

**NPL REPORT
DQL-AS-016**

**UK Non-Automatic Hydrocarbon
Network:**

Annual Report for 2004

David Butterfield,
Kevin Whiteside &
Paul Quincey

NOT RESTRICTED

March 2005

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Approved on behalf of the Managing Director, NPL
by Dr Stuart Windsor, Business Leader, Analytical Science Group

Executive Summary

This report summarises operational matters and the data obtained by the Non-Automatic Hydrocarbon Network in the year 2004.

The background, methods used and site locations are given in Sections 1 and 2.

Annual average data for benzene and 1,3-butadiene, and data capture, are given in Section 3. No sites exceeded the European Limit Value for benzene or the UK Air Quality objectives for benzene and 1,3-butadiene.

Notable operational events in 2004 are summarised in Section 4.

Section 5 examines long term trends for benzene and 1,3-butadiene and compares them with the trends expected from the National Atmospheric Emissions Inventory. Trends over the period 1994 to 2002 are significantly downward and agree well between the two methods. Since this Network was set up in 2002 there has been an upward trend in benzene concentration that will merit investigation in future years.

Section 6 compares the 2004 Network data with the geographical distribution predicted by Defra modelling data. Measured concentrations of benzene at a large majority of background sites are higher than those predicted by the model, suggesting either that the emissions are underestimated or that meteorological factors were important. Concentrations of 1,3-butadiene are generally too low to allow any similar conclusion to be drawn.

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UK Non-Automatic Hydrocarbon Network

Annual Report for 2004

1. Introduction

Background, History and Methods

The Hydrocarbon Networks exist within the framework of Defra's Air Quality Science Programme, the aims of which are to determine the magnitude of sources, exposure and effects of air pollutants on human health and the natural environment, to develop a better understanding of underlying processes, and to underpin the development and implementation of national and international strategies in order to reduce impacts. The programmes include a combination of monitoring Networks, emission inventories, atmospheric modelling, strategic evaluation, scientific research and dissemination to assist in these aims.

The Automatic and Non-Automatic Hydrocarbon Networks were formed in 2002, following on from the previous Hydrocarbon Network, which measured 25 species of hydrocarbon on an hourly basis at 13 sites. As more benzene measuring sites were needed to comply with regulations, the Non-Automatic Network was set up using a less expensive method to produce benzene measurements every fortnight at 35 sites. Some of the sites are at the same location as the previous Hydrocarbon Network sites, so that long term trends can be evaluated.

The method for benzene involves pumping ambient air at a rate of about 10 ml/min through duplicate tubes containing the sorbent Carbopack X, with subsequent laboratory analysis of the benzene content of the tubes. This method was validated over a year- long pilot study, whose results are available through the Defra website:

http://www.airquality.co.uk/archive/reports/cat05/0407061411_btex_npl_pilot_final.pdf

The method is described in the paper:

Studies using the sorbent Carbopack X for measuring environmental benzene with Perkin-Elmer-type pumped and diffusive samplers

Nicholas A Martin, David J Marlow, Malcolm H Henderson, Brian A Goody and Paul G Quincey

Atmospheric Environment 37 (2003) 871-879

Alongside the benzene measurements, 1,3-butadiene is measured at 10 sites using a diffusive technique, also using Carbopack X as the sorbent. The method is described in the paper:

Studies using the sorbent Carbopack X for measuring environmental 1,3-butadiene with pumped and diffusive samplers

Nicholas A Martin, Philippa Duckworth, Malcolm H Henderson, Nigel R W Swann, Simon T

Granshaw, Robert P Lipscombe, Brian A Goody

Atmospheric Environment **39** (2005) 1069-1077

Units of Measurement

Regulations in the United Kingdom have in the past expressed concentrations of gases in units of molar parts per billion (1,000,000,000) - ppb. This is the ratio of the number of benzene molecules, for example, to the total number of molecules in the volume of air of interest. These units have the advantage that if the temperature or pressure of the air changes, the concentration remains the same.

Current UK and European legislation sets limit value concentrations as micrograms of pollutant per cubic metre of air ($\mu\text{g.m}^{-3}$). When these units are used without correcting to a standard temperature and pressure, the same "packet" of air will have a different concentration as these properties of the air change. The legislation specifies that the air volume must be corrected to be at a standard temperature of 293 K (about 20°C), and a pressure of 101.3 kPa (about average atmospheric pressure at sea level).

Both sets of units are used in this report.

The conversion factors between the two sets of units are:

for benzene	1 ppb = $3.25 \mu\text{g.m}^{-3}$
for 1,3-butadiene	1 ppb = $2.25 \mu\text{g.m}^{-3}$.

2. Map and Table of Sites at end 2004

At the end of 2004, the sites in the Network were located as follows:



Figure 1: map of sites across the United Kingdom

Table 1 lists the sites with their Local Site Operators and whether they also measure 1,3-butadiene.

Table 1: Network sites

Site Name	Local Site Operator	1,3-butadiene
Barnsley Gawber	Barnsley Council	
Belfast centre	Belfast City Council	Y
Belfast roadside	Belfast City Council	Y
Birmingham roadside	Birmingham City Council	Y
Bloomsbury	Casella Stanger	
Bournemouth	Bournemouth Borough C	
Bristol Old Market	Bristol City Council	Y
Coventry Memorial Park	Coventry City Council	
Cwmbran	Torfaen CBC	
Edinburgh	City of Edinburgh Council	
Grangemouth	Falkirk Council	Y
Haringey roadside	King's College London	Y
Hove roadside	Brighton and Hove City C	
Hull Freetown	Hull City Council	
Leamington Spa	Warwick District Council	
Leeds centre	Leeds City Council	Y
Leeds roadside	Leeds City Council	Y
Leicester centre	Leicester City Council	
Liverpool Speke	Faber Maunsell	
Manchester Piccadilly	Manchester City Council	
Middlesbrough	Middlesbrough Borough C	Y
Newcastle	Newcastle City Council	
Northampton	Northampton Borough C	
Norwich Centre	Faber Maunsell	
Nottingham centre	Nottingham City Council	
Oxford centre	Oxford City Council	
Plymouth	Plymouth City Council	
Portsmouth	Portsmouth City Council	
Reading	Reading Borough Council	
Sheffield	Sheffield City Council	
Southampton	Southampton City Council	
Southend-on-sea	Southend-on-Sea BC	
Stoke centre	City of Stoke on Trent	
Wigan-Leigh	Wigan Metropolitan BC	
Yarm	Stockton on Tees BC	

Further details on these sites can be found on the UK Automatic Urban and Rural Network Site Information Archive at:

<http://www.stanger.co.uk/siteinfo/>

3. Data and Data Capture for 2004

3.1 Benzene: Comparison with Limit Values and Objectives

Table 2: Benzene Annual Average Concentrations 1/1/04 to 31/12/04

Site Name	ppb	$\mu\text{g.m}^{-3*}$
Barnsley Gawber	0.41	1.33
Belfast centre	0.36	1.17
Belfast roadside	0.83	2.70
Birmingham roadside	0.94	3.06
Bloomsbury	0.51	1.66
Bournemouth	0.31	1.01
Bristol Old Market	0.94	3.06
Coventry Memorial Park	0.38	1.24
Cwmbran	0.26	0.85
Edinburgh	0.25	0.81
Grangemouth	0.51	1.66
Haringey roadside	0.83	2.70
Hove roadside	0.59	1.92
Hull Freetown	0.38	1.24
Leamington Spa	0.40	1.30
Leeds centre	0.42	1.37
Leeds roadside	0.95	3.09
Leicester centre	0.44	1.43
Liverpool Speke	0.49	1.59
Manchester Piccadilly	0.44	1.43
Middlesbrough	0.58	1.89
Newcastle	0.34	1.11
Northampton	0.35	1.14
Norwich Centre	0.40	1.30
Nottingham centre	0.51	1.66
Oxford centre	0.47	1.53
Plymouth	0.30	0.98
Portsmouth	0.33	1.07
Reading	0.34	1.11
Sheffield	0.45	1.46
Southampton	0.50	1.63
Southend-on-sea	0.39	1.27
Stoke centre	0.46	1.50
Wigan-Leigh	0.44	1.43
Yarm	0.96	3.12

* standardised to 293K and 101.3 kPa.

The annual average concentration of benzene at each site over the calendar year 2004 is given in Table 2. Some of the later data is unratified, but it is not expected to change significantly.

Concentrations at all sites were below the Limit Value of $5 \mu\text{g.m}^{-3}$ set by the 2nd European Daughter Directive 2000/69/EC.

Within the UK Air Quality Strategy Addendum, published in 2003, the objectives for benzene are:

- for England and Wales, an annual average of $5 \mu\text{g}/\text{m}^3$ to be achieved by 31 December 2010;
- for Scotland and Northern Ireland, a running annual mean of $3.25 \mu\text{g}/\text{m}^3$ to be achieved by 31 December 2010.

These objectives were met in 2004 for all sites.

Data capture figures are given in Table 3.

Table 3: Benzene Data Capture 1/1/04 – 31/12/04

Site	Data capture, %	Site	Data capture, %
Wigan-Leigh	49	Portsmouth	99
Liverpool Speke	69	Bloomsbury	100
Plymouth	92	Leeds Centre	100
Stoke Centre	92	Southend-on-Sea	100
Southampton	95	Northampton	100
Leamington Spa	95	Edinburgh	100
Newcastle	96	Hull Freetown	100
Sheffield	96	Haringey Roadside	100
Belfast Roadside	96	Norwich Centre	100
Hove Roadside	98	Reading	100
Leicester Centre	98	Middlesbrough	100
Nottingham Centre	98	Cwmbran	100
Belfast Centre	98	Bournemouth	100
Manchester Piccadilly	98	Grangemouth	100
Bristol Old Market	99	Yarm	100
Leeds Roadside	99	Coventry Memorial Park	100
Oxford Centre	99	Barnsley Gawber	100
Birmingham Roadside	99		

The reasons for data loss at those sites with less than 90% data capture were:

Wigan Leigh

01/01/04 – 03/02/04
03/02/04 – 13/03/04
end 09/04 onwards

Electrical supply problem at site
LSO failed to expose tubes
Site closed and moved to Wigan Centre (see Section 4)

Liverpool Speke

15/9/04 – 31/12/04

Data was deleted as an NPL six-monthly audit found that the sample line was sampling cabin air rather than ambient air. The pipework is understood to have been altered during AURN activities.

3.2 1,3-Butadiene: Comparison with Limit Values and Objectives

Annual average concentrations and data capture for 1,3-butadiene are given in Table 4.

Table 4: 1,3-butadiene measurements and data capture 1/1/04 – 31/12/04

Site	ppb	$\mu\text{g.m}^{-3}$ *	Data Capture, %
Grangemouth	0.13	0.29	26
Haringey Roadside	0.10	0.22	78
Birmingham Roadside	0.07	0.16	96
Leeds Roadside	0.07	0.16	93
Bristol Old Market	0.06	0.14	95
Belfast Centre	0.03	0.07	95
Belfast Roadside	0.03	0.07	95
Middlesbrough	0.03	0.07	100
Leeds Centre	0.02	0.04	96

* standardised to 293K and 101.3 kPa.

The method has a much higher measurement uncertainty below around 0.05 ppb, so that the values below the red line should be treated with caution.

All measured concentrations are below the United Kingdom Air Quality Strategy objective of $2.25 \mu\text{g/m}^3$ (1 ppb). There is no European Union Limit Value for 1,3-butadiene.

Reasons For Data Capture Below 90%:

Grangemouth Persistent theft of sampling tubes, a significant operating expense, had reduced data capture to such an extent that tubes have been withheld until security at the site is upgraded.

Haringey Roadside A change in LSO personnel resulted in tubes not being exposed for some of the summer period.

4. Notable Operational Events in 2004

4.1 Modification to Pump Box Design

The mass flow controller contains a 100µm orifice, which had become partially blocked at some sites. An additional 0.5µm filter was installed between the existing 30 µm filter and the mass flow controller, at all 35 sites, to extend mass flow controller lifetime.

4.2 Wigan-Leigh Site Relocation

Due to refurbishment of the building containing the site, the site at Leigh was closed at the end of September 2004. The equipment was moved to the Wigan Centre site and restarted in early October 2004. The AURN analysers have also been moved.

4.3 Grangemouth Diffusive Samplers

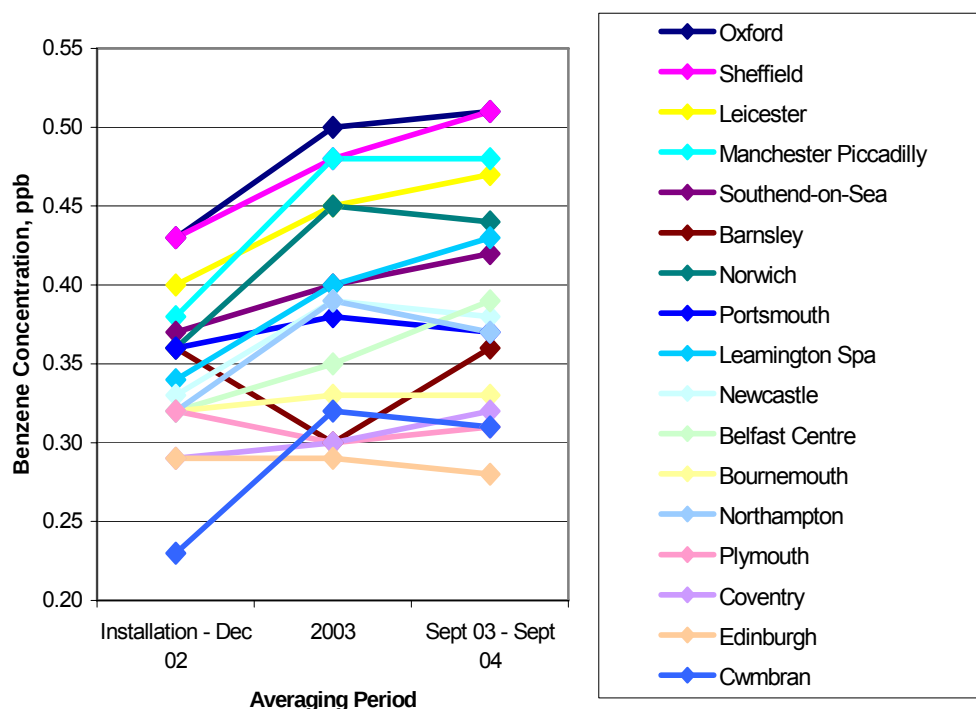
As noted in Section 3.2, the problem of theft of the diffusive tubes at the Grangemouth site resulted in the cessation of 1,3-butadiene monitoring while security at the site is upgraded.

5. Long Term Trends and Comparison with Emission Inventory

5.1 Benzene

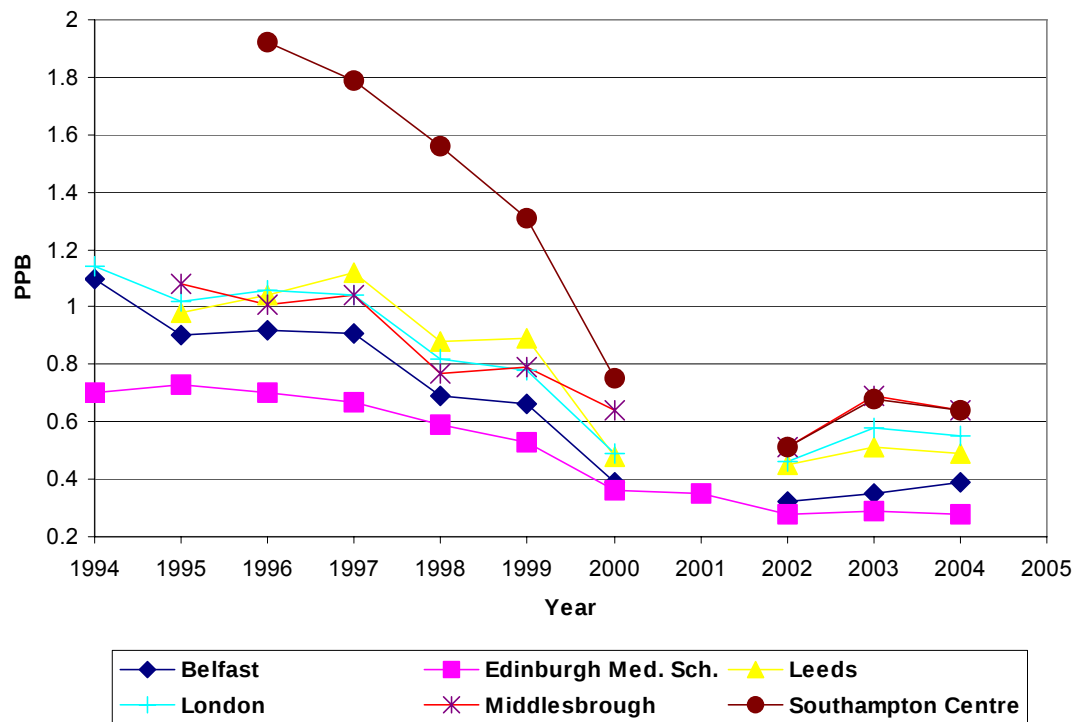
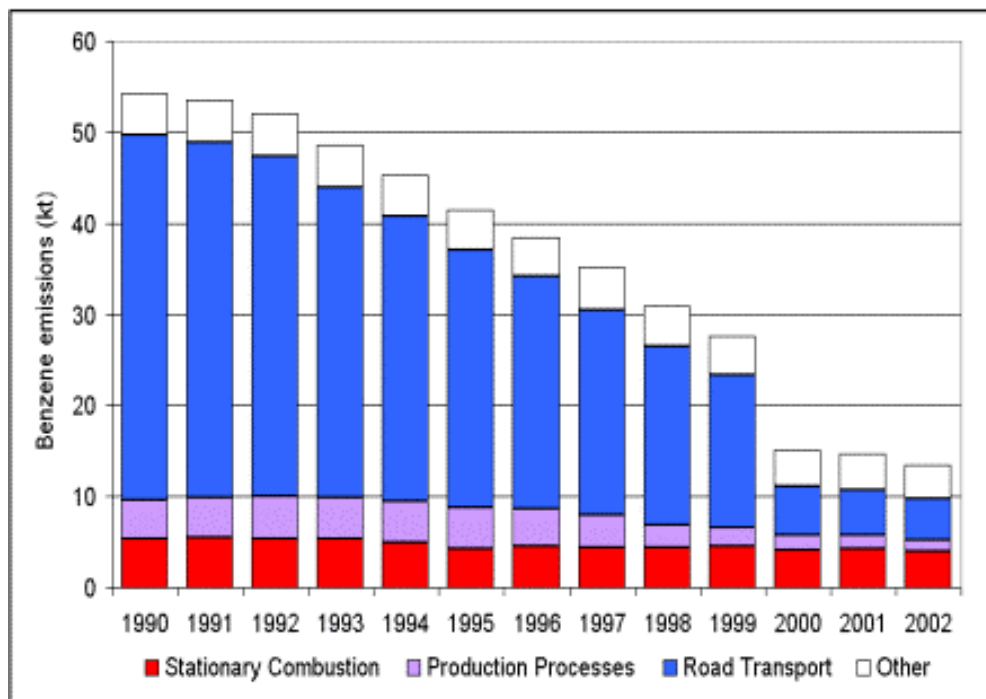
Benzene data from the three years of operation of the pumped samplers is shown in Figure 2. The results show a general increase over the period.

Figure 2: Recent Annual Average Benzene Concentrations



Longer term trends can be gauged from data at sites that were monitoring benzene in the previous Hydrocarbon Network. This is shown in Figure 3. The results show that the recent small increase follows a larger general decrease since 1994.

This long term trend is well matched by the trend predicted by the National Atmospheric Emissions Inventory, shown in Figure 4.

Figure 3: Long Term Trends in Benzene Concentration**Figure 4:** Emission Inventory Trend for Benzene

5.2 1,3-Butadiene

Figure 5 shows recent 1,3-butadiene data at sites where long term measurements are available. The downward trend follows the trend predicted by the National Atmospheric Emissions Inventory, shown in Figure 6.

Figure 5: Long Term Trends in 1,3-Butadiene Concentration

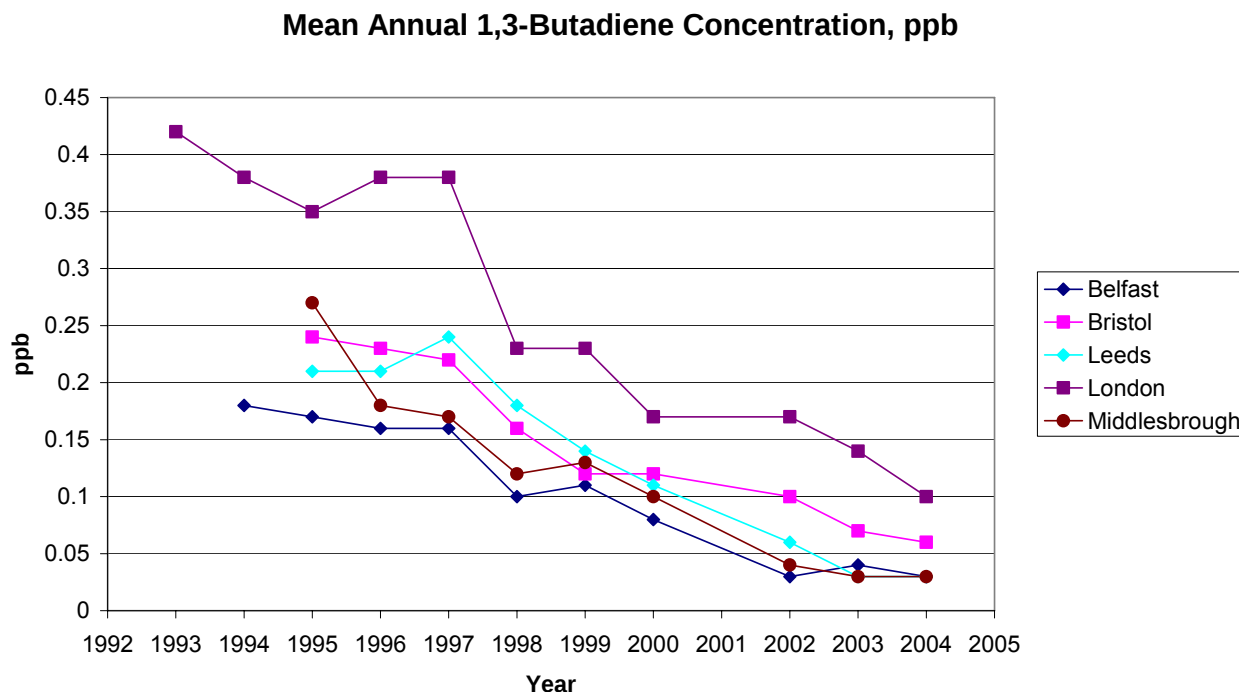
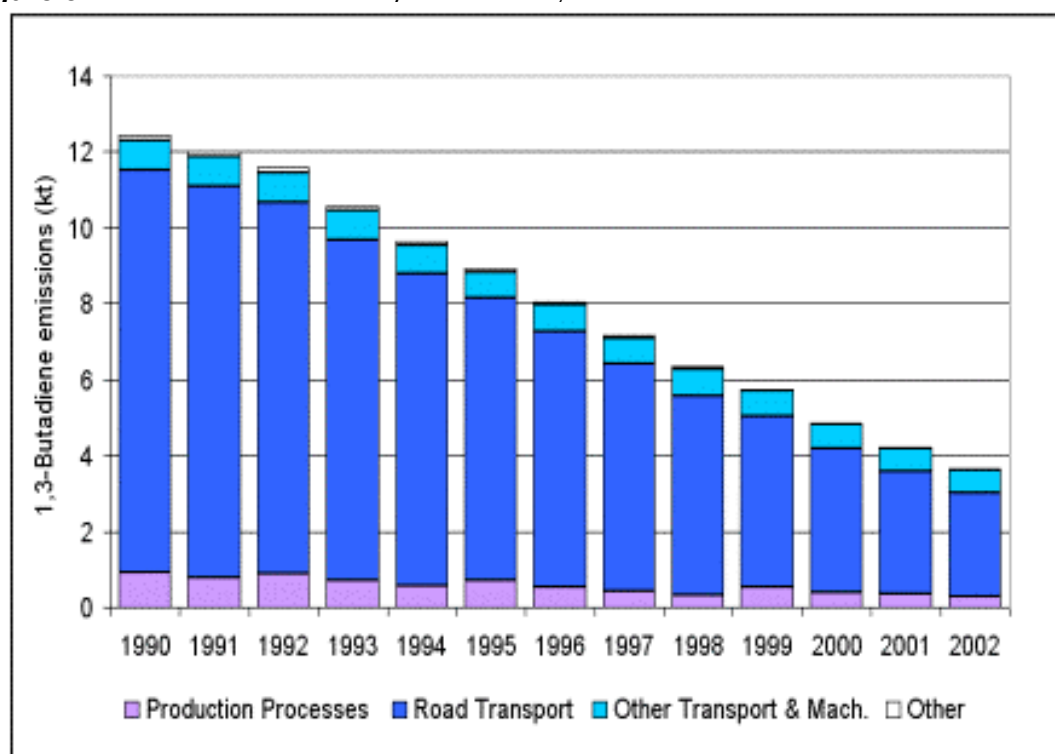


Figure 6: Emission Inventory Trend for 1,3-Butadiene



6. Geographical Distribution and comparison with modelling data

6.1 Benzene

Figure 7 shows the estimated annual mean background benzene concentrations in 2003, from modelling of emissions.

Figure 7: Estimated Mean Benzene Concentrations in 2003
(from http://www.airquality.co.uk/archive/laqm/tools/aq_maps_2001.pdf)

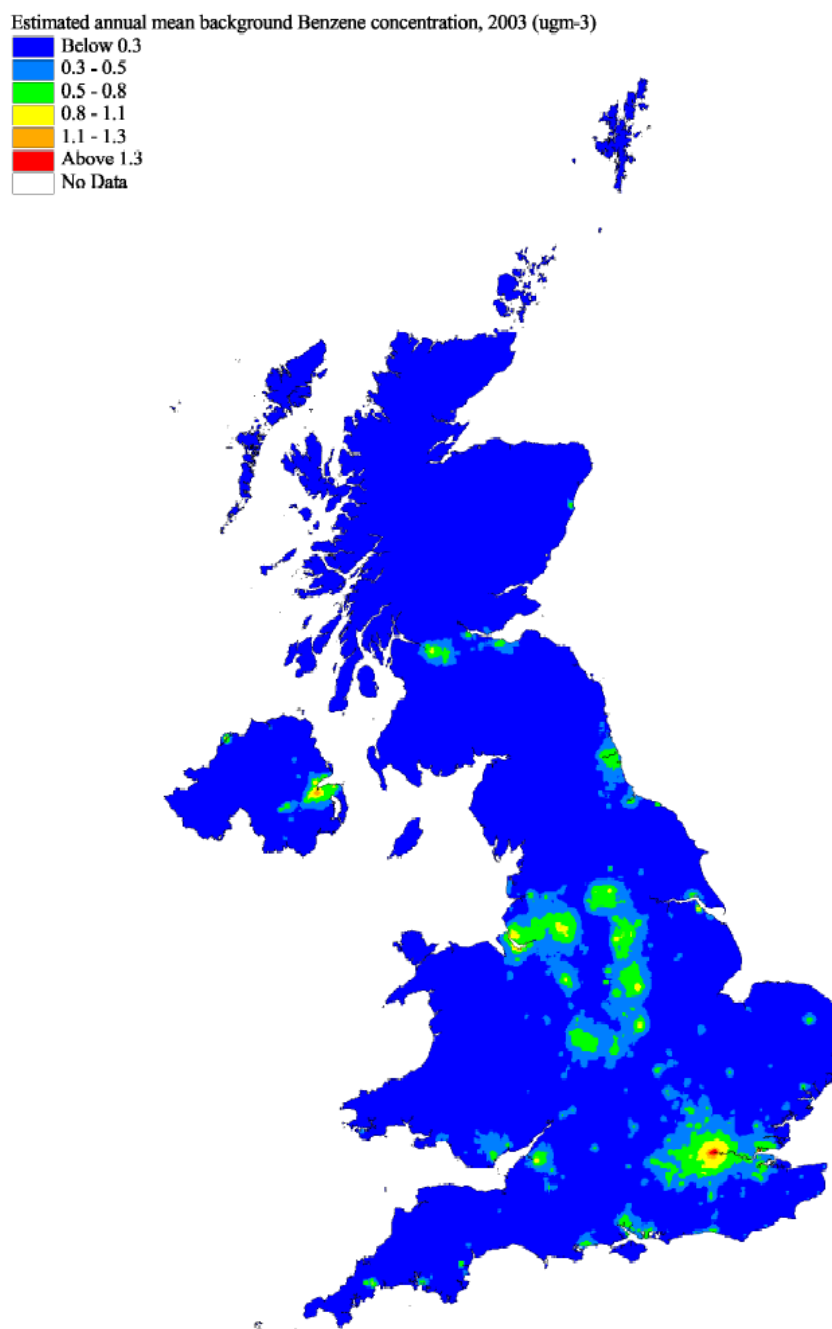


Table 5 compares the modelled concentration for each site in 2003, determined by inspection of the map, with the measured concentration for 2004.

Table 5: Comparison of Modelled and Measured Data for Benzene.

Site Name	Modelled zone ($\mu\text{g}/\text{m}^3$) 2003	Measured concentration ($\mu\text{g}/\text{m}^3$) 2004	Measured is High, Low, or Agrees?	Comment
Barnsley Gawber	0.5-0.8	1.3	H	Roadside site
Belfast centre	1.1-1.3	1.2	A	
Belfast roadside	1.1-1.3	2.7	H	Roadside site
Birmingham roadside	0.5-0.8	3.1	H	Roadside site
Bloomsbury	>1.3	1.7	A	Roadside site
Bournemouth	0.5-0.8	1.0	H	
Bristol Old Market	0.8-1.1	3.1	H	Roadside site
Coventry Memorial Park	0.5-0.8	1.2	H	Roadside site
Cwmbran	0.5-0.8	0.8	A	
Edinburgh	0.5-0.8	0.8	A	Industrial site
Grangemouth	0.3-0.5	1.7	H	
Haringey roadside	0.8-1.1	2.7	H	Roadside site
Hove roadside	0.5-0.8	1.9	H	Roadside site
Hull Freetown	0.5-0.8	1.2	H	Roadside site
Leamington Spa	0.5-0.8	1.3	H	
Leeds centre	0.8-1.1	1.4	H	Roadside site
Leeds roadside	0.8-1.1	3.1	H	
Leicester centre	0.8-1.1	1.4	H	Industrial site
Liverpool Speke	0.8-1.1	1.6	H	
Manchester Piccadilly	0.8-1.1	1.4	H	Industrial site
Middlesbrough	0.5-0.8	1.9	H	
Newcastle	0.5-0.8	1.1	H	Industrial site
Northampton	0.5-0.8	1.1	H	
Norwich Centre	0.5-0.8	1.3	H	Industrial site
Nottingham centre	0.8-1.1	1.7	H	
Oxford centre	0.5-0.8	1.5	H	Industrial site
Plymouth	0.5-0.8	1.0	H	
Portsmouth	0.5-0.8	1.1	H	Industrial site
Reading	0.5-0.8	1.1	H	
Sheffield	0.8-1.1	1.5	H	Industrial site
Southampton	0.5-0.8	1.6	H	
Southend-on-sea	0.5-0.8	1.3	H	Industrial site
Stoke centre	0.8-1.1	1.5	H	
Wigan-Leigh	0.5-0.8	1.4	H	Roadside site
Yarm	0.3-0.5	3.1	H	

The roadside or industrial sites all measure higher than the modelling estimates, as would be expected given that the estimates are for background concentrations. However, the fact that the large majority of background sites also have higher modelled concentrations than the estimates suggest either that the emissions are underestimated or that meteorological factors played a role in increasing annual average concentrations.

6.2 1,3-Butadiene

Figure 8 shows the estimated annual mean background 1,3-butadiene concentrations in 2003, from modelling of emissions.

Figure 8: Estimated Mean 1,3-Butadiene Concentrations in 2003
(from http://www.airquality.co.uk/archive/laqm/tools/aq_maps_2001.pdf)

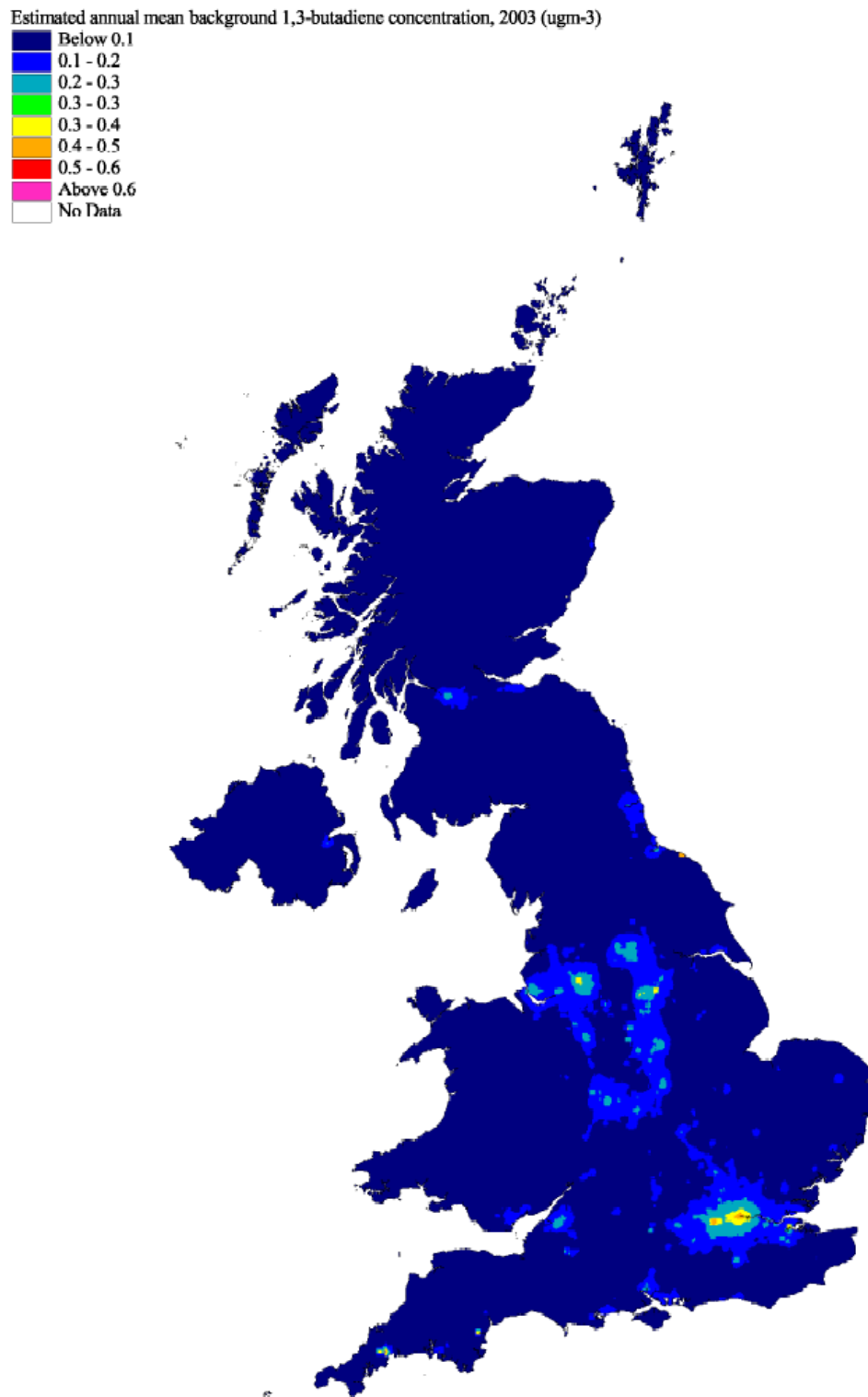


Table 6 compares the modelled concentrations for each site for 2003, determined by inspection of the map, with the measured concentration for 2004.

Table 6: Comparison of modelled and measured data for 1,3-butadiene.

Site Name	Modelled zone ($\mu\text{g}/\text{m}^3$) 2003	Measured concentration ($\mu\text{g}/\text{m}^3$) 2004	Measured is High, Low, or Agrees?	Comment
Belfast centre	0.1-0.2	0.1	A	
Belfast roadside	0.1-0.2	0.1	A	Roadside site
Birmingham roadside	0.2-0.3	0.2	A	Roadside site
Bristol Old Market	0.2-0.3	0.1	L	Roadside site
Grangemouth	0.1-0.2	0.3	H	Industrial site
Haringey roadside	0.2-0.3	0.2	A	Roadside site
Leeds centre	0.2-0.3	0.0	L	
Leeds roadside	0.2-0.3	0.2	A	Roadside site
Middlesbrough	0.1-0.2	0.1	A	Industrial site

Apart from Grangemouth, where the relatively elevated concentration can be attributed to the local oil refinery, measured concentrations of 1,3-butadiene are found to be on the low side of the estimated concentrations, in contrast to the benzene results. This might suggest that 1,3-butadiene estimates are overestimated, but it is more likely that the accuracy of the measurement technique at these low concentrations limits the conclusions that can be drawn from the comparison.

Annex 1a – Fortnightly data - Benzene

Site	Start Date	End Date	Benzene, ppb
Barnsley Gawber	30/12/2003	13/01/2004	0.39
	13/01/2004	28/01/2004	0.36
	28/01/2004	11/02/2004	0.20
	11/02/2004	25/02/2004	0.46
	25/02/2004	10/03/2004	1.53
	10/03/2004	25/03/2004	0.24
	25/03/2004	07/04/2004	0.34
	07/04/2004	21/04/2004	0.24
	21/04/2004	29/04/2004	0.37
	29/04/2004	19/05/2004	0.80
	19/05/2004	02/06/2004	0.35
	02/06/2004	16/06/2004	0.23
	16/06/2004	01/07/2004	0.10
	01/07/2004	14/07/2004	0.10
	14/07/2004	28/07/2004	0.24
	28/07/2004	11/08/2004	0.16
	11/08/2004	25/08/2004	0.21
	25/08/2004	08/09/2004	0.23
	08/09/2004	22/09/2004	0.21
	22/09/2004	06/10/2004	0.13
	06/10/2004	20/10/2004	0.34
	20/10/2004	03/11/2004	0.27
	03/11/2004	17/11/2004	0.55
	17/11/2004	29/11/2004	0.35
	29/11/2004	15/12/2004	1.01
	15/12/2004	29/12/2004	1.40
Belfast Centre	30/12/2003	13/01/2004	0.33
	13/01/2004	27/01/2004	0.64
	27/01/2004	04/02/2004	0.40
	04/02/2004	10/02/2004	0.50
	10/02/2004	24/02/2004	0.88
	24/02/2004	09/03/2004	0.46
	09/03/2004	18/03/2004	0.47
	24/03/2004	06/04/2004	0.36
	06/04/2004	20/04/2004	0.32
	20/04/2004	04/05/2004	0.31
	04/05/2004	18/05/2004	0.30
	18/05/2004	01/06/2004	0.20
	01/06/2004	15/06/2004	0.19
	15/06/2004	29/06/2004	0.18
	29/06/2004	14/07/2004	0.22
	14/07/2004	27/07/2004	0.19

Site	Start Date	End Date	Benzene, ppb
	27/07/2004	10/08/2004	0.17
	10/08/2004	24/08/2004	0.27
	24/08/2004	07/09/2004	0.21
	07/09/2004	21/09/2004	0.30
	21/09/2004	05/10/2004	0.20
	05/10/2004	19/10/2004	0.55
	19/10/2004	02/11/2004	0.44
	02/11/2004	16/11/2004	0.29
	16/11/2004	30/11/2004	0.27
	30/11/2004	14/12/2004	0.80
	14/12/2004	29/12/2004	0.36
Belfast Roadside	30/12/2003	13/01/2004	0.69
	13/01/2004	27/01/2004	1.51
	27/01/2004	04/02/2004	1.24
	04/02/2004	10/02/2004	0.95
	10/02/2004	24/02/2004	1.65
	24/02/2004	09/03/2004	1.26
	09/03/2004	23/03/2004	0.79
	23/03/2004	06/04/2004	0.85
	06/04/2004	20/04/2004	0.81
	20/04/2004	04/05/2004	0.76
	04/05/2004	18/05/2004	0.84
	01/06/2004	15/06/2004	0.57
	15/06/2004	29/06/2004	0.45
	29/06/2004	14/07/2004	0.54
	14/07/2004	27/07/2004	0.41
	27/07/2004	10/08/2004	0.37
	10/08/2004	12/08/2004	0.77
	12/08/2004	24/08/2004	0.67
	24/08/2004	07/09/2004	0.56
	07/09/2004	21/09/2004	0.73
	21/09/2004	05/10/2004	0.65
	05/10/2004	19/10/2004	0.91
	19/10/2004	02/11/2004	0.70
	02/11/2004	16/11/2004	0.65
	16/11/2004	30/11/2004	0.77
	30/11/2004	14/12/2004	1.33
	14/12/2004	29/12/2004	0.93
Birmingham Roadside	08/01/2004	22/01/2004	0.68
	22/01/2004	05/02/2004	0.56
	05/02/2004	19/02/2004	1.26
	19/02/2004	04/03/2004	1.43
	04/03/2004	18/03/2004	1.67
	18/03/2004	01/04/2004	1.27
	01/04/2004	15/04/2004	1.09
	15/04/2004	29/04/2004	1.14

Site	Start Date	End Date	Benzene, ppb
	13/05/2004	27/05/2004	1.44
	18/05/2004	01/06/2004	0.47
	27/05/2004	10/06/2004	0.82
	10/06/2004	24/06/2004	0.60
	24/06/2004	07/07/2004	0.26
	08/07/2004	22/07/2004	0.67
	22/07/2004	05/08/2004	0.87
	05/08/2004	19/08/2004	0.78
	19/08/2004	02/09/2004	0.66
	02/09/2004	16/09/2004	1.17
	16/09/2004	30/09/2004	0.53
	30/09/2004	14/10/2004	1.54
	14/10/2004	11/11/2004	1.28
	11/11/2004	25/11/2004	0.69
	25/11/2004	09/12/2004	0.93
	09/12/2004	23/12/2004	1.28
	23/12/2004	06/01/2005	0.51
Bloomsbury	07/01/2004	21/01/2004	0.50
	21/01/2004	04/02/2004	0.39
	04/02/2004	18/02/2004	0.61
	18/02/2004	04/03/2004	0.66
	04/03/2004	17/03/2004	0.72
	17/03/2004	30/03/2004	0.52
	30/03/2004	14/04/2004	0.60
	14/04/2004	29/04/2004	0.61
	29/04/2004	12/05/2004	0.66
	12/05/2004	27/05/2004	0.52
	27/05/2004	09/06/2004	0.43
	09/06/2004	24/06/2004	0.28
	24/06/2004	08/07/2004	0.61
	07/07/2004	23/07/2004	0.38
	23/07/2004	28/07/2004	0.36
	28/07/2004	12/08/2004	0.34
	12/08/2004	08/09/2004	0.28
	08/09/2004	21/09/2004	0.42
	21/09/2004	07/10/2004	0.40
	07/10/2004	22/10/2004	0.38
	22/10/2004	02/11/2004	0.38
	02/11/2004	16/11/2004	0.54
	16/11/2004	30/11/2004	0.59
	30/11/2004	14/12/2004	1.13
	14/12/2004	29/12/2004	0.58
Bournemouth	30/12/2003	13/01/2004	0.44
	13/01/2004	27/01/2004	0.42
	27/01/2004	10/02/2004	0.36
	10/02/2004	24/02/2004	0.59

Site	Start Date	End Date	Benzene, ppb
	24/02/2004	09/03/2004	0.68
	09/03/2004	23/03/2004	0.37
	23/03/2004	06/04/2004	0.39
	06/04/2004	20/04/2004	0.29
	20/04/2004	04/05/2004	0.28
	04/05/2004	18/05/2004	0.24
	18/05/2004	01/06/2004	0.27
	01/06/2004	15/06/2004	0.16
	15/06/2004	29/06/2004	0.09
	29/06/2004	13/07/2004	0.12
	13/07/2004	26/07/2004	0.15
	26/07/2004	10/08/2004	0.13
	10/08/2004	24/08/2004	0.09
	24/08/2004	07/09/2004	0.26
	07/09/2004	21/09/2004	0.21
	21/09/2004	05/10/2004	0.20
	05/10/2004	19/10/2004	0.37
	19/10/2004	02/11/2004	0.18
	02/11/2004	16/11/2004	0.28
	16/11/2004	30/11/2004	0.43
	30/11/2004	14/12/2004	0.97
	14/12/2004	29/12/2004	0.38
Bristol Old Market	30/12/2003	14/01/2004	0.99
	14/01/2004	28/01/2004	1.15
	28/01/2004	11/02/2004	0.80
	11/02/2004	25/02/2004	1.61
	25/02/2004	11/03/2004	1.21
	11/03/2004	24/03/2004	0.87
	24/03/2004	07/04/2004	1.04
	07/04/2004	21/04/2004	0.98
	21/04/2004	05/05/2004	1.10
	05/05/2004	19/05/2004	1.01
	19/05/2004	02/06/2004	0.94
	02/06/2004	16/06/2004	0.50
	16/06/2004	30/06/2004	0.41
	30/06/2004	14/07/2004	0.77
	14/07/2004	27/07/2004	0.72
	27/07/2004	10/08/2004	0.70
	10/08/2004	25/08/2004	0.48
	25/08/2004	08/09/2004	0.80
	08/09/2004	20/09/2004	0.80
	20/09/2004	06/10/2004	0.58
	06/10/2004	20/10/2004	1.46
	20/10/2004	03/11/2004	1.06
	03/11/2004	17/11/2004	0.86
	17/11/2004	01/12/2004	1.38
	01/12/2004	15/12/2004	1.39

Site	Start Date	End Date	Benzene, ppb
	15/12/2004	29/12/2004	1.27
Coventry Memorial Park	30/12/2003	13/01/2004	0.24
	13/01/2004	27/01/2004	0.40
	27/01/2004	11/02/2004	0.30
	11/02/2004	24/02/2004	0.53
	24/02/2004	09/03/2004	0.42
	09/03/2004	23/03/2004	0.34
	23/03/2004	06/04/2004	0.34
	06/04/2004	20/04/2004	0.31
	20/04/2004	04/05/2004	0.38
	04/05/2004	19/05/2004	0.32
	19/05/2004	02/06/2004	0.16
	02/06/2004	15/06/2004	0.15
	15/06/2004	29/06/2004	0.11
	29/06/2004	13/07/2004	0.13
	13/07/2004	27/07/2004	0.17
	27/07/2004	10/08/2004	0.31
	10/08/2004	24/08/2004	0.26
	24/08/2004	07/09/2004	0.26
	07/09/2004	21/09/2004	0.33
	21/09/2004	05/10/2004	0.28
	05/10/2004	19/10/2004	0.81
	19/10/2004	02/11/2004	1.12
	02/11/2004	16/11/2004	0.89
	16/11/2004	30/11/2004	0.43
	30/11/2004	14/12/2004	0.48
Cwmbran	05/01/2004	13/01/2004	0.36
	13/01/2004	27/01/2004	0.26
	27/01/2004	12/02/2004	0.40
	12/02/2004	02/03/2004	0.30
	02/03/2004	16/03/2004	0.42
	16/03/2004	30/03/2004	0.30
	30/03/2004	14/04/2004	0.29
	14/04/2004	05/05/2004	0.19
	05/05/2004	18/05/2004	0.38
	18/05/2004	02/06/2004	0.17
	02/06/2004	16/06/2004	0.15
	16/06/2004	29/06/2004	0.10
	29/06/2004	15/07/2004	0.10
	15/07/2004	27/07/2004	0.14
	27/07/2004	10/08/2004	0.18
	10/08/2004	25/08/2004	0.15
	25/08/2004	07/09/2004	0.20
	07/09/2004	23/09/2004	0.18
	23/09/2004	11/10/2004	0.36

Site	Start Date	End Date	Benzene, ppb
	11/10/2004	27/10/2004	0.09
	27/10/2004	15/11/2004	0.28
	15/11/2004	07/12/2004	0.37
	07/12/2004	17/12/2004	0.40
	17/12/2004	04/01/2005	0.38
Edinburgh	31/12/2003	14/01/2004	0.28
	14/01/2004	28/01/2004	0.38
	28/01/2004	11/02/2004	0.33
	11/02/2004	25/02/2004	0.59
	25/02/2004	10/03/2004	0.43
	10/03/2004	24/03/2004	0.32
	24/03/2004	07/04/2004	0.31
	07/04/2004	21/04/2004	0.21
	21/04/2004	05/05/2004	0.24
	05/05/2004	19/05/2004	0.21
	19/05/2004	02/06/2004	0.17
	02/06/2004	16/06/2004	0.12
	16/06/2004	30/06/2004	0.12
	30/06/2004	14/07/2004	0.16
	14/07/2004	28/07/2004	0.14
	28/07/2004	11/08/2004	0.27
	11/08/2004	25/08/2004	0.18
	25/08/2004	08/09/2004	0.14
	08/09/2004	22/09/2004	0.23
	22/09/2004	06/10/2004	0.14
	06/10/2004	20/10/2004	0.42
	20/10/2004	03/11/2004	0.33
	03/11/2004	17/11/2004	0.15
	17/11/2004	01/12/2004	0.26
	01/12/2004	15/12/2004	0.28
	15/12/2004	29/12/2004	0.29
Grangemouth	06/01/2004	15/01/2004	0.38
	15/01/2004	11/02/2004	0.48
	11/02/2004	02/03/2004	0.68
	02/03/2004	17/03/2004	0.73
	17/03/2004	25/03/2004	0.29
	25/03/2004	08/04/2004	0.71
	08/04/2004	26/04/2004	0.31
	26/04/2004	07/05/2004	1.01
	07/05/2004	21/05/2004	0.37
	21/05/2004	17/06/2004	0.34
	17/06/2004	02/07/2004	0.40
	02/07/2004	19/07/2004	0.23
	19/07/2004	29/07/2004	0.39
	29/07/2004	13/08/2004	0.92
	13/08/2004	27/08/2004	0.79

Site	Start Date	End Date	Benzene, ppb
	27/08/2004	16/09/2004	0.41
	16/09/2004	07/10/2004	0.31
	07/10/2004	14/10/2004	1.07
	14/10/2004	21/10/2004	0.39
	21/10/2004	09/11/2004	0.58
	09/11/2004	23/11/2004	0.30
	23/11/2004	10/12/2004	0.27
	10/12/2004	24/12/2004	0.45
Haringey Roadside	07/01/2004	20/01/2004	0.58
	20/01/2004	04/02/2004	0.62
	04/02/2004	17/02/2004	1.09
	17/02/2004	02/03/2004	0.81
	02/03/2004	15/03/2004	1.17
	15/03/2004	02/04/2004	0.90
	02/04/2004	16/04/2004	1.03
	16/04/2004	27/04/2004	1.26
	27/04/2004	10/05/2004	0.83
	10/05/2004	13/05/2004	1.06
	13/05/2004	25/05/2004	0.55
	25/05/2004	11/06/2004	0.49
	11/06/2004	30/06/2004	0.45
	30/06/2004	09/07/2004	0.40
	09/07/2004	27/07/2004	0.62
	27/07/2004	13/08/2004	0.61
	13/08/2004	01/09/2004	0.55
	01/09/2004	14/09/2004	0.85
	14/09/2004	01/10/2004	0.79
	01/10/2004	13/10/2004	1.05
	13/10/2004	26/10/2004	0.67
	26/10/2004	11/11/2004	1.00
	11/11/2004	23/11/2004	0.82
	23/11/2004	10/12/2004	1.66
	10/12/2004	23/12/2004	1.15
Hove Roadside	06/01/2004	21/01/2004	0.56
	21/01/2004	04/02/2004	0.47
	04/02/2004	20/02/2004	0.89
	20/02/2004	03/03/2004	0.60
	03/03/2004	17/03/2004	0.87
	17/03/2004	30/03/2004	0.58
	30/03/2004	14/04/2004	0.69
	14/04/2004	29/04/2004	0.80
	29/04/2004	12/05/2004	0.50
	18/05/2004	27/05/2004	0.60
	27/05/2004	09/06/2004	0.53
	09/06/2004	23/06/2004	0.36
	23/06/2004	08/07/2004	0.30

Site	Start Date	End Date	Benzene, ppb
	08/07/2004	22/07/2004	0.38
	22/07/2004	04/08/2004	0.53
	04/08/2004	18/08/2004	0.38
	18/08/2004	01/09/2004	0.23
	01/09/2004	16/09/2004	0.53
	16/09/2004	30/09/2004	0.46
	30/09/2004	13/10/2004	0.46
	13/10/2004	28/10/2004	0.46
	28/10/2004	10/11/2004	0.79
	10/11/2004	25/11/2004	0.77
	25/11/2004	07/12/2004	1.31
	07/12/2004	21/12/2004	0.66
	21/12/2004	05/01/2005	0.68
Hull Freetown	07/01/2004	27/01/2004	0.60
	27/01/2004	05/02/2004	0.35
	05/02/2004	19/02/2004	0.41
	19/02/2004	04/03/2004	0.39
	04/03/2004	18/03/2004	0.64
	18/03/2004	01/04/2004	0.43
	01/04/2004	15/04/2004	0.28
	15/04/2004	29/04/2004	0.48
	29/04/2004	13/05/2004	0.38
	13/05/2004	27/05/2004	0.35
	27/05/2004	10/06/2004	0.25
	10/06/2004	24/06/2004	0.20
	24/06/2004	08/07/2004	0.30
	08/07/2004	22/07/2004	0.28
	22/07/2004	05/08/2004	0.34
	05/08/2004	19/08/2004	0.33
	19/08/2004	02/09/2004	0.29
	02/09/2004	16/09/2004	0.37
	16/09/2004	30/09/2004	0.32
	30/09/2004	14/10/2004	0.27
	14/10/2004	28/10/2004	0.30
	28/10/2004	11/11/2004	0.43
	11/11/2004	02/12/2004	0.31
	02/12/2004	09/12/2004	0.61
	09/12/2004	22/12/2004	0.48
	22/12/2004	06/01/2005	0.52
Leamington Spa	05/01/2004	22/01/2004	0.43
	22/01/2004	05/02/2004	0.33
	05/02/2004	19/02/2004	0.56
	19/02/2004	04/03/2004	0.59
	04/03/2004	18/03/2004	0.45
	18/03/2004	01/04/2004	0.43
	01/04/2004	15/04/2004	0.40

Site	Start Date	End Date	Benzene, ppb
	15/04/2004	29/04/2004	0.39
	29/04/2004	13/05/2004	0.44
	13/05/2004	27/05/2004	0.35
	27/05/2004	10/06/2004	0.27
	10/06/2004	24/06/2004	0.26
	24/06/2004	08/07/2004	0.22
	08/07/2004	22/07/2004	0.40
	22/07/2004	05/08/2004	0.28
	05/08/2004	19/08/2004	0.25
	19/08/2004	02/09/2004	0.29
	02/09/2004	23/09/2004	0.27
	23/09/2004	07/10/2004	0.36
	07/10/2004	21/10/2004	0.62
	21/10/2004	04/11/2004	0.33
	04/11/2004	18/11/2004	0.48
	18/11/2004	02/12/2004	0.71
	02/12/2004	16/12/2004	0.54
Leeds Centre	07/01/2004	21/01/2004	0.51
	21/01/2004	05/02/2004	0.58
	05/02/2004	18/02/2004	0.41
	18/02/2004	03/03/2004	0.50
	03/03/2004	17/03/2004	0.41
	17/03/2004	31/03/2004	0.49
	31/03/2004	14/04/2004	0.41
	14/04/2004	28/04/2004	0.50
	28/04/2004	12/05/2004	0.37
	12/05/2004	25/05/2004	0.30
	25/05/2004	07/06/2004	0.35
	07/06/2004	23/06/2004	0.27
	23/06/2004	08/07/2004	0.25
	08/07/2004	21/07/2004	0.31
	21/07/2004	04/08/2004	0.24
	04/08/2004	25/08/2004	0.33
	25/08/2004	15/09/2004	0.53
	15/09/2004	29/09/2004	0.22
	29/09/2004	13/10/2004	0.33
	13/10/2004	27/10/2004	0.46
	27/10/2004	10/11/2004	0.47
	10/11/2004	24/11/2004	0.41
	24/11/2004	09/12/2004	0.74
	09/12/2004	22/12/2004	0.84
	22/12/2004	05/01/2005	0.32
Leeds Roadside	13/01/2004	26/01/2004	0.87
	26/01/2004	11/02/2004	0.66
	11/02/2004	26/02/2004	1.27
	26/02/2004	09/03/2004	1.70

Site	Start Date	End Date	Benzene, ppb
	09/03/2004	23/03/2004	0.90
	23/03/2004	08/04/2004	1.16
	08/04/2004	22/04/2004	0.80
	22/04/2004	06/05/2004	1.39
	06/05/2004	24/05/2004	1.05
	24/05/2004	25/05/2004	0.58
	25/05/2004	18/06/2004	0.79
	18/06/2004	12/07/2004	0.75
	12/07/2004	26/07/2004	0.71
	26/07/2004	12/08/2004	0.76
	12/08/2004	26/08/2004	0.73
	26/08/2004	21/09/2004	0.83
	21/09/2004	01/10/2004	0.98
	01/10/2004	14/10/2004	1.01
	14/10/2004	29/10/2004	0.70
	29/10/2004	10/12/2004	1.44
	10/12/2004	23/12/2004	1.23
Leicester Centre	06/01/2004	15/01/2004	0.47
	15/01/2004	10/02/2004	0.52
	10/02/2004	25/02/2004	0.62
	25/02/2004	08/03/2004	0.61
	08/03/2004	23/03/2004	0.45
	23/03/2004	06/04/2004	0.49
	06/04/2004	20/04/2004	0.44
	20/04/2004	05/05/2004	0.47
	05/05/2004	18/05/2004	0.51
	18/05/2004	04/06/2004	0.30
	04/06/2004	15/06/2004	0.25
	15/06/2004	29/06/2004	0.20
	29/06/2004	15/07/2004	0.35
	15/07/2004	26/07/2004	0.38
	26/07/2004	10/08/2004	0.24
	10/08/2004	24/08/2004	0.27
	24/08/2004	02/09/2004	0.37
	02/09/2004	21/09/2004	0.40
	21/09/2004	07/10/2004	0.37
	07/10/2004	19/10/2004	0.78
	19/10/2004	02/11/2004	0.28
	02/11/2004	17/11/2004	0.32
	29/11/2004	15/12/2004	0.96
	15/12/2004	29/12/2004	0.53
Liverpool Speke	06/01/2004	20/01/2004	0.52
	20/01/2004	03/02/2004	0.52
	03/02/2004	19/02/2004	0.89
	19/02/2004	01/03/2004	0.50
	01/03/2004	18/03/2004	0.86

Site	Start Date	End Date	Benzene, ppb
	18/03/2004	01/04/2004	0.32
	01/04/2004	13/04/2004	0.46
	13/04/2004	26/04/2004	0.53
	26/04/2004	10/05/2004	0.54
	10/05/2004	24/05/2004	0.56
	24/05/2004	07/06/2004	0.38
	07/06/2004	21/06/2004	0.30
	21/06/2004	08/07/2004	0.31
	08/07/2004	19/07/2004	0.28
	19/07/2004	02/08/2004	0.45
	02/08/2004	18/08/2004	0.51
	18/08/2004	01/09/2004	0.32
	01/09/2004	15/09/2004	0.50
Manchester Piccadilly	24/12/2003	07/01/2004	0.71
	07/01/2004	21/01/2004	0.61
	21/01/2004	06/02/2004	0.37
	06/02/2004	18/02/2004	0.63
	18/02/2004	02/03/2004	0.53
	02/03/2004	17/03/2004	0.58
	17/03/2004	31/03/2004	0.29
	31/03/2004	14/04/2004	0.41
	14/04/2004	28/04/2004	0.48
	28/04/2004	12/05/2004	0.50
	12/05/2004	26/05/2004	0.36
	26/05/2004	09/06/2004	0.25
	09/06/2004	23/06/2004	0.28
	23/06/2004	07/07/2004	0.24
	07/07/2004	21/07/2004	0.22
	21/07/2004	04/08/2004	0.32
	04/08/2004	18/08/2004	0.30
	25/08/2004	01/09/2004	0.26
	01/09/2004	15/09/2004	0.40
	15/09/2004	29/09/2004	0.28
	29/09/2004	13/10/2004	0.46
	13/10/2004	27/10/2004	0.50
	27/10/2004	11/11/2004	0.54
	11/11/2004	25/11/2004	0.68
	25/11/2004	09/12/2004	0.95
	09/12/2004	23/12/2004	0.60
	23/12/2004	06/01/2005	0.48
Middlesbrough	06/01/2004	20/01/2004	0.51
	20/01/2004	03/02/2004	0.67
	03/02/2004	17/02/2004	0.40
	17/02/2004	02/03/2004	0.56
	02/03/2004	16/03/2004	0.73
	16/03/2004	30/03/2004	0.29

Site	Start Date	End Date	Benzene, ppb
	30/03/2004	14/04/2004	0.61
	14/04/2004	27/04/2004	0.95
	27/04/2004	11/05/2004	0.62
	11/05/2004	25/05/2004	0.52
	25/05/2004	08/06/2004	0.72
	08/06/2004	22/06/2004	0.37
	22/06/2004	06/07/2004	0.29
	06/07/2004	21/07/2004	0.40
	21/07/2004	03/08/2004	1.02
	03/08/2004	17/08/2004	2.00
	17/08/2004	19/08/2004	0.51
	19/08/2004	31/08/2004	0.35
	31/08/2004	15/09/2004	0.72
	15/09/2004	28/09/2004	0.23
	28/09/2004	12/10/2004	0.31
	12/10/2004	26/10/2004	0.42
	26/10/2004	09/11/2004	0.82
	09/11/2004	24/11/2004	0.46
	24/11/2004	07/12/2004	0.34
	07/12/2004	21/12/2004	0.47
	21/12/2004	06/01/2005	0.35
Newcastle	06/01/2004	20/01/2004	0.40
	20/01/2004	03/02/2004	0.32
	03/02/2004	17/02/2004	0.37
	17/02/2004	02/03/2004	0.29
	02/03/2004	16/03/2004	0.59
	16/03/2004	30/03/2004	0.37
	30/03/2004	13/04/2004	0.43
	13/04/2004	27/04/2004	0.40
	27/04/2004	11/05/2004	0.35
	11/05/2004	25/05/2004	0.24
	25/05/2004	10/06/2004	0.25
	10/06/2004	22/06/2004	0.19
	22/06/2004	06/07/2004	0.25
	06/07/2004	20/07/2004	0.22
	20/07/2004	03/08/2004	0.24
	03/08/2004	17/08/2004	0.28
	17/08/2004	31/08/2004	0.17
	31/08/2004	14/09/2004	0.45
	14/09/2004	28/09/2004	0.21
	28/09/2004	12/10/2004	0.39
	12/10/2004	26/10/2004	0.43
	09/11/2004	23/11/2004	0.29
	23/11/2004	07/12/2004	0.35
	07/12/2004	21/12/2004	0.73
	21/12/2004	06/01/2005	0.30
Northampton			

Site	Start Date	End Date	Benzene, ppb
	31/12/2003	15/01/2004	0.42
	15/01/2004	29/01/2004	0.33
	29/01/2004	12/02/2004	0.27
	12/02/2004	26/02/2004	0.55
	26/02/2004	11/03/2004	0.61
	11/03/2004	25/03/2004	0.43
	25/03/2004	08/04/2004	0.36
	08/04/2004	22/04/2004	0.32
	22/04/2004	28/04/2004	0.33
	28/04/2004	06/05/2004	0.27
	06/05/2004	20/05/2004	0.38
	20/05/2004	03/06/2004	0.25
	03/06/2004	17/06/2004	0.19
	17/06/2004	01/07/2004	0.16
	01/07/2004	15/07/2004	0.19
	15/07/2004	29/07/2004	0.24
	29/07/2004	12/08/2004	0.17
	12/08/2004	26/08/2004	0.19
	26/08/2004	09/09/2004	0.28
	09/09/2004	23/09/2004	0.24
	23/09/2004	07/10/2004	0.30
	07/10/2004	21/10/2004	0.76
	21/10/2004	26/10/2004	0.65
	26/10/2004	04/11/2004	0.36
	04/11/2004	18/11/2004	0.21
	18/11/2004	02/12/2004	0.59
	02/12/2004	16/12/2004	0.54
	16/12/2004	30/12/2004	0.24
Norwich Centre	05/01/2004	21/01/2004	0.31
	21/01/2004	02/02/2004	0.39
	02/02/2004	19/02/2004	0.30
	19/02/2004	26/02/2004	0.27
	26/02/2004	10/03/2004	0.76
	10/03/2004	22/03/2004	0.49
	22/03/2004	15/04/2004	0.37
	15/04/2004	26/04/2004	0.52
	26/04/2004	10/05/2004	0.30
	10/05/2004	24/05/2004	0.28
	24/05/2004	14/06/2004	0.27
	14/06/2004	28/06/2004	0.15
	28/06/2004	12/07/2004	0.25
	12/07/2004	30/07/2004	0.29
	30/07/2004	25/08/2004	0.32
	25/08/2004	06/09/2004	0.34
	06/09/2004	27/09/2004	0.44
	27/09/2004	12/10/2004	0.28
	12/10/2004	26/10/2004	0.31

Site	Start Date	End Date	Benzene, ppb
	26/10/2004	09/11/2004	0.53
	09/11/2004	26/11/2004	0.50
	26/11/2004	08/12/2004	1.13
	08/12/2004	04/01/2005	0.43
Nottingham Centre	31/12/2003	14/01/2004	0.57
	14/01/2004	29/01/2004	0.49
	29/01/2004	03/02/2004	0.33
	03/02/2004	11/02/2004	0.83
	11/02/2004	25/02/2004	0.74
	25/02/2004	10/03/2004	0.90
	10/03/2004	24/03/2004	0.52
	24/03/2004	07/04/2004	0.60
	07/04/2004	21/04/2004	0.42
	21/04/2004	05/05/2004	0.56
	05/05/2004	19/05/2004	0.53
	19/05/2004	02/06/2004	0.44
	02/06/2004	16/06/2004	0.31
	16/06/2004	30/06/2004	0.19
	30/06/2004	14/07/2004	0.28
	14/07/2004	28/07/2004	0.38
	28/07/2004	11/08/2004	0.38
	11/08/2004	25/08/2004	0.29
	25/08/2004	08/09/2004	0.42
	08/09/2004	22/09/2004	0.36
	22/09/2004	06/10/2004	0.42
	06/10/2004	22/10/2004	0.87
	22/10/2004	10/11/2004	0.51
	10/11/2004	24/11/2004	0.40
	24/11/2004	08/12/2004	0.83
	08/12/2004	22/12/2004	0.76
	22/12/2004	05/01/2005	0.46
Oxford Centre	13/01/2004	26/01/2004	0.54
	26/01/2004	09/02/2004	0.29
	09/02/2004	23/02/2004	0.77
	23/02/2004	08/03/2004	0.82
	08/03/2004	24/03/2004	0.50
	24/03/2004	02/04/2004	0.68
	02/04/2004	19/04/2004	0.51
	19/04/2004	14/05/2004	0.44
	14/05/2004	02/06/2004	0.42
	02/06/2004	15/06/2004	0.29
	15/06/2004	30/06/2004	0.21
	30/06/2004	14/07/2004	0.27
	14/07/2004	02/08/2004	0.29
	02/08/2004	13/08/2004	0.35
	13/08/2004	06/09/2004	0.23

Site	Start Date	End Date	Benzene, ppb
	06/09/2004	23/09/2004	0.42
	23/09/2004	04/10/2004	0.34
	04/10/2004	18/10/2004	0.79
	18/10/2004	15/11/2004	0.46
	15/11/2004	29/11/2004	0.37
	29/11/2004	14/12/2004	1.24
	14/12/2004	24/12/2004	0.28
Plymouth	14/01/2004	29/01/2004	0.21
	29/01/2004	11/02/2004	0.28
	11/02/2004	26/02/2004	0.66
	26/02/2004	11/03/2004	0.64
	11/03/2004	23/03/2004	0.33
	23/03/2004	07/04/2004	0.41
	07/04/2004	21/04/2004	0.27
	21/04/2004	04/05/2004	0.28
	04/05/2004	20/05/2004	0.35
	20/05/2004	01/06/2004	0.30
	01/06/2004	15/06/2004	0.18
	15/06/2004	29/06/2004	0.11
	29/06/2004	13/07/2004	0.20
	13/07/2004	27/07/2004	0.22
	27/07/2004	12/08/2004	0.18
	12/08/2004	24/08/2004	0.14
	24/08/2004	07/09/2004	0.26
	07/09/2004	21/09/2004	0.25
	21/09/2004	05/10/2004	0.18
	05/10/2004	19/10/2004	0.37
	19/10/2004	02/11/2004	0.28
	02/11/2004	16/11/2004	0.26
	16/11/2004	30/11/2004	0.26
	30/11/2004	14/12/2004	0.64
Portsmouth	31/12/2003	19/01/2004	0.40
	19/01/2004	04/02/2004	0.45
	04/02/2004	17/02/2004	0.50
	17/02/2004	20/02/2004	0.32
	20/02/2004	01/03/2004	0.37
	01/03/2004	09/03/2004	0.83
	09/03/2004	30/03/2004	0.32
	30/03/2004	30/04/2004	0.44
	30/04/2004	20/05/2004	0.41
	20/05/2004	09/06/2004	0.19
	09/06/2004	23/06/2004	0.19
	23/06/2004	09/07/2004	0.13
	09/07/2004	27/07/2004	0.24
	28/07/2004	11/08/2004	0.19
	11/08/2004	24/08/2004	0.18

Site	Start Date	End Date	Benzene, ppb
	24/08/2004	30/09/2004	0.22
	30/09/2004	25/10/2004	0.15
	25/10/2004	19/11/2004	0.56
	19/11/2004	20/12/2004	0.31
Reading	06/01/2004	20/01/2004	0.40
	20/01/2004	03/02/2004	0.32
	03/02/2004	17/02/2004	0.50
	17/02/2004	02/03/2004	0.49
	02/03/2004	16/03/2004	0.38
	16/03/2004	30/03/2004	0.31
	30/03/2004	13/04/2004	0.39
	13/04/2004	27/04/2004	0.33
	27/04/2004	11/05/2004	0.35
	11/05/2004	25/05/2004	0.39
	25/05/2004	08/06/2004	0.26
	08/06/2004	21/06/2004	0.15
	21/06/2004	05/07/2004	0.18
	05/07/2004	20/07/2004	0.25
	20/07/2004	02/08/2004	0.25
	02/08/2004	31/08/2004	0.22
	31/08/2004	21/09/2004	0.24
	21/09/2004	05/10/2004	0.35
	05/10/2004	18/10/2004	0.51
	18/10/2004	02/11/2004	0.36
	02/11/2004	17/11/2004	0.26
	17/11/2004	20/12/2004	0.39
	20/12/2004	06/01/2005	0.46
Sheffield	31/12/2003	14/01/2004	0.50
	14/01/2004	28/01/2004	0.61
	28/01/2004	12/02/2004	0.38
	12/02/2004	26/02/2004	0.68
	26/02/2004	10/03/2004	0.83
	10/03/2004	24/03/2004	0.55
	24/03/2004	07/04/2004	0.68
	07/04/2004	21/04/2004	0.31
	21/04/2004	06/05/2004	0.37
	06/05/2004	20/05/2004	0.44
	20/05/2004	01/06/2004	0.46
	01/06/2004	17/06/2004	0.24
	17/06/2004	01/07/2004	0.26
	01/07/2004	15/07/2004	0.27
	15/07/2004	29/07/2004	0.37
	12/08/2004	26/08/2004	0.42
	26/08/2004	08/09/2004	0.47
	08/09/2004	22/09/2004	0.47
	22/09/2004	07/10/2004	0.29

Site	Start Date	End Date	Benzene, ppb
	07/10/2004	22/10/2004	0.51
	22/10/2004	03/11/2004	0.41
	03/11/2004	19/11/2004	0.29
	19/11/2004	03/12/2004	0.64
	03/12/2004	14/12/2004	0.61
	14/12/2004	30/12/2004	0.36
Southampton	08/01/2004	20/01/2004	0.62
	20/01/2004	03/02/2004	0.40
	03/02/2004	17/02/2004	0.59
	17/02/2004	20/02/2004	0.50
	20/02/2004	02/03/2004	0.53
	02/03/2004	16/03/2004	0.58
	16/03/2004	30/03/2004	0.45
	30/03/2004	13/04/2004	0.57
	13/04/2004	27/04/2004	0.75
	27/04/2004	11/05/2004	0.57
	11/05/2004	25/05/2004	0.52
	25/05/2004	08/06/2004	0.47
	08/06/2004	22/06/2004	0.23
	22/06/2004	02/07/2004	0.37
	02/07/2004	06/07/2004	0.28
	06/07/2004	20/07/2004	0.36
	20/07/2004	03/08/2004	0.35
	17/08/2004	31/08/2004	0.21
	31/08/2004	14/09/2004	0.47
	14/09/2004	28/09/2004	0.39
	28/09/2004	12/10/2004	0.37
	12/10/2004	26/10/2004	0.34
	26/10/2004	09/11/2004	0.74
	09/11/2004	23/11/2004	0.51
	23/11/2004	07/12/2004	1.06
	07/12/2004	21/12/2004	0.73
	21/12/2004	04/01/2005	0.54
Southend-on-Sea	07/01/2004	21/01/2004	0.37
	21/01/2004	04/02/2004	0.46
	04/02/2004	18/02/2004	0.57
	18/02/2004	03/03/2004	0.38
	03/03/2004	17/03/2004	0.48
	17/03/2004	31/03/2004	0.48
	31/03/2004	14/04/2004	0.43
	14/04/2004	28/04/2004	0.43
	28/04/2004	12/05/2004	0.40
	12/05/2004	26/05/2004	0.42
	26/05/2004	09/06/2004	0.29
	09/06/2004	01/07/2004	0.19
	01/07/2004	21/07/2004	0.20

Site	Start Date	End Date	Benzene, ppb
	21/07/2004	04/08/2004	0.23
	04/08/2004	19/08/2004	0.28
	19/08/2004	01/09/2004	0.23
	01/09/2004	15/09/2004	0.40
	15/09/2004	29/09/2004	0.61
	29/09/2004	13/10/2004	0.34
	13/10/2004	27/10/2004	0.26
	27/10/2004	10/11/2004	0.44
	10/11/2004	24/11/2004	0.55
	24/11/2004	08/12/2004	0.49
	08/12/2004	22/12/2004	0.40
	22/12/2004	05/01/2005	0.44
Stoke Centre	07/01/2004	21/01/2004	0.43
	21/01/2004	04/02/2004	0.43
	04/02/2004	18/02/2004	0.77
	18/02/2004	03/03/2004	0.69
	03/03/2004	17/03/2004	0.38
	17/03/2004	01/04/2004	0.21
	01/04/2004	27/04/2004	0.23
	12/05/2004	26/05/2004	0.58
	26/05/2004	09/06/2004	0.36
	09/06/2004	23/06/2004	0.33
	23/06/2004	07/07/2004	0.27
	07/07/2004	21/07/2004	0.58
	21/07/2004	04/08/2004	0.48
	04/08/2004	18/08/2004	0.35
	18/08/2004	15/09/2004	0.29
	15/09/2004	01/10/2004	0.51
	01/10/2004	13/10/2004	0.44
	13/10/2004	27/10/2004	0.39
	27/10/2004	10/11/2004	0.48
	10/11/2004	24/11/2004	0.62
	24/11/2004	08/12/2004	0.79
	08/12/2004	21/12/2004	0.51
Wigan Centre	05/10/2004	15/10/2004	0.41
	15/10/2004	28/10/2004	0.47
	28/10/2004	11/11/2004	0.34
	11/11/2004	25/11/2004	0.58
	25/11/2004	09/12/2004	1.04
	09/12/2004	22/12/2004	0.51
Wigan-Leigh	19/03/2004	01/04/2004	0.57
	01/04/2004	19/04/2004	0.57
	19/04/2004	29/04/2004	0.77
	29/04/2004	13/05/2004	0.62
	13/05/2004	28/05/2004	0.57

Site	Start Date	End Date	Benzene, ppb
	28/05/2004	10/06/2004	0.58
	10/06/2004	24/06/2004	0.22
	24/06/2004	08/07/2004	0.26
	08/07/2004	23/07/2004	0.34
	05/08/2004	11/08/2004	0.38
	11/08/2004	19/08/2004	0.25
	19/08/2004	03/09/2004	0.34
	03/09/2004	16/09/2004	0.45
	16/09/2004	28/09/2004	0.21
Yarm	24/12/2003	06/01/2004	1.68
	06/01/2004	20/01/2004	1.20
	20/01/2004	02/02/2004	0.96
	02/02/2004	16/02/2004	0.97
	16/02/2004	02/03/2004	1.04
	02/03/2004	16/03/2004	1.59
	16/03/2004	30/03/2004	1.06
	30/03/2004	13/04/2004	1.35
	13/04/2004	27/04/2004	0.91
	27/04/2004	11/05/2004	0.78
	11/05/2004	24/05/2004	0.96
	24/05/2004	08/06/2004	0.77
	08/06/2004	23/06/2004	0.66
	23/06/2004	08/07/2004	0.62
	08/07/2004	22/07/2004	1.01
	22/07/2004	11/08/2004	1.36
	11/08/2004	25/08/2004	1.03
	25/08/2004	09/09/2004	1.01
	09/09/2004	24/09/2004	0.61
	24/09/2004	07/10/2004	0.89
	07/10/2004	21/10/2004	0.80
	21/10/2004	04/11/2004	1.00
	04/11/2004	18/11/2004	0.58
	18/11/2004	02/12/2004	1.21
	02/12/2004	16/12/2004	0.83
	16/12/2004	06/01/2005	0.87

Annex 1b – Fortnightly data – 1,3 Butadiene

Site	Start Date	End Date	1,3 Butadiene, ppb
Belfast Centre	30/12/2003	13/01/2004	0.01
	13/01/2004	27/01/2004	0.04
	27/01/2004	10/02/2004	0.05
	10/02/2004	24/02/2004	0.07
	24/02/2004	09/03/2004	0.05
	09/03/2004	18/03/2004	0.02
	24/03/2004	06/04/2004	0.07
	06/04/2004	20/04/2004	0.07
	04/05/2004	18/05/2004	0.03
	18/05/2004	01/06/2004	0.01
	01/06/2004	15/06/2004	0.01
	15/06/2004	29/06/2004	0.01
	29/06/2004	14/07/2004	0.02
	14/07/2004	27/07/2004	0.01
	27/07/2004	10/08/2004	0.01
	10/08/2004	24/08/2004	0.01
	24/08/2004	07/09/2004	0.01
	07/09/2004	21/09/2004	0.01
	21/09/2004	05/10/2004	0.01
	05/10/2004	19/10/2004	0.01
	19/10/2004	02/11/2004	0.01
	02/11/2004	19/11/2004	0.01
	16/11/2004	30/11/2004	0.02
	30/11/2004	14/12/2004	0.04
	14/12/2004	29/12/2004	0.03
Belfast Roadside	30/12/2003	13/01/2004	0.01
	13/01/2004	27/01/2004	0.02
	27/01/2004	10/02/2004	0.06
	10/02/2004	24/02/2004	0.06
	24/02/2004	09/03/2004	0.04
	09/03/2004	23/03/2004	0.03
	23/03/2004	06/04/2004	0.06
	06/04/2004	20/04/2004	0.05
	20/04/2004	04/05/2004	0.06
	04/05/2004	18/05/2004	0.02
	01/06/2004	15/06/2004	0.04
	15/06/2004	29/06/2004	0.01
	29/06/2004	14/07/2004	0.01
	14/07/2004	27/07/2004	0.01

Site	Start Date	End Date	1,3 Butadiene, ppb
	27/07/2004	10/08/2004	0.01
	10/08/2004	24/08/2004	0.04
	10/08/2004	24/08/2004	0.04
	24/08/2004	07/09/2004	0.02
	07/09/2004	21/09/2004	0.04
	21/09/2004	05/10/2004	0.01
	05/10/2004	19/10/2004	0.02
	19/10/2004	02/11/2004	0.01
	02/11/2004	11/11/2004	0.04
	16/11/2004	30/11/2004	0.04
	30/11/2004	14/12/2004	0.05
	14/12/2004	29/12/2004	0.04
Birmingham Roadside	23/12/2003	08/01/2004	0.02
	08/01/2004	22/01/2004	0.01
	22/01/2004	05/02/2004	0.05
	05/02/2004	19/02/2004	0.12
	19/02/2004	04/03/2004	0.22
	04/03/2004	18/03/2004	0.07
	18/03/2004	01/04/2004	0.07
	01/04/2004	15/04/2004	0.12
	29/04/2004	13/05/2004	0.02
	13/05/2004	27/05/2004	0.10
	18/05/2004	01/06/2004	0.01
	27/05/2004	10/06/2004	0.07
	10/06/2004	24/06/2004	0.06
	24/06/2004	07/07/2004	0.01
	08/07/2004	22/07/2004	0.03
	22/07/2004	05/08/2004	0.10
	05/08/2004	19/08/2004	0.02
	19/08/2004	02/09/2004	0.07
	02/09/2004	16/09/2004	0.12
	16/09/2004	30/09/2004	0.02
	30/09/2004	14/10/2004	0.07
	14/10/2004	11/11/2004	0.04
	11/11/2004	25/11/2004	0.06
	25/11/2004	09/12/2004	0.10
	09/12/2004	23/12/2004	0.12
	23/12/2004	06/01/2005	0.01
Bristol Old Market	30/12/2003	14/01/2004	0.01
	14/01/2004	28/01/2004	0.07
	28/01/2004	11/02/2004	0.08
	11/02/2004	25/02/2004	0.16

Site	Start Date	End Date	1,3 Butadiene, ppb
	28/02/2004	11/03/2004	0.09
	11/03/2004	24/03/2004	0.05
	24/03/2004	07/04/2004	0.08
	07/04/2004	21/04/2004	0.08
	05/05/2004	19/05/2004	0.05
	19/05/2004	02/06/2004	0.11
	02/06/2004	16/06/2004	0.05
	16/06/2004	30/06/2004	0.01
	30/06/2004	14/07/2004	0.01
	14/07/2004	27/07/2004	0.01
	27/07/2004	10/08/2004	0.02
	10/08/2004	25/08/2004	0.01
	25/08/2004	08/09/2004	0.10
	08/09/2004	20/09/2004	0.03
	20/09/2004	06/10/2004	0.04
	06/10/2004	20/10/2004	0.02
	20/10/2004	03/11/2004	0.04
	03/11/2004	17/11/2004	0.08
	17/11/2004	01/12/2004	0.09
	01/12/2004	15/12/2004	0.11
	15/12/2004	29/12/2004	0.05
Grangemouth	31/12/2003	09/01/2004	0.12
	09/01/2004	15/01/2004	0.02
	15/01/2004	11/02/2004	0.07
	02/03/2004	17/03/2004	0.46
	17/03/2004	25/03/2004	0.04
	25/03/2004	08/04/2004	0.18
	17/06/2004	02/07/2004	0.04
Haringey Roadside	29/05/2003	12/06/2003	0.01
	12/06/2003	26/06/2003	0.08
	26/06/2003	07/07/2003	0.02
	22/07/2003	04/08/2003	0.01
	04/08/2003	19/08/2003	0.01
	19/08/2003	02/09/2003	0.01
	02/09/2003	18/09/2003	0.01
	18/09/2003	02/10/2003	0.01
	02/10/2003	13/10/2003	0.01
	14/11/2003	26/11/2003	0.01
	26/11/2003	15/12/2003	0.02
	04/02/2004	17/02/2004	0.08
	17/02/2004	02/03/2004	0.18
	02/03/2004	15/03/2004	0.09

Site	Start Date	End Date	1,3 Butadiene, ppb
	15/03/2004	02/04/2004	0.10
	02/04/2004	16/04/2004	0.44
	16/04/2004	27/04/2004	0.21
	27/04/2004	10/05/2004	0.32
	11/06/2004	30/06/2004	0.01
	30/06/2004	09/07/2004	0.01
	09/07/2004	27/07/2004	0.02
	13/08/2004	01/09/2004	0.02
	01/09/2004	14/09/2004	0.07
	14/09/2004	01/10/2004	0.04
	01/10/2004	13/10/2004	0.03
	13/10/2004	26/10/2004	0.01
	26/10/2004	11/11/2004	0.03
	11/11/2004	23/11/2004	0.04
	23/11/2004	10/12/2004	0.10
	10/12/2004	23/12/2004	0.06
	23/12/2004	11/01/2005	0.01
Leeds Centre	23/12/2003	07/01/2004	0.07
	07/01/2004	21/01/2004	0.01
	21/01/2004	05/02/2004	0.01
	05/02/2004	18/02/2004	0.02
	18/02/2004	03/03/2004	0.05
	03/03/2004	17/03/2004	0.01
	17/03/2004	31/03/2004	0.01
	31/03/2004	14/04/2004	0.01
	28/04/2004	12/05/2004	0.05
	12/05/2004	07/06/2004	0.01
	07/06/2004	23/06/2004	0.01
	23/06/2004	08/07/2004	0.01
	08/07/2004	21/07/2004	0.01
	21/07/2004	04/08/2004	0.10
	04/08/2004	25/08/2004	0.01
	25/08/2004	15/09/2004	0.03
	15/09/2004	29/09/2004	0.04
	29/09/2004	13/10/2004	0.01
	13/10/2004	27/10/2004	0.01
	27/10/2004	10/11/2004	0.01
	10/11/2004	24/11/2004	0.05
	24/11/2004	09/12/2004	0.09
	09/12/2004	22/12/2004	0.05
	22/12/2004	05/01/2005	0.01
Leeds Roadside			
	23/12/2003	13/01/2004	0.01

Site	Start Date	End Date	1,3 Butadiene, ppb
	13/01/2004	26/01/2004	0.05
	26/01/2004	11/02/2004	0.08
	11/02/2004	26/02/2004	0.14
	26/02/2004	09/03/2004	0.13
	09/03/2004	23/03/2004	0.03
	23/03/2004	08/04/2004	0.10
	08/04/2004	22/04/2004	0.06
	22/04/2004	06/05/2004	0.28
	06/05/2004	24/05/2004	0.07
	24/05/2004	18/06/2004	0.05
	18/06/2004	12/07/2004	0.04
	12/07/2004	26/07/2004	0.03
	26/07/2004	12/08/2004	0.01
	12/08/2004	26/08/2004	0.01
	26/08/2004	21/09/2004	0.05
	21/09/2004	01/10/2004	0.04
	01/10/2004	14/10/2004	0.02
	14/10/2004	29/10/2004	0.04
	29/10/2004	12/11/2004	0.09
	12/11/2004	10/12/2004	0.05
	10/12/2004	23/12/2004	0.09
	23/12/2004	05/01/2005	0.01
Middlesbrough	22/12/2003	06/01/2004	0.03
	06/01/2004	20/01/2004	0.01
	20/01/2004	03/02/2004	0.01
	03/02/2004	17/02/2004	0.02
	17/02/2004	02/03/2004	0.06
	02/03/2004	16/03/2004	0.01
	16/03/2004	30/03/2004	0.05
	30/03/2004	14/04/2004	0.03
	14/04/2004	27/04/2004	0.05
	27/04/2004	11/05/2004	0.07
	11/05/2004	25/05/2004	0.02
	25/05/2004	08/06/2004	0.03
	08/06/2004	22/06/2004	0.02
	22/06/2004	06/07/2004	0.01
	06/07/2004	21/07/2004	0.03
	21/07/2004	03/08/2004	0.01
	03/08/2004	17/08/2004	0.06
	17/08/2004	31/08/2004	0.01
	31/08/2004	15/09/2004	0.02
	15/09/2004	28/09/2004	0.02
	28/09/2004	12/10/2004	0.03

Site	Start Date	End Date	1,3 Butadiene, ppb
	12/10/2004	29/10/2004	0.01
	26/10/2004	09/11/2004	0.01
	09/11/2004	24/11/2004	0.01
	24/11/2004	07/12/2004	0.01
	07/12/2004	21/12/2004	0.02
	21/12/2004	06/01/2005	0.01

Annex 2 – Audit schedule

Site	1st Audit	2nd Audit
London Bloomsbury	07/01/2004	07/09/04
Wigan Centre	03/02/2004	05/10/04
Nottingham Centre	03/02/2004	14/10/04
Belfast Centre	04/02/2004	12/08/04
Belfast Roadside	04/02/2004	12/08/04
Portsmouth	20/02/2004	24/08/04
Norwich	24/02/2004	02/09/04
Liverpool Speke	02/03/2004	25/08/04
Manchester Piccadilly	02/03/2004	25/08/04
Stoke Centre	28/04/2004	06/10/04
Northampton	28/04/2004	26/10/04
Barnsley	29/04/2004	15/10/04
Hove Roadside	05/05/2004	25/11/04
Southend-on-Sea	06/05/2004	24/11/04
Coventry	11/05/2004	23/11/04
Leamington Spa	11/05/2004	23/11/04
Haringey Roadside	13/05/2004	04/11/04
Bristol Old Market	17/05/2004	17/11/04
Cwmbran	17/05/2004	18/11/04
Plymouth	17/05/2004	11/01/05
Sheffield	25/05/2004	03/11/04
Leeds	25/05/2004	10/11/04
Leeds Roadside	25/05/2004	10/11/04
Hull	26/05/2004	02/11/04
Bournemouth	03/06/2004	30/11/04
Reading	08/06/2004	17/11/04
Birmingham Roadside	10/06/2004	02/12/04
Leicester	15/06/2004	03/12/04
Oxford	16/06/2004	01/12/04
Middlesbrough	24/06/2004	08/12/04
Newcastle	24/06/2004	08/12/04
Yarm	24/06/2004	08/12/04
Edinburgh	25/06/2004	09/12/04
Grangemouth	25/06/2004	09/12/04
Southampton	02/07/2004	25/11/04