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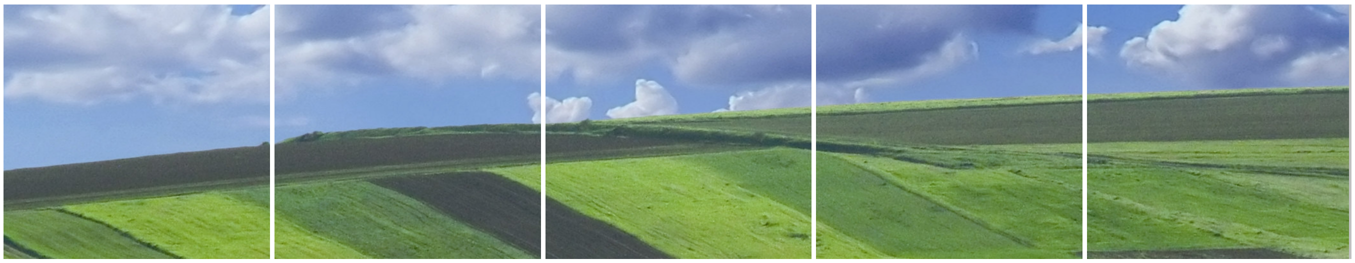

QA/QC Data Ratification and Intercalibration Report for the Automatic Urban and Rural Network, July-September 2010

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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AEA Group
The Gemini Building
Fermi Avenue
Harwell
Didcot
Oxfordshire
OX11 0QR

Tel: 0870 190 6574
Fax: 0870 190 6608

AEA is a business name of AEA Technology plc

AEA is certificated to ISO9001 and ISO14001

Author	Name	Stewart Eaton
Approved by	Name	Rachel Yardley
	Signature	R E Yardley
	Date	16 February 2011

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 87.8% for all pollutants (O_3, NO_2, SO_2, CO, PM_{10} and $PM_{2.5}$) during the 3-month reporting period July-September 2010. Data capture rates for all pollutants except O_3 were below 90%. There were 52 sites with data capture less than 90% for the period.

The number of monitoring sites in the AURN during this quarter was 135, of which 73 are Local Authority owned sites affiliated to the national network. Some are co-located 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 problems associated with the replacement of analysers and infrastructure. A summary of recommendations to help improve network performance is given in Appendix 1.

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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 July-September 2010. During this period there were 135 operational monitoring sites in the Network of which there are 99 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 61 Defra-funded sites and 73 affiliate sites, although many affiliate sites have fully-funded PM_{10} and/or $PM_{2.5}$ analysers. 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 PM_{10} and PM_{25}.Port Talbot Margam has a Partisol, which was converted from $PM_{2.5}$ to PM_{10} during February 2010.

1.1 Overview of Network Performance

Ratified hourly average data capture for the network averaged 87.8% for all pollutants (O_3, NO_2, SO_2, CO, PM_{10} and $PM_{2.5}$) during the 3 month reporting period July-September 2010 (see Table 1.1). Only O_3 achieved 90% or higher data capture. 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 1.1: AURN Ratified Data Capture (%) by Quarter, 2010

	CO	PM_{10}	$PM_{2.5}$	NO_2	O_3	SO_2	Mean
Q1 2010 %	90.3	85.1	85.9	89.9	91.8	91.2	88.8
Q2 2010 %	93.6	81.0	84.0	89.8	93.4	92.1	88.4
Q3 2010 %	85.2	77.5	84.4	89.1	92.4	89.6	87.8

Overall, 314 out of the 406 analysers (77%) achieved data capture levels above the required 90% target during this reporting period (See Table 1.2).

Table 1.2: Number of Analysers with Data Capture below 90%

Total Number Of Analysers		Q1 Jan-Mar 2010 (No. below 90%)	Q2 Apr-Jun 2010 (No. below 90%)	Q3 Jul-Sept 10 (No. below 90%)
CO	24	5	4	5
NO_2	113	22	19	25
O_3	80	10	15	12
PM_{10} [1]	67	21	30	31
$PM_{2.5}$ [1]	77	27	26	25
SO_2	45	10	11	10
Total <90%	-	93	105	108

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

In total, 52 out of the 135 operational network sites in the quarter (38%) had an average data capture rate below the required 90% level for the July-September 2010 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 main site operational and QA/QC issues giving rise to data capture below the required 90% level are summarised in Section 4.

1.2 Status of Ratified Data

During ratification of the July-September data, a number of issues were discovered which affect data already reported as ratified in previous quarters. As a result, the following data already reported as ratified have been deleted.

Charlton Mackrell: NOx data deleted from 2 March-17 August 2010, poor quality data
Belfast Centre: PM_{10} data deleted from 1 May to 30 June-PM_{10} concentrations lower than $PM_{2.5}$
Chesterfield Roadside: PM_{10} deleted from 1 May to 30 June concentrations lower than $PM_{2.5}$
Leeds Centre: NOx data deleted from 25 June, suspected sampling fault
Mold: NO2 deleted December 2009-January 2010; suspected internal sampling
Reading New Town: PM_{10} data deleted from 1 May to 30 June, regional outlier
Rochester Stoke: NOx, SO_2 and PM_{10} data deleted from 1 June, poor quality data

In addition, the following data have been revised:

High Muffles: NOx data rescaled for June in light of July calibrations
Exeter Roadside: O_3 data rescaled April-June

A full list of changes to ratified data is given at http://uk-air.defra.gov.uk/data/verification_and_ratification?action=report

2 Changes in the Network for Directive Compliance

Table 2.1: Sites Added to the AURN during 2010

	Pollutants	Date started
Ballymena	SO_2	01/01/10
Eastbourne	NO_2 $PM_{2.5}$ PM_{10}	01/01/10
Storrington Roadside	$PM_{2.5}$ PM_{10}	01/01/10
Chatham Centre Roadside	NO_2 $PM_{2.5}$ PM_{10}	01/07/10
Dumbarton Roadside	NO_2	01/09/10

The $PM_{2.5}$ Partisol at Inverness has been affiliated into the network backdated to 1 June 2008. In addition, several existing sites have had additional $PM_{2.5}$ analysers installed to ensure compliance. The analysers are listed in Table 2.2:

Table 2.2: Additional Analysers installed for Directive Compliance from 1 Jan 2010

Site	Pollutant	Date started
Chepstow A48	$PM_{2.5}$	09/02/10
Port Talbot Margam $PM_{2.5}$ PM_{10}	$PM_{2.5}$	19/02/10
Saltash Roadside	$PM_{2.5}$	23/02/10

The Saltash Roadside site was closed on 31 August and a new location is being sought.

The rural CO analysers at St Osyth and Market Harborough were discontinued from 31 Dec 2009. The Partisol at Port Talbot Margam was converted from $PM_{2.5}$ to PM_{10} on 18 February 2010. This is not strictly necessary for compliance, as the site also has an FDMS instrument for PM_{10}.

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

In 2011 the UK will be undertaking a full assessment of the AURN in accordance with Articles V to VII of the Air Quality Directive (2008/50/EC). It is expected that the results of this will be available by the end of the year. It will review the number and locations of sites and equipment required for monitoring.

3 Generic Data Quality Issues

3.1 Auto-calibration Run-on

The 22 sites (22 analysers) showing continuing problems with the autocalibration run-on during July-September 2010 are given in Table 3.1. Any autocalibration run-on data that look visibly significant have been deleted from these data sets during ratification.

Table 3.1: Autocalibration Run-ons: July-September 2010

Site	Pollutant	Run-on conc (ppb)
Aberdeen Union Street Roadside	NO_2	3
Belfast Centre	NO_2	5
Billingham	NO_2	3
Coventry Memorial Park	NO_2	3
Hull Freetown	NO_2	3
Leeds Centre	NO_2	3
Leicester Centre	NO_2	3
Liverpool Speke	NO_2	2
London Hillingdon	NO_2	5
Manchester Piccadilly	NO_2	5
Market Harborough	NO_2	4
Mold	NO_2	4
Newcastle Centre	NO_2	4
Norwich Lakenfields	NO_2	4
Oxford Centre Roadside	NO_2	5
Plymouth Centre	NO_2	4
Preston	NO_2	6

Site	Pollutant	Run-on conc (ppb)
Reading New Town	NO_2	4
Sheffield Centre	NO_2	5
Southampton Centre	NO_2	3
Southend-on-Sea	NO_2	2
Stockton-on-Tees Eaglescliffe	NO_2	2

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 where analysers were commissioned during the period, 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 July-September 2010 is given in Table 4.1:

Table 4.1: Data capture for London: July-September 2010

Network Data Capture for 01/07/2010 to 30/09/2010 from start date of any new site

Site	CO	PM_{10}	$PM_{2.5}$	NO_2	O_3	SO_2	Site Average
England							
Camden Kerbside	-	97.3	95.5	96.0	-	-	96.3
Haringey Roadside	-	99.3	98.8	98.2	-	-	98.7
London Bexley	90.2	-	84.0	99.3	-	99.5	93.3
London Bloomsbury	98.2	97.6	73.7	98.1	75.4	98.3	90.2
London Cromwell Road 2	20.7	-	-	20.7	-	20.7	20.7
London Eltham	-	-	98.5	99.0	97.7	-	98.4
London Haringey	-	-	-	99.1	58.8	-	79.0
London Harlington	-	98.3	61.4	96.6	98.3	-	88.6
London Harrow Stanmore	-	-	80.7	-	-	-	80.7
London Hillingdon	-	-	-	93.9	96.5	-	95.2
London Marylebone Road	98.3	98.7	81.1	97.9	98.2	98.1	95.4
London Marylebone Road PARTISOL	-	**81.5**	**23.9**	-	-	-	**52.7**
London N. Kensington	97.6	15.2	98.1	96.9	91.1	96.1	82.5
London N. Kensington PARTISOL	-	**96.7**	**87.0**	-	-	-	**91.8**
London Teddington	-	-	98.6	69.8	70.3	-	79.6
London Westminster	94.7	-	**60.9**	95.2	91.8	92.6	**87.0**
Tower Hamlets Roadside	97.1	-	-	94.2	-	-	95.6
Number of sites	7	8	13	14	9	6	17
Number of sites < 90%	1	2	8	2	3	1	8
Network Mean (%)	85.2	85.6	80.2	89.6	86.5	84.2	83.9

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

London Cromwell Road 2
Following air conditioning failure, the equipment was switched off on 24 May to avoid damage through overheating. Monitoring recommenced on 10 September.

London Harlington
Air conditioning faults caused the loss of NOx, PM_{10} and $PM_{2.5}$ data during the quarter. The PM_{10} FDMS also suffered data loss due to damaged seals.

London Haringey
Repeated problems with the ozone analyser resulted in a replacement loan analyser being installed which was not calibrated correctly. Data have been deleted from 17 May

London Marylebone Road $PM_{2.5}$ Partisol
As reported in the October-December 2009 QA/QC report, anomalous results from the $PM_{2.5}$ Partisol prompted a detailed investigation into the analyser performance in April 2010. It was found that a pipe on the sample inlet was missing, and so the instrument was sampling internally, bypassing the size selective head. No clear change point can be identified when the tube was removed, and so based on the agreement with the FDMS, all 2009 and Q1 2010 data from the Partisol have been deleted.

London North Kensington
The PM_{10} FDMS suffered from high volatile fractions and sample dew points. These improve following service in September, although another period of data were deleted following a filter change. A total of 63 days PM_{10} data were lost this quarter.

4.2 England (excluding London)

4.2.1 Data Capture

The data capture for sites in England for the period July-September 2010 is given in Table 4.2:

Table 4.2: Data capture for England (except London): July-September 2010

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
England							
Barnsley 12	-	-	-	-	-	98.6	98.6
Barnsley Gawber	-	-	-	88.4	88.3	96.6	91.1
Bath Roadside	-	-	-	97.1	-	-	97.1
Billingham	-	-	-	94.7	-	-	94.7
Birmingham Tyburn	-	**48.8**	**69.4**	97.2	97.5	97.4	**82.1**
Birmingham Tyburn Roadside	-	94.6	98.2	98.1	98.5	-	97.3
Blackburn Darwen Roadside	-	-	-	85.6	-	-	85.6
Blackpool Marton	-	-	0.0	0.0	0.0	-	0.0
Bottesford	-	-	-	-	99.3	-	99.3
Bournemouth	-	-	**94.6**	98.5	98.7	-	**97.3**
Brighton Preston Park	-	-	**87.0**	98.5	98.6	-	**94.7**
Brighton Roadside	-	-	-	90.3	-	-	90.3
Bristol Old Market	99.4	-	-	99.3	-	-	99.4
Bristol St Paul's	96.1	94.0	95.5	94.7	96.1	95.9	95.4
Bury Roadside	44.7	97.1	98.1	98.7	-	-	84.7
Cambridge Roadside	-	-	-	89.8	-	-	89.8
Canterbury	-	-	-	99.5	-	-	99.5
Carlisle Roadside	-	91.3	93.2	92.7	-	-	92.4
Charlton Mackrell	-	-	-	48.4	98.7	-	73.6

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
Chatham Centre Roadside	-	99.0	92.9	61.4	-	-	84.4
Chesterfield	-	99.0	98.9	69.9	-	-	89.3
Chesterfield Roadside	-	0.0	97.1	94.4	-	-	63.9
Coventry Memorial Park	-	-	98.3	91.0	97.8	-	95.7
Eastbourne	-	52.6	99.7	-	-	-	76.1
Exeter Roadside	-	-	-	97.2	**96.8**	-	**97.0**
Glazebury	-	-	-	97.9	98.5	-	98.2
Great Dun Fell	-	-	-	-	96.6	-	96.6
Harwell	-	69.1	98.2	92.6	98.1	97.5	91.1
Harwell PARTISOL	-	**88.0**	**98.9**	-	-	-	**93.5**
High Muffles	-	-	-	71.2	71.6	-	71.4
Horley	-	-	-	70.5	-	-	70.5
Hull Freetown	98.1	81.9	93.6	93.3	98.1	90.6	92.6
Ladybower	-	-	-	89.2	88.8	79.7	85.9
Leamington Spa	-	99.0	99.4	99.4	**99.4**	99.4	**99.3**
Leeds Centre	65.9	96.6	96.6	84.7	97.5	97.3	89.8
Leeds Headingley Kerbside	-	51.3	60.8	99.1	-	-	70.4
Leicester Centre	97.2	51.9	17.9	50.6	53.8	44.6	52.7
Leominster	-	-	-	60.0	98.1	59.0	72.4
Liverpool Queen's Drive Roadside	-	-	-	99.3	-	-	99.3
Liverpool Speke	97.4	91.3	53.0	84.3	97.6	97.3	86.8
Lullington Heath	-	-	-	97.5	97.7	97.5	97.5
Manchester Piccadilly	-	-	97.8	94.0	98.3	95.4	96.4
Manchester South	-	-	-	98.2	98.8	-	98.5
Market Harborough	-	-	-	86.5	98.6	-	92.6
Middlesbrough	93.5	92.2	39.6	95.4	66.9	95.7	80.6
Newcastle Centre	77.8	94.1	75.6	93.3	97.5	89.6	88.0
Newcastle Cradlewell Roadside	-	-	-	99.6	-	-	99.6
Northampton	-	-	**96.7**	98.2	98.4	92.7	**96.5**
Norwich Lakenfields	-	81.0	93.2	89.8	94.7	98.2	91.4
Nottingham Centre	-	74.7	**28.7**	98.1	98.3	91.5	**78.3**
Oxford Centre Roadside	-	-	-	95.1	-	-	95.1
Oxford St Ebbes	-	99.0	97.6	86.2	-	-	94.2
Plymouth Centre	-	96.6	92.3	93.8	98.2	-	95.2
Portsmouth	-	0.0	97.9	99.3	99.6	-	74.2
Preston	-	-	98.1	29.3	98.4	-	75.3
Reading New Town	-	97.5	98.5	83.2	98.4	-	94.4
Rochester Stoke	-	**0.0**	97.9	32.9	99.5	75.0	**61.1**
Salford Eccles	95.2	98.6	90.3	54.4	93.4	93.6	87.6
Saltash Roadside	-	91.9	83.1	-	-	-	87.5
Sandwell West Bromwich	-	-	-	99.4	99.5	99.5	99.5
Sandy Roadside	-	77.6	98.8	93.7	-	-	90.0
Scunthorpe Town	-	44.9	-	98.5	-	89.5	77.7
Sheffield Centre	92.7	79.6	98.1	89.9	98.4	97.2	92.6
Sheffield Tinsley	-	-	-	98.5	-	-	98.5

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
Sibton	-	-	-	-	99.5	-	99.5
Southampton Centre	98.4	98.4	85.1	94.2	98.4	97.8	95.4
Southend-on-Sea	-	-	95.4	98.9	98.5	-	97.6
St Osyth	-	-	-	96.9	97.1	-	97.0
Stanford-le-Hope Roadside	-	98.5	76.0	96.9	-	95.8	91.8
Stockton-on-Tees Eaglescliffe	-	94.4	91.6	98.2	-	-	94.7
Stoke-on-Trent Centre	-	98.1	90.6	98.3	97.5	-	96.1
Storrington Roadside	-	89.4	91.6	99.6	-	-	93.6
Sunderland Silksworth	-	-	95.3	94.3	94.2	68.1	88.0
Thurrock	-	80.3	-	98.1	98.6	98.1	93.8
Warrington	-	3.6	93.7	97.9	-	-	65.1
Weybourne	-	-	-	-	81.3	-	81.3
Wicken Fen	-	-	-	93.8	97.8	95.6	95.7
Wigan Centre	-	-	93.2	99.1	98.6	-	97.0
Wirral Tranmere	-	-	95.2	98.5	98.6	-	97.4
Yarner Wood	-	-	-	98.1	98.5	-	98.3
York Bootham	-	98.7	99.5	-	-	-	99.1
York Fishergate	-	99.7	-	99.6	-	-	99.6
Number of sites	12	40	48	73	51	29	82
Number of sites < 90%	3	18	12	22	7	7	30
Network Mean (%)	88.0	77.4	86.1	88.3	93.4	90.5	88.6

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
Both FDMS analysers suffered following a suspected power cut on 1 July; 26 ($PM_{2.5}$) and 33 days (PM_{10}) data were lost as a result. Considerable doubt remains obver the performance of these FDMS analysers and data remain provisional at time of writing, and may be deleted.

Blackpool Marton
The site remained closed during the quarter whilst repairs to the hut infrastructure are carried out. Monitoring restarted on 14 January 2011.

Charlton Mackrell
As reported in the April-June report, the NOx analyser response changed at the service on 2 March, which prevented the correct processing to be applied without making NO_2 data negative. This continued up to the service on 16 August. No information is available on the nature of the fault.

Chesterfield Roadside
Data from this site has been persistently lower than the Chesterfield site. Data have been deleted from 1 January to 30 September, and subsequent data will be assessed during the ratification of the next quarter's data.

Eastbourne

The PM_{10} dryer was found to be full of water at the audit in August. Since new dryer fitted in August the volatile fraction has remained high with the PM_{10} concentrations lower than previously recorded at the start of this site. Further investigation was carried out in October.

High Muffles
The sample manifold fan was found to have seized from 11 July to 6 August.

Ladybower
The analysers were found to be internally sampling from 20 to 28 July.

Leeds Headingley Kerbside
The FDMS analysers frequently produced poor quality data due to excessively high sample dewpoints. In addition, both analysers lost their memories up to 4 August when they were reset by the LSO. Poor PM_{10} data continued, and the PM_{10} dryer was finally replaced on 21 September; data up to the service have been deleted.

Leicester Centre
Air conditioning problems resulted in the loss of all data (except CO) from 30 June to 14 August. However, poor $PM_{2.5}$ FDMS performance led to the deletion of data up to 14 September.

Leominster
The NOx analyser pump failed on 18 June to 6 August. Further problems with the SO_2 pump resulted in the loss of data from 1 June to 3 August.

Preston
Elevated baselines in the NOx and NO channels gave cause for concern following an ESU visit on 16 June to remove the old analysers and equipment. Investigation by the QA/QC unit in September found that there was a gap in the roof around the sample inlet tubes. The pressurisation of the cabin by the air conditioning unit meant that cabin air was being sampled by the NOx analyser. The NOx data have been deleted from 16 June to 1 September.

Portsmouth
A suspected FDMS dryer failure caused elevated PM_{10} concentrations; data for the quarter have been deleted.

Rochester Stoke
The site has been closed since early November due to a water leak in the cabin. A replacement cabin has been purchased by the LSO, and the site restarted in early June 2010, although problems with some analysers persist. The PM_{10} data have all been deleted up to the end of September, and possibly up to the end of 2010.

Saltash Roadside
Both FDMS units suffered frequent, short periods of unstable data due to dew points being too high, particularly during August, when almost all data were lost.

Scunthorpe Town
The PM_{10} FDMS dryer failed, resulting in the loss of 45 days data up to replacement on 20 August.

Stanford-le-Hope Roadside
As a result of tests described in April-June report, the $PM_{2.5}$ dryer was identified and finally replaced on 15 July; 45 days data were lost.

Walsall Willenhall
The Walsall Willenhall site was destroyed by fire on 3 February. Work on commissioning a replacement site is under way.

Warrington
The PM_{10} data was found to be significantly higher than the $PM_{2.5}$ data due to an offset. Much of the PM_{10} data have been deleted up to replacement of the dryer on 27 September.

4.3 Scotland

4.3.1 Data Capture

The data capture for sites in Scotland for the period July-September 2010 is given in Table 4.3.

Table 4.3 Ratified Data Capture for Scotland, July-September 2010

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
Scotland							
Aberdeen	-	98.7	99.0	35.1	95.7	-	82.1
Aberdeen Union Street Roadside	-	-	-	79.9	-	-	79.9
Auchencorth Moss	-	**94.6**	**97.8**	-	99.8	-	**97.4**
Auchencorth Moss PM_{10} PM_{25}	-	61.2	9.0	-	-	-	35.1
Bush Estate	-	-	-	95.0	99.3	-	97.2
Dumbarton Roadside	-	-	-	**99.9**	-	-	**99.9**
Dumfries	-	-	-	98.7	-	-	98.7
Edinburgh St Leonards	97.5	97.6	96.7	97.5	**97.5**	97.4	**97.4**
Eskdalemuir	-	-	-	93.9	96.2	-	95.1
Fort William	-	-	-	99.8	99.9	-	99.9
Glasgow Centre	97.9	3.6	99.0	98.4	98.4	98.4	82.6
Glasgow City Chambers	-	-	-	98.5	-	-	98.5
Glasgow Kerbside	-	99.4	93.7	98.0	-	-	97.0
Grangemouth	-	98.1	97.1	92.8	-	97.5	96.3
Grangemouth Moray	-	-	-	99.0	-	-	99.0
Inverness	-	**80.4**	**89.1**	84.2	-	-	**84.6**
Lerwick	-	-	-	-	99.6	-	99.6
Peebles	-	-	-	97.3	98.6	-	98.0
Strath Vaich	-	-	-	-	99.5	-	99.5
Number of sites	2	8	8	15	10	3	19
Number of sites < 90%	0	3	2	3	0	0	5
Network Mean (%)	97.7	79.2	85.2	91.2	98.5	97.8	91.5

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

Auchencorth Moss PM_{10} $PM_{2.5}$
Temperature control problems continue to affect the site, resulting in noisy and unstable PM_{10} and $PM_{2.5}$ data.

Glasgow Centre
The PM_{10} volatile concentrations at Glasgow Centre continued to be anomalously high during the period and the data have been deleted. As a result, the dryer was replaced in September, but further problems resulted in the loss of almost the entire dataset for the quarter.

4.4 Wales

4.4.1 Data Capture

The data capture for sites in Wales for the period July-September 2010 is given in Table 4.4.

Table 4.4 Data Capture for Wales, July-September 2010

Network Data Capture for 01/07/2010 to 30/09/2010 from start date of any new site

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
Wales							
Aston Hill	-	-	-	98.3	98.4	-	98.3
Cardiff Centre	98.1	48.9	72.6	90.2	97.0	98.3	84.2
Chepsto w A48	-	76.1	4.3	95.3	-	-	58.6
Cwmbran	-	-	-	97.7	99.6	-	98.6
Mold	-	-	-	26.4	99.7	-	63.0
Narberth	-	23.4	-	97.9	94.7	98.3	78.6
Newport	-	0.0	93.1	93.8	-	-	62.3
Port Talbot Margam	**98.0**	**0.0**	**97.2**	98.1	**98.1**	**98.0**	**81.6**
Port Talbot Margam PM_{10}	-	**94.6**	-	-	-	-	**94.6**
Swansea Roadside	-	98.5	97.9	98.7	-	-	98.3
Wrexham	-	**98.9**	**82.6**	98.3	-	98.3	**94.5**
Number of sites	2	8	6	10	6	4	11
Number of sites < 90%	0	5	3	1	0	0	6
Network Mean (%)	98.1	55.0	74.6	89.5	97.9	98.2	83.0

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

Cardiff Centre
Following a power cut on 24 May, the performance of both FDMS units was poor. The PM_{10} analyser ultimately had to be removed for workshop repair; 84 days PM_{10} and 14 days $PM_{2.5}$ data were lost in total.

Mold
The QA/QC Unit noticed unusual NO_2/NOx ratios from this site during the ratification of the January-March 2010 data. Investigations by CMCU, LSO and the ESU were initially inconclusive, as all calibration and audit data were within expected limits. It was subsequently discovered that the sample inlet system was leaking, and cabin air was being sampled by the NOx analyser. Data have been deleted from 4 February (ESU visit) to 17 September 2010. The ozone was apparently unaffected.

Narberth

A number of faults with the PM_{10} analyser required removal of the instrument for workshop repair on more than one occasion. Data between 31 March and 22 June, and 12 July to 31 August have been deleted. Problems continue into Q4 2010.

Newport
The PM_{10} data were noisy from 1 May to the service on 3 August, when the dryer was replaced. This improved the data only briefly, and further data from 7 August to 25 October have been deleted.

Port Talbot Margam
As reported in the April-June report, careful inspection of the Port Talbot Margam particulate data, it was noticed that the PM_{10} appeared to have a positive offset from around 20 May. A cooler failure was diagnosed, but following repair, the data was still suspect. A possible mass transducer fault has been suggested. Data from the PM_{10} FDMS have been deleted from 20 May to the replacement of the analyser on 22 November.

There were also communications faults with the other analysers intermittently between June and August following replacement of the analysers.

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 July-September 2010 is given in Table 4.5.

Network Data Capture for 01/07/2010 to 30/09/2010 from start date of any new site

Site	**CO**	**PM_{10}**	**$PM_{2.5}$**	**NO_2**	**O_3**	**SO_2**	**Site Average**
N Ireland							
Armagh Roadside	-	**68.2**	-	99.9	-	-	**84.1**
Ballymena	-	-	-	-	-	84.6	84.6
Belfast Centre	97.3	80.3	95.9	84.2	97.6	97.2	92.1
Derry	-	98.3	98.8	98.5	55.1	98.6	89.8
Lough Navar	-	89.1	-	-	99.3	-	94.2
Number of sites	1	4	2	3	3	3	5
Number of sites < 90%	0	3	0	1	1	1	3
Network Mean (%)	97.3	84.0	97.4	94.2	84.0	93.5	89.0

Shaded boxes are for data capture < 90%
Bold data captures are for data that are provisional and subject to further quality control

4.5.2 Site Specific Issues

Ballymena
A logger/communications fault resulted in the loss of data from 18 to 30 July.

Belfast Centre
Persistent performance problems with the PM_{10} FDMS were encountered during the previous quarter, continuing into this period. Measured PM_{10} concentrations were frequently less than the $PM_{2.5}$. A total of 16 days were deleted in July-September.

4.6 Overall Data Capture

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

Table 4.6: Data Capture by Pollutant, Entire Network

Site	CO	PM_{10}	PM_{25}	NO_2	O_3	SO_2	Site Average
Number of sites	24	68	77	115	80	45	135
Number of sites < 90%	5	31	25	29	12	10	52
Network Mean (%)	85.2	77.5	84.4	89.1	92.4	89.6	87.8

Shaded boxes are for data capture < 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.

Part B: Intercalibration Exercise Summer 2010

5 Introduction

In July to September 2010, AEA undertook an intercalibration of 136 monitoring stations in operation in the Defra and the Devolved Administrations Automatic Urban and Rural Monitoring Network.

The intercalibration exercise is a vital step in the process of data ratification. The audits are used to undertake a number of analyser and infrastructure performance checks that cannot be performed by Local Site Operators, with a view to ensuring confidence in the accuracy, consistency and traceability of air pollution measurements made at all the monitoring stations.

The intercalibration requires the coordination and close cooperation of QA/QC unit, Management Units, ESUs and LSOs in making sure the entire operation runs smoothly and is the result of many months of planning.

Leading up to the intercalibration, a draft schedule of visits is prepared and circulated to Management Units and ESUs for approval. ESU ozone photometers are calibrated at AEA and all QA/QC equipment and cylinders are tested, calibrated and verified before use.

QA/QC visits are always undertaken before any ESU visits, to allow the performance of the sites to be quantified for the six month period prior to the visit. During the QA/QC visit, the LSO usually attends to demonstrate their competence in performing routine calibrations.

The audits are used to transport independent calibration standard gases and test apparatus to all of the sites, to quantify the performance of the entire measurement process at the monitoring stations. The results obtained from these tests are fed into the ratification process, where any correction of datasets can be applied to account for any performance anomalies.

ESU visits are normally undertaken within a three week period following the QA/QC visit. At this time, the analysers and sampling systems are all cleaned and serviced in accordance with manufacturer's specifications. The analysers are then set up ready for the following six month period, until the next round of intercalibrations and servicing.

This scheduling has proven to be very successful in delivering reliable operation of monitoring stations and high quality data. The programme is iterative: improvements and enhancements are continually added to further improve performance and analyse results.

6 Scope of Intercalibration Exercise

The QA/QC visits fulfil a number of important functions:

- A "health check" on the production of provisionally scaled data, which is rapidly disseminated to the public soon after collection.
- Identification of poorly performing analysers and infrastructure, together with recommendations for corrective action.
- A measure of network performance, by examining for example, how different NOx analysers around the network respond to a common gas standard. This test checks how "harmonised" UK measurements are; ie that a 200ppb NO_2 pollution episode in Edinburgh would be reported in exactly the same way at every other site in the UK, regardless of the location or the analyser used to record the event.
- Assessment of the area around the monitoring station: has the environment changed in the last six months? Is the location still representative of the site classification?

The QA/QC audits test the following aspects of analyser performance:

1. Analyser accuracy and precision. These are basic checks to ensure analysers respond to known concentrations of gases in a reliable manner.
2. Instrument linearity. This test refines the response checks on analysers, by assessing

whether doubling a concentration of gas to the analyser results in a doubling of the analyser signal response. If an analyser's response characteristics are not linear, data cannot be reliably scaled into concentrations.

3. Instrument signal noise. This test checks that an analyser responds to calibration gases in a stable manner with time. A "noisy" analyser may not provide high quality data which may be difficult to process at lower concentrations.
4. Analyser response time. This test checks that the analyser responds quickly to a change in gas concentrations. If analyser response is too slow, data may not accurately reflect ambient concentrations.
5. Leak and flow checks. These tests ensure that ambient air reaches the analysers, without being compromised in any way. Leaks in the sampling system can affect the ability of the analyser to sample ambient air reliably.
6. NOx analyser converter efficiency. This test evaluates the ability of the analyser to measure NO_2. An inefficient converter severely compromises the data from the analyser.
7. TEOM ko evaluation. The analyser uses this factor to calculate mass concentrations, so the value is calculated to determine its accuracy compared to the stated value.
8. Particulate analyser flow rate checks. These tests ensure that the flow rates through critical parts of the analyser are within specified limits. There are specific analyser flow rates that are set to make sure particle size fractions and mass concentration calculations are performed correctly.
9. SO_2 analyser hydrocarbon interference. This test evaluates the analyser's ability to remove interfering hydrocarbon gases from the sample gas. A failed test could have significant implications for analyser data.
10. Evaluation of site cylinder concentrations. These tests use a set of AEA certified cylinders that are taken to all the sites. The concentrations of the site cylinders are used to scale pollution datasets, so it is important to ensure that the concentrations of gases in the cylinders do not change.
11. Competence of Local Site Operators (LSO) in undertaking calibrations. As it is the calibrations by the LSOs that are used to scale pollution datasets, it is important to check that these are undertaken competently.

Once all data have been collected, a "Network Intercomparison" is conducted. This utilises the audit gas cylinders transported to each site in the Network. These cylinders are recently calibrated by the Calibration Laboratory at AEA, and allow us to examine how different site analysers respond when they are supplied with the same gas used at other sites. For ozone analysers, the calibration is undertaken with recently calibrated ozone photometers.

The technique used to process the intercomparison results is broadly as follows:

- The analyser responses to audit gas are converted into concentrations, using provisional calibration factors obtained from the Management Units on the day of the intercalibration. These factors are also used for the provisional data supplied to the web.
- These individual results are tabulated, and statistical analyses undertaken (e.g. network average result, network standard deviation, deviation of individual sites from the network mean etc).

These results are then used to pick out problem sites, or "outliers", which are investigated further to determine reasons and investigate possible remedies for the outliers. The definition of an outlier is an analyser result that falls outside the following limits:

- ±10% of the network average for NOx, CO and SO_2 analysers,
- ±5% of the reference standard photometer for Ozone analysers,
- ±2.5 % of the stated ko value for TEOM analysers,
- ±10% for particulate analyser flow rates,
- ±10% for the recalculation of site cylinder concentrations.

Thus, the intercalibration investigates the quality of provisional data output by the Management Units for use in forecastingand the web. It also provides input into the ratification process by highlighting sites where close scrutiny of datasets is likely to be required.

Any outliers that are identified are rigorously checked to determine the cause, and any required corrective action to be taken, if necessary. There are a number of likely main causes for outlier results, as discussed below:

- Drift of an analyser between scheduled LSO calibrations. This is by far the most common cause of an outlier result, and one that is simply corrected for during ratification of data.
- Drift of site cylinder concentrations between intercalibrations. Site cylinders can sometimes become unstable, especially at low pressures. All site cylinder concentrations are checked every six months, and are replaced as necessary.
- Erroneous calibration factors. It can occasionally happen that an analyser calibration is unsuccessful, and results in unsuitable scaling factors being used to produce pollution datasets. These are identified and corrected during ratification.
- Pressurisation of the sampling system at the audit. Occasionally, an analyser can be very sensitive to small changes in applied flow rates of calibration gas. This is more difficult to identify and correct, and may have consequences for data quality.
- Leaks, sample switching valves, etc. Outliers can be generated if an analyser is not sampling ambient air properly. It is likely that if a leaking analyser is identified, data losses will result.

7 Results

The results section has been restructured to allow easier regional analysis. As well as a detailed national summary, a regional summary and breakdown outlier analysis is provided.

7.1 National Network Overview

The results of the intercalibration are summarised in Table 7.1 below:

Table 7.1 - Summary of audited analyser performance – 136 UK stations

Parameter	Number of outliers	Number in network	% outliers in total
NOx analyser	25	115	22%
CO analyser	2	26	8%
SO_2 analyser	7	43	16%
Ozone analyser	14	81	17%
TEOM and BAM analysers	1 k_0, 5 flow	4 TEOM PM_{10} 54 FDMS PM_{10} 1 BAM PM_{10} 0 TEOM $PM_{2.5}$ 68 FDMS $PM_{2.5}$ 1 BAM $PM_{2.5}$	3%
Gravimetric PM analysers	3	8 PM_{10} 9 $PM_{2.5}$	0%
Total	57	410	14%

Four of the 136 sites were not in operation at the time of the intercalibration: The Cromwell Road site had an air conditioning failure at the time of the audit, the building housing Walsall Willenhall was destroyed in a fire, the Blackpool site was switched off pending hut repair, while Southwark Roadside has been relocated.

The number of analyser outliers identified is dramatically better than the previous exercise. At the Winter 2010 intercalibration 19% of the analysers in use were identified as outliers.

The procedures used to determine network performance are documented in AEA Work Instructions. These methods are regularly updated and improved and are evaluated by the United Kingdom Accreditation Service (UKAS). AEA holds ISO17025 accreditation for the on-site calibration of all the analyser types (NOx, CO, SO_2, O_3) and for the determination of the TEOM ko factor and particulate analyser flow rates used in the network.

7.1.1 Network Intercomparisons

Table 7.1 below shows the accuracy of the network measurements for the gaseous pollutants.

Table 7.1 Network accuracy

Parameter	Network Mean	Audit reference concentration	Network Accuracy %	%Std Dev
NO	473 ppb	454 ppb	4.3	4.2
NO_2	467 ppb	469 ppb	-1.5	4.5
CO	20.3 ppm	20.2 ppm	0.5	2.4
SO_2	155 ppb	152 ppb	2.0	4.8

- Oxides of Nitrogen.

  A total of 25 outliers (22%) were identified during this intercalibration. This is worse than the previous Winter exercise where 33% of the analysers were identified as outliers.
  There were no converters which fell outside the ±5% acceptance limits, but 14 where the initial result was outside the ±2% trigger for NO_2 rescaling. Additional testing showed that only two of these converters required rescaling to be undertaken.

- Carbon Monoxide

  Two analysers were identified as outliers at this intercalibration. This result is better than the winter exercise, when no analysers fell outside the acceptance limits.

- Sulphur Dioxide

  A total of 7 outliers (16%) were identified at this intercalibration. This is slightly worse than the previous winter exercise, when 10 analysers were identified as outliers. All m-xylene interference tests were less than 25ppb.

- Ozone

  A total of 14 outliers (17%) were identified during the Summer exercise. This is similar to the previous intercalibration, where 13 analysers were found to be outside the ±5% acceptance criterion.

- Particulate Analysers

  One calculated TEOM and FDMS k_0 determination was outside the required ±2.5% of their stated values. This is similar to the previous exercise - two outliers were identified in the Winter intercalibration

  Four TEOM main flows were found to be outside the ±10% acceptance limits, compared to eleven in total at the Winter exercise.
  Three Partisol analyser total flows were outside the acceptance limits.

- Site Cylinder Concentrations

  6 of the 299 site cylinders used to scale ambient pollution data were found to be outside the ±10% acceptance limit.

7.2 London Sites

The results of the intercomparison for the 16 London sites in operation at the time of the intercalibration are summarised below:

Table 7.2 - Summary of audited analyser performance – London Sites

Parameter	Number of outliers	Number in region
NOx analyser	2	14
NOx converter	0	
CO analyser	0	7
SO_2 analyser	0	6
Ozone analyser	2	9
TEOM and BAM analysers	0 k_0, 0 flow	0 TEOM PM_{10} 6 FDMS PM_{10} 0 TEOM $PM_{2.5}$ 10 FDMS $PM_{2.5}$
Gravimetric PM analysers	3	2 PM_{10} 1 $PM_{2.5}$
Cylinders	1	41

In addition to these findings, the following additional observations were made:

1. Marylebone Road $PM_{2.5}$ FDMS – A minor leak, but this and associated performance issues led to 6 weeks data rejection between July and September
2. Marylebone Road $PM_{2.5}$ Partisol – A major leak, component in sample line missing, meaning that the analyser is sampling internally. All data rejected.
3. The FDMS dryer at London Harrow Stanmore was seen to struggle with performance at the time of the audit. It is likely that the hot humid weather influenced this observation, but it will need careful ongoing monitoring to ensure good performance.
4. At Marylebone Road, the NOx analyser showed a slightly elevated NO response to NO_2 calibration gas. This may indicate a slight internal valve leak, but investigation has not revealed any significant systematic data anomalies; no data have been rejected. (The NOx ratio does look lower from July on...)

7.3 Scottish Sites

The results of the intercomparison for the 18 Scottish sites are summarised below:

Table 7.3 - Summary of audited analyser performance – Scottish Sites

Parameter	Number of outliers	Number in region
NOx analyser	3	14
NOx converter	1	
CO analyser	1	2
SO_2 analyser	1	3
Ozone analyser	0	10
TEOM and BAM analysers	0 k_0, 1 flow	0 TEOM PM_{10} 6 FDMS PM_{10} 0 TEOM $PM_{2.5}$ 6 FDMS $PM_{2.5}$
Gravimetric PM analysers	0	2 PM_{10} 2 $PM_{2.5}$
Cylinders	1	33

In addition to these findings, the following additional observations were made:

1. Significant leaks in both FDMS analysers at Auchencorth Moss
2. At Edinburgh St Leonards, the NOx analyser showed a slightly elevated NO response to NO_2 calibration gas. This may indicate a slight internal valve leak, but investigation has not revealed any systematic data anomalies; no data have been rejected.

7.4 Welsh Sites

The results of the intercomparison for the 10 Welsh sites are summarised below:

Table 7.4 - Summary of audited analyser performance – Welsh Sites

Parameter	Number of outliers	Number in region
NOx analyser	4	10
NOx converter	0	
CO analyser	0	2
SO_2 analyser	1	4
Ozone analyser	1	6
TEOM and BAM analysers	0 k_0, 0 flow	2 TEOM PM_{10} 4 FDMS PM_{10} 0 TEOM $PM_{2.5}$ 4 FDMS $PM_{2.5}$
Gravimetric PM analysers	0	1 PM_{10} 2 $PM_{2.5}$
Cylinders	1	26

In addition to these findings, the following additional observations were made:

1. At Cwmbran, Swansea and Wrexham, the NOx analysers showed slightly elevated NO responses to NO_2 calibration gas. This may indicate a slight internal valve leak, but investigation has not revealed any systematic data anomalies; no data have been rejected.

7.5 Northern Ireland Sites (incl. Mace Head)

The results of the intercomparison for the 5 Northern Irish and Mace Head sites are summarised below:

Table 7.5 - Summary of audited analyser performance – Northern Irish Sites

Parameter	Number of outliers	Number in region
NOx analyser	0	3
NOx converter	0	
CO analyser	0	1
SO_2 analyser	0	2
Ozone analyser	1	4
TEOM and BAM analysers	1 k_0, 0 flow	0 TEOM PM_{10} 4 FDMS PM_{10} 0 TEOM $PM_{2.5}$ 1 FDMS $PM_{2.5}$
Gravimetric PM analysers	0	0 PM_{10} 0 $PM_{2.5}$
Cylinders	0	9

In addition to these findings, the following additional observations were made:

1. At Derry, the NOx analyser showed a slightly elevated NO response to NO_2 calibration gas. This may indicate a slight internal valve leak, but investigation has not revealed any systematic data anomalies; no data have been rejected.

7.6 English Sites

The results of the intercomparison for the 87 English sites are summarised below:

Table 7.6 - Summary of audited analyser performance – English Sites

Parameter	Number of outliers	Number in region
NOx analyser	16	74
NOx converter	1	
CO analyser	1	14
SO_2 analyser	5	28
Ozone analyser	10	52
TEOM and BAM analysers	0 k_0, 2 flow	2 TEOM PM_{10} 34 FDMS PM_{10} 1 BAM PM_{10} 0 TEOM $PM_{2.5}$ 52 FDMS $PM_{2.5}$ 1 BAM $PM_{2.5}$
Gravimetric PM analysers	0	3 PM_{10} 4 $PM_{2.5}$
Cylinders	3	179

In addition to these findings, the following additional observations were made:

1. At Wicken Fen, Coventry Memorial Park, Portsmouth and Harwell, the NOx analysers showed slightly elevated NO responses to NO_2 calibration gas. This may indicate a slight internal valve leak, but investigation has not revealed any systematic data anomalies at any of the sites; no data have been rejected.
2. The Scunthorpe NOx analyser was seen to be rebooting regularly during the audit. This prevented meaningful results from being obtained and was reported to CMCU for action.
3. The sampling system at Sunderland was compromised, calling NOx ambient data to be questioned. Extensive investigations were undertaken,
4. The BAM PM_{10} at Stockton-on-Tees Eaglescliffe suffered from a sticking nozzle at the audit. This was resolved by the operator, fortunately the problem does not appear to have affected measurement data.
5. The SO_2 analyser at Leominster was broken at the time of the audit. The calibration system for the NOx analyser was incorrectly plumbed, This, and associated performance issues has resulted in 6 weeks of data rejection in July and August.
6. The PM analysers at Leeds Headingley Roadside had been switched off to prevent them from overheating (air con failure).
7. The NOx analyser at Brighton Roadside was responding very slowly to calibration gas. In addition, the sampling system appears to have been poorly upgraded. Data for the whole of Q2 has already been rejected, it is likely that further data rejection will be required.
8. The NOx analyser at Rochester Stoke was broken at the time of the audit.

As noted earlier, the results from the intercalibration exercises are used to inform the entire data ratification process. Any actions required as a result of the intercalibration findings are discussed in the ratification section of this report.

8 Site Cylinder Concentrations

During the intercalibration, the concentrations of the on-site cylinders were evaluated using the audit cylinder standards. The calculated results showed that 6 of the 299 cylinders (~2%) used to scale analyser data into concentrations (NO, CO and SO_2) were outside the ±10% acceptance criterion. This is similar to the Winter exercise, where 3% (10) of the scaling cylinders were outside the acceptance limits. There were 5 NO cylinders and 1 SO_2 cylinder identified as outliers.

In addition, the concentrations of 40 NO_2 cylinders appear to have drifted by more than 10%. NO_2 cylinders are not used for the scaling of data and so will not be replaced at this time. Hence, a total of 46 of the 299 cylinders (16%) were outside the acceptance limits. This is very similar to the previous intercalibration, where 16% of the total cylinder population (47 in total) were also found to be out of specification. The number of outlying NO_2 cylinders has increased slightly since the last audit, but no further remedial action will be taken at this stage.

2 of the 5 NO cylinders (Brighton Roadside, Bexley) appear to have been contaminated; a significant oxidation of the NO into NO_2 has occurred since the last intercalibration. These have been replaced and the performance of the new cylinders will be closely monitored at subsequent audits.

The remainder of the cylinders were all slightly outside the 10% limit. These will all be checked at the summer audits and appropriate action taken if necessary.

9 Site Information

All site information is now uploaded to CMCU and UK_AIR for dissemination using Google Earth (http://uk-air.defra.gov.uk/interactive-map). QA/QC unit make considerable effort in ensuring that site locations are accurate on the new Google Earth site information and AQ archive pages. All future additions to the AURN will include accurate positioning using Google Earth. Site location information is available in links from the AURNHUB (http://aurnhub.defra.gov.uk/login.php).

10 CEN

The European Committee for Normalisation (CEN) have prepared a series of documents prescribing how analysers must be operated, to produce datasets that conform to the Data Quality Objectives of the EC Directives. The CEN documents for operation of air pollution analysers; BS EN14211 (NOx), BS EN14212 (SO_2), BS EN14626 (CO) and BS EN14625 (O_3) set out a series of performance criteria for analysers which must be achieved, both in the field and under laboratory conditions. The test requirements have been extensively reported in previous intercalibration summaries and should be referenced for further information.

The CEN operating methodologies are now finalised and published and have been incorporated into the requirements of the air quality Directive 2008/50/EC. Member States had until June 2010 to ensure their monitoring networks are compliant. Older, non-compliant equipment still on site after this date will need to be replaced before June 2013. AEA have taken steps to ensure the procedures used in the UK comply with the requirements ahead of any imposed deadlines. To this end, the procedures used for the intercomparisons have been fully compliant with the CEN protocols since January 2006.

To comply with the Directive, the uncertainty for gaseous analyser measurements must be less than ±15%.

For sites that have CEN-compliant gaseous instrumentation, it is possible to calculate the overall uncertainty of measuring air quality. This information is site and analyser specific and presented in the table below:

Table 10.1 – Analyser measurement uncertainties (%)

Date	Site	O_3	CO	SO_2	NOx	NO
13-Jul	Barnsley 12			13.4		
13-Jul	Barnsley Gawber	10.7		13.4	10	10
22-Jul	Bath Roadside				13.5	14
14-Jul	Billingham				13.5	14
05-Aug	Birmingham Tyburn	8.7		12.3	11.8	11.8
05-Aug	Birmingham Tyburn Roadside	12.4			13.5	14
12-Aug	Bournemouth	12.4			13.5	14
09-Aug	Brighton Preston Park	12.4			13.5	14
09-Aug	Brighton Roadside				13.5	14
22-Jul	Bristol Old Market		9.5		13.5	14
21-Jul	Bristol St Paul's	12.4	9.5	13.5	13.5	14
10-Aug	Canterbury				13.5	14

12-Jul	Carlisle Roadside				10.5	10.5
04-Aug	Charlton Mackrell	12.4			13.5	14
22-Jul	Coventry Memorial Park	10.7			10	10
02-Aug	Exeter Roadside	28.2			11.8	11.8
27-Jul	Glazebury	12.4			13.5	14
13-Jul	Great Dun Fell	12.4				
20-Aug	Harwell	12.4		13.4	13.5	14
12-Jul	High Muffles	12.4			13.5	14
05-Jul	Hull Freetown	10.7	9.5	13.5	10	10
28-Jul	Ladybower	12.4		13.4	13.5	14
07-Jul	Leeds Centre	10.7	9.5	13.6	10	10
18-Aug	Leicester Centre	10.7	9.5	13.5	10	10
26-Jul	Leominster	12.4			13.5	14
10-Aug	Liverpool Queen's Drive Roadsi				13.5	14
09-Aug	Liverpool Speke	10.7	9.5	13.5	10	10
10-Aug	London Bexley		9.5	13.4	13.5	14
05-Aug	London Bloomsbury	12.4	9.5	13.4	13.5	14
03-Aug	London Haringey	10.7			13.5	14
04-Aug	London Harlington	12.4			13.5	14
27-Jul	London Hillingdon	10.7			10	10
09-Aug	London Marylebone Road	12.4	9.5	13.7	13.5	14
23-Aug	London N. Kensington	12.4	9.5	13.4	13.5	14
26-Aug	London Westminster	12.4	9.5	13.4	13.5	14
27-Jul	Lullington Heath	12.4		13.4	13.5	14
28-Jul	Manchester Piccadilly	10.7			10	10
27-Jul	Manchester South	12.4			13.5	14
13-Jul	Middlesbrough	12.4	9.5	13.6	13.5	14
12-Jul	Newcastle Centre	10.7	9.5	15.4	10	10
12-Jul	Newcastle Cradlewell Roadside				10.5	10.5
24-Aug	Northampton	8.7			11.8	11.8
06-Jul	Norwich Lakenfields	10.7		13.5	10	10
20-Jul	Nottingham Centre	10.7		13.4	10	10
03-Aug	Plymouth Centre	10.7			10	10
28-Jul	Portsmouth	10.7			11.8	11.8
10-Aug	Preston	10.7			10	10
22-Jul	Reading New Town	10.7			10	10
11-Aug	Rochester Stoke	12.4		13.4		
02-Aug	Sandwell West Bromwich	8.7		12.6	11.8	11.8
07-Jul	Sandy Roadside				13.5	14
06-Jul	Scunthorpe Town			14.2		
14-Jul	Sheffield Centre	10.7	9.5	13.4	10	10
14-Jul	Sheffield Tinsley				13.5	14
05-Jul	Sibton	12.4				
11-Aug	Southampton Centre	10.7	9.5	13.4	10	10
29-Jul	Southend-on-Sea	10.7			13.5	14
28-Jul	St Osyth	10.7			10	10
29-Jul	Stanford-le-Hope Roadside			13.4	13.5	14
14-Jul	Stockton-on-Tees Eaglescliffe				13.5	14
21-Jul	Stoke-on-Trent Centre	10.7			10	10
19-Jul	Storrington Roadside					
14-Jul	Sunderland Silksworth	12.4				
28-Jul	Thurrock	12.4		13.4	13.5	14
17-Aug	Tower Hamlets Roadside		9.5			
07-Jul	Wicken Fen	12.4		13.4	13.5	14
09-Aug	Wirral Tranmere	10.7			10	10
29-Jul	Yarner Wood	12.4			13.5	14
11-Aug	Armagh Roadside				10.5	10.5
05-Aug	Ballymena			11.4		
10-Aug	Belfast Centre	10.7	12.6	13.4	10	10
04-Aug	Derry	12.4		14.2	13.5	14
02-Aug	Lough Navar	12.4				
20-Jul	Aberdeen	12.4			13.5	14
21-Jul	Aberdeen Union Street Roadside				13.5	14
23-Jun	Auchencorth Moss	12.4				
22-Jul	Bush Estate	12.4			13.5	14
15-Jul	Dumfries				13.5	14
20-Jul	Edinburgh St Leonards	12.4	9.5	13.6	13.5	14
11-Jul	Eskdalemuir	12.4			13.5	14
21-Jul	Fort William	12.4			13.5	14

27-Jul	Glasgow Centre	10.7	9.5	13.5	13.5	14
26-Jul	Glasgow City Chambers				13.5	14
28-Jul	Glasgow Kerbside				10	10
23-Jul	Inverness				13.5	14
22-Jul	Lerwick	12.4				
22-Jul	Peebles	12.4			13.5	14
23-Jul	Strath Vaich	12.4				
26-Jul	Aston Hill	12.4			13.5	14
13-Jul	Cardiff Centre	12.4	9.5	13.8	13.5	14
15-Jul	Cwmbran	10.7			11.8	11.8
17-Aug	Mold	12.4			13.5	14
12-Jul	Narberth	12.4		13.4	13.5	14
14-Jul	Port Talbot Margam	10.7	9.5	13.4	13.5	14
13-Jul	Swansea Roadside				13.5	14
17-Aug	Wrexham			13.4	13.5	14

This table will be extended to include upgraded sites and PM measurements in future intercomparison exercises. Exeter's O3 uncertainty is due to it being an outlier during the autumn intercalibration; this may be revised after the winter exercise.

11 Safety

AEA undertakes regular extensive risk assessments of all its activities on-site, to ensure that its staff are not exposed to unsafe practices while working.

The most significant risks to field operators are electrical faults and lack of safe access to PM sample inlets to perform flow tests. This gains increased importance with FDMS analysers, where meaningful flow tests are impossible if access to the sample inlet cannot be achieved. We have successfully trialled a modified ladder design that does not require ladder restraints. We have rolled this out to all QA/QC field operators and recommended its use to all ESUs and MUs. There are now just a few sites where it is not currently possible to measure flows safely:

Table 11.1 Actions Required for Safe Roof Access

Site	Action required
Liverpool Speke	Has half barrier - needs full barrier
Middlesbrough	Roof access required, needs barrier
Coventry Memorial Park	Sloping roof - access not possible
Southend on Sea	Sloping roof - access not possible
Glasgow Kerbside	Needs new ladder support or railings
Thurrock	Sloping roof - access not possible

It is recommended that roof access at these sites is investigated, to determine whether safe access can be achieved.

In addition, the PM inlet cages at Plymouth Centre are securely bolted to the roof, with no easy means of accessing the heads without unbolting the cages. These need to be modified with doors to allow the LSO, ESU and QA/QC rapid access to the heads.

12 Certification

The accreditation schedule is available at http://www.ukas.org/calibration/lab_detail.asp?lab_id=902&vMenuOption=3. This certificate presents the results of the individual analyser scaling factors on the day of the audit, as calculated by AEA using the audit cylinder standards, in accordance with our ISO17025 accreditation.

13 Summary

The intercalibration exercise has demonstrated its value as an effective tool in determining overall site performance and assessing the reliability and traceability of air quality measurements from a large scale network. The results from this intercalibration have been used to assess data quality during the ratification of the network datasets for the period April to September 2010.

Appendices

Appendix 1: Recommendations for Upgrade or Replacement of Equipment

Appendix 2: Inventory of Defra-owned Equipment

Appendix 3: Partisol Data Report

Appendix 4: Information for New Sites

Appendix 1

Recommendations for Upgrade or Replacement of Equipment

As requested by Defra, 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 January 2010	**Priority**	**Action**
30	All permanently pressurised cylinder calibration systems to be fitted with passivated stainless steel tubing	High	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 LSOs 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 ESUs 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 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)**	Medium	Many sites now cured, but some need attention at next ESU visit

Appendix 2

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, December 2010

Relevant Contract	Location		Asset Description	Serial no	Purchase date
	x	y			
AURN QA/QC	*447965*	*187270*	*API model M401*	123	01/04/1999
AURN QA/QC	*447965*	*187270*	*API model M401*	151	01/10/2000
AURN QA/QC	*447965*	*187270*	*API model M401*	176	01/12/2002
AURN QA/QC	*232119*	*653198*	*API model M401*	290	01/05/2004
AURN QA/QC	*232119*	*653198*	*API model M402*	245	unknown
AURN QA/QC	*447965*	*187270*	*API model M401*	291	01/05/2004
AURN QA/QC	*447965*	*187270*	*API model M401*	292	01/05/2004
AURN QA/QC	*447965*	*187270*	*API model M401*	293	01/05/2004
AURN QA/QC	*447965*	*187270*	*API model M703*	254	01/01/2010
AURN QA/QC	*232119*	*653198*	*API model M703*	255	01/01/2010
AURN QA/QC	*232119*	*653198*	*Sabio 2010 dilution calibrator*	374040708	01/02/2005
AURN QA/QC	*232119*	*653198*	*Sabio 2010 dilution calibrator*	02940306A	unknown
AURN QA/QC	*447965*	*187270*	*Sabio 2020 zero air generator*	02720306B	01/02/2005
AURN QA/QC	*447965*	*187270*	*Sabio 2030 ozone photometer*	15591	01/02/2005
AURN QA/QC	*447965*	*187270*	*Sabio 2010 dilution calibrator*	away for repair	01/06/2006
AURN QA/QC	*447965*	*187270*	*Sabio 2020 zero air generator*	away for repair	01/06/2006
AURN QA/QC	*447965*	*187270*	*Sabio 2030 ozone photometer*	17743	01/06/2006
AURN QA/QC	*447965*	*187270*	*Sabio 2020 zero air generator*	away for repair	01/03/2008
AURN QA/QC	*447965*	*187270*	*Sabio 2030 ozone photometer*	7820708	01/03/2008
AURN QA/QC	*447965*	*187270*	*Sabio 2010 dilution calibrator*	away for repair	01/03/2008
AURN QA/QC	*232119*	*653198*	*Drycal flow meter*	110085	unknown
AURN QA/QC	*232119*	*653198*	*Drycal flow meter*	107881	unknown
AURN QA/QC	*232119*	*653198*	*Drycal low flow meter*	6699	unknown
AURN QA/QC	*232119*	*653198*	*Sabio 2020 zero air source*	36207088	unknown
AURN QA/QC	*232119*	*653198*	*Sabio 2020 zero air source*	03711208c	unknown
AURN QA/QC	*232119*	*653198*	*Sabio 2020 zero air source*	03701208c	unknown
AURN QA/QC	*447965*	*187270*	*AC31 dual chamber NOx analyser*	1672	01/03/2003
AURN QA/QC	*447965*	*187270*	*TEI 43C SO_2 analyser*	386	01/03/2003
AURN QA/QC	*447965*	*187270*	*TEI 48C CO analyser*	16067	01/03/2003
AURN QA/QC	*447965*	*187270*	*M265 chemiluminescent ozone analyser*	16373	01/03/2003
AURN QA/QC	*232119*	*653198*	*Thermo 03 Analyser Model 49i*	713021784	unknown
AURN QA/QC	*232119*	*653198*	*API fluorescent S02 Analyser Model 100A*	1572	unknown

AURN QA/QC	*232119*	*653198*	*Thermo NO-NO2-NOx Analyser Model 42c*	42c-56236-307	unknown
AURN QA/QC	*447965*	*187270*	*API model M703*	19417	30/06/2010
AURN QA/QC	*447965*	*187270*	*API model M703*	19418	30/06/2010
AURN QA/QC	*447965*	*187270*	*Ozone analyser Thermo 49i*	713021785	unknown
AURN QA/QC	*232119*	*653198*	*Ozone analyser Thermo 42i*	713021784	unknown
AURN QA/QC	*232119*	*653198*	*API model M703*	18941	06/01/2010
AURN QA/QC	*232119*	*653198*	*API model M703*	18942	06/01/2010

Appendix 3

Partisol Data: July-September 2010

Partisol data were ratified for the following sites and measurement periods.

Site	Start date	End date	Ratified Data Capture, %
Auchencorth Moss PM_{10}	1st Jul	30th Sep	94.6
Auchencorth Moss $PM_{2.5}$	1st Jul	30th Sep	97.8
Bournemouth $PM_{2.5}$	1st Jul	30th Sep	94.6
Brighton Preston Park $PM_{2.5}$	1st Jul	30th Sep	87%
Harwell PM_{10}	1st Jul	30th Sep	88%
Harwell $PM_{2.5}$	1st Jul	30th Sep	99%
Inverness PM_{10}	1st Jul	30th Sep	80%
Inverness $PM_{2.5}$	1st Jul	30th Sep	89%
L. Marylebone Road PM_{10}	1st Jul	30th Sep	82%
L. Marylebone Road $PM_{2.5}$	1st Jul	30th Sep	**24%**
London N Kens PM_{10}	1st Jul	30th Sep	96%
London N Kens $PM_{2.5}$	1st Jul	30th Sep	87%
London Westminster $PM_{2.5}$	1st Jul	30th Sep	76%
Northampton $PM_{2.5}$	1st Jul	30th Sep	97%
Port Talbot Margam PM_{10}	1st Jul	30th Sep	95%
Wrexham PM_{10}	1st Jul	30th Sep	99%
Wrexham $PM_{2.5}$	1st Jul	30th Sep	88%

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 PM_{10} and $PM_{2.5}$ datasets "track" each other.
- Do an initialcomparison 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 PM_{10} concentration.
- Ensuring that data with a Partisol fault code or filter fault are rejected.
- Checking site audit data where available.
- Carrying out a more detailed quarterly comparison of Partisol data with co-located or nearby FDMS-TEOM 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.

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 m^3/h).

Site Audits – Winter 2009-10 and summer 2010 periods.

Site	**Audit date**	**Flowrate m^3/h**	**% out from 16.7 m^3/h**
Auchencorth Moss PM_{10} (serial no. 21550)	3 Feb 2010 23 Jun 2010	16.7 17.41	0 4.43
Auchencorth Moss $PM_{2.5}$ (serial no. 21548)	3 Feb 2010 23 Jun 2010	16.7 17.09	0 2.51
Bournemouth $PM_{2.5}$ (serial no. **21863**)	8 Feb 2010 12 Aug 2010	17.48 16.38	4.70 -1.76
Brighton Preston Park $PM_{2.5}$ (212200001)	22 Feb 2010 09 Aug 2010	No access 17.46	No access 4.71
Harwell PM_{10}	28 Jan 2010 20 Aug 2010	16.7 16.90	0 1.4
Harwell $PM_{2.5}$	28 Jan 2010 20 Aug 2010	16.7 17.07	0 2.40
Inverness PM_{10} (serial no. 21255)	20 Jan 2010 23 Jul 2010	16.7 17.24	0 3.44
Inverness $PM_{2.5}$ (serial no. 21861)	20 Jan 2010 23 Jul 2010	16.7 16.54	0 -0.75
London Marylebone Road PM_{10} (serial no. 21306)	11 Feb 2010 09 Aug 2010	16.79 **0.02**	0.68 **-99.87**
London Marylebone Road $PM_{2.5}$ (serial no. 21493)	11 Feb 2010 09 Aug 2010	Partisol not operating. **0**	Partisol not operating. **-100%**
London N Kens PM_{10} (serial no. 21722) – assumed to be “2[nd] set”.	12 Jan 2010 23 Aug 2010	16.53 16.02	1.0 -3.9
London N Kens $PM_{2.5}$ – assumed to be “2[nd] set”.	12 Jan 2010 23 Aug 2010	16.31 16.16	2.3 -3.06
London Westminster $PM_{2.5}$	8 Feb 2010 26 Aug 2010	16.0 16.44	-4.14 -1.4
Northampton $PM_{2.5}$	10 Feb 2010 24 Aug 2010	Not tested, no safe ladder access. 16.93	- 1.54
Port Talbot Margam PM_{10} (formerly 2.5) (serial number 22588?)	02 Jan 2010 14 Jul 2010	16.7 16.81	0 0.8
Wrexham PM_{10} (serial no. 21224)	23 Feb 2010 17 Aug 2010	16.7 15.87	0 -4.77
Wrexham $PM_{2.5}$ (serial no. 21011)	23 Feb 2010 17 Aug 2010	16.7 15.73	0 -5.77

Flowrate test results in all cases where it was possible to carry out a flowrate test on the Partisol were normal (i.e. within 10%).

Auchencorth Moss

PM_{10}: data capture 94.5%.
Partisol data losses –

6th Jul: scheduled service.
10th – 13th Jul: Filter exchange failure (FEF)

$PM_{2.5}$: data capture was 98.9%.

Data losses as follows:
6th Jul: scheduled service.
27th Jul: uncorrected value was negative.

Bournemouth

$PM_{2.5}$ only: Data capture was 94.6% for this quarter. Data losses:

4th -6th Jul: FEF
23rd Aug: scheduled service resulting in < 18h sampling.
7th Sep: time correction resulting in < 18h sampling.

Brighton Preston Park

$PM_{2.5}$ only: data capture was 87%, as Partisol was out of operation since early April, awaiting repair after vandalism. Data losses:

1st - 8th Jul: vandalised in April, awaiting repair.
9th Jul: incorrect date and time entered.
22nd - 23rd Jul: FEF
25th Aug: < 18h sampling.

Harwell

PM_{10}: 88% data capture. Several breakdowns and data losses:
23rd Jul: < 18h
15th -17th Aug: unspecified breakdown
23rd – 25th Aug: unspecified breakdown
5th – 7th & 10th Sep: breakdown – found in “STOP” mode.

$PM_{2.5}$: 99% data capture. Only 1 day’s data lost,
5th Aug – PM2.5 > PM10.

Inverness

PM_{10}: data capture 80.4%.
Data losses as follows:
22nd Jul – 2nd Aug – Filter Exchange Failure (FEF)
7th – 10th Aug: FEF
25th -26th Aug, failure due to LSO error in entering filters (confirmed by BV).
5th – 6th Sep, 8th – 10th Sep: further FEFs (confirmed by BV).
31st Aug: callout and service by ESU.

There was one unusually low value (2 μgm^{-3}) on 28th Aug: however a similar low daily mean (3 μgm^{-3}) was measured by the FDMS analyser at Aberdeen, so this has not been rejected.

$PM_{2.5}$: data capture 89.1%.
Data losses:
15th Aug: error in initial weighing.
25th Aug: damaged filter.
26th – 31st Aug, 21st and 24th Sep: FEF.

London Marylebone Road

PM_{10}: data capture 81.5%. This Partisol shows good agreement with the co-located FDMS.
Data losses:

6^{th} Jul: < 18h sampling.
31^{st} Aug – 15^{th} Sep: broken bayonet fitting. This was actually repaired by the ESU on 8^{th} Sep but ESU did not inform the CMCU or LSO therefore no filters were loaded until 15^{th}.

$PM_{2.5}$: ***The $PM_{2.5}$ Partisol has consistently under-read relative to the co-located FDMS. An investigative visit on 28^{th} April discovered that a connector inside the sampler was completely missing, so the Partisol had been sampling from inside the housing. It is not clear when this connector was removed, but all data from that time will be invalid and must be deleted. It is suspected that this could be well back into 2009.The Partisol was repaired on 8^{th} September.***

Data capture is therefore reduced from 91.3% to 23.9%.
Data losses:

Upto 8^{th} Sep: missing connection inside sampler.

From the date of the repair, the Partisol and FDMS data appear to match each other closely. It does appear that the problem existed from before the beginning of 2010.

London North Kensington

PM_{10}: data capture 96%. There is very little data from the co-located FDMS this quarter for comparison with the Partisol.

Data losses:
8^{th} Sep: < 18h sampling.
10^{th} Sep: delayed filter change
30^{th} Sep: scheduled service.

$PM_{2.5}$: data capture 87.0%. Last quarter, it was highlighted that the Partisol tracked the co-located FDMS well until around the time of a power failure on 30^{th} Apr, after which it under-read relative to the FDMS. This was tracked to a leak in the SCC due to corrosion. The SCC was replaced at the beginning of Q4.

Data losses:
6^{th}, 7^{th} July: flow halted, < 18h sampling.
23^{rd} Aug: < 18h sampling.
10^{th} Sep: delayed filter change.
14^{th} Sep: FEF.
30^{th} Sep: scheduled service.

London Westminster

$PM_{2.5}$ only. Data capture = 76.1%.
Data losses –
1^{st}, 2^{nd} , 22^{nd} Jul, 9^{th}-10^{th} Aug, 22^{nd} – 23^{rd} Aug : power failure. (Several power failures were noted last quarter also.)
1^{st} – 15^{th} Sep: filters went missing in post and were not re-weighed.

Northampton

$PM_{2.5}$ only: Data capture was 96.7%. Data losses:
7^{th} Sep: time corrected
1^{6th} – 1^{7th} Sep: ran out of filters early due to an LSO error.

Port Talbot Margam

PM_{10} only: Partisol was converted to PM_{10} as of 18^{th} Feb. Data capture 95%..
Data losses:

16^{th} – 17^{th} Aug: FEF.

26th – 27th Aug: low flow noted: Partisol found in “STOP” mode.
6th Sep: date and time corrected.

One daily mean (10th Sep) was very high: however, as the co-located FDMS recorded a similar peak, this has not been rejected.

Wrexham
PM_{10}: Data capture was 98.9%..
Data losses:
7th Sep: time/date re-set.

$PM_{2.5}$: Data capture 88.0%. Data losses:
5th Jul: FEF.
18th Jul: PM2.5 > PM10, and the former was thought to be suspect.
On 13th – 17th Aug, the Partisol was sampling but no records were retained. Although BV were able to match each filter to a day, the data had to be rejected because it was not possible to confirm that 24 m^3 of air had been sampled on each day. This is a recurrence of a problem that occurred in March, and then again 25th – 29th Jun.
7th Sep: time re-set.
22nd – 28th Sep: quartz filters erroneously used instead of Emfab. This has happened before at another site.

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Appendix 4

Site Details for New Sites

Site Name	Pollutants	Region Name	Grid	Easting	Northing	Altitude m	Type
Chatham C Roadside	NO_2 PM_{10} PM_{25}	SE England	TQ 77487 66947				Traffic Urban
Eastbourne	NO_2 PM_{10} PM_{25}	SE England	TQ 60085 02118	560085	102118	-	Background Urban
Storrington Roadside	PM_{10} PM_{25}	SE England	TQ 08991 14249	508991	114249	-	Traffic Urban
Dumbarton Roadside	NO_2	Scotland	NS 49724 72042	249724	672042	49	Traffic Urban
Ballymena	SO2	N Ireland	D 11990 02630	311900	402600	-	Background Urban

AEA group
The Gemini Building
Fermi Avenue
Harwell
Didcot
Oxfordshire
OX11 0QR
Tel: 0870 190 6465
Fax: 0870 190 6608

AEA