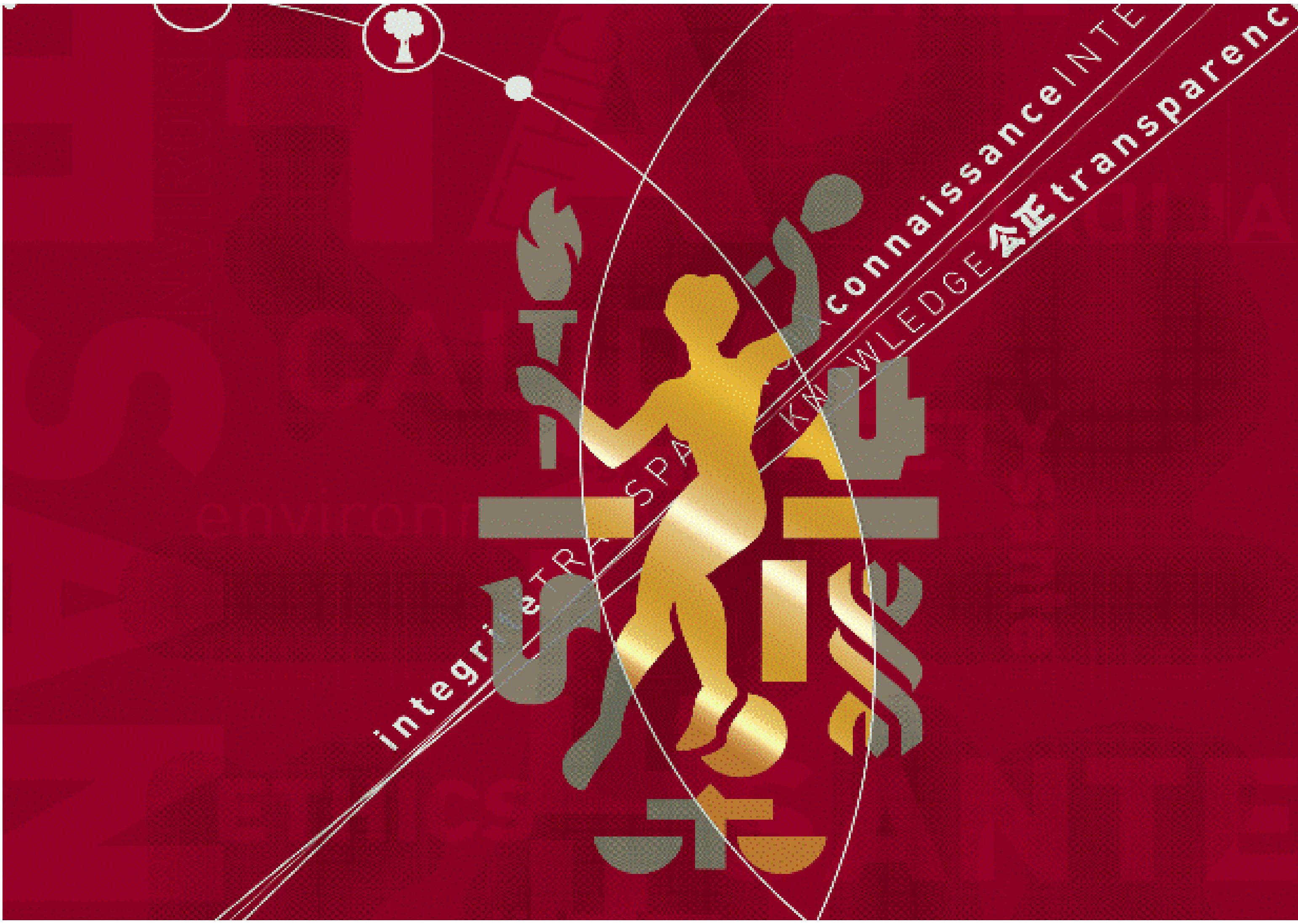

The London Wide Environment Programme

Benzene Diffusion Tube Survey Annual Report 2006

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Report

London Wide Benzene Diffusion Tube Survey Annual Report 2006

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London Borough of Bexley
London Borough of Brent
London Borough of Greenwich
London Borough of Hackney
London Borough of Hammersmith and Fulham
London Borough of Harrow
London Borough of Hillingdon
London Borough of Hounslow
Royal Borough of Kensington and Chelsea
City of London
London Borough of Newham
London Borough of Richmond
London Borough of Sutton

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Executive Summary

This report presents the results of the 2006 London Wide Benzene Monitoring Programme. The main objective of the programme is to determine the ambient concentration of benzene to which people are exposed in urban areas, since benzene is a genotoxic carcinogen and as such is strongly linked to the formation of cancer.

During the 2006 programme participating boroughs maintained ninety five sites across London. These sites included urban background locations, thus allowing the levels of benzene to which the general public are exposed for significant periods of time to be quantified. Monitoring sites also included roadside and petrol station locations, as motor vehicles are the major source of atmospheric benzene, with significant evaporative emissions resulting from the handling, distribution and storage of petrol. Toluene, ethyl benzene, m, p-xylene and o-xylene were also monitored at thirty-seven sites in six boroughs across London. Such measurements can be of use in determining possible emission sources. Benzene, toluene, ethyl benzene, m, p-xylene and o-xylene levels were determined using passive diffusion tubes. These provide long term measurements, which give a good indication of personal exposure.

As would be expected, maximum benzene concentrations were recorded at a petrol station location. Annual mean benzene concentrations ranged from 1.5µg m^{-3} to 3.8µg m^{-3} at roadside locations, 1.1µg m^{-3} to 2.9µg m^{-3} at background locations and 1.9µg m^{-3} 2.5µg m^{-3} at petrol stations. The annual mean benzene concentrations for the three different location types were 2.3µg m^{-3}, 1.7µg m^{-3} and 2.2µg m^{-3} at roadside, background and petrol station locations respectively.

These results are consistent with road traffic and petrol being significant sources of atmospheric benzene. This is shown in the results where a reduction in benzene has occurred with increasing distance from the road. Ambient benzene levels are influenced by several factors; for example traffic flow, meteorological conditions and height of the sampler. This partially explains why there appeared to be little influence of road traffic benzene levels in some boroughs.

Benzene levels recorded in this study were compared against the Air Quality Objective and the Air Quality Standard *(AQS)* for benzene set by the Expert Panel on Air Quality Standards. The objective and the AQS are set at 16.25µg m^{-3} as a running annual mean and is the level 'at which the risks are exceedingly small and unlikely to be detectable'. Although comparisons with such criteria give a good indication of likely exceedences, direct comparisons cannot be made, due to

the different averaging periods used. However, as a guide the annual mean can be converted into a running mean by using a multiplication factor of 1.1[1].

In 2006 annual mean concentrations at all sites were below the Standard and Objective of 16.25μg m^{-3} and the future long term objective of 5μg m^{-3} to be met by the end of 2010. This supports the assertion made by the Expert Panel on Air Quality Standards that annual average benzene concentrations rarely exceed the AQS. Current policies already in place have helped considerably to reduce benzene concentrations and keep levels below the long-term AQS target concentration of 5μg m^{-3}.

[1] Department of the Environment (2000), LAQM.TEG 4 (00) Pollutant Specific Guidance

1 Introduction

This report presents the results of the 2006 London Wide Benzene Monitoring Programme. The report describes results collected from January 2006 to December 2006 and covers the fourteenth year during which the programme has been in operation. The Benzene Monitoring Programme forms part of the London Wide Environmental Programme *(LWEP)*, an integrated programme dealing with environmental issues for London Boroughs.

The following London Boroughs sponsored the 2006 Benzene Monitoring Programme:

London Borough of Bexley
London Borough of Brent
London Borough of Greenwich
London Borough of Hackney
London Borough of Hammersmith and Fulham
London Borough of Harrow
London Borough of Hillingdon
London Borough of Hounslow
Royal Borough of Kensington and Chelsea
City of London
London Borough of Newham
London Borough of Richmond
London Borough of Sutton

The main objective of the Benzene Monitoring Programme is to determine the ambient concentrations of benzene to which people are exposed in urban areas. The programme was initiated in response to continuing concern that people living within urban areas are often exposed to elevated concentrations of benzene, which may be harmful to human health. Monitoring conducted as part of the Programme also allows compliance with relevant guidelines to be assessed.

During the 2006 programme, a total of ninety five sites across London were maintained by participating boroughs. Benzene levels were surveyed using the passive diffusion sampler technique incorporating procedures developed by Bureau Veritas specifically for monitoring ambient levels. Diffusion samplers were despatched to participating boroughs at regular intervals, exposed by local council staff and returned to Bureau Veritas following a standard exposure period.

Toluene, ethyl benzene, m, p-xylene and o-xylene were also monitored at a total of thirty-seven sites within six boroughs across London. This additional analysis was carried out on the same diffusion samplers used for benzene monitoring. There are currently no ambient air quality guidelines or standards regarding these volatile organic compounds, however monitoring can be useful in determining possible emission sources in order to aid the understanding of the pollutant occurrence. The ratio between benzene and toluene varies depending on the emission source and so can be used to assess whether road traffic or industrial sources are the main contributors to VOC levels at certain locations. A benzene/toluene ratio of approximately 1:2-1:4 indicates that road traffic is likely to be the major source of VOC's measured at a particular location. Benzene/toluene ratios for this study can be found in Appendix H, Table 4.

As road traffic and petrol stations are major sources of atmospheric benzene, at least one site in each borough was located near one of these emission sources. However, as the overall objective of the study was to determine long term concentrations to which the general public are exposed for significant periods of time, samplers were also located at background sites away from the direct sources, such as residential areas. Sites were located at varying distances from busy roads, which enabled the importance of road traffic as a source to be assessed.

2 Sources of Benzene

Benzene in the environment is from both human activities and natural processes. Benzene was first discovered and isolated from coal tar in the 19th century. Today, benzene is made mostly from petroleum sources. It is an aromatic hydrocarbon occurring as a colourless, clear liquid. Benzene is one of a group of substances known as volatile organic compounds; this group of compounds also includes toluene, ethyl benzene and xylenes.

There are no well-defined natural sources of benzene although it is known to occur naturally as a constituent of natural gases. Other industrial processes including the pyrolysis of petrol also synthetically produce benzene. In Western Europe at the beginning of the 21st century, production of benzene was estimated to be 7.5 million tonnes[2], accounting for 20% of global production with the UK, Federal Republic of Germany and Netherlands being the major producers.

Benzene is an intermediate in the production of many important chemicals used in the manufacture of plastics, drugs, dyes, detergents and insecticides[2]. Industrial process contributions of benzene in ambient air are to be expected in the vicinity of petrochemical manufacturing plants and locally this can be a more significant source than traffic related emissions. In the UK ambient benzene concentrations are monitored close to industrial sources at Redcar and Stockton on Tees, whilst the industrial contribution is greater than in London at these locations, monitored benzene continues to be below national air quality objectives. The Environment Agency expects further reduction in benzene emissions form the chemical industry in the Tees valley between now and 2010[3].

Benzene is also added to petrol as an anti-knock agent. Since 1 July 1989 the content of benzene in petrol in the UK had been limited to 5% by volume in leaded or unleaded petrol by the EC Directive COM (84) 226. In practice this amount varied since refineries often used a variety of other compounds to obtain the same effect depending upon the availability and cost. Since January 2000, EU legislation implemented through the Auto-Oil Programme requires that the amount of benzene in petrol be below 1% in volume and is presently about 0.6% in volume on average for fuel sold in the UK[4]

Benzene in ambient air arises mainly from anthropogenic sources, in particular through the combustion of petrol and oil, although natural benzene emissions occur from plant and animal matter and seepage from petroleum reservoirs.

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2 http://www.greener-industry.org/pages/benzene/1BenzeneAPQ.htm#top

3 http://www.stockton.gov.uk/resources/environment/airquality/raairquality2006/raairquality06.pdf

4 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A consultation document on proposals for Air Quality Objectives for particles, benzene, carbon monoxide and polycyclic aromatic hydrocarbons *(September 2001)*

Table 1 shows the benzene emission inventory for the UK, which illustrates motor vehicles being the major source of benzene emissions. On a national basis, this accounted for about 71% of the total emissions in 1999. These sources are also significant contributors to ambient concentrations of other VOC's such as toluene, ethyl benzene and xylenes.

An additional significant source of ambient benzene is petrol evaporation from vehicles and evaporative emissions from the handling, distribution and storage of petrol. A study undertaken in Leeds identified motor vehicles, as the single largest source of VOC's responsible for almost half of all releases. A high proportion of VOC emissions were also attributed to solvent use, particularly in the city centre where there was a large number of industrial point sources[5].

[5] Clarke, A. and Ko, Y-H (1996). The Relative Significance of Vehicular Emissions of Volatile Organic Compounds in the Urban Area of Leeds. The Science of the Total Environment, October 1996 189/190, 401.

Table 1: UK Annual Benzene Emissions, 1990-1999 (Ktonnes)[6]

Source	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	%in 1999
Industrial Combustion	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	3%
Industrial Processes	3.7	3.8	3.9	3.9	4	4	3.4	2.9	2	1.8	6%
Domestic	3.5	3.6	3.4	3.4	3.1	2.8	3	2.8	2.9	3	10%
Road Transport Combustion	42.4	41.5	39.8	36.8	34.1	31.3	29	26.1	23.4	21	71%
Other	4	4.1	4.2	4.2	4.3	4	3.9	3.8	3.5	3.1	10%

While the previously mentioned sources of benzene contribute significantly to ambient benzene levels, it is important to realise that there are other benzene sources that can contribute significantly to an individual's total intake of the chemical. Cigarette smoke contains benzene, and may be the main source of exposure for a heavy smoker; passive smoking may also contribute to benzene intake. It is also present at low concentrations in food and drinking water, and diet may be the main source of benzene for non-smokers living in unpolluted rural areas.

[6] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A Consultation Document on Proposals for Air Quality Objectives for Particles, Benzene, Carbon Monoxide and Polycyclic Aromatic Hydrocarbons (September 2001).

3 Human Exposure to Benzene

Since benzene is a primary pollutant, concentrations are generally higher close to the emission source. However, the sources of personal exposure to benzene may be very different from those contributing to outside air due to time activity and behavioural patterns. Smoking, in particular, is linked to benzene exposure, as tobacco smoke contains significant benzene concentrations.

Personal exposure to benzene in the home may also result from evaporative emissions from consumer products, such as paints, adhesives and marker pens, while in homes with attached garages, evaporative emissions from petrol tanks of cars could be significant. However, the importance of these sources for personal exposure in the UK is unknown and yet to be established.

Benzene in motor vehicles is likely to be a significant source of exposure. These exposures can result from exhaust and evaporative emissions arising from the vehicle itself or from the higher concentrations of this primary pollutant in the road. The actual concentrations may be influenced by the age and model of the vehicle, by traffic and weather conditions, and by whether the vehicle is being driven with the window open or with the fans or heaters on. Again, there is very little data on the actual UK exposures in vehicles, but the data from elsewhere suggest these exposures could be 2-10 times those at urban monitoring sites. Finally, exposure while refilling vehicles with petrol may be high, although the time spent by most individuals at such locations is generally small.

These complex sources of benzene mean that the contributions from different sources to total outdoor emissions give a poor indication of the importance of different sources to personal exposure. For example, in the US it has been estimated direct outdoor exposure only contributes 15% of the total population exposure, where as 60% is due to direct and indirect exposure to tobacco smoke.

Since the health concerns of ambient benzene exposure are not respiratory effects, and the pollutant tends to accumulate in fatty tissue within the body, exposure in food and drink may be important, as well as that in air. However, most calculations suggest that the exposure through food and drink is likely to be small relative to that through the lungs, on a population basis. Deposition to local gardens and allotments could additionally contribute to the total benzene dose of some individuals in urban areas, although little is known about actual rates of benzene deposition to, and accumulation in, vegetation.

Benzene exposure is especially high in certain groups of industrial workers, in the chemical and petrochemical sectors, and among certain groups with a high exposure to adhesives. These exposures are much greater than those due to ambient benzene and it is studies of these occupational groups, which have provided the clearest evidence of adverse health effects of this pollutant.

4 Health Effects of Benzene

At extremely high concentrations, relatively short-term exposure to benzene can cause anaesthesia or fatal damage to the bone marrow. However, such concentrations can only build up as a result of accidental release into poorly ventilated indoor environments, and are several orders of magnitude higher than ambient concentration *(10 to 100mg m^{-3})*. Consequently, these toxicological effects are of little relevance when considering the health effects of ambient concentrations.

The concern relating to normal ambient exposure is linked to the fact that benzene is a proven genotoxic carcinogen and as such no absolutely safe level can be specified for ambient levels. Benzene has the effect of modifying the genetic makeup of living cells, which has been deduced from laboratory studies with animals. There is also evidence from several studies of occupational groups that long term exposure to high concentrations of benzene is associated with a small increase in the probability of developing certain types of leukaemia.

Since leukaemia is a relatively rare disease, and since lifetime exposures as a result of ambient exposure are relatively low, it is effectively impossible to carry out epidemiological studies of the association between benzene exposure and the risk of contracting leukaemia in the general population. Thus, any assessment of the health risks associated with ambient benzene exposure is usually based on extrapolation from the occupational studies.

These occupational investigations are primarily cohort studies, in which defined groups of workers are followed forward over many years, and the number of deaths due to leukaemia recorded. In most of these studies, the number of subjects was no more than 3000, and since the chances of contracting leukaemia overall are only 1 in 6000, the results are generally based on a very small number of deaths. This fact, together with the relatively crude estimates of benzene exposure, which were made in some cases, makes it very difficult to establish exposure-response relationships for benzene.

The data from these studies provide good evidence of an effect after exposure at 32,440 μg m^{-3} over 20 years, and some evidence of an effect at exposures between 3,244 μg m^{-3} and 32,440μg m^{-3}. However, any assessment of the risk of adverse health effects from long-term exposures to ambient benzene, which are likely to range from 3.24μg m^{-3} to 32.44μg m^{-3} in non-smokers, must rely on extrapolation downward over several orders of magnitude assuming a particular shape to the exposure-response relationship. Assuming a linear exposure-response relationship, it would be possible to calculate the benzene exposure corresponding to any particular level of risk, but there is no means of verifying the actual shape of the exposure-response relationship.

Some research[7] has suggested that the health risk from exposure to low levels of benzene, such as ambient levels, may be greater than that predicted by extrapolation of occupational research. Muconic acid, a harmful metabolite of benzene, is produced in much higher quantities at lower concentrations than high concentrations. A 2% increase in muconic acid levels was typical at high ppm exposures whereas at exposures 2 to 3 orders of magnitude 25% was produced. This is consistent with enzymes involved in the metabolic pathway processing much more efficiently at low concentrations. This effect was measured in humans exposed to tobacco smoke but is likely to be relevant to other petrochemical exposures.

Clearly, the understanding of the health effects of benzene is increasing all the time through studies of the type quoted here. However, until further evidence is gathered, it shall be assumed that there is no acceptable level of benzene that should be set against which health risks become acceptable.

[7] Weisel, C.P., Yu, R (1996). Measurement of the Urinary Benzene Metabolite Trans, Trans-Muconic Acid from Benzene Exposure in Humans. J Toxicol & Env Health. 48 (5) 453.

5 The Air Quality Strategy

In March 1997, the Government published *The United Kingdom Air Quality Strategy).* This fulfilled the requirement for a National Air Quality Strategy under the Environment Act 1995, by setting out policies for the management of air quality. The aim of this strategy was to map out, as far as possible, the future of ambient air quality policy in the United Kingdom for at least the next ten years. A particular purpose was to ensure that all those who contribute to air pollution, or are affected by it, or have a part to play in its abatement, can identify both what is statutorily required from them and what further contribution they could voluntarily make in as efficient manner as possible[8]

Two revisions of the Air Quality Strategy have been published since the original Air Quality Strategy, the first being in January 2000 and the second in July 2007. These two revisions have addressed a number of the remaining air quality issues and updated standards, and outdated sections of the report. Standards are set in the Strategy, which are concentrations below which effects are unlikely, even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely on the effects of a particular pollutant.

The Government has established air quality objectives for pollutants, which are based on recommendations of the Expert Panel on Air Quality Standards *(EPAQS*). These set out the extent to which the standards are to be achieved for this year and future years. They take account of the costs, benefits, feasibility and practicality of achieving the standards.

Euro Standards for cars, LDVs and HDVs have applied limiting emissions for all newly manufactured vehicles sold in the European Union since the 1990s. Each subsequent Euro Standard has set more and more stringent emission limits. The Euro 1 Standard was phased in from 1992, Euro 2 from 1996 and Euro 3 from 2000. The Euro 4 Standard was then applied in 2006 and will have started to contribute further to the reduction of benzene emissions from road transport. Euro Standards ‘5 and 6’ are also planned for 2010 onwards and will go further in setting tighter emissions limits.[9].

[8] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (July 2007).
[9] http://europa.eu/scadplus/leg/en/lvb/l28186.htm

6 Air Quality Standards and Objectives for Benzene

As a requirement of the Environment Act 1995, the UK Government and devolved administrations for Scotland and Wales produce a national air quality strategy containing standards, objectives and measures. Since the adoption of first air quality strategy in 1997 a general improvement in air quality has been observed.

The first strategy was replaced in January 2000 with the Air Quality Strategy for England, Scotland, Wales and Northern Ireland. This replaced the framework for achieving further improvements in ambient air quality in the UK and beyond and identified actions at a local, national and international level. The objectives set were then tightened further in the February 2003 Addendum.

In 2007 the new Air Quality Strategy for England, Scotland, Wales and Northern Ireland was adopted which reviewed potential policy measures to improve air quality further and retain air quality objectives and set an agenda for long term improvements. The benzene objectives implemented are as follows: 16.25μg m^{-3} as a running annual mean to be achieved across the UK by 31 December 2003; 5μg m^{-3} as an annual average to be achieved by 31 December 2010 in England and Wales, and 3.25μg m^{-3} as a running annual mean to be achieved by 2010 in Scotland.

6.1 European Air Quality Standards and Objectives

In addition to the UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland the European Parliament adopted the second Air Quality Daughter Directive was published in November 2000 which sets limit values for benzene and carbon monoxide *(Council Directive 2000/69/EC)*. This European Directive sets a limit value for benzene in ambient air of 5μg m^{-3} as an annual mean to be achieved by Member States by 1st January 2010[10]

[10] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum (February 2003)

7 Methodology

7.1 Monitoring Sites

Descriptions of all ninety five monitoring sites are given in Appendix A on an individual borough basis. As motor vehicle emissions are a major source of benzene, sites have been categorised according to distance from the nearest busy road. Over time site classifications tend to change within air quality surveys due to assessment of new data and opinion. Theoretically, this could mean the relocation of a site to meet new criteria, which could mean the loss of a valuable data source. Individual borough data thus includes sites that have been moved, ceased to exist, or new sites established.

For the purpose of this survey, sites are defined using roadside, petrol station and background locations only. The term kerbside location is no longer used but instead classified as roadside if within 20m from the kerb edge. A background site is one which is beyond 20m of any road, usually situated in a residential area. A petrol station site can be located within roadside or background locations. Monitoring was conducted at 58 roadside sites, 33 background sites and 3 petrol stations as shown in Figure A.

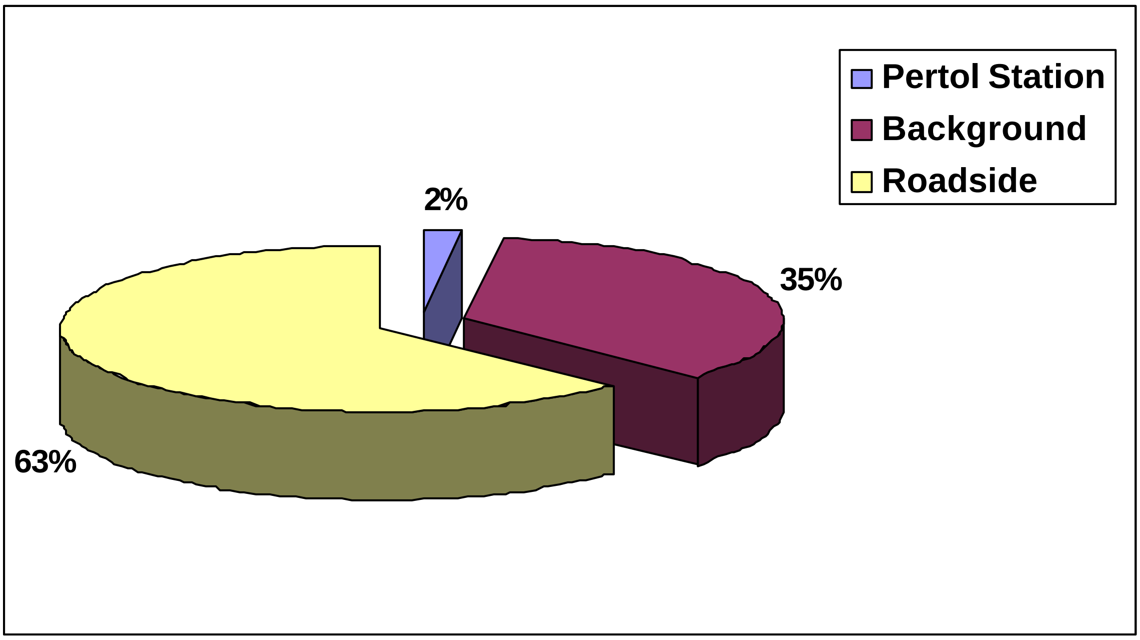


Figure A. Percentage of classified sites, which participated in the survey

7.2 Measurement Technique

In 2005/2006, five European Standard methods for the measurement of benzene in air were approved by the European Committee for Standardization (CEN), all of which are in accordance with the generic methodology selected as the basis of the reference method (EN14662) for the purpose of assessing compliance with limit values with one year reference period.

The measurement method used in this survey was consistent with the sampling, analysis and QA/QC requirements of ***EN 14662-4: 2005 Ambient air quality – Standard method for measurement of benzene concentrations – Part 4 : Diffusive sampling followed by thermal desorption and gas chromatography***.

Benzene, toluene, ethyl benzene, m, p and o-xylene *(BTEX)* measurements were made using Perkin-Elmer type diffusive samplers[11]. These are 9cm long stainless steel tubes packed with Chromosorb 106 polymer, an adsorbent material with an excellent affinity for benzene, and sealed at both ends with protective caps. One end is sealed with a brass fitting containing a teflon ferrule, the other end with a white teflon cap. On exposure, the white teflon cap is removed and replaced with a diffusive cap, which allows air to diffuse at a constant rate into the tube.

The samplers operate on the principle of molecular diffusion, whereby during exposure benzene in air will migrate to the adsorbent at a rate dependent on several quantifiable variables defined by Fick's Law of Diffusion:

(a) The path length between the top surface of the monitor and the absorbent bed.

(b) The cross sectional area of the sampler

(c) The exposure time

(d) The diffusive coefficient of benzene through air

(e) The ambient concentration of benzene

Bureau Veritas prepared all tubes in accordance with in-house technical procedure note: TP44 AIR(C). The tubes were despatched by special post to each borough and exposed for periods of approximately 2-weeks, following which the diffuser head was replaced with the original protective cap. Upon receipt the tubes were stored in a refrigerator prior to analysis.

[11] Health and Safety Laboratory Environment Measurement Group. Diffusive sampling of VOC's as an aid to monitoring urban air quality.

Although tubes are exposed for 2-week periods, previous work has shown that the uptake for benzene on to Chromosorb 106 differs by less than 1% for exposure periods of one, two and 4 weeks[20]. For most adsorbents their uptake rates decline rapidly over the first 16-24 hours of sampling, after which rates tend to stabilise.

7.3 Sample Analysis

All tubes were analysed by a UKAS accredited laboratory using desorption scanning gas chromatography/mass spectrometry *(GC/MS)*. This method of analysis gives unequivocal identification of BTEX peaks.

7.3.1 QC Checks

Quantitation was performed and determined by the internal standard technique with formal native compound calibration. A QC standard solution was spiked on to a blank tube together with the internal standard. The validity of the internal calibration was then verified by the analysis of the sample. A blank tube was also spiked with internal standard and analysed. A variation of +/- 20% was considered acceptable for the analysis of samples to continue.

7.3.2 Detection Limits

These were also assessed from the low standards sample i.e. 1ng on the tube and this was determined to be better than 1ng for the benzene based on the minimum detectable peak on the mass chromatogram.

7.3.3 Cleaning of Tubes

After analysis all tubes were heated to 230°C for 60 minutes with a desorption flow of 100ml/min. 10% of tubes were then spiked with internal standard and analysed. These tubes were then re-cleaned.

The mass of BTEX collected in the tube was then expressed as an average airborne concentration *($mg\ m^{-3}$)* measured over the monitoring period. This calculation is shown in Appendix B. The diffusion coefficient for benzene has been empirically calculated at Bureau Veritas as described in Section 7.4.

As identified above quality control procedures integral to the analytical procedure involve verification of the benzene peak and calibration against internal spiking solutions. All cleaned tubes were analysed prior to exposure to ensure the Chromosorb retains no benzene. Duplicate and Triplicate tubes were also exposed at a selection of boroughs each month thus allowing the coefficient of variation between tubes to be assessed.

7.4 Empirical Determination of the Benzene Diffusion Coefficient

Benzene tubes were exposed to a known benzene concentration in air generated using a permeation vial held at 50°C in a glass oven, in turn held in a thermostatic water bath. A purge flow of pure air from an Aadco Model 737 Pure Air Generator was passed through a glass ball filled heat exchanger at a rate of 1-litre/minute to flush the benzene from the oven.

The generated benzene/air mix was further diluted with pure air at a rate of 5-l/m and fed to a 30-cm diameter spherical glass reaction vessel. Diffusion tubes were mounted on a carousel turning at approximately 1.2-revs per minute.

Tubes were exposed over a period of two weeks and benzene uptake was determined by thermal desorption followed by flame ionisation detection *(FID)* using internal standards. The diffusion coefficient was calculated according to the equation shown in Appendix B. A Photovac, photo ionisation detector with gas chromatography *(PID GC)* was used to determine any losses of benzene in the diffusion coefficient test rig.

8 Results of the 2006 Benzene Monitoring Programme

Benzene, toluene, ethyl benzene, m, p and o-xylene data collected between January 2006 and December 2006 are given on an individual bases in Appendices C, D, E, F and G respectively.

Annual mean benzene concentrations have been calculated for each monitoring site in order to allow comparison with the published Air Quality Standard *(AQS)* and Objective. Making such comparisons gives a good indication of likely exceedences of such criteria. Due to the different averaging periods, direct comparisons cannot be made however, as a guide, the annual mean can be converted to a running mean by using a multiplication factor of 1.1 *(LAQM.TE4 (00).* For the purposes of Local Air Quality Management *(LAQM)* results have been expressed in micrograms per cubic meter.

The following section provides results for individual boroughs, given in alphabetical order. In order to maintain validity of results, annual means have not been reported for site locations with data capture of less than 75% or where blocks of seasonal data are missing. Equipment breakdown issues resulted in data loss during the month of August for sites situated in LB Sutton, City of London, LB Hounslow and L B Richmond. Royal Borough of Kensington and Chelsea relocated a site in April situated in the vicinity of a petrol station resulting in poor data capture for this site.

8.1 London Borough of Bexley

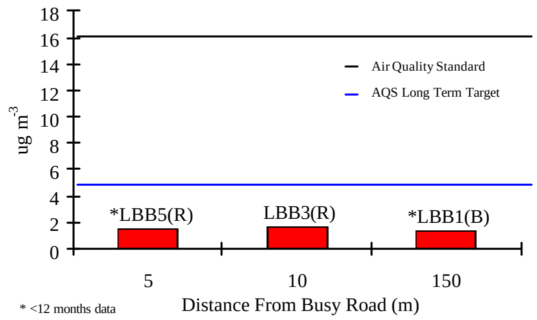


Figure 1A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Annual mean concentrations recorded at Bexley ranged from 1.3 to 1.6µg m^{-3}, (compared to 1.4 to 1.8µg m^{-3} in 2005) with the lowest annual mean recorded at site LBB1 a background location at Watling Street, Bexleyheath and the highest at site LBB3, also a roadside site at Crayford Library, Neither the current AQS nor the long-term AQS targets was exceeded or approached at any of the three sites.

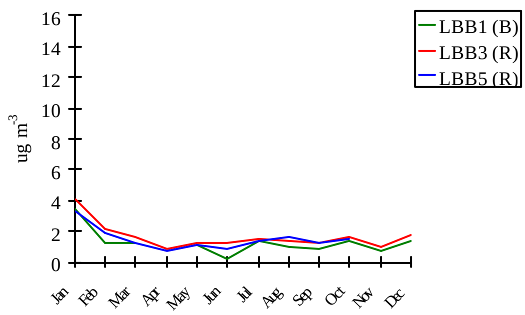


Figure 1B. Temporal Variation - 2006

Temporal Variation

During 2006, some seasonal variation was observed at all the Bexley sites, with a small increase in concentrations observed throughout winter months. A maximum peak level of 4.1µg m^{-3} was recorded for January at roadside site LBB3 while a minimum of 0.2µg m^{-3} was recorded at roadside site LBB1 in June.

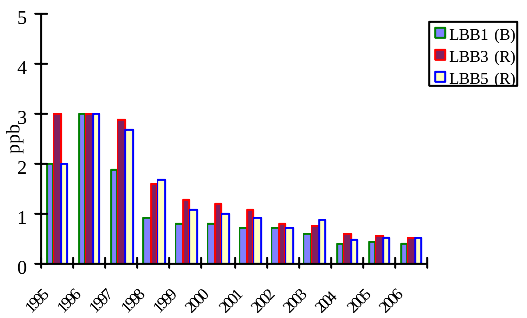


Figure 1C. Trends in Annual Average Benzene Concentrations

Annual Trends

The initial sharp decrease in concentrations from 1996-1999 has been followed by a less significant decline in subsequent years. Annual mean benzene concentrations have remained consistently below the AQS since 1995 with levels showing a continued decrease since 1996 and levelling out by 2006.

8.2 London Borough of Brent

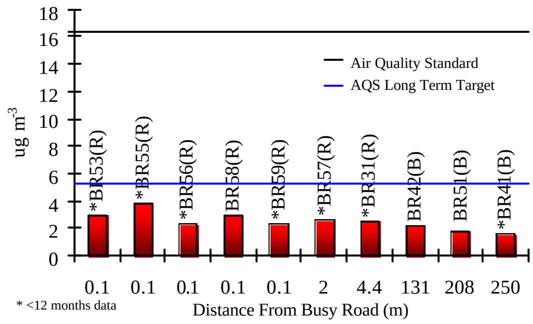


Figure 2A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Annual mean benzene concentrations ranged from 1.6µg m^{-3} at background site BR41 located at Alperton Community School, Stanley Avenue, Wembley to 3.8µg m^{-3} recorded at roadside site BR55, located at 79 High Street, Harlesdon. The current AQS and AQS long term targets were not exceeded or approached at any site.

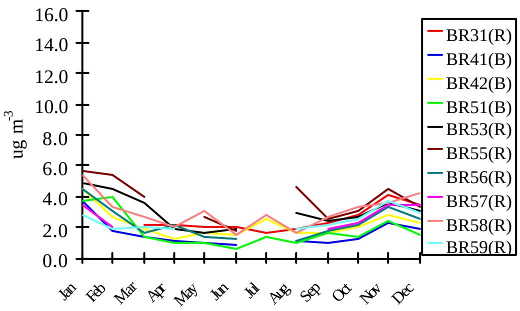


Figure 2B.Temporal Variation – 2006

Temporal Variation

Temporal trends for 2006 are illustrated in Figure 2B. Concentrations throughout the year displayed some seasonal variation with a nominal rise in concentrations during winter months. A maximum concentration of 5.7µg m^{-3} was recorded during January at roadside site BR55.

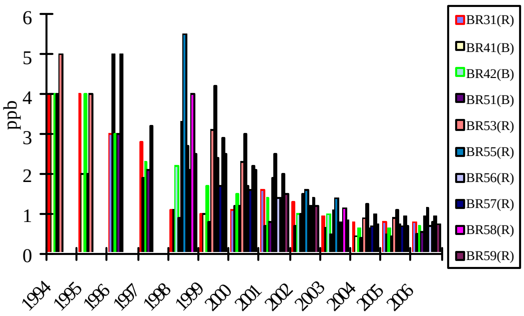


Figure 2C. Trends in Annual Average benzene Concentrations

Annual Trends

Although a substantial drop in levels was observed from 1998-2003, this has been followed by a period of relative stability with little or no change between 2004-2006. As with 2004 and 2005 the highest annual average recorded for 2006 was at site BR55.

8.3 London Borough of Greenwich

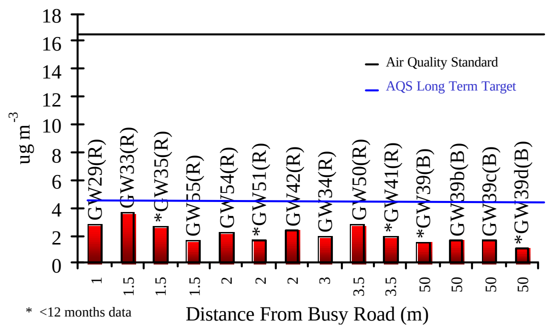


Figure 3A. Annual Mean Benzene Concentrations – 2006

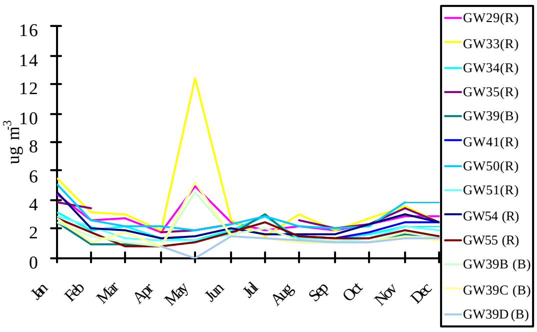


Figure 3B. Temporal Variation 2006

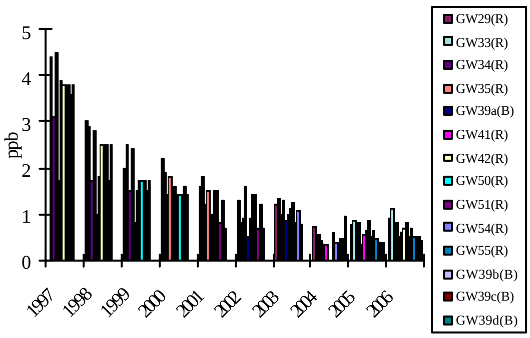


Figure 3C. Trends in Annual Average Benzene Concentrations

Annual Mean Concentration

The annual mean concentrations recorded at Greenwich, ranged from 1.1µg m^{-3} recorded at the background site GW39d, to 3.6µg m^{-3} recorded at the roadside sites GW33, Blackheath Hill. Although the relationship between mean concentration and distance from a busy road was not consistent, all four background sites typically show lower concentrations than the roadside sites. Neither the current AQS nor the long-term AQS targets were exceeded or approached by any site.

Temporal Variation

Similar temporal trends were observed at all fourteen sites, with the exception of an episodic high during May recorded at three sites, GW29, GW33 & GW39. A maximum peak concentration of 12.4µg m^{-3} was recorded for site GW33. The majority of sites show slightly higher than average benzene during December and January where a maximum peak concentration of 5.5µg m^{-3} was recorded at roadside site GW33 during January.

Annual Trends

Figure 3C shows that levels significantly declined at all sites from 1997 to 2001 and this decline has, to a lesser extent, continued from 2002 through to 2005 with a slight increase in 2006.

8.4 London Borough of Hackney

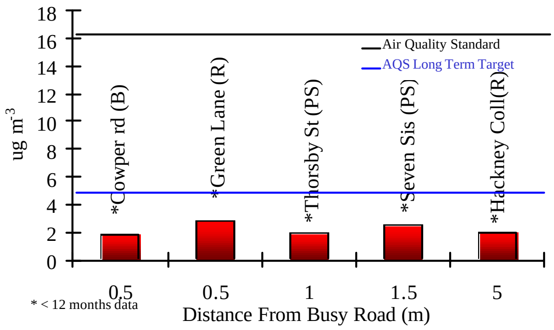


Figure 5A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Annual mean concentrations ranged from 1.8µg m^{-3} at the background site located at Cowper Road to 2.8µg m^{-3} at the petrol station site on Green Lane. Neither the current AQS nor long-term AQS targets were exceeded or approached.

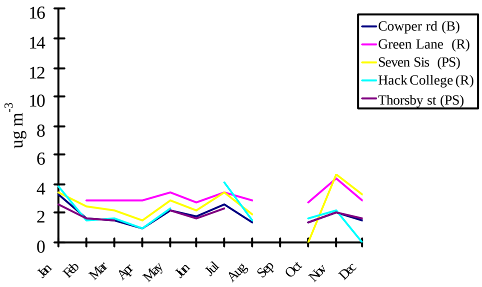


Figure 5B. Temporal Variation – 2006

Temporal Variation

Figure 5B shows that a similar temporal trend was observed at all sites throughout the year, with concentration peaks seen during November. A maximum peak concentration of 4.6µg m^{-3} was observed during November at the Seven Sis Petrol station location.

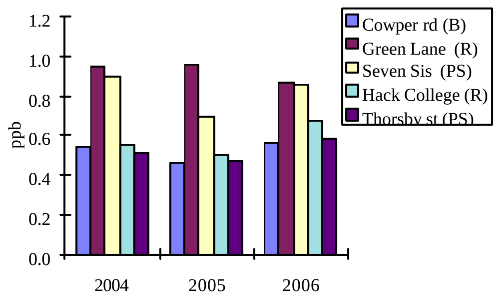


Figure 5C. Trends in Annual Average Benzene Concentrations

Annual Trends

Figure 5C shows that from 2004-06 concentrations at all sites showed little change.

8.5 London Borough of Hammersmith and Fulham

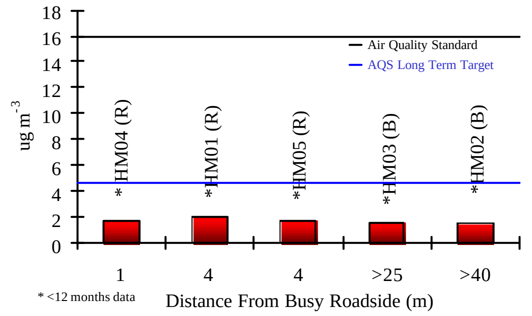


Figure 4A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Annual mean concentrations ranged from 1.5µg m^{-3} to 2.1µg m^{-3}. The highest annual mean concentration of 2.1µg m^{-3} was recorded at roadside site HM01. The lowest mean level of 1.5µg m^{-3} was recorded at background site HM02. Neither the current AQS nor the long-term AQS targets were exceeded or approached at any site.

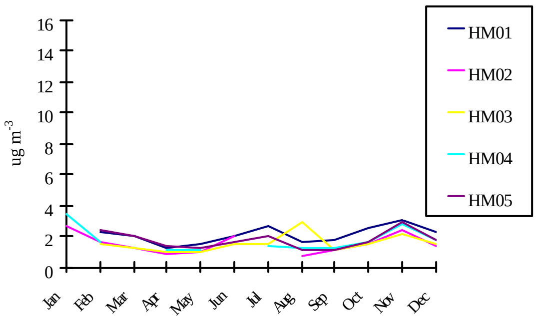


Figure 4B. Temporal Variation – 2006

Temporal Variation

The temporal variation illustrated in Figure 4B, shows that concentrations remained very stable throughout 2006 with only minimal seasonal variation. A small increase in levels was however, observed during mid winter months with a peak of 3.4µg m^{-3} measured at roadside site, HM04 during January.

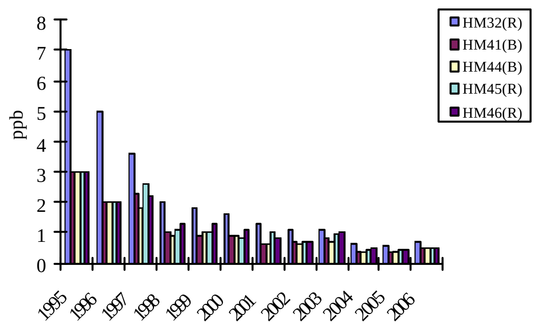


Figure 4C. Trends in Annual Average Benzene Concentrations

Annual Trends

Following a decline in levels since 1995, Figure 4C shows concentrations stabilising in recent years with little change.

8.6 London Borough of Harrow

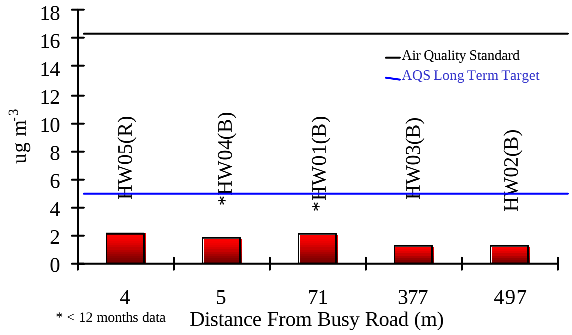


Figure 6A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Annual mean concentrations varied from 2.2 µg m^{-3} at site HW05 to 1.2µg m^{-3} at site HW02 and HW03. The highest concentration of 2.2µg m^{-3} was recorded at the only roadside site on Station Road, Harrow. The lowest mean of 1.2µg m^{-3} was recorded at background locations at Grimsdyke School, Hatch End and Aylward School, Stanmore. A clear relationship between concentration and the distance from a busy road can be seen. The current AQS and long-term AQS targets were not exceeded at any site.

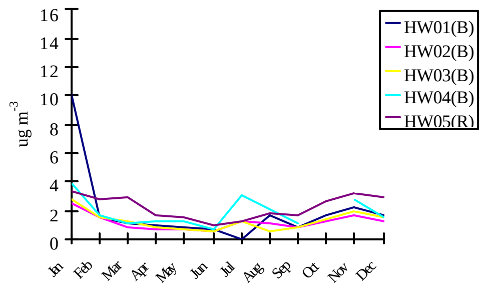


Figure 6B. Temporal Variation – 2006

Temporal Variation

Temporal trends shown in Figure 6B showed that concentrations were stable throughout the year with little seasonal variation with the exception of site HW01 in January. At this site the highest concentration of 10.1µg m^{-3} was recorded for January.

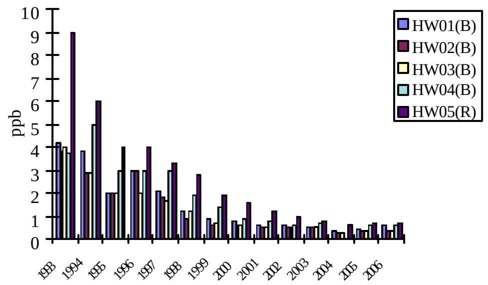


Figure 6C. Trends in Annual Average Benzene Concentrations

Annual Trends

After the substantial drop in concentrations from 1993-98, a more gradual decline in annual mean concentrations was observed at all sites. Concentrations in more recent years continue to show little variation.

8.7 London Borough of Hillingdon

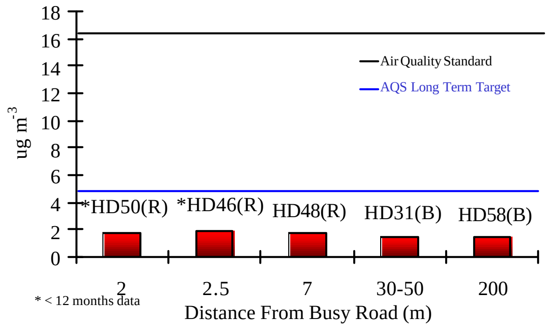


Figure 7A. Annual Mean Benzene concentrations – 2006

Annual Mean Concentration

Annual mean concentrations varied between 1.5µg m^{-3} at site HD31 and HD58 to 1.9µg m^{-3} at site HD46. The lowest means were recorded at a background "suburban" site located at Sipson Road, West Drayton and a background site at Brendon Close, Harlington. The highest mean was recorded at a roadside site at south Ruislip monitoring station, West End Road. The current AQS and the long-term AQS targets were not exceeded or approached by any site.

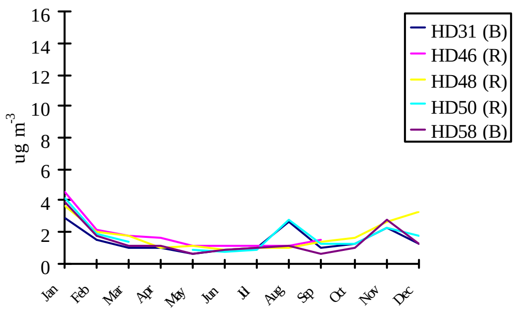


Figure 7B. Temporal Variation – 2006

Temporal Variation

Temporal trends shown by Figure 7B illustrated that benzene levels remained relatively stable throughout the year with minor peaks up to 2.8µg m^{-3} in August at roadside site HD50 and the same concentration during November at background site HD58.

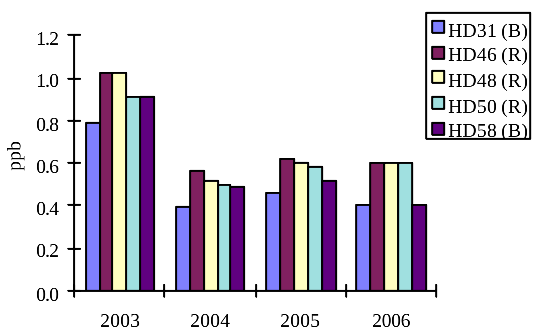


Figure 7C. Trends in Annual Average Benzene concentrations

Annual Trends

Following 2003, mean levels at all Hillingdon sites declined. From the period 2004 – 2006 levels have remained similar across all sites.

8.8 London borough of Hounslow

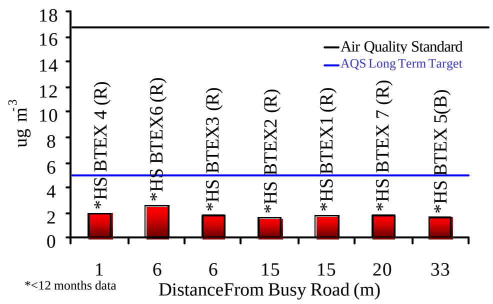


Figure 8A. Annual Mean Benzene concentration – 2006

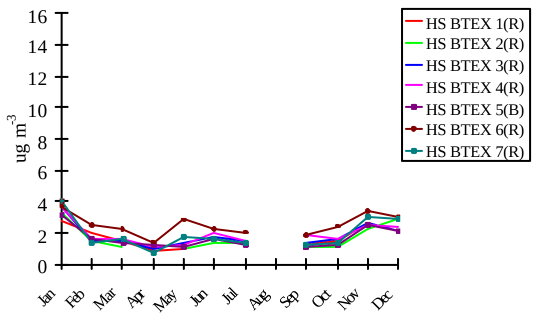


Figure 8B. Temporal Variation – 2006

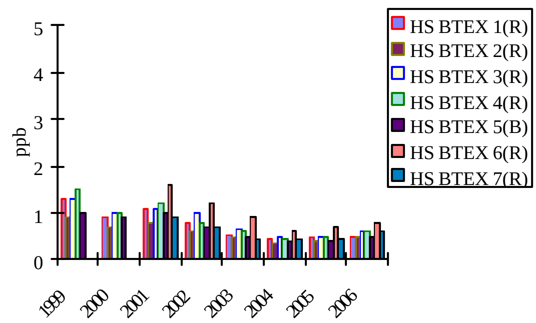


Figure 8C. Trends in Annual Average Benzene Concentrations

Annual Mean Concentration

Annual mean concentrations recorded for Hounslow varied between 1.6µg m^{-3} and 2.5µg m^{-3}. The highest mean value of 2.5µg m^{-3} was recorded at roadside site HS BTEX6 located at 24 Adelaide Terrace, Brentford. The lowest mean value of 1.6µg m^{-3} was recorded at roadside site HS BTEX2 located at Marjory Kinnon School, Hatton Road. The current AQS and long-term AQS targets were not exceeded or approached at any time.

Temporal Variation

Figure 8B shows that all sites have followed a similar trend with minimal seasonal variation. During November, a maximum peak value of 3.4µg m^{-3} was recorded at roadside site HS BTEX6.

Annual Trends

Figure 8C shows that concentrations have stabilised in recent years with little variation at all sites.

8.9 Royal Borough of Kensington and Chelsea

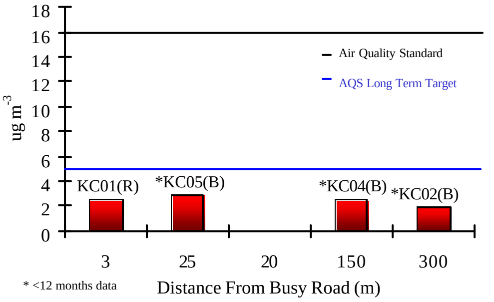


Figure 9A. Annual Mean Benzene Concentrations – 2006

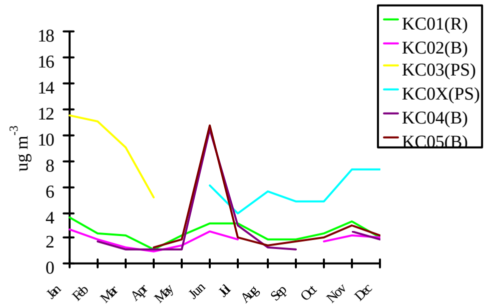


Figure 9B. Temporal Variation – 2006

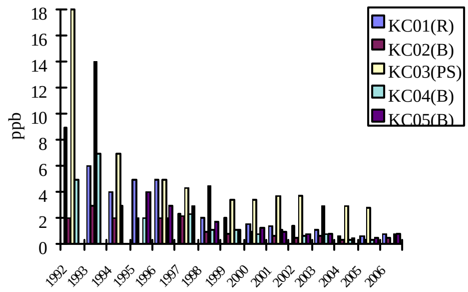


Figure 9C. Trends in Annual Average Benzene Concentrations

Annual Mean Concentration

Annual mean concentrations varied from 1.9µg m^{-3} to 2.9µg m^{-3}. The lowest mean value was recorded for background site KC02, located at Holland Park Offices. The highest mean value was recorded for site KC05, located at Notting Hill Library, another background location. Due to insufficient data capture an annual mean has not been calculated for the petrol station location, site KC03. This site was relocated in June, 1m from the petrol station forecourt boundary, KC0X. Levels measured at this site reached a maximum of 7.4µg m^{-3} in November and an average of 5.7µg m^{-3} Levels obtained would indicate that the long-term AQS target may have been exceeded. The AQS was not exceeded or approached at any site.

Temporal Variation

Figure 9B illustrates temporal trends for 2006. All sites followed a similar trend throughout the year with the exception of an episode during June when 10.7 and 10.4µg m^{-3} was recorded at background sites KC04 and KC05.

Annual Trends

Figure 9C shows that after a substantial drop in levels from 1992-1998, little change has been observed in subsequent years. The petrol station location KC03 continued to show the highest levels although for 2006 data has been omitted due to site changes.

8.10 City of London

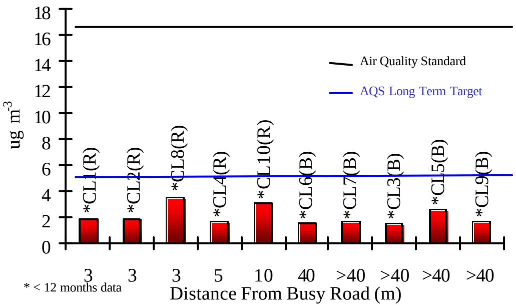


Figure 10A. Annual Mean Benzene Concentration – 2006

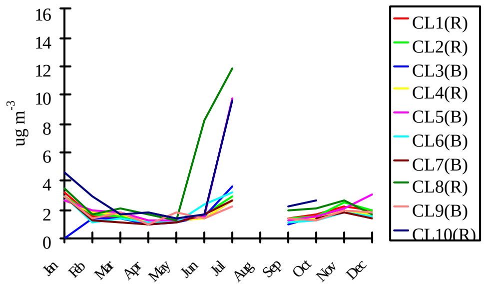


Figure 10B Temporal Variation – 2006

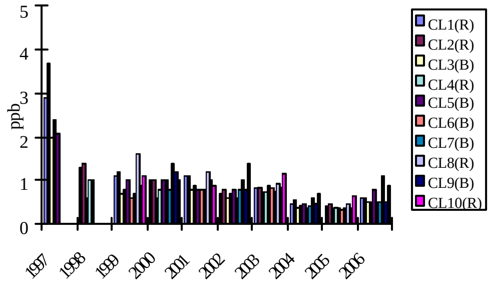


Figure 10C. Trends in Annual Average Benzene Concentrations

Annual Mean Concentration

Annual mean benzene concentrations ranged from 1.5µg m^{-3} to 3.5µg m^{-3}. The lowest mean level of 1.5µg m^{-3} was recorded at background site CL3 Pleach Walk, Barbican. The highest mean level of 3.5µg m^{-3} was recorded at roadside site CL8 London Bridge Lower Thames Street. Mean levels have remained low with no exceedences of the current AQS or of the long-term AQS targets.

Temporal Variation

Figure 10B shows that sites have followed a similar trend with the exception of an episodic peak recorded at background sites CL5 and CL10 recording 9.8µg m^{-3} and 9.7µg m^{-3} during July, and roadside site CL8 in June rising to a peak of 11.9µg m^{-3} during July. Results are missing for the month of August at all sites in the Borough.

Annual Trends

The annual average benzene concentrations illustrated in Figure 10C show a substantial decrease in levels from 1997 to 1998 followed by a period of relative stability in later years. Concentrations dropped slightly in 2004 and were maintained at this level in 2005. All sites in the Borough showed a moderate increase between 2005 and 2006.

8.11 London Borough of Newham

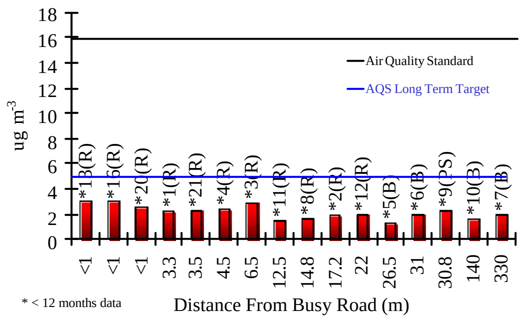


Figure 11A, Annual Mean Benzene Concentrations – 2006

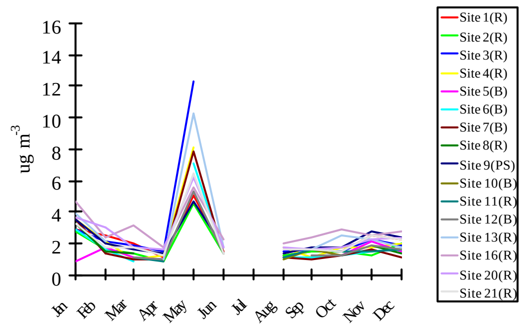


Figure 11B. Temporal Variation – 2006

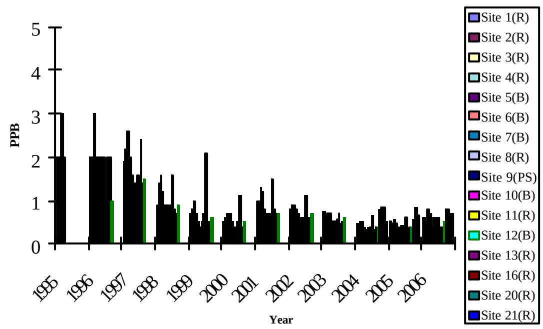


Figure 11C. Trends in Annual Average Benzene Concentrations

Annual Mean Concentration

Mean benzene concentrations ranged from 1.3µg m^{-3} to 3.0µg m^{-3}. The maximum mean concentration of 3.0µg m^{-3} recorded at roadside site 16, located at Leytonstone Road, Stratford and similar concentrations and site 13 at Green Street. The lowest mean value of 1.3µg m^{-3} was recorded at site 5 a background site located at West Ham Town Hall, Romford Road. The current AQS and long-term AQS targets were not exceeded or approached at any site.

Temporal Variation

Figure 11B illustrated temporal trends for 2006. All sites in the Borough showed higher Benzene levels during the month of May regardless of type. A maximum peak concentration of 12.3µg m-was recorded at roadside site 3 during this month. Other than the May peak higher concentrations were also recorded during January with a maximum winter peak concentration of 4.7µg m^{-3} at roadside site 16.

Annual Trends

After an initial decline in levels from 1995 to 2000, a slight increase in concentration was observed during 2001. Although a steady decrease in concentrations was observed in subsequent years, the concentrations recorded for 2005 showed little change compared to 2004. In 2006 concentrations are either the same or show a slight increase compared with 2005.

8.12 London Borough of Richmond

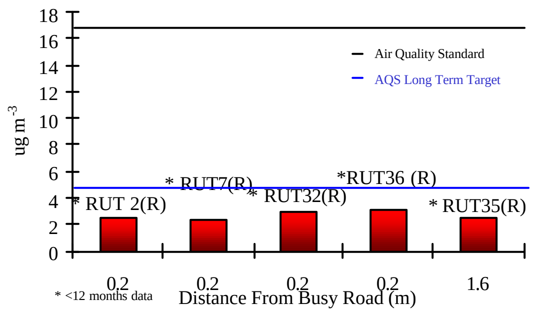


Figure 12A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

The lowest annual mean concentration 2.4µg m^{-3} was recorded at site RUT7 located at Broad Street Teddington. The highest mean concentration of 3.1µg m^{-3} was recorded at roadside site 36 located at Upper Richmond Road, East Sheen. The current AQS nor the long-term AQS targets were exceeded or approached at any site.

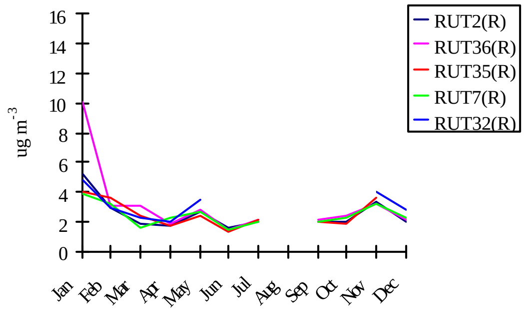


Figure 12B. Temporal Variation 2006

Temporal Variation

Figure 12B shows concentrations in Richmond during 2006. Data is missing for all sites during August and at RUT32 roadside during June and October. Some seasonal variation can be seen with higher concentrations during the winter. The maximum peak concentration of 10.1µg m^{-3} was recorded during January at roadside site RUT36.

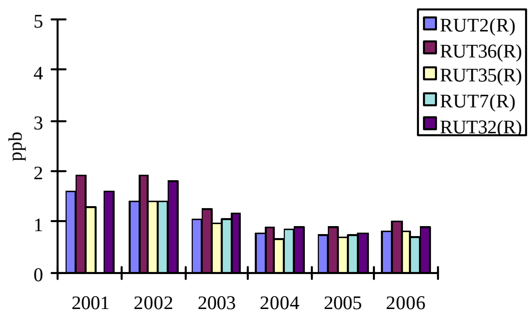


Figure 12C. Trends in Annual Average Benzene Concentrations

Annual Trends

A period of stability for annual average concentrations can be seen in Figure 12C during 2001 to 2002, followed by a general decrease in concentrations from 2003 to 2005. Concentrations of benzene in 2006 were either slightly higher four out of five sites or the same one site when compared to 2005 archive.

8.13 London Borough of Sutton

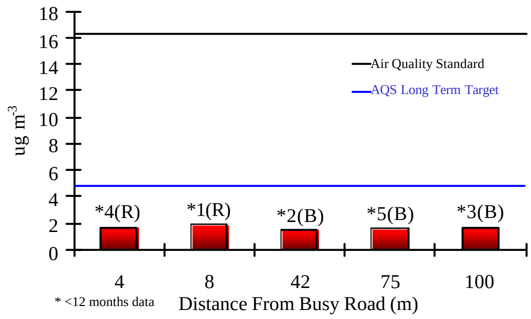


Figure 13A. Annual Mean Benzene Concentrations – 2006

Annual Mean Concentration

Mean benzene concentrations in Sutton ranged from 1.5µg m^{-3} to 1.9µg m^{-3}. The minimum mean value of 1.5µg m^{-3} was recorded at site 2, a background location at Devonshire School, Devonshire Avenue. The highest mean value of 1.9µg m^{-3} was recorded for site 1, a roadside location at Paynes Poppets, Croydon Road. The current AQS and long-term AQS targets were not exceeded at any site.

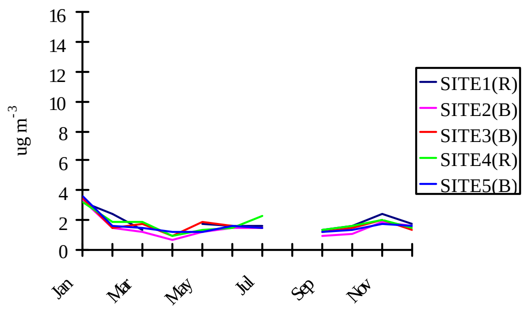


Figure 13B. Temporal Variation – 2006

Temporal Trends

Temporal trends, illustrated in Figure 13B, were similar at all five sites with some peak concentrations seen in January and November. All results are missing for August. The highest peak value of 3.6µg m^{-3} was recorded in January for site 5, a background location although all sites show very similar concentrations for this month.

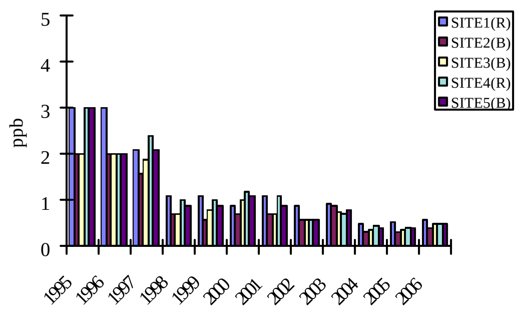


Figure 13C. Trends in Annual Average Benzene Concentrations

Annual Trends

Annual trends are illustrated in Figure 13C. Following a decrease in levels from 1995-1998, they were relatively settled from 1999-2003. A slight decrease in concentrations was then observed during 2004 and 2005. All sites show a very small increase between 2005 and 2006.

8.14 Summary of 2006 Annual Mean Benzene Concentrations

Across all boroughs, annual mean concentrations recorded at roadside sites ranged from 1.5µg m^{-3} recorded in Bexley and Newham, to 3.8µg m^{-3} in Brent. At background sites, mean benzene concentrations varied from 1.1µg m^{-3} in Greenwich to 2.9µg m^{-3} at Kensington. Mean concentrations recorded at petrol stations varied from 1.9µg m^{-3} to 2.5µg m^{-3} at Hackney. The annual mean benzene concentrations for the three different location types are summarised in Table 2 below:

Table 2: Summary of 2006 Annual Mean Concentration (mg m^{-3})

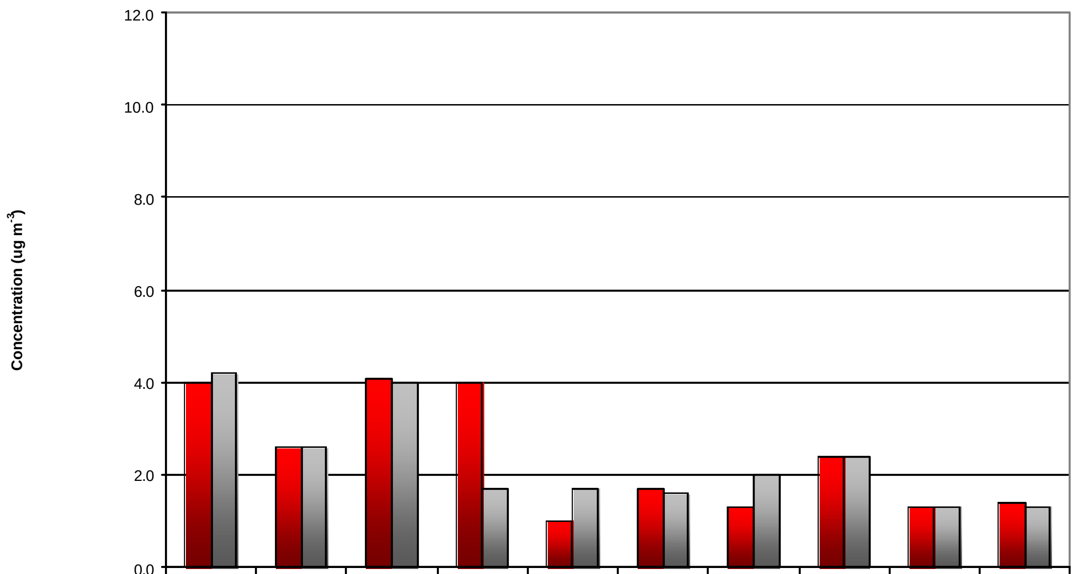
Site Type	Minimum	Mean	Maximum
Background	1.1	1.7	2.9
Roadside	1.5	2.3	3.8
*Petrol Station	1.9	2.2	2.5

* Please note that data for Kensington & Chelsea has been omitted due to insufficient data capture.

9 Quality Assurance and Quality Control

9.1 Duplicate Exposures at Monitoring Sites

As part of quality control procedures integral to the London-Wide Benzene Survey, a selection of boroughs are sent one or two extra diffusion tubes for duplicate or triplicate exposure at a monitoring site within their borough. In 2006, duplicate exposures were successful on ten occasions and triplicate exposures on six. The results of these tubes indicate satisfactory agreement between duplicate and triplicate tubes. The maximum difference between duplicates is ± 2.3µg m^{-3} and the maximum difference between triplicates is ± 0.4µg m^{-3}. The results of these duplicate exposures are summarised below in Figures 17a-17c.



	Rich	Rich	Hou	Hou	Hou	Ken	Bre	Sut	Bex	Bex
Sampler ugm-3	4.0	2.6	4.1	4.0	1.0	1.7	1.3	2.4	1.3	1.4
Duplicate ugm-3	4.2	2.6	4.0	1.7	1.7	1.6	2.0	2.4	1.3	1.3

Figure 15A. Summary of 2006 Duplicate Exposure within London Boroughs showing concentrations recorded.

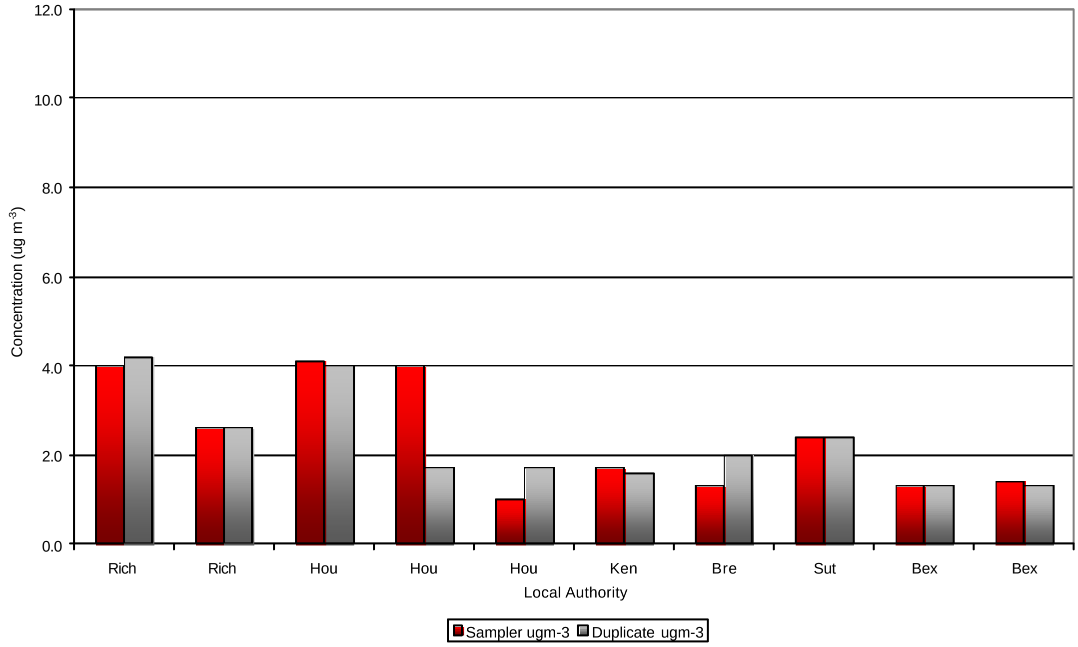
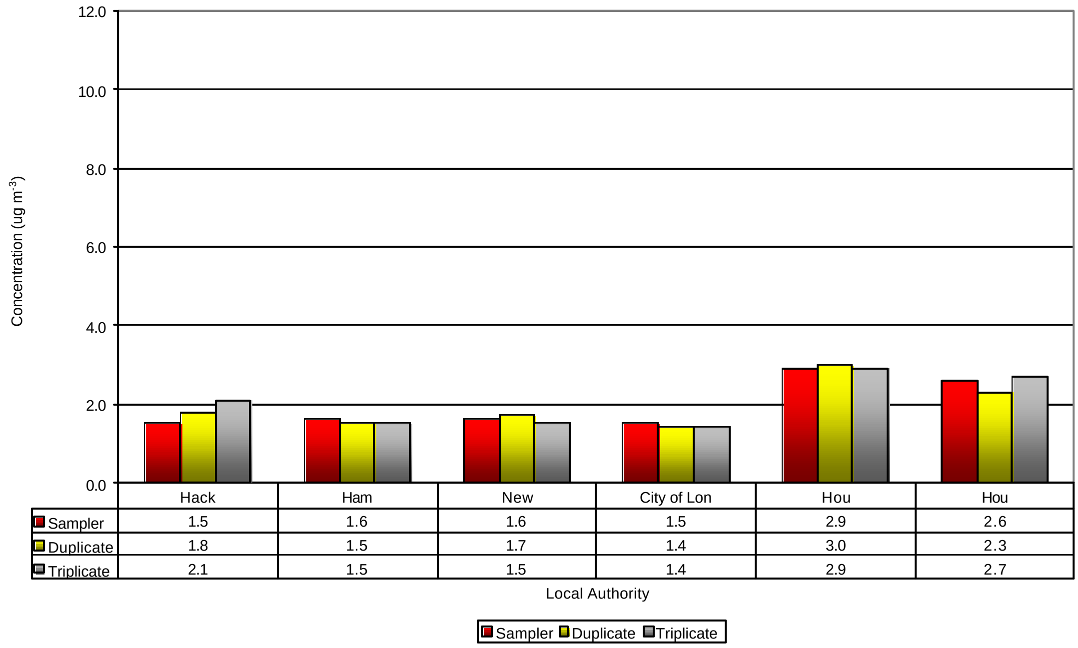


Figure 15B. Summary of 2006 Duplicate Exposures within London Boroughs shown without recorded data.



	Hack	Ham	New	City of Lon	Hou	Hou
Sampler	1.5	1.6	1.6	1.5	2.9	2.6
Duplicate	1.8	1.5	1.7	1.4	3.0	2.3
Triplicate	2.1	1.5	1.5	1.4	2.9	2.7

Figure 15C. Summary of 2006 Triplicate Exposures within London Boroughs showing concentrations recorded.

9.2 Duplicate Exposures at the Hydrocarbon Network

As an additional part of the quality assurance/control procedures, diffusion tubes were also exposed at the Hydrocarbon Network site on Marylebone Road *(super-site)*. Tubes exposed at this site were analysed for benzene, toluene, ethyl benzene, m, p-xylene and o-xylene *(BTEX)* and the data compared against data from the automatic Hydrocarbon Network data for comparable periods.

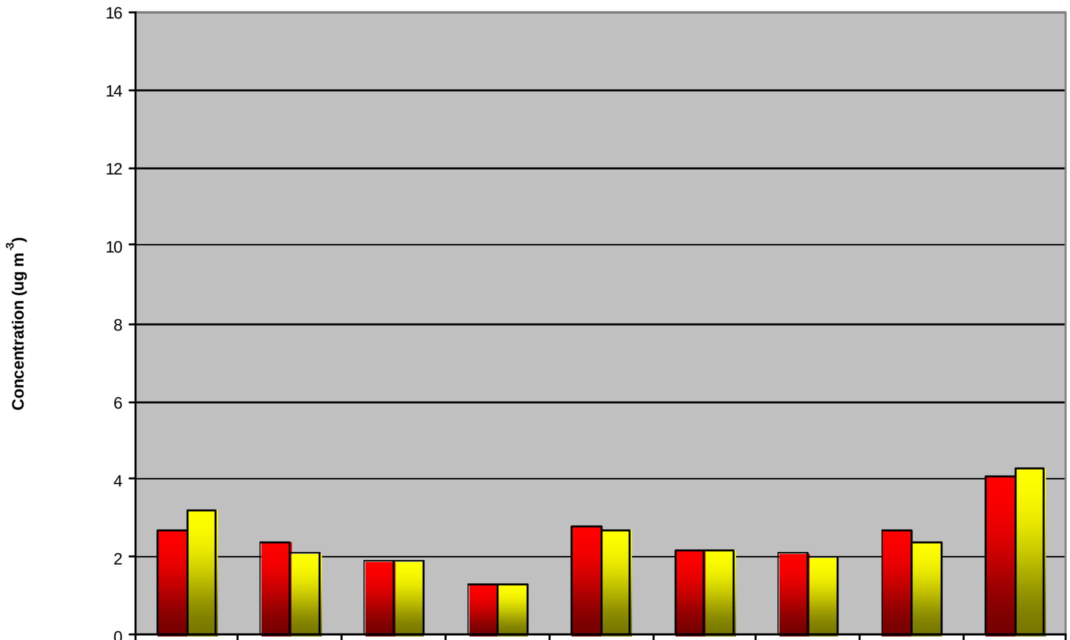
QA Duplicate Hydrocarbon results for 2006 are missing for the months of August, September and December. For the remaining months benzene levels ranged from 1.3µg m^{-3} recorded in April to 4.3µg m^{-3} recorded at in November. This is a similar range to many roadside sites in London. From this data capture the results show slightly higher concentrations when compared with 2005. From this data, an annual mean value of 2.5µg m^{-3} was calculated, higher than the benzene annual mean value of 1.9µg m^{-3} recorded by the Hydrocarbon Network at Marylebone Road. Toluene concentrations ranged from 11.8µg m^{-3} recorded in July to 53.2µg m^{-3} recorded in February. Methylbenzene levels ranged between 0.9µg m^{-3} recorded in March to 9.2µg m^{-3} also in November. Results for m, p-xylene ranged from 2.9µg m^{-3} in April to 18.0 µg m^{-3} in November. Monthly mean values for o-xylene ranged between 1.1 µg m^{-3} in March and April to 4.7µg m^{-3} in November.

Table 3 below shows a comparison between the Hydrocarbon Network benzene and the Bureau Veritas diffusive sampling at the Marylebone Road site. Data has been calculated and compared for the same exposure periods for both 2005 and 2006.

Table 3: Comparison of Annual Mean Concentrations at Marylebone Road Hydrocarbon Station (9 months of data)

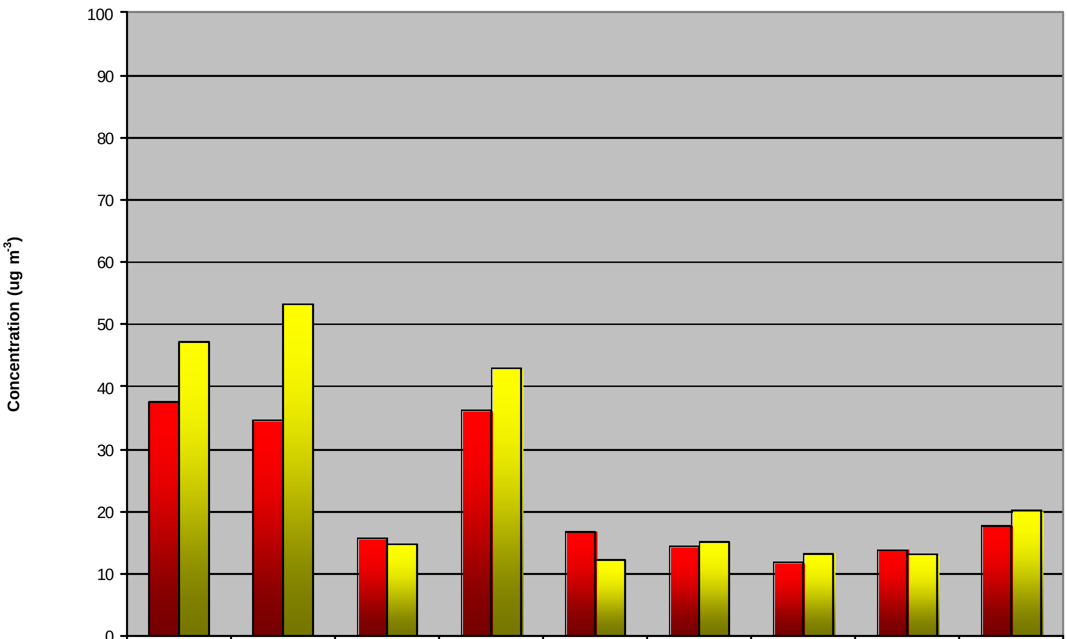
Species (mg m^{-3})	***Bureau Veritas Tubes**		**Hydrocarbon network**	
	2005	**2006**	**2005**	**2006**
Benzene	2.1	**2.5**	2.2	**1.7**
Toluene	19.4	**23.9**	9.9	**7.8**
Ethyl Benzene	1.7	**2.5**	1.6	**1.2**
M, p Xylene	5.1	**6.1**	5.6	**4.5**
o-Xylene	1.9	**2.0**	2.1	**1.6**

* Please note that mean calculations for Bureau Veritas are based on 9-months data.



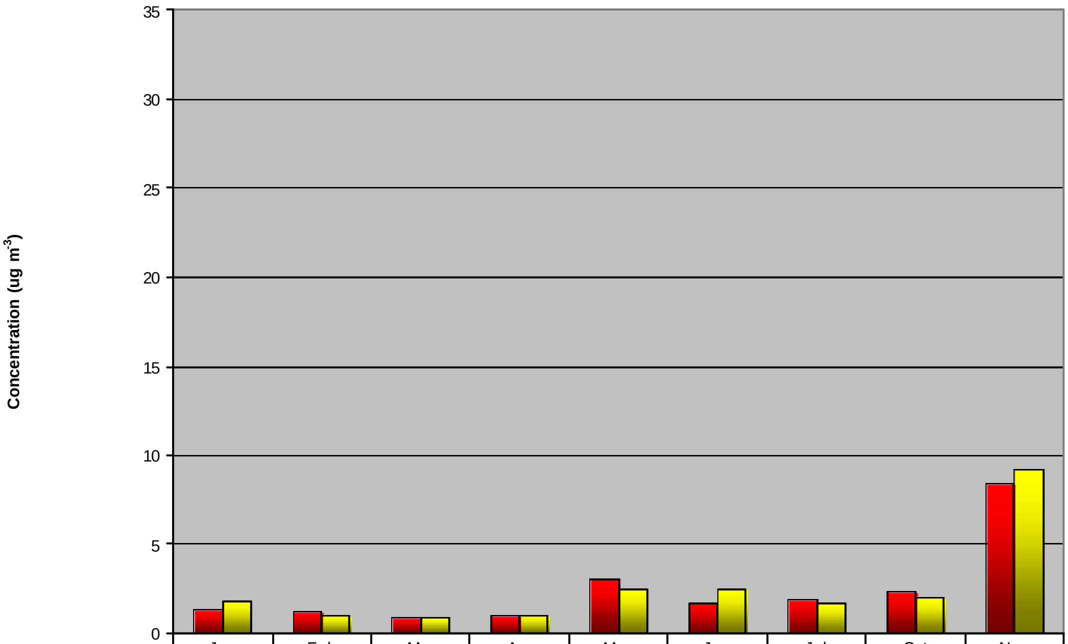
	Jan	Feb	Mar	Apr	May	Jun	Jul	Oct	Nov
Benzene 1	2.7	2.4	1.9	1.3	2.8	2.2	2.1	2.7	4.1
Benzene 2	3.2	2.1	1.9	1.3	2.7	2.2	2.0	2.4	4.3

Figure 16A. Summary of 2006 Duplicate Benzene Exposures at London Marylebone Road.



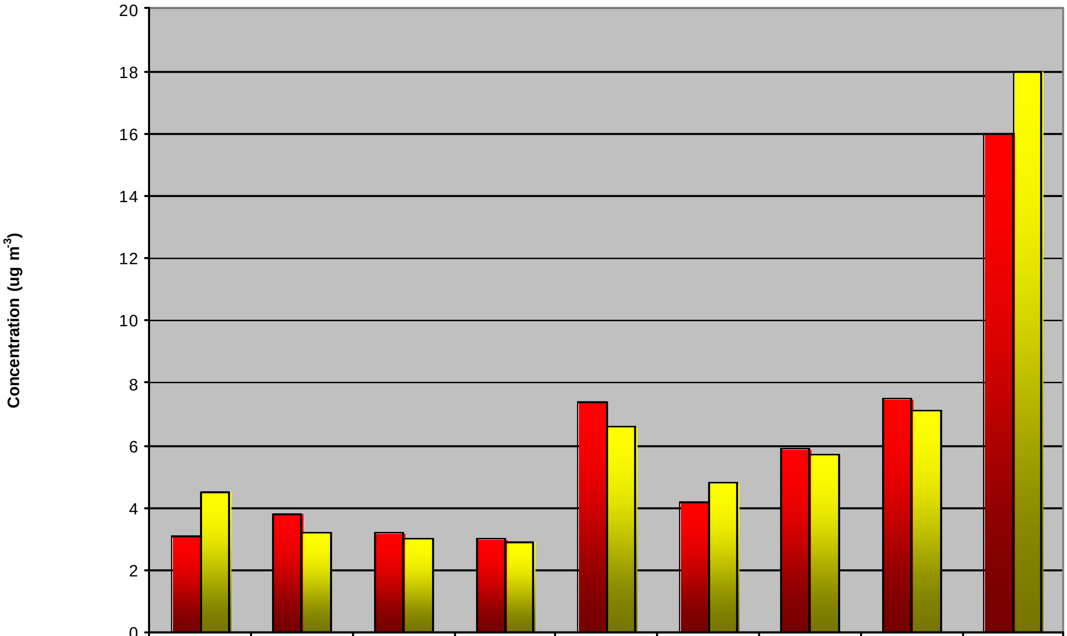
	Jan	Feb	Mar	Apr	May	Jun	Jul	Oct	Nov
Toluene 1	37.6	34.6	15.7	36.2	16.8	14.3	11.8	13.8	17.7
Toluene 2	47.2	53.2	14.7	42.9	12.3	15.1	13.3	13.1	20.1

Figure 16B. Summary of 2006 Duplicate Toluene Exposures at London Marylebone Road



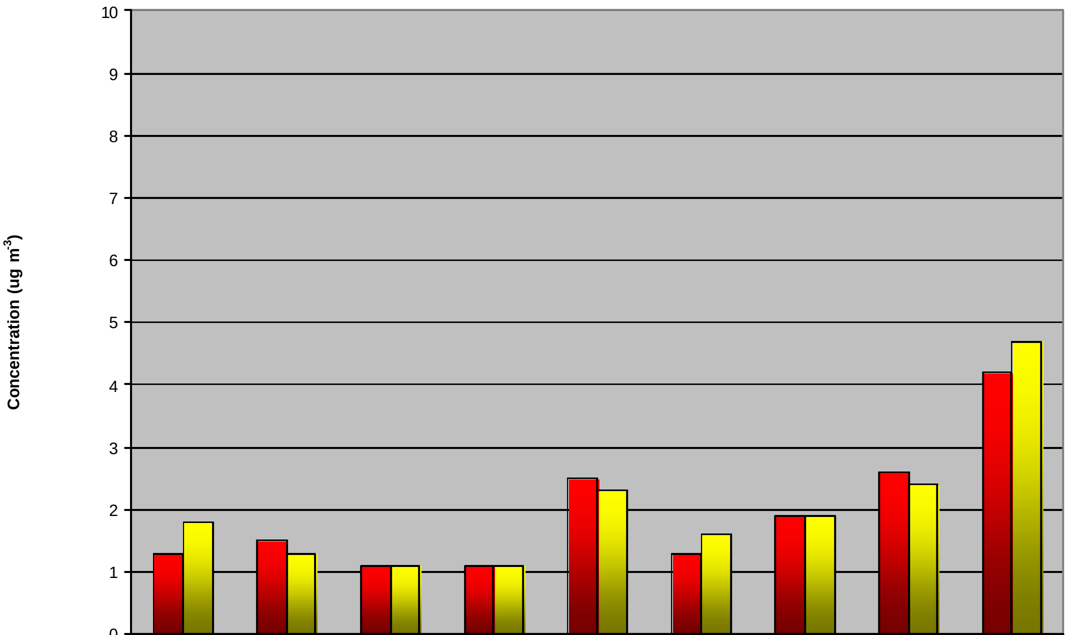
	Jan	Feb	Mar	Apr	May	Jun	Jul	Oct	Nov
Ethyl Benzene 1	1.3	1.2	0.9	1.0	3.1	1.7	1.9	2.3	8.4
Ethyl Benzene 2	1.8	1.0	0.9	1.0	2.5	2.5	1.7	2.0	9.2

Figure 17C. Summary of 2006 Duplicate Ethyl Benzene Exposures at London Marylebone Road



	Jan	Feb	Mar	Apr	May	Jun	Jul	Oct	Nov
m,p Xylene 1	3.1	3.8	3.2	3.0	7.4	4.2	5.9	7.5	16.0
m,p Xylene 2	4.5	3.2	3.0	2.9	6.6	4.8	5.7	7.1	18.0

Figure 17D. Summary of 2006 Duplicate m, p Xylene Exposures at London Marylebone Road



	Jan	Feb	Mar	Apr	May	Jun	Jul	Oct	Nov
o Xylene 1	1.3	1.5	1.1	1.1	2.5	1.3	1.9	2.6	4.2
o Xylene 2	1.8	1.3	1.1	1.1	2.3	1.6	1.9	2.4	4.7

Figure 16E. Summary of 2006 Duplicate o-Xylene Exposures at London Marylebone Road

10 Discussion

10.1 Mean Benzene Concentrations

As expected, maximum concentrations were recorded at roadside and petrol station locations, which accounted for 63% and 2% of sites respectively. These findings are consistent with motor vehicle emissions and evaporative emissions from petrol being significant sources of atmospheric benzene in Greater London. Within some boroughs, there continues to be a relationship between distance from a busy road and mean concentration, with benzene levels decreasing with increasing distance from the roadside. This emphasises the significance of traffic as a source of benzene and the strong influence of emission source on urban benzene levels.

Compared to roadside sites, background concentrations were generally lower. However, there was some concentration overlap between site classifications, for example mean levels recorded at background sites ranged from 1.1µg m^{-3} to 2.9µg m^{-3} and at roadside mean values ranged from 1.5µg m^{-3} to 3.8µg m^{-3}. Although this overlap exists, maximum mean values were consistent across the three categories. Such variability mainly reflects spatial variation in intensity of traffic flow, which in turn is attributable to heterogeneity in London's road network. Benzene concentrations are also influenced by factors such as meteorological conditions, height of sampler and episodic peaks in benzene which can happen at background and roadside sites. Factors, which influence ambient benzene concentrations will obviously vary from site to site and from borough to borough. This may explain why in some boroughs there was no clear relationship between distance from the roadside and benzene concentrations.

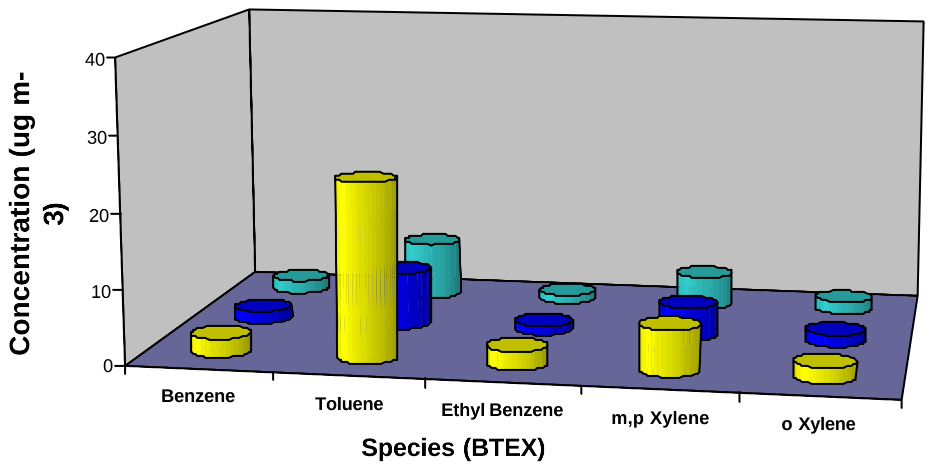
In Hackney and Newham, mean benzene levels recorded at the petrol station sites were similar to levels recorded at the busy roadside sites. This suggests that the influence of evaporative exhaust emissions on benzene levels at these sites is similar to the influence of exhaust emissions at roadside sites. However, benzene levels at the Kensington and Chelsea petrol station continue to be higher than typical roadside levels with concentrations recorded, ranging from 1.2µg m^{-3} to 11.5µg m^{-3}. Such levels were also higher than petrol station levels recorded at other boroughs. Thus, at this site, it would appear that evaporative emissions of benzene from petrol have a significant effect on benzene levels. It is likely that this petrol station site is located near a relatively busy road and thus vehicle emissions would have contributed to levels recorded at this site. This may also reflect the number of transactions taking place and/or size of the station.

10.2 Comparison with other Data

Comparison of the LWEP data with the calculated mean data for the Automatic Hydrocarbon Monitoring Network *(AHMN)* indicates that the concentrations recorded in this survey were very comparable for all BTEX species except toluene. Historically the diffusion tube method has tended to over-estimate toluene concentrations and thus present a worst-case scenario when assessing annual means.

The calculated annual mean level of benzene for the roadside location type was 2.3µg m^{-3}, which compares with 2.5µg m^{-3} and 1.7µg m^{-3} calculated for Marylebone Road diffusion tube and Hydrocarbon Network (LWEP exposure period) data respectively. Within the survey, the highest annual mean recorded at a roadside location was 3.8µg m^{-3}, which was recorded at a site in Brent. The maximum annual mean recorded at a background site was 2.9µg m^{-3}, recorded at a site in Kensington and Chelsea.

Hydrocarbon species *(BTEX)* measured at London Marylebone Road was comparable with diffusion tube data recorded at that location. Figure 18 illustrates the comparison in mean levels between species measured.



	Benzene	Toluene	Ethyl Benzene	m,p Xylene	o Xylene
Mean data for LWEP diffusion tubes at Marlylebone Road	2.5	23.9	2.5	6.1	2.0
Hydrocarbon Network mean data for LWEP exposure period 9 months 2006	1.7	7.8	1.2	4.5	1.6
Hydrocarbon Network annual mean data.	1.8	7.9	1.2	4.5	1.7

Figure 17. Comparison of Species Measured at London Marylebone Road.

10.3 Seasonal Trends

All site locations showed some degree of inter-site variation. As with previous years prior to 2005, some months stood out as having exceptionally high benzene levels for example May at certain sites showed an episodic high. Continuously low levels recorded at many Boroughs could again have been due to favourable meteorological conditions. High peaks and pollution episodes typically occur during winter months, therefore the stability of the pollutant levels may have been attributed to a mild winter. A slight increase in benzene levels was observed at a number of sites during December and January and these increased levels may have been attributable to winter conditions.

Measurements of benzene made by Imperial College during the London 1991 pollution episode showed a substantial episodic increase in benzene levels, with a concentration of 58.3µg m^{-3} *(2 day mean)* prior to the episode, increasing to a mean of 382.7µg m^{-3} *(4 day mean)* during the episode[12]. Therefore, it seems that benzene concentrations follow the pattern described for other primary pollutants, with high ground levels occurring in winter as a result of cold temperatures and low wind speeds trapping the pollution in a stable air mass near to the ground.

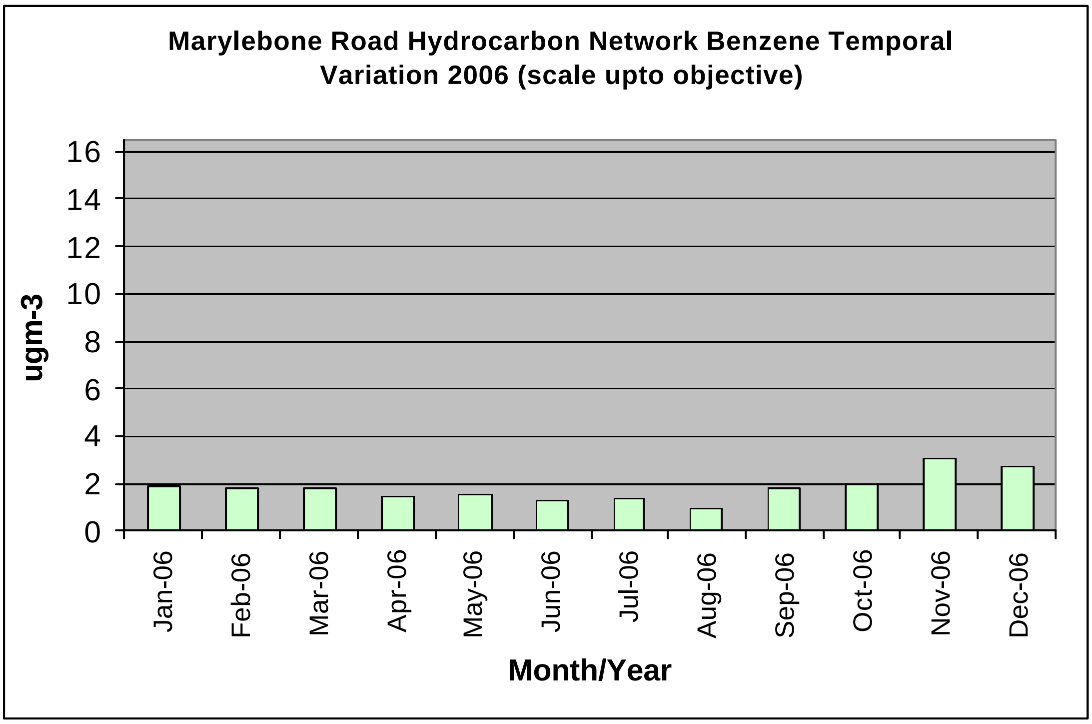


Figure 18. Marylebone Road Temporal Variation

[12] Quality of Urban Air Review group (1993). Urban Air Quality in the UK. HMSO, London, UK.

During 2005, the majority of sites followed a similar profile, with little seasonal variation. Slight increases in benzene concentrations were observed during December 2005 at Bexley, Brent, Greenwich, Harrow, Hounslow, Kensington and Chelsea, Newham and Richmond and this was sustained through to January 2006. Unlike the previous year certain sites showed summer peaks in concentration for example in Greenwich and Newham during May, in Kensington and Chelsea during June and the City of London during July. Figure 18, shows a stability in concentrations observed at the continuous hydrocarbon monitoring network at Marylebone Road with a winter rise in November.

11 Predictions for Future Urban Benzene Concentrations

Several measures have been introduced over the past few years to reduce the emissions of pollutants from the transport sector. Benzene concentrations at both background and roadside sites have fallen sharply due to reductions in the benzene content of petrol and the introduction of cars equipped with catalytic converters *(Directive 91/441/EEC)* and a further Directive implemented in 1996 (*94/12/EEC)*. Policy developments such as Euro Standards 3 and 4, implemented in 2000 and 2006 respectively, have reduced benzene levels further.

There are also several developments in European air quality policy proposed over the next few years which could potentially reduce benzene levels further in the future. These include a new directive to replace the four daughter directives which will include new measures to control emissions from road transport, shipping, small combustion plans and domestic combustion. In addition the implementation of Euro Standards 5-6 will go further than their predecessors to set tighter limits for cars, LDVs and HDVs. In addition the proposed Small Combustion Plants Directive is anticipated to be introduced in 2008 and would take effect in 2013. Benzene emissions are expected to continue to decline until around 2015.

As predicted the policy measures in place have helped all urban background and roadside locations achieve the current AQS objective of 16.25$\mu g\ m^{-3}$ (2003) and the long-term AQS target of 5$\mu g\ m^{-3}$ annual mean (2010). Favourable meteorological conditions during 2005 helped prevent winter episodes caused by temperature inversions, this winter was uncharacteristically mild and in combination with 2006 summer peaks may go some way to explaining slightly higher concentrations at many sites during 2006 as compared with 2005, the first time benzene concentration have not declined since the LWEP started. It is therefore important to ensure through monitoring that the long-term AQS target 5$\mu g\ m^{-3}$ as an annual mean is met by 2010.

12 Report Statement

Bureau Veritas completed this report on the basis of a defined program of works and within the terms and conditions agreed with the client.

This report was compiled with all reasonable skill and care, bearing in mind the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project as agreed.

Bureau Veritas cannot accept responsibility to any parties whatsoever, following issue of this report, for any matters arising which may be considered outside the agreed scope of works.

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In addition to the above, in reports containing results for UKAS accredited procedures, all non-accredited activities, subcontracted results, recommendations and professional opinions will be disclaimed.

Appendix A

Site Descriptions

London Borough of Bexley

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
LBB1	Whitehall Day Centre Whitehall Lane, Slade Green	150	Background	TQ551813/176394
LBB3	Crayford Library Crayford Road, Crayford	10	Roadside	TQ551660/174607
LBB5	Watling Street, Bexleyheath	5	Roadside	TQ550269/174941

London Borough of Hammersmith and Fulham

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
HM01 (32)	Queen Caroline Street	4	Roadside	TQ523303/178408
HM02 (41)	Bishops Park	>40	Background	TQ523809/176209
HM03 (44)	Eel Brook Common	>25	Background	TQ525309/176803
HM04 (45)	Byrony Road	1	Roadside	TQ522406/180604
HM05 (46)	Cobbold Road	4	Roadside	TQ521606/179609

London Borough of Brent

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
BR31	IKEA (car park) 2 Dury Way, London NW10	4.4	Roadside	TQ520756/185142
BR41	Alperton Community School, Stanley Avenue, Wembley HA0	250	Background	TQ518451/184111
BR42	Harlesden Polic Station, Craven Park, Harlesden, London NW10 8RJ	131	Background	TQ521152/184002
BR51	Kingsbury High School, Princes Ave, Kingsbury, London NW9	208	Background	TQ519562/189276
BR53	High Road (435-431), Wembley, Middx, HA	0.1	Roadside	TQ518303/185181
BR55	79 High Street, Harlesdon, London	0.1	Roadside	TQ521743/183361
BR56	Opposite 73 Chamberloyne Road, Willesden, London, NW10	0.1	Roadside	TQ523635/183153
BR57	1 Kilburn Bridge, High Road, Kilburn, London NW6	2	Roadside	TQ525461/183558
BR58	51 High Road, Willesden, London NW10	0.1	Roadside	TQ522031/184655
BR59	1 Cricklewood Broadway Cricklewood, London	0.1	Roadside	TQ524167/185251

London Borough of Hillingdon

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
HIL31	Aurn London Hillingdon Sipson Road / Keats Way, West Drayton, Middlesex	30-50	Suburban	TQ506926/178614
HD46	South Ruislip Monitoring Station, West End Road, South Ruislip, Middlesex	2.5	Roadside	TQ510821/184923
HD48	Citizens Advice Bureau, Eastcote Road, Ruislip, Middlesex	7	Roadside	TQ509094/187645
HD50	Hillingdon Hospital Monitoring Site, Colham Road / Pield Health Road, Hillingdon, Middlesex	2	Roadside	TQ506989/181920
HD58	Brendon Close, Harlington, Middlesex	200	Background	TQ508415/177125

London Borough of Harrow

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
HW01	Roxeth Manor School, Eastcote Lane	71	Background	TQ513131/136233
HW02	Grimsdyke School, Hatch End	497	Background	TQ512522/191623
HW03	Aylward School, Pangbourne Drive, Stanmore	377	Background	TQ518013/192250
HW04	North Harrow, Social Services, Council owned Bin Area.	<5	Background	TQ513667/188630
HW05	Psychology Service, Station Road, Harrow	>25	Roadside	TQ51375/188990

London Borough of Greenwich

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
GW29	Antigallican PH, Woolwich Road	1.0	Roadside	TQ541166/178511
GW33	9 Blackheath Hill, Blackheath SE3	1.5	Roadside	TQ537978/176770
GW34	Bannockburn School, Plumstead High Street, SE18	3	Roadside	TQ545490/178543
GW35	Greenwich Mini Town Hall, SE 10	1.5	Roadside	TQ539527/178282
GW55	O/S 581/583 Westhorne Avenue, Eltham SE 9	2	Roadside	TQ541914/175038
GW39a,b, c,d	Environmental Curriculum Centre, Bexley Road, Eltham SE9	50	Background	TQ543975/174647
GW41	699 Sidcup Road, New Eltham	3.5	Roadside	TQ543390/172764
GW42	Near 10 Greenwich Church Street, SE10	2	Roadside	TQ541915/175042
GW50	O/S Rear of 26 Fearon Street, Peartree Way	3.5	Roadside	TQ540176/178394
GW51	Bugsbys Way	2	Roadside	TQ539638/179024
GW55	GRE/BEX 6 Monitoring Station, Crown Woods Way	1.5	Roadside	TQ545001.7/175098.4

London Borough of Hackney

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
Cowper Rd	Cowper Road, Stoke Newington Road.	0.5	Background	TQ533224/185606
Green Lane	Green Lane, Seven Sisters	0.5	Roadside	TQ532051/187466
7Sister Rd	Seven Sister Road	1.5	Petrol Station	TQ531591/186898
Hackney College	Six Form College, Brooke House, Kenninghall Road, E5	5	Roadside	TQ534802/186229
Thoresby St	Thoresby Street	1	Petrol Station	TQ532262/182871

London of Hounslow

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
BTEX 1	West View, Bedfont, A30, Gt S-West Rd	15	Roadside	TQ508142/173665
BTEX 2	Marjory Kinnon School, Hatton Road	15	Roadside	TQ509127/174568
BTEX 3	Cranford Library, A4 Bath Road	6	Roadside	TQ510747/176687
BTEX 4	The Avenue, Cranford	1	Roadside	TQ510491/177160
BTEX 5	Church of the Good Shepherd, Gt South West Road	33	Background	TQ510986/176032
BTEX 6	24 Adelaide Terrace, Brentford	6	Roadside	TQ517592/178212
BTEX 7	Chiswick Community School	20	Roadside	TQ521028/077321

Royal Borough of Kensington and Chelsea

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
KC01	North Kensington Library	3	Roadside	TQ524401/181160
KC02	Holland Park Offices	300	Background	TQ524773/179641
KC03	Petrol Station Warwick Road	30	Petrol station	TQ525029/178570
KC0X	West-side Clareville Grove	20	Petrol station	TQ526496/178553
KC04	Dovehouse Street	150	Background	TQ526958/178187
KC05	Notting Hill Library, Pembridge Square	25	Background	TQ525202/180664

London Borough of Sutton

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
Site 1	Paynes Poppets, Croydon Road, Croydon CRO 4QE	8	Roadside	TQ530687/164837
Site 2	Devonshire Primary School, Devonshire Avenue, Sutton SM2 5JL	42	Background	TQ526158/163221
Site 3	Sutton Cemetery, Alcorn Close, Sutton SM3 9PX	100	Background	TQ525128/165823
Site 4	Robin Hood Junior School, Thorncroft Road, Sutton SM1 1RL	4	Roadside	TQ525713/164498
Site 5	The Lodge, Honeywood Walk, Carshalton SM5 3PB	75	Background	TQ527775/164606

London Borough of Newham

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
Site 1	London International Freight Terminal, Temple Mill Lane, E15	3.3	Roadside (kerbside)	TQ538280/185359
Site 2	Fire Station, Romford Road, Stratford, E15	17.2	Roadside	TQ539572/184659
Site 3	Salisbury School, Romford Road, E12	6.5	Roadside (kerbside)	TQ541954/185430
Site 4	Town Hall Annex,, Barking Road, E15	4.5	Roadside (kerbside)	TQ542832/183617
Site 5	Courtyard, West Ham Town Hall, Romford Road, E15	26.5	Background	TQ538899/184283
Site 6	East London Cemetery, Grange Road, E13	31	Background	TQ539859/182655
Site 7	Newham General Hospital, Glen Road, E13	330	Background	TQ541492/182332
Site 8	Mortuary High Street South, E6	14.8	Roadside	TQ542688/183202
Site 9	Save Petrol Station, 99 Barking Road, E16	30.8	Petrol Station (intermediate)	TQ539585/181720
Site 10	Mayflower Nursery School, Taut Avenue, E16	140	Background	TQ539747/181477
Site 11	London City Airport, Car Park Entrance, E16	12.5	Roadside	TQ542583/180201
Site 12	Pumping Station, Gallions Roundabout, E16	22	Roadside	TQ543762/180784
Site 13	290-292 Green Street, Upton park. E7	<1	Road side	TQ541134/184098
Site 16	Leytonstone Road, Lamp Post Opposite 107, Stratford, E15	<1	Roadside	TQ541134/184098
Site 20	Corner of Canning Town Roundabout, Silvertown Way, Canning Town, E13	<1	Roadside	TQ539556/181499
Site 21	Monitoring Station Cam Road, Stratford, E15	3.5	Roadside	TQ538657/183973

London Borough of Richmond

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
RUT2	George Street, Richmond	0.2	Roadside	TQ517916/174926
RUT7	Broad Street, Teddington, Middlesex	0.2	Roadside	TQ515690/170983
RUT32	Kings Street, Twickenham, Middlesex	0.2	Roadside	TQ516246/173217
RUT35	High Street, Hampton Wick, Middlesex	1.6	Roadside	TQ517628/169795
RUT36	Upper Richmond Road West, East Sheen, SW14	0.2	Roadside	TQ520533/175399

City of London

Site Code	Location	Distance from Busy Road (m)	Classification	Grid Reference
CL1	St Andrews Church Queen Victoria St	3	Roadside	TQ53189/18096
CL2	St Dustins Church Fleet Street	3	Roadside	TQ53123/18115
CL3	Pleach Walk, Barbican, Moorgate	>40	Background	TQ53249/18174
CL4	Crescent House, Goswell Road	5	Roadside	TQ53211/18205
CL5	Petticoat Square Estate, Harrow Place	>40	Background	TQ53353/18147
CL6	St Pauls Cathedral St Pauls Churchyard	>40	Background	TQ53203/18119
CL7	St Bartholomews Hospital	40	Background	TQ53191/18158
CL8	London Bridge Lower Thames Street	3	Roadside	TQ53285/18073
CL9	Finsbury Park	>40	Background	TQ53284/18159
CL10	Mansion House Mansion House Street	10	Roadside	TQ53269/18108

Appendix B

Benzene Calculation

Benzene Calculation and Conversion

Average Benzene Concentration (ppb) $= \dfrac{M\ (ng)\ x\ 1000}{T\ (mins)\ x\ Dc}$

Where:

M = the amount of benzene adsorbed by each tube

T = the period during which the tube was exposed

Dc = the diffusion coefficient

Where:

Diffusion coefficient $= \dfrac{D(v)\ x\ F\ x\ 1000}{T\ x\ C}$

Where:

D(v) = uptake of benzene (ng)
F = 3.244 = ppm to µg m^{-3} conversion factor at 20°C
T = Time in mins
C = Concentration (µg m^{-3})

Diffusion coefficient used = 1.39 ng ppm^{-1} min^{-1}

1 ppb = 3.244 µg m^{-3}

To convert from ppb to µg m^{-3} = multiply by 3.244
To convert from µg m^{-3} to ppb = multiply by 0.31

Appendix C

Benzene Concentrations (ppb & μg m^{-3})

Benzene Concentrations 2006

London Borough of Bexley

Month	Site Code LBB1 ppb	ug m3	LBB3 ppb	ug m3	LBB5 ppb	ug m3
January	1.1	3.5	1.3	4.1	1.0	3.3
February	0.4	1.3	0.6	2.1	0.6	1.9
March	0.4	1.2	0.5	1.6	0.4	1.2
April	-	-	0.2	0.8	0.2	0.7
May	0.3	1.1	0.4	1.2	0.3	1.1
June	0.1	0.2	0.4	1.2	0.3	0.9
July	0.4	1.4	0.5	1.5	0.4	1.4
August	0.3	1.0	0.4	1.4	0.5	1.6
September	0.3	0.9	0.4	1.3	0.4	1.2
October	0.4	1.4	0.5	1.6	0.5	1.5
November	0.2	0.7	0.3	1.0	-	-
December	0.4	1.4	0.6	1.8	0.4	1.4
Annual Mean	0.4	1.3	0.5	1.6	0.5	1.5

Benzene Concentrations 2006

London Borough of Brent

Month	Site Code BR31 ppb	ug m3	BR41 ppb	ug m3	BR42 ppb	ug m3	BR51 ppb	ug m3	BR53 ppb	ug m3
January	-	-	1.1	3.7	1.4	4.5	1.1	3.7	1.5	4.9
February	-	-	0.5	1.7	0.8	2.7	1.2	3.9	1.4	4.5
March	0.7	2.2	0.4	1.4	0.6	2.0	0.4	1.4	1.1	3.6
April	0.7	2.2	0.3	1.1	0.4	1.3	0.3	1.0	0.6	1.8
May	0.6	2.0	0.3	1.0	0.5	1.6	0.3	1.0	0.5	1.6
June	0.6	2.1	0.3	0.9	0.5	1.5	0.2	0.6	0.6	1.8
July	0.5	1.6	-	-	0.8	2.5	0.4	1.4	-	-
August	0.6	1.8	0.4	1.1	0.5	1.6	0.3	1.0	0.9	3.0
September	0.7	2.3	0.3	1.0	0.5	1.6	0.5	1.6	0.7	2.4
October	0.9	2.8	0.4	1.3	0.6	2.0	0.4	1.4	0.8	2.7
November	1.2	4.0	0.7	2.3	0.9	2.8	0.7	2.4	1.1	3.6
December	1.1	3.5	0.6	1.8	0.7	2.3	0.5	1.6	1.0	3.1
Annual Mean	0.8	2.5	0.5	1.6	0.7	2.2	0.5	1.8	0.9	3.0
Month	**Site Code** BR55 ppb	ug m3	BR56 ppb	ug m3	BR57 ppb	ug m3	BR58 ppb	ug m3	BR59 ppb	ug m3
January	1.8	5.7	1.4	4.5	1.1	3.4	1.7	5.4	0.9	2.8
February	1.7	5.4	0.9	3.0	0.6	2.0	1.0	3.4	0.6	1.9
March	1.2	4.0	0.5	1.6	-	-	0.8	2.6	0.6	2.1
April	-	-	0.7	2.2	0.6	1.8	0.6	2.0	0.6	2.0
May	0.8	2.7	0.4	1.4	-	-	0.9	3.0	-	-
June	0.5	1.7	0.4	1.3	-	-	0.5	1.5	0.4	1.2
July	-	-	-	-	0.6	2.0	0.9	2.8	-	-
August	1.4	4.6	0.4	1.1	-	-	0.5	1.6	0.6	2.0
September	0.8	2.6	0.5	1.8	0.6	1.9	0.8	2.7	0.7	2.1
October	0.9	3.0	0.7	2.1	0.7	2.3	1.0	3.3	0.8	2.6
November	1.4	4.5	1.0	3.4	1.1	3.5	1.1	3.6	1.2	3.7
December	1.0	3.3	0.8	2.6	1.1	3.4	1.3	4.2	0.9	3.0
Annual Mean	1.2	3.8	0.7	2.3	0.8	2.6	0.9	3.0	0.7	2.3

Benzene Concentrations 2006

City of London

Month	Site Code CL1 ppb	ug m3	CL2 ppb	ug m3	CL3 ppb	ug m3	CL4 ppb	ug m3	CL5 ppb	ug m3
January	1.0	3.2	0.9	3.0	-	-	0.8	2.6	0.8	2.7
February	0.5	1.5	0.5	1.7	0.4	1.4	0.5	1.7	0.6	1.9
March	0.5	1.6	0.5	1.5	0.4	1.4	0.5	1.7	0.5	1.7
April	0.3	1.1	0.4	1.2	0.3	0.9	0.3	1.1	0.4	1.2
May	-	-	-	-	0.4	1.1	0.4	1.3	0.4	1.3
June	0.4	1.4	0.5	1.6	0.5	1.5	0.4	1.4	0.5	1.5
July	0.8	2.7	0.9	2.9	1.1	3.6	0.8	2.6	3.0	9.8
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.4	0.4	1.4	0.3	1.0	0.4	1.3	0.4	1.3
October	0.5	1.6	0.5	1.5	0.5	1.5	0.4	1.4	0.5	1.5
November	0.7	2.2	0.7	2.4	0.6	1.9	0.6	2.0	0.6	2.1
December	0.6	2.0	0.6	1.9	0.5	1.7	0.5	1.6	0.9	3.1
Annual Mean	0.6	1.9	0.6	1.9	0.5	1.6	0.5	1.7	0.8	2.6
Month	Site Code CL6 ppb	ug m3	CL7 ppb	ug m3	CL8 ppb	ug m3	CL9 ppb	ug m3	CL10 ppb	ug m3
January	0.9	3.0	0.9	3.0	1.1	3.5	0.9	2.9	1.4	4.5
February	0.3	1.1	0.4	1.3	0.5	1.7	0.4	1.4	0.9	2.9
March	0.4	1.3	0.3	1.0	0.7	2.1	0.5	1.7	0.5	1.7
April	0.3	1.0	0.3	0.9	0.5	1.6	0.3	0.9	0.5	1.7
May	0.4	1.2	0.4	1.2	0.4	1.2	0.5	1.8	0.4	1.4
June	0.7	2.4	0.5	1.7	2.5	8.2	0.4	1.4	0.5	1.6
July	1.0	3.2	0.8	2.7	3.7	11.9	0.7	2.1	3.0	9.7
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.1	-	-	0.6	2.0	0.4	1.4	0.7	2.2
October	0.4	1.2	0.4	1.3	0.6	2.1	0.4	1.3	0.8	2.6
November	0.5	1.7	0.5	1.8	0.8	2.7	0.6	1.9	-	-
December	0.5	1.5	0.4	1.4	0.5	1.6	0.5	1.8	0.8	2.5
Annual Mean	0.5	1.7	0.5	1.6	1.0	3.5	0.5	1.7	0.9	3.1

Benzene Concentrations 2006

London Borough of Greenwich

Month	Site Code GW29 ppb	ug m3	GW33 ppb	ug m3	GW34 ppb	ug m3	GW35 ppb	ug m3	GW39 ppb	ug m3
January	1.4	4.5	1.7	5.5	1.0	3.1	1.2	3.9	0.8	2.5
February	0.8	2.7	1.0	3.1	0.6	1.9	1.1	3.5	0.3	1.0
March	0.9	2.8	0.9	3.0	0.7	2.2	-	-	0.3	0.9
April	0.6	1.8	0.6	2.0	0.4	1.4	0.6	1.8	0.3	0.9
May	1.5	4.9	3.8	12.4	0.4	1.2	0.6	2.0	-	-
June	0.8	2.5	0.8	2.6	0.6	2.0	0.7	2.3	0.5	1.6
July	0.6	1.9	0.5	1.5	0.9	2.8	-	-	0.9	3.0
August	0.7	2.1	0.9	3.0	0.4	1.4	0.8	2.6	0.3	1.1
September	0.6	1.9	0.6	1.9	0.4	1.3	0.6	2.0	0.3	1.1
October	0.7	2.4	0.8	2.7	0.5	1.6	0.7	2.4	0.3	1.1
November	0.9	3.0	1.1	3.5	0.7	2.1	1.1	3.4	0.5	1.6
December	0.9	2.9	0.8	2.5	0.7	2.1	0.8	2.5	0.5	1.5
Annual Mean	0.9	2.8	1.1	3.6	0.6	1.9	0.8	2.6	0.5	1.5
Month	Site Code GW41 ppb	ug m3	GW42 ppb	ug m3	GW50 ppb	ug m3	GW51 ppb	ug m3	GW54 ppb	ug m3
January	0.7	2.4	1.2	4.0	1.6	5.0	0.9	2.9	1.4	4.5
February	-	-	0.8	2.4	0.8	2.6	0.7	2.2	0.6	2.1
March	-	-	0.6	1.8	0.7	2.1	0.4	1.3	0.6	1.9
April	0.3	1.0	0.4	1.4	0.7	2.2	0.4	1.2	0.4	1.4
May	-	-	0.5	1.5	0.6	1.9	0.4	1.2	0.5	1.5
June	0.6	1.9	0.7	2.2	0.7	2.3	0.5	1.6	0.6	2.1
July	-	-	1.7	5.5	0.9	2.9	-	-	0.5	1.6
August	0.5	1.5	0.7	2.1	0.7	2.1	0.4	1.4	0.5	1.6
September	0.4	1.4	0.5	1.6	0.6	2.0	0.4	1.2	0.5	1.6
October	0.5	1.7	0.6	2.0	0.7	2.2	0.4	1.4	0.7	2.3
November	0.8	2.4	0.8	2.7	1.2	3.8	0.7	2.2	0.9	3.0
December	0.8	2.5	0.6	1.8	1.2	3.8	0.6	1.9	0.8	2.5
Annual Mean	0.6	1.9	0.7	2.4	0.8	2.8	0.5	1.7	0.7	2.2

Benzene Concentrations 2006

London Borough of Greenwich (continued)

Month	**Site Code** GW55 ppb	ug m3	GW39b ppb	ug m3	GW39c ppb	ug m3	GW39d ppb	ug m3
January	0.9	2.8	0.8	2.5	0.8	2.7	-	-
February	0.6	1.8	0.5	1.5	0.3	1.1	0.5	1.5
March	0.3	0.8	0.3	1.1	0.5	1.7	-	-
April	0.3	0.9	0.2	0.8	0.2	0.8	0.3	0.8
May	0.3	1.1	1.4	4.5	1.6	5.2	-	-
June	0.5	1.7	0.5	1.6	0.5	1.5	0.5	1.5
July	0.8	2.5	0.6	2.1	0.4	1.4	0.4	1.4
August	0.5	1.5	0.4	1.3	0.3	1.1	0.4	1.2
September	0.4	1.3	0.4	1.2	0.3	1.0	0.3	1.1
October	0.4	1.3	0.3	1.0	0.3	1.0	0.3	1.0
November	0.6	2.0	0.5	1.8	0.5	1.5	0.4	1.4
December	0.4	1.4	0.4	1.4	0.4	1.2	0.4	1.3
Annual Mean	0.5	1.6	0.5	1.7	0.5	1.7	0.4	1.2

Benzene Concentrations 2006

London Borough of Hammersmith and Fulham

Month	**Site Code** HM01 ppb	ug m3	HM02 ppb	ug m3	HM03 ppb	ug m3	HM04 ppb	ug m3	HM05 ppb	ug m3
January	-	-	0.8	2.7	-	-	1.0	3.4	-	-
February	0.7	2.3	0.5	1.6	0.5	1.5	0.5	1.6	0.8	2.4
March	0.6	2.0	0.4	1.3	0.4	1.3	-	-	0.6	2.0
April	0.4	1.3	0.3	0.8	0.3	1.0	0.3	1.1	0.4	1.3
May	0.5	1.5	0.3	1.0	0.3	1.0	0.3	1.1	0.4	1.2
June	0.6	2.1	0.6	2.1	0.5	1.5	-	-	0.5	1.6
July	0.8	2.7	-	-	0.5	1.5	0.4	1.4	0.6	2.0
August	0.5	1.6	0.2	0.7	0.9	2.9	0.4	1.3	0.4	1.2
September	0.6	1.8	0.3	1.1	0.4	1.1	0.4	1.2	0.3	1.1
October	0.8	2.6	0.5	1.6	0.5	1.5	0.5	1.6	0.5	1.6
November	0.9	3.0	0.7	2.4	0.7	2.2	0.9	2.8	0.9	2.9
December	0.7	2.3	0.4	1.4	0.5	1.5	0.5	1.8	0.5	1.8
Annual Mean	0.7	2.1	0.5	1.5	0.5	1.6	0.5	1.7	0.5	1.7

Benzene Concentrations 2006

London Borough of Harrow

Month	Site Code HW01 ppb	ug m3	HW02 ppb	ug m3	HW03 ppb	ug m3	HW04 ppb	ug m3	HW05 ppb	ug m3
January	3.1	10.1	0.8	2.5	0.9	2.8	1.2	3.9	1.0	3.3
February	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.6	0.8	2.7
March	0.3	1.1	0.3	0.9	0.4	1.3	0.3	1.1	0.9	2.9
April	0.3	1.0	0.2	0.7	0.3	0.9	0.4	1.2	0.5	1.6
May	0.2	0.8	0.2	0.7	0.2	0.7	0.4	1.2	0.5	1.5
June	0.2	0.6	0.2	0.5	0.2	0.5	0.2	0.6	0.3	1.0
July	0.0	0.0	0.4	1.3	0.4	1.3	0.9	3.0	0.4	1.3
August	0.5	1.6	0.3	1.1	0.2	0.5	0.7	2.1	0.6	1.8
September	0.2	0.8	0.2	0.8	0.2	0.8	0.4	1.1	0.5	1.6
October	0.5	1.6	0.4	1.3	0.4	1.4	-	-	0.8	-
November	0.7	2.3	0.5	1.7	0.6	1.9	0.8	2.7	1.0	3.1
December	0.5	1.6	0.4	1.2	0.5	1.5	0.5	1.5	0.9	2.9
Annual Mean	0.6	1.9	0.4	1.2	0.4	1.3	0.6	1.8	0.7	2.2

London Borough of Hounslow

Month	Site Code HS BTEX1 ppb	ug m3	HS BTEX2 ppb	ug m3	HS BTEX3 ppb	ug m3	HS BTEX4 ppb	ug m3
January	0.9	2.8	1.0	3.3	1.1	3.7	1.1	3.6
February	0.6	2.0	0.5	1.5	0.5	1.5	0.5	1.6
March	0.5	1.5	0.3	1.1	0.5	1.5	0.5	1.6
April	0.3	0.9	-	-	0.3	1.0	0.3	1.1
May	0.3	1.0	0.3	1.0	0.4	1.4	0.4	1.2
June	-	-	0.4	1.4	0.5	1.8	0.6	2.0
July	0.5	1.6	0.4	1.4	0.5	1.5	0.5	1.5
August	-	-	-	-	-	-	-	-
September	0.4	1.3	0.4	1.2	0.4	1.4	0.6	1.9
October	0.5	1.5	0.4	1.2	0.5	1.6	0.5	1.6
November	0.8	2.7	0.7	2.2	0.8	2.7	0.8	2.6
December	0.7	2.2	0.9	2.9	0.7	2.1	0.7	2.4
Annual Mean	0.6	1.8	0.5	1.6	0.6	1.8	0.6	1.9

Month	HS BTEX5 ppb	ug m3	HS BTEX6 ppb	ug m3	HS BTEX7 ppb	ug m3
January	1.0	3.1	1.1	3.7	1.2	4.0
February	0.5	1.6	0.8	2.5	0.4	1.4
March	0.4	1.3	0.7	2.2	0.5	1.6
April	0.4	1.2	0.4	1.4	0.2	0.8
May	0.3	1.1	0.9	2.8	0.5	1.7
June	0.5	1.6	0.7	2.3	0.5	1.6
July	0.4	1.3	0.6	2.1	0.4	1.4
August	-	-	-	-	-	-
September	0.4	1.2	0.6	1.9	0.4	1.3
October	0.4	1.3	0.8	2.4	0.4	1.4
November	0.8	2.6	1.0	3.4	0.9	3.0
December	0.6	2.1	0.9	3.0	-	-
Annual Mean	0.5	1.7	0.8	2.5	0.5	1.8

Benzene Concentrations 2006

London Borough of Newham

Month	Site Code 1 ppb	ug m3	2 ppb	ug m3	3 ppb	ug m3	4 ppb	ug m3
January	0.9	3.0	0.9	2.8	0.9	3.0	1.1	3.5
February	0.8	2.6	0.5	1.6	0.7	2.1	0.7	2.1
March	0.6	2.0	0.4	1.4	0.6	1.9	0.3	0.9
April	0.3	1.1	0.3	0.9	0.5	1.5	0.4	1.2
May	1.6	5.1	1.4	4.6	3.8	12.3	2.5	8.1
June	0.5	1.5	0.4	1.4	-	-	-	-
July	-	-	-	-	-	-	-	-
August	0.4	1.3	0.4	1.2	0.5	1.5	0.6	1.8
September	0.5	1.5	0.5	1.6	0.5	1.6	0.4	1.2
October	0.5	1.5	0.5	1.5	0.5	1.6	0.5	1.7
November	0.8	2.5	0.4	1.3	0.7	2.2	0.5	1.7
December	0.7	2.2	0.6	2.1	0.6	1.9	0.6	2.0
Annual Mean	0.7	2.2	0.6	1.9	0.9	3.0	0.8	2.4
Month	5 ppb	ug m3	6 ppb	ug m3	7 ppb	ug m3	8 ppb	ug m3
January	0.3	0.9	0.9	2.9	1.1	3.6	1.0	3.3
February	0.5	1.8	0.5	1.6	0.4	1.4	0.5	1.5
March	0.4	1.2	0.3	0.9	0.3	1.0	0.4	1.4
April	0.3	1.0	-	-	0.3	1.0	-	-
May	-	-	2.2	7.1	2.4	7.9	-	-
June	-	-	0.4	1.3	0.4	1.3	0.4	1.4
July	-	-	-	-	-	-	-	-
August	0.3	1.1	0.3	1.1	0.3	1.1	0.4	1.2
September	0.4	1.1	0.3	1.1	0.3	1.0	-	-
October	0.4	1.3	0.4	1.2	0.4	1.2	-	-
November	0.7	2.1	0.5	1.6	0.5	1.7	0.6	1.9
December	0.5	1.5	0.5	1.6	0.4	1.2	0.4	1.3
Annual Mean	0.4	1.3	0.6	2.0	0.6	2.0	0.5	1.7

Benzene Concentrations 2006

London Borough of Newham (continued).

Month	Site Code 9 ppb	ug m3	10 ppb	ug m3	11 ppb	ug m3	12 ppb	ug m3
January	1.1	3.5	0.8	2.8	0.8	2.7	0.8	2.7
February	0.6	2.0	-	-	-	-	-	-
March	0.5	1.6	0.4	1.4	0.3	1.1	0.4	1.2
April	0.4	1.4	-	-	0.3	0.9	0.3	1.0
May	1.4	4.7	-	-	-	-	1.7	5.4
June	0.5	1.7	0.4	1.2	0.4	1.3	0.4	1.4
July	-	-	-	-	-	-	-	-
August	0.4	1.4	0.3	1.0	0.3	1.1	-	-
September	0.6	1.8	0.5	1.6	0.5	1.6	0.4	1.3
October	0.5	1.7	0.4	1.3	0.5	1.5	0.4	1.2
November	0.9	2.8	-	-	0.5	1.5	0.6	1.9
December	0.7	2.4	0.5	1.7	0.5	1.7	0.5	1.6
Annual Mean	0.6	2.3	0.4	1.6	0.4	1.5	0.5	2.0
Month	13 ppb	ug m3	16 ppb	ug m3	20 ppb	ug m3	21 ppb	ug m3
January	1.2	4.0	1.5	4.7	1.1	3.7	1.0	3.2
February	0.7	2.1	0.8	2.4	0.9	3.0	0.5	1.7
March	-	-	1.0	3.2	0.5	1.7	0.5	1.7
April	0.3	1.0	0.5	1.7	0.5	1.6	0.4	1.3
May	3.2	10.3	1.7	5.6	1.9	6.2	2.0	6.5
June	0.5	1.7	0.7	2.3	0.5	1.7	0.4	1.4
July	-	-	-	-	-	-	-	-
August	-	-	0.6	2.0	0.5	1.7	0.5	1.6
September	0.5	1.7	0.7	2.4	0.5	1.7	0.5	1.6
October	0.8	2.5	0.9	2.9	0.5	1.7	0.5	1.6
November	0.7	2.3	0.8	2.5	0.7	2.2	0.8	2.6
December	0.5	1.7	0.9	2.8	0.7	2.4	0.7	2.3
Annual Mean	0.8	3.0	0.8	3.0	0.7	2.5	0.7	2.3

Benzene Concentrations 2006

Royal Borough of Kensington and Chelsea

Month	Site Code KC01 ppb	ug m3	KC02 ppb	ug m3	KC03 ppb	ug m3	KC0X ppb	ug m3	KC04 ppb	ug m3
January	1.1	3.6	0.8	2.7	3.6	11.5	-	-	-	-
February	0.7	2.3	0.6	2.0	3.4	11.0	-	-	0.5	1.8
March	0.7	2.1	0.4	1.4	2.8	9.0	-	-	0.4	1.2
April	0.4	1.2	0.3	1.0	1.6	5.2	-	-	0.3	1.1
May	0.7	2.2	0.4	1.4	-	-	-	-	0.4	1.2
June	1.0	3.1	0.8	2.5	-	-	1.9	6.0	3.2	10.4
July	1.0	3.2	0.6	1.8	-	-	1.2	3.9	0.9	3.0
August	0.6	2.0	-	-	-	-	1.7	5.6	0.4	1.3
September	0.6	1.9	-	-	-	-	1.5	4.8	0.3	1.1
October	0.7	2.4	0.5	1.7	-	-	1.5	4.8	-	-
November	1.0	3.2	0.7	2.2	-	-	2.3	7.4	0.8	2.5
December	0.7	2.1	0.6	2.0	-	-	2.3	7.3	0.6	1.9
Annual Mean	0.8	2.4	0.6	1.9	2.9	9.2	1.8	5.7	0.8	2.6

Month	KC05 ppb	ug m3
January	-	-
February	0.7	2.2
March	-	-
April	0.4	1.3
May	0.6	1.9
June	3.3	10.7
July	0.6	2.0
August	0.4	1.4
September	0.5	1.8
October	0.6	2.1
November	0.9	3.0
December	0.7	2.3
Annual Mean	0.9	2.9

Benzene Concentration 2006

London Borough of Richmond

Month	Site Code RUT 2 ppb	ug m3	RUT 36 ppb	ug m3	RUT 35 ppb	ug m3	RUT 7 ppb	ug m3	Rut 32 ppb	ug m3
January	1.6	5.2	3.1	10.1	1.2	4.0	1.2	3.9	1.5	4.8
February	0.9	2.9	0.9	3.0	1.1	3.6	1.0	3.2	0.9	3.0
March	0.6	1.9	0.9	3.1	0.7	2.4	0.5	1.5	0.7	2.3
April	0.5	1.7	0.6	1.8	0.5	1.7	0.7	2.3	0.6	1.9
May	0.8	2.6	0.9	2.8	0.7	2.4	0.8	2.7	1.1	3.5
June	0.5	1.6	0.5	1.5	0.4	1.4	0.4	1.4	-	-
July	0.6	1.9	0.6	2.1	0.7	2.2	0.6	2.0	0.8	2.5
August	-	-	-	-	-	-	-	-	-	-
September	0.6	2.0	0.6	2.1	0.6	2.0	0.6	2.0	0.7	2.3
October	0.6	2.0	0.7	2.4	0.6	1.9	0.7	2.2	-	-
November	1.0	3.3	1.0	3.2	1.1	3.6	1.0	3.3	1.3	4.1
December	0.6	2.0	0.6	2.1	-	-	0.7	2.3	0.9	2.8
Annual Mean	0.8	2.5	0.9	3.1	0.8	2.5	0.7	2.4	0.9	3.0

Benzene Concentration 2006

London Borough of Sutton

Month	**Site Code** Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	1.0	3.2	1.0	3.3	1.1	3.5	1.0	3.3	1.1	3.6
February	0.8	2.5	0.5	1.5	0.5	1.5	0.6	1.9	0.5	1.6
March	0.4	1.3	0.4	1.2	0.5	1.8	0.6	1.8	0.4	1.5
April	-	-	0.2	0.6	0.3	0.9	0.3	0.9	0.4	1.2
May	0.5	1.8	0.4	1.2	0.6	1.9	0.4	1.3	0.4	1.2
June	0.5	1.6	0.5	1.5	0.5	1.6	0.4	1.4	0.5	1.6
July	0.5	1.6	0.4	1.4	0.5	1.5	0.7	2.2	0.4	1.4
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.3	0.3	0.9	0.4	1.2	0.4	1.3	0.4	1.2
October	0.5	1.6	0.3	1.1	0.4	1.4	0.5	1.5	0.4	1.3
November	0.7	2.4	0.6	1.9	0.6	2.0	0.6	2.0	0.5	1.7
December	0.5	1.7	0.5	1.5	0.4	1.3	0.4	1.4	0.5	1.6
Annual Mean	0.6	1.9	0.5	1.5	0.5	1.7	0.5	1.7	0.5	1.6

Benzene Concentrations 2006

London Borough of Hillingdon

Month	Site Code HD31 ppb	ug m3	HD46 ppb	ug m3	HD48 ppb	ug m3	HD50 ppb	ug m3	HD58 ppb	ug m3
January	0.9	2.9	1.4	4.6	1.1	3.7	1.3	4.1	1.2	3.9
February	0.5	1.5	0.7	2.1	0.6	2.0	0.6	1.9	0.5	1.7
March	0.3	1.0	0.5	1.7	0.5	1.7	0.4	1.3	0.4	1.2
April	0.3	1.0	0.5	1.7	0.3	1.0	-	-	0.3	1.1
May	0.2	0.7	0.4	1.2	0.4	1.2	0.3	0.8	0.2	0.7
June	0.3	0.8	0.3	1.1	0.3	0.8	0.2	0.8	0.3	0.8
July	0.3	1.0	0.4	1.2	0.3	1.0	0.3	0.9	0.3	1.0
August	0.8	2.6	0.4	1.2	0.3	1.0	0.9	2.8	0.4	1.2
September	0.3	1.0	0.5	1.6	0.4	1.4	0.4	1.3	0.2	0.6
October	0.4	1.2	-	-	0.5	1.6	0.4	1.3	0.3	1.1
November	0.7	2.3	0.8	2.5	0.8	2.7	0.7	2.3	0.9	2.8
December	0.4	1.3	-	-	1.0	3.3	0.5	1.8	0.4	1.3
Annual Mean	0.5	1.4	0.6	1.9	0.5	1.8	0.5	1.8	0.4	1.5

Benzene Concentrations 2006

London Borough of Hackney

Month	**Site Code** Cowper Road ppb	ug m3	Green Lane ppb	ug m3	Seven Sisters ppb	ug m3	Hack College ppb	ug m3	Thorsby St ppb	ug m3
January	1.0	3.3	-	-	1.0	3.4	1.2	3.8	0.8	2.6
February	0.5	1.7	0.9	2.8	0.7	2.4	0.4	1.5	0.5	1.7
March	0.4	1.5	0.9	2.9	0.7	2.1	0.5	1.7	0.4	1.5
April	0.3	1.0	0.9	2.9	0.5	1.5	0.3	0.9	-	-
May	0.7	2.1	1.0	3.4	0.9	2.9	0.7	2.4	0.7	2.2
June	0.5	1.7	0.8	2.7	0.7	2.2	-	-	0.5	1.6
July	0.8	2.6	1.1	3.5	1.1	3.5	1.3	4.1	0.7	2.4
August	0.4	1.4	0.9	2.9	0.6	1.9	0.5	1.5	-	-
September	-	-	-	-	-	-	-	-	-	-
October	0.4	1.3	0.9	2.8	-	-	0.5	1.6	0.4	1.4
November	0.6	2.1	1.3	4.4	1.4	4.6	0.7	2.2	0.6	2.1
December	0.4	1.5	0.9	2.9	1.0	3.2	-	-	0.5	1.6
Annual Mean	0.5	1.8	1.0	3.1	0.9	2.8	0.7	2.2	0.6	1.9

Appendix D

Toluene Concentrations (ppb & $\mu g\ m^{-3}$)

Toluene Concentrations (2006)

Royal Borough of Kensington and Chelsea

Month	Site Code KC01 ppb	ug m3	KC02 ppb	ug m3	KC03 ppb	ug m3	KC0X ppb	ug m3	KC04 ppb	ug m3
January	3.5	13.6	2.5	9.6	15.8	60.4	-	-	-	-
February	2.6	10.1	2.1	7.9	20.4	78.0	-	-	2.4	9.0
March	2.2	8.5	1.6	6.3	14.7	56.1	-	-	2.5	9.7
April	1.4	5.3	1.3	4.8	10.0	38.5	-	-	0.9	3.6
May	2.7	10.4	2.1	8.1	-	-	-	-	1.3	4.9
June	4.3	16.3	4.0	15.2	-	-	10.4	39.7	21.3	81.6
July	2.6	10.0	1.0	3.7	-	-	4.8	18.3	1.8	7.0
August	4.1	15.6	-	-	-	-	10.6	40.7	2.6	10.0
September	4.9	18.8	-	-	-	-	12.8	49.0	4.0	15.2
October	2.7	10.4	1.8	6.9	-	-	7.9	30.1	-	-
November	4.7	18.0	2.2	8.5	-	-	10.1	38.7	3.1	11.8
December	2.2	8.3	1.7	6.5	-	-	8.7	33.2	2.2	8.4
Annual Mean	3.2	12.1	2.0	7.7	15.2	58.3	9.3	35.7	4.2	16.1

Month	KC05 ppb	ug m3
January	-	-
February	3.0	11.4
March	-	-
April	1.6	6.1
May	2.4	9.3
June	26.9	103.0
July	4.6	17.4
August	2.0	7.6
September	9.9	38.1
October	2.4	9.0
November	3.4	13.1
December	2.0	7.7
Annual Mean	5.8	22.3

Toluene Concentrations (2006)

City of London

Month	Site Code CL1 ppb	ug m3	CL2 ppb	ug m3	CL3 ppb	ug m3	CL4 ppb	ug m3	CL5 ppb	ug m3
January	3.2	12.2	3.7	14.3	-	-	2.6	10.0	2.0	7.8
February	1.4	5.5	1.8	7.1	1.5	5.7	1.8	6.9	2.0	7.8
March	2.3	8.9	1.9	7.3	2.7	10.3	2.3	8.9	2.6	9.9
April	1.3	5.1	1.5	5.6	1.2	4.7	1.1	4.1	1.2	4.7
May	-	-	-	-	2.6	9.9	2.4	9.2	2.9	11.0
June	1.9	7.1	1.8	6.8	1.6	6.0	1.8	6.9	1.4	5.5
July	1.9	7.1	1.9	7.4	1.4	5.2	1.9	7.4	13.1	50.2
August	-	-	-	-	-	-	-	-	-	-
September	4.9	18.7	1.4	5.5	3.9	15.1	3.4	13.2	1.9	7.4
October	2.0	7.6	2.1	8.1	2.5	9.5	1.7	6.6	1.8	6.7
November	3.4	12.8	2.9	11.2	4.8	18.6	3.0	11.6	2.7	10.4
December	7.4	28.5	9.2	35.1	3.2	12.2	3.1	12.0	2.7	10.3
Annual Mean	3.0	11.4	2.8	10.8	2.5	9.7	2.3	8.8	3.1	12.0
Month	CL6 ppb	ug m3	CL7 ppb	ug m3	CL8 ppb	ug m3	CL9 ppb	ug m3	CL10 ppb	ug m3
January	2.2	8.6	3.3	12.8	4.7	17.8	3.0	11.6	4.2	16.2
February	0.8	3.2	1.3	5.1	1.9	7.2	1.4	5.2	3.7	14.2
March	1.4	5.2	1.6	6.1	2.3	8.9	2.3	8.7	2.3	8.6
April	0.9	3.3	0.8	3.1	2.5	9.4	1.1	4.1	2.2	8.4
May	2.8	10.7	2.4	9.4	1.7	6.4	3.8	14.4	4.0	15.4
June	3.4	13.0	2.1	8.0	2.3	8.7	1.4	5.3	1.8	6.9
July	2.1	8.2	1.7	6.4	19.5	74.7	2.8	10.8	3.5	13.4
August	-	-	-	-	-	-	-	-	-	-
September	4.4	17.0	-	-	3.4	13.0	4.0	15.2	5.5	21.1
October	1.5	5.8	1.8	6.8	2.8	10.6	2.0	7.8	3.7	14.1
November	2.4	9.0	5.3	20.3	7.3	28.1	3.2	12.2	-	-
December	3.4	13.2	4.2	15.9	3.4	12.9	3.5	13.4	4.7	18.2
Annual Mean	2.3	8.8	2.5	9.4	4.7	18.0	2.6	9.9	3.6	13.6

Toluene Concentrations (2006)

London Borough of Hounslow

Month	**Site Code** HS BTEX1 ppb	ug m3	HS BTEX2 ppb	ug m3	HS BTEX3 ppb	ug m3	HS BTEX4 ppb	ug m3
January	3.4	12.9	3.3	12.7	4.6	17.5	2.8	10.7
February	2.8	10.9	1.4	5.3	1.6	6.2	1.6	6.1
March	1.9	7.1	1.1	4.4	2.6	9.9	1.4	5.4
April	0.7	2.8	-	-	1.5	5.8	1.6	6.2
May	1.5	5.8	1.1	4.1	1.7	6.4	1.2	4.5
June	-	-	1.8	6.9	2.1	8.1	2.8	10.5
July	2.7	10.2	2.5	9.7	2.3	8.9	4.3	16.3
August	-	-	-	-	-	-	-	-
September	2.8	10.9	3.5	13.6	1.4	5.4	3.3	12.4
October	1.7	6.5	1.1	4.3	1.7	6.4	1.6	6.1
November	3.0	11.6	1.7	6.5	2.6	9.9	2.3	8.9
December	2.3	8.7	-	-	7.4	28.5	2.7	10.2
Annual Mean	2.3	8.8	2.0	7.5	2.7	10.3	2.3	8.9

Toluene Concentrations (2006)

London Borough of Hounslow (continued)

Month	**Site Code** HS BTEX5 ppb	ug m3	HS BTEX6 ppb	ug m3	HS BTEX7 ppb	ug m3
January	3.1	12.0	4.5	17.3	4.2	16.1
February	1.6	6.0	2.8	10.9	1.5	5.8
March	1.7	6.4	2.5	9.4	1.8	6.9
April	1.4	5.4	2.2	8.4	1.0	3.7
May	1.9	7.4	2.7	10.2	1.6	6.3
June	1.3	5.2	2.8	10.8	1.6	6.2
July	2.9	11.3	4.5	17.0	3.0	11.7
August	-	-	-	-	-	-
September	1.8	6.8	4.4	17.0	4.0	15.2
October	1.4	5.4	3.0	11.5	1.5	5.7
November	2.7	10.5	3.9	14.8	2.7	10.2
December	7.9	30.4	3.8	14.7	-	-
Annual Mean	2.5	9.7	3.4	12.9	2.3	8.8

Toluene Concentrations (2006)

London Borough of Richmond

Month	Site Code RUT 2 ppb	ug m3	RUT 36 ppb	ug m3	RUT 35 ppb	ug m3	RUT 7 ppb	ug m3	Rut 32 ppb	ug m3
January	6.4	24.6	2.8	10.9	4.4	16.9	5.0	19.2	5.5	21.0
February	3.2	12.2	3.9	14.9	4.6	17.5	4.2	16.3	4.1	15.8
March	2.3	8.7	3.8	14.5	2.7	10.2	2.6	10.1	2.6	9.9
April	2.4	9.2	2.7	10.3	2.4	9.2	5.9	22.5	3.1	11.7
May	3.3	12.8	3.4	13.0	2.8	10.5	5.8	22.3	4.2	16.2
June	2.1	8.2	2.1	8.0	4.1	15.8	6.3	24.1	-	-
July	2.2	8.4	2.7	10.2	3.9	14.8	7.5	28.8	4.4	16.9
August	-	-	-	-	-	-	-	-	-	-
September	7.0	26.7	5.5	20.9	5.0	19.2	13.8	52.7	6.7	25.7
October	2.5	9.6	3.0	11.6	2.6	10.1	7.0	26.8	-	-
November	4.0	15.4	3.6	13.7	5.3	20.4	9.0	34.6	5.4	20.5
December	3.0	11.5	2.3	8.9	-	-	3.9	15.1	2.5	9.8
Annual Mean	3.5	13.4	3.2	12.4	3.8	14.5	6.5	24.8	4.3	16.4

Toluene Concentrations (2006)

London Borough of Sutton

Month	**Site Code** Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	-	-	-	-	-	-	-	-	-	-
February	3.3	12.5	1.5	5.9	1.4	5.4	2.1	7.9	1.4	5.4
March	2.5	9.5	2.1	8.1	2.2	8.5	3.3	12.8	1.8	7.0
April	-	-	0.2	1.0	0.5	2.1	0.6	2.1	0.8	3.0
May	2.1	7.9	2.9	11.3	3.9	15.0	1.6	6.2	1.4	5.5
June	1.6	6.1	1.0	3.7	1.6	5.9	0.9	3.6	1.3	5.0
July	2.2	8.5	1.0	4.0	1.6	6.0	3.0	11.6	1.2	4.4
August	-	-	-	-	-	-	-	-	-	-
September	1.5	5.6	2.4	9.3	3.5	13.6	3.5	13.6	3.4	12.8
October	1.7	6.3	0.9	3.5	1.3	5.0	1.2	4.5	1.2	4.6
November	2.5	9.5	1.7	6.5	1.6	6.0	2.4	9.0	1.8	6.8
December	2.4	9.1	6.1	23.3	2.8	10.8	1.7	6.3	3.0	11.5
Annual Mean	2.2	8.3	2.0	7.7	2.0	7.8	2.0	7.8	1.7	6.6

Toluene Concentrations (2006)

London Borough of Hackney

Month	**Site Code** Cowper rd ppb	ug m3	Green Lane ppb	ug m3	Seven Sis ppb	ug m3	Hack Coll ppb	ug m3	Thorsby St ppb	ug m3
January	2.3	8.8	-	-	2.9	11.0	4.1	15.7	2.0	7.8
February	2.2	8.5	3.1	11.9	3.2	12.2	2.1	8.2	1.9	7.1
March	0.5	1.5	0.7	2.1	0.7	2.1	0.4	1.4	0.5	1.6
April	8.1	31.1	11.7	44.6	11.5	43.9	9.9	38.0	8.4	32.0
May	1.6	6.1	4.4	16.7	1.9	7.2	1.1	4.1	-	-
June	30.5	117	31.3	120	32.5	124.5	30.8	117.8	33.9	129.8
July	1.3	5.0	2.9	11.0	2.7	10.5	2.1	8.2	1.3	5.0
August	3.5	13.5	6.6	25.5	4.6	17.4	4.4	16.8	-	-
September	-	-	-	-	-	-	-	-	-	-
October	1.2	4.8	3.6	13.6	-	-	1.8	6.8	1.6	6.1
November	3.9	15.1	4.8	18.4	6.1	23.2	5.2	19.8	3.6	13.8
December	1.2	4.7	2.5	9.6	3.5	13.4	-	-	1.7	6.5
Annual Mean	5.1	19.6	7.1	27.3	6.9	26.5	6.2	23.7	6.1	23.3

Appendix E

Ethyl Benzene Concentrations (ppb & µg m^{-3})

Ethyl Benzene Concentrations (2006)

Royal Borough of Kensington and Chelsea

Month	Site Code KC01 ppb	ug m3	KC02 ppb	ug m3	KC03 ppb	ug m3	KC0X ppb	ug m3	KC04 ppb	ug m3
January	0.4	1.9	0.2	1.0	6.1	26.9	-	-	-	-
February	0.3	1.1	0.2	0.7	2.4	10.8	-	-	0.2	0.7
March	0.2	0.9	0.1	0.4	1.6	7.1	-	-	0.1	0.4
April	0.1	0.4	0.1	0.4	1.1	4.8	-	-	0.1	0.3
May	0.4	1.6	0.2	0.7	-	-	-	-	0.2	0.7
June	0.5	2.3	0.3	1.4	-	-	1.1	4.9	1.5	6.7
July	0.5	2.4	0.2	0.9	-	-	0.6	2.8	0.4	1.7
August	0.4	1.8	-	-	-	-	0.9	4.0	0.2	1.0
September	0.3	1.3	-	-	-	-	0.8	3.6	0.2	0.9
October	0.4	1.9	0.3	1.3	-	-	0.9	4.0	-	-
November	0.7	2.9	0.4	1.7	-	-	1.6	7.1	0.5	2.1
December	2.7	11.9	2.2	9.8	-	-	2.5	11.0	2.4	10.6
Annual Mean	0.6	2.5	0.4	1.8	7.2	11.0	1.2	5.3	0.6	2.5

Month	KC05 ppb	ug m3
January	-	-
February	0.3	1.2
March	-	-
April	0.1	0.5
May	0.3	1.2
June	4.8	21.0
July	0.5	2.0
August	0.2	1.0
September	0.3	1.2
October	0.4	1.6
November	0.8	3.5
December	1.7	7.7
Annual Mean	0.9	4.1

Ethyl Benzene Concentrations (2006)

City of London

Month	Site Code CL1 ppb	ug m3	CL2 ppb	ug m3	CL3 ppb	ug m3	CL4 ppb	ug m3	CL5 ppb	ug m3
January	0.3	1.2	1.3	5.8	-	-	0.2	1.1	0.2	0.9
February	0.1	0.6	0.2	0.8	0.1	0.6	0.2	0.7	0.2	0.9
March	0.2	0.9	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.9
April	0.1	0.5	0.1	0.5	0.1	0.3	0.1	0.4	0.1	0.4
May	-	-	-	-	0.2	0.8	0.2	1.0	0.3	1.1
June	0.5	2.3	0.4	1.7	0.3	1.5	0.5	2.0	0.4	1.9
July	0.4	2.0	0.4	2.0	0.5	2.2	0.4	1.6	1.0	4.4
August	-	-	-	-	-	-	-	-	-	-
September	0.2	1.0	0.2	1.0	0.2	0.9	0.2	0.7	0.2	0.8
October	0.3	1.1	0.3	1.2	0.4	1.7	0.2	0.9	0.2	0.8
November	0.4	1.9	0.9	3.8	0.4	1.7	0.4	1.7	0.4	1.6
December	2.2	9.6	2.0	8.7	2.8	12.3	1.7	7.7	0.8	3.3
Annual Mean	0.5	2.1	0.6	2.6	0.5	2.3	0.4	1.7	0.4	1.5
Month	CL6 ppb	ug m3	CL7 ppb	ug m3	CL8 ppb	ug m3	CL9 ppb	ug m3	CL10 ppb	ug m3
January	0.3	1.1	0.3	1.4	0.4	1.6	0.3	1.3	0.6	2.7
February	0.1	0.2	0.1	0.4	0.1	0.6	0.1	0.6	0.5	2.1
March	0.1	0.5	0.1	0.4	0.2	1.1	0.2	0.8	0.2	0.9
April	0.1	0.4	0.0	0.2	0.2	1.1	0.1	0.3	0.2	1.0
May	0.2	1.0	0.2	0.9	0.2	0.9	0.4	1.6	0.4	1.7
June	0.8	3.5	0.5	2.3	2.0	8.8	0.3	1.1	0.3	1.5
July	0.5	2.3	0.4	1.8	1.1	5.0	0.4	1.9	0.2	0.9
August	-	-	-	-	-	-	-	-	-	-
September	0.1	0.5	-	-	0.4	1.7	0.2	0.9	0.4	1.9
October	0.2	0.7	0.2	0.8	0.4	1.7	0.2	0.9	0.5	2.2
November	0.3	1.2	0.4	1.7	0.5	2.3	0.4	1.8	-	-
December	1.4	6.1	1.6	6.9	2.4	10.6	1.9	8.3	1.4	6.0
Annual Mean	0.4	1.6	0.4	1.7	0.7	3.2	0.4	1.8	0.5	2.1

Ethyl Benzene Concentrations 2006

London Borough of Hounslow

Month	**Site Code** HS BTEX1 ppb	ug m3	HS BTEX2 ppb	ug m3	HS BTEX3 ppb	ug m3	HS BTEX4 ppb	ug m3
January	0.6	2.5	0.3	1.2	0.4	1.7	0.3	1.4
February	0.3	1.1	0.1	0.5	0.1	0.5	0.1	0.6
March	0.2	0.8	0.1	0.4	0.2	0.9	0.2	0.7
April	0.1	0.3	-	-	0.1	0.5	0.1	0.5
May	0.1	0.5	0.1	0.4	0.2	0.8	0.1	0.5
June	-	-	0.5	2.1	0.5	2.4	0.7	3.0
July	0.3	1.2	0.2	1.0	0.3	1.1	0.3	1.1
August	-	-	-	-	-	-	-	-
September	0.2	0.9	0.1	0.6	0.2	0.9	0.2	1.1
October	0.2	0.8	0.2	1.1	0.2	0.9	0.2	0.9
November	0.5	2.2	0.7	3.0	0.5	2.2	0.4	2.0
December	1.3	5.8	-	-	0.8	3.7	2.1	9.1
Annual Mean	0.4	1.6	0.3	1.2	0.3	1.4	0.4	1.9

Month	HS BTEX5 ppb	ug m3	HS BTEX6 ppb	ug m3	HS BTEX7 ppb	ug m3
January	0.7	3.1	1.1	4.9	1.1	4.7
February	0.1	0.6	0.3	1.4	0.1	0.5
March	0.4	1.8	0.3	1.2	0.2	0.7
April	0.1	0.5	0.2	0.8	0.1	0.2
May	0.1	0.6	0.6	2.5	0.4	1.6
June	0.5	2.1	0.4	2.0	0.4	1.6
July	0.2	0.9	0.4	1.9	0.2	1.0
August	-	-	-	-	-	-
September	0.1	0.6	0.4	1.6	0.2	0.9
October	0.1	0.6	0.4	1.8	0.2	0.7
November	0.4	1.9	0.6	2.5	0.8	3.3
December	1.8	7.8	1.7	7.4	-	-
Annual Mean	0.4	1.9	0.6	2.5	0.3	1.5

Ethyl Benzene Concentrations 2006

London Borough of Richmond

Month	**Site Code** RUT 2 ppb	ug m3	RUT 36 ppb	ug m3	RUT 35 ppb	ug m3	RUT 7 ppb	ug m3	Rut 32 ppb	ug m3
January	2.0	8.7	2.4	10.5	1.2	5.2	1.2	5.1	1.8	7.9
February	0.4	1.6	0.4	1.7	0.5	2.3	0.4	1.8	0.4	1.7
March	0.2	1.0	0.4	1.8	0.3	1.3	0.2	0.7	0.2	1.0
April	0.2	0.8	0.2	1.0	0.2	0.9	0.4	1.6	0.2	1.1
May	0.5	2.0	0.5	2.0	0.4	1.7	0.4	1.7	0.6	2.5
June	0.3	1.3	0.3	1.2	0.3	1.3	0.3	1.3	-	-
July	0.5	2.2	0.4	1.8	0.4	1.8	0.4	1.6	0.5	2.1
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.9	0.4	1.6	0.3	1.5	0.4	1.6	0.5	2.1
October	0.3	1.2	0.4	1.6	0.3	1.3	0.3	1.5	-	-
November	1.9	8.5	1.4	6.3	1.8	8.1	1.6	7.2	0.6	2.6
December	2.6	11.7	2.1	9.2	-	-	3.9	17.4	0.9	4.0
Annual Mean	0.8	3.7	0.8	3.5	0.6	2.5	0.9	3.8	0.6	2.8

Ethyl Benzene Concentrations 2006

London Borough of Sutton

Month	**Site Code** Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	-	-	-	-	-	-	-	-	-	-
February	0.8	2.5	0.5	1.5	0.5	1.5	0.6	1.9	0.5	1.6
March	0.4	1.3	0.4	1.2	0.5	1.8	0.6	1.8	0.4	1.5
April	-	-	0.2	0.6	0.3	0.9	0.3	0.9	0.4	1.2
May	0.5	1.8	0.4	1.2	0.6	1.9	0.4	1.3	0.4	1.2
June	0.5	1.6	0.5	1.5	0.5	1.6	0.4	1.4	0.5	1.6
July	0.5	1.6	0.4	1.4	0.5	1.5	0.7	2.2	0.4	1.4
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.3	0.3	0.9	0.4	1.2	0.4	1.3	0.4	1.2
October	0.5	1.6	0.3	1.1	0.4	1.4	0.5	1.5	0.4	1.3
November	0.7	2.4	0.6	1.9	0.6	2.0	0.6	2.0	0.5	1.7
December	0.5	1.7	0.5	1.5	0.4	1.3	0.4	1.4	0.5	1.6
Annual Mean	0.6	1.9	0.4	1.5	0.5	1.7	0.5	1.7	0.5	1.6

London Borough of Hackney Ethyl benzene

Month	Site Code Cowper rd ppb	ug m3	Green Lane ppb	ug m3	Seven Sis ppb	ug m3	Hack Coll ppb	ug m3	Thorsby St ppb	ug m3
January	9.8	0.3	0.0	0.0	21.5	0.6	30.8	0.9	5.9	0.2
February	4.2	0.1	10.4	0.3	<2	0.0	4.6	0.1	21.9	0.6
March	14.0	0.3	28.5	0.6	23.6	0.5	18.3	0.4	14.2	0.3
April	4.3	0.1	20.9	0.5	7.3	0.2	2.9	0.1	0.0	-
May	58.0	1.7	64.0	1.9	61.0	1.8	60.0	1.8	68.0	2.0
June	12.0	0.3	19.0	0.5	17.0	0.4	0.0	-	12.0	0.3
July	11.0	0.3	18.0	0.5	18.0	0.5	20.0	0.6	10.0	0.3
August	12.0	0.3	27.0	0.8	17.0	0.5	15.0	0.4	0.0	-
September	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-
October	11.0	0.2	26.0	0.5	0.0	-	16.0	0.3	15.0	0.3
November	66.8	1.7	65.6	1.7	58.2	1.5	74.9	1.9	50.4	1.3
December	69.2	1.7	50.2	1.2	106.1	2.6	0.0	-	88.8	2.2
Annual Mean	22.7	0.6	27.5	0.8	30.0	0.9	20.2	0.7	23.8	0.8

Appendix F

m, p-Xylene Concentrations (ppb & $\mu g\ m^{-3}$)

m, p-Xylene Concentrations 2006

Royal Borough of Kensington and Chelsea

Month	**Site Code** KC01 ppb	ug m3	KC02 ppb	ug m3	KC03 ppb	ug m3	KC04 ppb	ug m3	KC05 ppb	ug m3
January	0.8	3.5	0.2	1.0	5.8	25.8	-	-	-	-
February	0.8	3.7	0.5	2.2	8.3	36.5	0.4	1.9	1.0	4.3
March	0.7	3.1	0.3	1.3	5.8	25.8	0.3	1.3	-	-
April	0.3	1.1	0.2	1.1	3.1	13.5	0.0	0.0	0.3	1.5
May	0.5	2.4	0.2	1.0	0.3	1.1	0.2	1.0	0.4	1.7
June	1.4	6.0	0.6	2.8	3.3	14.6	3.3	14.4	8.9	39.2
July	1.3	5.7	0.4	1.7	1.6	7.0	0.7	3.3	0.9	4.0
August	1.3	5.6	-	-	3.2	14.2	0.6	2.6	0.6	2.7
September	1.0	4.5	-	-	3.1	13.6	0.7	2.9	0.9	4.0
October	1.3	5.7	0.8	3.4	2.9	12.8	-	-	1.0	4.5
November	2.2	9.5	1.1	5.0	4.7	20.6	1.3	5.9	2.1	9.2
December	4.3	19.1	3.3	14.5	5.0	22.3	3.6	15.8	3.1	13.5
Annual Mean	1.3	5.8	0.8	3.4	3.9	17.3	1.1	4.9	1.9	8.5

Corporation London

Month	Site Code CL1 ppb	ug m3	CL2 ppb	ug m3	CL3 ppb	ug m3	CL4 ppb	ug m3	CL5 ppb	ug m3
January	0.5	2.2	1.2	5.2	0.0	0.0	0.3	1.5	0.3	1.1
February	0.4	2.0	0.6	2.8	0.5	2.1	0.6	2.5	0.7	2.9
March	0.7	3.2	0.6	2.7	0.8	3.4	0.7	2.9	0.7	3.1
April	0.3	1.5	0.3	1.2	0.0	0.0	0.2	0.8	0.2	1.0
May	-	-	-	-	0.3	1.2	0.3	1.4	0.4	1.6
June	0.9	4.0	1.0	4.2	0.7	3.3	0.8	3.4	0.7	3.3
July	0.9	3.9	1.1	4.8	0.9	3.9	0.8	3.4	1.9	8.2
August	-	-	-	-	-	-	-	-	-	-
September	0.8	3.4	0.8	3.4	0.6	2.8	0.5	2.1	0.6	2.6
October	0.8	3.6	0.9	3.9	1.4	6.1	0.7	3.0	0.7	2.9
November	1.1	4.9	1.9	8.5	1.0	4.5	0.9	3.9	1.0	4.3
December	3.5	15.6	3.2	14.0	4.2	18.6	2.8	12.3	1.7	7.4
Annual Mean	1.0	4.4	1.0	4.6	0.9	3.8	0.7	3.1	0.7	3.2
Month	CL6 ppb	ug m3	CL7 ppb	ug m3	CL8 ppb	ug m3	CL9 ppb	ug m3	CL10 ppb	ug m3
January	0.4	1.6	0.6	2.5	0.8	3.4	0.6	2.5	1.6	7.0
February	0.2	0.8	0.3	1.3	0.4	1.9	0.4	1.8	1.6	7.2
March	0.4	2.0	0.3	1.4	0.8	3.7	0.6	2.8	0.8	3.7
April	0.2	0.9	0.0	0.0	0.7	2.9	0.0	0.0	0.7	3.0
May	0.3	1.4	0.3	1.2	0.3	1.1	0.5	2.4	0.5	2.1
June	1.8	7.9	1.1	4.7	3.6	15.9	0.6	2.5	0.9	4.1
July	1.3	5.7	0.9	4.1	3.0	13.1	1.3	5.8	0.2	0.9
August	-	-	-	-	-	-	-	-	-	-
September	0.4	1.7	-	-	1.4	6.1	0.6	2.7	1.5	6.6
October	0.4	1.9	0.5	2.4	1.2	5.5	0.6	2.8	1.7	7.4
November	0.6	2.8	0.9	3.9	1.5	6.6	1.0	4.3	-	-
December	2.1	9.4	2.5	11.1	3.8	16.6	3.0	13.3	2.6	11.2
Annual Mean	0.7	3.0	0.7	3.0	1.5	6.4	0.8	3.4	1.1	4.8

m, p-Xylene Concentrations 2006

London Borough of Hounslow

Month	**Site Code** HS BTEX1 ppb	ug m3	HS BTEX2 ppb	ug m3	HS BTEX3 ppb	ug m3	HS BTEX4 ppb	ug m3
January	0.4	2.0	0.4	1.7	0.8	3.3	0.6	2.6
February	0.8	3.7	0.4	1.6	0.4	1.7	0.4	1.9
March	0.6	2.8	0.3	1.3	0.6	2.9	0.6	2.5
April	0.2	0.8	-	-	0.3	1.2	0.3	1.3
May	0.2	0.7	0.1	0.4	0.2	1.0	0.2	0.7
June	-	-	0.7	3.0	0.9	3.8	1.1	4.7
July	0.7	3.2	0.5	2.3	0.7	2.9	0.7	3.0
August	-	-	-	-	-	-	-	-
September	0.6	2.6	0.4	1.7	0.5	2.4	0.7	3.3
October	0.6	2.6	0.8	3.6	0.6	2.6	0.6	2.6
November	1.3	5.6	1.5	6.5	1.2	5.4	1.1	4.8
December	2.2	9.5	2.5	10.8	1.4	6.2	3.2	14.2
Annual Mean	0.7	3.0	0.7	3.0	0.6	2.8	0.8	3.5

Month	HS BTEX5 ppb	ug m3	HS BTEX6 ppb	ug m3	HS BTEX7 ppb	ug m3
January	0.6	2.6	1.0	4.3	0.9	4.1
February	0.4	1.9	1.1	4.8	0.4	1.6
March	0.3	1.3	0.9	3.9	0.5	2.4
April	0.3	1.2	0.6	2.5	0.1	0.4
May	0.2	0.7	1.3	5.7	0.6	2.8
June	0.7	3.0	1.2	5.3	0.7	3.0
July	0.5	2.2	1.3	5.8	0.6	2.4
August	-	-	-	-	-	-
September	0.4	1.8	1.2	5.3	0.6	2.5
October	0.4	1.9	1.4	6.0	0.5	2.1
November	1.1	5.0	1.6	7.0	1.9	8.4
December	2.8	12.3	2.8	12.4	1.7	7.5
Annual Mean	0.6	2.8	1.2	5.2	0.7	3.1

m, p-Xylene Concentrations 2006

London Borough of Richmond

Month	Site Code RUT 2 ppb	ug m3	RUT 36 ppb	ug m3	RUT 35 ppb	ug m3	RUT 7 ppb	ug m3	Rut 32 ppb	ug m3
January	1.8	8.0	4.1	18.3	1.0	4.5	1.0	4.5	1.6	7.2
February	1.2	5.1	1.2	5.4	1.7	7.5	1.3	5.9	1.2	5.4
March	0.8	3.7	1.4	6.2	1.0	4.6	0.5	2.4	0.9	3.8
April	0.4	1.9	0.6	2.7	0.6	2.5	1.1	4.6	0.7	2.9
May	0.6	2.7	0.7	2.9	0.6	2.5	0.6	2.6	0.9	3.9
June	0.5	2.0	0.4	1.8	0.5	2.0	0.5	2.0	-	-
July	1.7	7.3	1.2	5.4	1.3	5.5	0.9	4.1	1.6	6.9
August	-	-	-	-	-	-	-	-	-	-
September	1.4	6.3	1.3	5.5	1.1	5.0	1.3	5.7	1.6	6.9
October	0.9	3.8	1.2	5.3	0.9	4.1	1.1	4.8	-	-
November	1.9	8.3	1.4	6.1	1.8	7.8	1.6	7.1	1.8	8.1
December	4.2	18.3	3.4	14.9	-	-	6.0	26.6	1.8	7.9
Annual Mean	1.4	6.1	1.5	6.8	1.0	4.6	1.4	6.4	1.3	5.9

m, p-Xylene Concentrations 2006

London Borough of Sutton

Month	Site Code Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
February	0.9	3.8	0.2	1.1	0.2	1.1	0.5	2.4	0.4	1.6
March	3.7	16.3	0.7	3.0	0.9	4.0	2.2	9.7	1.0	4.6
April	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May	0.4	1.8	0.2	1.0	0.6	2.5	0.2	1.0	0.2	0.9
June	0.7	3.1	0.5	2.3	0.7	3.0	0.4	1.8	0.8	3.4
July	0.9	4.0	0.4	1.9	0.7	2.9	1.0	4.3	0.5	2.2
August	-	-	-	-	-	-	-	-	-	-
September	0.5	2.2	0.3	1.1	0.5	2.2	0.5	2.3	0.5	2.0
October	0.5	2.3	0.2	0.9	0.4	2.0	0.4	1.7	0.4	1.6
November	1.0	4.5	4.3	19.0	1.6	6.9	0.8	3.7	0.8	3.7
December	0.8	3.5	2.2	9.5	2.2	9.7	1.0	4.4	5.7	24.9
Annual Mean	0.9	4.2	0.8	3.6	0.7	3.1	0.6	2.9	0.9	4.1

m, p-Xylene Concentrations 2006

London Borough of Sutton

Month	**Site Code** Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	-	-	-	-	-	-	-	-	-	-
February	0.9	3.8	0.2	1.1	0.2	1.1	0.5	2.4	0.4	1.6
March	3.7	16.3	0.7	3.0	0.9	4.0	2.2	9.7	1.0	4.6
April	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May	0.4	1.8	0.2	1.0	0.6	2.5	0.2	1.0	0.2	0.9
June	0.7	3.1	0.5	2.3	0.7	3.0	0.4	1.8	0.8	3.4
July	0.9	4.0	0.4	1.9	0.7	2.9	1.0	4.3	0.5	2.2
August	-	-	-	-	-	-	-	-	-	-
September	0.5	2.2	0.3	1.1	0.5	2.2	0.5	2.3	0.5	2.0
October	0.5	2.3	0.2	0.9	0.4	2.0	0.4	1.7	0.4	1.6
November	1.0	4.5	4.3	19.0	1.6	6.9	0.8	3.7	0.8	3.7
December	0.8	3.5	2.2	9.5	2.2	9.7	1.0	4.4	5.7	24.9
Annual Mean	0.9	4.2	0.8	3.6	0.7	3.1	0.6	2.9	0.9	4.1

Appendix G

o-Xylene Concentrations (ppb & μg m^{-3})

o-Xylene Concentrations 2006

Royal Borough of Kensington and Chelsea

Month	Site Code KC01 ppb	ug m3	KC02 ppb	ug m3	KC03 ppb	ug m3	KC04 ppb	ug m3	KC05 ppb	ug m3
January	0.4	1.6	0.1	0.6	2.4	10.6	-	-	-	-
February	0.3	1.4	0.2	0.9	3.0	13.2	0.2	0.8	0.4	1.7
March	0.3	1.1	0.1	0.6	2.0	8.7	0.1	0.6	-	-
April	0.1	0.4	0.1	0.5	1.1	4.7	0.0	0.0	0.1	0.6
May	0.4	1.8	0.2	0.9	0.2	0.9	0.2	0.8	0.3	1.2
June	0.5	2.2	0.2	1.0	1.2	5.1	1.2	5.3	1.7	7.5
July	0.5	2.1	0.1	34.0	0.6	2.4	0.3	1.1	0.3	1.4
August	0.5	2.0	-	-	1.1	5.0	0.2	0.9	0.2	0.9
September	0.4	1.6	-	-	1.1	4.9	0.2	1.0	0.3	1.4
October	0.5	2.0	0.3	1.2	1.0	4.5	-	-	0.4	1.6
November	0.7	3.2	0.4	1.9	1.5	6.6	0.5	2.0	0.7	3.1
December	1.0	4.3	0.7	3.0	1.5	6.5	0.9	4.1	0.8	3.6
Annual Mean	0.4	2.0	0.3	4.5	1.4	6.1	0.4	1.7	0.5	2.3

o-Xylene Concentrations 2006

City of London

Month	Site Code CL1 ppb	ug m3	CL2 ppb	ug m3	CL3 ppb	ug m3	CL4 ppb	ug m3	CL5 ppb	ug m3
January	0.2	0.9	0.4	1.6	0.0	0.0	0.2	0.8	0.1	0.6
February	0.2	0.7	0.2	1.0	0.2	0.8	0.2	0.9	0.2	1.0
March	0.3	1.3	0.3	1.2	0.4	1.6	0.3	1.2	0.3	1.2
April	0.1	0.5	0.1	0.5	0.0	0.0	0.1	0.3	0.1	0.3
May	-	-	-	-	0.2	1.1	0.3	1.1	0.3	1.3
June	0.3	1.3	0.3	1.3	0.2	1.0	0.2	1.0	0.2	1.0
July	0.3	1.3	0.4	1.7	0.3	1.1	0.3	1.1	0.5	2.3
August	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
September	0.2	1.1	0.2	1.1	0.2	1.0	0.2	0.7	0.2	0.9
October	0.3	1.2	-	-	0.5	2.0	0.2	0.9	0.2	1.0
November	0.4	1.7	0.6	2.8	0.3	1.5	0.3	1.3	0.3	1.5
December	0.7	3.3	0.7	2.9	0.8	3.5	0.6	2.5	0.5	2.1
Annual Mean	0.3	1.3	0.3	1.4	0.3	1.1	0.2	1.0	0.3	1.1
Month	CL6 ppb	ug m3	CL7 ppb	ug m3	CL8 ppb	ug m3	CL9 ppb	ug m3	CL10 ppb	ug m3
January	0.2	0.8	0.3	1.1	0.3	1.5	0.2	1.1	0.6	2.6
February	0.1	0.3	0.1	0.5	0.2	0.7	0.2	0.7	0.6	2.5
March	0.2	0.9	0.2	0.7	0.4	1.6	0.3	1.2	0.3	1.5
April	0.0	0.2	0.0	0.0	0.2	1.0	0.0	0.0	0.2	1.0
May	0.3	1.1	0.3	1.1	0.2	0.9	0.5	2.0	0.4	1.7
June	0.6	2.6	0.4	1.5	1.7	7.6	0.2	0.8	0.3	1.4
July	0.5	2.1	0.3	1.1	0.9	3.8	0.4	1.8	-	-
August	-	-	-	-	-	-	-	-	-	-
September	0.1	0.5	-	-	0.5	2.2	0.2	0.9	0.5	2.3
October	0.1	0.6	0.2	0.7	0.4	1.9	0.2	1.0	0.6	2.7
November	0.2	1.0	0.3	1.2	0.5	2.3	0.3	1.3	-	-
December	0.4	1.9	0.5	2.2	0.7	3.1	0.6	2.7	0.6	2.8
Annual Mean	0.2	1.0	0.2	0.9	0.5	2.2	0.3	1.1	0.4	1.9

London Borough of Hounslow o, Xylene

Month	**Site Code** HS BTEX1 ppb	ug m3	HS BTEX2 ppb	ug m3	HS BTEX3 ppb	ug m3	HS BTEX4 ppb	ug m3
January	0.2	0.9	0.2	0.8	0.3	1.4	0.2	1.1
February	0.4	1.6	0.1	0.6	0.2	0.7	0.2	0.8
March	0.3	1.2	0.1	0.6	0.3	1.3	0.3	1.1
April	0.1	0.3	-	-	0.1	0.5	0.1	0.5
May	0.1	0.6	0.1	0.2	0.2	0.7	0.1	0.6
June	-	-	0.2	0.8	0.3	1.2	0.3	1.4
July	0.2	1.0	0.2	0.7	0.2	0.9	0.2	0.9
August	-	-	-	-	-	-	-	-
September	0.2	0.9	0.1	0.6	0.2	0.9	0.3	1.1
October	0.2	0.9	0.3	1.2	0.2	0.9	0.2	0.9
November	0.4	1.9	0.5	2.1	0.4	1.9	0.4	1.7
December	0.5	2.0	0.6	2.6	0.3	1.4	0.6	2.8
Annual Mean	0.2	1.0	0.2	0.9	0.2	1.0	0.2	1.1

Month	HS BTEX5 ppb	ug m3	HS BTEX6 ppb	ug m3	HS BTEX7 ppb	ug m3
January	0.2	1.1	0.4	1.7	0.4	1.7
February	0.2	0.7	0.4	1.7	0.1	0.6
March	0.1	0.6	0.3	1.4	0.2	1.0
April	0.1	0.4	0.2	0.9	0.0	0.0
May	0.1	0.6	0.5	2.0	0.2	0.9
June	0.2	1.0	0.4	1.8	0.2	1.0
July	0.2	0.7	0.4	2.0	0.2	0.8
August	-	-	-	-	-	-
September	0.1	0.6	0.4	1.9	0.2	0.9
October	0.2	0.7	0.5	2.1	0.2	0.7
November	0.4	1.7	0.5	2.4	0.6	2.7
December	0.5	2.4	0.6	2.7	0.5	2.0
Annual Mean	0.2	0.9	0.4	1.7	0.2	1.0

o-Xylene Concentrations 2006

London Borough of Richmond

Month	**Site Code** RUT 2 ppb	ug m3	RUT 36 ppb	ug m3	RUT 35 ppb	ug m3	RUT 7 ppb	ug m3	Rut 32 ppb	ug m3
January	0.7	3.2	2.1	9.2	0.5	2.1	0.4	1.9	0.7	2.9
February	0.4	1.8	0.5	2.0	0.6	2.8	0.5	2.1	0.5	2.0
March	0.4	1.6	0.5	2.3	0.4	1.7	0.2	1.0	0.3	1.4
April	0.2	0.7	0.2	1.0	0.2	0.9	0.4	1.6	0.3	1.1
May	0.4	2.0	0.5	2.1	0.4	1.7	0.4	1.8	0.6	2.8
June	0.4	1.5	0.3	1.3	0.3	1.3	0.3	1.4	-	-
July	0.5	2.2	0.4	1.9	0.4	1.9	0.3	1.3	0.6	2.4
August	-	-	-	-	-	-	-	-	-	-
September	0.5	2.1	0.4	1.9	0.4	1.7	0.4	1.9	0.5	2.3
October	0.3	1.4	0.4	1.9	0.3	1.4	0.4	1.7	-	-
November	0.6	2.7	0.5	2.1	0.6	2.7	0.6	2.5	0.6	2.8
December	0.9	3.7	0.7	3.0	-	-	1.1	5.0	0.5	2.1
Annual Mean	0.4	1.9	0.5	2.4	0.4	1.7	0.4	1.9	0.5	2.0

o-Xylene Concentrations 2006

London Borough of Sutton

Month	Site Code Site 1 ppb	ug m3	Site 2 ppb	ug m3	Site 3 ppb	ug m3	Site 4 ppb	ug m3	Site 5 ppb	ug m3
January	-	-	-	-	-	-	-	-	-	-
February	0.3	1.5	0.1	0.6	0.1	0.5	0.2	0.9	0.2	0.7
March	1.5	6.7	0.3	1.4	0.4	1.7	0.9	4.1	0.5	2.1
April	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May	0.3	1.4	0.2	0.8	0.4	1.9	0.2	0.8	0.2	0.7
June	0.2	1.0	0.2	0.7	0.2	0.9	0.2	0.7	0.3	1.1
July	0.3	1.3	0.1	0.6	0.2	1.0	0.3	1.4	0.2	0.7
August	-	-	-	-	-	-	-	-	-	-
September	0.2	0.8	0.1	0.3	0.2	0.8	0.2	0.8	0.2	0.7
October	0.2	0.8	-	-	0.2	0.7	0.1	0.6	0.1	0.6
November	0.4	1.6	0.8	3.4	0.4	1.8	0.3	1.2	0.3	1.3
December	0.2	0.8	0.4	1.8	0.4	1.8	0.2	1.0	1.1	4.7
Annual Mean	0.4	1.6	0.2	1.0	0.2	1.0	0.2	1.0	0.3	1.1

London Borough of Hackney

Month	**Site Code** Cowper rd ppb	ug m3	Green Lane ppb	ug m3	Seven Sis ppb	ug m3	Hack Coll ppb	ug m3	Thorsby St ppb	ug m3
January	6.1	0.2	-	-	7.8	0.2	12.0	0.3	5.0	0.1
February	6.7	0.2	16.2	0.4	12.7	0.3	7.8	0.2	7.6	0.2
March	19.0	0.4	39.6	0.8	34.1	0.7	27.3	0.6	20.9	0.4
April	5.6	0.1	24.8	0.5	8.0	0.2	3.0	0.1	-	-
May	37.0	1.0	47.0	1.3	44.0	1.2	40.0	1.1	41.0	1.1
June	11.0	0.3	22.0	0.5	18.0	0.4	-	-	11.0	0.3
July	7.0	0.2	18.0	0.5	17.0	0.5	11.0	0.3	7.0	0.2
August	17.0	0.4	41.0	1.0	25.0	0.6	23.0	0.6	-	-
September	-	-	-	-	-	-	-	-	-	-
October	12.0	0.2	34.0	0.6	-	-	18.0	0.3	18.0	0.3
November	25.3	0.6	39.0	0.9	38.0	0.9	28.8	0.7	21.2	0.5
December	26.4	0.6	26.9	0.6	49.9	1.1	-	-	30.2	0.7
Annual Mean	14.4	0.4	25.7	0.7	21.2	0.6	14.2	0.5	13.5	0.4

Appendix H

Benzene / Toluene Ratios

Table 4 Benzene / Toluene Ratios

Borough	Site Code	Site Classification	Annual Benzene Concentration (ppb)	Annual Toluene Concentration (ppb)	Benzene: Toluene
Richmond	RUT 2	Roadside	0.8	3.5	1: 4
	RUT36	Roadside	1.0	3.2	1: 3
	RUT35	Roadside	0.8	3.8	1: 5
	RUT7	Roadside	0.7	6.5	1: 9
	RUT32	Roadside	0.9	4.3	1: 5
Kensington	KC01	Roadside	0.8	3.2	1: 4
	KC02	Background	0.6	2.0	1: 3
	KC03	Roadside/PS	-	-	1: -
	KC0X	Roadside/PS	-	-	1: -
	KC04	Background	0.8	4.2	1: 5
	KC05	Roadside	0.9	5.8	1: 6
Sutton	1	Roadside	0.6	2.2	1: 4
	2	Background	0.4	2.0	1: 5
	3	Background	0.5	2.0	1: 4
	4	Roadside	0.5	2.0	1: 4
	5	Background	0.5	1.7	1: 3
Hounslow	BTEX 1	Roadside	0.5	2.3	1: 5
	BTEX 2	Roadside	0.5	2.0	1: 4
	BTEX 3	Roadside	0.6	2.7	1: 5
	BTEX 4	Roadside	0.6	2.3	1: 4
	BTEX 5	Background	0.5	2.5	1: 5
	BTEX 6	Roadside	0.8	3.4	1: 4
	BTEX 7	Roadside	0.6	2.3	1: 4
City of	CL1	Roadside	0.6	3.0	1: 5
London	CL2	Roadside	0.6	2.8	1: 5
	CL3	Background	0.5	2.5	1: 5
	CL4	Roadside	0.5	2.3	1: 5
	CL5	Background	0.8	3.1	1: 4
	CL6	Background	0.5	2.3	1: 5
	CL7	Background	0.5	2.5	1: 5
	CL8	Roadside	1.1	4.7	1: 4
	CL9	Background	0.5	2.6	1: 5
	CL10	Roadside	0.9	3.6	1: 4
Hackney	Cowper rd	Background	0.5	5.1	1: 11
	Green Lane	Roadside	1.0	7.1	1: 7
	Seven Sis	Petrol Station	0.7	6.9	1: 10
	Hack College	Roadside	0.5	6.2	1: 12
	Thorsby st	Petrol Station	0.5	6.1	1: 13
Marylebone Road					
	Duplicate 1	Roadside	0.8	5.8	1: 7
	Duplicate 2	Roadside	0.8	6.7	1: 8

Note: Above ratio are approximated values, calculated using available data which may not be representative of a full year. However, these give a good indication of ratio between the two compounds.

Appendix I

Marylebone Road Duplicate BTEX Data

Hydrocarbon Network Comparison, Marylebone Road Duplicate Exposure

Benzene Diffusion Tube Results

Site Code	Tube Code	Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Jan-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK069	04/01/2006	13:35	25/01/2006	12:30	35	0.8	2.7	456	9.8	37.6	16	0.3	1.3	41	0.7	3.1	17	0.3	1.3
	BK070	04/01/2006	13:35	25/01/2006	12:30	42	1.0	3.2	573	12.3	47.2	22	0.4	1.8	60	1.0	4.5	24	0.4	1.8
Site Code	Tube Code	Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Feb-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK190	08/02/2006	11:55	20/02/2006	12:15	18	0.7	2.4	241	9.0	34.6	8	0.3	1.2	29	0.9	3.8	11	0.3	1.5
	BK191	08/02/2006	11:55	20/02/2006	12:15	16	0.6	2.1	370	13.9	53.2	7	0.2	1.0	24	0.7	3.2	10	0.3	1.3
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Mar-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK312	06/03/2006	11:55	23/03/2006	12:05	20	0.6	1.9	154	4.1	15.7	9	0.2	0.9	34	0.7	3.2	12	0.3	1.1
	BK313	06/03/2006	11:55	23/03/2006	12:05	20	0.6	1.9	145	3.8	14.7	9	0.2	0.9	32	0.7	3.0	12	0.2	1.1
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Apr-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK434	05/04/2006	12:15	28/04/2006	13:00	19	0.4	1.3	482	9.4	36.2	14	0.2	1.0	44	0.7	3.0	16	0.2	1.1
	BK435	05/04/2006	12:15	28/04/2006	13:00	19	0.4	1.3	572	11.2	42.9	14	0.2	1.0	42	0.7	2.9	16	0.2	1.1
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
May-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK562	11/05/2006	12:30	26/05/2006	12:19	26	0.9	2.8	146	4.4	16.8	27	0.7	3.1	70	1.7	7.4	24	0.6	2.5
	BK563	11/05/2006	12:30	26/05/2006	12:19	25	0.8	2.7	107	3.2	12.3	22	0.6	2.5	62	1.5	6.6	22	0.5	2.3
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Jun-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK679	26/05/2006	12:27	06/06/2006	11:55	15	0.7	2.2	91	3.7	14.3	11	0.4	1.7	29	1.0	4.2	9	0.3	1.3
	BK680	26/05/2006	12:27	06/06/2006	11:55	15	0.7	2.2	96	3.9	15.1	16	0.6	2.5	33	1.1	4.8	11	0.4	1.6
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Jul-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK798	20/06/2006	12:54	06/07/2006	12:50	21	0.7	2.1	109	3.1	11.8	18	0.4	1.9	59	1.3	5.9	20	0.4	1.9
	BK799	20/06/2006	12:54	06/07/2006	12:50	20	0.6	2.0	123	3.5	13.3	16	0.4	1.7	57	1.3	5.7	20	0.4	1.9
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Aug-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BK916	26/07/2006	17:45	07/08/2006	13:12															
	BK917	26/07/2006	17:45	07/08/2006	13:12															
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Sep-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BL35	16/08/2006	14:46	04/09/2006	12:40															
	BL36	16/08/2006	14:46	04/09/2006	12:40															
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Oct-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BL155	05/10/2006	11:50	20/10/2006	13:05	25	0.8	2.7	120	3.6	13.8	20	0.5	2.3	71	1.7	7.5	25	0.6	2.6
	BL156	05/10/2006	11:50	20/10/2006	13:05	22	0.7	2.4	114	3.4	13.1	18	0.5	2.0	67	1.6	7.1	23	0.5	2.4
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Nov-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BL276	16/11/2006	15:39	01/12/2006	14:38	38	1.3	4.1	154	4.6	17.7	74	1.9	8.4	151	3.6	16.0	41	1.0	4.2
	BL277	16/11/2006	15:39	01/12/2006	14:38	40	1.3	4.3	174	5.3	20.1	81	2.1	9.2	170	4.1	18.0	45	1.1	4.7
Site Code		Date On	Time On	Date Off	Time Off	Conc Tube (ng)	Benzene	Benzene		Toluene	Toluene		Ethylbenzene	Ethylbenzene		M+p-Xylene	M+p-Xylene		o-Xylene	o-Xylene
Dec-06							ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3		ppb	ug/m3
	BL404	20/12/2006	14:12	17/01/2007	11:26															
	BL405	20/12/2006	14:12	17/01/2007	11:26															