



# **QA/QC Data Ratification Report for the Automatic Urban and Rural Network, April-June 2008**

**Report produced for the Department for  
Environment, Food and Rural Affairs, Scottish  
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# Executive Summary

AEA 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), Scottish Government, Welsh Assembly Government and DoE in Northern Ireland.

Ratified hourly average data capture for the network averaged 91.3% for all pollutants ( $O_3$ ,  $NO_2$ ,  $SO_2$ , CO,  $PM_{10}$  and  $PM_{2.5}$ ) during the 3-month reporting period April-June 2008. Data capture rates for all pollutants were above 90%, with the exception of  $PM_{10}$  (89.7%). There were 26 sites with data capture less than 90% for the period. These figures exclude the Partisol data, which remain provisional at present.

The number of monitoring sites in the AURN during this quarter was 122, of which 60 are Local Authority owned sites affiliated to the national network. Significant changes have taken place in the network during this quarter.

The main reasons for data loss at the 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.

Substantial changes have been made to the AURN network from the end of September 2007, and these are summarised in this report. The changes are necessary to ensure compliance with the new European Air Quality Directive. Considerable progress has been made in implementing these changes though they will still take some time to complete.

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# Data Ratification Report, April-June 2008

## 1 Introduction

This quarterly report covers the Quality Assurance and Control (QA/QC) activities undertaken by AEA to ratify automatic monitoring data from Defra and the Devolved Administrations' urban and rural air quality monitoring network (AURN) for the period April-June 2008. During this period there were 122 monitoring sites in the Network of which there are 89 urban sites, 25 rural sites and a further 8 sites in the London Air Quality Monitoring Network (LAQN) which are affiliated into the national network. There are currently 62 Defra-funded sites and 60 affiliate sites. Auchencorth Moss has both Partisol and FDMS analysers for both PM<sub>10</sub> and PM<sub>2.5</sub>; the FDMS instruments are listed as a separate site (Auchencorth Moss PM<sub>10</sub> PM<sub>2.5</sub>).

### 1.1 Recent Changes in the Network

This section gives an overview of the main changes that have taken place in the network during this quarter, 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. Major changes to the network since the end of July are described in Section 2.

**Table 1.1 Changes in the Network, April-June 2008**

Site Name	Owner	Pollutants	Date started	Date closed
Bolton	Affiliate	NO <sub>2</sub> O <sub>3</sub>		30/06/08
Brighton Roadside PM <sub>10</sub>	Affiliate	PM <sub>10</sub>		29/05/08
Brighton Preston Park	Affiliate	PM <sub>2.5</sub>	30/05/08	
Dumfries	DEFRA	PM <sub>10</sub>		01/04/08
London Eltham	Affiliate	PM <sub>2.5</sub>	15/05/08	
*London Marylebone PM <sub>2.5</sub>	DEFRA		22/05/08	
*London Marylebone PM <sub>10</sub>	DEFRA		02/05/08	
*London North Kensington PM <sub>2.5</sub>	DEFRA		13/05/08	
*London North Kensington PM <sub>10</sub>	DEFRA		13/05/08	
Norwich Centre	DEFRA	NO <sub>2</sub> O <sub>3</sub> SO <sub>2</sub>		13/05/08
Port Talbot Margam	Affiliate	PM <sub>2.5</sub>	01/04/08	
Sunderland Silkworth	Affiliate	SO <sub>2</sub>	01/04/08	

\* Gravimetric daily samplers

The QA/QC unit has also liaised closely with the CMCU to update the LSO manual for Partisol and FDMS analysers and LSOs with these analysers at their sites should now follow these new procedures.

Further details of the new sites, including locations, are given in Appendix A5.

A full description of the ratification procedures for FDMS data is given in the 2006 QA/QC Annual Report.

### 1.2 Overview of Network Performance

Ratified hourly average data capture for the network averaged 91.3 % for all pollutants (O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO, PM<sub>10</sub> and PM<sub>2.5</sub>) during the 3-month reporting period April-June 2008 (see Table 1.4 below). All pollutants were 90% or higher data capture, except for PM<sub>10</sub> at 89.7%.

**Table 1.4 AURN Ratified Data Capture (%) by Quarter, 2008  
(Using the start date of any new site)**

	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Mean
Data capture Q1 2008	93.3%	91.3%	92.8%	92.4%	93.6%	89.8%	91.7%
Data capture Q2 2008	91.7%	89.7%	95.8%	91.2%	96.5%	92.7%	91.3%

Overall, 282 out of the 335 analysers (83%) achieved data capture levels above the required 90% target during this reporting period (See Table 1.5).

**Table 1.5 Number of Analysers with Data Capture below 90%**

Total Number Of Analysers	Q1 Jan-Mar 2008 (No. below 90%)	Q2 Apr-June 2008 (No. below 90%)
CO	26	6
NO <sub>2</sub>	106	16
O <sub>3</sub>	78	12
PM <sub>10</sub>	69 <sup>1</sup>	13
PM <sub>2.5</sub>	12 <sup>1</sup>	2
SO <sub>2</sub>	44	6
Total <90%	335	55

1. Includes TEOM, FDMS, and Partisol analysers.

In total, 26 out of the 122 operational network sites in the quarter (22%) had an average data capture rate below the required 90% level for the April-June 2008 period. These sites are listed in Table 1.6. The main site operational and QA/QC issues giving rise to data capture below the required 90% level are summarised in Section 4.

**Table 1.6 Sites with Average Data Capture < 90%, April-June 2008**

Site	Owner	Site Average
<b>England</b>		
Brighton Preston Park	DEFRA	86.7
Brighton Roadside PM <sub>10</sub>	Affiliate	55.9*
Glazebury	DEFRA	39.6
Leamington Spa	Affiliate	66.0
Leominster	DEFRA	74.1
Liverpool Queen's Drive Roadside	Affiliate	78.1
London Cromwell Road 2	DEFRA	88.8
London Hillingdon	DEFRA	71.9
London Marylebone Road Partisol	DEFRA	78.8*
London N. Kensington Partisol	DEFRA	67.3*
Lullington Heath	DEFRA	65.9
Manchester Piccadilly	DEFRA	79.9
Northampton	Affiliate	73.5
Oxford St Ebbes	Affiliate	70.8
Portsmouth	Affiliate	64.6
Sheffield Tinsley	DEFRA	0.0
Southwark Roadside	Affiliate	0.0
St Osyth	DEFRA	86.7
Walsall Willenhall	Affiliate	87.9

Site	Owner	Site Average
Yarner Wood	DEFRA	87.0
<b>Ireland</b>		
<b>N Ireland</b>		
Belfast Centre	DEFRA	75.7
<b>Scotland</b>		
Auchencorth Moss	DEFRA	88.4
Eskdalemuir	DEFRA	84.4
Fort William	DEFRA	87.3
Glasgow Centre	DEFRA	80.7
<b>Wales</b>		
Cwmbran	Affiliate	56.0
<b>Number of sites &lt; 90%</b>		26

\* Partisol data remains provisional

### 1.3 LSO Manual

As noted in Section 1.1, the LSO Manual has been updated to include a section on the TEOM FDMS analysers. In addition, the Partisol section of the manual has been updated. LSOs with these analysers at their site should now use the new version of the manual.

Copies of the new TEOM FDMS and Partisol sections will be distributed to the relevant LSOs as these analysers are installed into the network. If LSOs have not received a copy of the manual or further copies are required please contact [Andy.Cook@aeat.co.uk](mailto:Andy.Cook@aeat.co.uk). The manual, including the new TEOM and FDMS sections is available electronically on the following web sites:

**AURN Hub** <http://www.aurnhub.co.uk/>

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

The LSO manual is currently being updated to reflect recent developments in the network.

### 1.4 AURN Hub Updates

The AURN project information hub has recently been moved to a new, more memorable web address located at<sup>1</sup>:

<http://www.aurnhub.co.uk/>; the user names and password remain unchanged.

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

- Provisional monthly PM<sub>10</sub> (Gravimetric) exceedences up to June 2008;
- QA/QC Unit's Data Ratification and Intercalibration Report, January-March 2008
- Recent Management Unit reports (April-June 2008); and
- Updated version of the LSO manual.

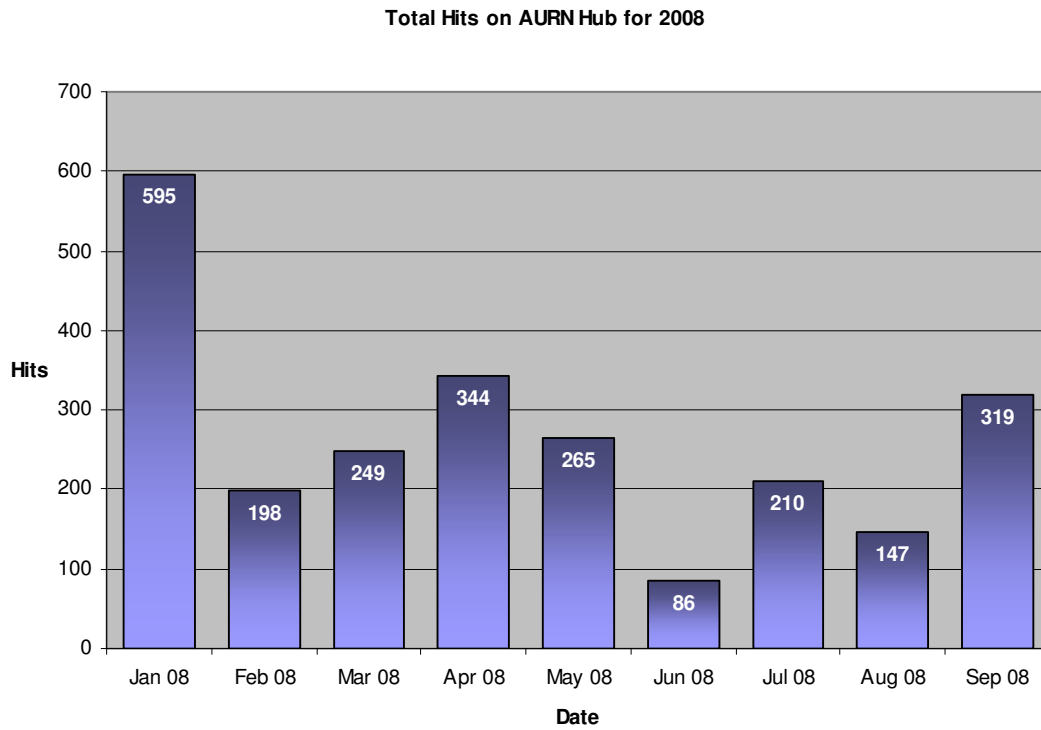
The Hub has continued to provide a valuable source of information for interested organisations see Figure 1.4. Recent changes include

- Updated contact details
- Archived old items
- Reformatted News
- Updated cylinder inventory, site lists and other links

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<sup>1</sup> Password protected site: username and password available from [stephen.bird@aeat.co.uk](mailto:stephen.bird@aeat.co.uk)

**Figure 1.4: AURN Hub Hits 2008**



The contents of the AURN Hub is currently being reviewed and a user survey has been carried out to assess how it may be improved. The survey rated the site as follows:

**Figure 1.5 AURN Site Rating**





## 2 Changes to the Network for Directive Compliance

The QA/QC Unit and the CMCU Unit in conjunction with Defra and the DAs have carried out a major review of the monitoring network. This was necessary to ensure the network is compliant with the European Air Quality Directive. There is a requirement for a minimum level of monitoring in each agglomeration and zone, and there is a need to measure PM<sub>2.5</sub> at many sites. The need for additional monitoring has been met by affiliating suitable sites from other organisations, adding additional analysers at existing sites, or in a small number of cases, installing new sites. Note that as a result of these changes, the concept of critical sites has been discontinued.

Sites that are no longer necessary for compliance have, in a number of cases, been closed down, or individual analysers at sites have been de-affiliated. Table 2.1 shows the sites commissioned as part of the review.

**Table 2.1 Sites Added to the AURN Since 1 July 2008**

Site	Pollutants	Site type	Start date
Sandy Roadside	NO <sub>2</sub> PM <sub>10</sub>	Roadside	28/07/2008
Saltash Roadside	PM <sub>10</sub>	Roadside	30/07/2008
Charlton Mackrell	NO <sub>2</sub> O <sub>3</sub>	Rural	03/09/2008

PM<sub>2.5</sub> at installation sites throughout the UK is well underway, and all PM<sub>2.5</sub> monitors need to be in place by 31 December 2008

A full description of the changes necessary for compliance with the Directive is given in Part B Section 8 of the October-December 2007 Report.

## 3 Generic Data Quality Issues

### 3.1 Gravimetric PM<sub>10</sub> and PM<sub>2.5</sub> Data Ratification

Eight gravimetric PM<sub>10</sub> analysers (Partisols) are currently located at sites in the network (Bournemouth, Wrexham, Inverness, London Westminster, London N Kensington, Auchencorth Moss (PM<sub>10</sub> and PM<sub>2.5</sub>) Brighton Roadside PM<sub>10</sub>) and Port Talbot Margam. Gravimetric PM<sub>2.5</sub> analysers are located at Auchencorth Moss, Brighton Preston Park, London Marylebone Road and London North Kensington.

Provisional data capture figures for the gravimetric PM<sub>10</sub> (Partisol) analysers for the period April-June 2008 are given in Table 2.4. Three of the gravimetric analysers for which data are available did not reach the 90% data capture target in this quarter, but the average data capture over all eight analysers was 93%.

**Table 2.4 Gravimetric PM<sub>10</sub> and PM<sub>2.5</sub> Provisional Data Capture (%) April-June 2008**

Site	Data Capture, %
Auchencorth Moss PM <sub>10</sub>	82
Auchencorth Moss PM <sub>2.5</sub>	84
Bournemouth PM <sub>10</sub>	100
Brighton Roadside PM <sub>10</sub>	36
Brighton Preston Park PM <sub>2.5</sub>	35

Site	Data Capture, %
Inverness PM <sub>10</sub>	99
London Marylebone Road PM <sub>10</sub>	43
London Marylebone Road PM <sub>2.5</sub>	39
London N Kens PM <sub>10</sub>	22
London N Kens PM <sub>2.5</sub>	58
London Westminster PM <sub>10</sub>	88
Port Talbot Margam	98
Wrexham	75

The reasons for data loss in the gravimetric analysers are given in Appendix A4. Bureau Veritas has supplied the measured data, undertaken the filter weighing and calculated the particulate concentrations. Final ratification of these Partisol data are delayed until the outcome of the current detailed investigations on all previous UK Partisol data are completed

A potential problem has been identified with the Partisol data from some of the AURN sites. This is described in "Analysis of Trends in Gravimetric Particulate Mass Measurements in the United Kingdom" published by CMCU in May 2008, available from:

[http://www.airquality.co.uk/archive/news.php?news\\_id=106](http://www.airquality.co.uk/archive/news.php?news_id=106).

As a result of this, improved QA/QC procedures for Partisol measurements have been implemented by BV and the QA/QC Unit. These include:

- Participation of both AEA and BV in the Workplace Analysis Scheme for Proficiency (WASP) run by HSL. Participants send in pre-weighed filters, which are spiked with sodium borate solution, dried and returned to participants to reweigh. (The dried borate is thus a surrogate for real particulate on a filter.)
- Round-robin of blank filter weighings between BV, AEA and NPL. Three sets of filters are weighed by all three organisations. This may be repeated at regular intervals.
- Each batch of 14 days' filters to include a travel (field) blank in the cannister, which should be treated exactly the same as the other filters in the batch, but not exposed.
- Each batch of pre-weighed filters should have an associated lab blank, which would not go to the site but would stay in a sealed container at the lab for the duration of the exposure period, and be weighed again when the final weighings are done.
- Both field and lab blank values should be communicated to the QA/QC Unit, who would monitor them on a long-term basis and check for any step changes, trends, or deviations from the typical spread of results.

The implementation of these initiatives is under way, and the outcome will be reported in future QA/QC reports.

### 3.2 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 or silica gel driers. In most cases this has improved the situation but it has not always eliminated the problem completely.

The 19 sites (20 analysers) showing continuing problems with the autocalibration run-on during April-June 2008 are given in Table 2.5. Any autocalibration run-on data that look visibly significant have been deleted from these data sets during ratification.

There has been a notable improvement in the number of sites adversely affected by auto-calibration faults during this quarter, and the efforts of the ESUs to achieve this are acknowledged.

**Table 2.5 Estimate of Spike or Dip due to Auto-calibration Run-on: April-June**

Site	Pollutant	Run-On Conc	Autocal Conc	Hours lost	Months
Aston Hill	NO <sub>2</sub>	2.5	50	4	Apr
Aston Hill	NO <sub>2</sub>	2.5	50	3	May-June
Barnsley Gawber	NO <sub>2</sub>	1	200	1	Apr-June
Belfast Centre	NO <sub>2</sub>	4	200	1	Apr-June
Bolton	NO <sub>2</sub>	4	600	1	Apr-June
Bournemouth	NO <sub>2</sub>	3	600	1	Apr-June
Bush Estate	NO <sub>2</sub>	2	450	1	Apr-June
Fort William	NO <sub>2</sub>	4	350	1	Apr-June
Glazebury	NO <sub>2</sub>	5.1	150	1	Apr-June
Hull Freetown	NO <sub>2</sub>	3	200	1	Apr-June
Liverpool Speke	NO <sub>2</sub>	3	250	1	Apr-June
London Teddington	NO <sub>2</sub>	2	100	1	Apr-June
Newcastle Centre	NO <sub>2</sub>	3	300	1	Apr-June
Oxford St Ebbes	NO <sub>2</sub>	2	300	1	Apr-May
Rochester Stoke	NO <sub>2</sub>	1.7	200	1	Apr and June
St Osyth	NO <sub>2</sub>	1	100	2	Apr
St Osyth	NO <sub>2</sub>	1	100	1	June
Walsall Willenhall	NO <sub>2</sub>	5	250	1	Apr-June
Yarner Wood	NO <sub>2</sub>	2.5	200	1	Apr
Yarner Wood	NO <sub>2</sub>	2.5	200	3	May-June
Barnsley Gawber	SO <sub>2</sub>	-1	250	1	Apr-June
Harwell	SO <sub>2</sub>	0.2	175	1	Apr-June
Scunthorpe Town	SO <sub>2</sub>	1	500	1	Apr-June

### 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 have held 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 NO<sub>2</sub> autocalibration span concentrations of less than 200ppb (urban sites) and 100ppb (rural sites) are used throughout the network.

**The CMCU is asked to specifically instruct ESUs to address these autocalibration faults at the earliest opportunity**

## 4 Site Specific Issues

In this section, we now discuss in turn specific site issues for sites in the following geographic groupings – London, England (except London), Scotland, N. Ireland and Wales.

### 4.1 London

The data capture figures for sites in London (within the M25) for the period April-June are given in Table 4.1:

**Table 4.1: Data capture for London: April-June 2008**

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>London</b>								
Camden Kerbside	Affiliate	-	99.7	-	90.2	-	-	95.0
Haringey Roadside	Affiliate	-	99.0	-	99.7	-	-	99.4
London Bexley	Affiliate	95.2	88.7	96.2	97.1	-	97.4	94.9
London Bloomsbury	DEFRA	99.9	99.8	98.1	99.9	99.9	99.7	99.5
London Cromwell Road 2	DEFRA	94.2	-	-	93.3	-	79.0	88.8
London Eltham	Affiliate	-	-	97.2	88.1	88.0	-	91.1
London Haringey	Affiliate	-	-	-	95.6	99.1	-	97.3
London Harlington	Affiliate	-	73.8	-	97.8	98.9	-	90.2
London Hillingdon	DEFRA	-	-	-	43.9	99.8	-	71.9
London Marylebone Road	Affiliate	94.8	97.8	90.9	98.2	89.5	75.2	91.0
London N. Kensington	Affiliate	99.2	99.3	-	99.5	99.4	99.2	99.3
London Teddington	Affiliate	-	-	-	95.7	99.9	-	97.8
London Westminster	DEFRA	92.5	87.9	-	96.5	95.8	96.1	93.8
Southwark Roadside	Affiliate	-	-	-	0.0	-	-	0.0
Tower Hamlets Roadside	Affiliate	95.3	-	-	99.6	-	-	97.4
<b>Number of sites</b>		7	8	4	15	9	6	15
<b>Number of sites &lt; 90%</b>		0	3	0	3	2	2	3
<b>Network Mean (%)</b>		95.9	93.2	95.6	86.3	96.7	91.1	87.2

Shaded boxes are for data capture < 90%

### 4.2 England (except London)

The data capture for sites in England for the period April-June is given in Table 4.2:

Table 4.2 data capture for England: April-June 2008

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>England</b>								
Barnsley 12	DEFRA	-	-	-	-	-	99.7	99.7
Barnsley Gawber	Affiliate	-	-	-	94.6	99.5	94.8	96.3
Bath Roadside	Affiliate	-	-	-	95.7	-	-	95.7
Billingham	DEFRA	-	-	-	99.5	-	-	99.5
Birmingham Centre	DEFRA	-	99.4	-	99.8	99.8	-	99.7
Birmingham Tyburn	Affiliate	-	92.2	-	99.8	99.8	99.9	97.9
Blackpool Marton	DEFRA	-	99.0	-	98.1	99.4	-	98.9
Bolton	Affiliate	-	93.9	-	92.6	97.6	-	94.7
Bottesford	Affiliate	-	-	-	-	98.5	-	98.5
Bournemouth	DEFRA	-	100.0	-	94.9	99.8	-	98.2
Brighton Preston Park	DEFRA	-	-	100.0	97.3	62.9	-	86.7
Brighton Roadside	Affiliate	-	-	-	99.5	-	-	99.5
Brighton Roadside PM <sub>10</sub>	Affiliate	-	55.9	-	-	-	-	55.9
Bristol Old Market	Affiliate	99.5	-	-	99.6	-	-	99.6
Bristol St Paul's	DEFRA	91.6	99.2	-	99.9	91.6	100.0	96.5
Bury Roadside	Affiliate	99.5	97.7	-	96.7	-	-	98.0
Cambridge Roadside	Affiliate	-	-	-	97.8	-	-	97.8
Canterbury	Affiliate	-	-	-	99.6	-	-	99.6
Carlisle Roadside	Affiliate	-	95.3	-	98.3	-	-	96.8
Chesterfield	Affiliate	-	99.5	-	95.4	-	-	97.4
Chesterfield Roadside	Affiliate	-	91.3	-	91.0	-	-	91.2
Coventry Memorial Park	DEFRA	-	96.8	-	99.8	99.8	-	98.8
Exeter Roadside	Affiliate	-	-	-	99.6	99.6	-	99.6
Glazebury	DEFRA	-	-	-	0.0	79.1	-	39.6
Great Dun Fell	DEFRA	-	-	-	-	98.1	-	98.1
Harwell	DEFRA	-	99.9	99.9	99.8	99.8	95.7	99.0
High Muffles	DEFRA	-	-	-	99.7	88.2	-	94.0
Horley	Affiliate	-	-	-	98.9	-	-	98.9
Hull Freetown	DEFRA	98.5	97.8	-	85.5	98.6	98.4	95.7
Ladybower	DEFRA	-	-	-	99.8	99.8	99.7	99.8
Leamington Spa	Affiliate	-	11.3	-	57.2	98.0	97.6	66.0
Leeds Centre	DEFRA	99.9	99.5	-	99.8	99.8	99.9	99.8
Leeds Headingley Kerbside	Affiliate	-	99.6	-	98.0	-	-	98.8
Leicester Centre	DEFRA	99.7	87.5	-	99.7	99.6	99.6	97.2

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
Leominster	DEFRA	-	-	-	98.9	99.7	23.6	74.1
Liverpool Queen's Drive Roadside	Affiliate	-	-	-	78.1	-	-	78.1
Liverpool Speke	DEFRA	98.8	98.3	-	95.6	99.7	99.7	98.4
Lullington Heath	DEFRA	-	-	-	98.7	99.0	0.0	65.9
Manchester Piccadilly	DEFRA	-	99.6	-	40.6	99.5	-	79.9
Manchester South	Affiliate	-	-	-	92.3	100.0	-	96.1
Market Harborough	DEFRA	87.7	-	-	99.8	99.7	-	95.7
Middlesbrough	Affiliate	96.7	95.8	-	99.0	98.1	99.2	97.8
Newcastle Centre	DEFRA	99.8	88.2	-	95.2	99.5	99.6	96.5
Newcastle Cradlewell Roadside	Affiliate	-	-	-	99.6	-	-	99.6
Northampton	Affiliate	-	7.0	-	95.6	99.7	91.7	73.5
Norwich Centre	DEFRA	-	98.1	-	98.2	98.2	98.1	98.1
Nottingham Centre	DEFRA	-	88.5	-	98.9	99.6	99.6	96.7
Oxford Centre Roadside	Affiliate	-	-	-	98.3	-	-	98.3
Oxford St Ebbes	Affiliate	-	88.1	-	53.6	-	-	70.8
Plymouth Centre	DEFRA	-	99.1	-	99.8	99.9	-	99.6
Portsmouth	Affiliate	-	0.0	-	94.4	99.5	-	64.6
Preston	DEFRA	-	99.2	-	99.8	100.0	-	99.6
Reading New Town	DEFRA	-	99.4	-	99.2	99.2	-	99.3
Rochester Stoke	Affiliate	-	98.3	98.8	94.5	98.7	98.7	97.8
Salford Eccles	Affiliate	97.6	96.5	-	99.5	99.7	99.4	98.5
Sandwell West Bromwich	Affiliate	-	-	-	95.6	99.8	99.9	98.4
Scunthorpe Town	Affiliate	-	99.4	-	99.2	-	92.9	97.1
Sheffield Centre	DEFRA	99.5	99.3	-	96.1	99.5	94.0	97.7
Sheffield Tinsley	DEFRA	-	-	-	0.0	-	-	0.0
Sibton	DEFRA	-	-	-	-	96.1	-	96.1
Southampton Centre	DEFRA	96.9	92.2	-	96.8	96.8	96.8	95.9
Southend-on-Sea	DEFRA	-	73.8	-	99.6	99.7	-	91.0
St Osyth	DEFRA	65.1	-	-	95.6	99.5	-	86.7
Stanford-le-Hope Roadside	Affiliate	-	99.6	-	99.5	-	99.5	99.5
Stewartby	Affiliate	-	-	-	-	-	99.0	99.0
Stockton-on-	Affiliate	-	99.6	-	99.9	-	-	99.7

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
Tees Yarm								
Stoke-on-Trent Centre	DEFRA	-	99.1	-	98.3	98.5	-	98.7
Sunderland Silksworth	Affiliate	-	-	-	99.7	99.7	99.7	99.7
Thurrock	Affiliate	-	99.8	-	99.3	97.5	97.8	98.6
Walsall Willenhall	Affiliate	-	-	-	87.9	-	-	87.9
Weybourne	Affiliate	-	-	-	-	98.4	-	98.4
Wicken Fen	DEFRA	-	-	-	99.2	99.2	99.2	99.2
Wigan Centre	Affiliate	-	-	-	98.7	96.7	-	97.7
Wirral Tranmere	DEFRA	-	98.9	-	98.8	98.7	-	98.8
Yarner Wood	DEFRA	-	-	-	77.9	96.0	-	87.0
York Bootham	Affiliate	-	96.0	-	-	-	-	96.0
York Fishergate	Affiliate	-	99.6	-	99.4	-	-	99.5
<b>Number of sites</b>		14	43	3	69	51	29	77
<b>Number of sites &lt; 90%</b>		2	9	0	9	3	2	15
<b>Network Mean (%)</b>		95.1	89.0	99.6	92.2	97.6	92.2	92.0

Shaded boxes are for data capture < 90%

### Site Specific Issues

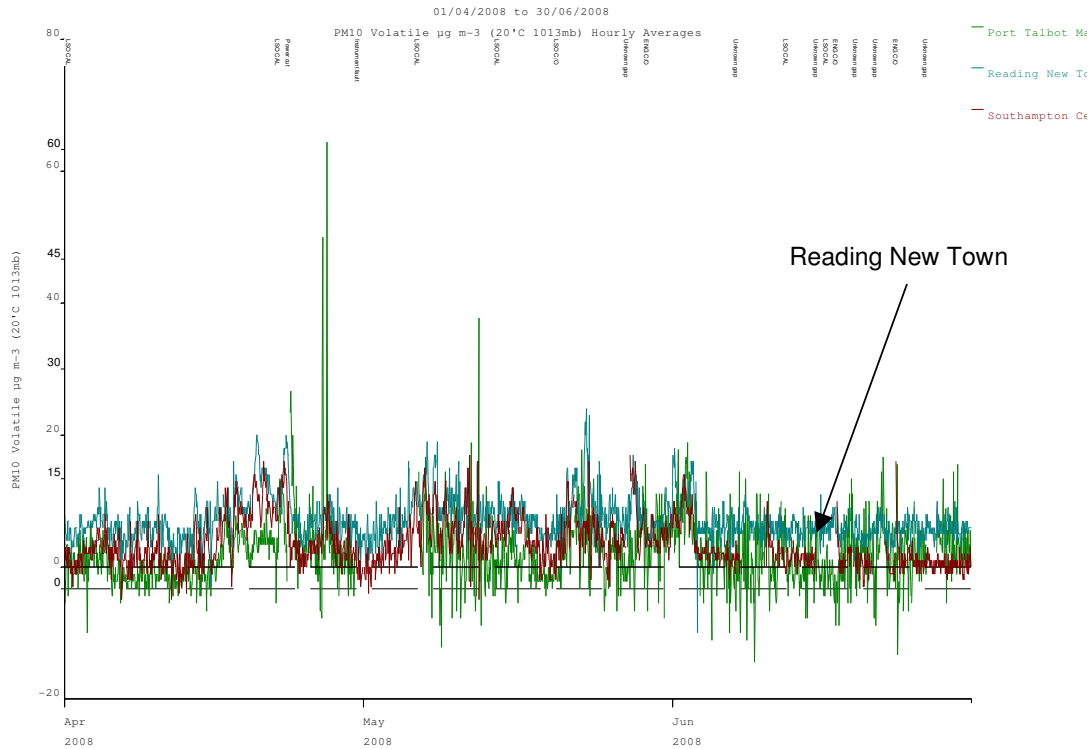
#### Sheffield Tinsley

As reported in the January-March QA/QC report, a persistent fault occurred with the NO<sub>x</sub> analyser. The NO<sub>x</sub> converter failed at the winter 2008 audit, and the ESU replaced the converter at the February service. From then, high NO readings were noted in the NO<sub>2</sub> cylinder calibrations. This indicates a leak in the main switching valve. This was finally rectified in September, but all data for this quarter have been deleted, and some further losses are anticipated in quarter 3.

#### Reading New Town

The Volatile PM<sub>10</sub> fraction measured at Reading New Town is consistently higher than other sites in the network. Figure 4.1 shows measured volatile PM<sub>10</sub> at Reading, Port Talbot and Southampton for comparison

**Figure 4.1 Volatile PM<sub>10</sub> at Reading**



During quarter 3, the PM<sub>2.5</sub> FDMS was installed and showed significantly lower volatile concentrations than the PM<sub>10</sub>. The reason for the apparently elevated concentrations of volatile PM<sub>10</sub> is still under investigation by the CMCU, QA/QC Unit and ESU.

**London Hillingdon**

The NO<sub>x</sub> analyser suffered a reaction chamber fault on 1 May; 51 days data were lost as a result

**London Southwark**

The site remains closed pending refurbishment and relocation.

**Lullington Heath**

A photomultiplier tube in the SO<sub>2</sub> analyser failed, resulting in noisy data being deleted from 1 January to 15 July 2008.

**Glazebury and Manchester Piccadilly**

The NO<sub>x</sub> converters were found to have failed at the QA/QC visit, resulting in the loss of 174 days (Glazebury) and 64 days (Man. Piccadilly).



### 4.3 Scotland

#### Data Capture

The data capture for sites in Scotland for the period April-June is given in Table 4.3:

**Table 4.3: Data capture for Scotland: April-June 2008**

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>Scotland</b>								
Aberdeen	Affiliate	-	99.4	-	99.1	99.3	-	99.3
Aberdeen Union Street Roadside	Affiliate	-	-	-	99.4	-	-	99.4
Auchencorth Moss	DEFRA	-	83.5	82.4	-	99.3	-	88.4
Auchencorth Moss PM <sub>10</sub> PM <sub>25</sub>	DEFRA	-	95.1	96.3	-	-	-	95.7
Bush Estate	DEFRA	-	-	-	94.8	99.0	-	96.9
Dumfries	DEFRA	-	-	-	99.5	-	-	99.5
Edinburgh St Leonards	DEFRA	98.8	99.5	-	96.9	99.5	99.7	98.9
Eskdalemuir	DEFRA	-	-	-	90.0	78.7	-	84.4
Fort William	DEFRA	-	-	-	74.8	99.8	-	87.3
Glasgow Centre	DEFRA	56.7	98.2	-	52.3	98.2	98.1	80.7
Glasgow City Chambers	DEFRA	-	-	-	98.6	-	-	98.6
Glasgow Kerbside	DEFRA	-	99.6	-	98.5	-	-	99.0
Grangemouth	Affiliate	-	99.7	-	99.7	-	99.7	99.7
Inverness	DEFRA	-	98.9	-	99.0	-	-	98.9
Lerwick	DEFRA	-	-	-	-	99.1	-	99.1
Strath Vaich	DEFRA	-	-	-	-	90.5	-	90.5
<b>Number of sites</b>		2	9	2	12	9	3	16
<b>Number of sites &lt; 90%</b>		1	2	1	2	1	0	5
<b>Network Mean (%)</b>		77.7	86.0	89.4	91.9	95.9	99.2	91.7

#### Site Issues

##### Glasgow Centre

The CO analyser suffered from flow problems during the quarter; a total of 54 days data were deleted.

### 4.4 Northern Ireland

The data capture for sites in Northern Ireland for the period April-June is given in Table 4.4:

**Table 4.4: Data Capture for Northern Ireland: April-June 2008**

Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>N Ireland</b>								
Belfast Centre	DEFRA	46.9	86.8	-	82.8	78.9	82.9	75.7
Derry	Affiliate	-	99.0	96.1	99.4	95.2	100.0	97.9
Lough Navar	DEFRA	-	99.7	-	-	99.6	-	99.6
<b>Number of sites</b>		1	3	1	2	3	2	3
<b>Number of sites &lt; 90%</b>		1	1	0	1	1	1	1
<b>Network Mean (%)</b>		46.9	95.1	96.1	91.1	91.2	91.4	91.1

### Site Specific Issues

#### Belfast Centre

The Belfast Centre CO analyser has suffered from a number of faults during this quarter and into the third, and the ESU has made a number of visits to effect repairs. The performance of this analyser will be closely monitored.

## 4.5 Wales

### Data Capture

The data capture for sites in Wales for the period April-June is given in Table 4.5:

**Table 4.5: Data capture for Wales: April-June 2008**

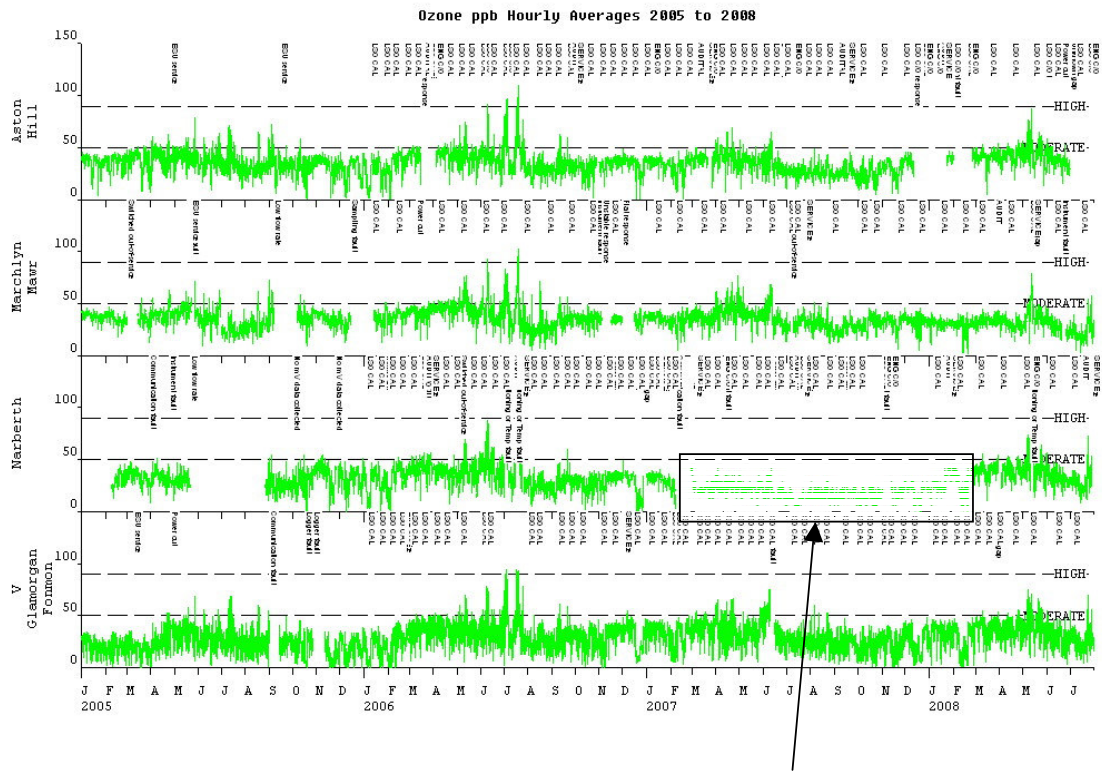
Site	Owner	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>Wales</b>								
Aston Hill	DEFRA	-	-	-	84.2	98.1	-	91.2
Cardiff Centre	DEFRA	99.9	90.3	-	99.9	99.8	99.9	98.0
Chepstow A48	Affiliate	-	99.6	-	98.6	-	-	99.1
Cwmbran	Affiliate	-	-	-	55.6	56.3	-	56.0
Narberth	DEFRA	-	94.0	-	94.1	94.1	86.8	92.3
Port Talbot Margam	Affiliate	80.7	90.8	97.8	98.3	98.4	98.4	94.1
Swansea Roadside	Affiliate	-	99.3	96.2	99.8	-	-	98.4
Wrexham	DEFRA	-	82.4	-	99.6	-	95.1	92.4
<b>Number of sites</b>		2	6	2	8	5	4	8
<b>Number of sites &lt; 90%</b>		1	1	0	2	1	1	1
<b>Network Mean (%)</b>		90.3	92.7	97.0	91.3	89.3	95.0	90.2

**Site Specific Issues**

**Narberth**

On close scrutiny, the ozone data from Narberth appears anomalously low for most of 2007 and up to the end of March 2008. This can be seen in Figure 4.2

**Figure 4.2 Ozone concentrations at Narberth, 2005-2008:**



Period of low data

During the period February 2007 to March 2008, the ozone concentration at Narberth is consistently lower than at the other Welsh sites. The low period follows a gap in February 2007, where data was also deleted as it looked anomalous. The analyser passed several audits during this period (albeit with some rescaling) but has a history of reading low. It is not clear what the nature of the fault was.

**Recommendation**

It is recommended that the analysers at this site be replaced as soon as possible

**Cwmbran**

The Cwmbran site suffered from communications problems during the quarter; 40 days data were lost.

#### 4.6 Sites highlighted in previous reports

Several analysers have been highlighted recently as being of concern to the QA/QC unit. An update is given in Table 4.6.

**Table 4.6 Status of Analysers Highlighted in Previous Reports**

Site	Analyser	Fault	Current status
Plymouth	FDMS	High volatile concentration	Now fixed
Ladybower	SO <sub>2</sub>	No calibrations	Calibrations now restarted
Leominster	SO <sub>2</sub>	No SO <sub>2</sub> cylinder	Cylinder now installed
Sheffield Tinsley	NO <sub>2</sub>	Converter and switching valve	Fixed September 2008; considerable data loss anticipated Q3
Auchencorth Moss	FDMS PM <sub>10</sub> and PM <sub>2.5</sub>		Negative data still observed
Aston Hill	O <sub>3</sub>	Noisy data	Logger now fixed
Narberth	O <sub>3</sub>	Anomalous data	QA/QC closely examining data
Cwmbran	NO <sub>x</sub>	Cylinders contaminated	ESU instructed to repair (effected in Q3)
Bush	NO <sub>x</sub>	Poor performance	Replacement analyser recommended
Weybourne	O <sub>3</sub>	No manual calibrations or IZS	No progress reported
Rural CO analysers	CO	Baseline drift	Drift still evident
Various	Rural ozone analysers	Temporary instruments installed some of which have no autocal	Two analysers have been upgraded by the manufacturer and are currently under test by the ESU.

#### 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 the outstanding issues as the majority of these instruments are located at critical sites.

## 5 Sites with Data Capture Below 90%

### 5.1 Sites with Low Data Capture

A summary of the main site analyser operational problems, which have resulted in data capture below the required 90% level during the reporting period April-June 2008 is given in Appendix 2. 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. The table lists all gaps of 6 hours or more for each pollutant.

## 6 Ratified Data Capture Statistics

Table 6.1 provides a summary of the ratified data capture figures for the network for the 3-month period April-June 2008. Data capture values below 90% are shown in the shaded boxes.

**Table 6.1 Ratified Network Data Summary Statistics: April-June 2008**

Site	CO	PM <sub>10</sub>	PM <sub>25</sub>	NO <sub>2</sub>	O <sub>3</sub>	SO <sub>2</sub>	Site Average
<b>Number of sites</b>	26	71	14	106	78	44	122
<b>Number of sites &lt; 90%</b>	5	18	1	17	8	6	27
<b>Network Mean (%)</b>	91.7%	89.7%	95.8%	91.2%	96.5%	92.7%	91.3%

## **Appendices**

Appendix A1: Recommendations for Upgrade or Replacement of Equipment

Appendix A2: Data gaps listing: April-June 2008

Appendix A3: Inventory of Defra-Owned Equipment

Appendix A4: Partisol Data Ratification Report

Appendix A5: Information for new Sites

## Appendix A1

### Recommendations for Upgrade or Replacement of Equipment

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 July 2005. 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 2008	Priority	Action
28	The analysers at Narberth should be replaced as soon as possible, as performance of the current analysers has been poor	High	CMCU
Recommendations August 2008		Priority	Action
27	Many sites require modifications to permit safe roof access for measuring PM analyser flows	High	CMCU
Recommendations January 2008		Priority	Action
26	It is recommended that the Bush NOx analyser be replaced.	High	CMCU
25	It is recommended that LSO's continue to pay particular attention to the NO <sub>2</sub> calibration results, to see whether the NO response is significantly higher (>10ppb) than that obtained for the zero calibration. These observations should be reported to CMCU as soon as possible	High	LSO
24	It is strongly recommended that ESU's clean all NOx analyser switching valves during servicing, and ensure the valve is leak checked afterwards.	High	ESU
Recommendations August 2007			
	None		
Recommendations April 2007			
22	Safe roof access needs to be provided for sites where FDMS TEOMs are to be deployed	High	ESU/CMCU
Recommendations January 2007			
22	ESUs to ensure all NOx converter software settings to be 100%.	High	ESUs to check at service
Recommendations July 2006			
19	Weybourne O <sub>3</sub> analyser should be upgraded to allow monthly LSO calibrations and daily autocalibrations	Medium	ESU to provide CMCU with quotation for necessary work
Recommendations April 2006			
	None		
Recommendations January 2006			

17	The performance of CO analysers needs close attention by all parties, and poorly performing analysers replaced or upgraded	High	LSOs and CMCU to check performance carefully; ESU's to action repairs promptly
<b>Recommendations July 2005</b>			
13	Continuing problems with some autocal run-ons causing loss of up to 2 hours per day-see Section 3.2 <b>CMCU to ensure ESUs are asked to attend to offending sites (Action May 2008)</b>	High	Many sites now cured, but some need attention at next ESU visit



## Appendix A2

### Gaps Listing April-June 2008

Pollutant (%)	Data Capture (%)	Start date	End date	Reason	Comments	Number of days	Number of hours
<b>England</b>							
Brighton Preston Park							
O3	62.90%	17-Apr-08	18-Apr-08	ESU service		1	25
		27-Apr-08	29-May-08	Sampling fault	Orifice flow sensor warning & pump diaphr'm worn	32.5	781
Glazebury							
NO2	0.00%	06-Feb-08	29-Jul-08	Pump fault	Data nulled by QC - Pump fault	174	4178
O3	79.10%	08-Apr-08	08-Apr-08	Power cut	Erroneous flat data caused by power problems	0.3	7
		24-Apr-08	08-May-08	Pump fault	ENG C/O pump failure	14	337
		02-Jun-08	03-Jun-08	Flat response	Flat O3 - LSO fixed	0.8	18
		27-Jun-08	30-Jun-08		Loose connection between logger and analyser	3.3	79
High Muffles							
O3	88.20%	12-Apr-08	15-Apr-08	Unstable response	Baseline skipped down	2.5	59
		05-May-08	12-May-08	Unstable response	ENG C/O Analyser zero flow on arrival	7.3	174
Hull Freetown							
NO2	85.50%	04-Apr-08	14-Apr-08	Instrument fault	O3 generator fault	9.7	232
Leamington Spa							
NO2	57.20%	11-Apr-08	12-Apr-08	No mV data collected	Engineer activity on TEOM	1	25
		12-May-08	13-Jun-08	NO2 converter fault		32.3	775
		25-Jun-08	30-Jun-08	Instrument fault	Heater and power supply failure	5.2	124
Leominster							
SO2	23.60%	01-Jan-08	09-Jun-08	High noise	Very noisy unstable data	160	3851
Liverpool Queen's Drive Roadside							
NO2	78.10%	11-Jun-08	31-Jul-08	No mV data collected	No data collected	50.8	1218
London Cromwell Road 2							
SO2	79.00%	17-Mar-08	03-Apr-08	ESU service		17.1	411
		22-Apr-08	23-Apr-08	No mV data collected	Probable comms failure	0.5	13
		24-Apr-08	25-Apr-08	No mV data collected	Probable comms failure	0.8	19
		04-May-08	04-May-08	No mV data collected	Probable comms failure	0.5	11
		05-May-08	05-May-08	No mV data collected	Probable comms failure	0.4	9
		05-May-08	06-May-08	No mV data collected	Probable comms failure	0.5	13
		09-May-08	22-May-08	Instrument fault	ENG C/O Return M100A after	13.1	314

repair

London Eltham						
NO2	88.10%	14-Apr-08	14-Apr-08 ESU service		0.3	7
		23-May-08	02-Jun-08 Instrument fault	chopper fault	10.1	243
O3	88.00%	15-May-08	25-May-08 Instrument fault	Call out Chopper fault	10.5	253
London Hillingdon						
NO2	43.90%	01-May-08	20-Jun-08 Instrument fault	Reaction chamber fault	51	1224
London Marylebone Road						
O3	89.50%	26-May-08	27-May-08 No mV data collected		1.2	29
		18-Jun-08	26-Jun-08 ESU service	ENG C/O Flow sensor failed. Removed for repair	8	193
			Rapid zero or sensitivity			
SO2	75.20%	22-Apr-08	12-May-08 drift	Rapid zero baseline drift	21	504
		26-May-08	27-May-08 Power cut		1.3	30
Lullington Heath						
SO2	0.00%	01-Jan-08	15-Jul-08 Instrument fault	Photomultiplier fault-data deleted	197	4716
Manchester Piccadilly						
NO2	40.60%	08-May-08	11-Jul-08 NO2 converter fault	Converter efficiency failed at audit NO2 deleted to service.	64.4	1546
Market Harborough						
CO	87.70%	29-May-08	09-Jun-08 Sampling fault	Sample pump fault	11	265
Norwich Centre						
NO2	46.40%	13-May-08	31-Aug-08 Site closed		111	2655
O3	46.40%	13-May-08	31-Aug-08 Site closed		111	2655
SO2	46.30%	13-May-08	31-Aug-08 Site closed		111	2655
Oxford St Ebbes						
NO2	53.60%	31-Mar-08	28-Apr-08 Operator error	suspect a series of LSO errors at cals	28.1	674
		08-Jun-08	13-Jun-08 Instrument fault	gap then unstable response	5.3	128
		20-Jun-08	27-Jun-08 Operator error	LSO had left analyser OOS	7.4	178
Sheffield Tinsley						
NO2	0.00%	01-Jan-08	21-Aug-08 Instrument fault	Switching valve/converter fault	234	5607
Southwark Roadside						
NO2	0.00%	01-Jan-08	31-Aug-08	Site closed	244	5856
St Osyth						
CO	65.10%	30-May-08	03-Jul-08 fault	Air Conditioning or Temp faulty air conditioning affecting CO data.	34.1	818
Walsall Willenhall						
NO2	87.90%	02-May-08	05-May-08 Instrument fault	Truncated data - ozonator fault	4	96
		12-May-08	15-May-08 Instrument fault	Truncated data - ozonator fault	3.4	82
Yarner Wood						

NO2	77.90%	14-May-08	15-May-08	Power cut		0.7	16
		29-May-08	30-May-08	Power cut		1	23
		04-Jun-08	16-Jun-08	Unstable response	Temperature related - air con faults	11.9	286

**N Ireland**

**Belfast Centre**

CO	46.90%	30-Apr-08	17-Jun-08	Instrument fault	Power cut & Flat response.	48.1	1155
NO2	82.80%	02-May-08	14-May-08	Air Conditioning or Temp		11.7	281
		20-May-08	20-May-08	No mV data collected	no mV collected	0.3	7
O3	78.90%	01-May-08	20-May-08	Air Conditioning or Temp		18.9	454
				fault	Site off for aircon repairs		
SO2	82.90%	30-Apr-08	15-May-08	fault	Site off for aircon repairs	15	359
		20-May-08	20-May-08	No mV data collected	no mV data	0.3	7

**Scotland**

**Eskdalemuir**

O3	78.70%	21-Mar-08	01-Apr-08	Instrument fault	ENG C/O Changed input ranges. Was reset after recent powercut	10.8	259		
				05-Apr-08	15-Apr-08			Instrument fault	ENG C/O Replaced faulty ozone instrument
				18-Apr-08	19-Apr-08			Power cut	
				30-Apr-08	01-May-08			Power cut	
				11-May-08	11-May-08			Power cut	
				12-May-08	12-May-08			Power cut	
				18-May-08	18-May-08			Power cut	
				19-May-08	20-May-08			Power cut	
				05-Jun-08	06-Jun-08			Power cut	
				08-Jun-08	08-Jun-08			Power cut	
				09-Jun-08	09-Jun-08			Power cut	
				18-Jun-08	18-Jun-08			Power cut	
				19-Jun-08	19-Jun-08			Power cut	

**Fort William**

NO2	74.80%	03-Apr-08	22-Apr-08	Instrument fault	PMT fault	20	480
		25-Jun-08	26-Jun-08	Operator error	LSO left it out of service	0.7	16

**Glasgow Centre**

CO	56.70%	01-Apr-08	21-Apr-08	Low flow rate	ENG C/O to install hot swop unit.	20.5	493
		14-May-08	20-May-08	Unstable response	Spurious data after cal	6.1	146
		18-Jun-08	16-Jul-08	Instrument fault	Call out: NOx and CO calibration reading low.	27.8	668
NO2	52.30%	11-Apr-08	12-Apr-08	No mV data collected	possible coms failure	1	25
		14-May-08	25-Jun-08	Instrument fault	baseline step change ozone restrictor blocked.	42.2	1012

**Wales**

**Aston Hill**

NO2	84.20%	29-May-08	29-May-08	Power cut		0.5	11
		12-Jun-08	12-Jun-08	Power cut		0.5	11
		21-Jun-08	21-Jun-08	Power cut		0.4	10

**Cwmbran**

NO2	55.60%	21-May-08	30-Jun-08	Communication fault		40.1	962
O3	56.30%	22-May-08	30-Jun-08	No mV data collected	comms problem	39.7	952

Narberth						
SO2	86.80%	30-Mar-08	02-Apr-08	Power cut		3.7 89
		05-May-08	14-May-08	Air Conditioning fault		9.7 233
Port Talbot Margam						
CO	80.70%	22-Apr-08	29-Apr-08	Instrument fault	Sync motor fault replaced parts at ET analyser returned	7 167
		20-May-08	27-May-08	Low flow rate	ENG C/O Flow low. Tubing replaced	7.6 183
		25-Jun-08	27-Jun-08	Power cut		2.7 65

## 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, August 2007

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 API model 401 s/n 151 - purchased October 2000 API model 401 s/n 176 – purchased December 2002 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 Sabio 2010 dilution calibrator – purchased June 2006 Sabio 2020 zero air generator – purchased June 2006 Sabio 2030 ozone photometer – purchased June 2006 Sabio 2020 zero air generator – purchased March 2008 Sabio 2030 ozone photometer – purchased March 2008 Sabio 2010 dilution calibrator – purchased March 2008
Zero air pumps	6 spare zero air pumps for routine maintenance/repair of zero air generators in the AURN.
Analysers	AC31 dual chamber NO <sub>x</sub> analyser TEI 43C SO <sub>2</sub> 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

### Partisol Data Ratification

Final ratification of the Partisol data are delayed until the outcome of the current detailed investigations on all previous UK Partisol data are completed. The investigation focuses on a possible weighing anomaly which appears to have affected blank weighings, leading to over-estimation of PM concentration.

View at:

[http://www.airquality.co.uk/archive/reports/cat09/0806161031\\_080528\\_Trends\\_in\\_Gravimetric\\_PM\\_Measurements\\_in\\_the\\_UK.pdf](http://www.airquality.co.uk/archive/reports/cat09/0806161031_080528_Trends_in_Gravimetric_PM_Measurements_in_the_UK.pdf)

Site	Start date	End date	Data Capture, %
Auchencorth Moss PM <sub>10</sub>	1st April	30th June	82
Auchencorth Moss PM <sub>2.5</sub>	1st April	30th June	84
Bournemouth PM <sub>10</sub>	1st April	30th June	100
Brighton Roadside PM <sub>10</sub>	1st April	6 <sup>th</sup> May	36
Brighton Preston Park PM <sub>2.5</sub>	31 <sup>st</sup> May	30th June	35
Inverness PM <sub>10</sub>	1st April	30th June	99
London Marylebone Road PM <sub>10</sub>	1 <sup>st</sup> May	30th June	43
London Marylebone Road PM <sub>2.5</sub>	22 <sup>nd</sup> May	30th June	39
London N Kens PM <sub>10</sub>	6 <sup>th</sup> May	30th June	22
London N Kens PM <sub>2.5</sub>	7 <sup>th</sup> May	30th June	58
London Westminster PM <sub>10</sub>	1st April	30th June	88
Port Talbot Margam	1st April	30th June	98
Wrexham	1st April	30th June	75

The following sites changes have taken place:

- Brighton Roadside PM<sub>10</sub>: closed as of 31<sup>st</sup> May and relocated to Brighton Preston Park as a PM<sub>2.5</sub> site.
- Dumfries PM<sub>10</sub>: closed at end of 1<sup>st</sup> quarter.
- London Marylebone Road: started 1<sup>st</sup> May for PM<sub>10</sub> and PM<sub>2.5</sub>.
- London North Kensington: started 6<sup>th</sup> May for PM<sub>10</sub> and PM<sub>2.5</sub>.
- Port Talbot Margam: started up 1<sup>st</sup> April for PM<sub>2.5</sub> only.

#### Data Rejection

Data codes are recorded during ambient measurement, and filter faults are recorded during filter weighings. Some codes indicate a fatal fault and are used to automatically reject data during ratification.

**Measurement codes are shown below.**

The measurement codes reported by BV are as follows:

<b>New Code</b>	<b>Meaning</b>	<b>Reject</b>
0	OK	No
8	Power Failure	Yes
4	System re-set	Only if < 18h data.
10	Flow 1 out of range	Yes
20	Flow 2 out of range	Yes
40	Flow 3 out of range	Yes
2000	Difference between ambient T and filter T > $\pm 5^{\circ}\text{C}$	No
10000	Elapsed sample period out of range/out of filters	Reject if < 18h data.
40000	Coefficient of variation of average flow too high (i.e. too much variation in flow)	If not caused by "audit" status e.g. inlet cleaning. Or if < 18h data.
100000	Elapsed Sample Period out of range (< 23 hours or >25 hours).	Reject if < 18h data.
102000	Difference between ambient T and filter T > $\pm 5^{\circ}\text{C}$ , causing Elapsed Sample Period out of range (< 23 hours or >25 hours).	Reject only if < 18h valid data or vol < 18 m3.
100008	Elapsed Sample Period out of range (< 23 hours or >25 hours), <i>and</i> Power Failure.	Yes (power failure)

The following faults should also be recorded during filter weighings and should be indicated by BV in their spreadsheet under "Lab Comments". All are fatal except "filter inverted".

**Filter faults**

Filter exposed inverted
Filter cut inside edge
Filter damaged some missing
Filter appears unexposed
Filter not returned
Filter inverted and in reverse order in canister

**Site Audits**

Site audit results for the AURN Partisols are shown in the table below. Audits take place every 6 months, so there may not necessarily have been an audit during the "quarter" currently being ratified. The table below therefore shows the two most recent audits.

The flowrate must be within +/-10% of the nominal value (16.7 m3/h) and the leakage must be < 5%.

**Site Audits – Winter 2008 and Summer 2008 periods.**

Site	Audit date	Flowrate m3/h	% out from 16.7 m3/h	Leak test %
Auchencorth Moss PM <sub>10</sub> (serial no. 21550)	13 Feb 2008	16.77	0.6	"pass"
	19 Jun 2008	16.96	1.74	"pass"
Auchencorth Moss PM <sub>2.5</sub> (serial no. 21548)	13 Feb 2008	16.35	-1.92	"pass"
	19 Jun 2008	16.56	-0.66	"pass"
Bournemouth PM <sub>10</sub> (serial no. 21257)	07 Feb 2008	15.71	-5.76	"pass"
	06 Aug 2008	16.64	-0.18	NOT RECORDED
Brighton Roadside PM <sub>10</sub>	06 Mar 2008	16.72	0.14	"pass"
Brighton Preston Park PM <sub>2.5</sub>	02 Sep 2008	Partisol not audited.	-	-
Inverness PM <sub>10</sub> (serial no. 21255)	23 Jan 2008	16.71	0.24	"pass"
	25 Jun 2008	16.76	0.54	"pass"
London Marylebone Road PM <sub>10</sub> (serial no. 21306)	11 Aug 2008	Partisols appeared not working.	-	-
London Marylebone Road PM <sub>2.5</sub> (serial no. 21493)	11 Aug 2008	Partisols appeared not working.	-	-
London N Kens PM <sub>10</sub> (serial no. 21722)	22 Jul 2008	Partisol not audited?	-	-
London N Kens PM <sub>2.5</sub>	22 Jul 2008	Partisol not audited?	-	-
London Westminster PM <sub>10</sub>	13 Jan 2008	Partisol not audited	?	?
	13 Aug 2008	16.10	-3.42	NOT RECORDED
Port Talbot Margam PM <sub>2.5</sub>	15 Jul 2008	17.17	2.80	"pass"
Wrexham (serial no. 212240)	11 Feb 2008	16.03	-3.84	NOT RECORDED
	11 Aug 2008	15.93	-4.44	NOT RECORDED

All audit results normal except –

- Bournemouth PM10: leak test result not recorded at August audit
- Brighton Preston Park: Partisol not included in August site audit, on advice of LSO.
- London Marylebone Rd. Partisols not working at time of August site audit.
- London N. Ken. Partisols apparently not checked at August site audit.
- London Westminster: not audited in Jan 2008 as building work prevented access to site. Leak test result not recorded at August audit.
- Wrexham: leak test result not recorded at either audit.

It is recommended that if a test is missed for any reason, the reason should be recorded on the audit sheet. Also, leak test results should be recorded, not just pass/fail.



**Auchencorth Moss**

PM<sub>10</sub>: Data capture was 82.4% for this quarter. Data losses as follows:

18<sup>th</sup> – 21<sup>st</sup> April: comms failure.

22<sup>nd</sup> May & 26<sup>th</sup> – 30<sup>th</sup> May: filter exchange failures. An engineer visited the site on 30<sup>th</sup> May.

5<sup>th</sup> – 9<sup>th</sup> June: reason unspecified – Partisol apparently not operating.

PM<sub>2.5</sub>: Data capture was 83.5% for this quarter.

2<sup>nd</sup> April: < 18h sampling

18<sup>th</sup> – 23<sup>rd</sup> April: comms & filter exchange failures.

4<sup>th</sup> – 7<sup>th</sup> May: filter exchange failure.

24<sup>th</sup> Jun: < 18h sampling.

**Bournemouth**

PM<sub>10</sub> only: Data capture in this quarter was 100%.

**Brighton Roadside**

PM<sub>10</sub> only: Data capture in this quarter was 36.3%. Data losses:

- 21<sup>st</sup> Apr: scratched filter
- 22<sup>nd</sup> Apr: filter exchange failure
- 6<sup>th</sup> May: switched off for relocation.

**Brighton Preston Park**

PM<sub>2.5</sub> only. Switched from PM<sub>10</sub> on 30<sup>th</sup> May. Data capture for quarter 35.2%. No data losses.

**Inverness**

PM<sub>10</sub>: Data capture = 98.9% Data losses:

- 15<sup>th</sup> May: delayed filter change & error in final weighing.

**London Marylebone Road**

Site started up on 1<sup>st</sup> May but was affected by various problems reducing data capture.

PM<sub>10</sub>: Data capture = 42.8%. Data losses:

- 14<sup>th</sup> – 28<sup>th</sup> May: memory corruption and filter exchange failures.
- 31<sup>st</sup> May, 3<sup>rd</sup> June – unexplained, data corruption?
- 12<sup>th</sup> Jun damaged filter
- 25<sup>th</sup> – 27<sup>th</sup> Jun filter exchange failures

PM<sub>2.5</sub>: first valid data after startup was 22<sup>nd</sup> May. Data capture 38.9%. Data losses:

- 26<sup>th</sup> May, power failure
- 27<sup>th</sup> May filter exchange failure
- 21<sup>st</sup> & 23<sup>rd</sup> Jun damaged filters
- 25<sup>th</sup> Jun unexplained. Looks like Partisol off.

### London North Kensington

Site started up on 1<sup>st</sup> May. However, like Marylebone Road, the PM<sub>10</sub> unit was affected by initial problems reducing data capture.

PM<sub>10</sub>: This site was switched on 6<sup>th</sup> May. However, initial pump problems were not resolved until early June, hence a data capture of 21.9%. Data losses:

- 6<sup>th</sup> May – 11<sup>th</sup> June: pump problems.
- 30<sup>th</sup> Jun: filter exchange failure.

PM<sub>2.5</sub>: site switched on 7<sup>th</sup> May, and unlike the PM<sub>10</sub> unit was largely problem-free in its first weeks. Data capture was 58.2%. Data losses:

- 21<sup>st</sup>, 22<sup>nd</sup> May: < 18h valid sampling.

### London Westminster

PM<sub>10</sub> only: Data capture = 87.9%. Data losses:

- 1<sup>st</sup> - 2<sup>nd</sup> & 5<sup>th</sup> - 8<sup>th</sup> Apr: filter exchange failures.
- 12<sup>th</sup> – 14<sup>th</sup> & 19<sup>th</sup> Apr: power failures.
- 28<sup>th</sup> May: routine service reduced valid sampling time to < 18h.

### Port Talbot Margam

This site started up on 1<sup>st</sup> April for PM<sub>2.5</sub> only: data capture = 97.8%. Data losses:

- 27<sup>th</sup> – 28<sup>th</sup> Jun: power failure.

### Wrexham

Data capture was 75.0%. Data losses:

- 29<sup>th</sup> April: inlet cleaning reduced valid sampling time to < 18h.
- 13<sup>th</sup> – 27<sup>th</sup> May: error in final weighing – filters mixed up.

# Appendix A5

## Site Details for New Sites

Site Name	Pollutants	Grid	East	North	Latitude	Longitude	Altitude m	Sample Ht m
Horley	NO <sub>2</sub>	SE England	TQ 28203 42431	528203	142431	51 09 57N 00 10 04W	57	3
Stewartby	SO <sub>2</sub>	East Anglia	TL 02165 42570	502165	242570	52 04 19N 00 30 40W	38	3
York Bootham	PM <sub>10</sub>	NE England	SE 59974 52278	459974	452278	53 57 47N 1 5 14W	11	3
York Fishergate	NO <sub>2</sub> PM <sub>10</sub>	NE England	SE 60744 51133	460744	451133	53 57 07N 1 4 33W	11	3
Oxford St Ebbes	NO <sub>2</sub> PM <sub>10</sub>	Midlands	SP 51200 05400	451200	205400		--	--
Newport	NO <sub>2</sub> PM <sub>10</sub>	Wales	ST 32471 89615	332471	189615	51 36 04N 02 58 37W	24	3
Chepstow A48	NO <sub>2</sub> PM <sub>10</sub>	Wales	ST 53126 93461	353126	193461	51 38 17N 02 40 43W	67	--
Aberdeen Union Street Roadside	NO <sub>2</sub>	Scotland	NJ 93660 05947	393660	805947	57 08 40N 02 06 23W	26	2
Stanford-le-Hope Roadside	NO <sub>2</sub> PM <sub>10</sub> SO <sub>2</sub>	SE England	TQ 69400 82710	569400	182710	51 31 5N 00 26 22E	18	3
Carlisle Roadside	NO <sub>2</sub> PM <sub>10</sub>	NW England	NY 39442 55956	339442	555956	54 53 41N 02 56 45W	11	3
Leeds Headingley Kerbside	NO <sub>2</sub> PM <sub>10</sub>	NE England	SE 27991 36071	427991	436071	53 49 12N 01 34 35W	85	3
Newcastle Cradlewell Roadside	NO <sub>2</sub>	NE England	NZ 25989 65850	425989	565850	54 59 11N 01 35 55W	42	3
Chesterfield Roadside	NO <sub>2</sub> PM <sub>10</sub>	Midlands	SK 36349 70657	436349	370657	53 13 54N 1 27 25W	94	--
Chesterfield (Queens Park) Sandy	NO <sub>2</sub> PM <sub>10</sub> PM <sub>2.5</sub>	Midlands	SK 37909 70545	437909	370545	53 13 50N 1 26 1 W	98	--
Saltash	PM <sub>10</sub> PM <sub>2.5</sub>	Eastern	TL165496	516450	249616	52 07 56N 0 18 1 W	22	
Charlton Mackrell	NO <sub>2</sub> O <sub>3</sub>	South West	SX416594	241613	659402	50 24 47N 4 13 49W	61	
		South West	ST 52235 28853					

