AIR QUALITY IN LONDON 1999

THE SEVENTH REPORT OF THE LONDON AIR QUALITY NETWORK

SEIPH-Environmental Research Group
King's College London
November 2000

CONTENTS

FOREWORD

It is heartening to see that the number of monitoring sites within the LAQN increased further last year. One of the main findings of this year's report is that there now appears to be a steady downward trend in the network rolling annual average concentrations of most of the major pollutants. This indicates that national policies to reduce emissions are having some effect on concentrations, but there were two exceptions. Even though nitric oxide (NO) concentrations decreased by 23% from November 1996 nitrogen dioxide (NO_2) concentrations remained largely unchanged (current, unratified, measurements suggest a 7% fall). This situation was predicted to occur as the majority of measured NO_2 is converted from NO. Future emissions of NO will have to be reduced sharply to affect the amount of NO_2. Ozone concentrations are also rising; the suggested mechanism is part of the complex series of photochemical reactions.

The GLA was set up under the Greater London Authority Act 1999 and assumed its main responsibilities on 3 July 2000. The GLA is a new and unique form of strategic city-wide government for London. It is made up of a directly elected Mayor - the Mayor of London - and a separately elected London Assembly. When fully staffed, there will be about 400 staff to help the Mayor and Assembly in their duties. The Mayor's duties include preparing strategies to deal with Londonwide issues, and co-ordinating action on a Londonwide basis. The Assembly scrutinises the Mayor's activities, questioning the Mayor about their decisions. The Assembly is also able to investigate other issues of importance to Londoners, and make proposals to the Mayor. The London wide strategies prepared by the Mayor are for Transport, Spatial Development, Economic Development, Air Quality, Municipal Waste, Noise, Biodiversity and Culture. The Mayor decided to also commission an Energy Strategy on the same lines. All of the Mayor's different activities will be integrated, as the strategies are required to be consistent with each other. Underpinning this will be the GLA's three main aims to promote health, equality and sustainability.

The London Air Quality Strategy will build on the Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Review and Assessment work carried out by the London boroughs indicated that two pollutants are likely to exceed the National Air Quality Standards (NAQS), these are nitrogen dioxide (NO_2) and fine particulates (PM_{10}). Carbon monoxide (CO) has also been expected to exceed by one London borough. The Review and Assessment of Air Quality used emission estimations to model current and future pollution concentrations. The results showed that current levels of pollution would fall markedly in the future in response to national policies. The target years for these pollutants are 2004 for daily average PM_{10} and 2005 for annual average NO_2. As already mentioned, there needs to be a huge reduction in emissions of NO to produce a reduction in NO_2 below the NAQS. The modelling work of the London boroughs supports the view that concentrations of NO_2 will fall in the future. Once the recent monitoring data has been quality controlled it may still indicate a 7% fall and will be consistent with these expectations. Even so, as illustrated in the main body of this report, this fall may be sufficient to bring the majority of outer London areas under the NAQS. It may not be enough for large areas of central London and the trunk road network.

The information in this report is very useful and shows how important it is that good quality pollution monitoring continues in the future. Monitoring is needed to ensure that future prediction of the scale of pollution exceedences is as accurate as possible and to show whether these predictions are borne out in reality.

Darren Johnson

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November 2000

ACKNOWLEDGEMENTS AND CONTACTS

The London Air Quality Network is a unique and valuable resource whose continued development would not have been possible without the support of the local authorities in London and the Home Counties, the Association of London Government, London's Health Authorities and the Association of London Environmental Health Managers. The kind support of the Department of the Environment, Transport and Regions and the Greater London Authority is also gratefully acknowledged.

The production of this report has truly been a team effort, which has been undertaken by staff who are both dedicated and committed to their work. Further information relating to this report (or related issues) can be gained through the following contacts.

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EXECUTIVE SUMMARY

This report summarises the results of the air pollution monitoring carried out by the London Air Quality Network (LAQN) during 1999.

During 1999 the LAQN expanded rapidly with the addition of twenty new monitoring sites.

No single major pollution episode occurred during 1999. The year was, however, characterised by a series of 'moderate' ozone (O_3) episodes.

Rolling network annual means have been analysed for the period November 1996 to September 2000.

- The rolling annual LAQN mean for nitrogen dioxide (NO_2) shows little overall change during the period November 1996 to November 1999 despite the significant reduction in the concentration of nitrogen oxides (NO_X). Unratified data for the summer 2000 suggests a recent modest overall decrease of around 7 % for NO_2, despite a 23 % overall fall in NO_X. This rate of change is less than the target rate for inner London kerbside sites but may be sufficient for the annual mean objective to be met at many background sites.

- Following the summer of 1999 the rolling annual LAQN mean for O_3 peaked at over 30 % above November 1996 levels. Provisional data for summer 2000 indicates a 17 % overall increase.

- The rolling LAQN annual means for CO, PM10 and SO_2 show significant a overall decrease.

Each of the pollutants monitored by the LAQN in 1999 has been analysed in terms of their spatial distribution, and compared to the Air Quality Strategy (AQS) objectives (DETR, 2000a, DETR 2000b).

- The annual mean objective for NO_2 was exceeded at an overwhelming majority of kerbside and roadside sites. The Objective was exceeded at all inner London background sites and those in West London. Around one third of the area of Greater London exceeded the objective.

- The 'incident' based objective for NO_2 was exceeded at Marylebone Road only.

- The CO objective was exceeded at the Redbridge 2 kerbside site only.

- All London sites met the objective for SO_2.

- The O_3 objective was exceeded at all outer London sites and several sites in inner London.

- The PM10 'incident' based objective was exceeded at the kerbside site in Marylebone Road, roadside sites in Bromley and Enfield and the suburban site in Havering.

- The annual mean objective for PM10 was exceeded at the kerbside site in Marylebone Road and at the roadside site in Enfield.

AIR QUALITY IN 1999

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1.1 Introduction

The purpose of this report is to review air quality in London during 1999. Measurements have been analysed with specific reference to the Air Quality Strategy objectives (AQS) (DETR, 2000a, DETR 2000b). Full details of the sites in the London Air Quality Network (LAQN) in 1999 are presented in Appendix 1 and the detailed monitoring results are presented in Appendix 2.

The LAQN was formed in 1993 to co-ordinate and improve air pollution monitoring in London. At the end of September 2000, twenty-nine London Boroughs were supplying data to the LAQN. Increasingly, these data are being supplemented by data from local authorities around London allowing an overall perspective of air pollution in South East England. The LAQN is facilitated by the Association of London Government on behalf of the thirty-three London Boroughs and is operated and managed by SEIPH-ERG. The core LAQN activities are mainly funded by SEIPH-ERG itself, supplemented by funding from several of London's Health Authorities. SEIPH-ERG is contracted by the Department of the Environment Transport and the Regions (DETR) to maintain sixteen of the LAQN sites as affiliate sites to the UK Automatic Urban and Rural Network (AURN). This DETR support assists the operation of the overall LAQN.

1.2 Network Changes

Considerable changes were implemented during 1999.

- Twenty new sites joined the LAQN and further investment took place at several existing sites. The specific site changes are detailed in Appendix 1. The combined London, Kent and Hertfordshire & Bedfordshire Networks produce a detailed perspective of air pollution in London and the Home Counties. This perspective is unique within the UK and is increasingly important resource to understand air pollution in London, supporting the Boroughs and the GLA in meeting the challenges of the UK Air Quality Strategy. The location of the LAQN sites and those surrounding London are shown in Figure 1.1.

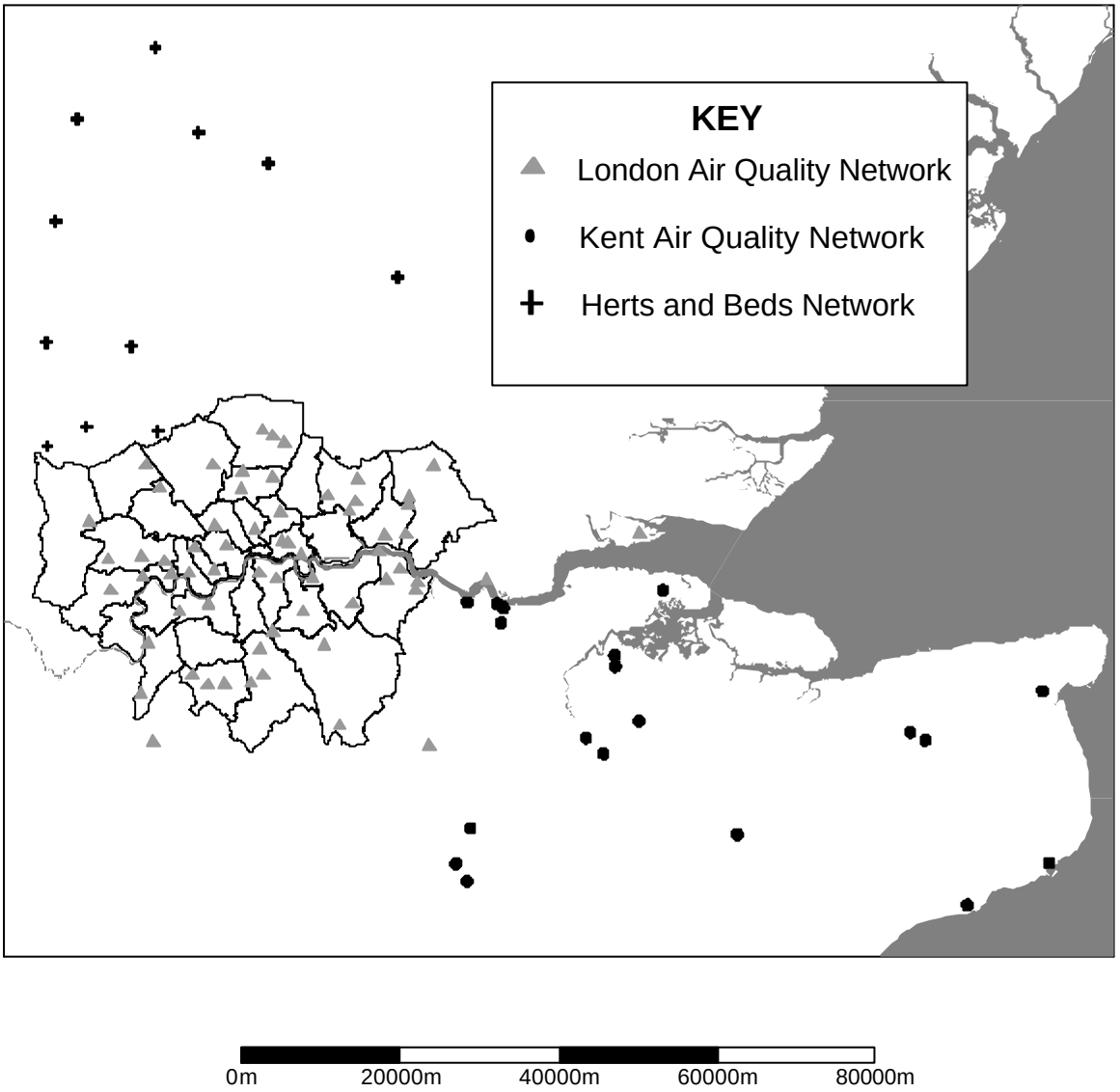

Figure 1.1 Location of LAQN Monitoring Sites and those in the Neighbouring Kent and Hertfordshire & Bedfordshire Networks.

- The Hertfordshire and Bedfordshire Air Pollution Monitoring Network (HBAPMN) was created in January 1999. Sites in Hertfordshire that were previously reported as part of the LAQN are now reported separately. The creation of the HBAPMN will allow more focused reporting for the Hertfordshire and Bedfordshire authorities through separate monthly and annual reports. Information on the HBAPMN can be found at www.seiph.umds.ac.uk/Hbnet.htm and in SEIPH-ERG (2000a).

- This year also saw expansion in the neighbouring Kent Air Quality Monitoring Network. Results from Kent Air Quality Monitoring Network sites can be found in The Kent Air Quality Monitoring Network Annual Report (SEIPH-ERG, 2000b) and at www.seiph.umds.ac.uk/khome.htm . Together, the results from the LAQN, HBAPMN and Kent networks allow a unique perspective on air quality in south east England from Bedfordshire, through London to the Channel ports.

- SEIPH-ERG relocated from Tunbridge Wells to central London during the summer. A carefully planned weekend operation produced a seamless transfer with real-time processes being temporarily undertaken using our backup server. The relocation to central London allows SEIPH-ERG to work closer with other organisations involved in air pollution in the Capital. This close proximity to fellow researchers in King's College will also facilitate a broader range of joint projects.

1.3 Discussion of Results

1.3.1 Measurement Uncertainty and Presentation

Comparisons of 1999 results with national and international guidelines and standards are shown in Appendix 2.

When examining data it is important to consider the location of the monitoring site e.g. kerbside, urban background, rural, etc., and the data quality. The site type and quality assurance standard for each site is listed in Appendix 1. Sites are divided into three quality standards. Data from sites affiliated to the Automatic Urban and Rural Network (AURN) and London Standard sites have traceabilty to national metrological standards, whereas for the locality standard sites there is insufficient information to demonstrate such traceability.

No scientific measurement is absolutely accurate or absolutely precise. The combination of accuracy and precision is termed the uncertainty. In order to place results in context, the uncertainty associated with each result has to be considered. Estimates of the uncertainty associated with air quality measurement are discussed in the 1996 LAQN Annual Report (SEIPH-ERG, 1996). This suggests that a working uncertainty of around 10 % (2σ) should be considered when discussing high values and long-term means of CO, NO_2 and SO_2 measured at London Standard sites. This is justified on the basis of both mathematical modelling and equipment performance tests. However, due to the statistical distribution of the data, a 10 % uncertainty in measurements does not imply a 10 % uncertainty in the number of exceedences of an objective. The calculation of uncertainty in the number of exceedences has to be based on an analysis of the dataset for each individual site. Error bars have been used to indicate the range of uncertainty in the figures below. There is some justification for a lower uncertainty of around 5 % for O_3 measurements. The uncertainty associated with the measurement of PM10 is more complex and is discussed below.

Data are subject to two quality assurance processes. Initially data are validated when they are collected using the best calibration and instrument performance information available at the time. Data are retrospectively examined during the ratification process, using long term instrument histories and the results of further quality checks. Hence the final ratified data in this report for 1999 will differ from that initially published via our fax and Email dissemination services, on the internet and in Quarterly Reports.

The final and definitive data sets for the AURN affiliated sites will be published by the DETR.

Each of the pollutants monitored by the LAQN in 1999 is discussed below in terms of their spatial distribution, and in comparison with the AQS objectives (DETR, 2000a, DETR 2000b). Many objectives require data representative of the whole year. If insufficient data were available (i.e. a data capture of less than 75% for the whole year), then comparison with the objective was not possible. This, for example, may be the case for new sites installed during the year.

1.3.2 Relative Results 1995 to 2000

During 1999 there was an absence of the major pollution incidents seen in previous years. For example, during 1994 and 1997 London experienced significant winter pollution incidents, a prolonged secondary particulate episode occurred during 1996 and the hot summer of 1995 produced substantial photochemistry. However, the summer of 1999 was characterised by a series of moderate photochemical episodes.

Data from November 1995 to September 2000 have been analysed to place the results from 1999 in context. Rolling annual means from November 1996 have been calculated in an attempt to eliminate seasonal effects. Note that the mean value for a particular date represents that for the preceding year e.g. the value calculated for November 1996 represents the mean between November 1995 and November 1996. To provide a perspective across the network as a whole, the rolling means from each of the long term sites have been averaged to produce a LAQN rolling mean, normalised to 100 % for each pollutant as at November 1996 to illustrate relative change. Measurements from roadside and background sites have been used. However, due to data availability, a different set of sites has been used for each pollutant. Four sites have been used for the rolling PM10 calculation, five for CO and twelve for NO_X and NO_2. (NOx is the sum of NO and NO_2). For the first time this analysis has been extended to include O_3 and SO_2. Six sites have been used for the rolling O_3 and SO_2 calculation. It should be noted that data from summer 2000 are still subject to ratification. The rolling annual means are shown in Figures 1.2 and 1.4.

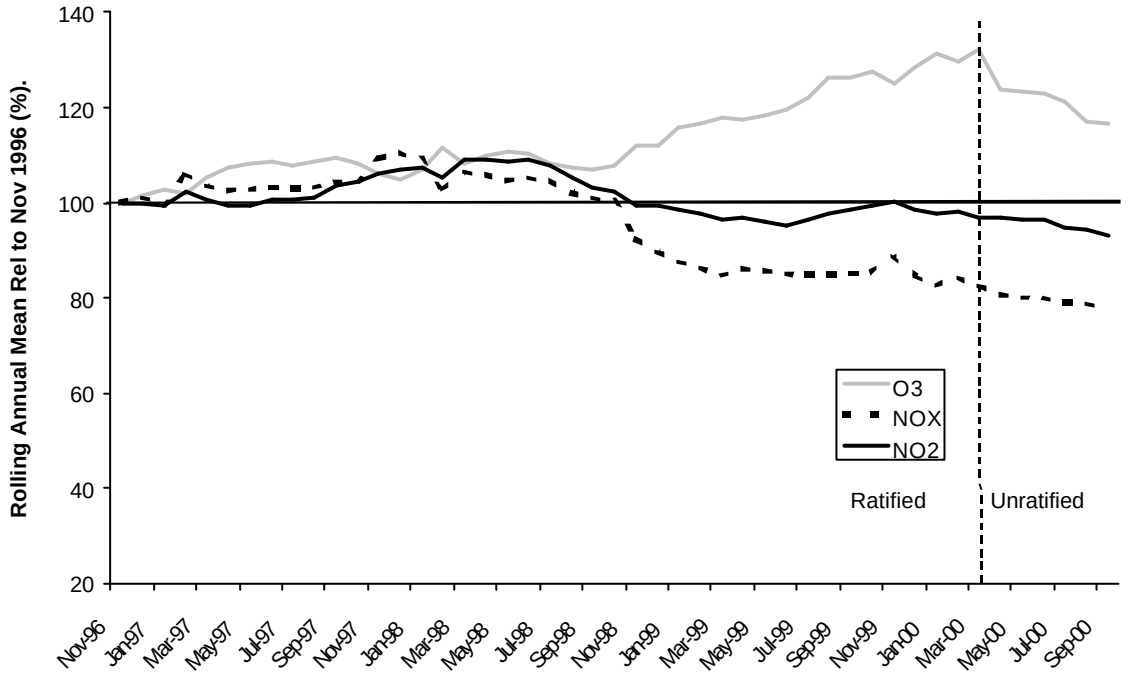

Figure 1.2 Relative Rolling Annual LAQN Means for O_3, NO_X and NO_2

Figure 1.2 shows a fall of around 23 % in the NO_X concentration over the period November 1996 to September 2000. This is very likely the result of reduced NO_X emissions due to technological changes in the vehicle fleet. The effects of pollution incidents during autumn 1997 can also be clearly seen in the NO_X concentration, causing a rise in concentration at this time and a consequential fall during autumn 1998 as this incident drops from the rolling annual mean. The overall fall in NO_X concentrations has not been matched by those of NO_2, which show little change over the period, although unratified data suggests a decline during the summer of 2000. This decrease might be linked to the relatively poor summer weather rather than being part of a long-term trend. The overall stability of NO_2 concentrations, in the face of NO_X reductions, is of profound importance to air quality management strategies.

The behaviour of NO_2 over the period begs the question whether the rate of decline is sufficient to achieve the objective by 2005. Clearly the required reduction in NO_2 concentrations is different at each site, dependent on its annual mean at the start of the period of analysis. To illustrate this, target rates of reduction have been derived for four sites in London. For illustrative purposes these are assumed to be constant. The rolling annual LAQN mean NO_2 is shown compared to these target reduction rates in Figure 1.3.

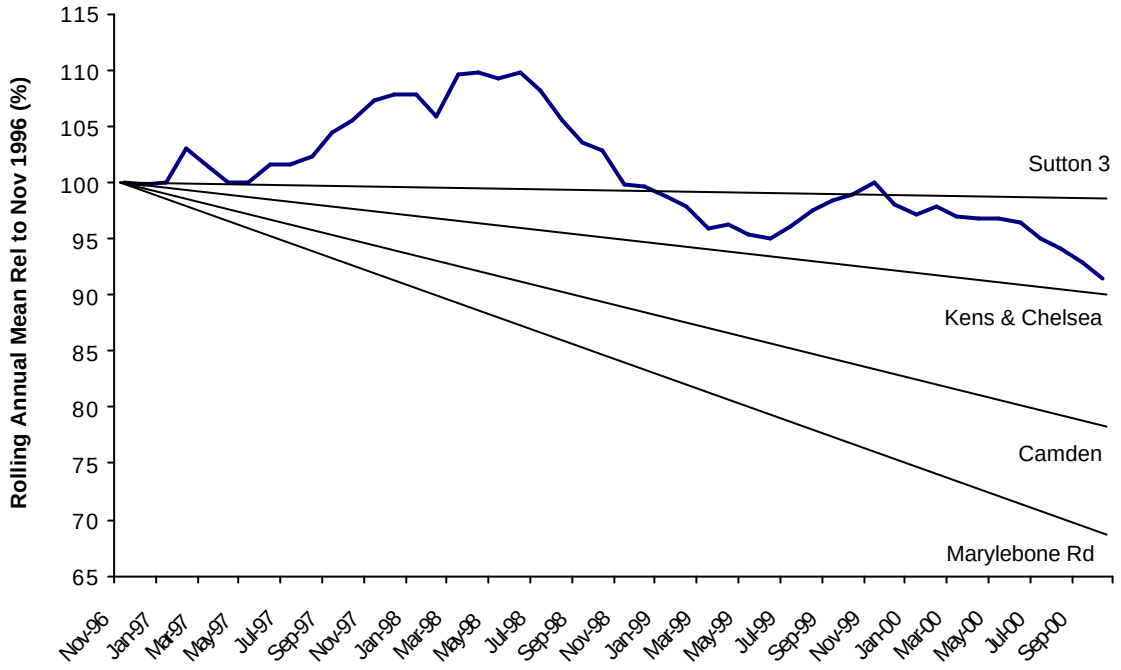

Figure 1.3 Relative Rolling Annual LAQN Means for NO_2 and target reduction rates for 4 sites.

Figure 1.3 suggests that the rate of change in NO_2 concentration seen over the previous 4 years may be sufficient to achieve the AQS objective at outer London suburban sites such as Sutton 3. The rate of change is approaching the rate at which inner London background sites will achieve the objective. The background site at Kensington & Chelsea illustrates this. It is evident that a greater rate of reduction will be required if inner and central kerbside sites, such as Camden and Marylebone Road, are to meet the objective by 2005.

The O_3 concentration in Figure 1.2 shows an overall rise. The rise is especially apparent during the spring and summer of 1999 due to a large number of moderate O_3 episodes resulting in a peak increase of over 30 %. Unratified data suggests a recent downturn to give an overall increase of around 17 % since November 1996. The general rise in O_3 can be partially explained by the fall in NO_X concentrations and the resultant fall in NO scavenging of O_3. Additionally, there may be a more general rise O_3 concentrations. Such a rise is suggested from sites in the neighbouring Kent and Hertfordshire and Bedfordshire Networks. However, further analysis would be required to disentangle these two processes.

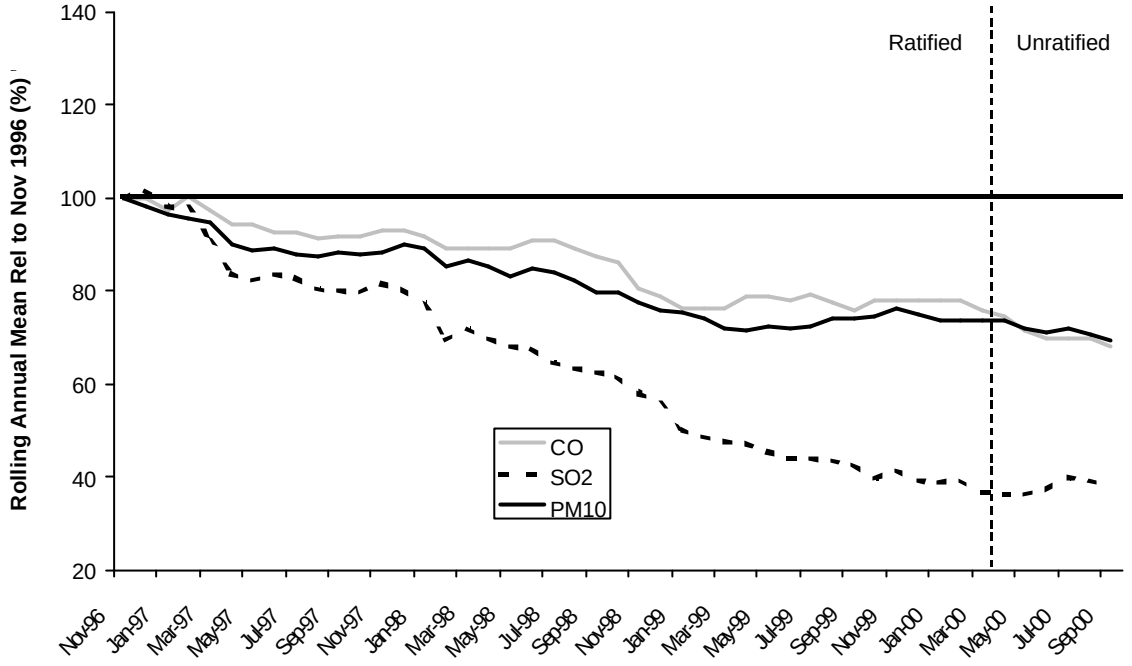

Figure 1.4 Relative Rolling Annual LAQN Means for CO, SO_2 and PM10

Figure 1.4 shows that rolling annual means for CO, SO_2 and PM10 have consistently fallen over the period. Both CO and PM10 show reductions of around 30 % overall, but no appreciable reduction occurred during 1999. The SO_2 annual mean shows a reduction of over 60 %, which may partly be attributed to a reduction in the sulphur content of vehicle fuel.

1.3.3 Nitrogen Dioxide

NO_2 is largely a secondary pollutant formed by the oxidation of NO. In the LAQN area, road transport is the dominant source of NO_X. This is reflected in the general distribution of NO_2, with the highest concentrations in 1999 being measured at roadside and central London locations. Lower concentrations were observed at background, suburban and rural areas.

The AQS stipulates two objectives for NO_2: an annual mean of 21 ppb and an incident based objective of 104.6 ppb (hourly mean) not to be exceeded more than 18 times per year. The predicted annual mean NO_2 concentration across London for 1999 is shown in Figure 1.5. The map is based on a calculated emissions inventory for 1999 and the meteorology and atmospheric chemistry experienced in London in 1996. Hence there are slight differences between the mapped results and those measured at the individual background monitoring sites, although these are within the variation that would be expected for individual sites and are within the limits of measurement uncertainty. Figure 1.5 shows two main concentration centres focused on central London and the area around Heathrow Airport. Around a third of Greater London can be seen to exceed the objective. Principal transport corridors from central London can be seen to affect background concentrations. This is particularly apparent for the M4/A4 corridor to the west, the M1/A40 corridor to the north west, the A1 to the north and the A2/A20 to the south east. The effects of the M25 can be seen where the motorway passes closest to greater London. This is most apparent in the London Boroughs of Hillingdon in the west, Barnet in the north, Havering in the east and Bromley and Bexley in the south east. The area around Heathrow is affected by the airport itself, by the M4/A4 and the busiest sections of the M25, which are apparent on the western side of Hillingdon.

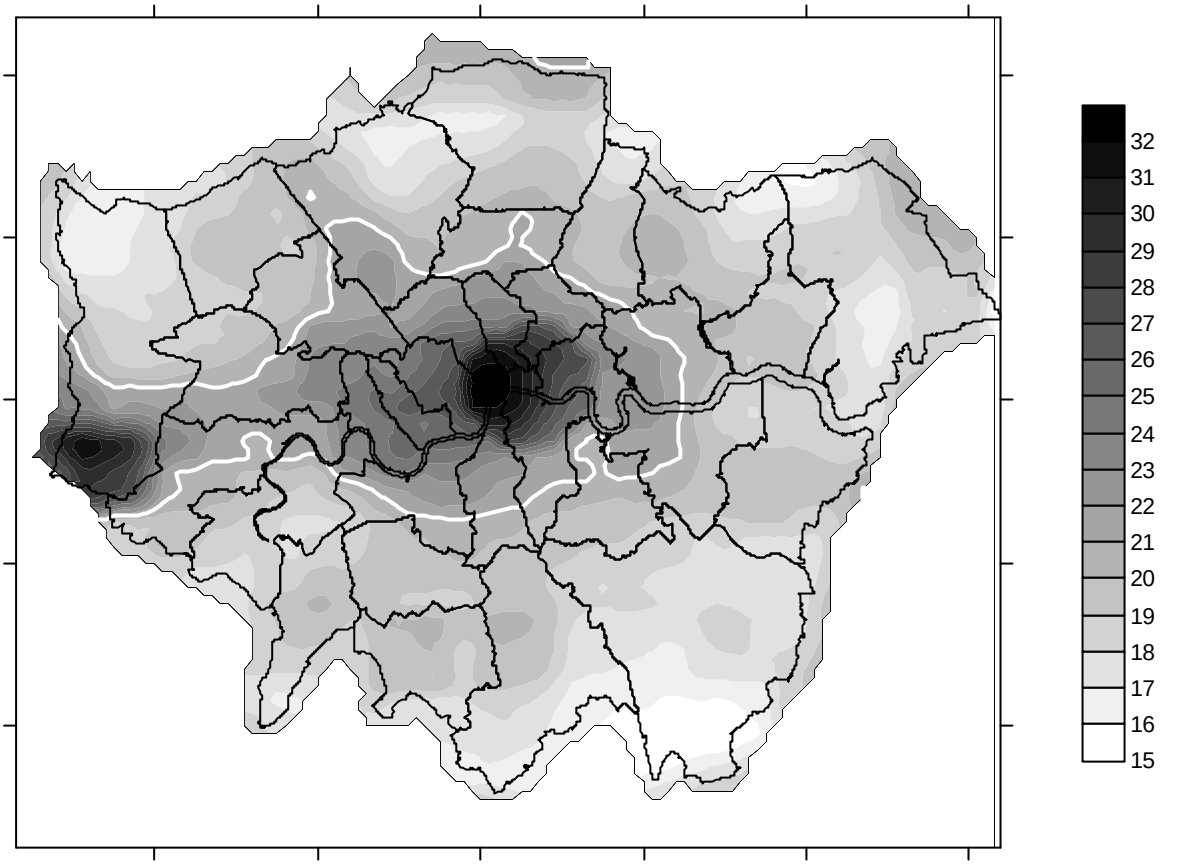

Figure 1.5 Predicted Annual Mean Background NO_2 Concentrations (ppb) (1999). The AQS Objective Contour (21ppb) is shown in White.

Figure 1.6 shows the annual mean NO_2 at the background sites across the network. Annual means are highest in central London, inner London and Heathrow. All inner and central sites exceed the objective. The outer west London sites in Ealing and at Heathrow exceed the objective. Elsewhere, a precautionary approach suggests that Enfield 3, Sutton 2, Bexley 1 and Waltham Forest equal or exceed the objective within the boundaries of uncertainty. Outside London, the site at Thurrock measured an annual mean similar to those in suburban London whereas the sites in Sevenoaks, Mole Valley and Castle Point reported lower annual means.

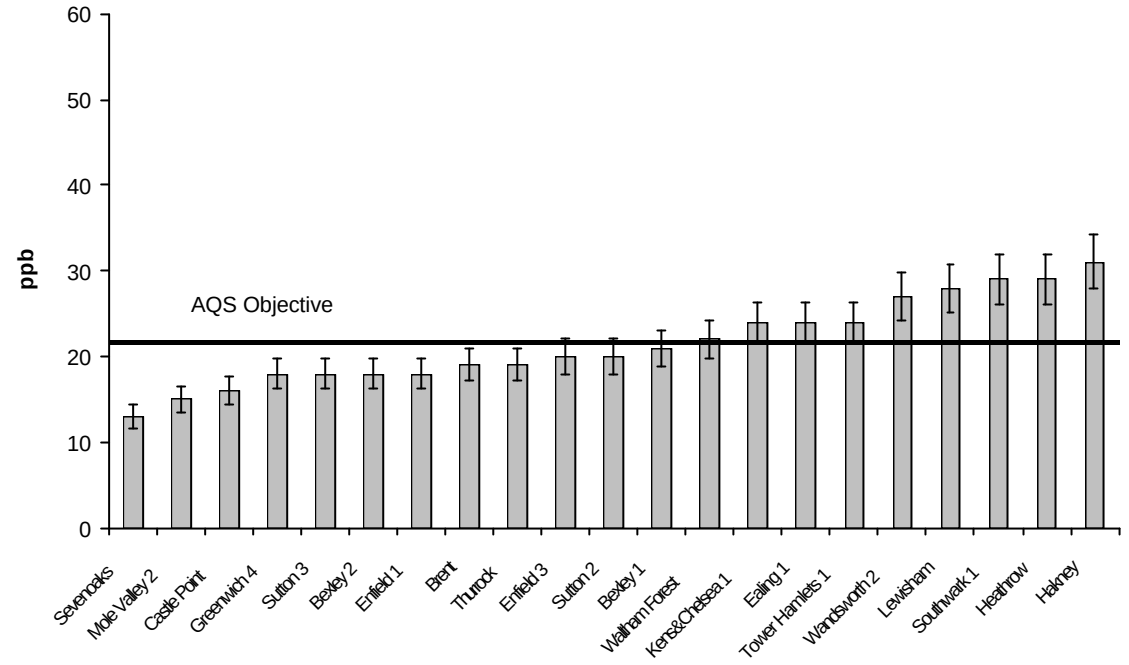

Figure 1.6 Background Annual Mean NO_2 (1999)

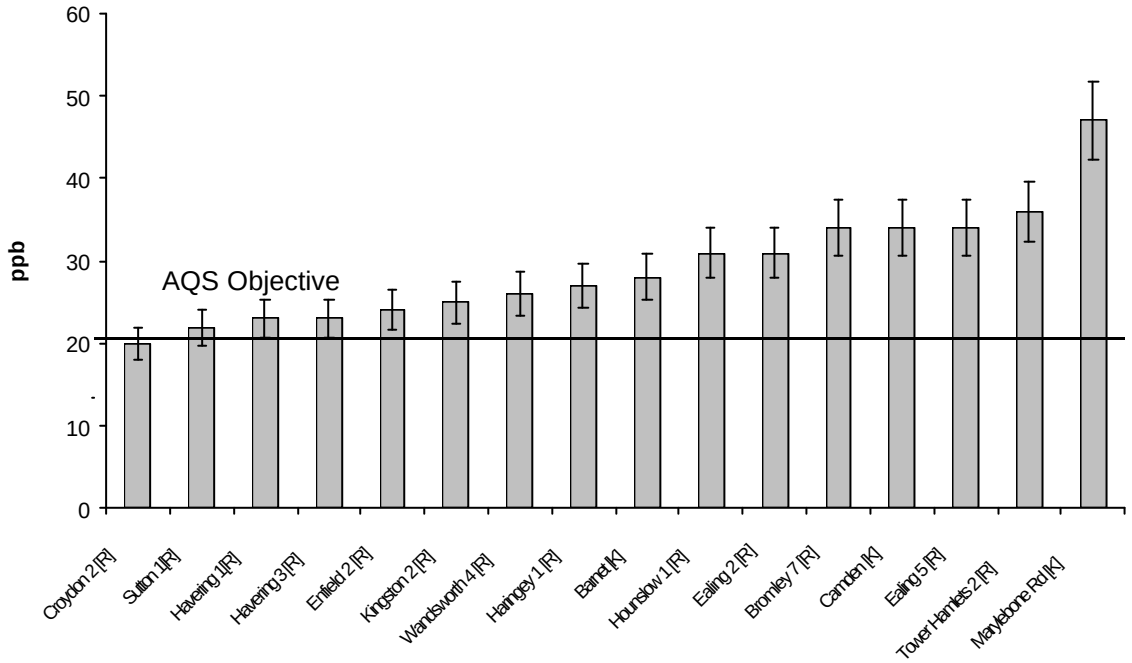

Figure 1.7 Kerbside and Roadside Annual Mean NO_2 (1999)

Figure 1.7 shows the annual mean for the kerbside and roadside sites in the network. Taking a precautionary view, all sites equalled or exceeded the annual mean objective within the limits of uncertainty. The relative concentrations show a similar pattern to the background sites. The highest annual means were measured in central and inner London at Marylebone Road, Camden, Ealing 2 and Tower Hamlets 2.

The AQS also has an incident based objective for NO_2. Measurements during 1999 are compared to this objective in Figure 1.8 for the sites that approached the objective during the year. Figure 1.8 shows that the objective was exceeded at Marylebone Road only. Results from the roadside sites at Tower Hamlets 2 and the urban background site at Hackney show possible exceedences, within the boundaries of uncertainty.

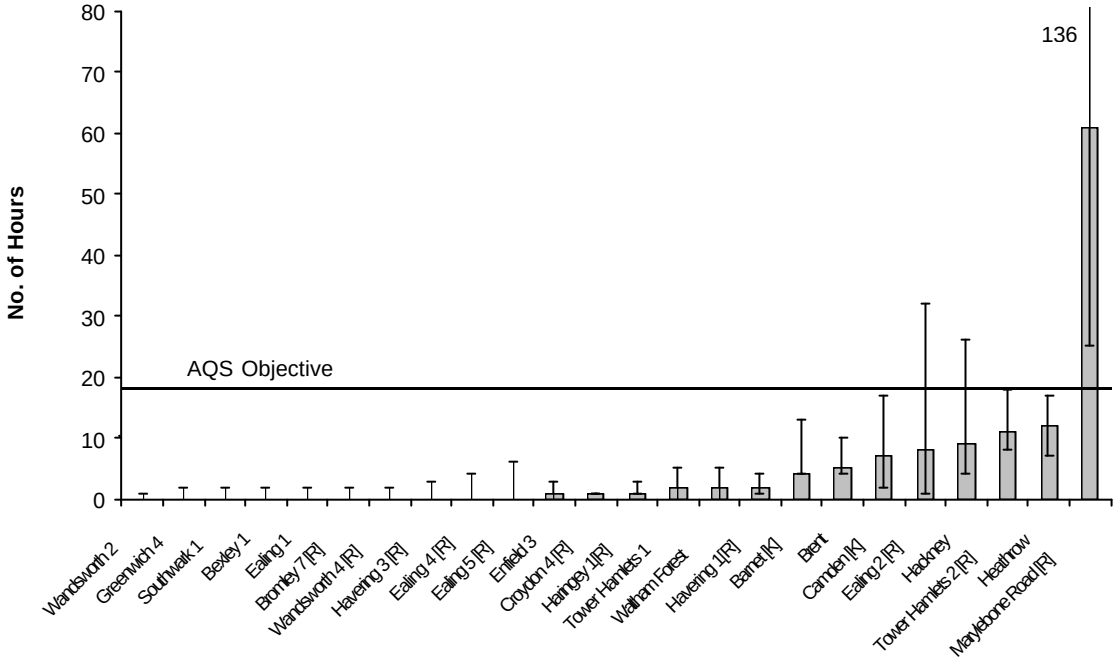

Figure 1.8 AQS incidence based Objective for NO_2 (1999).

1.3.4 Carbon Monoxide

Carbon monoxide emissions within the LAQN area are dominated by road transport sources.

Figure 1.9 shows the maximum rolling 8-hour mean CO measured at each site during the year. The highest rolling 8-hour means were measured at kerbside and roadside sites with the AQS Objective of 10 ppm being exceeded at the kerbside site Redbridge 2. This site is located on a traffic island in the centre of a busy junction. Results from this site and from the Bromley kerbside site (now closed) suggest that CO concentrations close to busy congested junctions may be higher than previously thought (SEIPH-ERG, 1999; Lonsdale, 1999).

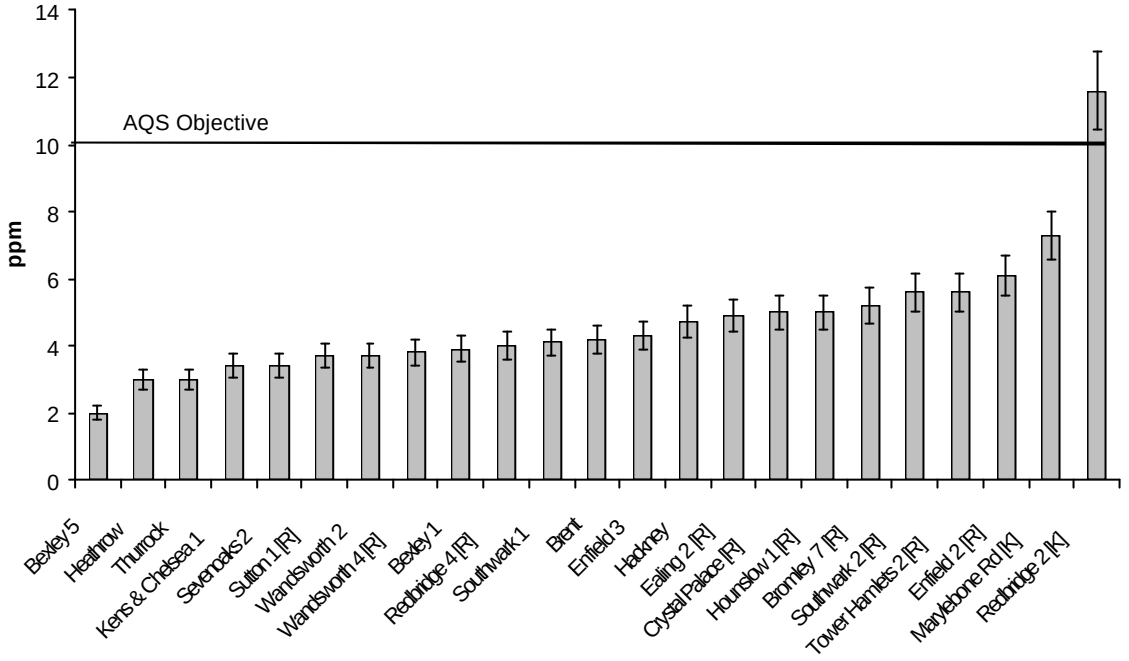

Figure 1.9 Maximum Rolling 8 Hour Mean CO (1999).

1.3.5 Sulphur Dioxide

The distribution of SO_2 concentrations in 1999 provides further evidence of the influence of both road traffic and industrial point sources. Road traffic sources are the main factor influencing annual mean concentrations, whereas industrial point sources produce short term high values due to plume grounding. This is discussed in Air Quality in London in 1995, The Third Report of the London Air Quality Network (SEIPH-ERG, 1996). The annual mean concentrations of SO_2 do not vary to any significant degree over the network.

The AQS objective for SO_2, based on 35 exceedences of a 15 minute mean of 100 ppb, is shown in Figure 1.10 for all sites measuring 15 minute means approaching 100 ppb within the limits of uncertainty. No site in Greater London exceeded the objective. During 1999, seven sites measured moderate SO_2 and high SO_2 was measured at two sites. Two KAQMN sites in the north Kent measured a similar number of exceedences to those at Bexley and Castle Point (SEIPH-ERG, 2000b).

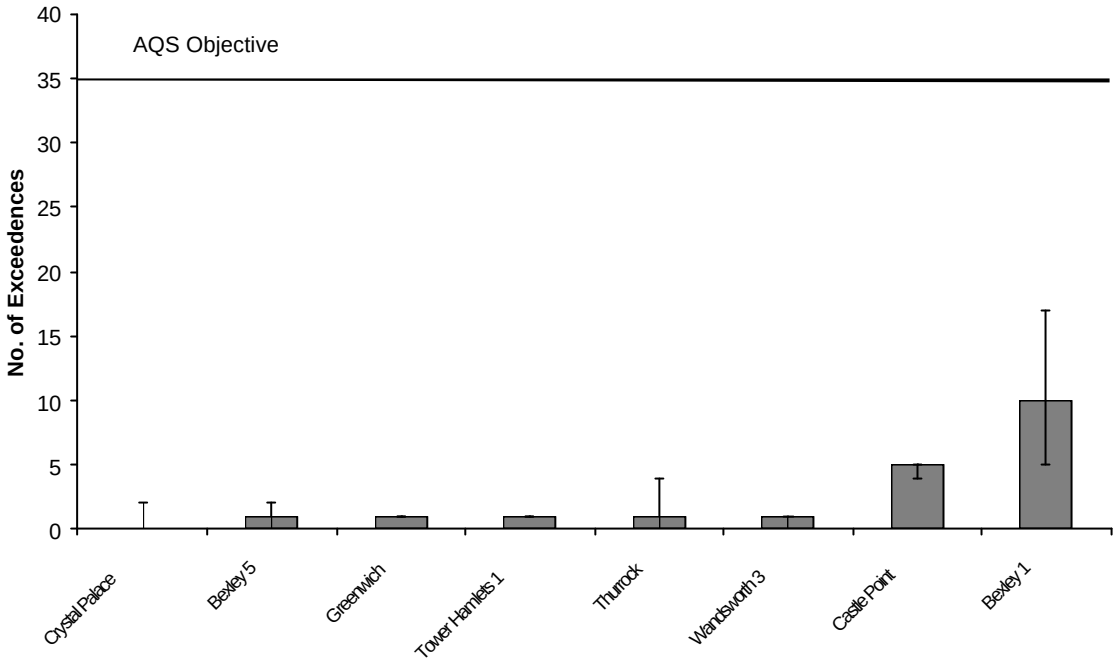

Figure 1.10 Air Quality Strategy Objective for SO_2 at measuring 15 minute means greater than 90ppb (1999).

1.3.6 Ozone

O_3 is a seasonal pollutant with the highest concentrations being measured during the summer months. It is also a regional pollutant, with episodes extending over many hundreds of kilometres. O_3 exhibits significant local variation caused by the scavenging effect of NO close to NO_X emission sources, e.g. at roadside. Exceedences of health-based standards are therefore not expected at roadside and kerbside sites and O_3 monitoring is not generally undertaken in these locations. Results from the LAQN are shown in Figure 1.11.

The AQS has an objective of 50 ppb, measured as a rolling 8 hour mean which should not be exceeded on more than 10 days per year. The objective was exceeded at almost all sites in London. The greatest number of exceedences was measured at Bromley 5 in the extreme south east of London and Kingston 1 in the extreme south west, reflecting the lack of NO scavenging in these locations. All suburban sites exceeded the objective although sites in the southern suburbs (Croydon 3 and Sutton 3) measured fewer exceedences than those in the northern suburbs. The effects of NO scavenging is further demonstrated at the inner London sites at Southwark 1, Hackney, Wandsworth 2 and Lewisham which measured fewer exceedences.

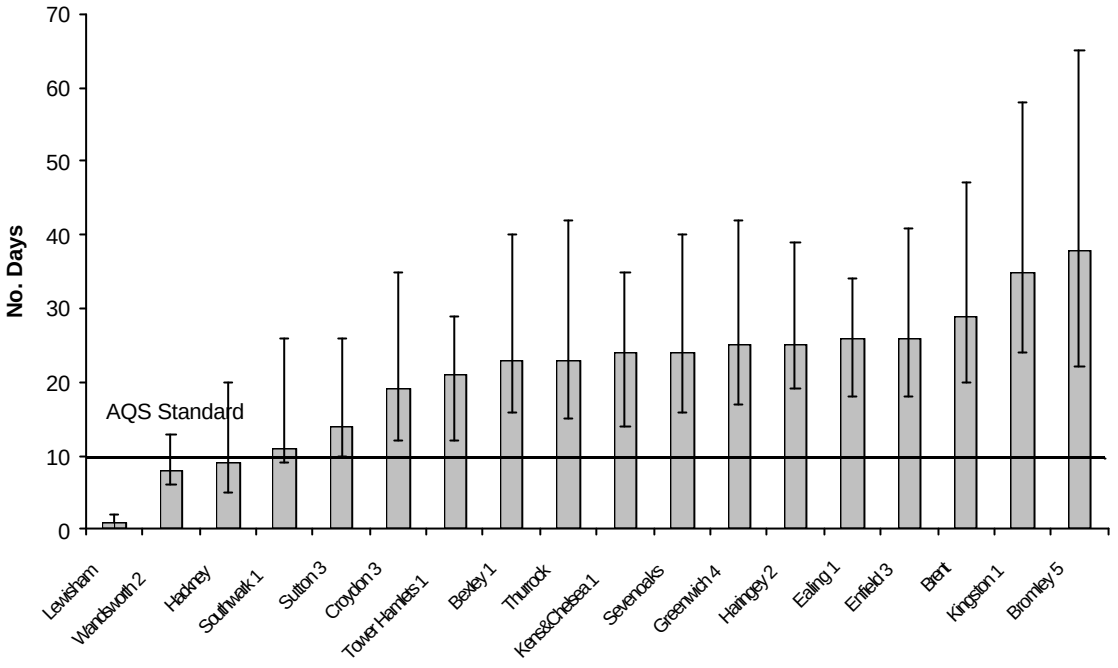

Figure 1.11 AQS Ozone Objective (1999).

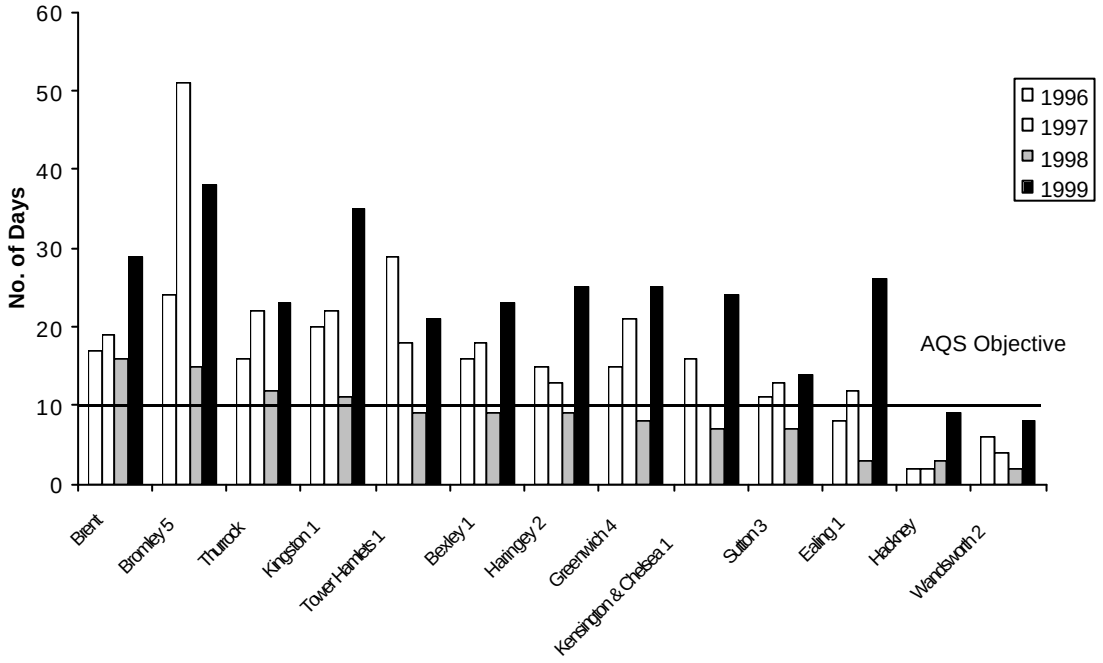

Figure 1.12 AQS Ozone Objective (1996-1999).

Analysis of exceedences of the objective over the years 1996 – 1999 is shown in Figure 1.12. The number of exceedences in 1999 is higher than in previous years at many long-term sites in London. This was due to a large number of 'moderate' O_3 episodes during 1999 with all sites measuring 'moderate' O_3 at some point during the year. A small number of 'moderate' measurements also occurred during the winter months. 'High' O_3, exceeding the EU Information Threshold was measured at all suburban sites and at around one third of urban background sites.

1.3.7 PM10

There are two AQS objectives for PM10. These are in line with the EU Daughter Directive Stage 1 Limit Value for PM10. The AQS has an incident based objective of 50 μgm^{-3}, measured as a daily mean, not to be exceeded on more than 35 days per year, and an annual mean objective of 40 μgm^{-3}.

PM10 poses many measurement challenges. Rather than comprising of a single defined chemical compound, like CO or SO_2 for example, the composition of PM10 varies with location, time of year and during episodes. PM10 can be considered to comprise; primary particulates, mainly emitted from local sources; secondary particulates, mainly from distant sources; and coarse particulates whose origin can be local or further afield. The variation in composition affects each measurement technique differently and therefore each measurement technique produces systematically different results. The EU Daughter Directive is based on a 'gravimetric' method where PM10 is collected on a filter that is then weighed in a laboratory (CEN, 1998). There is ample evidence to suggest that the most common measurement methodology employed in the UK, the Tapered Element Oscillating Microbalance (TEOM) produces a result lower than the 'gravimetric' method (APEG, 1999; Green 1999, Green et al., 2000). Green et al (2000) reviewed several comparisons, which identify geographical and temporal variation in the correction factor. DETR (1999) suggests that a correction factor of 1.3 be applied to TEOM results for comparison to the AQS Objective. TEOM results from 1999, calculated on this basis, are shown in Figures 1.13 to 1.16.

Beta attenuation monitors (BAM) are also used on the LAQN to measure PM10. BAM instruments are specifically marked in Figures 1.13 - 1.16. Research at Marylebone Road (Green, 2000) sought to compare the results from TEOM, 'gravimetric' and BAM instruments. The BAM instrument tested produced higher results than the 'gravimetric' method at this location during the test period. However, no correction factor has been applied to the BAM measurements. Due to these methodological differences it has not been possible to make an uncertainty estimate for PM10 measurements.

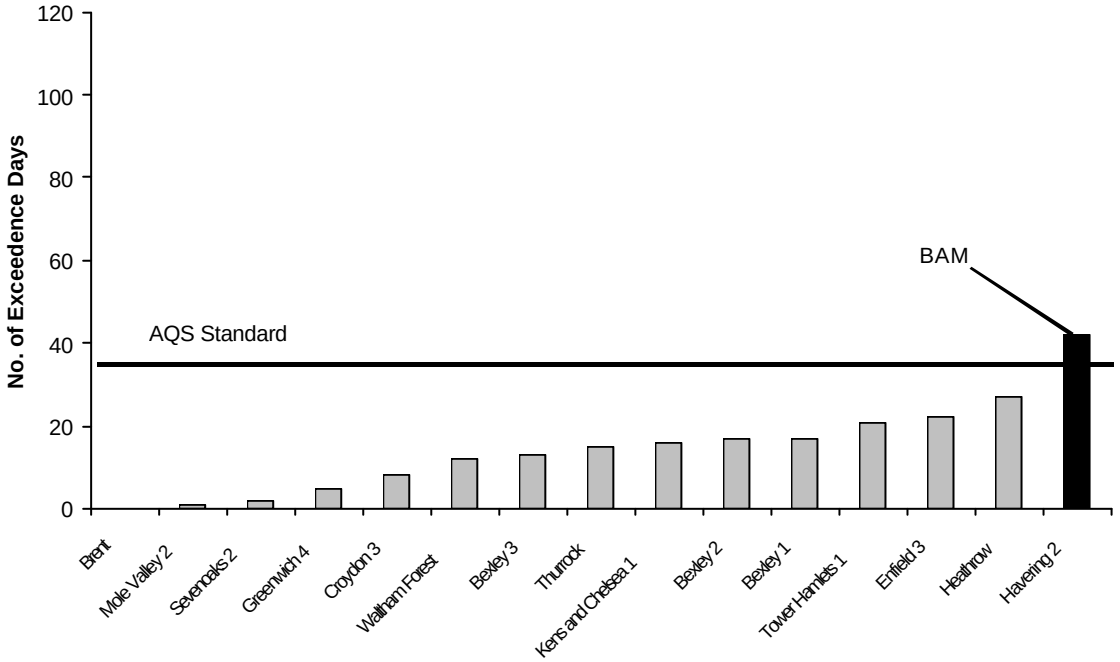

Figure 1.13 AQS Incident Based Objective for PM10 at Background Sites (1999).

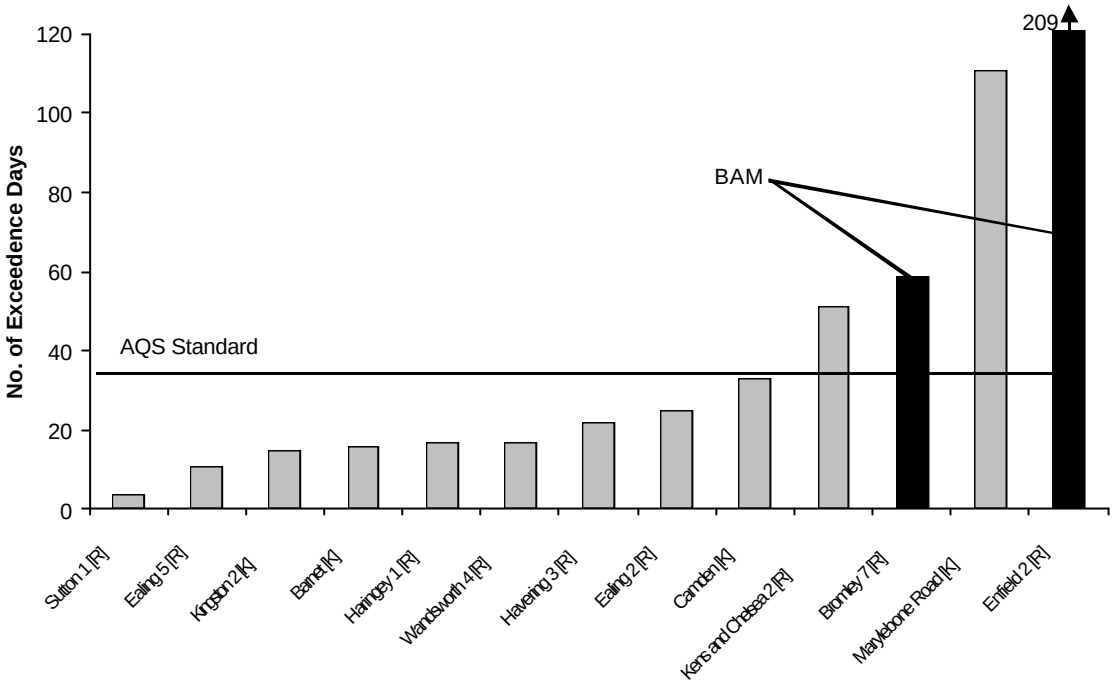

Figure 1.14 AQS Incident Based Objective for PM10 at Road and Kerbside Sites (1999).

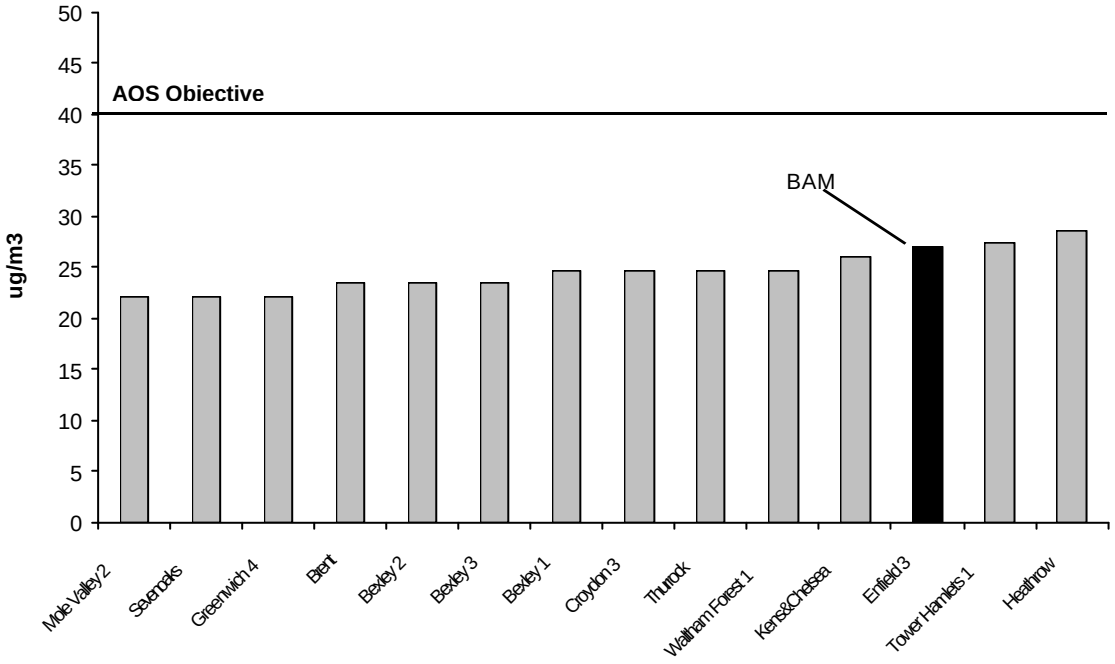

Figure 1.15 Annual Mean AQS Objective for PM10 at Background Sites.

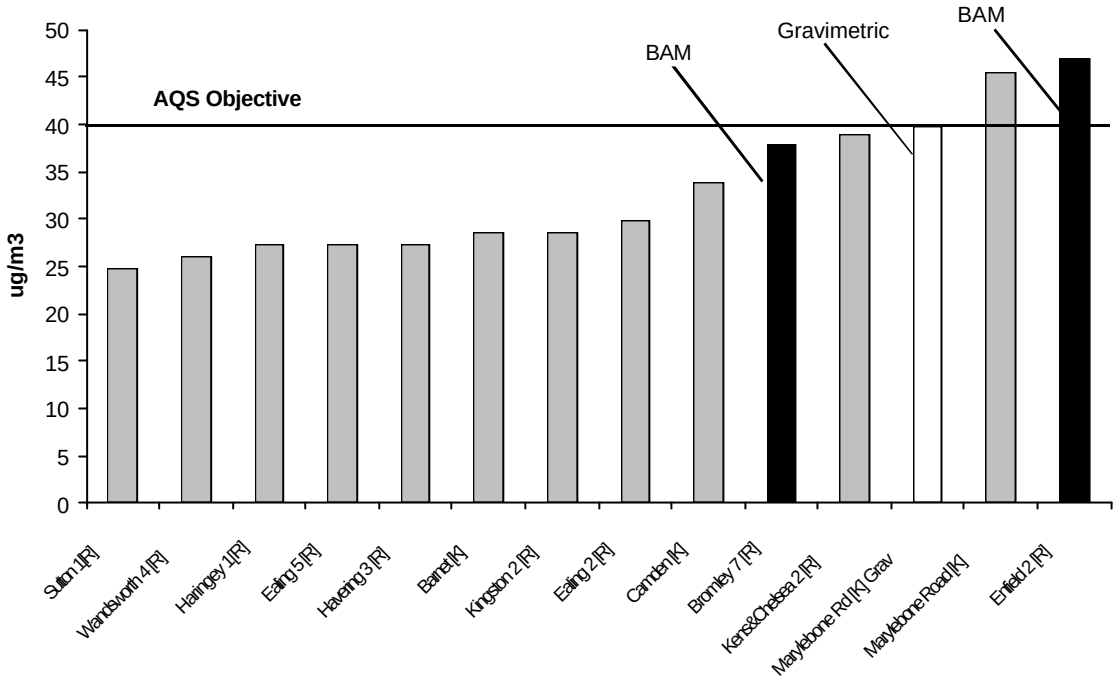

Figure 1.16 Annual Mean AQS Objective for PM10 at Roadside and Kerbside Sites.

Figures 1.15 and 1.16 show that spatial distribution of annual mean PM10 concentration is similar to that for NO_2. Measurements are highest at kerbside and roadside sites and generally decrease with distance from central London. As with NO_2, Heathrow, Tower Hamlets 1 and Kensington and Chelsea 1 are amongst the highest background sites. Similarly, the lowest values are measured at the Mole Valley 2 and Sevenoaks sites outside London. The annual mean measured at Thurrock is also similar to that measured in outer London. The pattern is, however, confused by the different measurement methods, and it is assumed that the results from the BAM instruments at Havering 2, Bromley 7 and Enfield 2 are greater those from TEOMs in similar locations. In common with data from previous years, (SEIPH-ERG, 1999; SEIPH-ERG, 2000c) the corrected TEOM measurement at Marylebone Road (TEOM * 1.3) exceeds the measurement from the co-located gravimetric sampler. During the year Bexley 4, Marylebone Road and Kensington & Chelsea 2 were influenced by nearby sources, which resulted a large number of local PM10 incidents (SEIPH, 2000d). The annual mean AQS objective was exceeded at the roadside site Enfield 2 (BAM) and the kerbside site at Marylebone Road (TEOM).

1.3.8 PM2.5

PM2.5 is a finer fraction of PM10. PM2.5 is not currently included in the AQS. The Expert Panel on Air Quality Standards have recently considered PM2.5 and concluded that health evidence does not justify a separate PM2.5 standard at this time. However, measurements of PM2.5 are essential to the understanding of PM10. Co-located measurements of PM10 and PM2.5 are especially useful. These are undertaken at several sites in the LAQN including the roadside sites Bromley 7, Ealing 2, the kerbside site at Marylebone Road, and at the suburban sites at Bexley 2 and Bexley 3. Additionally PM2.5 is measured at Hackney.

The ratio of PM2.5 to PM10 at each of these sites is shown in Figure 1.17. The ratio of PM2.5 to PM10 is broadly similar at each of the TEOM monitoring sites. The ratios during 1999 are similar to those measured during 1998 (SEIPH 1999). The ratio measured by the BAM at the Bromley 7 roadside site is slightly higher than that measured at the TEOM sites. This is most likely due to the different monitoring techniques.

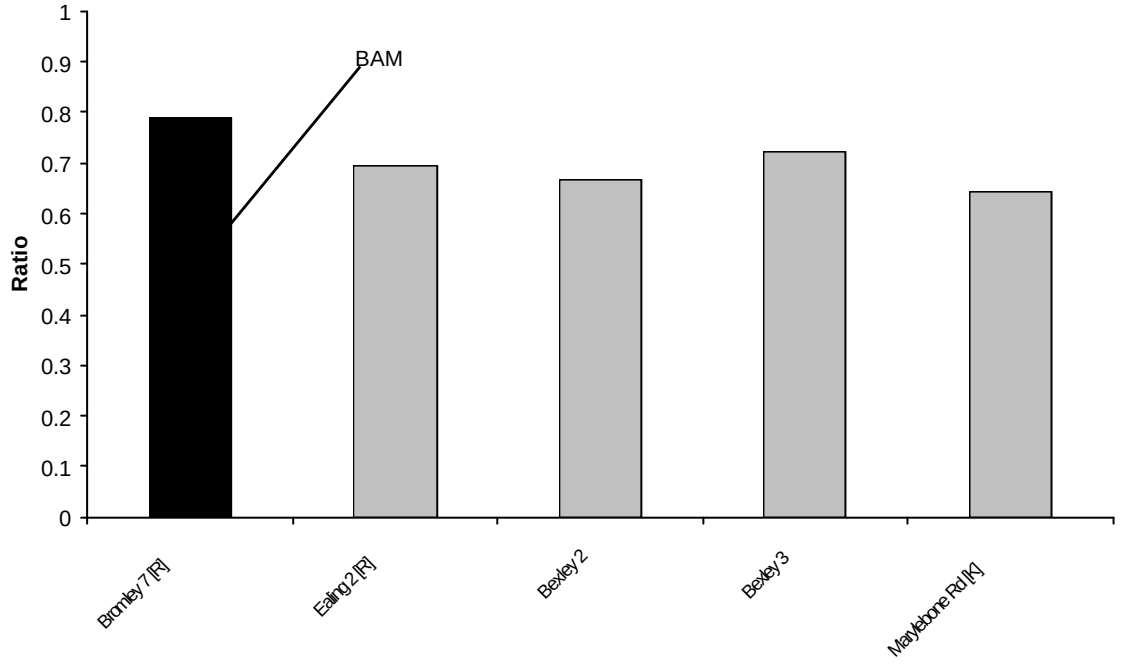

Figure 1.17 Ratio of PM2.5 to PM10 (1999).

1.3.9 Benzene and 1,3 Butadiene

The AQS contains objectives for the annual mean concentration of these substances. The main atmospheric source of benzene is the distribution and combustion of petrol, whereas 1,3 butadiene is mainly derived from the combustion of petrol. Both benzene and 1,3 butadiene are measured at the kerbside at Marylebone Road and at the roadside at Tower Hamlets 2. During 1999 the annual means were below the AQS objectives for 2003. Both pollutants are also measured at the National Hydrocarbon Network monitoring sites in central London and at Eltham (co-located with the Greenwich 4 site). The AQS objectives for benzene and 1,3 butadiene were comfortably met at both sites for 1999.

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Appendix 1

LAQN MONITORING SITES 1999

APPENDIX 1: LAQN MONITORING SITES 1999

A.1.1 Kerbside Sites

	Start	CO	NO2	SO2	O3	PM10	PM2.5	Data	Quality
Barnet	Dec 98		•			**T**		•	**
Bromley 4	Feb 96	Closed Jul 1998							
Camden	Apr 96		•			**T**		•	** **A1**
Marylebone Road	Jun 97	•	•	•	•	**TG**	•	•	** **A1**
Redbridge 2	Dec 99	•	•					•	*
Redbridge 3	Dec 99		•			**B**		•	*

Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards.
A1= Affiliated to UKAURN – Ratified Data supplied to LAQN by NPL
A2= Affiliated to UKAURN – final data set published by DETR

A.1.2 Roadside Sites

	Start	CO	NO2	SO2	O3	PM10	PM2.5	Data	Quality
Bexley 4	May 99					**T**		●	**
Bromley 7	July 98	●	●			**B**	**B**	●	*/****A1**
Croydon 2	Sept 94		●					●	**
Croydon 4	Sept 99		●	●		**T**		●	**
Crystal Palace	Oct 99	●	●	●		**T**		●	**
Ealing 2	Sept 96	●	●			**T**	**T**	●	**
Ealing 4	Dec 98	Closed March 1999						●	**
Ealing 5	Mar 99		●	●		**T**		●	**
Enfield 2	Jan 98	●	●			**B**		●	**
Greenwich 5	Sept 97		●			**T**		●	*
Hams & Fulham 1	Aug 99		●			**T**		●	**
Haringey 1	Dec 94		●	●		**T**		●	** **A1**
Haringey 3	Apr 99		●	●		**B**		●	**
Havering 1	Dec 95		●					●	**
Havering 3	Dec 98		●	●		**T**		●	**
Hillingdon 1	Sept 99		●			**T**		●	**
Hounslow 1	Apr 93	●	●		●			●	** **A1**
Hounslow 3	Mar 99					**T**		●	**
Hounslow 4	Aug 99		●	●		**T**		●	**
Ken&Chelsea 2	May 98					**T**		●	**
Kingston 2	Apr 96		●			**T**		●	**
Redbridge 4	Dec 99	●	●	●		B		●	*
Southwark 2	Oct 94	●	●	●				●	** **A1**
Sutton 1	May 95	●	●	●		**T**		●	** **A1**
Tower Hamlets 2	Mar 94	●	●					●	** **A1**
Wandsworth 1	Sept 94	Closed Mar 1996							
Wandsworth 4	Feb 98	●	●			**T**		●	**
Westminster 2	Jun95	Last data 1995							

Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards.
A1= Affiliated to UKAURN – Ratified Data supplied to LAQN by NPL
A2= Affiliated to UKAURN – final data set published by DETR

A.1.3 Urban Background Sites

	Start	CO	NO2	SO2	O3	PM10	PM2.5	Data	Quality
Brent	Aug 95	•	•	•	•	**T**		•	* **A2**
Bromley 1	Jan 93	Closed Feb 96							
Castle Point	May 96		•	•				•	**
Croydon 3	May 96				•	**T**		•	**
Ealing 1	Mar 95	**(•)**	•	•	•			•	**
Enfield 3	Nov 98	•	•	•	•	**B**		•	**
Greenwich 4	Sept 93		•	•	•	**T**		•	** **A1**
Hackney	Oct 93	•	•		•		**T**	•	*/****A1**
Heathrow	Mar 99	•	•			**T**		•	*
Hillingdon (O)	Oct 94	Last Data Apr 95							
Ken&Chelsea 1	Mar 95	•	•	•	•	**T**		•	****A1**
Islington	Sep 94	**(•)**	•			**T**		•	**
Lewisham	Jan 95		•	•	•			•	****A1**
Redbridge 1	Dec 99		•		•	**B**		•	*
Sevenoaks 2	Feb 98	•	•	•	•	**T**		•	**
Southwark 1	Mar 93	•	•	•	•			•	****A1**
Thurrock	Feb 95	•	•	•	•	**T**		•	***A2**
Tower Hamlets 1	Jan 94		•	•	•	**T**		•	**
Tower Hamlets 3	Oct 99		•	•		**T**		•	**
Waltham Forest	Jul 98		•	•		**T**		•	**
Wandsworth 2	Oct 94	•	•	•	•			•	****A1**
Westminster (O)	Jan 93	Last Data 1996							

Key: T =TEOM, B=Beta Attenuation, G= Gravimetric, *Locality Standard, **Traceability to National Standards
A1= Affiliated to UKAURN – Ratified Data supplied to LAQN by NPL
A2= Affiliated to UKAURN – final data set published by DETR

A.1.4 Suburban Sites

	Start	CO	NO2	SO2	O3	PM10	PM2.5	Data	Quality
Bark & Dag 1	Sep 1993		●	●					
Bark & Dag 2	Oct 99					**T**		●	**
Bexley 1	Jan 93	●	●	●	●			●	*A2
Bexley 2	Jan 98		●			**T**	**T**	●	**
Bexley 3	Jan 98					**T**	**T**	●	**
Bexley 5	Nov 99	●	●	●				●	**
Brentwood 1	Aug 95	Last data Mar 1999							
Bromley 5	Mar 96				●			●	**
Enfield 1	Jul 95		●					●	**
Haringey 2	Apr 96		●		●	**B**		●	**A1
Havering 2	Apr 98					**B**		●	*
Harrow	Apr 99		●			**T**		●	**
Hounslow 2	Apr 99		●	●		**T**		●	**
Kingston 1	Mar 96				●			●	**
Mole Valley 2	Apr 97		●			**T**		●	**
Sutton 2	May 95		●					●	**
Sutton 3	May 95		●		●			●	**A1
Wandsworth 3	Oct 94			●	**(●)**			●	**

A.1.5 Rural Sites

	Start	CO	NO2	SO2	O3	PM10	PM2.5	Data	Quality
Mole Valley 1	Mar 96	Closed Mar 1999							
S'oaks Scudders H	Sept 95	Closed Sept 1997							

Key: T =TEOM, B=Beta Attentuation, G= Gravimetric, *Locality Standard, **Traceablity to National Standards.
A1= Affiliated to UKAURN – Ratified Data supplied to LAQN by NPL
A2= Affiliated to UKAURN – final data set published by DETR

A.1.6 Principle Site Changes During 1999

- Two sites in Barking and Dagenham joined the LAQN in November. Barking and Dagenham 1 is a site formally owned by Barking Power. The site monitors NO_2 and SO_2 and is located in a suburban location, at a school, in the north east of the Borough. The site supplied data to the LAQN in 1993 and 1994 (SEIPH-ERG, 1994; SEIPH-ERG, 1995) and was of great assistance in determining the extent of plume grounding in east London. The Barking and Dagenham 2 site is located in the south of the borough in a residential area, close to the rerouted A12. The site monitors PM10 (TEOM).

- Bexley Council installed a PM10 monitoring site at a roadside location in the north of the Borough during May. The site, Bexley 4, was installed in response to concerns about the impact of fugitive dust emissions and a high level of heavy goods vehicle traffic in this mixed industrial and residential area. The former Barking Power site on the south of the river joined the LAQN in October. Located in a suburban school, the site monitors CO, NO_2 and SO_2. The site, designated as Bexley 5, is now owned and funded by Bexley Council.

- The suburban site in Brentwood left the network at the end of March.

- The Croydon 4 monitoring site joined the LAQN during September. The site is broadly roadside in character and is located in the centre of Croydon, adjacent to a road shared by both trams and other traffic. The site is located at a busy road junction and in an area that experiences considerable pedestrian traffic. The site monitors PM10 (TEOM), NO_2 and SO_2.

- The Crystal Palace monitoring site became operational during October. The site is funded jointly by the London Boroughs of Bromley, Croydon, Lambeth, Lewisham and Southwark and is located at the confluence of their borders in Crystal Palace. The site is in a roadside location and monitors CO, NO_2, SO_2 and PM10 (TEOM). The site has been given the designation Crystal Palace 1.

- The Ealing mobile monitoring site was deployed at 2 locations during the year. The Ealing 4 site was located on part of a one-way system in Acton used extensively by buses and shoppers. The Ealing 5 site is located close to Ealing 4 in a lay-by on the main Uxbridge Road, which experiences considerable traffic queues.

- The Greenwich 5 refurbishment was completed during August with the installation of an NO_2 analyser alongside the existing PM10 (TEOM) monitoring equipment. The site is located at the roadside on Trafalgar Road, which forms part of the 'Greenwich Lorry Ban' route.

- Hammersmith and Fulham's first continuous monitoring site was integrated into the network during August. The site monitors PM10 (TEOM) and NO_2 at the roadside on Hammersmith Broadway. It is an important addition to the roadside monitoring in central and inner London.

- The London Borough of Haringey undertook a substantial investment program to augment monitoring undertaken at the existing Haringey 1 and Haringey 2 monitoring sites and to set up a new site, Haringey 3. A SO_2 analyser was installed at the Haringey 1 roadside site in High Road Tottenham. NO_X, SO_2 and PM10 (BAM) monitoring was installed alongside the O_3 analyser at the suburban Haringey 2 site in Crouch End, and a new roadside site monitoring NO_X, SO_2 and PM10 (BAM) was installed in Bounds Green. The new equipment was commissioned during April and May. This investment has greatly enhanced the monitoring coverage in north London. The installation of NO_X alongside the O_3 at HG2 will assist in the understanding of photochemistry. The new SO_2 analysers will increase the LAQN's plume tracking capabilities and permit better detection of local plume grounding from sources in north London.

- The London Borough of Harrow's first automatic monitoring site was installed in April. The site is located in a school playing field in Stanmore and monitors NO_X and PM10. The site

was located to be broadly representative of the majority of the Borough and in response to air pollution predictions, which suggest that the M1 corridor might produce elevated background concentrations over a wide area including Stanmore. The site further extends the geographical coverage of the LAQN in north west London.

- The Heathrow air pollution monitoring site was linked to the LAQN. The site is located on the airport's northern perimeter and is operated by AEA Technology plc on behalf of BAA. Data are collected by AEA Technology plc on a regular basis and is transmitted by Email to SEIPH-ERG following validation. A ratified data set was subsequently supplied for 1999. Operation of the link has been funded by BAA.

- The Hillingdon 1 site was also commissioned during September. The site is located in a residential roadside location on the approach road to RAF Northolt. The site was located in response to possible expansion of civilian air traffic using the airport.

- The Hounslow 2 monitoring site was integrated into the LAQN during mid April. The site monitors NO_X, PM10 (TEOM) and SO_2. It is located in a park in a residential area of Cranford, to the north east of Heathrow Airport, and is situated to measure the impact of the airport on the surrounding suburbs. The Hounslow 3 monitoring site joined the LAQN during March 1999. The site monitors PM10 using a TEOM and is located within 5 m of the Hounslow 1 site, adjacent to the busy A4/M4 in Brentford. Hounslow's fourth monitoring site was installed in Chiswick, in the east of the Borough during August. The site monitors PM10 (TEOM), NO_2 and SO_2 and is situated at the roadside in a location likely to be an air quality management area.

- Monitoring at Islington was largely suspended during the year. The site was reopened during the autumn and now monitors PM10 and NO_2.

- The equipment at the Mole Valley 1 monitoring site reached the end of its useful lifetime. Following a period of frequent failures, the site was closed at the end of February 1999. Mole Valley District Council intend to open a new site in central Dorking during 2001.

- The London Borough of Redbridge monitoring sites joined the LAQN during December:

    - Redbridge 1 is a comprehensive background site monitoring PM10 (BAM), NO_2 and O_3. The site is a valuable addition to the spatial coverage of the LAQN, and will provide increasingly important O_3 data for the north east sector of London
    - Redbridge 2 is a kerbside site monitoring CO and NO_2. Located at a busy junction, it will provide further insight into pollution in this type of location, especially CO.
    - Redbridge 3 is a kerbside monitoring site measuring PM10 (BAM) and NO_2.
    - Redbridge 4 is a roadside site monitoring CO, PM10 (BAM), NO_2 and SO_2 in a housing estate beside the north circular.

- Tower Hamlets 3 was installed in a background location in the west of the Borough during October. The site monitors PM10 (TEOM), NO_2 and SO_2 and will provide useful data to measure the size of the central area of NO_2 and PM10 exceedence and its incursion into the Borough.

- The Wandsworth 3 O_3 analyser was withdrawn during January 1999, following repeated equipment failures.

Appendix 2

SUMMARY OF RESULTS

APPENDIX 2: SUMMARY OF MONITORING RESULTS

Where data capture for an analyser is less than 75 % a statistical comparison is shown in parenthesis. Where comparison with the objective cannot be made these results are marked not applicable (N.A.)

A.2.1 Carbon Monoxide

Carbon Monoxide	Data Capture %	Annual Mean (ppm)	Annual Max (h) (ppm)
Kerbside			
Marylebone Rd	95	1.8	9.6
Redbridge 2	4	(3.7)	(14.6)
Roadside			
Bromley 7	75	0.9	8.7
Crystal Palace	24	(1.3)	(6.3)
Ealing 2	98	1.0	6.8
Enfield 2	91	0.8	11.1
Hounslow 1	91	0.9	7.6
Redbridge 4	4	(0.9)	(4.8)
Southwark 2	98	1.0	7.3
Sutton 1	97	0.8	5.9
Tower Hamlets 2	97	1.0	7.6
Wandsworth 4	82	0.9	6.3

Carbon Monoxide	Data Capture %	Annual Mean (ppm)	Annual Max (h) (ppm)
Background			
Brent	97	0.4	6.0
Enfield 3	89	0.5	5.3
Hackney	89	0.6	6.7
Heathrow	76	0.6	4.4
Kens & Chelsea 1	98	0.3	5.3
Sevenoaks 2	76	0.2	5.2
Southwark 1	98	0.5	5.1
Thurrock	91	0.5	4.8
Wandsworth 2	94	0.9	5.9
Suburban			
Bexley 1	89	0.5	5.5
Bexley 5	11	(0.4)	(2.8)

Carbon Monoxide	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Kerbside								
Marylebone Rd	8299	345	0	0	0	0	0	0
Redbridge 2	387	15	5	1	0	0	0	0
Roadside								
Bromley 7	6626	277	0	0	0	0	0	0
Crystal Palace	2107	87	0	0	0	0	0	0
Ealing 2	8578	359	0	0	0	0	0	0
Enfield 2	7981	347	0	0	0	0	0	0
Hounslow 1	7899	333	0	0	0	0	0	0
Redbridge 4	417	18	0	0	0	0	0	0
Southwark 2	8568	359	0	0	0	0	0	0
Sutton 1	8541	359	0	0	0	0	0	0
Tower Hamlets 2	8510	357	0	0	0	0	0	0
Wandsworth 4	7237	303	0	0	0	0	0	0
Background								
Brent	8493	356	0	0	0	0	0	0
Enfield 3	7832	339	0	0	0	0	0	0
Hackney	7779	340	0	0	0	0	0	0
Heathrow	6623	273	0	0	0	0	0	0
Kens & Chelsea 1	8601	361	0	0	0	0	0	0
Sevenoaks 2	6635	281	0	0	0	0	0	0
Southwark 1	8558	359	0	0	0	0	0	0
Thurrock	7968	334	0	0	0	0	0	0
Wandsworth 2	8263	363	0	0	0	0	0	0
Suburban								
Bexley 1	7767	325	0	0	0	0	0	0
Bexley 5	1023	43	0	0	0	0	0	0

Carbon Monoxide	Comparison of Annual Data to AQS Objective (Max Rolling 8h Mean >10ppm)
Kerbside	
Marylebone Rd	No / 7.3
Redbridge 2	Yes / (11.6)
Roadside	
Bromley 7	No / 5.2
Crystal Palace	No / 5.0
Ealing 2	No / 4.9
Enfield 2	No / 6.1
Hounslow 1	No / 5.0
Redbridge 4	No / 4.0
Southwark 2	No / 5.6
Sutton 1	No / 3.7
Tower Hamlets 2	No / 5.6
Wandsworth 4	No / 3.8
Background	
Brent	No / 4.2
Enfield 3	No / 4.3
Hackney	No / 4.7
Heathrow	No / 3.0
Kens & Chelsea 1	No / 3.4
Sevenoaks 2	No / 3.4
Southwark 1	No / 4.1
Thurrock	No / 3.0
Wandsworth 2	No / 3.7
Suburban	
Bexley 1	No / 3.9
Bexley 5	No / 2.0

A.2.2 Nitrogen Dioxide

Where data capture for an analyser is less than 75% a statistical comparison is shown in parenthesis. Where comparison with the objective cannot be made these results are marked not applicable (N.A.)

Nitrogen Dioxide	Data Capture %	Annual Mean (ppb)	Annual Max (h) (ppb)
Kerbside			
Barnet	94	28	140
Camden	96	34	123
Marylebone Road	92	47	169
Redbridge 2	7	(70)	(314)
Redbridge 3	4	(45)	(137)
Roadside			
Bromley 7	94	34	103
Croydon 2	94	20	79
Croydon 4	10	(21)	(147)
Crystal Palace	11	(24)	(74)
Greenwich 5	26	(27)	(84)
Ealing 2	96	31	122
Ealing 5	77	34	100
Enfield 2	92	24	93
Hams & Fulham 1	34	(48)	(123)
Haringey 1	97	25	135
Haringey 3	50	(27)	(115)
Havering 1	91	23	116
Havering 3	98	23	102
Hillingdon 1	27	(24)	(79)
Hounslow 1	91	31	91
Hounslow 4	25	(29)	(116)
Kingston 2	95	25	86
Redbridge 4	4	(27)	(104)
Southwark 2	49	(39)	(112)
Sutton 1	96	22	73
Tower Hamlets 2	97	34	119
Wandsworth 4	87	26	100

Nitrogen Dioxide	Data Capture %	Annual Mean (ppb)	Annual Max (h) (ppb)
Background			
Brent	96	19	138
Castle Point	94	16	75
Ealing 1	96	24	103
Enfield 3	89	20	105
Greenwich 4	96	18	96
Hackney	93	31	135
Heathrow	98	29	203
Islington	22	(26)	(69)
Ken & Chelsea 1	96	24	93
Lewisham	95	28	86
Redbridge 1	-	-	-
Sevenoaks 2	85	13	55
Southwark 1	93	29	103
Thurrock	96	19	82
Tower Hamlets 1	93	24	110
Tower Hamlets 3	17	(23)	(100)
Waltham Forest	91	22	119
Wandsworth 2	96	27	99
Suburban			
Bark & Dag 1	-	-	-
Bexley 1	97	21	95
Bexley 2	87	18	87
Bexley 5	22	(18)	(59)
Enfield 1	99	18	90
Haringey 2	59	(19)	(76)
Harrow	45	(18)	(86)
Hounslow 2	71	(20)	(89)
Mole Valley 2	95	15	74
Sutton 2	85	20	83
Sutton 3	91	18	78

Nitrogen Dioxide	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Kerbside								
Barnet	8274	344	0	0	0	0	0	0
Camden	8466	354	0	0	0	0	0	0
Marylebone Road	8143	333	2	1	0	0	0	0
Redbridge 2	668	21	29	6	1	1	0	0
Redbridge 3	436	19	0	0	0	0	0	0
Roadside								
Bromley 7	8274	344	0	0	0	0	0	0
Croydon 2	8293	346	0	0	0	0	0	0
Croydon 4	899	41	0	0	0	0	0	0
Crystal Palace	987	41	0	0	0	0	0	0
Greenwich 5	2342	101	0	0	0	0	0	0
Ealing 2	8442	352	0	0	0	0	0	0
Ealing 5	6831	286	0	0	0	0	0	0
Enfield 2	8136	352	0	0	0	0	0	0
Ham & Fulham 1	6477	271	0	0	0	0	0	0
Haringey 1	8558	357	0	0	0	0	0	0
Haringey 3	4418	193	0	0	0	0	0	0
Havering 1	8045	333	0	0	0	0	0	0
Havering 3	8604	356	0	0	0	0	0	0
Hillingdon 1	2397	100	0	0	0	0	0	0
Hounslow 1	8035	334	0	0	0	0	0	0
Hounslow 4	2212	96	0	0	0	0	0	0
Kingston 2	8404	350	0	0	0	0	0	0
Redbridge 4	422	18	0	0	0	0	0	0
Southwark 2	4359	177	0	0	0	0	0	0
Sutton 1	8431	351	0	0	0	0	0	0
Tower Hamlets 2	8559	358	0	0	0	0	0	0
Wandsworth 4	7677	320	0	0	0	0	0	0

Nitrogen Dioxide	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Background								
Brent	8465	354	0	0	0	0	0	0
Castle Point	8253	345	0	0	0	0	0	0
Ealing 1	8440	352	0	0	0	0	0	0
Enfield 3	7854	337	0	0	0	0	0	0
Greenwich 4	8436	355	0	0	0	0	0	0
Hackney	8159	356	0	0	0	0	0	0
Heathrow	8598	356	3	1	0	0	0	0
Islington	1946	82	0	0	0	0	0	0
Ken & Chelsea 1	8470	355	0	0	0	0	0	0
Lewisham	8333	326	0	0	0	0	0	0
Redbridge 1	-	-	-	-	-	-	-	-
Sevenoaks 2	7466	319	0	0	0	0	0	0
Southwark 1	8169	341	0	0	0	0	0	0
Thurrock	8447	352	0	0	0	0	0	0
Tower Hamlets 1	8148	338	0	0	0	0	0	0
Tower Hamlets 3	1501	62	0	0	0	0	0	0
Waltham Forest	8570	331	0	0	0	0	0	0
Wandsworth 2	8442	351	0	0	0	0	0	0
Suburban								
Bark & Dag 1	-	-	-	-	-	-	-	-
Bexley 1	8562	358	0	0	0	0	0	0
Bexley 2	7661	315	0	0	0	0	0	0
Bexley 5	1929	84	0	0	0	0	0	0
Enfield 1	8690	363	0	0	0	0	0	0
Haringey 2	5198	225	0	0	0	0	0	0
Harrow	4029	169	0	0	0	0	0	0
Hounslow 2	6231	261	0	0	0	0	0	0
Mole Valley 2	8363	348	0	0	0	0	0	0
Sutton 2	7531	311	0	0	0	0	0	0
Sutton 3	7993	330	0	0	0	0	0	0

Comparison of Annual Data to AQS Objective		
Nitrogen Dioxide	**Annual Mean >21ppb**	**104.6ppb exceeded on more than 18 hours**
Kerbside		
Barnet	Yes / 28	No / 4
Camden	Yes / 34	No / 7
Marylebone Road	Yes / 47	Yes / 61
Redbridge 2	NA / (70)	Yes / 119
Redbridge 3	NA / (45)	No / 9
Roadside		
Bromley 7	Yes / 34	No / 0
Croydon 2	No / 20	No / 0
Croydon 4	NA / (21)	NA / (1)
Crystal Palace	NA / (24)	NA / (0)
Greenwich 5	NA / (27)	NA / (0)
Ealing 2	Yes / 31	No / 8
Ealing 5	Yes / 34	No / 0
Enfield 2	Yes / 24	No / 0
Hams & Fulham 1	NA / (14)	NA / (0)
Haringey 1	Yes / 25	No / 0
Haringey 3	NA / (27)	NA / (0)
Havering 1	Yes / 23	No / 2
Havering 3	Yes / 23	No / 0
Hillingdon 1	NA / (24)	NA / (0)
Hounslow 1	Yes / 31	No / 0
Hounslow 4	NA / (29)	NA / (1)
Kingston 2	Yes / 25	No / 0
Redbridge 4	NA / (27)	NA / (0)
Southwark 2	NA / (39)	NA / (4)
Sutton 1	Yes / 22	No / 0
Tower Hamlets 2	Yes / 36	No / 11
Wandsworth 4	Yes / 26	No / 0

Comparison of Annual Data to AQS Objective		
Nitrogen Dioxide	**Annual Mean >21ppb**	**104.6ppb exceeded on more than 18 hours**
Background		
Brent	No / 19	No / 5
Castle Point	No / 16	No / 0
Ealing 1	Yes / 24	No / 0
Enfield 3	No / 20	No / 1
Greenwich 4	No / 18	No / 0
Hackney	Yes / 31	No / 9
Heathrow	Yes / 29	No / 12
Islington	NA / (26)	NA / (0)
Kens & Chelsea 1	Yes / 24	No / 0
Lewisham	Yes / 28	No / 0
Redbridge 1	-	-
Sevenoaks 2	No / 13	No / 0
Southwark 1	Yes / 29	No / 2
Thurrock	No / 19	No / 0
Tower Hamlets 1	Yes / 24	No / 2
Tower Hamlets 3	NA / (23)	NA / (0)
Waltham Forest	Yes / 22	No / 2
Wandsworth 2	Yes / 27	No / 0
Suburban		
Bark & Dag 1	-	-
Bexley 1	Yes / 21	No / 0
Bexley 2	No / 18	No / 0
Bexley 5	NA / (18)	NA / (0)
Enfield 1	No / 18	No / 0
Haringey 2	NA / (19)	NA / (0)
Harrow	NA / (18)	NA / (0)
Hounslow 2	NA / (20)	NA / (0)
Mole Valley 2	No / 15	No / 0
Sutton 2	No / 20	No / 0
Sutton 3	No / 18	No / 0

A.2.3 Ozone

Where data capture for an analyser is less than 75% a statistical comparison is shown in parenthesis. Where comparison with the objective cannot be made these results are marked not applicable (N.A.)

Ozone	Data Capture %	Annual Mean (ppb)	Annual Max (h) (ppb)
Kerbside			
Marylebone Road	95	6	52
Roadside			
Hounslow	92	9	52
Background			
Brent	97	20	98
Croydon 3	98	19	83
Ealing 1	99	17	101
Enfield 3	84	19	99
Greenwich 4	99	20	82
Hackney	93	15	73
Kens & Chelsea 1	98	18	91
Lewisham	90	10	62
Redbridge 1	4	(10)	(42)
Sevenoaks 2	84	21	89
Southwark 1	97	15	85
Thurrock	96	19	96
Tower Hamlets 1	98	17	85
Wandsworth 2	99	13	85
Suburban			
Bexley 1	97	19	96
Bromley 5	94	26	97
Haringey 2	98	17	98
Kingston 1	96	22	101
Sutton 3	99	18	78

Ozone	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Kerbside								
Marylebone Road	8326	348	1	1	0	0	0	0
Roadside								
Hounslow	7922	333	5	2	0	0	0	0
Background								
Brent	8189	313	333	43	2	1	0	0
Croydon 3	8348	326	245	34	0	0	0	0
Ealing 1	8429	329	274	32	6	4	0	0
Enfield 3	7116	283	283	34	7	3	0	0
Greenwich 4	8393	326	273	39	0	0	0	0
Hackney	8007	330	115	24	0	0	0	0
Kens & Chelsea 1	8360	323	259	39	1	1	0	0
Lewisham	7885	326	16	5	0	0	0	0
Redbridge 1	374	16	0	0	0	0	0	0
Sevenoaks 2	7121	279	276	37	0	0	0	0
Southwark 1	8368	329	162	28	0	0	0	0
Thurrock	8150	311	268	40	4	2	0	0
Tower Hamlets 1	8372	328	225	30	0	0	0	0
Wandsworth 2	8549	345	107	19	0	0	0	0
Suburban								
Bexley 1	8227	318	282	39	1	1	0	0
Bromley 5	7830	285	424	56	7	4	0	0
Haringey 2	8317	319	287	37	4	3	0	0
Kingston 1	7981	293	396	55	8	2	0	0
Sutton 3	8495	330	192	35	0	0	0	0

Ozone	Exceedence of NAQS Objective 10 days (Max Rolling 8h Mean >50ppb)
Kerbside	
Marylebone Road	No / 0
Roadside	
Hounslow	No / 0
Background	
Brent	Yes / 29
Croydon 3	Yes / 19
Ealing 1	Yes / 26
Enfield 3	Yes / 26
Greenwich 4	Yes / 25
Hackney	No / 9
Kens & Chelsea 1	Yes / 24
Lewisham	No / 1
Redbridge 1	NA / 0
Sevenoaks 2	Yes / 24
Southwark 1	Yes / 11
Thurrock	Yes / 23
Tower Hamlets 1	Yes / 21
Wandsworth 2	No / 8
Suburban	
Bexley 1	Yes / 23
Bromley 5	Yes / 38
Haringey 2	Yes / 25
Kingston 1	Yes / 35
Sutton 3	Yes / 14

A.2.4 PM10

Where data capture for an analyser is less than 75% a statistical comparison is shown in parenthesis. Where comparison with the objective cannot be made these results are marked not applicable (N.A.)

PM10	Instrument Type*	Data Capture %	Annual Mean (μgm^{-3})	Annual Max (h) (μgm^{-3})
Kerbside				
Barnet	**T**	95	22	151
Camden	**T**	94	26	311
Marylebone Road	**T**	94	35	801
Redbridge 3	**B**	10	(28)	(176)
Roadside				
Bexley 4	**T**	62	(36)	(473)
Bromley 7	**B**	90	38	250
Croydon 4	**T**	15	(19)	(144)
Crystal Palace	**T**	23	(22)	(85)
Ealing 2	**T**	96	23	119
Ealing 5	**T**	75	21	171
Enfield 2	**B**	95	47	273
Greenwich 5	**T**	45	(20)	(247)
Hams & Fulham 1	**T**	94	17	90
Haringey 1	**T**	97	22	114
Haringey 3	**B**	59	(36)	(454)
Havering 3	**T**	97	21	117
Hillingdon 1	**T**	26	(18)	(120)
Hounslow 3	**T**	72	(26)	(153)
Hounslow 4	**T**	27	(23)	(122)
Kens and Chelsea 2	**T**	98	30	1517
Kingston 2	**T**	98	22	244
Redbridge 4	**B**	10	(28)	(176)
Sutton 1	**T**	98	19	473
Wandsworth 4	**T**	98	20	210

*T= TEOM, B=BAM

PM10	Instrument Type*	Data Capture %	Annual Mean (μgm^{-3})	Annual Max (h) (μgm^{-3})
Background				
Brent	**T**	97	18	180
Croydon 3	**T**	95	19	171
Enfield 3	**B**	90	27	363
Greenwich 4	**T**	98	17	261
Heathrow	**T**	95	22	209
Islington	**T**	27	(19)	(96)
Kens and Chelsea 1	**T**	98	20	100
Redbridge 1	**B**	7	(20)	(118)
Sevenoaks 2	**T**	82	17	129
Tower Hamlets 1	**T**	97	21	115
Tower Hamlets 3	**T**	13	(12)	(80)
Thurrock	**T**	93	19	248
Waltham Forest	**T**	89	19	135
Suburban				
Bark & Dag 2	T	18	(16)	(80)
Bexley 1	T	96	19	259
Bexley 2	**T**	95	18	182
Bexley 3	**T**	77	18	113
Haringey 2	**B**	50	(29)	(186)
Harrow	**T**	55	(16)	(87)
Hounslow 2	**T**	71	(18)	(262)
Havering 2	**B**	78	(38)	(179)
Mole Valley 2	**T**	99	17	140

*T= TEOM, B=BAM

PM10	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Kerbside								
Barnet	8148	341	38	4	0	0	0	0
Camden	7980	325	173	18	0	0	0	0
Marylebone Road	7353	282	559	44	128	7	107	10
Redbridge 3	(571)	(23)	(8)	(1)	(0)	(0)	(0)	(0)
Roadside								
Bexley 4	3973	144	726	36	522	32	134	13
Bromley 7	(6411)	(237)	(1075)	(64)	(211)	(19)	(24)	(2)
Croydon 4	1333	55	0	0	0	0	0	0
Crystal Palace	1980	84	0	0	0	0	0	0
Ealing 2	8206	338	140	15	0	0	0	0
Ealing 5	6175	39	264	5	0	0	0	0
Enfield 2	(5283)	(172)	(2150)	(116)	(490)	(36)	(221)	(18)
Greenwich 5	3748	154	39	4	0	0	0	0
Hams & Fulham 1	2869	118	17	2	0	0	0	0
Haringey 1	8393	350	63	10	0	0	0	0
Haringey 3	(3950)	(153)	(516)	(31)	(145)	(12)	(25)	(4)
Havering 3	8427	347	75	10	0	0	0	0
Hillingdon 1	2279	96	11	2	0	0	0	0
Hounslow 3	6134	253	80	9	0	0	0	0
Hounslow 4	2263	93	50	5	0	0	0	0
Kens and Chelsea 2	8339	338	206	19	26	3	47	4
Kingston 2	8535	358	2	1	0	0	0	0
Redbridge 4	(788)	(32)	(12)	(2)	(12)	(2)	(0)	(0)
Sutton 1	8539	359	0	0	0	0	0	0
Wandsworth 4	8499	352	59	8	0	0	0	0

DETR bands are for PM10 as measured by TEOM instruments. Results using other instruments cannot be compared directly and are shown in parenthesis.

PM10	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	Hours	Days	Hours	Days	Hours	Days	Hours	Days
Background								
Brent	8387	352	20	3	0	0	0	0
Croydon 3	8171	343	0	0	0	0	0	0
Enfield 3	(7132)	(283)	(488)	(37)	(35)	(4)	(12)	(1)
Greenwich 4	8563	359	8	2	0	0	0	0
Heathrow	8088	336	49	7	0	0	0	0
Islington	2347	97	14	2	0	0	0	0
Kens & Chelsea 1	8591	355	41	8	0	0	0	0
Redbridge 1	(380)	(17)	(16)	(1)	(0)	(0)	(0)	(0)
Sevenoaks 2	7136	299	0	0	0	0	0	0
Tower Hamlets 1	8374	344	76	12	0	0	0	0
Tower Hamlets 3	1171	49	0	0	0	0	0	0
Thurrock	7913	333	61	5	0	0	0	0
Waltham Forest	7625	318	29	3	0	0	0	0
Suburban								
Bark & Dag 2	1574	67	0	0	0	0	0	0
Bexley 1	8214	341	86	10	0	0	0	0
Bexley 2	8072	335	79	8	0	0	0	0
Bexley 3	6467	276	27	3	0	0	0	0
Haringey 2	(3276)	(136)	(0)	(0)	(0)	(0)	(0)	(0)
Harrow	4677	198	13	1	0	0	0	0
Hounslow 2	6167	260	0	0	0	0	0	0
Havering 2	(5091)	(204)	(763)	(48)	(165)	(15)	(6)	(1)
Mole Valley 2	8641	363	0	0	0	0	0	0

DETR bands are for PM10 as measured by TEOM instruments. Results using other instruments cannot be compared directly and are shown in parenthesis.

PM10	Comparison of Annual Data to AQS Objective	
	35 Days Daily Mean >50μgm^{-3} (TEOM *1.3, BAM *1)	Annual Mean >40μgm^{-3} (TEOM *1.3, BAM *1)
Kerbside		
Barnet	No / 16	No / 29
Camden	No / 33	No / 34
Marylebone Road	Yes / 111	Yes / 46
Redbridge 3	NA / (0)	NA / (27)
Roadside		
Bexley 4	Yes / (77)	NA / (47)
Bromley 7	Yes / 59	No / 38
Croydon 4	NA / (0)	NA / (25)
Crystal Palace	NA / (0)	NA / (29)
Ealing 2	No / 25	No / 30
Ealing 5	No / 11	No / 27
Enfield 2	Yes / 209	Yes / 47
Greenwich 5	NA / (8)	NA / (26)
Hams & Fulham 1	No / 2	No / 22
Haringey 1	No / 17	No / 29
Haringey 3	NA / (34)	NA / (36)
Havering 3	No / 22	No / 27
Hillingdon 1	NA / (2)	NA / (23)
Hounslow 3	NA / (20)	NA / (34)
Hounslow 4	NA / (6)	NA / (30)
Kens and Chelsea 2	Yes / 51	No / 39
Kingston 2	No / 15	No / 29
Redbridge 4	NA / (2)	NA / (28)
Sutton 1	No / 4	No / 25
Wandsworth 4	No / 17	No / 26

PM10	Comparison of Quarter's Data to AQS Objective 35 Days Daily Mean >50μgm^{-3} (TEOM *1.3, BAM *1)	Annual Mean >40 μgm^{-3} (TEOM *1.3, BAM *1)
Background		
Brent	No / 0	No / 23
Croydon 3	No / 8	No / 25
Enfield 3	No / 22	No / 27
Greenwich 4	No / 5	No / 22
Heathrow	No / 27	No / 29
Islington	NA / (3)	NA / (25)
Kens and Chelsea 1	No / 16	No / 26
Redbridge 1	NA / (1)	NA / (20)
Sevenoaks 2	No / 2	No / 22
Tower Hamlets 1	No / 21	No / 27
Tower Hamlets 3	NA / (0)	NA / (17)
Thurrock	No / 15	No / 25
Waltham Forest	No / 12	No / 25
Suburban		
Bark & Dag 2	NA / (1)	NA / (21)
Bexley 1	No / 17	No / 25
Bexley 2	No / 17	No / 23
Bexley 3	No / 13	No / 23
Haringey 2	NA / (18)	NA / (29)
Harrow	NA / (3)	NA / (21)
Hounslow 2	NA / (4)	NA / (23)
Havering 2	Yes / 42	No / 38
Mole Valley 2	No / 1	No / 22

A.2.5 PM2.5

PM2.5	Instrument Type*	Data Capture %	Annual Mean (μgm^{-3})	Annual Max (μgm^{-3})
Roadside				
Bromley 7	**B**	85	30	995
Ealing 2	**T**	98	16	74
Background				
Hackney	**T**	94	17	77
Suburban				
Bexley 2	**T**	92	12	77
Bexley 3	**T**	95	13	75

*T= TEOM, B=BAM

A.2.6 Sulphur Dioxide

Where data capture for an analyser is less than 75% a statistical comparison is shown in parenthesis. Where comparison with the objective cannot be made these results are marked not applicable (N.A.)

Sulphur Dioxide	Data Capture %	Annual Mean (ppb)	Annual Max (h) (ppb)
Kerbside			
Marylebone Road	95	5	46
Roadside			
Croydon 4	8	(6)	(44)
Crystal Palace	25	(4)	(80)
Ealing 5	66	(3)	(46)
Haringey 1	62	(4)	(26)
Haringey 3	51	(3)	(49)
Havering 3	98	3	40
Hounslow 4	30	(3)	(32)
Redbridge 4	8	(4)	(31)
Southwark 2	87	4	51
Sutton 1	97	3	46

Sulphur Dioxide	Data Capture %	Annual Mean (ppb)	Annual Max (h) (ppb)
Background			
Brent	96	2	37
Castle Point	93	4	146
Ealing 1	98	3	25
Enfield 3	86	3	74
Greenwich 4	93	2	68
Kens & Chelsea 1	98	3	38
Lewisham	94	3	53
Sevenoaks 2	81	2	57
Southwark 1	94	3	56
Tower Hamlets 1	93	3	32
Tower Hamlets 3	17	(3)	(20)
Thurrock	96	3	76
Waltham Forest	89	3	37
Wandsworth 2	98	3	44
Suburban			
Bexley 1	98	3	168
Bexley 5	22	(2)	(71)
Hounslow 2	70	(2)	(46)
Wandsworth 3	98	1	47

Sulphur Dioxide	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	15 mins	Days	15 mins	Days	15 mins	Days	15 mins	Days
Kerbside								
Marylebone Road	32838	347	0	0	0	0	0	0
Roadside								
Croydon 4	2868	27	0	0	0	0	0	0
Crystal Palace	8832	92	0	0	0	0	0	0
Ealing 5	28506	243	0	0	0	0	0	0
Haringey 1	22126	235	0	0	0	0	0	0
Haringey 3	18487	197	0	0	0	0	0	0
Havering 3	33845	357	0	0	0	0	0	0
Hounslow 4	11053	116	0	0	0	0	0	0
Redbridge 4	3023	32	0	0	0	0	0	0
Southwark 2	33607	350	0	0	0	0	0	0
Sutton 1	33985	365	0	0	0	0	0	0

Sulphur Dioxide	Low Pollution		Moderate Pollution		High Pollution		Very High Pollution	
DETR Bands	15 mins	Days	15 mins	Days	15 mins	Days	15 mins	Days
Background								
Brent	33074	350	0	0	0	0	0	0
Castle Point	31866	338	4	3	1	1	0	0
Ealing 1	33581	361	0	0	0	0	0	0
Enfield 3	30555	325	0	0	0	0	0	0
Greenwich 4	33512	356	1	1	0	0	0	0
Kens & Chelsea 1	33946	363	0	0	0	0	0	0
Lewisham	33921	358	0	0	0	0	0	0
Sevenoaks 2	29183	306	0	0	0	0	0	0
Southwark 1	34125	359	0	0	0	0	0	0
Tower Hamlets 1	31862	341	1	1	0	0	0	0
Tower Hamlets 3	6048	63	0	0	0	0	0	0
Thurrock	33223	350	1	1	0	0	0	0
Waltham Forest	30799	321	0	0	0	0	0	0
Wandsworth 2	34384	365	0	0	0	0	0	0
Suburban								
Bexley 1	33670	354	8	4	2	1	0	0
Bexley 5	7897	83	1	1	0	0	0	0
Hounslow 2	24178	260	0	0	0	0	0	0
Wandsworth 3	34682	360	1	1	0	0	0	0

Sulphur Dioxide	Comparison of Annual Data to AQS Objective 100ppb (15min avg) exceeded more than 35 occasions
Kerbside	
Marylebone Road	No / 0
Roadside	
Croydon 4	NA / (0)
Crystal Palace	NA / (0)
Ealing 5	NA / (0)
Haringey 1	NA / (0)
Haringey 3	NA / (0)
Havering 3	No / 0
Hounslow 4	NA / (0)
Redbridge 4	NA / (0)
Southwark 2	No / 0
Sutton 1	No / 0

Sulphur Dioxide	Comparison of Quarter's Data to AQS Objective 100ppb (15min avg) exceeded more than 35 occasions
Background	
Brent	No / 0
Castle Point	No / 5
Ealing 1	No / 0
Enfield 3	No / 0
Greenwich 4	No / 1
Kens & Chelsea 1	No / 0
Lewisham	No / 0
Sevenoaks 2	No / 0
Southwark 1	No / 0
Tower Hamlets 1	No / 1
Tower Hamlets 3	NA / (0)
Thurrock	No / 1
Waltham Forest	No / 0
Wandsworth 2	No / 0
Suburban	
Bexley 1	No / 10
Bexley 5	NA / (1)
Hounslow 2	NA / (0)
Wandsworth 3	No / 1

Appendix 3

AIR QUALITY STRATEGY OBJECTIVES AND UK AIR QUALITY INFORMATION SYSTEM

APPENDIX 3: AIR QUALITY STRATEGY OBJECTIVES & UK AIR QUALITY INFORMATION SYSTEM

The following objectives are set out in the Air Quality Regulations 2000 for the purposes of Local Air Quality Management.

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg/m^3 (5 ppb)	Running Annual Mean	31 Dec 2003
1, 3 Butadiene	2.25 μg/m^3 (1 ppb)	Running Annual Mean	31 Dec 2003
Carbon Monoxide	11.6 μg/m^3 (10 ppb)	Running 8 hour mean	31 Dec 2003
Lead	0.5 μg/m^3	Annual Mean	31 Dec 2003
	0.25 μg/m^3	Annual Mean	31 Dec 2008
Nitrogen Dioxide (provisional)	200 μg/m^3 (105 ppb) not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
	40 μg/m^3 (21 ppb)	Annual Mean	31 Dec 2005
Particles (PM10)	50 μg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31 Dec 2004
	40 μg/m^3	Annual Mean	31 Dec 2004
Sulphur Dioxide	350 μg/m^3 (132 ppb) not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 μg/m^3 (47 ppb) not to be exceeded more than3 times a year	24 hour mean	31 Dec 2004
	266 μg/m^3 (100 ppb) not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

The following objectives are not included in the Air Quality Regulations 2000 for the purposes of Local Air Quality Management.

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Objectives for the protection of human health			
Ozone (provisional)	100 μg/m^3 (50 ppb) not to be exceeded more than 10 times per year	Daily maximum of running 8 hour mean	31 Dec 2005
Objectives for the protection of vegetation and ecosystems			
Nitrogen Oxides (assuming NOX is taken as NO2)	30 μg/m^3 (16 ppb)	Annual mean	31 Dec 2000
Sulphur Dioxide	20 μg/m^3 (8 ppb) 20 μg/m^3 (8 ppb)	Annual Mean Winter Mean (1 Oct- 31 Mar)	31 Dec 2000 31 Dec 2000

DETR, 2000; The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

DETR, 2000; Air Quality Regulations 2000.

The 'descriptors' applied to air pollution concentrations are defined by the UK Air Quality Information system.

Pollutant / Band	LOW	MODERATE	HIGH	VERY HIGH
Sulphur Dioxide	below 100ppb, averaged over 15 minutes	100ppb, averaged over 15 minutes	200ppb, averaged over 15 minutes	400ppb, averaged over 15 minutes
Ozone	below 50ppb, as an 8 hour running average	50ppb, as an 8 hour running average or 50ppb averaged over one hour	90 ppb, averaged over one hour	180 ppb, averaged over one hour
Carbon Monoxide	below 10 ppm, as an 8 hour running average	10 ppm, as an 8 hour running average	15 ppm, as an 8 hour running average	20 ppm, as an 8 hour running average
Nitrogen Dioxide	below 150 ppb, averaged over one hour	150 ppb, averaged over one hour	300 ppb, averaged over one hour	400 ppb, averaged over one hour
PM10 Particles (by TEOM)	below 50 ug/m^3, as a 24 hour running average	50 ug/m^3, as a 24 hour running average	75 ug/m^3, as a 24 hour running average	100 ug/m^3, as a 24 hour running average