

Ratification of data produced by the UK Ambient Hydrocarbon Automatic Air Quality Network, 1 April 2001 to 30 June 2001

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1 Introduction

This report contains information on the quality and statistical parameters associated with ratified data from the UK Ambient Hydrocarbon Automatic Air Quality Network (The UK Hydrocarbon Network). The presented information and data cover the period 1 April 2001 to 30 June 2001. The ratified data have been made available on the World Wide Web at www.aeat.co.uk/netcen/airqual.

This report contains:

- The definition of a Data Quality Code for each reported hydrocarbon.
- The Data Quality Codes assigned to the data presented on the web.
- A list of periods of data loss, reasons for data loss and descriptions of the most significant causes of data loss.
- Statistical information for each measured hydrocarbon for each individual month.

2 Hydrocarbon Data Quality

All hydrocarbon data are assigned a quality value. In general ratified hourly data have an uncertainty (at 95% confidence) of $\pm 10\%$ for values above 0.1 ppb and ± 0.01 ppb for values below 0.1 ppb. These data are termed 'good quality'.

In some cases, because of instrument problems, data cannot be described as 'good' quality, but the data may still be of use to modellers and is therefore included in the archive. This is termed 'acceptable' quality data, and has an uncertainty (at 95% confidence) of $\pm 25\%$ above 0.2ppb and ± 0.05 ppb below 0.2 ppb.

Data that do not meet either the 'good' or 'acceptable' criteria do not appear in the archive.

Each month's data are assigned a Data Quality Code for each species as follows:

- A. all 'good' quality data
- B. most (> 75%) data points 'good', remainder 'acceptable' quality
- C. roughly equal numbers of 'good' and 'acceptable' quality data
- D. some (< 25%) data points 'good' quality; remainder 'acceptable' quality
- E. all points 'acceptable' quality

3 Monthly Data Reports

The following sections give details of issues affecting data on a month by month basis. Data quality codes have been assigned for each monthly set of data.

3.1 CARDIFF

3.1.1 April

3.1.1.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for Ethane, n-Hexane, Isoprene, n-Heptane, Toluene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.1.1.2 Missing Data – All hydrocarbons

Calibration 05/04/01 hours 12 to 15.
Faulty liquid nitrogen valve 18/04/01 hour 02 to 19/04/01 hour 10.
Calibration 20/04/01 hours 12 to 15.
No liquid nitrogen 26/04/01 hours 08 to 10.

3.1.1.3 Missing Data – Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted for the whole month.

3.1.2 May

3.1.2.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for Ethane, n-Hexane, Isoprene, n-Heptane, Toluene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.1.2.2 Missing Data - All hydrocarbons

Calibration 03/05/01 hours 10 to 13.
No liquid nitrogen 10/05/01 hours 06 to 09.
Calibration 17/05/01 hours 11 to 14.
Calibration 31/05/01 hours 13 to 16.

3.1.2.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted for the whole month.

3.1.3 June

3.1.3.1 Data Quality Codes

Data quality code A for all data for all of the month except:

Data quality code E for Ethyne and 2-Methylpropane from 12/06/01 to 30/06/01.

Data quality code E for Ethane, n-Hexane, Isoprene, n-Heptane, Toluene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.1.3.2 Missing Data - All hydrocarbons

Calibration 14/06/01 hours 12 to 15.

Calibration 29/06/01 hours 09 to 12.

3.1.3.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted from 01/06/01 to 12/06/01.

3.2 EDINBURGH

3.2.1 April

3.2.1.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for Ethyne, 2-Methylpropane, n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.2.1.2 Missing Data - All hydrocarbons

Calibration 12/04/01 hours 13 to 16.
Calibration 24/04/01 hours 13 to 16.

3.2.1.3 Missing Data - Specific hydrocarbons

None.

3.2.2 May

3.2.2.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for Ethyne and 2-Methylpropane from 01/05/01 to 16/05/01.
Data quality code E for Benzene from 19/05/01 to 20/05/01
Data quality code E for Ethane and Ethene from 19/05/01 to 31/05/01.
Data quality code E for n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.2.2.2 Missing Data - All hydrocarbons

Calibration 08/05/01 hours 13 to 16.
Calibration 15/05/01 hours 15 to 19.
Calibration 16/05/01 hours 08 to 12.
CMCU audit and service visit 16/05/01 hour 13 to 19/05/01 hour 07.
Calibration 19/05/01 hours 08 to 10.
Calibration 23/05/01 hours 12 to 17.

3.2.2.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted from 19/05/01 to 31/05/01.

3.2.3 June

3.2.3.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for Ethane, Ethene, Ethyne, 2-Methylpropane, n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.2.3.2 Missing Data - All hydrocarbons

Calibration 13/06/01 hours 12 to 15.

Calibration 26/06/01 hours 12 to 16.

3.2.3.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted for the whole month.

3.3 HARWELL

3.3.1 April

3.3.1.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.3.1.2 Missing Data - All hydrocarbons

Calibration 11/04/01 hours 10 to 13.
Calibration 26/04/01 hours 09 to 12.

3.3.1.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted for the whole month.

3.3.2 May

3.3.2.1 Data Quality Codes

Data quality code A for all data for all of the month except:
Data quality code E for n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.3.2.2 Missing Data - All hydrocarbons

Calibration 10/05/01 hours 09 to 12.
Liquid nitrogen supply problem 10/05/01 hour 23 to 11/05/01 hour 17.
PC communication problem 19/05/01 hours 01 to 24.
GC Oven Failure 22/05/01 hour 17 to 24/05/01 hour 23.
Calibration 24/05/01 hours 15 to 18.
GC electrical problem 29/05/01 hour 01 to 31/05/01 hour 24.

3.3.2.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane coeluted from 01/05/01 to 22/05/01.
Isoprene coeluted with an unknown compound from 24/05/01 to 31/05/01.

3.3.3 June

3.3.3.1 Data Quality Codes

Data quality code A for all data for all of the month except:

Data quality code E for n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.3.3.2 Missing Data - All hydrocarbons

GC electrical problem 01/06/01 hour 01 to 04/06/01 hour 09.

Calibration 06/06/01 hours 08 to 11.

Calibration 21/06/01 hours 10 to 13.

3.3.3.3 Missing Data - Specific hydrocarbons

Isoprene coeluted with an unknown compound for the whole month.

3.4 MARYLEBONE ROAD

3.4.1 April

3.4.1.1 Data Quality Codes

Data quality code A for all species and periods.

3.4.1.2 Missing Data - All hydrocarbons

GC oven failure 01/04/01 hour 01 to 03/03/01 hour 11.

Calibration 11/04/01 hours 19 to 22.

Calibration 18/04/01 hours 16 to 19.

3.4.1.3 Missing Data - Specific hydrocarbons

2-Methylpentane, 3-Methylpentane and Isoprene coeluted with unknown compounds from 03/04/01 to 19/04/01.

n-Hexane, 1,3,5-Trimethylbenzene and 1,2,4-Trimethylbenzene coeluted with unknown compounds from 03/04/01 to 10/04/01.

3.4.2 May

3.4.2.1 Data Quality Codes

Data quality code A for all species and periods.

3.4.2.2 Missing Data - All hydrocarbons

Calibration 02/05/01 hour 18 to 21.

Calibration 17/05/01 hours 09 to 12.

Calibration 23/05/01 hours 13 to 16.

GC problem / no data files 27/05/01 hour 24 to 29/05/01 hour 13.

3.4.2.3 Missing Data - Specific hydrocarbons

None.

3.4.3 June

3.4.3.1 Data Quality Codes

Data quality code A for all species and periods.

3.4.3.2 Missing Data - All hydrocarbons

Calibration 08/06/01 hours 18 to 21.

Calibration 13/06/01 hours 18 to 21.

GC problem / no data files 26/06/01 hours 19 to 24.

Calibration 27/06/01 hours 17 to 20.

3.4.3.3 Missing Data - Specific hydrocarbons

None.

4 Discussion

Tables 1 to 4, Appendix 1 contain statistical information relating to the ratified data, for each measured hydrocarbon, over the period 1 April 2001 to 30 June 2001. The tables list the percentage data capture, maximum concentration, mean concentration and minimum concentration of each hydrocarbon. The data capture is the number of ratified hourly data values expressed as a percentage of the number of hours in the specified period.

The periods when data for benzene and 1,3-butadiene were available, for all the sites, are plotted graphically in Figures 1 to 8, Appendix 2.

For the Cardiff, Edinburgh and Marylebone Road sites the data capture values for benzene and 1,3-butadiene were greater than 90%.

For the Harwell site, the data capture for benzene was 87.6% and for 1,3-butadiene was 87.3%. Two faults at the Harwell site resulted in loss of data.

- The oven door controller developed a fault on 22 May. The VOCAIR was replaced with a working spare on 24 May to bring the site back on-line as quickly as possible.
- On 29 May the chromatograms were affected by electrical noise and also exhibited variations in retention times. The problem was traced to the Auto-TCT head, which was serviced and repaired. The chromatography took time to settle down, the results being considered reliable from 4 June.

No further problems have occurred.

The Edinburgh GC was serviced between the 16th and 19th May. During the service it was found that a heater assembly on the Auto-TCT head required replacing. A spare Auto-TCT head was fitted. Since the Auto-TCT head has been replaced the ethane and ethene peaks 'split' occasionally and have been assigned data quality code E.

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Appendix 1

Summary Statistical Information

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Table 3.	Percentage data capture, maximum, mean and minimum values of ratified data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001
Table 4.	Percentage data capture, maximum, mean and minimum values of ratified data from the Marylebone Road site for the period; 1 April 2001 to 30 June 2001

Table 1. Percentage data capture, maximum, mean and minimum values of ratified data from the Cardiff site of the UK Hydrocarbon Network, for the period 1 April 2001 to 30 June 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	95.1	25.25	4.17	1.44
Ethene	95.1	18.32	1.76	0.2
Propane	95.1	10.16	1.56	0.4
Propene	95.1	3.35	0.86	0.33
Ethyne	18.18	6.08	1.11	0.14
2-Methylpropane	18.22	8.36	0.68	0.09
n-Butane	95.01	12.38	1.66	0.18
trans-2-Butene	95.1	0.55	0.12	0.05
1-Butene	82.65	0.49	0.07	0.01
cis-2-Butene	86.72	0.47	0.05	0.01
2-Methylbutane	94.51	21.44	1.2	0.06
n-Pentane	95.1	15.6	0.46	0.05
1,3-Butadiene	94.09	1.27	0.07	0.01
trans-2-Pentene	91.62	0.74	0.06	0.01
cis-2-Pentene	77.7	0.39	0.03	0.01
(2+3)-Methylpentane *	95.01	57.63	0.44	0.01
Isoprene	92.77	0.84	0.06	0.01
n-Hexane	94.87	2.63	0.16	0.01
n-Heptane	87.32	1.55	0.08	0.01
Benzene	93.5	1.92	0.36	0.05
Toluene	89.33	9.98	1.02	0.05
Ethylbenzene	59.34	1.68	0.2	0.03
(m+p)-Xylene *	57.14	5.43	0.54	0.05
o-Xylene	37.77	3.82	0.23	0.03

* (2+3)-Methylpentane and (m+p)-Xylene are reported as the sum of the 2 individual components due to the fact that they are not sufficiently well resolved in the chromatogram.

Table 2. Percentage data capture, maximum, mean and minimum values of ratified data from the Edinburgh site of the UK Hydrocarbon Network, for the period 1 April 2001 to 30 June 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	94	24.45	3.07	0.59
Ethene	94.18	12.24	0.92	0.04
Propane	94.83	137.7	2.41	0.18
Propene	94.78	4.74	0.88	0.37
Ethyne	48.67	9.06	0.81	0.16
2-Methylpropane	48.76	33.85	0.87	0.07
n-Butane	94.83	83.35	1.62	0.08
trans-2-Butene	94.83	0.48	0.14	0.03
1-Butene	90.06	0.38	0.06	0.01
cis-2-Butene	94.64	0.23	0.06	0.01
2-Methylbutane	94.83	21.97	0.77	0.04
n-Pentane	94.83	23.85	0.48	0.03
1,3-Butadiene	90.84	0.8	0.06	0.01
trans-2-Pentene	89.61	0.37	0.04	0.01
cis-2-Pentene	69.64	0.13	0.02	0.01
(2+3)-Methylpentane *	94.83	6.36	0.32	0.01
Isoprene	94.14	0.14	0.03	0
n-Hexane	94.83	5.54	0.31	0.01
n-Heptane	92.9	1.39	0.05	0
Benzene	94.83	2.28	0.32	0.1
Toluene	94.37	4.36	0.71	0.02
Ethylbenzene	82.37	1.43	0.12	0.01
(m+p)-Xylene *	84.94	2.41	0.45	0.01
o-Xylene	74.5	1.82	0.16	0.01

* (2+3)-Methylpentane and (m+p)-Xylene are reported as the sum of the 2 individual components due to the fact that they are not sufficiently well resolved in the chromatogram.

Table 3. Percentage data capture, maximum, mean and minimum values of ratified data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	87.55	3.94	1.49	0.15
Ethene	86.68	1.9	0.32	0.03
Propane	87.5	3.52	0.69	0.07
Propene	87.55	1.26	0.16	0.06
Ethyne	33.15	2.49	0.37	0.05
2-Methylpropane	33.24	1.01	0.16	0.01
n-Butane	87.41	3.07	0.37	0.03
trans-2-Butene	39.19	0.25	0.03	0
1-Butene	44.46	0.43	0.02	0
cis-2-Butene	11.13	0.05	0.01	0
2-Methylbutane	87.18	5.19	0.27	0.01
n-Pentane	83.33	1.31	0.1	0.01
1,3-Butadiene	87.32	0.98	0.04	0.01
trans-2-Pentene	18.77	0.2	0.02	0
cis-2-Pentene	3.16	0.09	0.01	0
(2+3)-Methylpentane *	74.22	0.78	0.08	0
Isoprene	13.51	0.34	0.02	0
n-Hexane	69.18	0.82	0.03	0
n-Heptane	49.77	0.29	0.03	0
Benzene	87.59	2.04	0.13	0.02
Toluene	82.55	3.78	0.25	0.02
Ethylbenzene	45.51	0.43	0.06	0
(m+p)-Xylene *	52.61	1.16	0.12	0
o-Xylene	41.39	0.46	0.06	0

* (2+3)-Methylpentane and (m+p)-Xylene are reported as the sum of the 2 individual components due to the fact that they are not sufficiently well resolved in the chromatogram.

Table 4. Percentage data capture, maximum, mean and minimum values of ratified data from the Marylebone Road site for the period; 1 April 2001 to 30 June 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	93.36	29.61	5.48	1.7
Ethene	93.36	32.27	7.11	0.39
Propane	92.9	10.68	1.99	0.31
Propene	92.99	10.05	2.29	0.11
Ethyne	93.27	25.76	4.55	0.15
2-Methylpropane	93.22	20.22	2.3	0.18
n-Butane	93.27	36.11	4.66	0.37
trans-2-Butene	93.5	2.06	0.31	0.01
1-Butene	93.5	1.61	0.36	0.02
cis-2-Butene	93.5	1.59	0.26	0.01
2-Methylbutane	93.5	27.79	4.92	0.25
n-Pentane	93.5	7.36	1.38	0.12
1,3-Butadiene	93.5	1.6	0.37	0.02
trans-2-Pentene	93.5	2.12	0.29	0.01
cis-2-Pentene	92.99	1.12	0.16	0.01
2-Methylpentane	76.97	7.44	1.43	0.07
3-Methylpentane	76.97	4.02	0.76	0.04
Isoprene	76.88	1.09	0.22	0.01
n-Hexane	80.91	2.51	0.4	0.02
n-Heptane	83.75	1.56	0.22	0.02
Benzene	94.05	7.75	1.13	0.04
Toluene	92.31	26.19	4.61	0.14
Ethylbenzene	92.58	4.36	0.77	0.02
(m+p)-Xylene *	92.58	16.17	2.82	0.03
o-Xylene	92.58	6.08	1.03	0.02
1,3,5-Trimethylbenzene	82.42	1.85	0.27	0.01
1,2,4-Trimethylbenzene	85.44	5.05	0.89	0.01

* (m+p)-Xylene are reported as the sum of the 2 individual components due to the fact that they are not sufficiently well resolved in the chromatogram.

Appendix 2

Time Series Plots of Hydrocarbon Concentrations

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- Figure 1. Time series plot of the ratified Benzene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001
- Figure 2. Time series plot of the ratified 1,3-Butadiene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001
- Figure 3. Time series plots for the ratified Benzene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001
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- Figure 8. Time series plots for the ratified 1,3-Butadiene data from the Marylebone Road site affiliated to the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001



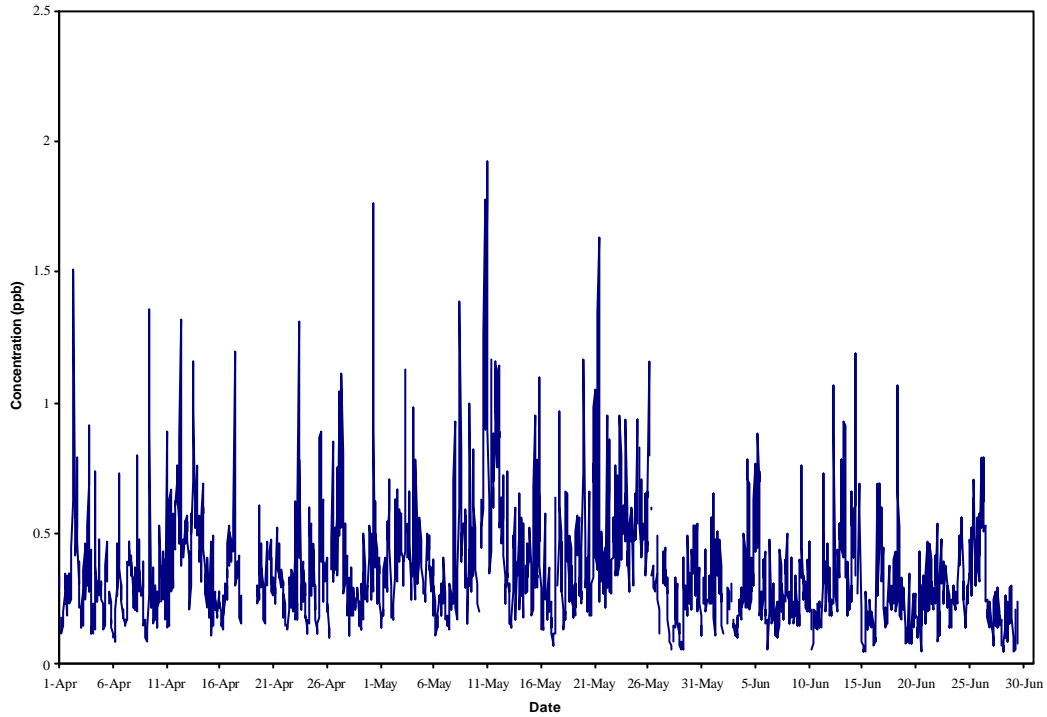


Figure 1. Time series plot of the ratified Benzene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

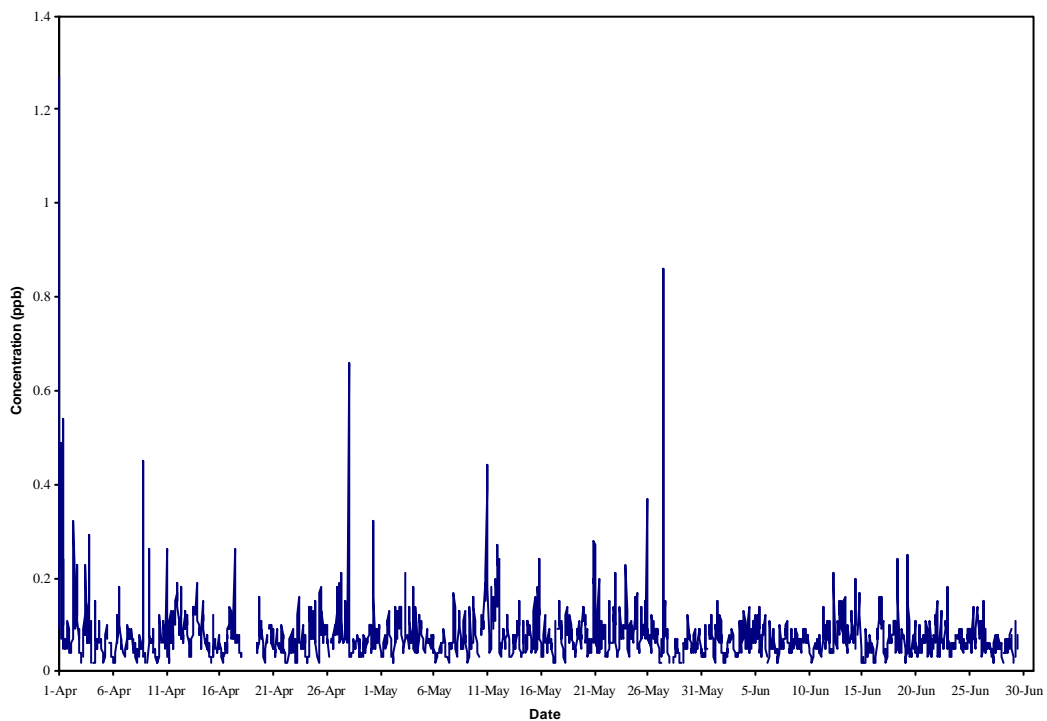


Figure 2. Time series plot of the ratified 1,3-Butadiene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

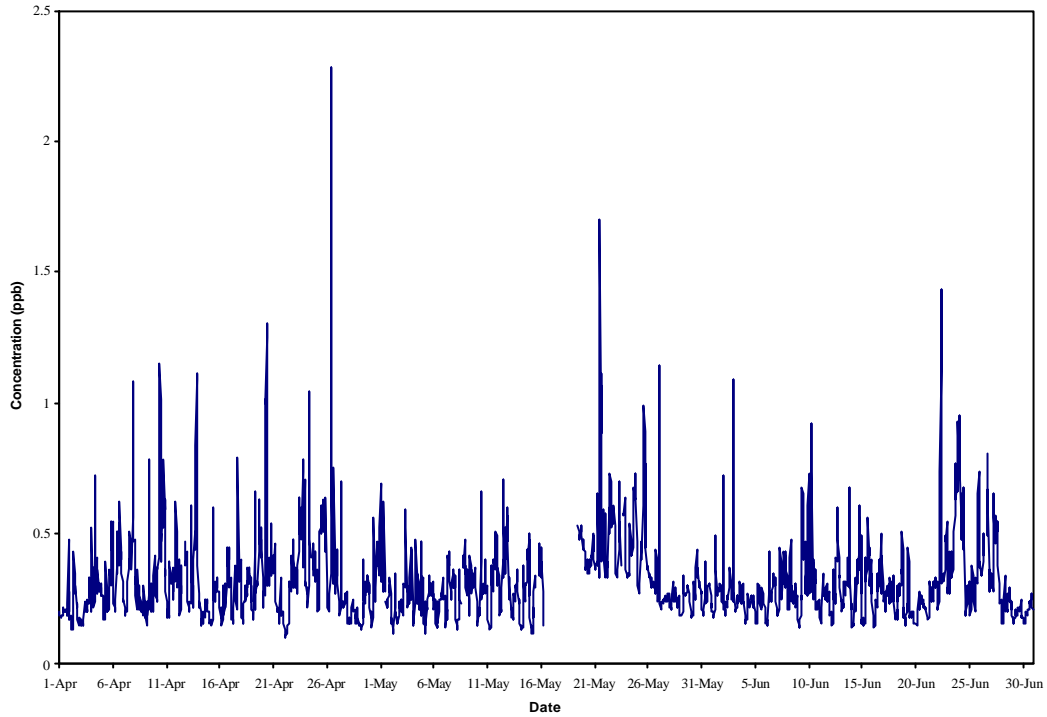


Figure 3. Time series plots for the ratified Benzene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

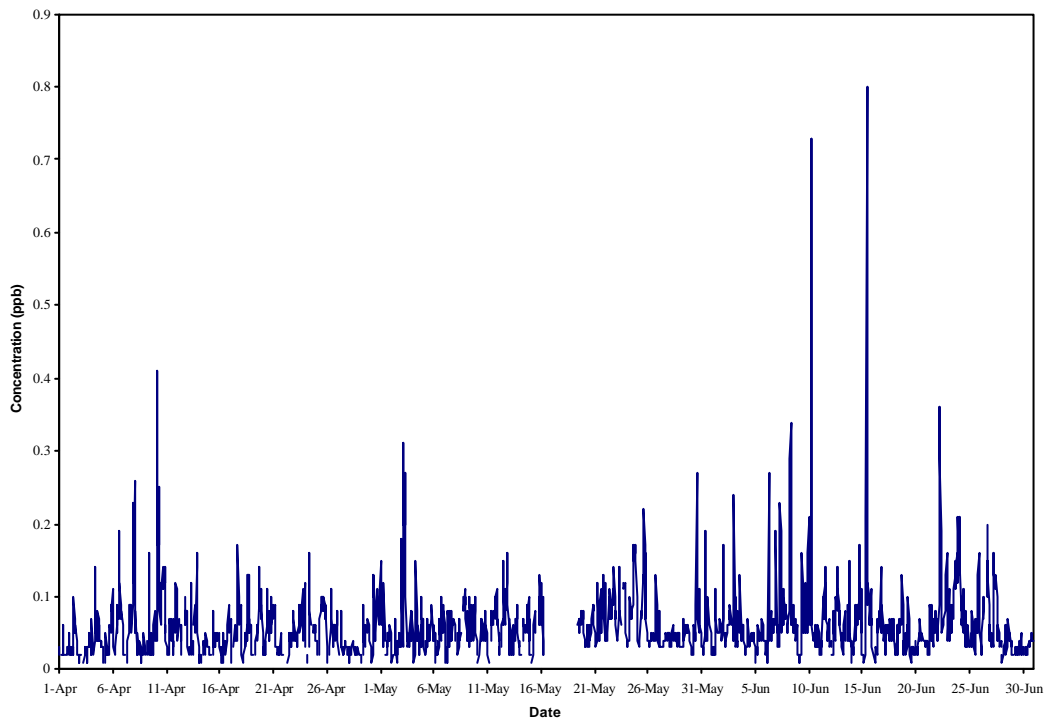


Figure 4. Time series plots for the ratified 1,3-Butadiene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

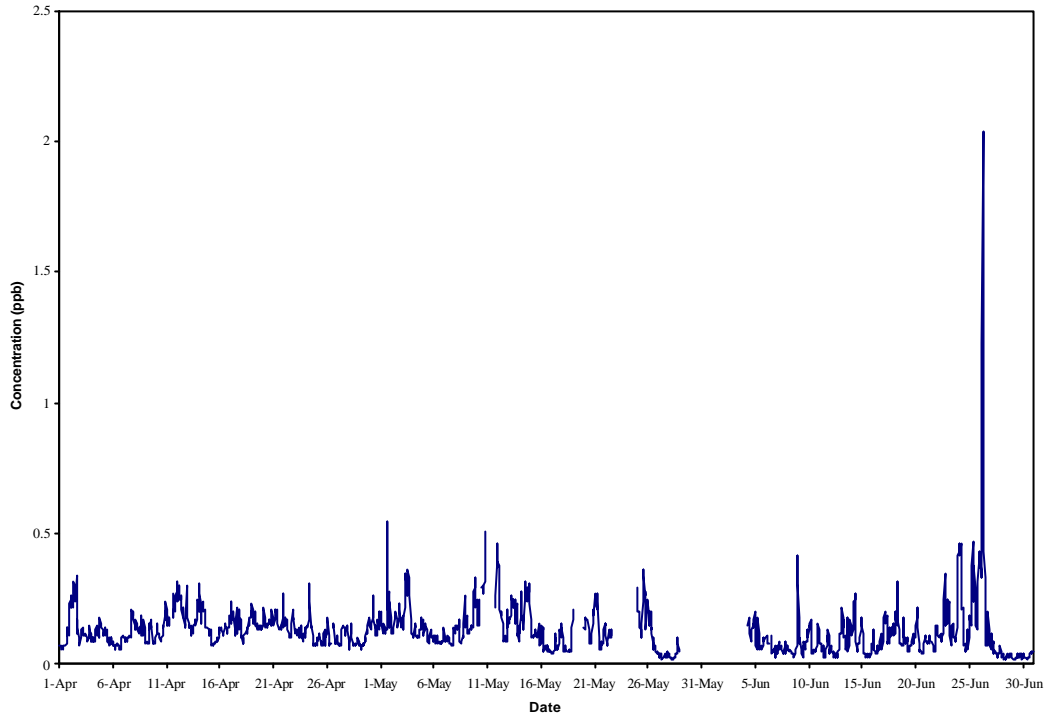


Figure 5. Time series plots for the ratified Benzene data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

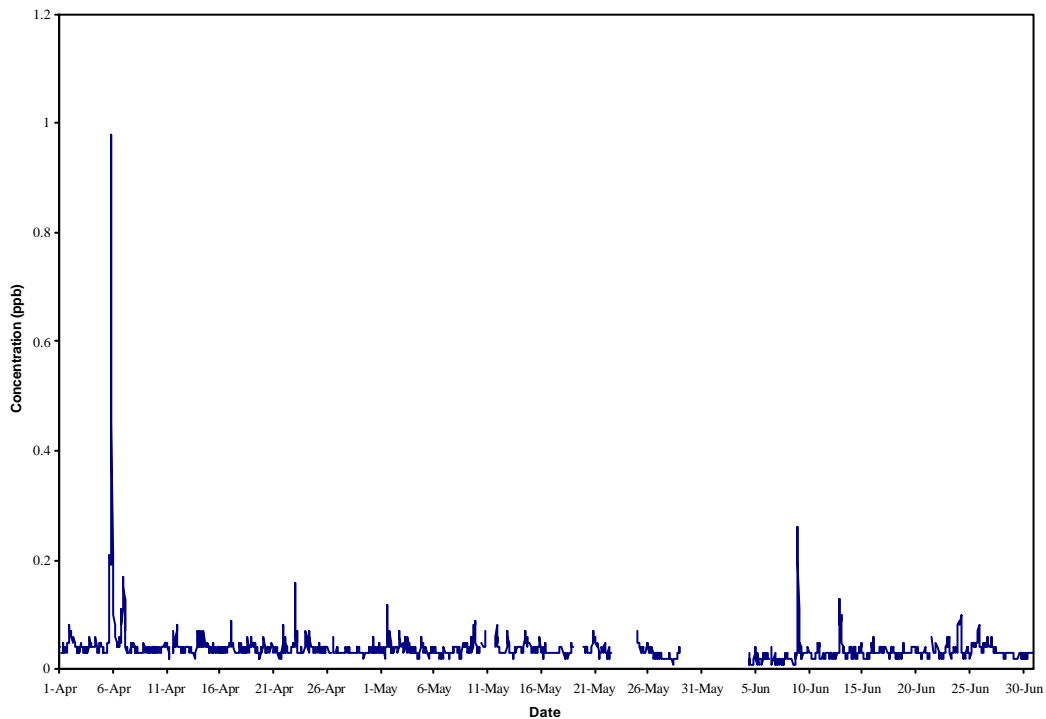


Figure 6. Time series plots for the ratified 1,3-Butadiene data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

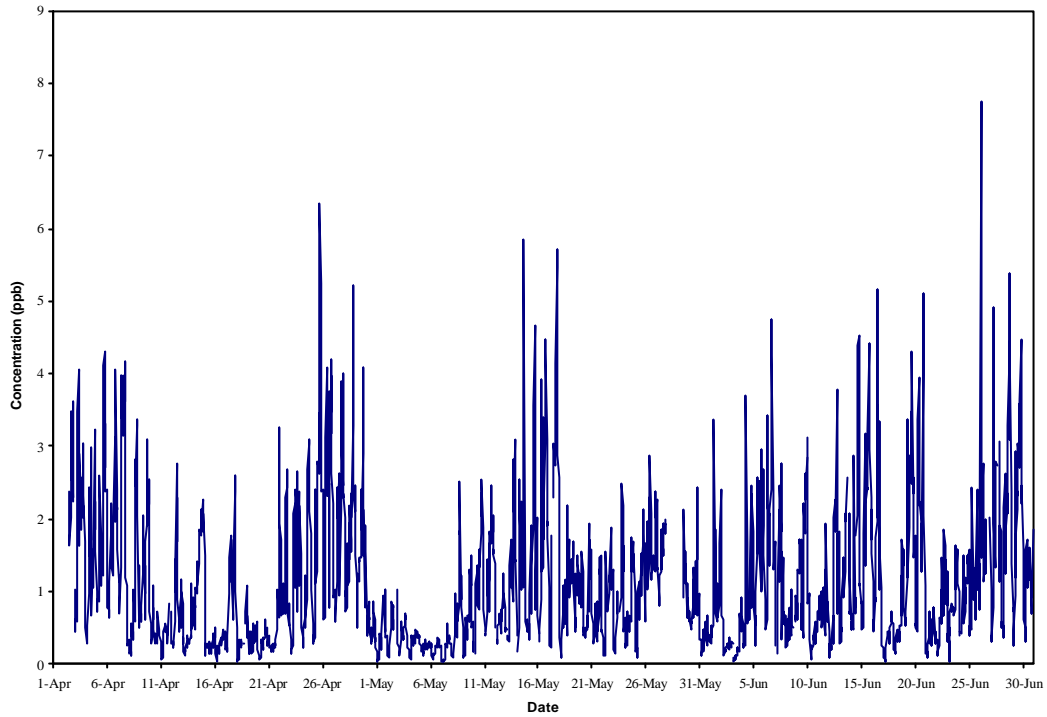


Figure 7. Time series plots for the ratified Benzene data from the Marylebone Road site affiliated to the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001

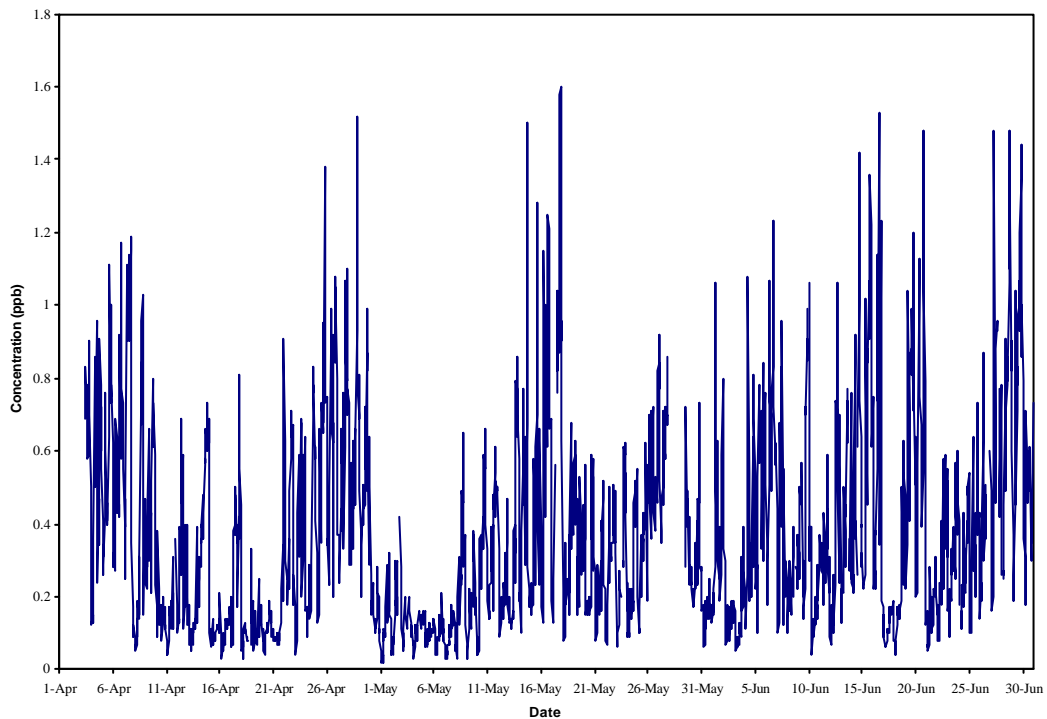


Figure 8. Time series plots for the ratified 1,3-Butadiene data from the Marylebone Road site affiliated to the UK Hydrocarbon Network, for the period; 1 April 2001 to 30 June 2001