

1. Introduction

This is the seventh report to Defra and indicates the progress made to date, covering the period April - May 2003. It provides summary statistics and data capture rates. Where significant amounts of data are missing the reasons for these are given together with details of any remedial action taken.

2. Sampling Locations and Details

Instruments are located at 11 established sites, ten of which form part of Defra's Automatic Urban and Rural Monitoring Network either directly or through affiliation, and one (Harwell Organic) which is part of the Automatic Hydrocarbon Monitoring Network. The sites are:

- Belfast Centre (Urban Centre, O.S Grid ref J339744)
- Birmingham Centre (Urban Centre, O.S Grid ref SP064868)
- Glasgow Centre (Urban Centre, O.S Grid ref NS589650)
- Harwell Inorganic (Rural, O.S Grid ref SU474863)
- Harwell Organic (Rural, O.S Grid ref SU 474863)
- London Bloomsbury (Urban Centre, O.S Grid ref TQ302820)
- London Kensington (Urban Centre, O.S Grid ref TQ240817)
- London Marylebone Rd (Urban Kerbside, O.S Grid ref TQ281820)
- Manchester Piccadilly (Urban Centre, O.S Grid ref SJ843983)
- Port Talbot (Urban Centre, O.S Grid ref SS780882)
- Rochester (rural, O.S Grid ref TQ831762)

Table 1 details the location of the monitoring equipment.

Table 1 Location of monitoring equipment

Site	PM _{2.5} Partisol	PM _{2.5} TEOM	PM ₁₀ Partisol	PM ₁₀ TEOM	PM ₁₀ Sulphate	PM ₁₀ Carbon	PM _{2.5} Nitrate	SMPS	CPC	Met Sensor
Belfast Centre	*			*	√	√	√		√	
Birmingham Centre	*			*					√	
Glasgow Centre	*		*	*					√	
Harwell (Inorganic)		√		√				√		√
Harwell (organic)					√	√	√			
London Bloomsbury		√		*				√	√	
London Kensington	*			*	√	√			√	
London Marylebone Rd		√		*	√	√		√		
Manchester Piccadilly	*		*	*					√	
Port Talbot	*			*					√	
Rochester		√		*						√ ⁽¹⁾

* Monitoring equipment operating under AURN contract

(1) Local authority owned equipment

3. Data Capture

3.1 TEOM

Data capture statistics for PM₁₀ and PM_{2.5} mass concentrations are presented in Table 2 for each of the monitoring sites.

**Table 2 Monthly particle mass data capture (%)
 April - May 2003**

	PM ₁₀				PM _{2.5}			
	LM ⁽¹⁾	LB ⁽²⁾	RO ⁽³⁾	HAR	LM	LB	RO	HAR
April	99	99	99	100	100	100	98	100
May	99	91	100	97	82	92	100	97
Period	99	95	99	98	91	96	99	98

(1) PM₁₀ data from Marylebone Rd is available as part of the London Network, which is operated by ERG. Casella Stanger do not report these data directly.

(2) London Bloomsbury PM₁₀, and Harwell PM₁₀ are operated under Defra's AURN contract.

(3) Rochester PM₁₀ data provided by Medway District Council.

Data capture from the TEOM instruments was excellent, with few significant losses. The exception was London Marylebone Road, which experienced flow problems.

3.2 SMPS

Table 3 SMPS particle count data capture (%) at London Bloomsbury, Marylebone Rd and Harwell, April - May 2003

	Bloomsbury	Marylebone Rd	Harwell
April	48	0	73
May	45	3	84
Period	46	2	78

Until the 30th May, the Marylebone Road SMPS was being calibrated by TSI: the instrument manufacturers. There were significant problems at London Bloomsbury, with the failure of the AC system, the logging computer, and the sample pump, leading to heavily reduced data capture. Data capture was generally good at Harwell, hindered only by a communications port error with the computer, and a power failure at the site.

3.3 CPC

Table 4 CPC particle count data capture (%) at the seven monitoring sites, April - May 2003

	CPC						
	LB	Belf	Man Pic	Birm	Port Talbot	Glasgow	N Kens
April	71	100	21	73	96	0	0
May	78	99	100	100	36	0	59
Period	74	99	60	86	66	0	30

London Bloomsbury suffered a laptop failure, which resulted in loss of data until a replacement could be obtained. Prior to this, the CPC had been performing well.

Belfast performed excellently throughout.

Birmingham Centre experienced problems when the on site PC was replaced at the beginning of June.

The Port Talbot CPC laptop suffered a serious disk failure and a large amount of data was lost due to failure by the Local Site Operator to return data at regular intervals.

The Glasgow CPC suffered an internal pump failure at the end of January and was returned to TSI Instruments (formerly BIRAL), for repair and annual service. Due to the backlog of work from the routine service schedule, the analyser was not returned during this quarter.

North Kensington instrument operated very well until a pump failure in March. The instrument was returned to TSI for repair, and was returned to the site in May, at which point it began to perform well again.

3.4 Sulphate Partisol

Table 5 Particulate sulphate data capture (%)
April - May 2003

Site	Data capture
North Kensington	90
Marylebone Road	68
Belfast	95
Harwell	100

Data capture is based on available exposure data, as filter analysis results are not yet available for the whole period. Data capture was generally very good, except for at Marylebone Road, where the filters would frequently become blocked due to the high filter loadings experienced at this site. This problem also occurred to a lesser extent at North Kensington.

3.5 Carbon Particulate Monitor

**Table 6 Carbon particulate data capture (%)
April - May 2003**

Site	April	May	Average
Belfast Centre	48	99	73
Harwell	96	44	70
London Marylebone Road	100	90	95
London North Kensington	49	0	25

At Belfast, a power failure in March lead to a callout, which was resolved on the 15 April, whereupon the problem was traced to one of the heater lamps being blown, and causing a leak in the collector assembly. From this point onwards, the instrument performed excellently.

The Harwell Carbon instrument performed excellently until 16 May when a failed pinch valve caused the instrument to fail. This was resolved early June.

At Marylebone Road, the instrument generally performed excellently, excepting a minor software error between 16 and 19 May.

At North Kensington, there was a complete failure of Oven A thermocouple and a partial failure of oven B thermocouple. This had caused Oven A to overheat resulting in the failure of one lamp and fuse F101 to blow on temperature controller PCB. Leak also found in outlet tube of punch valve assembly.

3.6 Nitrate Particulate Monitor

Table 7 Nitrate particulate data capture (%)
April - May 2003

Site	April	May	Average
Belfast Centre	48	50	49
Harwell	48	68	58

There were generally still teething problems with the nitrate instruments during this period. At Harwell, there were problems delivering the nitrogen to the site, and the flash strip failed on five separate occasions, leading to poor data capture.

Similarly at Belfast, there were problems with the cross flow failure, and the flash strip, which coupled with the long period that it took to get to the site, lead to reduced data capture in this period.

4 Summary Data and Statistics

4.1 Particle Mass concentration

**Table 8 Average particle mass concentration ($\mu\text{g m}^{-3}$),
April - May 2003**

	PM₁₀	PM_{2.5}	PM_{coarse}
Harwell	14.1	10.5	3.6
London Bloomsbury	30.6	12.7	17.9
Marylebone Road	36.4	17.8	18.6
Rochester	18.9	12.0	6.9

- PM_{coarse} is defined as PM₁₀ – PM_{2.5}