



QA/QC Data Ratification Report for the Automatic Urban and Rural Network, April-June 2009

**Report produced for the Department for
Environment, Food and Rural Affairs, Scottish
Government, Welsh Assembly Government and
the DoE in Northern Ireland**

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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 93.4% for all pollutants (O_3 , NO_2 , SO_2 , CO , PM_{10} and $PM_{2.5}$) during the 3-month reporting period April-June 2009. Data capture rates for all pollutants were above 90%. There were 26 sites with data capture less than 90% for the period.

The number of monitoring sites in the AURN during this quarter was 127, of which 67 are Local Authority owned sites affiliated to the national network. Some are colocated gravimetric particulate analysers at sites with automatic analysers.

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 to help improve network performance is given in Appendix 1.

Substantial changes have been made to the AURN network since 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 (2008/50/EC). Considerable progress has been made in implementing these changes though they will still take some time to complete. Six additional analysers (including two new sites) were commissioned this quarter.

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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 2009. During this period there were 127 operational monitoring sites in the Network of which there are 92 urban sites, 27 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 60 Defra-funded sites and 67 affiliate sites. Eleven sites have non-automatic particulate samplers (Partisols); some of these are collocated with FDMS analysers at Auchencorth Moss, Harwell, London North Kensington and Marylebone Road for both PM₁₀ and PM_{2.5}.

1.1 Overview of Network Performance

Ratified hourly average data capture for the network averaged 93.4% for all pollutants (O₃, NO₂, SO₂, CO, PM₁₀ and PM_{2.5}) during the 3 month reporting period April-June 2009 (see Table 1.2). All pollutants were 90% or higher data capture, except PM_{2.5}. Data capture rates are calculated using the actual data capture as hourly averages (daily for Partisol) against the total number of hours (or days) in the relevant period; service and maintenance are counted as lost data. For sites starting or closing, the data capture is based on the actual date starting or closing.

Table 1.2: AURN Ratified Data Capture (%) by Quarter, 2009 (Using the start date of any new site)

	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Mean
Q1 2009	92%	89.2%	86.6%	90.6%	94.4%	96.5%	91.2%
Q2	96.5%	90.9%	85.6%	94.1%	97.2%	97.2%	93.4%

Overall, 314 out of the 385 analysers (82%) achieved data capture levels above the required 90% target during this reporting period (See Table 1.3).

Table 1.3: Number of Analysers with Data Capture below 90%

Total Number Of Analysers		Q1 Jan-Mar 2009 (No. below 90%)	Q2 Apr-Jun 2009 (No. below 90%)
CO	26	7	2
NO ₂	109	21	15
O ₃	78	12	7
PM ₁₀ ¹	66	17	17
PM _{2.5} ¹	66	22	27
SO ₂	43	2	3
Total <90%		81	71

1. Includes TEOM, FDMS, BAM and Partisol analysers.

In total, 26 out of the 127 operational network sites in the quarter (20%) had an average data capture rate below the required 90% level for the April-June 2009 period. This is influenced by the fact that new analysers at existing sites have data capture figures calculated from the start date of the quarter, not from the start of the analyser itself. The sites with overall data capture below 90% 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.

Table 1.4: Sites with Average Data Capture < 90%, April-June 2009

Site	Site Average	Principle Reason for Loss
England		
Birmingham Tyburn Roadside	77.5	PM _{2.5} FDMS drier fault
Camden Kerbside	85.6	Data deleted due to site overheating
Canterbury	70.3	Analyser electronics fault
Chesterfield Roadside	87.5	Temperature related faults
Harwell PARTISOL	89.0	See Partisol report at Appendix 4
Ladybower	86.2	Power cuts
Leeds Headingley Kerbside	77.1	Poor quality PM _{2.5} FDMS data
London Harlington	69.4	Faulty NOx amplifier board
London Hillingdon	88.7	Temperature faults
London Marylebone Road PARTISOL	80.8	See Partisol report at Appendix 4
London N. Kensington PARTISOL	74.2	See Partisol report at Appendix 4
Plymouth Centre	65.2	PM ₁₀ FDMS fault
Salford Eccles	82.7	Poor quality NOx data
Sandy Roadside	87.8	Unstable NOx and PM data deleted by CMCU
Stanford-le-Hope Roadside	66.8	High PM ₁₀ and PM _{2.5} FDMS noise and high sample dewpoints
Sunderland Silksworth	81.9	Noisy PM _{2.5} ; power cuts
Tower Hamlets Roadside	78.6	CO analyser removed for repair
Weybourne	84.2	Spurious low data deleted
York Bootham	89.1	High internal temperature
N Ireland		
Derry	76.7	Poor PM ₁₀ and PM _{2.5} FDMS performance
Lough Navar	89.9	O ₃ analyser replaced
Scotland		
Aberdeen	79.5	Noisy PM _{2.5} data deleted
Glasgow Kerbside	69.9	Noisy PM ₁₀ and PM _{2.5} FDMS data deleted
Grangemouth	78.6	Site turned off due to overheating
Wales		
Port Talbot Margam PM _{2.5}	82.4	See Partisol report at Appendix 4
Swansea Roadside	81.9	Poor PM _{2.5} FDMS performance; analyser removed for repair
Number of sites < 90%	26	

1.2 LSO Manual

As noted in Section 1.1, the LSO Manual has been extensively updated in March 2009 to include a section on the FDMS analysers and updates to the Partisol section Instructions for new analyser types recently introduced into the network are also available.. LSOs who operate any of these analysers should now use the new version of the manual.

During the site upgrade process, many sites have been equipped with analysers of more than one manufacturer, and LSOs for these sites will need several of the individual sections to cover all their equipment. For this reason, and for environmental reasons, printed copies will no longer be provided, but all relevant sections are available on the UK Air Quality Archive at <http://www.airquality.co.uk/reports/empire/lsoman/lsoman.html>.

1.3 AURN Hub

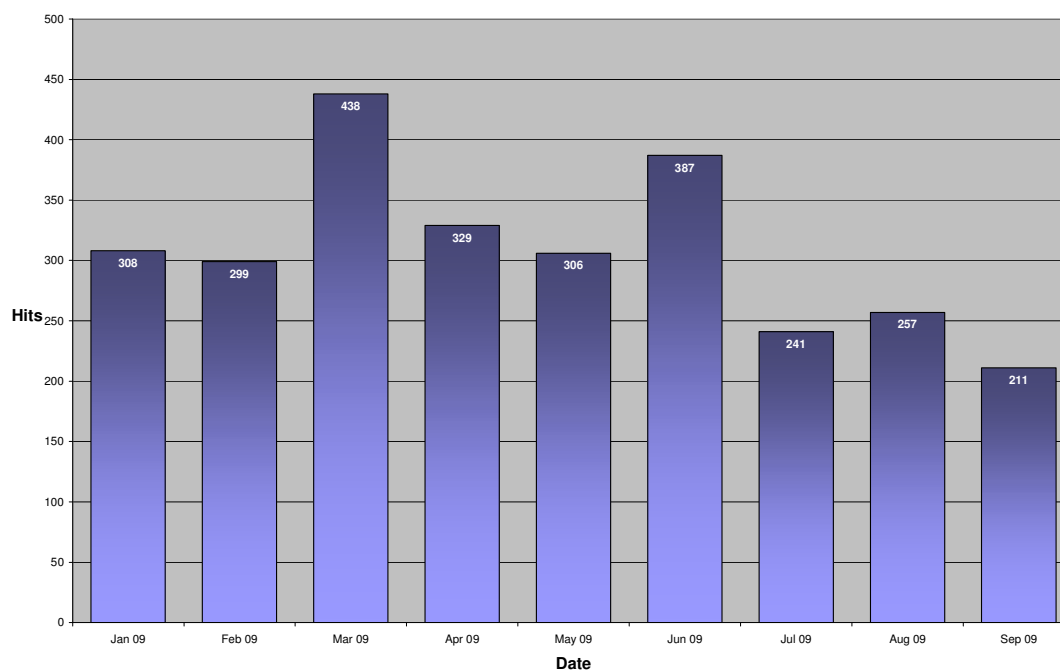
The AURN project information hub is located at¹: <http://www.aurnhub.co.uk/>

The site is regularly updated and some of the more recent information includes:

- Monthly PM₁₀ (Gravimetric) exceedences up to May 2009 (provisional);
- QA/QC Unit's Data Ratification and Intercalibration Report Jan-March 2009
- CMCU Quarterly report, January-March 2009
- Recent news items; and
- Updated version of the LSO manual.
- Site cylinder concentrations and pressures updated weekly

The Hub has continued to provide a valuable source of information for interested organisations as shown in Figure 1.1.

Figure 1.1: AURN Hub Hits 2009



1.4 AURN QA/QC Manual

The QA procedures used throughout the AURN network have been documented by AEA and BV. This document covers a wider range of procedures than covered in this report. The QA/QC manual can be downloaded at http://www.airquality.co.uk/reports/reports.php?report_id=574

1.5 Status of Ratified Data

Once all the ratification checks and corrections have been made then the data are loaded to the Air Quality Archive with a status flag of "Ratified".

¹ Password protected site: username and password available to LSOs and ESUs from rachel.yardley@aeat.co.uk

It should however be noted that there are occasionally circumstances where data which have been flagged as "Ratified" could be subject to further revision. This may be for example where:

- A QA/QC audit has detected a problem that affects data back into an earlier ratification period.
- Long-term analysis has detected an anomaly between expected and measured trends which requires further investigation and possible data correction. This was the case with 2000-2008 gravimetric particulate monitoring data in the UK national network.
- Further research comes to light that indicates that new or tighter QA/QC criteria are required to meet the data quality objectives. This may require review and revision of historical data by applying the new criteria.

Any further necessary corrections to an annual data set are, as far as possible, made before the UK results are sent to the European Commission in September of the following year.

In the event that there is a strong case for modifying datasets already sent to the European Commission, this will usually require widespread consultation and agreement before implementation.

An example is the correction of UK gravimetric PM₁₀ monitoring data from 2000 to 2008, which was widely consulted on. The corrected data are now on the Air Quality Archive database and the revised dataset will be submitted to the Commission in September 2009.

Significant changes to ratified data will be described on the archive and in future QA/QC reports.

An initial description of the ratification procedures for FDMS data is given in the 2006 QA/QC Annual Report. Since then, procedures for ratification have been refined in light of experience by all parties involved; these are described in Section 12.3 of the 2008 Annual Report. On-site procedures by LSOs, ESUs and QA/QC Unit have also been revised for optimal instrument performance and reliability. LSOs should now follow these new procedures.

1.6 EU Directive Siting Criteria

The sites currently in the Automatic Urban and Rural Network (AURN) have been assessed for compliance with the requirements of the EU Directive on ambient air quality 2008/50/EC. This places requirements on site location and sampling criteria, which must be met by all sites used to ensure the UK's compliance with the Directive. The report is available at http://www.airquality.co.uk/reports/cat13/0909101231_Siting_Criteria_Report_Sept09.pdf

Of the 127 sites in the network as of July 2009 and several which have yet to be commissioned into the network, eight have been identified as not fully meeting the requirements. These are:

Brighton Roadside
Bristol Old Market
Bury Roadside
Great Dun Fell
Leicester Centre
London Cromwell Road 2
Sandwell West Bromwich
Weybourne

The reasons for non-compliance are described and possible solutions provided.

2 Changes in the Network for Directive Compliance

The QA/QC Unit and the Central management and Control Unit (CMCU), 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 Directive (2008/50/EC). There is a requirement for a minimum level of monitoring in each agglomeration and zone, and there is a need to measure PM_{2.5} 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 is no longer meaningful and 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. Southwark Roadside has been out of commission since early 2006, and has been removed from the reported statistics.

Table 2.1: Sites Added to the AURN Since 1 January 2009

Site	Pollutant	Date started
Birmingham Tyburn Roadside	NO ₂ O ₃ PM ₂₅ PM ₁₀	11/02/09
Grangemouth Moray	NO ₂	01/06/09
Blackburn Darwen Roadside	NO ₂	15/06/09

In addition, several existing sites have had additional analysers (mainly PM_{2.5}) installed to ensure compliance. The analysers are listed in Table 2.2:

Table 2.2: Additional Analysers installed for Directive Compliance from 1 Jan 2009

Site	Pollutant	Date started
Aberdeen	PM _{2.5}	20/02/09
Blackpool Marton	PM _{2.5}	28/01/09
Bournemouth	PM _{2.5}	01/01/09
Bury Roadside	PM _{2.5}	07/05/09
Camden Kerbside	PM _{2.5}	19/02/09
Carlisle Roadside	PM _{2.5}	17/03/09
Glasgow Kerbside	PM _{2.5}	28/05/09
Haringey Roadside	PM _{2.5}	18/02/09
Leeds Headingley Kerbside	PM _{2.5}	02/04/09
Manchester Piccadilly	PM _{2.5}	15/01/09
Preston	PM _{2.5}	27/01/09
Sandy Roadside	PM _{2.5}	27/01/09
Southend-on-Sea	PM _{2.5}	30/01/09
Stanford-le-Hope Roadside	PM _{2.5}	01/04/09
Stockton-on-Tees Eaglescliffe	PM _{2.5}	21/01/09
Wirral Tranmere	PM _{2.5}	28/01/09

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

An equipment upgrade programme is underway to provide equipment that is demonstrated to be an equivalent measurement to the reference method. Annex vi of the EU Directive 2008/50/EC defines the reference methods and the procedure for demonstration of equivalence with these

The reference methods specified are those developed by CEN and published in the UK through British Standards. In compliance with Annex vi, D, all new equipment introduced into the network complies with the reference method or has been demonstrated to be equivalent. Going forward, there is a rolling programme to replace all monitoring equipment in the network with reference or equivalent methods by Jun 2013 – as required by the Directive. For the gaseous analysers, the relevant Standard Methods include a requirement for type testing and approval. The mechanism in the UK to conform to this is described in Section 5.2 of the AURN QA/QC manual. Further details are available in Section 1.5.

A list of current approved equipment is available on the Sira website
<http://www.siraenvironmental.com/UserDocs/mcerts/MCERTSCertifiedProductsCAMS.pdf>

3 Generic Data Quality Issues

3.1 Gravimetric PM₁₀ and PM_{2.5} Data

Six Gravimetric PM₁₀ analysers and ten gravimetric PM_{2.5} analysers (Partisol 2025s) are currently located at eleven sites in the network. These are listed below. Provisional data capture for the gravimetric PM (Partisol) analysers for the period April-June 2009 is given in Table 3.1. Six of the gravimetric analysers for which data are available did not reach the 90% data capture target in this quarter. The data remain provisional whilst the necessary QA checks are completed.

Table 3.1: Gravimetric PM₁₀ and PM_{2.5} Data Capture (%) April-June 2009

Site	Provisional Data Capture, %
Auchencorth Moss PM _{2.5}	84
Auchencorth Moss PM ₁₀	95
Bournemouth PM _{2.5}	90
Brighton Preston Park PM _{2.5}	81
Harwell PM _{2.5}	77
Harwell PM ₁₀	100
Inverness PM _{2.5}	100
Inverness PM ₁₀	97
London Marylebone Road PM _{2.5}	81
London Marylebone Road PM ₁₀	73
London N Kens PM _{2.5}	95
London N Kens PM ₁₀	78
London Westminster PM _{2.5}	100
Northampton PM _{2.5}	98
Port Talbot Margam PM _{2.5}	75
Wrexham PM ₁₀	98

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.

In 2008, evidence emerged that the Partisol sampling and analysis method was overestimating ambient particle concentrations, despite the filters (Whatman QMA quartz) being conditioned (to a standard temperature and humidity level) before each weighing.

After investigation and consultation it was decided that a "field blank" correction - based on filters that had been placed in the sampler but not actually used - should be subtracted from the measured concentrations. For years up to and including 2007, a monthly field blank correction has been used¹.

This field blank correction has been applied retrospectively, resulting in changes to previously ratified data. **Any daily-measured PM₁₀ or PM_{2.5} data downloaded from the Archive before 1st July 2009 might therefore have changed.**

From January 2008 onwards, blank filters have been routinely included with each fortnightly batch of filters sent to each site. This makes it possible to apply a field blank correction specific to each site and 2-week period, which should provide a more accurate value for the daily mean PM concentration. Again, this correction has been applied retrospectively, so any daily-measured PM₁₀ or PM_{2.5} data downloaded from the Archive before 1st July 2009 may have changed.

Only data for which

- (i) the weighings have been carried out by the current laboratory (i.e. Bureau Veritas) and
- (ii) the filter material was quartz (Whatman QMA)

- have had the blank correction applied. Both field-blank corrected data and uncorrected data are still available for download from the Air Quality Archive.

Finally, during January and February 2009 all AURN sites measuring particulate matter by this method changed to PTFE-bonded glass fibre filters (Emfab), which are expected to offer improved performance. It may prove unnecessary to apply a field blank correction to data obtained using filters of this type. However, pending further investigation, it has been agreed with Defra that both uncorrected and corrected data should be available for download from the Air Quality Archive.

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

- Round-robin of blank filter weighings between BV, AEA and NPL. Three sets of filters and check weights were weighed by all three organisations in April 2009. For the check weights there was no significant difference in results of the three laboratories. Quartz filters, and to a lesser extent, PTFE-coated glass fibre filters, exhibited some issues with conditioning which meant that the three laboratories could not be reliably compared. These issues are currently under consideration within the UK and Europe
- As described above, each batch of 14 days' filters now include a travel (field) blank in the cannister, which is treated exactly the same as the other filters in the batch, but not exposed, to be used for the correction of quartz filters
- Each batch of pre-weighed filters has an associated lab blank, which does not go to the site but stays in a sealed container at the lab for the duration of the exposure period, and is weighed again when the final weighings are done
- Both field and lab blank values are communicated to the QA/QC Unit, who 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 complete, and the outcome will be reported in future QA/QC data ratification reports.

3.2 Auto-calibration Run-on

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 Equipment Service Units (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 17 sites (17 analysers) showing continuing problems with the autocalibration run-on during April-June 2009 are given in Table 3.2. Any autocalibration run-on data that look visibly significant have been deleted from these data sets during ratification.

Table 3.2: Autocalibration Run-ons: April-June 2009

Site	Pollutant	Run-On Conc	Autocal Conc	Hours lost	Months
Aston Hill	NO ₂	1	500	3	Apr-June
Barnsley Gawber	NO ₂	2	200	1	Apr-June
Belfast Centre	NO ₂	4	150	1	Apr-June
Blackpool Marton	NO ₂	1	250	1	Apr-June
Bush Estate	NO ₂	2.3	450	1	Apr-June
Charlton Mackrell	NO ₂	1	180	2	Apr-May
Eskdalemuir	NO ₂	1.7	500	2	Apr, June
				3	May
Glazebury	NO ₂	2.6	150	1	Apr-June
Hull Freetown	NO ₂	3	200	1	Apr-June
Leamington Spa	NO ₂	3	275	1	Apr-June
Liverpool Speke	NO ₂	3	250	1	Apr-June
London Eltham	NO ₂	2	200	1	Apr-June
London Hillingdon	NO ₂	15	900	1	Apr-June
Narberth	NO ₂	0.5	90	1	Apr-June
Newcastle Centre	NO ₂	4	300	1	Apr-June
Oxford Centre Roadside	NO ₂	5	200	1	Apr-May
Plymouth Centre	NO ₂	3	275	1	Apr-June
Sheffield Centre	NO ₂	6	280	1	Apr-June
Walsall Willenhall	NO ₂	3	250	1	Apr-June
Yarner Wood	NO ₂	1.9	200	2	Apr-May
				1	June
Harwell	SO ₂	0.1	175	1	Apr-May

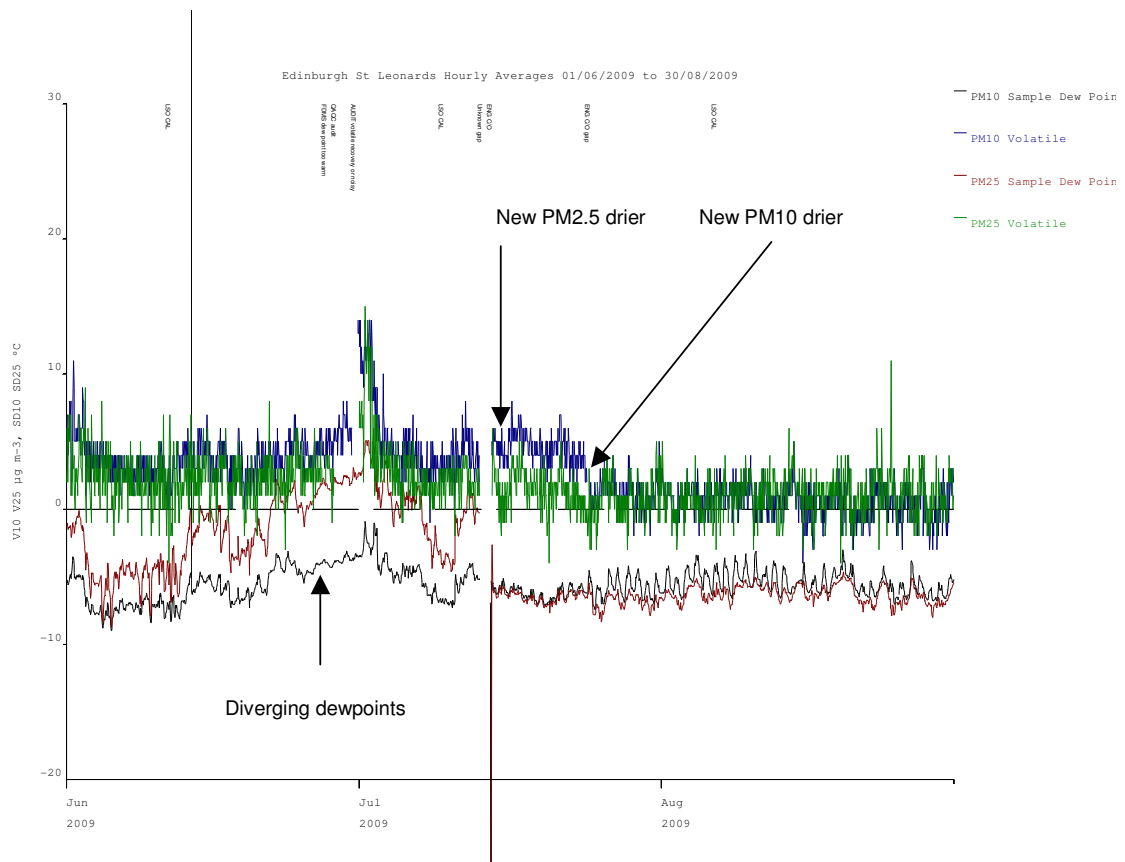
3.3 FDMS Installations

There have been a number of issues affecting the collection of valid data from FDMS analysers as these have been introduced into the network. The CMCU, QA/QC and ESUs have put considerable effort into solving these issues. The overall data capture for PM_{2.5} was 85.6% and for PM₁₀ 90.9%; both considerably lower than for the gaseous analysers. Several FDMS analysers have proved particularly problematic and considerable ESU effort has been required to rectify the problems. Some are as yet unresolved-see Section 4.

It is important that the correct operation of the FDMS driers is checked and maintained. The QA/QC unit have been checking the drier types at the summer 2009 intercalibration exercise, and the ESUs have been asked to provide records of drier upgrades as they occur.

The plots of volatile PM₁₀ and PM_{2.5} alongside sample dew points at Edinburgh St Leonards are shown in Figure 4.2. This shows the sample dew points gradually rising over time, particularly towards the end of June; this corresponded with a period of warm weather. The sample dew points of the PM₁₀ and PM_{2.5} are becoming significantly different during May, which may suggest that the efficiency of the drier is reducing. The original C type driers were replaced with CB types on 14 July (PM_{2.5}) and 24 July (PM₁₀); changes in the profiles of volatile concentrations were observed following the change. This will be looked at in more detail next quarter. This has been observed at other sites in the network following drier replacement.

Figure 4.2 PM₁₀ and PM_{2.5} Volatiles and Sample Dewpoints



. Note slight degradation of PM₁₀ dewpoint following drier change on 24 July

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. Note that many analysers, particularly PM_{2.5} were commissioned during the period, and the stated data capture for these instruments is calculated from the date of commissioning.

4.1 London

4.1.1 Data Capture

The data capture for sites in London (within the M25) for the period April-June 2009 is given in Table 4.1:

Table 4.1: Data capture for London: April-June 2009

Network Data Capture for 01/04/2009 to 30/06/2009 from start date of any new site

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
London								
Camden Kerbside	Affiliate	-	74.6	84.2	99.0	-	-	85.9
Haringey Roadside	Affiliate	-	99.2	98.8	99.6	-	-	99.2
London Bexley	Affiliate	99.9	-	77.9	99.8	-	98.3	94.0
London Bloomsbury	DEFRA	99.9	98.9	98.0	99.8	99.9	99.0	99.2
London Cromwell Road 2	DEFRA	99.2	-	-	99.0	-	99.2	99.2
London Eltham	Affiliate	-	-	91.7	93.1	97.4	-	94.0
London Haringey	Affiliate	-	-	-	93.9	99.1	-	96.5
London Harlington	Affiliate	-	96.3	81.5	0.0	99.8	-	69.4
London Harrow Stanmore	Affiliate	-	-	90.9	-	-	-	90.9
London Hillingdon	DEFRA	-	-	-	79.8	97.6	-	88.7
London Marylebone Road	Affiliate	97.6	96.7	96.5	99.6	93.2	97.3	96.8
London Marylebone Road PARTISOL	DEFRA	-	80.2	81.3	-	-	-	80.8
London N. Kensington	Affiliate	99.3	80.2	99.5	94.1	98.6	97.9	94.9
London N. Kensington PARTISOL	DEFRA	-	53.8	94.5	-	-	-	74.2
London Teddington	Affiliate	-	-	99.4	98.8	99.4	-	99.2
London Westminster	DEFRA	99.3	-	100.0	98.7	80.2	99.5	95.6
Tower Hamlets Roadside	Affiliate	57.8	-	-	99.4	-	-	78.6
Number of sites		7	8	13	14	9	6	17
Number of sites < 90%		1	4	4	2	1	0	6
Network Mean (%)		93.3	85.0	91.9	89.6	96.1	98.5	90.4

Shaded boxes are for data capture < 90%

Bold data captures are for data that are provisional and subject to further quality control

4.1.2 Site Specific Issues

Camden Kerbside

The FDMS analysers performed poorly during May and June due to excessive hut temperatures. Temperatures up to 42C have been recorded during summer 2009.

London Harlington

The NOx analyser suffered from a faulty amplifier board; although the analyser initially appeared to be working normally, following careful scrutiny during the ratification process, data have been deleted from 26 February to 3 July 2009

4.2 England (excluding London)

4.2.1 Data Capture

The data capture for sites in England for the period April-June 2009 is given in Table 4.2:

Table 4.2: Data capture for England (except London): April-June 2009

Network Data Capture for 01/04/2009 to 30/06/2009 from start date of any new site

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
England								
Barnsley 12	DEFRA	-	-	-	-	-	99.7	99.7
Barnsley Gawber	Affiliate	-	-	-	91.0	99.6	99.4	96.7
Bath Roadside	Affiliate	-	-	-	99.0	-	-	99.0
Billingham	DEFRA	-	-	-	98.4	-	-	98.4
Birmingham Tyburn	Affiliate	-	96.4	96.7	97.3	97.4	97.3	97.0
Birmingham Tyburn Roadside	Affiliate	-	87.3	37.4	91.9	93.4	-	77.5
Blackburn Darwen Roadside	Affiliate	-	-	-	95.8	-	-	95.8
Blackpool Marton	DEFRA	-	-	97.5	95.7	99.9	-	97.7
Bottesford	Affiliate	-	-	-	-	99.6	-	99.6
Bournemouth	DEFRA	-	-	90.1	99.7	100.0	-	96.6
Brighton Preston Park	DEFRA	-	-	80.2	98.0	96.2	-	91.5
Brighton Roadside	Affiliate	-	-	-	99.6	-	-	99.6
Bristol Old Market	Affiliate	99.6	-	-	99.6	-	-	99.6
Bristol St Paul's	DEFRA	99.5	99.0	85.8	92.4	99.9	99.9	96.1
Bury Roadside	Affiliate	96.8	88.6	96.1	96.9	-	-	94.6
Cambridge Roadside	Affiliate	-	-	-	99.7	-	-	99.7
Canterbury	Affiliate	-	-	-	70.3	-	-	70.3
Carlisle Roadside	Affiliate	-	97.3	97.3	82.7	-	-	92.5
Charlton Mackrell	Affiliate	-	-	-	94.0	99.8	-	96.9
Chesterfield	Affiliate	-	99.4	88.8	97.9	-	-	95.4
Chesterfield Roadside	Affiliate	-	80.1	-	95.0	-	-	87.5
Coventry Memorial Park	DEFRA	-	-	77.8	99.8	99.9	-	92.5
Exeter Roadside	Affiliate	-	-	-	99.6	99.6	-	99.6

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Glazebury	DEFRA	-	-	-	95.3	97.6	-	96.5
Great Dun Fell	DEFRA	-	-	-	-	92.3	-	92.3
Harwell	DEFRA	-	99.5	97.8	98.5	99.7	96.8	98.5
Harwell PARTISOL	Affiliate	-	100.0	78.0	-	-	-	89.0
High Muffles	DEFRA	-	-	-	99.6	98.5	-	99.0
Horley	Affiliate	-	-	-	99.8	-	-	99.8
Hull Freetown	DEFRA	99.1	98.0	94.7	93.8	99.1	91.4	96.0
Ladybower	DEFRA	-	-	-	87.8	87.9	82.9	86.2
Leamington Spa	Affiliate	-	98.2	95.3	85.3	99.4	98.0	95.3
Leeds Centre	DEFRA	99.6	91.9	97.8	99.8	99.3	99.8	98.0
Leeds Headingley Kerbside	Affiliate	-	93.2	38.5	99.7	-	-	77.1
Leicester Centre	DEFRA	99.7	79.7	98.2	99.9	99.6	99.1	96.0
Leominster	DEFRA	-	-	-	98.5	93.5	98.2	96.7
Liverpool Queen's Drive Roadside	Affiliate	-	-	-	100.0	-	-	100.0
Liverpool Speke	DEFRA	99.7	98.4	99.8	95.6	99.7	99.7	98.8
Lullington Heath	DEFRA	-	-	-	98.1	98.2	97.3	97.8
Manchester Piccadilly	DEFRA	-	-	95.8	96.5	96.3	96.1	96.2
Manchester South	Affiliate	-	-	-	93.0	99.9	-	96.5
Market Harborough	DEFRA	96.0	-	-	99.4	99.4	-	98.2
Middlesbrough	Affiliate	91.7	94.7	79.8	97.8	98.7	99.4	93.7
Newcastle Centre	DEFRA	99.9	99.7	96.5	88.8	99.9	99.9	97.4
Newcastle Cradlewell R/Side	Affiliate	-	-	-	98.2	-	-	98.2
Northampton	Affiliate	-	-	97.8	98.5	98.6	99.7	98.6
Nottingham Centre	DEFRA	-	-	87.9	97.8	99.5	99.5	96.2
Oxford Centre Roadside	Affiliate	-	-	-	98.3	-	-	98.3
Oxford St Ebbes	Affiliate	-	99.8	99.5	99.6	-	-	99.6
Plymouth Centre	DEFRA	-	0.0	-	96.7	98.9	-	65.2
Portsmouth	Affiliate	-	99.0	97.5	99.5	99.7	-	98.9
Preston	DEFRA	-	-	77.7	96.4	98.5	-	90.9
Reading New Town	DEFRA	-	100.0	100.0	96.0	96.1	-	98.0
Rochester Stoke	Affiliate	-	94.0	60.3	99.1	99.1	98.9	90.3
Salford Eccles	Affiliate	99.6	98.1	99.6	0.0	99.5	99.5	82.7
Saltash Roadside	Affiliate	-	99.9	-	-	-	-	99.9
Sandwell West Bromwich	Affiliate	-	-	-	99.9	99.9	99.9	99.9
Sandy Roadside	Affiliate	-	90.8	84.7	88.0	-	-	87.8
Scunthorpe Town	Affiliate	-	98.6	-	99.2	-	88.4	95.4
Sheffield Centre	DEFRA	82.4	65.3	99.5	95.1	99.2	99.8	90.2
Sheffield Tinsley	DEFRA	-	-	-	95.7	-	-	95.7
Sibton	DEFRA	-	-	-	-	98.8	-	98.8
Southampton Centre	DEFRA	99.8	99.6	99.6	99.7	99.8	98.7	99.5
Southend-on-Sea	DEFRA	-	-	99.5	99.5	99.7	-	99.6
St Osyth	DEFRA	98.6	-	-	99.7	97.2	-	98.5
Stanford-le-Hope Roadside	Affiliate	-	56.2	25.8	93.2	-	92.2	66.8
Stockton-on-Tees Eaglescliffe	Affiliate	-	97.8	98.0	96.6	-	-	97.5
Stoke-on-Trent Centre	DEFRA	-	99.7	99.9	82.8	84.0	-	91.6
Sunderland Silksworth	Affiliate	-	-	72.3	85.2	85.2	85.2	81.9

Site	Owner	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
Thurrock	Affiliate	-	98.1	-	99.5	99.7	99.7	99.3
Walsall Willenhall	Affiliate	-	-	-	95.6	-	-	95.6
Warrington	Affiliate	-	96.6	98.8	99.7	-	-	98.4
Weybourne	Affiliate	-	-	-	-	84.2	-	84.2
Wicken Fen	DEFRA	-	-	-	92.9	90.3	99.7	94.3
Wigan Centre	Affiliate	-	-	75.5	98.7	98.6	-	90.9
Wirral Tranmere	DEFRA	-	-	90.0	99.6	99.7	-	96.4
Yarner Wood	DEFRA	-	-	-	91.8	99.6	-	95.7
York Bootham	Affiliate	-	81.6	96.7	-	-	-	89.1
York Fishergate	Affiliate	-	98.6	-	98.2	-	-	98.4
Number of sites		14	35	41	71	50	28	79
Number of sites < 90%		1	8	16	9	4	3	13
Network Mean (%)		97.3	90.7	87.3	94.5	97.4	97.0	94.1

Shaded boxes are for data capture < 90%

Bold data captures are for data that are provisional and subject to further quality control

4.2.2 Site Specific Issues

Birmingham Tyburn Roadside

The PM_{2.5} FDMS drier suffered several problems during the quarter, and was removed for repair.

Canterbury

The NO_x analyser suffered prolonged electronic problems during the quarter, possibly temperature related. Data have been deleted from 1 to 21 April, and again from 24th to 30 April.

Leeds Headingley Roadside

The PM_{2.5} FDMS data were noisy for much of the quarter, and a period of 54 days was deleted during ratification.

Manchester South

The NO_x analyser at Manchester South has given persistently high NO concentrations in NO₂ span gas during 2009. As part of the investigation, the ESU closely examined the internal surfaces of the pneumatics, and discovered substantial contamination. Chemical analysis of this suggests a build-up of chlorine compounds, which results in corrosion of stainless steel. The site has already been fitted with a heated sample inlet to reduce condensation.

Whilst investigations continue, we have requested that a duplicate analyser be run in parallel in order to see if the problem may be replicated, and also to check the quality of the NO_x data collected.

Plymouth Centre

Long-running problems with the PM₁₀ FDMS at Plymouth continued. Significant leaks were found in the analyser, as well as temperature problems due to air conditioning faults. This is still largely unresolved as of October 2009.

Rochester Stoke

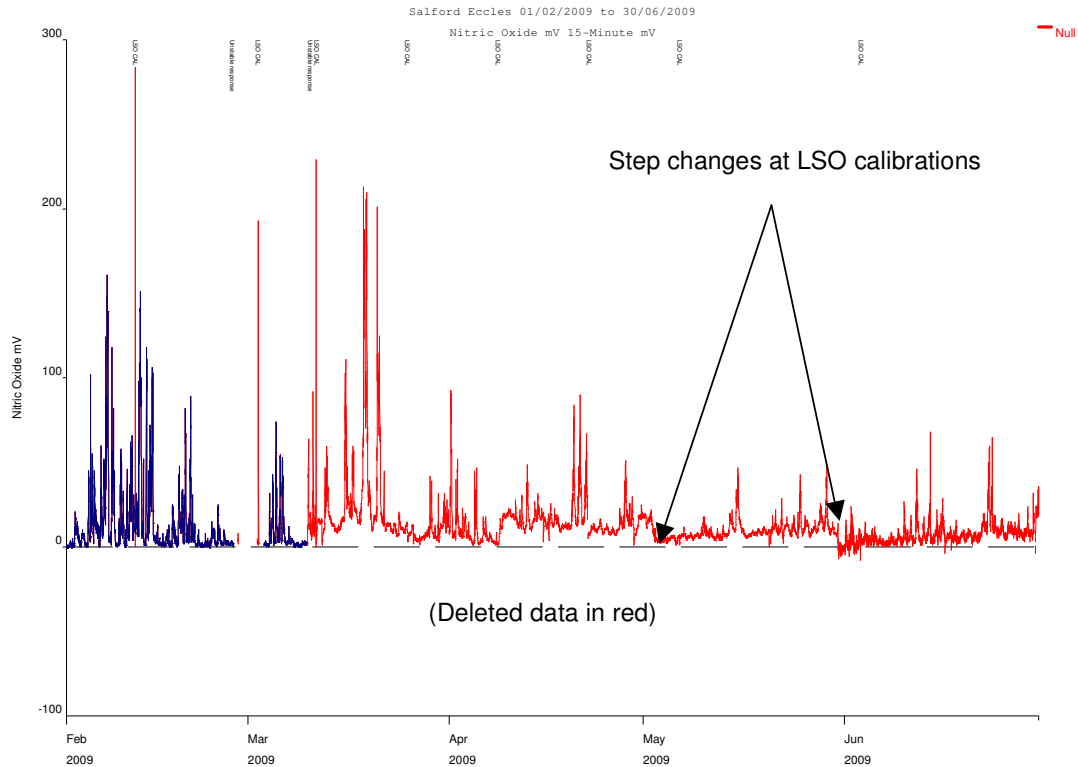
Following upgrade to FDMS, the PM_{2.5} data were noisy from 3 June, and were deleted during ratification.

Salford Eccles

The NO_x analyser at Salford Eccles has continued to perform poorly. The NO baseline shows an unusual profile since 10 March-see Figure 4.1. The baseline appears to change following LSO calibrations. Poor analyser flowrate has been noted at LSO calibrations since January 2009. The NO_x

data have therefore been deleted from 10 March to 30 June, and may continue in the next quarter. Low sample flows are still being reported as of October 2009.

Figure 4.1 Salford Eccles NO Data (mV)



Sheffield Centre

The PM₁₀ FDMS analyser suffered a variety of faults during the quarter, resulting in the loss of a total of 36 days. The CO analyser also had problems continuing from the previous quarter.

Stanford-le-Hope Roadside

The FDMS analysers suffered high noise and dewpoint problems during the quarter; much of the data were deleted.

Sunderland Silkworth

Building works around the site are thought to be responsible for a series of power cuts during June. In addition the PM_{2.5} FDMS was frequently noisy and a significant amount of data have been deleted.

4.3 Scotland

4.3.1 Data Capture

The data capture for sites in Scotland for the period April-June 2009 is given in Table 4.3.

Table 4.3 Ratified Data Capture for Scotland, April-June 2009

Network Data Capture for 01/04/2009 to 30/06/2009 from start date of any new site

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Scotland								
Aberdeen	Affiliate	-	98.8	22.5	98.8	98.7	-	79.7
Aberdeen Union Street Roadside	Affiliate	-	-	-	99.4	-	-	99.4
Auchencorth Moss	DEFRA	-	94.5	83.5	-	93.5	-	90.5
Auchencorth Moss PM ₁₀ PM ₂₅	DEFRA	-	86.6	97.9	-	-	-	92.3
Bush Estate	DEFRA	-	-	-	87.1	99.7	-	93.4
Dumfries	DEFRA	-	-	-	99.6	-	-	99.6
Edinburgh St Leonards	DEFRA	95.1	94.4	96.3	94.9	88.2	93.9	93.8
Eskdalemuir	DEFRA	-	-	-	89.8	99.8	-	94.8
Fort William	DEFRA	-	-	-	99.8	99.8	-	99.8
Glasgow Centre	DEFRA	99.6	95.4	99.7	99.5	99.5	98.2	98.7
Glasgow City Chambers	DEFRA	-	-	-	99.9	-	-	99.9
Glasgow Kerbside	DEFRA	-	89.4	21.8	98.4	-	-	69.9
Grangemouth	Affiliate	-	73.1	85.5	64.3	-	91.3	78.6
Grangemouth Moray	Affiliate	-	-	-	99.4	-	-	99.4
Inverness	DEFRA	-	96.7	100.0	99.7	-	-	98.8
Lerwick	DEFRA	-	-	-	-	99.8	-	99.8
Strath Vaich	DEFRA	-	-	-	-	90.9	-	90.9
Number of sites		2	8	8	13	9	3	17
Number of sites < 90%		0	3	4	3	1	0	3
Network Mean (%)		97.3	91.1	75.9	94.7	96.7	94.5	92.9

Shaded boxes are for data capture < 90%

Bold data captures are for data that are provisional and subject to further quality control

4.3.2 Site Specific Issues

Glasgow Kerbside

The PM_{2.5} FDMS has proved to be noisy since installation in May. Much of the data for the quarter have been deleted. There has also been a possible problem with the NO_x converter efficiency determined in early July; this will be reviewed in the next quarter.

Grangemouth

The site overheated on 20 May, and was subsequently turned off by the LSO from 1 to 8 June. In addition, a NO_x analyser fault resulted in further data losses. The PM₁₀ FDMS installed in May performed poorly and was subsequently completely replaced in early May.

4.4 Wales

4.4.1 Data Capture

The data capture for sites in Wales for the period April-June 2009 is given in Table 4.4.

Table 4.4 Data Capture for Wales, April-June 2009

Network Data Capture for 01/04/2009 to 30/06/2009 from start date of any new site

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Wales								
Aston Hill	DEFRA	-	-	-	87.2	99.7	-	93.5
Cardiff Centre	DEFRA	99.9	99.6	99.1	99.8	99.9	99.8	99.7
Chepstow A48	Affiliate	-	99.5	-	99.7	-	-	99.6
Cwmbran	Affiliate	-	-	-	99.8	100.0	-	99.9
Narberth	DEFRA	-	98.9	-	92.0	95.9	96.1	95.7
Newport	Affiliate	-	86.1	99.5	99.8	-	-	95.2
Port Talbot Margam	Affiliate	99.2	98.9	98.9	99.4	99.4	99.3	99.2
Port Talbot Margam PM _{2.5}	Affiliate	-	-	82.4	-	-	-	82.4
Swansea Roadside	Affiliate	-	99.7	46.1	99.8	-	-	81.9
Wrexham	DEFRA	-	97.8	-	98.4	-	98.9	98.4
Number of sites		2	7	5	9	5	4	10
Number of sites < 90%		0	1	2	1	0	0	2
Network Mean (%)		99.6	97.2	85.2	97.3	99.0	98.5	94.5

Shaded boxes are for data capture < 90%

Bold data captures are for data that are provisional and subject to further quality control

4.4.2 Site Specific Issues

Swansea Roadside

The performance of the PM_{2.5} FDMS was poor during the quarter, with problems caused by low vacuum, temperature faults, leaks and drier faults, ultimately leading to the analyser being removed completely for repair.

4.5 Northern Ireland (including Mace Head)

4.5.1 Data Capture

The data capture for sites in Northern Ireland (including Mace Head) for the period April-June 2009 is given in Table 4.5.

Table 4.5: Data Capture for Ireland, April-June 2009

Network Data Capture for 01/04/2009 to 30/06/2009 from start date of any new site

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
N Ireland								
Belfast Centre	DEFRA	99.7	89.7	99.6	95.5	99.6	99.6	97.3
Derry	Affiliate	-	96.5	0.0	90.5	98.9	97.5	76.7
Lough Navar	DEFRA	-	92.3	-	-	87.6	-	89.9
Ireland								
Mace Head	Affiliate	-	-	-	-	99.7	-	99.7
Number of sites		1	3	2	2	4	2	4
Number of sites < 90%		0	1	1	0	1	0	2
Network Mean (%)		99.7	92.8	49.8	93.0	96.5	98.6	90.9

4.5.2 Site Specific Issues

Derry

The FDMS instruments have continued to experience problems during this quarter. The PM_{2.5} analyser was diagnosed with a mass transducer fault on 15 May, but poor data continued for the remainder of the quarter. All data have been deleted from 12 February.

4.6 Overall Data Capture

Overall data capture for each pollutant across the network is given in Table 4.6

Table 4.6: Data Capture by Pollutant, Entire Network

Site	Owner	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Number of sites		26	61	69	109	77	43	127
Number of sites < 90%		2	17	27	15	7	3	26
Network Mean (%)		96.5	90.9	85.6	94.1	97.2	97.2	93.4

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 2009 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 where overall data capture is below 90%. Note that data capture is calculated for the whole month for each pollutant (except for new sites, which are from the start date), so additional analysers installed during the period will have reduced data captures quoted.

4.7 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 4.7.

Table 4.7: Status of Analysers Highlighted in Previous Reports

Site	Analyser	Fault	Current status
Aberdeen	PM _{2.5}	Pump fault	Now fixed
Aston Hill	NO _x	Autocalibration run-on	Still a serious problem-see section 3.2
Auchencorth Moss	FDMS PM ₁₀ and PM _{2.5}		Negative data still observed, particularly PM _{2.5}
Bush	NO _x	Poor data	Still some faults in Q2
Camden Kerbside	PM ₁₀	Leak	Still evident at summer QA/QC audit; frequent temperature problems
Derry	PM ₁₀ PM _{2.5}	Poor performance	Pumps repaired Q1 2009; problems still continue-see Section 4.5.2
Exeter Roadside	Site	Closed for building work	Restarted, but work still continuing. Service not carried out
Fort William	O ₃	Internal sampling	Now fixed
Glasgow Centre	NO _x	Faults with new analyser	Generally improved
Haringey Roadside	PM ₁₀	Noisy data	Significant problems reported in Q3
London Bloomsbury	CO and PM _{2.5}	Pump and FDMS drier	Now OK

Site	Analyser	Fault	Current status
London Eltham	NOx	Pump fault	Now fixed
London Harlington	PM _{2.5}	Poor quality data	Now OK
London Teddington	Site	Air conditioning	No progress reported
Manchester Piccadilly	NOx	Converter fault	Now fixed
Market Harborough	CO	Various faults	Now fixed
Newcastle Centre	O ₃	Spurious high data	Now OK
Preston	NOx and PM _{2.5}	Noisy data and leaks	Now fixed
St Osyth	Site	Air conditioning	No progress reported
Strathvaich	Site	Power cuts	No longer evident
Sunderland Silkworth	Logger	Frequent gaps	Now fixed
Swansea Roadside	PM _{2.5}	Poor drier performance	Fault continues in Q2
Warrington	Site	Power cuts	No longer evident
Weybourne	O ₃	No manual calibrations or IZS	No progress reported
Yarner Wood	Site	Power cuts	No longer evident
Rural CO analysers	CO	Baseline drift	Drift still evident
Various	Rural ozone analysers	Temporary instruments installed some of which have no autocal	Reinstallation of these analysers is well underway

Appendices

Appendix 1: Recommendations for Upgrade or Replacement of Equipment

Appendix 2: Data Gaps Listing: April-June 2009

Appendix 3: Inventory of Defra-owned Equipment

Appendix 4: Partisol Data Report

Appendix 5: Information for New Sites

Appendix 1

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.	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 July 2009	Priority	Action
30	All permanently pressurised cylinder calibration systems to be fitted with passivated stainless steel tubing	Medium	ESU
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
25	It is recommended that LSO's continue to pay particular attention to the NO ₂ 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 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 ₃ analyser should be upgraded to allow monthly LSO calibrations and daily autocalibrations	Medium	Addressed as part of the network upgrade
Recommendations July 2005			
13	Continuing problems with some autocal run-ons causing loss of up to 2 hours per day-see Section 3.2 CMCU to ensure ESUs are asked to attend to offending sites (Action May 2008)	High	Many sites now cured, but some need attention at next ESU visit

Appendix 2

Gaps listing April-June 2009

01/04/2009 to 30/06/2009 Gaps in 15-minute table >= 6 hours and data capture <= 90%

Pollutant	Data Capture (%)	Start date	End date	Reason	Comments	Number of days	Number of hours
England							
Birmingham Tyburn Roadside							
PM10	87.30%	13-May-09	21-May-09	Air Conditioning or Temp fault	Call out: A/C failure.	8.1	195
		27-May-09	27-May-09	Instrument fault	Flow Fault	0.6	14
		29-May-09	29-May-09	Instrument fault	Flow Fault	0.4	9
		27-Jun-09	27-Jun-09	FDMS drier	Drier Fault	0.3	7
		29-Jun-09	29-Jun-09	FDMS drier	Drier Fault	0.7	16
		30-Jun-09	30-Jun-09	FDMS drier	Drier Fault	0.6	15
		PM25	37.40%	21-Mar-09	08-May-09	Instrument fault	ENG C/O PM2.5 FDMS Cooler fault. Removed for repair
13-May-09	21-May-09			Air Conditioning or Temp fault	Air Con Fault	8.5	205
27-May-09	29-May-09			FDMS dew point too warm	Sample dew point too high	2.6	63
31-May-09	31-May-09			FDMS dew point too warm	Sample dew point too high	0.4	9
13-Jun-09	13-Jun-09			FDMS drier	Drier Fault	0.3	8
22-Jun-09	23-Jun-09			FDMS drier	Drier Fault	1.6	38
25-Jun-09	25-Jun-09			FDMS drier	Drier Fault	0.5	11
26-Jun-09	03-Jul-09			FDMS drier	Drier Fault	7.5	181
Brighton Preston Park							
PM25	0.00%	09-May-09	11-May-09		See Partisol report	3	72
		30-May-09	02-Jun-09			4	96
		12-Jun-09	22-Jun-09			11	264
Bristol St Paul's							
PM25	85.80%	16-Apr-09	16-Apr-09	FDMS volatile recovery or noisy	Long recovery after powercut	0.4	10
		20-May-09	01-Jun-09	High noise	Very noisy prior to removal of unit	12.1	291
		29-Jun-09	29-Jun-09	High noise	Noisy data deleted	0.3	7
Bury Roadside							
PM10	88.60%	01-May-09	08-May-09	Monitoring suspended	ENG C/O Installation of NEW PM10 TEOM FDMS System	7.8	187
		21-Jun-09	22-Jun-09	High noise	Noisy rdata deleted	1.1	27
		25-Jun-09	26-Jun-09	High noise	Noisy response	0.8	18
		30-Jun-09	01-Jul-09	FDMS dew point too warm	dew point too warm	1.3	30
Camden Kerbside							
PM10	73.80%	20-Apr-09	20-Apr-09	Unstable response	Unstable response	0.3	6
		26-Apr-09	27-Apr-09	Unstable response	Unstable response	0.8	19
		24-May-09	03-Jun-09	Air Conditioning or Temp fault	intermittent temp fault air con needs replacing	9.7	233
		12-Jun-09	16-Jun-09	Air Conditioning or Temp fault	intermittent temp fault air con needs replacing	4	95
		21-Jun-09	28-Aug-09	Unstable response	Unstable response and removed from site	68	1631

PM25	84.20%	24-May-09	26-May-09	Air Conditioning or Temp fault	Intermittent temp fault air con needs replacing	1.7	40
		29-May-09	03-Jun-09	Air Conditioning or Temp fault	Intermittent temp fault air con needs replacing	4.8	116
		23-Jun-09	17-Aug-09	Unstable response	Unstable response, removed from site	55	1321
Canterbury							
NO2	70.30%	01-Apr-09	21-Apr-09	Air Conditioning or Temp fault	Analyser not booting temperature related	20	480
		24-Apr-09	30-Apr-09	Air Conditioning or Temp fault	Analyser not booting temperature related	6.7	160
Carlisle Roadside							
NO2	82.70%	15-Jun-09	15-Jul-09	Low flow rate	Nox Leak - QC deleting all data	30.1	723
Chesterfield							
PM25	88.80%	28-May-09	29-May-09	Unstable response	Unstable following routine filter change	1.3	32
		22-Jun-09	10-Jul-09	Instrument fault	Call out: Poor correlation between PM10/2.5.	18	432
Chesterfield Roadside							
PM10	80.10%	27-Apr-09	28-Apr-09	Instrument removed for repair	Installed FDMS upgrade from teom system	1.1	26
		08-May-09	11-May-09	Air Conditioning or Temp fault	Air con inadequate, site over heating	3.8	92
		29-May-09	02-Jun-09	FDMS volatile recovery or noisy	Unstable Volatiles / high temperatures	4.3	104
		22-Jun-09	30-Jun-09	FDMS volatile recovery or noisy	instability due to temperature	8.3	198
Coventry Memorial Park							
PM25	87.90%	28-Apr-09	01-May-09	Flat response	Non-volatile is flatlining	3.4	81
		28-May-09	28-May-09	Unstable response	Dewpoint issues	0.3	7
		29-May-09	29-May-09	Unstable response	Dewpoint Issues	0.5	11
		22-Jun-09	23-Jun-09	FDMS dew point too warm	Sample dew point > 2C	1.4	33
		25-Jun-09	25-Jun-09	FDMS dew point too warm	Sample dew point > 2C	0.5	11
		26-Jun-09	30-Jun-09	FDMS dew point too warm	Sample dew point > 2C	4.6	111
Ladybower							
NO2	87.80%	15-Jun-09	26-Jun-09	Power cut		10.9	261
O3	87.90%	15-Jun-09	26-Jun-09	Power cut		10.9	261
SO2	82.90%	15-Jun-09	31-Jul-09	Unstable response	P/cut unstable response & fault	46.4	1113
Leamington Spa							
NO2	85.30%	11-May-09	12-May-09	Power cut	Aircon Failure	0.3	8
		12-May-09	21-May-09	Instrument fault	System and high voltage failure	9.2	221
Leeds Headingley Kerbside							
PM25	38.50%		02-Apr-09		Site started	91.7	2200
		07-May-09	03-Jul-09	High noise	High noise after LSO cal instrument replaced in July	56.5	1356
Leicester Centre							
PM10	79.70%	30-Mar-09	17-Apr-09	FDMS volatile recovery or noisy	Pallflex 47mm filter was very dirty + never changed	18.2	436
		27-Jun-09	27-Jun-09	FDMS dew point too warm	Sample dew point > 2C	0.3	7
		29-Jun-09	29-Jun-09	FDMS dew point too warm	Sample dew point > 2C	0.5	13

		30-Jun-09	30-Jun-09	FDMS dew point too warm	Sample dew point > 2C	0.5	12
London Bexley							
PM25	77.90%	11-Apr-09	17-Apr-09	Unstable response	Due to divergence of perge reading	6.3	152
		26-Apr-09	28-Apr-09	Unstable response	Rejection of highly unstable data.	1.3	30
		15-Jun-09	15-Jun-09	High noise	Erratic data rejected by GB	0.6	14
		20-Jun-09	30-Jun-09	High noise	Erratic data rejected by GB	11	263
London Harlington							
NO2	0.00%	26-Feb-09	03-Jul-09	Instrument fault	faulty pre-amp board.	127	3045
PM25	81.50%	29-Jan-09	07-Apr-09	Unstable response	No mV collected up to LSO calibration	68.5	1644
		21-Apr-09	01-May-09	Flat response	then unstable	10.2	244
London Hillingdon							
NO2	79.80%	23-May-09	27-May-09	Air Conditioning or Temp fault	Call out:for unstable air con temperature	3.9	93
		29-May-09	03-Jun-09	Air Conditioning or Temp fault	ENG C/O A/C temp erratic. Needs replacement	4.8	116
		06-Jun-09	10-Jun-09	Air Conditioning or Temp fault	Instrument tripping out due to a/c fault	4.2	101
		24-Jun-09	24-Jun-09	Air Conditioning or Temp fault	Site tripping out due to a/c fault	0.3	8
		29-Jun-09	30-Jun-09	Air Conditioning or Temp fault	Site tripping out due a/c fault	0.5	12
		30-Jun-09	30-Jun-09	Air Conditioning or Temp fault	Site tripping out due a/c fault	0.8	19
London N. Kensington							
PM10	80.20%	03-Apr-09	03-Apr-09	QAQC audit	Unstable period following pre-comm audit	0.3	7
		20-Apr-09	20-Apr-09	Unstable response	unstable data	0.3	7
		06-May-09	15-May-09	Unstable response	Volatile unstable + noisy; power surge on 12th	9.5	228
		27-May-09	30-May-09	Unstable response	Volatile unstable + noisy	2.9	69
		01-Jun-09	01-Jun-09	Unstable response	Volatile unstable + noisy	0.3	8
		03-Jun-09	07-Jun-09	Unstable response	Volatile unstable + noisy	3.8	90
		27-Jun-09	27-Jun-09	Unstable response	Volatile unstable + noisy	0.3	8
London Westminster							
O3	80.20%	01-Apr-09	02-Apr-09	Logger fault	o3 Data intermittently Flagged odessa logger needs replacing	0.7	17
		03-Apr-09	04-Apr-09	Logger fault	o3 data flagged odessa logger needs replacing	1.3	30
		05-Apr-09	06-Apr-09	Logger fault	c/o code activated switch to replace odessa	0.5	12
		08-Apr-09	23-Apr-09	Sampling fault	c/o swapped data logger/internally sampling	15	360
Middlesbrough							
PM25	79.80%	24-May-09	24-May-09	Low flow rate		0.3	8
		25-May-09	25-May-09	Low flow rate		0.3	7
		28-May-09	03-Jun-09	High noise	Noisy data	5.7	136
		12-Jun-09	14-Jun-09	High noise	intermittent drier fault	2.6	62
		15-Jun-09	15-Jun-09	High noise	FDMS drier fault	0.3	8
		21-Jun-09	21-Jun-09	Unstable response	Unstable response	0.4	10
		22-Jun-09	08-Jul-09	High noise	FDMS drier fault	16.1	387
Newcastle Centre							
NO2	88.80%	12-Jun-09	18-Jun-09	NO2 converter fault	Converter failure	6.5	156

Nottingham Centre							
PM25	87.90%	28-May-09	29-May-09	No mV data collected	intermittent temp issue 13.00 to 2.00 on 3 Jun	0.3	8
		29-May-09	29-May-09	No mV data collected	intermittent temp issue 13.00 to 2.00 on 3 Jun	0.5	12
		31-May-09	31-May-09	No mV data collected	Dewpoint error	0.3	6
		02-Jun-09	03-Jun-09	Unstable response	Poor data- temp problem	0.6	15
		22-Jun-09	03-Jul-09	Instrument fault	Call out: FDMS 2.5 performance / code:128 drier issue.	11.3	270
Plymouth Centre							
PM10	0.00%	04-Nov-08	30-Sep-09	Instrument fault	ENG C/O Found & cured leaks on both the main & aux. flows.	331	7933
Preston							
PM25	77.70%	12-Jun-09	01-Jul-09	High noise	Noisy response until V seal replaced 1 July	19.5	469
Rochester Stoke							
PM25	60.30%	13-May-09	13-May-09	Power cut	Power failure and corrupted buffers on the logger.	0.5	12
		26-May-09	14-Jul-09	Switched out-of-service	New FDMS installed	48.9	1173
Salford Eccles							
NO2	0.00%	10-Mar-09	06-Jul-09	Unstable response	High and unstable baseline. Could be sample pressure fault	119	2845
Sandy Roadside							
NO2	88.00%	23-May-09	24-May-09	Unstable response	Poor data rejected by ERG	0.3	8
		24-May-09	24-May-09	Unstable response	Poor data rejected by ERG	0.3	6
		24-Jun-09	01-Jul-09	Manifold fault	Internal sampling- filter left loose	6.9	165
PM25	84.70%	29-Apr-09	29-Apr-09	Unstable response	Poor data rejected by ERG	0.3	6
		01-May-09	01-May-09	Unstable response	Poor data rejected by ERG	0.5	13
		02-May-09	02-May-09	Unstable response	Poor data rejected by ERG	0.4	10
		12-May-09	17-May-09	Unstable response	Poor data rejected by ERG	4.5	109
		20-May-09	20-May-09	Unstable response	Poor data rejected by ERG	0.4	9
		22-May-09	22-May-09	Unstable response	Poor data rejected by ERG	0.5	12
		23-May-09	24-May-09	Unstable response	Poor data rejected by ERG	0.7	17
		24-May-09	25-May-09	Unstable response	Poor data rejected by ERG	0.6	14
		25-May-09	26-May-09	No calibrations	Poor data rejected by ERG	0.6	14
		28-May-09	29-May-09	Unstable response	Poor data rejected by ERG	0.5	13
		29-May-09	30-May-09	Unstable response	Poor data rejected by ERG	0.7	16
		30-May-09	30-May-09	Unstable response	Poor data rejected by ERG	0.5	13
		02-Jun-09	03-Jun-09	Unstable response	Poor data rejected by ERG	0.6	14
		04-Jun-09	05-Jun-09	Unstable response	Poor data rejected by ERG	1.5	35
Scunthorpe Town							
SO2	88.40%	02-May-09	07-May-09	Pump fault	ENG C/O Fixed pump.	4.6	111
		13-May-09	19-May-09	Instrument fault	ENG C/O Replaced UV lamp	5.4	130
Sheffield Centre							
CO	82.40%	25-Mar-09	15-Apr-09	Instrument fault	Call out: CO analyser is intermittently flagged	20.8	498
PM10	65.30%	30-Mar-09	08-Apr-09	Instrument fault	Unstable data following fault	9	216
		04-May-09	06-May-09	FDMS dew point too warm	Sample dew point too warm	1.7	40
		12-May-09	18-May-09	Instrument fault	Valve blocked.	6	145
		21-May-09	27-May-09	Instrument fault	Fixed stuck valve	6.3	150
		05-Jun-09	06-Jun-09	Instrument fault	Non-volatiles are very low	0.7	17

		22-Jun-09	08-Jul-09	FDMS volatile recovery or noisy	Very noisy	16.3	392
Stanford-le-Hope Roadside							
PM10	56.20%	01-Apr-09	01-Apr-09	ESU service	C/O Installation of FDMS upgrade	0.3	8
		02-May-09	02-May-09	Unstable response		0.3	6
		06-May-09	06-May-09	Unstable response		0.3	7
		23-May-09	15-Jul-09	Unstable response	unstable response volatiles	52.6	1263
PM25	25.80%	01-Jan-09	01-May-09	Pump fault	Site started o1/4 April data rejected faulty pump vac gauge	121	2904
		06-May-09	06-May-09	Unstable response	Poor data due to overheating	0.3	6
		24-May-09	25-May-09	Unstable response	Poor data due to overheating	2	48
		28-May-09	30-Jun-09	Unstable response	Poor data due to overheating	33.5	804
Stoke-on-Trent Centre							
NO2	82.80%	07-May-09	23-May-09	Logger fault	ENG C/O cannot get the Ambirack PC to boot	15.4	369
O3	84.00%	07-May-09	21-May-09	Logger fault	ENG C/O cannot get the Ambirack PC to boot	13.6	326
Sunderland Silksworth							
NO2	85.20%	17-Jun-09	10-Sep-09	Power cut	ENG C/O Power problems probably caused by building works	85.4	2050
O3	85.20%	17-Jun-09	10-Sep-09	Power cut	ENG C/O Power problems probably caused by building works	85.4	2050
PM25	72.30%	02-May-09	02-May-09	Unstable response	very noisy	0.3	6
		22-May-09	22-May-09	Unstable response	very noisy	0.3	8
		24-May-09	31-May-09	Unstable response	Very noisy data	8	192
		01-Jun-09	02-Jun-09	Unstable response	Very noisy data	0.7	17
		02-Jun-09	02-Jun-09	Unstable response	Very noisy data	0.5	13
		13-Jun-09	14-Jun-09	Unstable response	Very noisy data	0.7	17
		14-Jun-09	14-Jun-09	Unstable response	Very noisy data	0.6	14
		17-Jun-09	25-Jun-09	Unstable response	ENG C/O Power problems probably caused by building works	7.8	188
		25-Jun-09	01-Jul-09	Unstable response	noisy data deleted	5.8	140
SO2	85.20%	17-Jun-09	10-Sep-09	Power cut	ENG C/O Power problems probably caused by building works	85.4	2050
Tower Hamlets Roadside							
CO	57.80%	01-May-09	08-Jun-09	High noise	Very noisy and unstable data	38.2	916
Weybourne							
O3	84.20%	18-May-09	01-Jun-09	Unstable response	Poor data deleted	14.4	345
Wigan Centre							
PM25	75.50%	29-May-09	19-Jun-09	High noise	Very noisy output	20.9	501
Wirral Tranmere							
PM25	90.00%	22-Jun-09	01-Jul-09	Unstable response	response instability 13.00 to 2.00 on 24 Jun	9.5	227
York Bootham							
PM10	81.60%	25-May-09	25-May-09	FDMS dew point too warm	dew point too high	0.3	6
		28-May-09	28-May-09	FDMS dew point too warm	dew point too high	0.5	11
		29-May-09	29-May-09	FDMS dew point too warm	dew point too high	0.5	12
		02-Jun-09	02-Jun-09	FDMS dew point too warm	dew point too high	0.4	10

		16-Jun-09	30-Jun-09	Air Conditioning or Temp fault	ENG C/O High rack temp. Air con is ok but may need service	14.4	346
N Ireland							
Belfast Centre							
PM10	89.70%	13-May-09	21-May-09	Unstable response	Unstable response	8.5	204
Derry							
PM25	0.00%	01-Jan-09	02-Jul-09	Instrument fault	ENG C/O Mass transducer fault fixed; pump and temp. problems	183	4383
Lough Navar							
O3	87.60%	16-May-09	16-May-09	Power cut		0.5	12
		01-Jun-09	11-Jun-09	Instrument fault	ET replaced the O3 to enable comms through a switch for the FDMS	10.5	252
Scotland							
Aberdeen							
PM25	21.70%	13-Apr-09	13-Apr-09	High noise	FDMS very noisy	0.3	7
		20-Apr-09	20-Apr-09	High noise	FDMS very noisy	0.3	8
		21-Apr-09	30-Apr-09	High noise	Deleted until end of May. Very noisy	9.3	224
Auchencorth Moss							
PM10	0.00%	06-Apr-09	06-Apr-09		See Partisol report	1	24
		30-Apr-09	30-Apr-09			1	24
		18-May-09	18-May-09			1	24
		21-May-09	21-May-09			1	24
		23-May-09	23-May-09			1	24
PM25	0.00%	06-Apr-09	06-Apr-09		See Partisol report	1	24
		26-Apr-09	01-May-09			6	144
		06-May-09	13-May-09			8	192
Auchencorth Moss PM10 PM25							
PM10	86.60%	29-May-09	30-May-09	FDMS dew point too warm	Sample dew point too high	1	23
		07-Jun-09	08-Jun-09	Power cut		1.1	27
		22-Jun-09	02-Jul-09	FDMS dew point too warm	Sample dew point to high followed by a drier fault	10.5	253
Bush Estate							
NO2	87.10%	23-Jun-09	16-Jul-09	Air Conditioning or Temp fault	PMT overheating	23.4	562
Edinburgh St Leonards							
O3	88.20%	10-Apr-09	14-Apr-09	Switched out-of-service	LSO left analyser oos	3.7	89
		19-Apr-09	22-Apr-09	Instrument fault	flat data - pump failure 19.45 to 13.30 on 21 Apr	2.6	63
		03-May-09	07-May-09	Power cut	Fault with surge protector.	4.1	99
Eskdalemuir							
Glasgow Kerbside							
PM10	89.40%	19-May-09	28-May-09	Instrument removed for repair	ENG C/O replaced by FDMS	9.3	224
PM25	21.80%	01-Jan-09	23-Jun-09	High noise	Noisy data	174	4166
Grangemouth							
NO2	64.30%	12-Apr-09	16-Apr-09	Flat response	Problem with O3 generator	4.7	112
		20-May-09	08-Jun-09	Instrument fault	Poor response due to	19.6	471

					excessive heat analyser turned off		
		16-Jun-09	23-Jun-09	Rapid zero or sensitivity drift	Data deleted due to baseline drift	8	191
PM10	73.10%	15-Apr-09	28-Apr-09	Unstable response	Instability following installation	13.3	320
		29-May-09	08-Jun-09	Monitoring suspended	Site turned off due to overheating	10.5	253
		23-Jun-09	23-Jun-09	Air Conditioning or Temp fault	Site temperature too high	0.5	12
PM25	85.50%	28-May-09	09-Jun-09	Monitoring suspended	Site turned off due to overheating	12	289
		23-Jun-09	23-Jun-09	Air Conditioning or Temp fault	site temperature issue 13.00 to 21.00	0.4	9
		30-Jun-09	30-Jun-09	FDMS dew point too warm	sample dew point >2C	0.3	6
Wales							
Newport							
PM10	86.10%	27-May-09	27-May-09	FDMS dew point too warm	dew point too high	0.3	7
		28-May-09	28-May-09	FDMS dew point too warm	dew point too high	0.6	14
		29-May-09	29-May-09	FDMS dew point too warm	dew point too high	0.5	11
		12-Jun-09	13-Jun-09	FDMS dew point too warm	dew point too high	0.8	19
		16-Jun-09	18-Jun-09	FDMS dew point too warm	dew point too high	1.1	27
		21-Jun-09	24-Jun-09	FDMS dew point too warm	dew point too high	2.5	60
		24-Jun-09	25-Jun-09	FDMS dew point too warm	dew point too high	0.3	7
		25-Jun-09	30-Jun-09	FDMS dew point too warm	dew point too high	5.6	135
Swansea Roadside							
PM25	46.10%	15-Apr-09	15-Apr-09	FDMS dew point too warm	Dew point temp too high.	0.3	7
		06-May-09	06-May-09	FDMS dew point too warm	Dew point temp too high.	0.3	6
		13-May-09	13-May-09	FDMS dew point too warm	Dew point temp too high.	0.3	7
		14-May-09	04-Aug-09	Instrument fault	ENG C/O FDMS PM2.5 drier fault . Removed for repair	82.3	1974

Appendix 3

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, June 2009

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 (now beyond economic repair) 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 _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 4

Partisol Data: April-June 2009

AURN Partisol Data: April-June 2009

Partisol data were supplied by BV for the following sites and measurement periods.

Site	Start date	End date	Ratified Data Capture, %
Auchencorth Moss PM _{2.5}	1st Apr	30th Jun	84
Auchencorth Moss PM ₁₀	1st Apr	30th Jun	95
Bournemouth PM _{2.5}	1st Apr	30th Jun	90
Brighton Preston Park PM _{2.5}	1st Apr	30th Jun	81
Harwell PM _{2.5}	1st Apr	30th Jun	77
Harwell PM ₁₀	1st Apr	30th Jun	100
Inverness PM _{2.5}	1st Apr	30th Jun	100
Inverness PM ₁₀	1st Apr	30th Jun	97
London Marylebone Road PM _{2.5}	1st Apr	30th Jun	81
London Marylebone Road PM ₁₀	1st Apr	30th Jun	73
London N Kens PM _{2.5}	1st Apr	30th Jun	95
London N Kens PM ₁₀	1st Apr	30th Jun	78
London Westminster PM _{2.5}	1st Apr	30th Jun	100
Northampton PM _{2.5}	1st Apr	30th Jun	98
Port Talbot Margam PM _{2.5}	1st Apr	30th Jun	75
Wrexham PM ₁₀	1st Apr	30th Jun	98

Bureau Veritas carry out the following:

- Filter conditioning and weighing.
- Calculation of ambient particulate concentrations using the Partisol download data and the filter weighings.
- Providing a field blank correction based on filters supplied with each batch, which travel to the Partisol site in the canister with the other filters, but are not actually exposed.
- Checking that the correct filter ID is matched with the correct day's sampling data.
- Checking that the PM₁₀ and PM_{2.5} datasets "track" each other.
- Initial comparison of ambient concentrations with those from co-located or nearby FDMS-TEOM sites.

The raw data and calculated concentrations are supplied to AEA in a spreadsheet, which is uploaded to AEA's Partisol processing system.

AEA complete the ratification process by

- Independently checking BV's calculation of the ambient PM₁₀ concentration
- Ensuring that data with a Partisol fault code or filter fault are rejected
- Checking site audit data including leak tests
- Carrying out a more detailed quarterly comparison of Partisol data with co-located or nearby FDMS-TEOM data
- Performing flow corrections
- Investigating anomalous data

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:

New Code	Meaning	Reject
0	OK	No
8	Power Failure	Only if < 18h data.
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 > ±5°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 > ±5°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), and 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

Auchencorth Moss

PM_{2.5}: Data capture was 84% for this quarter. Data losses as follows:

- 6th Apr – stop key pressed.
- 26th Apr – 1st May – Filter exchange failure (FEF)
- 6th – 13th May – pump problem.

This is the 2nd consecutive quarter with <90% data capture for the PM_{2.5} Partisol at this site, due to filter exchange failures etc.

PM₁₀: Data capture was 95% for this quarter.

- 6th Apr – stop key pressed.
- 1st May - mass increase < field blank
- 19th May - mass increase < field blank
- 22nd May – unspecified problem
- 12th May - mass increase < field blank

Bournemouth

PM_{2.5}: Data capture was 90% for this quarter. Data losses as follows:

- 29th Apr - < 18h sampling
- 12th – 14th May – FEF
- 12-16th Jun – unspecified fault

Brighton Preston Park

PM_{2.5} only: Data capture was 81% for this quarter.

- 9th – 11th Apr – FEF
- 30th May – 2nd Jun – pump fault
- 12th – 22nd Jun – FEF

Harwell

PM_{2.5} : 77% data capture. Data losses:

- 14th – 21st May – pump failure
- 23rd – 29th May – pump failure
- 31st May – 1st June – unspecified
- 20th – 23rd Jun – power failure

PM₁₀: Data capture 100%.

Inverness

PM_{2.5}: Data capture = 100%.

PM₁₀: Data capture = 97%. Data losses:

- 10th Jun, 13th Jun - < 18m³ sampled

London Marylebone Road

PM_{2.5}: Data capture 81%. Data losses:

- 29th May – 6th Jun – FEF
- 7th – 8th Jun – pump
- 24th – 30th June – both of the above.

PM₁₀: Data capture = 73%. Data losses:

- 11th – 15th Apr – FEF
- 30th Apr - < 18m³ sampled
- 7th – 15th Jun – date and time suspect.
- 20th Jun - < 18m³ sampled
- 21-22nd Jun – FEF

London North Kensington

PM_{2.5}: Data capture was 95%. Data losses:

- 7th Apr – very low value – possibly filter not exposed.
- 3rd – 6th Jun – mass < field blank
- 12th May - < 18m³ sampled

PM₁₀: data capture 78%. Data losses:

- 12th May - < 18m³ sampled
- 21st May - end of Jun: PM10 < PM2.5 and < FDMS. Split v-seal replaced in July. All data from 21st May suspect.

London Westminster

PM_{2.5} only. Data capture = 100%.

Northampton

PM_{2.5} only: Data capture was 98%. Data losses:

- 6th Apr - < 18m³ sampled
- 14th Apr - < 18m³ sampled

Port Talbot Margam

PM_{2.5} only: data capture = 75%. Data losses:

- 16th – 28th May – FEF
- 11th – 12th May – pneumatic line disconnected.
- 17th Jun – 2 filters sampled.

Wrexham

PM₁₀ only: Data capture was 98%. Data losses:

- 6th Apr - < 18m³ sampled
- 4th May – mass < field blank.

Appendix 5

Site Details for New Sites

Site Name	Pollutants	Region Name	Grid	East	North	Latitude	Longitude	Altitude m	Type
Grangemouth Moray	NO2	Scotland	NS 9335 8132	455682	6207760	56 00 47.31N	03 42 39W	4	URBAN B.GROUND
Blackburn Darwen Roadside	NO2	NW England	SD 68167 24452	368167	424452	53 42 56.5N	02 29 1.4W	139	ROADSIDE



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