

School of  
Biomedical &  
Health Sciences

Environmental  
Research Group



University of London

# **UK Automatic Urban Network London Air Quality Network Affiliated Sites**

## **Management Report July to September 2008**

**Prepared for the Department for Environment, Food and Rural  
Affairs (DEFRA), Scottish Executive, Welsh Assembly Government  
and the DoE in Northern Ireland**

November 2008

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## **1 Introduction**

This report details the equipment performance for the AURN affiliate sites where the King's College London Environmental Research Group (ERG) is contracted as the Central Management Unit and Control Unit (CMCU) by Defra under contract number EPG 1/3/168. The report highlights issues causing data capture to fall below 90% during the period July to September 2008.

## **2 Routine Data Handling**

The routine handling of data from the air sampling through to the dissemination of verified data to the QA/QC Unit is a multi stage process. Data is stored on site in either an external logging system or in individual, in-built analyser logging systems. This is the first stage of quality control as many loggers and analysers are capable of diagnosing faults and identifying them as non-ambient data. Data is collected every hour from each air quality monitoring site using the MONNET data handling software and transferred to an MS-SQL database. After data collection, files are placed in an import queue to await processing, in practice the processing power of the King's air quality server is such that files are processed in a matter of seconds. During this transfer process raw data is checked against algorithms to ensure data quality and data is scaled according to the last known calibration response. Both scaled and raw measurements are stored in the MS-SQL database, this ensures that data can be rescaled from the raw values if necessary.

Data is disseminated to the DDU on an hourly basis by email. Data collection calls are scheduled to complete within the first 20 minutes of each hour. This enables an email to be automatically assembled and dispatched at 27 minutes past the hour, arriving sufficiently early to update the National Air Quality Archive at 45 minutes past the hour.

Manual verification occurs twice daily, this aims to confirm valid data, record site events, identify and diagnose analyser faults.

Fifteen-minute mean measurements, including those diagnosed as non-ambient, are transferred to the QA/QC Unit at the start of each month in the format required. Data from the automatic overnight calibrations and routine LSO visits are also supplied.

### **2.1 Data Dissemination Performance**

Between July and September 2008, ERG estimate that 95% of hourly emails arrived at the DDU to meet their timetabled requirements. Accurate figures of punctual e-mails can be obtained from the DDU.

### 3 Quality Control / Quality Assurance (QA/QC)

Sites affiliated to the AURN are operated in accordance with the Network Operations Manual and any additional QA/QC procedures requested. Through close liaison with the local authorities and the LSOs, the QA/QC unit is provided with unrestricted access to the monitoring sites.

#### 3.1 QA/QC Site Audits

The QA/QC Unit (AEA) carried out routine equipment audits at the London affiliated AURN sites during the third quarter of 2008 to assess the performance of the instruments. The dates of these audits are shown in Table 1. Southwark Roadside has not been audited as the site is currently closed for relocation.

<b>Site</b>	<b>Start Date</b>
Camden Kerbside	26/08/08
Eltham	04/08/08
Haringey Roadside	18/09/08
Horley	08/07/08
London Bexley	23/07/08
London Haringey	18/09/08
London North Kensington	22/07/08
Marylebone Road	11/08/08
Sandy Roadside	03/07/08
Southwark Roadside	Site Closed
Stanford-le-Hope Roadside	26/08/08
Stewartby	23/07/08
Tower Hamlets	27/08/08

Table 1: QA/QC audit dates

#### 4 Changes to sites affiliated to the AURN

The AURN is in the process of reorganisation due to the requirements of the EU Directive on ambient air quality and cleaner air for Europe (PE-CONS 3696/07). This resulted in the de-affiliation of several sites from the LAQN at the end of September 2007 and the affiliation of several sites from networks managed by King's. The sites identified for affiliation to the AURN and the current status of the site is shown in Table 2

<b>Site</b>	<b>Current Status</b>
Horley	Affiliated 21/11/07
Stewartby	Affiliated 26/11/07
Stanford-le-Hope Roadside	Affiliated 22/01/08
London Haringey (NO <sub>x</sub> )	Affiliated 29/11/07
London Bexley (PM <sub>2.5</sub> )	Affiliated 25/02/08
London Harrow	Awaiting installation of Defra PM <sub>2.5</sub> instrument
Sandy Roadside	Affiliated 28/07/08
Storrington Roadside	Awaiting site installation
Eastbourne Background	Awaiting site installation

**Table 2: Sites managed by King's which have been identified for affiliation to the AURN**

## 5 Quarterly Data Capture Statistics

Data capture rates for July, May and September are detailed in Table 3, Table 4 and Table 5. The data capture for each month was calculated from valid hourly averages, after excluding data lost due to calibration and the faults discussed. The overall data capture for the quarter July to September are detailed in the Table 6.

Specific issues affecting data collection and quality at each site are discussed in 5.1 to 5.6. Details of faults are specified where data capture falls below 90% for the quarter.

Site	Hourly Data Capture % for July 2008					
	CO	PM <sub>10</sub>	NO <sub>x</sub>	O <sub>3</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>
Camden Kerbside		44.9	97.2			
Eltham			99.6	99.5		99.9
Haringey Roadside		99.6	99.7			
Horley			99.7			
London Bexley						98.9
London Haringey			95.2	86.7		
London North Kensington	98.4	98.7	98.4	98.8	98.3	
Marylebone Road	86.8	99.2	99.6	99.3	99.7	
Sandy Roadside		12.9	10.8			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.7	99.6		99.6	
Stewartby					98.0	
Tower Hamlets Roadside	68.2		99.6			

Table 3: Hourly data capture for July 2008

Site	Hourly Data Capture % for August 2008					
	CO	PM <sub>10</sub>	NO <sub>x</sub>	O <sub>3</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>
Camden Kerbside		93.3	99.2			
Eltham			98.0	98.3		95.0
Haringey Roadside		96.8	98.0			
Horley			99.7			
London Bexley						93.7
London Haringey			99.9	99.6		
London North Kensington	99.2	99.7	99.6	99.6	99.6	
Marylebone Road	99.2	97.7	98.9	99.1	99.1	
Sandy Roadside		99.6	79.4			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.7	99.3		99.5	
Stewartby					99.1	
Tower Hamlets Roadside	88.8		99.5			

Table 4: Hourly data capture for August 2008



Site	Hourly Data Capture % for September 2008					
	CO	PM <sub>10</sub>	NO <sub>x</sub>	O <sub>3</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>
Camden Kerbside		96.1	98.8			
Eltham			89.4	99.7		100.0
Haringey Roadside		56.9	99.2			
Horley			99.4			
London Bexley						99.9
London Haringey			99.3	99.2		
London North Kensington	98.8	99.9	99.4	99.6	99.4	
Marylebone Road	99.6	99.2	99.6	99.7	99.7	
Sandy Roadside		99.4	99.9			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.9	99.7		99.7	
Stewartby					98.5	
Tower Hamlets Roadside	15.3		99.3			

Table 5: Hourly data capture for September 2008

Site	Hourly Data Capture % for July to September 2008					
	CO	PM <sub>10</sub>	NO <sub>x</sub>	O <sub>3</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>
Camden Kerbside		77.9	98.4			
Eltham			95.7	99.1		98.3
Haringey Roadside		84.7	99.0			
Horley			99.6			
London Bexley						97.5
London Haringey			98.1	95.1		
London North Kensington	98.8	99.4	99.1	99.3	99.1	
Marylebone Road	95.2	98.7	99.4	99.4	99.5	
Sandy Roadside		70.3	63.0			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.8	99.6		99.6	
Stewartby					98.5	
Tower Hamlets Roadside	57.9		99.5			

Table 6: Hourly data capture for July to September 2008

**5.1 Camden Kerbside PM<sub>10</sub>****77.9%***2<sup>nd</sup> to 7<sup>th</sup> July 2008**120 Hours*

The filter loading reading became unstable and stepped up sharply. There was also an intermittent flow fault on the analyser. As this type of behaviour had also been noted before the previous two LSO filter changes, a callout was issued to the ESU on 4<sup>th</sup> July. The engineer attended on 7<sup>th</sup> July where a low pump vacuum was found so the overhaul kits and fan blades were replaced.

*10<sup>th</sup> to 22<sup>nd</sup> July 2008**289 Hours*

The measurements from the analyser became noisy following a filter change. There were some periods where the stability improved but after a further noisy period from 19<sup>th</sup> July the LSO was asked to return to site to reseal the filter on 22<sup>nd</sup> July. This resolved the problem.

The measurements have been set for review by the QA/QC unit.

**5.2 Haringey Roadside PM<sub>10</sub>****84.7%***31<sup>st</sup> August to 1<sup>st</sup> September**23 Hours*

The measurements became noisy. This was resolved during a visit by the ESU.

*18<sup>th</sup> to 30<sup>th</sup> September**297 Hours*

The audit on 18<sup>th</sup> September found low main and auxiliary flows and a leak on the instrument. A callout was issued to the ESU on 18<sup>th</sup> September. An engineer attended site on 23<sup>rd</sup> September and found a leak in the sensor unit that could not be repaired during that visit. He reported that a spare sensor unit or seal replacement was required. He returned on 29<sup>th</sup> September to remove the unit to the workshop and a spare sensor unit was installed on 10<sup>th</sup> October.

The measurements have been set for review by the QA/QC unit between the audit and final repair. However, it is also possible that previous measurements may have been affected by the leak.

**5.3 Sandy Roadside Nitrogen Dioxide****63%**

The analyser was affiliated to the AURN on 28<sup>th</sup> July following an audit by the QA/QC unit. Therefore, data capture has been calculated from that date. The initial audit results found the converter efficiency to be 91% so the site was affiliated following the repair.

*1<sup>st</sup> to 5<sup>th</sup> August**109 Hours*

The analyser started to flag a PMT temperature fault on 1<sup>st</sup> August. A callout was issued to the ESU on 1<sup>st</sup> August and the fault was repaired on 5<sup>th</sup> August.

*12<sup>th</sup> to 13<sup>th</sup> August and 15<sup>th</sup> August**19 Hours*

Measurements from the analyser became unusually elevated on 12<sup>th</sup> August and an intermittent AZERO warning was recorded. The ESU was notified and although the measurements returned to expected levels on 13<sup>th</sup> August, a hot spare was installed on 15<sup>th</sup> August due to concerns about repeated faults on the instrument.

**5.4 Sandy Roadside PM<sub>10</sub>****70.3%**

The analyser was affiliated to the AURN on 28<sup>th</sup> July following an audit by the QA/QC unit. Therefore data capture has been calculated from that date.

**5.5 Southwark Roadside All Analysers****0%**

The site is currently closed for relocation.

## **5.6 Tower Hamlets Carbon Monoxide**

**57.9%**

*7<sup>th</sup> to 17<sup>th</sup> July*

*233 Hours*

The measurement baseline started to drift downwards and readings were noisy. A callout was issued to the ESU on 11<sup>th</sup> July. The measurement baseline became increasingly unstable and an engineer attended on 16<sup>th</sup> July. Although no clear fault was found, the stability improved from 17<sup>th</sup> July.

*25<sup>th</sup> to 28<sup>th</sup> August*

*81 Hours*

The measurements again became noisy and unstable. Another callout was issued to the ESU on 27<sup>th</sup> August. The engineer attended the callout on 28<sup>th</sup> August and again could find no fault. However, due to the ongoing problems, he said he would try to locate a spare analyser to install.

*8<sup>th</sup> September to 30<sup>th</sup> September*

*599 Hours*

On 8<sup>th</sup> September the measurements started to drift again. A callout was issued to the ESU on 8<sup>th</sup> September. On 9<sup>th</sup> September the readings became highly erratic and the analyser was showing an IR and chopper fault. The engineer attended site on 12<sup>th</sup> September to install a spare analyser.

The spare analyser also had a fault, producing excessively noisy and unstable measurements. A new callout was issued and the engineer went to site on 22<sup>nd</sup> September but was unable to fix the fault. A replacement analyser was installed on 3<sup>rd</sup> October.

## **6 Contact Information**

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