1. Introduction

This is the tenth report to Defra and indicates the progress made to date, covering the period March 2004 - May 2004. 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 PM_{10} and $PM_{2.5}$ mass concentrations are presented in Table 2 for each of the monitoring sites.

Table 2 Monthly particle mass data capture (%)
Mar 2004 – May 2004

	PM_{10}				**$PM_{2.5}$**			
	LM(1)	LB(2)	RO	HAR	LM	LB	RO	HAR
Mar	97	98	93	97	100	98	96	97
Apr	98	100	100	100	100	100	100	100
May	99	100	100	100	100	100	100	100
Quarter	98	99	97	99	100	99	98	99

(1) PM_{10} data from Marylebone Rd is available as part of the London Network, which is operated by seiph (ERG). Casella Stanger do not report these data directly.

(2) London Bloomsbury PM_{10}, and Harwell PM_{10} are operated under DEFRA's AURN contract.

Data capture from the TEOM instruments was high, with few significant losses occurring

3.2 SMPS

Table 3 SMPS particle count data capture (%) at London Bloomsbury, Marylebone Rd and Harwell, Mar 2004 - May 2004

	Bloomsbury	**Marylebone Rd**	**Harwell**
Mar	Awaiting data	84	61
Apr	Awaiting data	94	95
May	Awaiting data	55	92
Quarter	Awaiting data	78	79

Bloomsbury's instrument operated well although the site suffered problems with the PC when the AC unit at the site failed. This resulted in cabin temperatures in excess of 40 deg C. Following this event, the PC was unable to start, meaning that data could not be copied. It is believed that this data like the CPC data, the SMPS data is recoverable and to this end the PC is currently with our IT department. If full recovery is possible, data capture is expected to be good.

The Instrument was returned for service at the end of May in light of refurbishment works scheduled for the site. These works are yet to be carried out so some disruption to sampling is likely during the next quarter.

Problems at Harwell have largely been resolved and the site is now operating with a new computer and updated software. This has the advantage over the previous version of being able to sample longer without intervention and being more stable. It is proposed that this improved technology is rolled out to the other sites over the next few weeks.

Marylebone Road operated very well until May, when flow problems occurred. As the annual service was almost due so the instrument was shipped to TSI Instruments for repair and service.

3.3 CPC

Table 4 CPC particle count data capture (%) at the seven monitoring sites, Mar 2004 - May 2004

	CPC						
	Co-Loc	**Belf**	**Man Pic**	**Birm**	**Port Talbot**	**Glasgow**	**N Kens**
Mar	36	81	47	100	87	0	33
Apr	71	100	100	100	99	0	85
May	78	97	79	100	54	0	80
Quarter	62	92	75	100	80	0	66

Co-located CPC - Despite rain damage to two laptops and overheating of a third following an Air con failure, all data has been recoverable and overall data capture has been good. Greatest data loss was experienced in March when a leak in the site roof caused damage to the laptop and delay in reinstating whilst we awaited a repair. The CPC will be moved to Marylebone Rd when the SMPS returns from servicing.

Belfast's, Manchester and Birmingham Centre has been consistently reliable over the quarter

The Port Talbot CPC performed very well throughout the quarter although some data was lost during mid May due to problems with the PC..

Following the Fault identified at the end of last quarter, which resulted in very low recorded values, the unit was returned to TSI for repair. However, repair took far longer than expected and the CPC was not returned to Glasgow until Mid June where further delays occurred due to local site operators not taking it to site.

North Kensington's CPC has functioned fairly well through the quarter although some data was lost in March due to the butanol feed running low. A stock of butanol has since been delivered to the site.

3.4 Sulphate Partisol

Table 5 Particulate sulphate data capture (%)

Mar 2004 - May 2004

Site	Data capture
North Kensington	91
Marlyebone Road	88
Belfast	85
Harwell	87

Data capture is based on available exposure data, as filter analysis results are not yet available for the whole period.

3.5 Carbon Particulate Monitor

Table 6 Carbon particulate data capture (%)
Mar 2004 - May 2004

Site	March	April	May	Average
Belfast Centre	13	5	100	39
Harwell	77	45	19	47
London Marylebone Road	100	32	100	77
London North Kensington	20	0	20	13

Belfast Centre

The instrument performed well until the Li-Cor sensor went spontaneously off-scale on the 5th March. This was fixed on the 29th April, beyond which time the instrument has performed faultlessly. The long delay was attributed to the difficulty that the engineers had in visiting the site. The LSO has now been trained on how to fix this problem should it happen again.

Harwell

The instrument performed well initially, before a power failure on the 22nd march caused the instrument to blow lamps on one of its 2 channels, resulting in only 50 % data capture. Engineers attended the site, and the instrument performed well until the circulator pump expired on the 9 May, resulting in a gross leak in both instrument

channels. Engineers attended the site again and fixed the leak, though the instrument performed well for just a few days before lamps again blew lamps on one of the 2 channels resulting in 50 % data capture.

London Marylebone Road

The instrument performed well until the Li-Cor sensor went spontaneously off-scale on the 3 rd April. This was fixed on the 24th April, beyond which time the instrument has performed faultlessly.

London North Kensington

The Li-cor carbon dioxide sensor continually lost its calibration despite repeated attempts to fix it. After discussions direct with Li-cor, the problem has been traced to the IR source in the detector, and efforts are underway to replace these, as it apparent that the instruments in North Kensington, Marylebone Road and Belfast have suffered from the same problem. The instrument is currently performing well (8 Jun 2004)

3.6 Nitrate Particulate Monitor

Table 7 Mar 2004 - May 2004

Site	March	April	May	Average
Belfast Centre	65	97	100	87
Harwell	66	95	69	77

Belfast

The instrument generally performed excellently. The only problems being that, the site was off for a few days for planned repainting in March, and the flash strip blew on one occasion, though this was fixed promptly by the LSO.

Harwell

The instrument performed very well. The instrument was switched off due to planned electrical upgrades at the site in March. The instrument was also temporarily switched off in March and May due to the difficulty in getting Nitrogen delivered to the site owing to increased police security at the gates in light of the current political situation.

4 Summary Data and Statistics

4.1 Particle Mass concentration

Table 8 Average particle mass concentration (μg m^{-3}), March 2004 – May 2004

	PM_{10}	**$PM_{2.5}$**	**PM_{coarse}**
Harwell	14.2	12.1	2.1
London Bloomsbury	21.4	13.7	7.7
Marylebone Road	32.2	18.4	13.8
Rochester	15.8	11.9	3.9

- PM_{coarse} is defined as $PM_{10} – PM_{2.5}$

Course fraction shows great variation from site to site ranging from 14 – 43% of the total PM10.

4.2 CPC vs SMPS measurements (London Bloomsbury)

The CPC spent this quarter at London Bloomsbury, the following table shows ratios between total count as measured by the stand alone CPC and SMPS system

	CPC	**SMPS**	**Ratio**
Dec	33,692	Awaiting data	-
Jan	27,088	Awaiting data	-
Feb	23,012	Awaiting data	-
Quarter	26,639	Awaiting data	-

This comparison is not possible as the SMPS data is currently being recovered following a PC failure.