

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

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 Ethyne and 2-Methylpropane from 1/07/01 to 10/07/01.
Data quality code E for Ethane, n-Hexane, Isoprene, n-Heptane, Toluene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.1.1.2 Missing Data – All hydrocarbons

No liquid nitrogen 02/07/01 hours 08 to 10.
PC/GC communication problem 04/07/01 hours 08 to 12.
Calibration 09/07/01 hours 08 to 15.
CMCU/QAQC audit and service visit 10/07/01 hour 08 to 12/07/01 hour 15.
Calibration 13/07/01 hours 08 to 15.
PC/GC communication problem 22/07/01 hour 09 to 23/07/01 hour 08.
Calibration 23/07/01 hours 11 to 14.
PC/GC communication problem 25/07/01 hours 11 to 24.

3.1.1.3 Missing Data – Specific hydrocarbons

Ethyne and 2-Methylpropane co-eluted from 12/07/01 to 31/07/01.

3.1.2 August

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 02/08/01 hours 09 to 12.
No liquid nitrogen 13/08/01 hour 22 to 14/08/01 hour 08.
Calibration 16/08/01 hours 09 to 12.
PC/GC communication problem 21/08/01 hour 16 to 22/08/01 hour 08.
Air compressor problem 29/08/01 hour 13 to 30/08/01 hour 15.

Calibration 31/08/01 hours 09 to 12.

3.1.2.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane co-eluted for the whole month.

3.1.3 September

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 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 13/09/01 hours 11 to 14.

Calibration 27/09/01 hours 11 to 15.

3.1.3.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane co-eluted for the whole month.

3.2 EDINBURGH

3.2.1 July

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 Ethane, Ethene, n-Hexane, Isoprene, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.2.1.2 Missing Data - All hydrocarbons

Calibration 11/07/01 hours 11 to 14.

Calibration 25/07/01 hours 12 to 16.

Liquid nitrogen supply problem 27/07/01 hour 12 to 31/07/01 hour 11.

3.2.1.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane co-eluted for the whole month.

3.2.2 August

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 02/08/01 to 31/08/01.

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

3.2.2.2 Missing Data - All hydrocarbons

Calibration 07/08/01 hours 12 to 15.

CMCU/QAQC audit and service visit 16/08/01 hour 13 to 19/08/01 hour 07.

Calibration 20/08/01 hours 12 to 15.

3.2.2.3 Missing Data - Specific hydrocarbons

Ethyne and 2-Methylpropane co-eluted from 01/08/01 to 02/08/01.

3.2.3 September

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 06/09/01 hours 11 to 14.

Calibration 18/09/01 hours 14 to 17.

3.2.3.3 Missing Data - Specific hydrocarbons

None.

3.3 HARWELL

3.3.1 July

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, Ethylbenzene, (m+p)-Xylene and o-Xylene for the whole month.

3.3.1.2 Missing Data - All hydrocarbons

Calibration 05/07/01 hours 10 to 13.
Calibration 19/07/01 hours 09 to 12.

3.3.1.3 Missing Data - Specific hydrocarbons

Isoprene co-eluted with an unknown compound for the whole month.

3.3.2 August

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 02/08/01 hours 10 to 13.
GC electrical problem 08/08/01 hour 23 to 09/08/01 hour 11.
Calibration 16/08/01 hours 10 to 13.
Calibration 29/08/01 hours 13 to 16.

3.3.2.3 Missing Data - Specific hydrocarbons

Isoprene co-eluted with an unknown compound from 01/08/01 to 02/08/01.

3.3.3 September

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

Liquid nitrogen supply problem 13/09/01 hour 06 to 13/09/01 hour 10.

Calibration 14/09/01 hours 09 to 12.

Liquid nitrogen supply problem 19/09/01 hour 23 to 20/09/01 hour 11.

Calibration 27/09/01 hours 09 to 14.

3.3.3.3 Missing Data - Specific hydrocarbons

None.

3.4 MARYLEBONE ROAD

3.4.1 July

3.4.1.1 Data Quality Codes

Data quality code A for all species and periods.

3.4.1.2 Missing Data - All hydrocarbons

Air conditioning failure 01/07/01 hour 18 to 05/07/01 hour 12.

Calibration 04/07/01 hours 14 to 17.

Calibration 05/07/01 hours 14 to 17.

Calibration 20/07/01 hours 05 to 08.

Calibration 25/07/01 hours 16 to 19.

Air conditioning failure 28/07/01 hours 19 to 22.

Air conditioning failure 29/07/01 hour 18 to 30/07/01 hour 03.

3.4.1.3 Missing Data - Specific hydrocarbons

None.

3.4.2 August

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 09/08/01 hour 21 to 24.

Air conditioning failure 10/08/01 hours 14 to 16.

Calibration 10/08/01 hours 19 to 22.

Air conditioning failure 14/08/01 hours 19 to 23.

Air conditioning failure 15/08/01 hours 12 to 16.

GC trap cooling failure 23/08/01 hour 18 to 24/08/01 hour 04.

GC trap cooling failure 24/08/01 hours 13 to 15.

ESU service visit 25/08/01 hour 16 to 29/08/01 hour 17.

Calibration 29/08/01 hours 18 to 21.

3.4.2.3 Missing Data - Specific hydrocarbons

None.

3.4.3 September

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 05/09/01 hours 18 to 21.

Power supply problem and ESU service visit 06/09/01 hour 17 to 07/09/01 hour 13.

Calibration 07/09/01 hours 14 to 17.

Power supply problem 10/09/01 hours 09 to 15.

Calibration 25/09/01 hours 03 to 06.

ESU service visit 25/09/01 hours 13 to 16.

Calibration 26/09/01 hours 19 to 22.

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 July 2001 to 30 September 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 site the data capture values for benzene and 1,3-butadiene were greater than 90%. The air compressor supplying the VOCAIR had to be replaced due to an air leak in the drier unit fitted to the compressor.

For the Edinburgh site the data capture values for benzene and 1,3-butadiene were greater than 90%. There were no significant problems for the period covered by this report.

For the Harwell site the data capture values for benzene and 1,3-butadiene were greater than 95%. There were no significant problems over the period covered by this report. The measured concentrations of hydrocarbons at Harwell were low for most of the period covered by this report. The concentrations of both benzene and 1,3-butadiene falling below 0.05 ppb on a number of occasions, see figures 5 and 6.

For the Marylebone Road site, the data capture for benzene was 78.8% and for 1,3-butadiene was 87.3%.

Three faults at the Marylebone Road site resulted in loss of data.

- The cabin air conditioning unit developed a fault during July. The air temperature within the cabin was elevated on a number of occasions. The Perkin Elmer GC oven could not cool to the temperature required to begin the analytical cycle. This effect resulted in several periods of data loss. The air conditioning unit was replaced on 15 August.
- The GC cold trap developed a fault on 23 August and was replaced during a service visit on the 25 August.
- After the service visit on the 25 August parts of the generated chromatograms were affected by electrical noise. The source of the noise was traced to a faulty FID heater assembly. The FID was serviced and the heater assembly repaired on 25 September. Hence, during this period a number of data points were rejected but the remaining data are all data quality code A.

No further problems have occurred.

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Appendix 1

Summary Statistical Information

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

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	90.58	28.47	4.69	1.41
Ethene	90.58	16.83	2.19	0.29
Propane	90.58	56.94	1.7	0.33
Propene	90.58	4.1	0.86	0.21
Ethyne	9.19	5.95	1.6	0.12
2-Methylpropane	9.19	5.42	1	0.13
n-Butane	90.53	18.19	1.85	0.2
trans-2-Butene	90.49	1.22	0.15	0.02
1-Butene	82.38	0.93	0.1	0.01
cis-2-Butene	85.78	1.15	0.08	0.01
2-Methylbutane	90.49	19.97	1.3	0.12
n-Pentane	90.58	13.99	0.6	0.07
1,3-Butadiene	88.09	0.71	0.09	0.01
trans-2-Pentene	88.27	1.55	0.09	0.01
cis-2-Pentene	80.8	0.83	0.05	0.01
(2+3)-Methylpentane *	90.22	18.07	0.56	0.01
Isoprene	88.59	0.76	0.11	0.01
n-Hexane	90.31	109.7	0.51	0.02
n-Heptane	84.65	1.52	0.08	0.01
Benzene	90.53	2.28	0.4	0.05
Toluene	89.18	6.28	1.15	0.11
Ethylbenzene	70.74	1.35	0.25	0.02
(m+p)-Xylene *	74.59	3.91	0.51	0.03
o-Xylene	52.63	1	0.17	0.02

* (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 July 2001 to 30 September 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	85.91	19.65	1.97	0.26
Ethene	90.9	10.03	0.77	0.07
Propane	93.61	105.7	2.57	0.19
Propene	93.48	14.41	1.07	0.42
Ethyne	61.1	8.45	1.08	0.11
2-Methylpropane	62.45	27.89	0.84	0.04
n-Butane	93.7	64.26	1.83	0.06
trans-2-Butene	93.61	0.5	0.1	0.02
1-Butene	87.95	1.69	0.07	0.01
cis-2-Butene	92.71	0.43	0.06	0.01
2-Methylbutane	93.98	17.8	0.92	0.03
n-Pentane	93.93	19.15	0.58	0.04
1,3-Butadiene	90.17	0.59	0.07	0.01
trans-2-Pentene	91.76	0.88	0.06	0.01
cis-2-Pentene	77.04	0.4	0.03	0.01
(2+3)-Methylpentane *	93.61	5.93	0.39	0.01
Isoprene	92.53	0.36	0.06	0.01
n-Hexane	93.75	4.84	0.49	0.19
n-Heptane	93.43	1.96	0.07	0
Benzene	93.75	1.79	0.34	0.11
Toluene	92.71	10.33	0.93	0.05
Ethylbenzene	85.51	2.33	0.16	0.01
(m+p)-Xylene *	88.45	6.47	0.61	0.03
o-Xylene	79.89	2.44	0.18	0.02

* (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 July 2001 to 30 September 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	96.51	5.53	1.07	0.34
Ethene	94.93	2.63	0.38	0.04
Propane	96.78	14.39	0.58	0.05
Propene	96.83	1.36	0.18	0.07
Ethyne	96.69	2.57	0.37	0.04
2-Methylpropane	94.7	1.98	0.18	0.01
n-Butane	96.83	4.28	0.39	0.02
trans-2-Butene	96.42	0.27	0.04	0.02
1-Butene	72.24	0.27	0.02	0.01
cis-2-Butene	20.83	0.99	0.02	0
2-Methylbutane	96.74	2.8	0.34	0.02
n-Pentane	93.57	1.32	0.11	0.01
1,3-Butadiene	96.69	0.11	0.03	0.01
trans-2-Pentene	55.25	0.17	0.01	0
cis-2-Pentene	8.56	0.07	0.01	0
(2+3)-Methylpentane *	85.24	0.63	0.08	0
Isoprene	57.29	0.34	0.03	0
n-Hexane	73.73	0.49	0.03	0
n-Heptane	79.3	0.18	0.03	0
Benzene	96.11	0.61	0.1	0.01
Toluene	94.57	4.15	0.26	0.02
Ethylbenzene	64.9	0.53	0.05	0
(m+p)-Xylene *	76	1.62	0.11	0
o-Xylene	44.38	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 July 2001 to 30 September 2001

Compound	%data capture	Maximum concentration (ppb)	Mean concentration (ppb)	Minimum concentration (ppb)
Ethane	85.42	30.85	5.56	1.45
Ethene	85.37	40.26	8.29	0.31
Propane	83.24	220.1	2.76	0.41
Propene	84.78	14.05	2.93	0.14
Ethyne	84.6	27.91	5	0.19
2-Methylpropane	85.33	22.41	2.75	0.18
n-Butane	85.55	44.6	5.89	0.36
trans-2-Butene	85.78	3.2	0.39	0.02
1-Butene	85.46	4.42	0.52	0.02
cis-2-Butene	85.64	2.71	0.33	0.01
2-Methylbutane	85.78	60.21	6.98	0.25
n-Pentane	85.78	11.46	1.63	0.1
1,3-Butadiene	85.73	2.33	0.53	0.04
trans-2-Pentene	85.69	3.41	0.43	0.01
cis-2-Pentene	85.69	1.72	0.23	0.01
2-Methylpentane	85.73	11.04	1.83	0.07
3-Methylpentane	85.73	6.08	0.97	0.04
Isoprene	85.64	1.48	0.37	0.01
n-Hexane	55.53	2.57	0.47	0.02
n-Heptane	66.67	1.99	0.33	0.01
Benzene	78.85	7.73	1.44	0.05
Toluene	81.07	45.67	5.9	0.18
Ethylbenzene	82.43	6.67	0.96	0.02
(m+p)-Xylene *	82.61	24.19	3.32	0.03
o-Xylene	82.93	5.72	1.22	0.01
1,3,5-Trimethylbenzene	81.61	13.41	0.37	0.01
1,2,4-Trimethylbenzene	79.89	42.01	1.3	0.02

* (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 July 2001 to 30 September 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 July 2001 to 30 September 2001
- Figure 3. Time series plots for the ratified Benzene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001
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- Figure 5. Time series plots for the ratified Benzene data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 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 July 2001 to 30 September 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 July 2001 to 30 September 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 July 2001 to 30 September 2001



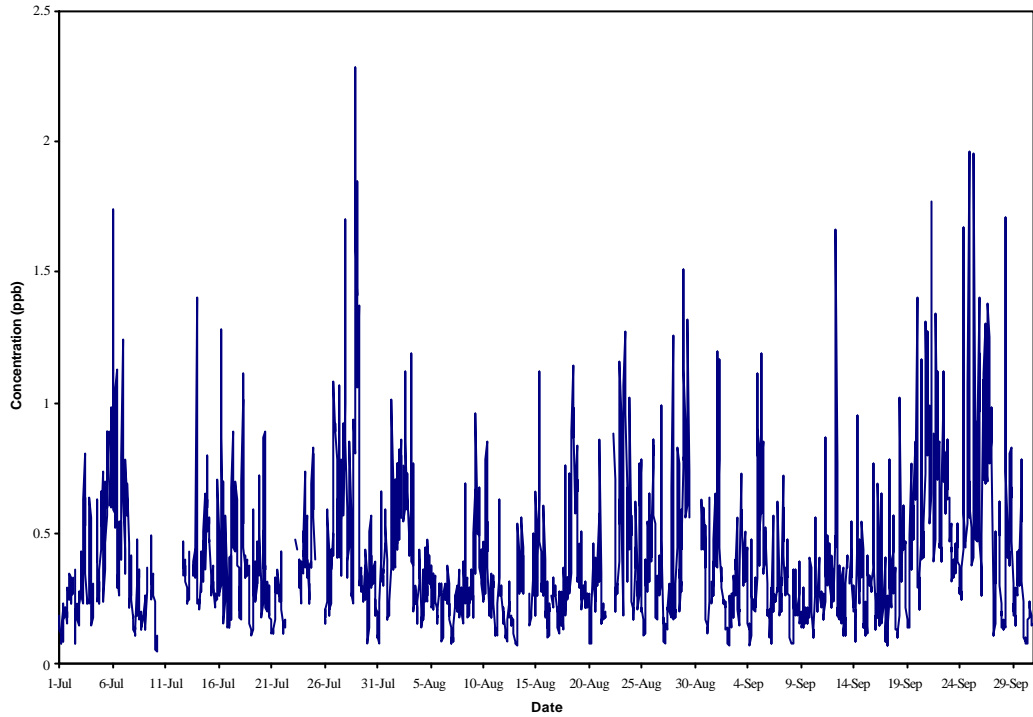


Figure 1. Time series plot of the ratified Benzene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

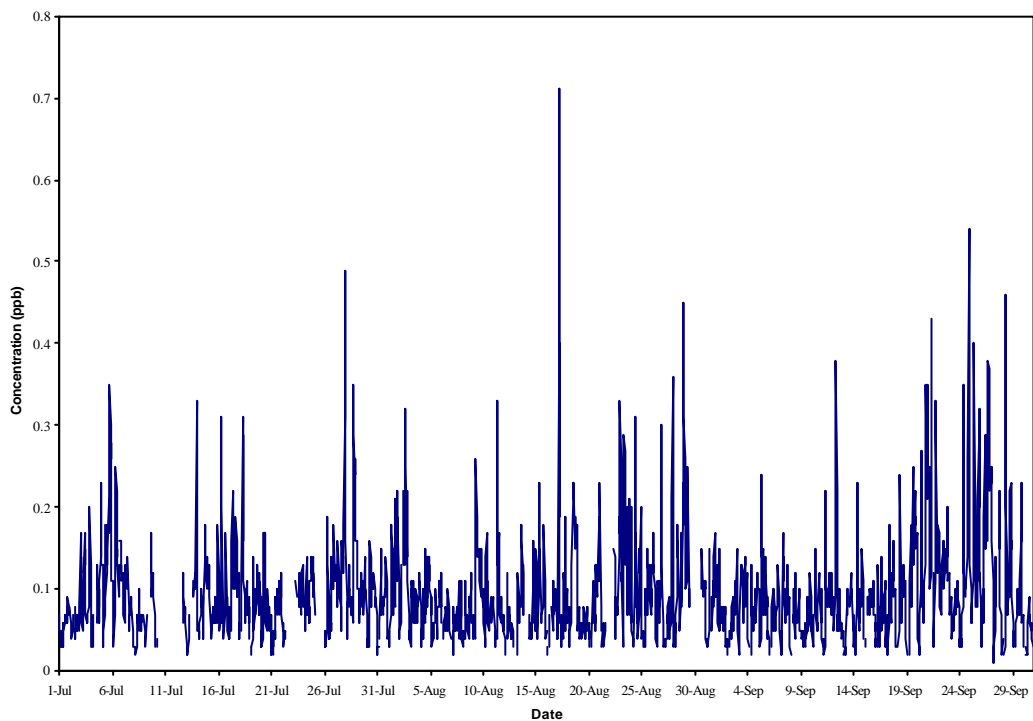


Figure 2. Time series plot of the ratified 1,3-Butadiene data from the Cardiff site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

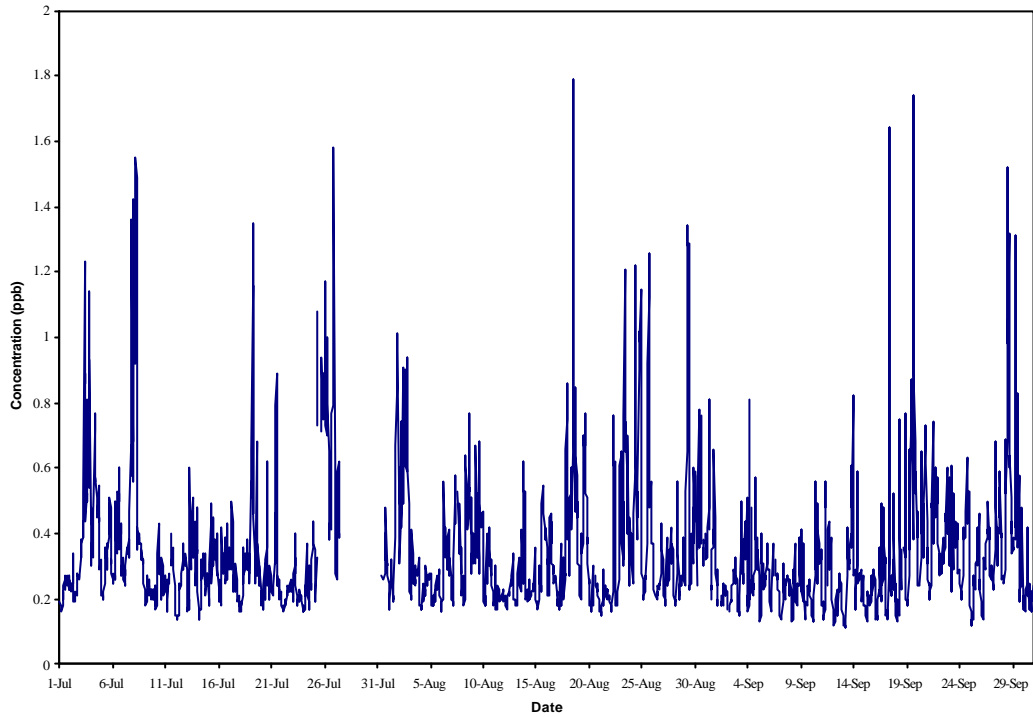


Figure 3. Time series plots for the ratified Benzene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

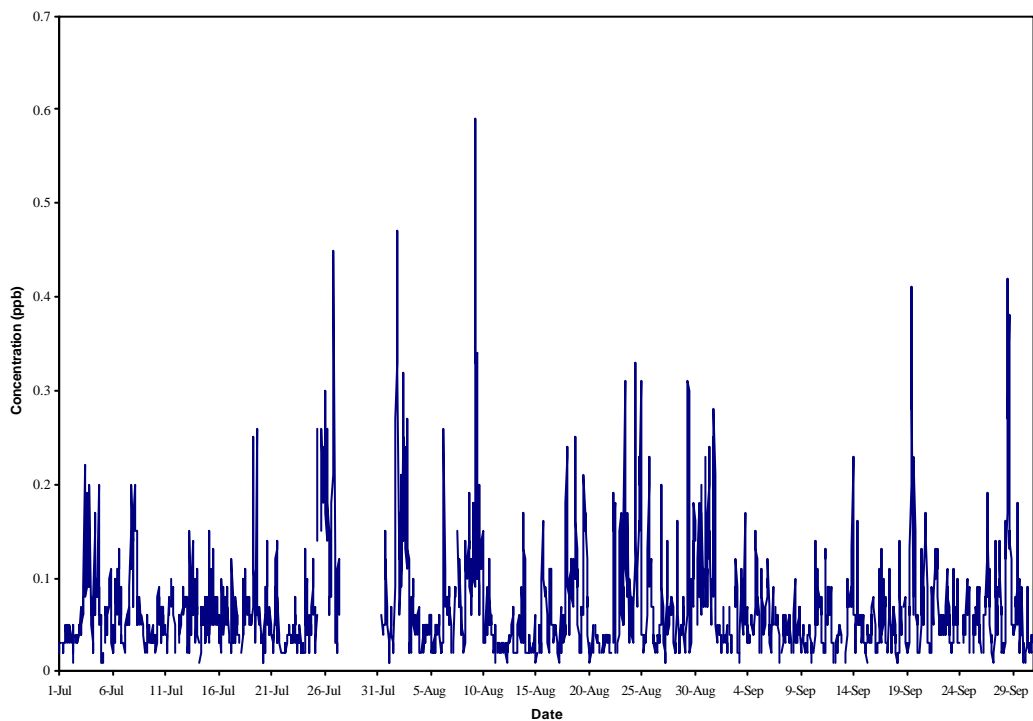


Figure 4. Time series plots for the ratified 1,3-Butadiene data from the Edinburgh site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

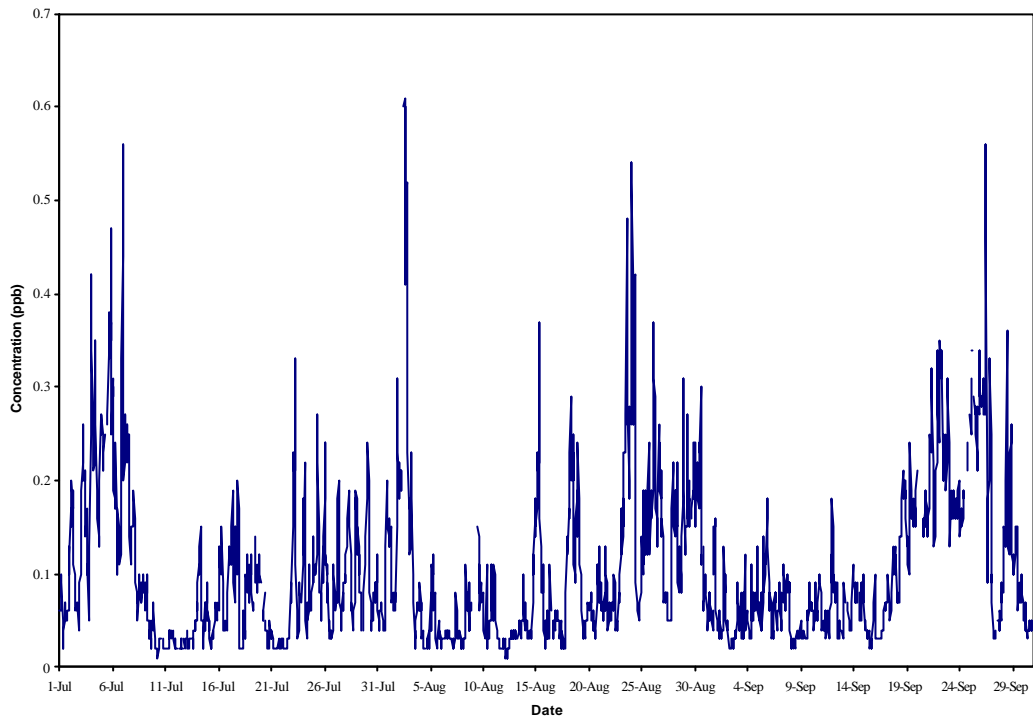


Figure 5. Time series plots for the ratified Benzene data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

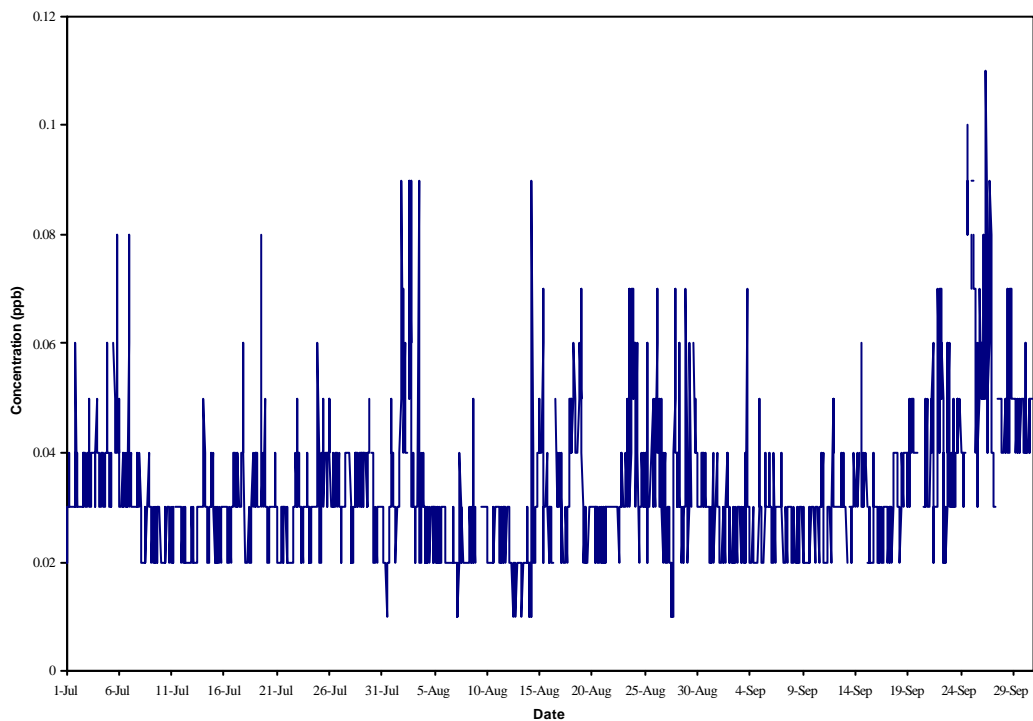


Figure 6. Time series plots for the ratified 1,3-Butadiene data from the Harwell site of the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

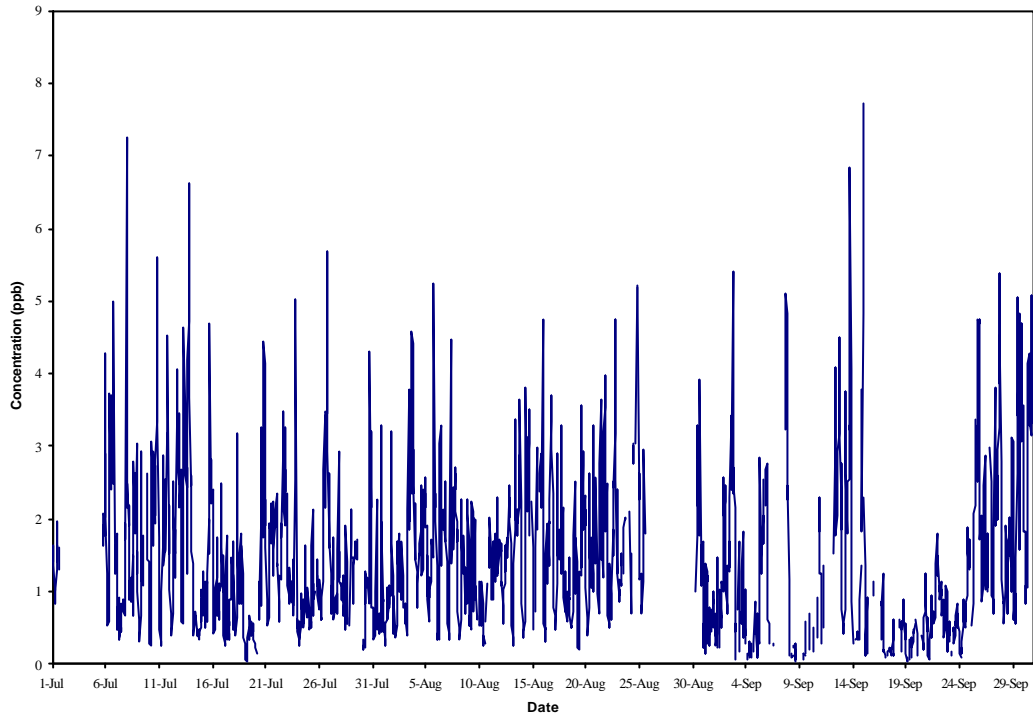


Figure 7. Time series plots for the ratified Benzene data from the Marylebone Road site affiliated to the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001

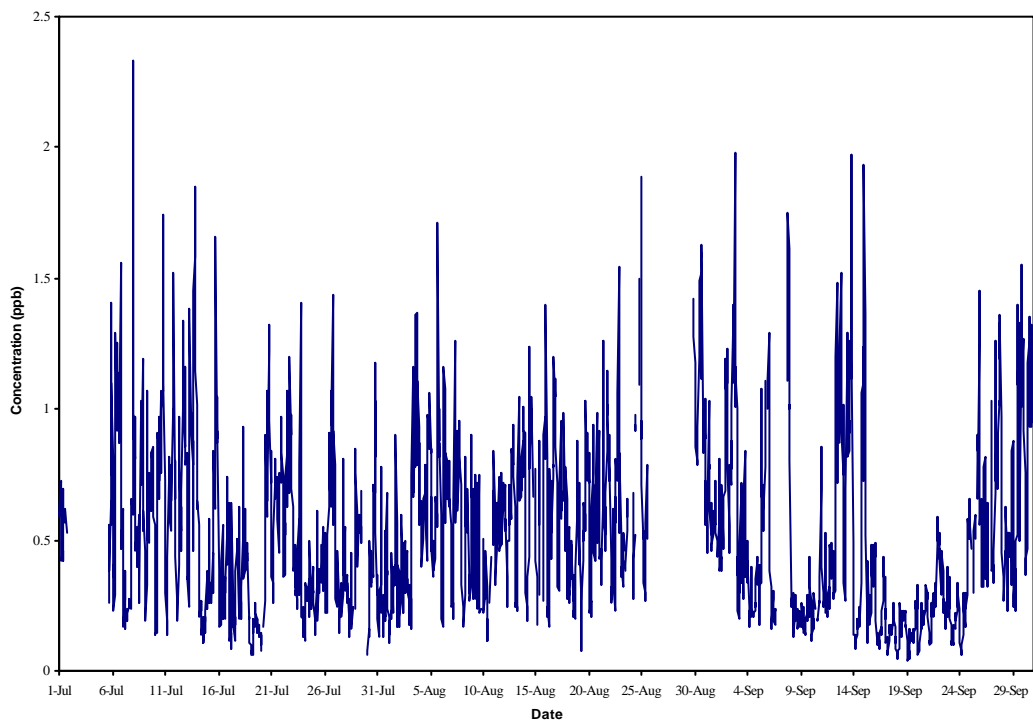


Figure 8. Time series plots for the ratified 1,3-Butadiene data from the Marylebone Road site affiliated to the UK Hydrocarbon Network, for the period; 1 July 2001 to 30 September 2001