA	69.1	69.4	69.2	60.1	-	65.4	66.6
Cwmbran	Affiliate	21.7	99.2	99.3	99.2	-	97.2	83.3
Narberth	Affiliate	-	90.8	53.8	76.2	-	94.8	78.9
Port Talbot	Affiliate	-	97.8	96.3	96.8	-	89.8	95.2
Swansea	Affiliate	97.7	92.2	97.7	97.8	-	97.7	96.6
Wrexham	DEFRA	98.3	94.4	-	-	-	98.5	97.1
Number of sites		79	110	87	64	4	76	123
Number of sites < 90%		23	28	12	5	0	15	30
Network Mean (%)		89.8	89.7	94.6	93.3	96.2	90.4	92


* Provisional data capture

Table 5.3 shows the ratified AURN data capture for the 61 **critical sites** in the network for the 6-month period January to June 2005. Sites with less than 90% data capture are shaded. This table contains the overall data capture for 6 months, regardless of when sites started or finished monitoring.

**Table 5.3 AURN Ratified Data Capture (%) for CRITICAL SITES
January to June 2005 (disregards start or end dates)**

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	SO ₂	Site Average
England							
Barnsley Gawber	Affiliate	70.3	74.5	96.8	-	93.7	83.8
Blackpool Marton	DEFRA	8.6	8.7	8.6	9.0	8.7	8.7
Bournemouth	Affiliate	98.3	94.1	98.3	-	98.3	97.2
Brighton Preston Park	DEFRA	-	95.9	98.4	-	-	97.2
Brighton Roadside PM10	Affiliate	-	-	-	90.6	-	90.6
Bristol Centre	DEFRA	98.0	97.9	98.1	97.7	97.5	97.8
Canterbury	Affiliate	-	91.3	-	99.1	-	95.4
Coventry Memorial Park	DEFRA	98.8	98.9	98.7	99.0	98.8	98.8
Glazebury	DEFRA	-	94.8	99.0	-	-	96.9
Great Dun Fell	DEFRA	-	-	98.9	-	-	98.9
High Muffles	DEFRA	-	82.9	88.3	-	-	85.6
Hove Roadside	Affiliate	98.0	95.1	-	-	94.3	95.8
Hull Freetown	DEFRA	60.0	94.4	98.2	97.5	83.8	86.8
Leamington Spa	Affiliate	98.1	94.0	94.6	98.3	98.2	96.6
Leicester Centre	DEFRA	97.7	98.0	97.9	97.8	98.0	97.9
Liverpool Speke	Affiliate	98.3	98.1	98.2	98.0	98.2	98.2
Newcastle Centre	DEFRA	96.5	94.4	96.4	96.6	93.2	95.4
Northampton	Affiliate	99.5	13.9	95.0	98.0	99.4	81.2
Norwich Centre	DEFRA	97.1	71.0	93.5	97.0	97.1	91.2
Nottingham Centre	DEFRA	83.8	90.5	98.0	97.9	91.3	92.3
Oxford Centre Roadside	Affiliate	92.5	96.5	-	-	98.2	95.7
Plymouth Centre	DEFRA	98.1	98.0	77.8	96.7	98.2	93.8
Portsmouth	Affiliate	98.3	98.5	98.7	98.3	98.3	98.4
Preston	DEFRA	79.1	91.1	98.1	97.7	98.3	92.9
Reading New Town	DEFRA	65.3	92.5	94.8	96.3	51.5	80.1
Scunthorpe Town	Affiliate	-	-	-	97.4	93.7	95.6
Sheffield Centre	DEFRA	97.2	83.7	98.3	98.3	97.8	95.1
Sibton	DEFRA	-	-	88.5	-	-	88.5
Somerton	Affiliate	-	90.0	93.5	-	-	91.7
Southampton Centre	DEFRA	97.9	92.4	98.4	97.9	97.5	96.8
Southend-on-Sea	DEFRA	96.1	90.7	94.3	95.1	94.0	94.1
St Osyth	DEFRA	96.2	94.6	98.8	-	-	96.5
Stockton-on-Tees Yarm	Affiliate	99.1	99.1	-	99.0	-	99.1

Site	Owner	CO	NO ₂	O ₃	PM ₁₀	SO ₂	Site Average
Stoke-on-Trent Centre	DEFRA	93.1	93.4	94.0	97.3	3.6	76.3
Sunderland	DEFRA	-	-	-	-	97.9	97.9
Sunderland Silksworth	Affiliate	-	86.2	78.0	-	-	82.1
Thurrock	Affiliate	98.0	95.2	98.2	97.7	98.0	97.4
Wicken Fen	DEFRA	-	98.9	98.9	-	94.2	97.3
Wigan Centre	Affiliate	98.9	96.7	98.8	93.3	99.3	97.4
Wirral Tramere	DEFRA	89.8	95.6	96.6	90.1	86.8	91.8
Yarner Wood	DEFRA	-	97.6	98.3	-	-	97.9
N Ireland							
Belfast Centre	DEFRA	93.5	89.5	92.5	92.9	92.4	92.1
Derry	Affiliate	96.6	92.9	78.9	96.5	87.4	90.4
Lough Navar	DEFRA	-	-	99.7	99.3	-	99.5
Scotland							
Aberdeen	Affiliate	98.9	96.6	98.8	98.6	98.6	98.3
Bush Estate	DEFRA	-	44.7	97.2	-	-	70.9
Dumfries	DEFRA	95.6	94.6	-	-	-	95.1
Edinburgh St Leonards	DEFRA	98.9	97.3	95.9	97.5	98.6	97.7
Eskdalemuir	DEFRA	-	94.0	99.1	-	-	96.5
Glasgow Centre	DEFRA	90.9	98.1	95.8	98.3	96.6	95.9
Grangemouth	Affiliate	99.4	99.1	-	99.4	99.3	99.3
Inverness	DEFRA	98.3	98.5	-	-	-	98.4
Strath Vaich	DEFRA	-	-	87.4	-	-	87.4
Wales							
Aston Hill	DEFRA	-	96.8	98.8	-	-	97.8
Cardiff Centre	DEFRA	69.1	69.4	69.2	60.1	65.4	66.6
Cwmbran	Affiliate	21.7	99.2	99.3	99.2	97.2	83.3
Narberth	Affiliate	-	90.8	53.8	76.2	94.8	78.9
Swansea	Affiliate	97.7	92.2	97.7	97.8	97.7	96.6
Wrexham	DEFRA	98.3	94.4	-	-	98.5	97.1

 Indicates pollutant measured but is not critical at this site

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.

Appendix A1

As requested by the Department, QA/QC Unit has provided a list of suggestions for equipment that may need replacing or upgrading in the network. The following provides a summary of the outstanding issues to date since January 2004. Recommendations have been prioritised as follows:

Priority	Definition	Time-scale
High*	Immediate action necessary to avoid compromising data capture/quality or safety. Critical sites should be treated as high priority.	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 2005	Priority	Action
16	The external loggers at Dumfries, Inverness and Wrexham should be replaced with code switches to allow remote interrogation of the analyser status	Medium	CMCU
15	The air conditioning unit at Southend-on-Sea needs to be repositioned to avoid influence on PM ₁₀ measurements	High	CMCU to arrange
	Recommendations July 2005	Priority	Action
14	Several analysers still exhibit poor performance-see items 10 and 7 below.	High	Repair/replace ment to be actioned by ESUs
13	Continuing problems with some autocal run-ons causing loss of up to 2 hours per day	High	Many sites now cured, but some need attention at next ESU visit
	Recommendations May 2005	Priority	Action
11	SO ₂ analyser at Stoke-on-Trent shows severe baseline response drift. Recommend immediate repair/up-grading	High Critical Site	Now fixed, but most data deleted this quarter
10	The SO ₂ analyser at Manchester South has shown a history of high noise response and should be up-graded or repaired.	Medium	Analyser performance still poor
	Recommendations October 2004		
7	Recommend repair or up-grading of 11 unstable CO analysers detailed in Section 3.1 of this report. Of these, Barnsley Gawber (Affiliate) and Nottingham Centre (Defra) are critical for CO.	High Critical sites	On-going
6	Further advice for AURN equipment replacement and up-grading was given to CMCU on 8 th September 2004.		On-going
	Recommendations July 2004		

4	Sheffield Tinsley CO noisy and drifting response. Recommend up-grade or repair	Medium	Still drifting
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APPENDIX A2

CRITICAL SITES IN THE AURN (October 2005)

Table A1 Critical Sites in Agglomerations

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

"+" indicates Affiliate site"

Note 7: Addresses CO, Benzene not included here

Table A2 Critical Sites in Zones

Site Name	Zone	Critical Pollutant		
		DD1	DD2 ⁷	DD3
Aberdeen+	North East Scotland	NO ₂ PM ₁₀ SO ₂	CO	NO ₂ O ₃
Aston Hill	North Wales			NO ₂ O ₃
Barnsley Gawber+	Yorkshire & Humberside	NO ₂	CO	NO ₂ O ₃
Bush Estate	Central Scotland			NO ₂ O ₃
Canterbury+	South East	PM ₁₀		
Cwmbran+	South Wales	NO ₂ PM ₁₀ SO ₂	CO	NO ₂ O ₃
Derry+	Northern Ireland	NO ₂ PM ₁₀ SO ₂	CO	NO ₂ O ₃
Dumfries	Scottish Borders	NO ₂ PM ₁₀	CO	
Eskdalemuir	Scottish Borders			NO ₂ O ₃
Fort William	Highland			NO ₂ ⁶ O ₃ ⁶
Glazebury	North West & Merseyside			NO ₂ O ₃
Grangemouth+	Central Scotland	NO ₂ PM ₁₀ SO ₂	CO	
Great Dunn Fell	North West & Merseyside			O ₃ ³
High Muffles	Yorkshire & Humberside			NO ₂ O ₃
Inverness	Highland	NO ₂ PM ₁₀		
Leamington Spa+	West Midlands	NO ₂ PM ₁₀ SO ₂	CO	NO ₂ O ₃
Leominster	West Midlands			NO ₂ ⁴ O ₃ ⁶
Lough Navar	Northern Ireland			O ₃ ³
Narberth	South Wales			O ₃ ³
Northampton+	East Midlands	NO ₂ PM ₁₀ ² SO ₂	CO	NO ₂ O ₃
Norwich Centre	Eastern			NO ₂ O ₃
Oxford Centre Roadside+	South East	SO ₂	CO	
Plymouth Centre	South West	PM ₁₀		
Scunthorpe Town+	Yorkshire & Humberside	PM ₁₀		
Sibton	Eastern			O ₃ ³
Somerton	South West			NO ₂ O ₃
St Osyth	Eastern			NO ₂ O ₃
Stockton-on-Tees Yarm+	North East	NO ₂ PM ₁₀	CO	
Strath Vaich	Highland			O ₃ ³
Sunderland	North East	SO ₂		
Sunderland Silkworth+	North East			NO ₂ O ₃
Thurrock	Eastern			NO ₂ O ₃
Wicken Fen	Eastern			NO ₂ O ₃
Wigan Leigh+/Centre ⁺⁸	North West & Merseyside	NO ₂ PM ₁₀ SO ₂	CO	NO ₂ O ₃
Wrexham	North Wales	NO ₂ PM ₁₀ SO ₂	CO	
Yarner Wood	South West			NO ₂ O ₃

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: PM₁₀ monitored by Gravimetric and TEOM

Note 3: DD3 Critical as Rural Background station

Note 4: If NO₂ at Leominster is Suburban then NO₂ at Leamington Spa is no longer critical for DD1

Note 6: Not Affiliated/Monitoring yet

Note 7: Addresses CO, Benzene not included here

APPENDIX A3

Inventory of Defra owned Equipment

An up-to-date inventory of Department-owned equipment used by the QA/QC Unit is provided below:

QA/QC Unit's inventory of Department-owned equipment, October 2005

Computer software	The HIS (Heuristic Information System) software suite used for all data management. A few specific capabilities of HIS were developed in order to meet specific Department deliverables or requirements (examples include software for annual report analysis/compilation, for formatting/transmitting network data to archive or DDU and for reporting Directive compliance data to the EC).
Field support equipment	Field support equipment: 1 intercalibration equipment set (includes mass flow controllers and read-out unit) A second intercalibration (commissioned January 2001) UV photometers: API model M401 s/n 123- purchased April 1999 (on temporary loan to Siemens) API model 401 s/n 151 - purchased October 2000 API model 401 s/n 176 - purchased December 2002 (on temporary loan to Horiba) API model 401 s/n 290 - purchased May 2004 API model 401 s/n 291 - purchased May 2004 API model 401 s/n 292 purchased May 2004 API model 401 s/n 293 purchased May 2004 Mass flow controllers - purchased April 2002 (incorporated into existing audit dilution apparatus) 3 Drycal flow meters - purchased September 2002 1 Mass flow controller read-out unit to be incorporated in the audit dilution apparatus - purchased September 2002. A third intercalibration kit (commissioned May 2004) Drycal flow meter - purchased March 2004 Sabio 2010 dilution calibrator - purchased February 2005 Sabio 2020 zero air generator - purchased February 2005 Sabio 2030 ozone photometer - purchased February 2005
Zero air pumps	6 spare zero air pumps for routine maintenance/repair of zero air generators in the AURN.
Analysers	AC31 dual chamber NO _x analyser TEI 43C SO ₂ analyser TEI 48C CO analyser M265 chemiluminescent ozone analyser (All of the above purchased on behalf of Defra by Casella Stanger in March 2003 and transferred to QA/QC Unit)

APPENDIX A4

Summary of Recommendations

This appendix provides a summary of all the recommendations given in this report.

	Need	Recommendation	Section	FAO
1	Improve data capture at critical sites	LSOs and ESUs should undertake call-outs as soon as possible at these sites	2.2 +5	LSOs and ESUs
2	Routine converter efficiency checking	Pay careful attention to stability of fortnightly NO ₂ calibration span response	2.4	LSOs
3	NO _x converter set-up after service and converter replacement	Converter to operate at >98% after service, or following converter replacement	2.4	ESUs
4	Autocalibration run-on	Investigate problem of autocalibration run on at sites given in Table 2.7. Autocalibration span concentrations to be <200ppb for urban sites and <100ppb for rural sites.	2.7	ESUs
5	Redcar	The ESU is to check the analyser calibration system at Redcar, and to provide the LSO with advice and instruction to ensure high quality of calibrations	3.1	ESU
6	Bush NOx	The ESU is requested to ensure the status of the Bush Nox analyser is closely checked and tested on site	3.2	ESU
7	Narberth O ₃	A replacement or as a minimum, a duplicate ozone analyser should be installed at Narberth to establish the reliability of the data from this site	3.3	ESU
8	Southend-on-Sea	Air conditioning unit blows onto the PM10 sampling head. This needs to be realigned to prevent influence of TEOM	3.4	CMCU
9	Replacement rural ozone analysers	Status of faulty ozone analysers to be clarified and a plan for re-installation supplied	3.5	ESU
10	Analyser status	The external loggers at Dumfries, Inverness and Wrexham should be replaced with code switches to allow remote interrogation of the analyser status	3.6	CMCU