

School of
Biomedical &
Health Sciences

Environmental
Research Group



University of London

UK Automatic Urban Network London Air Quality Network Affiliated Sites

Management Report October to December 2008

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

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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 October to December 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 October and December 2008, ERG estimate that 98% 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

There were no audits carried out by the QA/QC Unit (AEA Energy and Environment) at the London affiliated AURN sites during the fourth quarter of 2008.

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 December 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 each site is shown in Table 1

Site	Current Status
Horley	Affiliated 21/11/07
Stewartby	Affiliated 26/11/07
Stanford-le-Hope Roadside	Affiliated 22/01/08
London Haringey (NO _x)	Affiliated 29/11/07
London Bexley (PM _{2.5})	Affiliated 25/02/08
London Harrow	Installed 16/12/08, awaiting audit
London North Kensington (PM _{2.5})	Installed 17/12/08, awaiting audit
Sandy Roadside	Affiliated 28/07/08
Storrington Roadside	Awaiting site installation
Eastbourne Background	Awaiting site installation

Table 1: Sites managed by King's which have been identified for affiliation to the AURN

5 Quarterly Data Capture Statistics

Data capture rates for October, November and December are detailed in Table 2, Table 3 and Table 4. 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 October to December is detailed in the Table 5.

Specific issues affecting data collection and quality at each site are discussed in 5.1 to 5.5. Details of faults are specified where data capture falls below 90% for the quarter.

Site	Hourly Data Capture % for October 2008					
	CO	PM ₁₀	NO _x	O ₃	SO ₂	PM _{2.5}
Camden Kerbside		99.3	80.7			
Eltham			99.6	69.2		99.2
Haringey Roadside		39.1	99.7			
Horley			99.7			
London Bexley						96.4
London Haringey			99.5	80.7		
London North Kensington	96.1	99.2	85.0	96.5	98.8	
Marylebone Road	99.3	89.0	98.9	99.2	99.3	
Sandy Roadside		99.5	97.9			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.7	99.7		99.7	
Stewartby					98.8	
Tower Hamlets Roadside	91.0		99.2			

Table 2: Hourly data capture for October 2008

Site	Hourly Data Capture % for November 2008					
	CO	PM ₁₀	NO _x	O ₃	SO ₂	PM _{2.5}
Camden Kerbside		92.4	99.6			
Eltham			99.6	99.4		100.0
Haringey Roadside		-	99.7			
Horley			99.7			
London Bexley						100.0
London Haringey			99.9	99.6		
London North Kensington	99.4	99.4	84.3	99.4	99.2	
Marylebone Road	99.4	99.0	99.6	99.7	99.0	
Sandy Roadside		99.9	95.4			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.4	96.3		96.1	
Stewartby					99.2	
Tower Hamlets Roadside	99.6		95.3			

Table 3: Hourly data capture for November 2008

Site	Hourly Data Capture % for December 2008					
	CO	PM ₁₀	NO _x	O ₃	SO ₂	PM _{2.5}
Camden Kerbside		94.8	81.5			
Eltham			99.2	99.2		100.0
Haringey Roadside		18.3	98.9			
Horley			99.7			
London Bexley						100.0
London Haringey			99.9	99.9		
London North Kensington	99.2	99.1	99.5	97.5	99.5	
Marylebone Road	99.6	99.2	99.6	99.7	99.7	
Sandy Roadside		99.9	95.2			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.6	77.7		99.6	
Stewartby					99.3	
Tower Hamlets Roadside	99.9		99.1			

Table 4: Hourly data capture for December 2008

Site	Hourly Data Capture % for October to December 2008					
	CO	PM ₁₀	NO _x	O ₃	SO ₂	PM _{2.5}
Camden Kerbside		95.5	87.1			
Eltham			99.5	89.2		99.7
Haringey Roadside		19.3	99.5			
Horley			99.7			
London Bexley						98.8
London Haringey			99.7	93.3		
London North Kensington	98.2	99.2	89.6	97.8	99.1	
Marylebone Road	99.5	95.7	99.4	99.6	99.4	
Sandy Roadside		99.7	96.2			
Southwark Roadside		-	-			
Stanford-le-Hope Roadside		99.6	91.2		98.5	
Stewartby					99.1	
Tower Hamlets Roadside	96.8		97.9			

Table 5: Hourly data capture for October to December 2008

5.1 Camden Kerbside Nitrogen Dioxide

87.1%

1st to 7th October 2008

140 Hours

The analyser became unresponsive, reading levels close to the instrument baseline starting on 1st October. The LSO went to site to investigate on 2nd October to find a flow and pressure fault so a callout was issued to the ESU. The ESU attended to repair the fault on 7th October.

16th to 22nd December 2008

137 Hours

The analyser began to read levels close to the instrument baseline on 16th December, showing no response to ambient conditions. The LSO went to site on 18th December to investigate but did not find a fault. The ESU were called out on 18th October and attended site on 22nd December to find that the analyser had lost its date and time settings.

5.2 Eltham Ozone

89.2%

20th October to 29th October 2008

225 Hours

The measurements from the analyser were showing some unusual dips which did not correspond with other sites. A callout was issued to the ESU on 24th October. The ESU attended on 29th October to investigate but could not find any specific fault. Although the measurements looked improved following the repair, it was suspected that the lamp might need to be replaced if the problem recurred.

The data between 20th and 29th October has been set for review and the final decision lies with the QA/QC unit.

5.3 Haringey Roadside PM₁₀

19.3%

Several problems were encountered during the quarter; these were consistent with the age of the instrument. A replacement FDMS instrument was scheduled for installation and attempts were made to prioritise this installation in the national programme. The new FDMS was eventually installed in February 2009.

1st October to 11th October 2008

258 Hours

As described in the 3rd quarterly management report for 2008, the analyser was removed from site for the investigation of a leak found at the audit in September. A spare sensor unit was installed at site on 9th October. However, this took some time to warm up and for the readings to settle. The readings were considered to be valid from 11th October.

23rd October to 24th October 2008

32 Hours

Following increasingly noisy readings from the analyser the ESU attended to tune the amplifier board. This resulted in low readings for several hours after the visit.

25th October to 26th December 2008

1485 Hours

Although there was a brief spell of more settled readings, the measurements again became noisy from 25th October. A callout was issued to the ESU on 27th October. The ESU attended on several occasions but could not resolve the fault. The analyser was removed from site again on 21st November.

The analyser was returned to site on 16th December. However it took a long time to settle and the measurements were not considered to be valid until they began to match well with other sites from 26th December.

5.4 London North Kensington Nitrogen Dioxide

89.6%

Between 2nd and 27th October 2008

45 Hours

There were several short periods of data loss between 2nd and 27th October due to repairs for unstable overnight calibrations and a power cut.

29th October to 5th November

172 Hours

The ESU attended a callout on 29th October for overnight span problem. Following the visit, the measurements from the analyser were noted to be too low. This was rectified at the next LSO visit where the analyser sample port was found to be attached to the span line.

5.5 Southwark Roadside - all analysers

0%

The site is currently closed for relocation.

6 Annual Data Capture Statistics

The overall data capture for the quarter October to December is detailed in the Table 5.

Site	Hourly Data Capture % for 2008					
	CO	PM ₁₀	NO _x	O ₃	SO ₂	PM _{2.5}
Camden Kerbside		93.1	93.8			
Eltham			95.7	93.9		99.3*
Haringey Roadside		74.9	99.3			
Horley			99.4			
London Bexley						95.3
London Haringey			98.3	96.8		
London North Kensington	98.7	98.1	90.8	98.8	97.6	
Marylebone Road	97.2	96.3	99.0	96.9	93.4	
Sandy Roadside		98.9	92.5			
Southwark Roadside		0	0			
Stanford-le-Hope Roadside		99.7	97.5		99.3	
Stewartby					98.3	
Tower Hamlets Roadside	87.3		99.1			

Table 6: Hourly data capture for 2008

* Data capture calculated since installation

6.1 Haringey Roadside PM₁₀

74.9%

Several problems were encountered during the final quarter of 2008; these were consistent with the age of the instrument. A replacement FDMS instrument was scheduled for installation, this was installed in February 2009.

6.2 Tower Hamlets Carbon Monoxide

87.3%

Measurement noise was experienced during the third quarter of 2008, this was not repairable on site. A replacement instrument was installed in October 2008 until the original instrument was repaired

7 Contact Information

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Day-to-day operational issues can be directed to the ERG Duty Officer by telephone on 020 7848 4022 or by Email on airquality@erg.kcl.ac.uk