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QA/QC Data Ratification Report for the Automatic Urban and Rural Network, April-June 2011

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

Ratified hourly average data capture for the network averaged 93.3% for all pollutants (O_3 , NO_2 , SO_2 , CO , PM_{10} and $PM_{2.5}$) during the 3-month reporting period April-June 2011. Data capture for all pollutants except PM_{10} and $PM_{2.5}$ were above 90%. There were 21 sites with data capture less than 90% for the period.

The number of monitoring sites in the AURN during this quarter was 134, of which 72 are Local Authority owned sites affiliated to the national network. Some are co-located and separately named gravimetric particulate analysers at sites with automatic analysers. Many affiliated sites have additional Defra-funded analysers installed on site.

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 April-June 2011. During this period there were 134 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 62 Defra-funded sites and 72 affiliate sites, although many affiliate sites have fully-funded PM₁₀ 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 PM₁₀ and PM_{2.5}. Port Talbot Margam has a Partisol, which was converted from PM_{2.5} to PM₁₀ during February 2010.

1.1 Overview of Network Performance

Ratified hourly average data capture for the network averaged 93.3% for all pollutants (O₃, NO₂, SO₂, CO, PM₁₀ and PM_{2.5}) during the 3 month reporting period April-June 2011 (see Table 1.1). All gaseous pollutants achieved 90% or higher data capture on average. 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. Some data remain provisional pending further investigation-see Section 1.3

Table 1.1: AURN Ratified Data Capture (%) by Quarter, 2011

	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Mean
Q1 2011	95.3	79.6	85.1	93.4	95.2	92.5	90.4
Q2 2011	97.8	86.8	89.8	94.6	96.2	97.2	93.3

Overall, 351 out of the 412 analysers (85%) achieved data capture levels above the required 90% target during this reporting period (See Table 1.2), although as stated above, this may be subject to change.

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

Total Number Of Analysers		Q1 Jan-Mar 2011 (No. below 90%)	Q2 Apr-June (No. below 90%)
CO	24	3	1
NO ₂	116	13	13
O ₃	82	7	9
PM ₁₀ ¹	68	24	17
PM _{2.5} ¹	76	25	19
SO ₂	46	6	2
Total <90%		78	61

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

In total, 21 out of the 134 operational network sites in the quarter (15.7%) had an average data capture rate below the required 90% level for the April-June 2011 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 April-June 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 or rescaled.

Leeds Centre	CO	20-31 March	deleted
Scunthorpe Town	SO ₂	Feb-May	deleted
York Fishergate	NOx	Dec-March	reprocessed
Chatham Centre Roadside	NOx	March	reprocessed
Narberth	SO ₂	Feb-March	reprocessed
Norwich Lakenfields	NOx	Jan-March	reprocessed
Portsmouth	NOx	March	reprocessed

1.3 Data Remaining Provisional

At the time of writing, a number of sites are undergoing investigations into the quality of data from January-June 2011. Generic data quality issues which result in this are discussed in Section 3.

Birmingham Tyburn PM_{2.5} PM₁₀ January-June 2011
 Cardiff Centre PM_{2.5} PM₁₀ April-June 2011
 Chepstow A48 PM_{2.5} PM₁₀ April-June 2011
 Coventry Memorial Park PM_{2.5} April-June 2011
 Derry PM_{2.5} PM₁₀ March-June 2011
 Leamington Spa PM_{2.5} PM₁₀ Jan-June 2011
 Manchester Piccadilly PM_{2.5} January-June 2011
 Nottingham Centre PM₁₀ April-June 2011
 Oxford St Ebbes PM_{2.5} April-June 2011
 Salford Eccles PM_{2.5} April-June 2011
 Sunderland Silkworth PM_{2.5} April-June 2011
 Swansea Roadside PM_{2.5} PM₁₀ April-June 2011
 Thurrock PM₁₀ April-June 2011
 Wigan Centre PM_{2.5} April-June 2011
 Southend on Sea NOx O₃ PM_{2.5} PM₁₀ restarted 20 June, Q2 data will be ratified with Q3
 St Osyth NOx August 2010-June 2011 Possible sampling fault
 York Fishergate NOx Jan-June 2011 No audit carried out due to refurbishment

The results of these investigations will be reported in future quarterly QA/QC reports.

2 Changes in the Network for Directive Compliance

No new analysers were installed in the network during the period April-June 2011.

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 FDMS Performance Issues

At the time of writing, there are a number of FDMS performance issues being investigated by the QA/QC unit. Most significant is the apparent baseline offset, which can result in data being higher or lower than might be expected. In order to determine this, zero checks are being carried out by placing a Hepa zero filter over the inlet and leaving for several days. This method does allow the determination of the analyser “zero” but requires a visit by QA/QC staff and the LSO, and therefore it will take time to complete all sites. The findings and implications of these tests will be discussed in future QA/QC reports. Sites affected remain provisional as discussed in Section 1.3.

3.2 Lack of Analyser Calibrations

For a number of sites, there have been no calibrations performed for a significant period of time. In many cases, this is due to a lack of calibration gas, and steps have been taken to alleviate this. In some cases, new LSO staff have taken responsibility for site duties, and have asked for training from the QA/QC Unit; some calibrations were therefore missed. In a limited number of cases, data have been lost as no suitable scaling factors could be determined.

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 April-June 2011 is given in Table 4.1:

Table 4.1: Data capture for London: April-June 2011

Site	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
England							
Camden Kerbside	-	94.2	94.1	96.4	-	-	94.9
Haringey Roadside	-	98.4	99.8	98.8	-	-	99.0
London Bexley	99.9	-	99.0	99.5	-	99.3	99.4

Site	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
London Bloomsbury	99.8	96.8	99.3	99.7	99.9	99.7	99.2
London Cromwell Road 2	99.5	-	-	99.4	-	99.2	99.3
London Eltham	-	-	95.6	99.5	99.0	-	98.0
London Haringey	-	-	-	95.6	99.8	-	97.7
London Harlington	-	39.1	68.5	97.0	99.6	-	76.1
London Harrow Stanmore	-	-	90.6	-	-	-	90.6
London Hillingdon	-	-	-	98.9	99.9	-	99.4
London Marylebone Road	96.1	97.3	96.6	94.9	86.8	98.5	95.0
London Marylebone Road PARTISOL	-	100.0	80.2	-	-	-	90.1
London N. Kensington	99.5	55.9	81.5	85.7	87.7	99.5	85.0
London N. Kensington PARTISOL	-	100.0	98.9	-	-	-	99.5
London Teddington	-	-	66.9	99.9	94.3	-	87.0
London Westminster	99.7	-	98.9	99.5	99.8	99.6	99.5
Southwark A2 Old Kent Road	-	93.5	-	98.3	-	-	95.9
Tower Hamlets Roadside	99.9	-	-	98.4	-	-	99.1
Number of sites	7	9	13	15	9	6	18
Number of sites < 90%	0	2	4	1	2	0	3
Network Mean (%)	99.2	86.2	90.0	97.4	96.3	99.3	94.7

Shaded boxes are for data capture < 90%

4.1.2 Site Specific Issues

London Harlington

This site has consistently shown PM₁₀ concentrations below those for PM_{2.5} since December 2010. The PM₁₀ analyser was eventually replaced in June 2011 which improved the data.

London North Kensington

The site suffered air conditioning faults from 21 May to 6 June, which most seriously affected the FDMS and NO_x analysers; only CO and SO₂ were unaffected. PM₁₀ data were lost between 11 May and 18 June.

London Teddington

A leaking seal on the PM_{2.5} FDMS resulted in poor data; data have been lost from 1 June to ESU callout on 7 July.

4.2 England (excluding London)

4.2.1 Data Capture

The data capture for sites in England for the period April-June 2011 is given in Table 4.2:

Table 4.2 Data Capture April-June 2011: England

Site	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
England							
Barnsley 12	-	-	-	-	-	99.8	99.8
Barnsley Gawber	-	-	-	95.8	99.6	99.7	98.4
Bath Roadside	-	-	-	99.2	-	-	99.2
Billingham	-	-	-	99.3	-	-	99.3
Birmingham Acocks Green	-	-	-	99.3	89.9	99.6	96.3
Birmingham Tyburn	-	96.3	98.9	99.6	99.6	99.7	98.9
Birmingham Tyburn Roadside	-	82.1	98.9	99.6	99.3	-	95.0
Blackburn Darwen Roadside	-	-	-	99.5	-	-	99.5
Blackpool Marton	-	-	86.6	99.1	99.9	-	95.2
Bottesford	-	-	-	-	99.3	-	99.3
Bournemouth	-	-	90.1	99.7	99.8	-	96.5
Brighton Preston Park	-	-	91.2	99.7	69.2	-	86.7
Bristol Old Market	99.7	-	-	99.5	-	-	99.6
Bristol St Paul's	98.2	95.7	84.8	98.1	91.7	98.2	94.5
Bury Roadside	99.7	96.1	99.1	99.8	-	-	98.7
Cambridge Roadside	-	-	-	90.9	-	-	90.9
Canterbury	-	-	-	93.6	98.9	-	96.3
Carlisle Roadside	-	93.1	99.0	99.7	-	-	97.3
Charlton Mackrell	-	-	-	99.5	100.0	-	99.7
Chatham Centre Roadside	-	99.8	99.8	99.8	-	-	99.8
Chesterfield	-	99.6	99.8	99.8	-	-	99.7
Chesterfield Roadside	-	62.0	75.8	62.1	-	-	66.7
Coventry Memorial Park	-	-	99.0	99.6	99.5	-	99.4
Eastbourne	-	17.1	94.9	0.0	-	-	37.3
Exeter Roadside	-	-	-	98.3	98.7	-	98.5
Glazebury	-	-	-	99.9	99.9	-	99.9
Great Dun Fell	-	-	-	-	90.9	-	90.9
Harwell	-	99.2	90.3	99.0	99.4	99.4	97.4
Harwell PARTISOL	-	94.5	100.0	-	-	-	97.3
High Muffles	-	-	-	99.9	100.0	-	99.9
Horley	-	-	-	98.4	-	-	98.4
Hull Freetown	75.4	93.6	88.3	92.4	99.8	98.9	91.4
Ladybower	-	-	-	92.8	98.7	99.8	97.1
Leamington Spa	-	99.1	97.1	99.5	99.8	99.7	99.0
Leeds Centre	91.9	97.3	97.3	99.8	99.8	99.8	97.7
Leeds Headingley Kerbside	-	93.2	94.0	89.0	-	-	92.1
Leicester Centre	99.7	99.7	99.7	99.8	95.6	99.7	99.0
Leominster	-	-	-	99.3	99.4	99.1	99.3

Site	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
Liverpool Queen's Drive Roadside	-	-	-	99.9	-	-	99.9
Liverpool Speke	99.8	99.5	99.9	99.7	99.8	99.7	99.7
Lullington Heath	-	-	-	99.3	99.7	99.6	99.5
Manchester Piccadilly	-	-	87.5	99.5	99.7	99.8	96.6
Manchester South	-	-	-	99.8	99.9	-	99.8
Market Harborough	-	-	-	39.1	99.7	-	69.4
Middlesbrough	99.8	99.7	98.3	99.5	99.9	99.1	99.4
Newcastle Centre	96.7	99.1	99.7	98.3	98.0	96.6	98.1
Newcastle Cradlewell Roadside	-	-	-	99.7	-	-	99.7
Northampton	-	-	100.0	99.7	99.9	99.8	99.9
Norwich Lakenfields	-	99.8	99.9	94.3	100.0	99.8	98.7
Nottingham Centre	-	98.9	95.7	99.8	96.6	99.9	98.2
Oxford Centre Roadside	-	-	-	98.7	-	-	98.7
Oxford St Ebbes	-	85.7	91.8	97.3	-	-	91.6
Plymouth Centre	-	99.6	98.1	66.3	99.4	-	90.8
Portsmouth	-	86.1	94.9	86.5	99.5	-	91.7
Preston	-	-	96.2	99.9	100.0	-	98.7
Reading New Town	-	99.8	99.8	95.5	99.9	-	98.8
Rochester Stoke	-	55.3	55.0	63.0	62.4	63.7	59.9
Salford Eccles	93.5	93.1	97.5	97.3	96.5	92.8	95.1
Sandwell West Bromwich	-	-	-	99.8	95.2	99.9	98.3
Sandy Roadside	-	0.0	0.0	95.0	-	-	31.7
Scunthorpe Town	-	91.6	-	95.0	-	45.7	77.4
Sheffield Centre	99.9	90.1	96.1	99.6	99.6	99.2	97.4
Sheffield Tinsley	-	-	-	99.5	-	-	99.5
Sibton	-	-	-	-	99.9	-	99.9
Southampton Centre	99.9	99.3	73.9	98.1	99.6	99.7	95.1
Southend-on-Sea	-	-	11.4	11.4	11.4	-	11.4
St Osyth	-	-	-	99.7	99.7	-	99.7
Stanford-le-Hope Roadside	-	98.9	90.2	99.7	-	96.9	96.4
Stockton-on-Tees Eaglescliffe	-	99.7	99.0	99.9	-	-	99.6
Stoke-on-Trent Centre	-	99.5	99.1	99.9	99.9	-	99.6
Storrington Roadside	-	96.2	95.3	92.2	-	-	94.6
Sunderland Silksworth	-	-	91.7	99.2	80.4	98.9	92.5
Thurrock	-	95.9	-	94.6	99.9	99.5	97.5
Warrington	-	87.0	85.5	87.5	-	-	86.6
Weybourne	-	-	-	-	99.9	-	99.9
Wicken Fen	-	-	-	95.1	90.9	95.2	93.8
Wigan Centre	-	-	88.3	99.8	88.5	-	92.2
Wirral Tranmere	-	-	99.3	99.8	100.0	-	99.7
Yarner Wood	-	-	-	99.9	100.0	-	99.9
York Bootham	-	64.1	88.8	-	-	-	76.5
York Fishergate	-	0.0	-	97.5	-	-	48.7
Number of sites	12	39	47	74	53	30	81
Number of sites < 90%	1	10	12	9	6	2	11

Site	CO	PM ₁₀	PM _{2.5}	NO ₂	O ₃	SO ₂	Site Average
Network Mean (%)	96.2	86.1	89.7	93.2	95.2	96.0	92.3

Shaded boxes are for data capture < 90%

4.2.2 Site Specific Issues

Brighton Preston Park

The ozone was noticed to be anomalously low compared to other local sites between LSO calibrations on 1 and 28 June. The data have been deleted.

Chesterfield Roadside

There have been long-term problems with the PM₁₀ analyser at Chesterfield Roadside, and investigations have been ongoing as to the cause. However, an electrical fault caused the site to be turned off from 13 April to 3 May while repairs were carried out. In addition, an instrument fault resulted in the loss of a further 9 days during May.

Eastbourne

No LSO calibrations were carried out from March to October 2011; as a result the NO_x data have been deleted for this quarter. In addition, the PM₁₀ analyser had a switching valve problem, and much of the data were also deleted for the quarter

Market Harborough

A suspected sampling fault (probably internal sampling) between LSO calibrations resulted in the loss of NO_x data from 7 April to 30 May.

Rochester Stoke

A fault with the air conditioning system resulted in the site being turned off from 8 April to 11 May. The PM_{2.5} and PM₁₀ data were also deleted from 1 April due to the temperature faults experienced.

Sandy Roadside

A suspected converter fault caused the loss of NO₂ data from 16-23 May. The FDMS analysers were removed for workshop repair but still performed poorly when reinstalled on site, despite repeated efforts at repair from the ESU. The air conditioning has also been unreliable, and the continuing situation between the landowner and local authority has hampered access. Data loss continues well into quarter 3 2011.

Scunthorpe Town

The SO₂ analyser suffered from several flow and lamp faults during the quarter starting in November 2010. This continued through this period, until a replacement analyser was installed in May. Data from 16 February to 18 May have been deleted.

Southend on Sea

The Southend site was closed on 21 February to enable the roof on the building to be replaced. Monitoring restarted on 20 June.

Walsall Willenhall

The Walsall Willenhall site was destroyed by fire on 3 February 2010. Work on commissioning a replacement site is under way.

Warrington

A power cut resulted in the loss of data between 3 and 11 April. The FDMS analysers lost their programming during this period, resulting in an additional short data loss.

York Bootham

The PM_{2.5} data was observed to be higher than the PM₁₀ data for a period from late May onwards. Data from 29 May to 30 June (and probably some in Q3) have been deleted.

York Fishergate

York Fishergate was closed from mid February to early March while a new enclosure was installed. The NO_x was promptly reinstalled but the PM₁₀ and PM_{2.5} FDMS took longer to install (Eventually installed and commissioned 1 September 2011)

4.3 Scotland

4.3.1 Data Capture

The data capture for sites in Scotland for the period April-June 2011 is given in Table 4.3.

Table 4.3 Data Capture April-June 2011: Scotland

Site	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Scotland							
Aberdeen	-	92.3	99.7	98.9	99.1	-	97.5
Aberdeen Union Street Roadside	-	-	-	99.0	-	-	99.0
Auchencorth Moss	-	98.9	100.0	-	100.0	-	99.6
Auchencorth Moss PM ₁₀ PM ₂₅ (FDMS)	-	61.0	99.4	-	-	-	80.2
Bush Estate	-	-	-	99.8	100.0	-	99.9
Dumbarton Roadside	-	-	-	99.5	-	-	99.5
Dumfries	-	-	-	98.9	-	-	98.9
Edinburgh St Leonards	99.8	99.6	99.8	98.2	99.9	99.6	99.5
Eskdalemuir	-	-	-	87.0	87.3	-	87.1
Fort William	-	-	-	97.6	97.6	-	97.6
Glasgow Centre	99.8	91.3	95.7	99.6	99.9	99.6	97.6
Glasgow Kerbside	-	66.7	93.8	99.3	-	-	86.6
Grangemouth	-	99.5	99.4	87.1	-	99.8	96.5
Grangemouth Moray	-	-	-	95.4	-	-	95.4
Inverness	-	91.2	98.9	99.5	-	-	96.5
Lerwick	-	-	-	-	99.9	-	99.9
Peebles	-	-	-	99.3	97.9	-	98.6
Strath Vaich	-	-	-	-	99.7	-	99.7
Number of sites	2	8	8	14	10	3	18
Number of sites < 90%	0	2	0	2	1	0	3
Network Mean (%)	99.8	87.6	98.3	97.1	98.1	99.7	96.1

Shaded boxes are for data capture < 90%

4.3.2 Site Specific Issues

Auchencorth Moss

The PM₁₀ FDMS was removed from site for repair to the valve assembly on 27 May, and was returned to site on 20 July.

Eskdalemuir

A number of communications faults and a power cut resulted in the loss of a total of 12 days during the quarter.

Glasgow Kerbside

Noisy and suspiciously low data resulted in a succession of engineers visits. The PM₁₀ sensor was ultimately removed for workshop repair. The air conditioning unit has been a particular source of problems during this and previous quarters.

4.4 Wales

4.4.1 Data Capture

The data capture for sites in Wales for the period April-June 2011 is given in Table 4.4.

Table 4.4 Data Capture April-June 2011: Wales

Site	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
Wales							
Aston Hill	-	-	-	99.4	99.9	-	99.6
Cardiff Centre	99.8	32.9	99.5	95.6	99.9	99.7	87.9
Chepstow A48	-	97.6	69.0	98.3	-	-	88.3
Cwmbran	-	-	-	99.8	100.0	-	99.9
Mold	-	-	-	70.8	100.0	-	85.4
Narberth	-	73.7	-	99.9	100.0	97.1	92.7
Newport	-	99.5	99.4	99.9	-	-	99.6
Port Talbot Margam	99.5	99.6	99.6	99.5	98.8	99.4	99.4
Port Talbot Margam PM ₁₀ PM _{2.5} (PM ₁₀ Partisol)	-	98.9	-	-	-	-	98.9
Swansea Roadside	-	77.1	0.0	99.9	-	-	59.0
Wrexham	-	100.0	92.3	99.7	-	99.6	97.9
Number of sites	2	8	6	10	6	4	11
Number of sites < 90%	0	3	2	1	0	0	4
Network Mean (%)	99.6	84.9	76.6	96.3	99.7	99.0	91.7

Shaded boxes are for data capture < 90%

4.4.2 Site Specific Issues

Cardiff Centre

The PM₁₀ FDMS performance was frequently poor during this quarter, which was removed for workshop repair in April and again in June. Problems persist into the third quarter.

Chepstow A48

The PM₁₀ data from Chepstow has been unreliable and often below the PM_{2.5} concentrations. Much of the Q2 data have been deleted. Both analysers were removed for extensive workshop repair during summer 2011.

Narberth

The Narberth site has suffered from temperature related problems for some time, affecting mainly the PM₁₀ analyser. The air conditioning unit ultimately failed in April, and although a repair was carried out, it is likely a more powerful unit is required.

Mold

A blocked sample line resulted in the loss of NO₂ data from 2 April to 17 May.

Swansea Roadside

The Swansea Roadside FDMS, particularly the PM_{2.5} have been lower than other local sites for the entire quarter. Investigations into the performance of both analysers have taken place in the workshop in June 2011 and the PM_{2.5} data have been deleted for the whole of the quarter.

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 2011 is given in Table 4.5.

Site	CO	PM ₁₀	PM ₂₅	NO ₂	O ₃	SO ₂	Site Average
N Ireland							
Armagh Roadside	-	98.0	-	97.7	-	-	97.8
Ballymena	-	-	-	-	-	99.8	99.8
Belfast Centre	99.8	99.7	89.8	99.5	99.9	99.6	98.0
Derry	-	92.0	99.6	99.9	100.0	99.6	98.2
Lough Navar	-	98.4	-	-	99.5	-	98.9
Number of sites	1	4	2	3	3	3	5
Number of sites < 90%	0	0	1	0	0	0	0
Network Mean (%)	99.8	97.0	94.7	99.0	99.8	99.7	98.6

Shaded boxes are for data capture < 90%

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

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	76	116	82	46	134
Number of sites < 90%	1	17	19	13	9	2	21
Network Mean (%)	97.8	86.8	89.8	94.6	96.2	97.2	93.3

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.

Appendices

Appendix 1: Recommendations for Upgrade or Replacement of Equipment

Appendix 2: Partisol Data Report

Appendix 3: 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 November 2011	Priority	Action
32	ESUs are reminded of the importance of supplying service records for Partisol samplers to QA/QC Unit	High	ESU
31	Zero air scrubbers to be changed for zero air cylinders at all sites (where possible)	Medium	QA/QC 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. Suspect leaking valves are highlighted by the QA/QC Unit during audits	High	ESU
Recommendations January 2007			
22	ESUs to ensure all NOx converter software settings to be 100%.	High	ESUs to check at service

Appendix 2

Partisol Data: April-June 2011

Ratification was carried out for all sites for the period 1st Apr 2011 to 30th June 2011.

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 CMCU's calculation of the ambient PM₁₀ 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.

General comments for Quarter 2:

- Data capture was excellent – much better than in recent previous quarters. Six of the Partisols achieved 100% data capture, and only one failed to reach the data capture target of 90%.
- Some Partisols, especially the PM_{2.5} ones, seemed to be under-reading with respect to their co-located FDMSs. This is worth checking out. As it affected several sites it could be a conditioning/weighing issue or else a genuine effect linked to the nature of the particulate.
- Some data have not yet been marked as "ratified", because service records (which would affect the flow correction) have not been received from the Equipment Support Units (ESU).

Auchencorth Moss PM₁₀ (serial number 21550).Flow checks for PM₁₀:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	12/01/2011	16.7	16.92	1.53	1.34
Service (pre - service check)	28/01/2011	16.7	16.20	-	-2.99
Service (post- service check)	28/01/2011	16.7	16.45	-	-1.50
Audit	13/07/2011	16.70	16.55	5.91	5.72
Flowrate correction: ramped flowrate correction was applied between the post-service flow check on 28/01/2011 (-2.99 %), and the summer audit on 13/07/11 (5.72%), because the flow went outside the range of $\pm 3\%$ during this period.					

Data Capture: **98.9%**. Data losses –

- 14th Apr. PM₁₀ was negative and considered suspect.

No major problems.

Auchencorth Moss PM_{2.5} (serial number 21548).Flow checks for PM_{2.5}:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.7 litres/min	% out from stated
Audit	12/01/2011	16.7	16.50	1.02	1.20
Service (pre - service check)	28/01/2011	16.7	16.64	-0.36	-0.36
Service (post- service check)	28/01/2011	16.7	16.58	-0.72	-0.72
Audit	13/07/2011	16.7	17.03	2.62	2.44
Flowrate correction: measured flowrate remained within +/- 3% of 16.67,					

Data capture **100%**.

Bournemouth PM_{2.5} (serial number 21863)Flow checks for PM_{2.5}:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	11/01/2011	16.67	16.67	0.00	0.00
Service (pre- service check)	20/01/2011	16.7	16.97	1.62	1.62
Service (post- service check)	20/01/2011	16.7	16.78	0.48	0.48
Audit	21/07/2011	16.67	16.15	-1.04	-1.04
Flowrate correction: measured flowrate remained within +/- 3% of 16.67					

Data capture was **90.1%** for this quarter. Data losses:

- 26th Mar – 8th Apr: double-exposed filters. (Note: this happened twice in the previous quarter due to LSO error. LSO may need additional training).

No major problems.

Brighton Preston Park PM_{2.5} (serial number 21896)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	08/02/2011	16.7	20.02	21.10	20.88
Service (pre- service check)	14/02/2011	16.7	21.2	26.9	26.9
Service (post- service check)	15/02/2011	16.7	16.6	-0.60	-0.60
Audit	02/08/2011	16.7	16.45	-1.13	-1.30
Flowrate correction: flowrate was within ±3% throughout this period.					

Data capture was 92.3%. Data losses:

- 23rd May – 26th May: power failure. Instrument re-started on 24th but incorrect date and time until 26th.

No major problems.

Harwell PM₁₀ (serial number 20143)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Callout	31/01/2011	16.7	17.24	3.23	3.23
Callout	31/01/2011	16.7	16.60	-0.60	-0.60
Audit	25/02/2011	15	14.94	-8.76	1.39
Service (pre- service check)	01/03/2011?	?	?	?	?
Service (post- service check)	01/03/2011?	?	?	?	?
Audit	19/08/2011	16.7	16.41	1.35	1.17
<p>Flowrate correction: (Note: the low flow seen at the audit appears to have been short-term as the average recorded for that day was 16.7 li/min: this has not been taken into account).</p> <p><i>If ESU can supply service information for service around 1st Mar, it may be necessary to re-calculate flowrate correction. For this reason, the data have been left as "provisional".</i></p>					

Data capture was 94.5%. Data losses:

- 15th Apr, 28th Apr, damaged filters.
- 3rd Jun double exposed filter
- 8th Jun, 9th Jun: double exposed filters.
-

Better performance than previous quarter.

Harwell PM_{2.5} (serial number)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	25/02/2011	16.7	17.63	7.13	6.94
Service (pre- service check)	01/03/2011?	?	?	?	?
Service (post- service check)	01/03/2011?	?	?	?	?
Audit	19/08/2011	16.7	14.21	-13.11	-13.27
<p>Ramped flow correction applied from audit on 25th Feb 2011 (6.94%) to audit on 19th Aug 2011 (-13.27%). <i>If ESU can supply service information for service around 1st Mar, it may be necessary to re-calculate flowrate correction. For this reason, the data have been left as "provisional". Flow remained within 10% for duration of Q2, but some data rejection expected in Q3.</i></p>					

Data capture was 100%. Data losses:

- 4th Jan: date and time correction.

Inverness PM₁₀ (Serial number 21255)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	03/02/2011	16.7	17.21	3.27	3.08
Service (pre- service check)	01/03/2011?	?	?	?	?
Service (post- service check)	01/03/2011?	?	?	?	?
Audit	09/08/2011	16.7	16.80	0.60	0.60
Flow correction applied from audit on 3 rd Feb 2011 (3.08%) to audit on 9 th Aug 2011 (0.60%). Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.					

Data capture 91.2%. Data losses as follows:

- 5th Apr: ran out of filters.
- 24th Apr & 29th Apr – 3rd May: filter exchange failures (FEFs).

This site remains prone to FEFs.

Inverness PM_{2.5} (Serial number 21861)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	03/02/2011	16.7	16.67	0.01	-0.17
Service (pre- service check)	01/03/2011?	?	?	?	?
Service (post- service check)	01/03/2011?	?	?	?	?
Audit	04/08/2011	16.7	16.63	3.77	3.58
Flow correction: Flowrate correction applied from audit on 3 rd Feb 2011 (-0.71%) to audit on 4 th Aug 2011 (3.58%). Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.					

Data capture 98.9%. Data losses:

- 3rd May: Filter exchange failure (FEF).

Both Inverness Partisols are prone to FEFs, but this quarter there was only one.

London Marylebone Road PM₁₀

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.7 litres/min	% out from stated
Audit	24/01/2011	Partisol not working on day of audit, so not tested.			
Service (pre-service check)	03/03/2011	16.7	16.80	0.60	0.60
Service (post-service check)	03/03/2011	16.7	16.67	-0.18	-0.18
Audit	21/07/2011	16.7	16.65	-1.36	-1.54
No flowrate correction applied as flow appears to have been within 3% over relevant period.					

Data capture was 100%.

London Marylebone PM_{2.5}

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.7 litres/min	% out from stated
Audit	24/01/2011	16.6	17.27	3.61	4.05
Service (pre-service check)	03/03/2011	16.67	17.06	2.16	2.16
Service (post-service check)	03/03/2011	16.67	16.65	-0.30	-0.30
Repair (broken magazine)	21/03/2011	16.67	16.71	0.06	0.06
Audit	21/07/2011	16.7	16.47	-2.49	-2.67
Flowrate was within $\pm 3\%$ throughout this period.					

Data capture was 80.2%. Data losses:

- 1st – 14th Apr, temp. probe failure
- 19th May: < 18h sampling.
- 11th – 13th Jun: FEF.

Numerous breakdowns and problems this quarter (like Q1)

London North Kensington PM₁₀ (serial number 21015)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	25/01/2010	16.7	16.86	1.15	0.97
Service (pre- service check)	?	?	?	?	?
Service (post- service check)	?	?	?	?	?
Audit	14/07/2011	16.7	16.02	-4.54	-4.71
	Flow correction applied , between audit on 25 th Jan and audit on 14 th Jul. Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.				

Data capture was 100%. Data losses:

This Partisol operated normally and reliably throughout.

London North Kensington PM_{2.5} (serial number 21015)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	25/01/2010	16.7	16.27	-2.41	-2.59
Service (pre- service check)	?	?	?	?	?
Service (post- service check)	?	?	?	?	?
Audit	14/07/2011	16.7	16.26	-2.85	-3.02
	Flow correction applied , between audit on 25 th Jan and audit on 14 th Jul. Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.				

Data capture was 99%. Data losses:

- 6th Apr: lost comms, ESU fixed promptly.

No major problems.

London Westminster PM_{2.5}

Flow checks for PM_{2.5}:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
<i>Audit – fault began during audit.</i>	<i>20/01/2011</i>	<i>0.01</i>	<i>0</i>	<i>-100</i>	<i>-100</i>
Service (pre - service check)	08/02/2011	16.7	16.95		1.50
Service (post- service check)	08/02/2011	16.7	17.02	1.92	1.92
Audit	06/07/2011	16.67	17.12	5.57	5.76
Flowrate correction applied between the post-service flow check on 8th Feb 2011 (1.92%) and the audit on 06/07/2011 (5.76%).					

Data capture **98.9%**. Data losses as follows:

- 5th May: FEF.

Northampton PM_{2.5} (serial number 21013)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	25/01/2010	16.7	17.5	4.98	4.98
Service (pre - service check)	23/02/2011	16.7	16.81	0.66	0.66
Service (post- service check)	23/02/2011	16.7	16.7	0.00	0.00
Audit	11/07/2011	-0.44	-0.62	-0.44	-0.62
No flow correction necessary between post-service check on 23 rd Feb and summer audit on 11 th Jul, as within +/- 3% of 16.67.					

Data capture was 100%. This Partisol operated reliably throughout.

Port Talbot PM₁₀ (Serial number 22588)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	03/02/2011	16.7	16.40	-1.62	-1.62
Service (pre - service check)	14/02/2011?	?	?	?	?
Service (post- service check)	14/02/2011?	?	?	?	?
Audit	26/07/2011	16.7	17.00	3.01	2.83
Flowrate correction applied from audit on 03/02/2011 (-1.62%) to the audit on 26/07/2011 (2.83%).					

Data capture 98.9%. Data losses as follows:

- 2nd Jun sampling time < 18h.

Partisol operating well.

Wrexham PM₁₀ (Serial number 21224)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Service (post- service check)	07/09/2010	16.7	16.70	0.00	0.00
Audit	24/02/2011	16.7	Flowmeter not working – flow not measured.		
Service (pre - service check)	10/03/2011	?	?	?	?
Service (post- service check)	10/03/2011	?	?	?	?
Audit	09/08/2011	16.7	19.72	19.33	19.11
Service (pre - service check)	16/08/2011	16.7	18.30	9.78	9.78
Service (post- service check)	16/08/2011	16.7	16.70	0.18	0.18
Flowrate correction applied from 7 th Sep 2010 to 9 th Aug 2011. Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.					

Data capture 100%. However, high flowrate found at the August 2011 audit is of concern. All the Q2 data are within $\pm 10\%$ of 16.67 li/min so no data have been rejected – but some data will almost certainly be rejected from Q3.

Data losses as follows:

- 7th Feb: PM_{2.5} > PM₁₀: PM₁₀ suspect as it was negative.
- 1st Mar: sampling time < 18h. Possibly something to do with inlet clean on that day
- 10th Mar: scheduled service: < 18h sampling.

Wrexham PM_{2.5} (Serial number 21224)

Flow checks:

Service/audit	Service/ Audit date	Partisol reading, litres/min	Tested Flowrate litres/min	% out from 16.67 litres/min	% out from stated
Audit	17/08/2010	16.7	15.74	-5.67	-5.84
Service	07/09/2010	16.70	(reportedly within spec but no measurement given)		
Audit	24/02/2011	16.7	Flowmeter not working – flow not measured.		
Service (pre - service check)	10/03/2011	?	?	?	?
Service (post- service check)	10/03/2011	?	?	?	?
Audit	09/08/2011	16.7	17.10	3.16	2.97
Service (pre - service check)	16/08/2011	16.7	16.70	0.18	0.18
Service (post- service check)	16/08/2011	16.7	16.70	0.18	0.18
	Flowrate correction applied from 17 th Aug 2010 to 9 th Aug 2011. Note that if ESU supplies records for intervening service this might change, hence data left as provisional for now.				

Data capture 97.8%. Data losses as follows:

- 28-29th Apr: records lost, unit reset.
- 24th – 28th May: power failure.

Appendix 3

Site Details for New Sites

Details of all site locations can be found at <http://uk-air.defra.gov.uk/interactive-map>

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