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Air Pollution in the UK 2010 – Compliance Assessment Summary



A report prepared by AEA for Defra and the Devolved Administrations.

Title Air Pollution in the UK 2010 – Compliance Assessment Summary

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Executive Summary

The UK is required to report air quality data on an annual basis under the following European Directives:

- The Council Directive on ambient air quality and cleaner air for Europe (2008/50/EC).
- The Fourth Daughter Directive 2004/107/EC under the Air Quality Framework Directive (1996/62/EC).

This document has been prepared to accompany and summarise the UK's 2010 submission on air quality to the EU Commission, presenting a summary of the UK's compliance with the above directives, based upon measurements from national air pollution monitoring networks and air pollution modelling. This includes details of the exceedences reported in 2010.

This document is an extract from a larger report, "Air Pollution in the UK 2010", which, in addition to the compliance summary also provides background information on the pollutants covered by these Directives and the UK's own Air Quality Strategy, their sources, effects, how they are measured and modelled in the UK, and details of their spatial distribution and changes over time.

These data are produced on behalf of Defra (the Department for Environment, Food and Rural Affairs) and the Devolved Administrations of Scotland, Wales and Northern Ireland.

The 2010 results can be summarised as follows:

- No exceedences of the SO₂ limit values were reported in 2010 or in recent years.
- The UK exceeded the limit value for hourly mean nitrogen dioxide in three zones, and for annual mean nitrogen dioxide in 40 zones (out of a total of 43 zones). This is similar to the numbers of zones exceeding (both measured and modelled) in previous years.
- One zone (Greater London Urban Area) exceeded the daily limit value for PM₁₀ during the year, after subtraction of the contribution from natural sources. A time extension has been granted in respect of this zone and limit value and consequently a margin of tolerance is in force. The limit value plus margin of tolerance was not exceeded in 2010.
- Exceedences were reported for the long term ozone objective for human health in 41 zones, and exceedences were reported for the long term ozone objective for vegetation in six of the 43 zones.
- Two exceedences of the target values for nickel were reported in 2010, as was the case in 2009 and 2008.
- Eight exceedences of the target values were reported for benzo[a]pyrene in 2010 (compared with six in 2009).

Copies of previous annual submissions can be found on the Commission website: <http://cdr.eionet.europa.eu/gb/eu/annualair>. For more information on air quality in the UK visit the Defra website at www.defra.gov.uk/environment/quality/air/index.htm and the UK Air Quality websites at <http://uk-air.defra.gov.uk>, www.scottishairquality.co.uk, www.welshairquality.co.uk and www.airqualityni.co.uk.

Table of contents

| | | |
|----------|--|-----------|
| 1 | Introduction | 3 |
| 2 | Definition of Zones | 4 |
| 3 | Air Quality Assessment for 2010 | 6 |
| 3.1 | Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe | 6 |
| 3.2 | Fourth Daughter Directive 2004/107/EC | 12 |
| 4 | Comparison with Previous Years | 14 |
| | References | 19 |

1 Introduction

All Member States of the European Union must comply with EU Directives on ambient air quality. These require all Member States, including the UK, to undertake air quality assessment, and to report the findings to the European Commission on an annual basis. Between 1996 and 2008, these were:

- The Air Quality Framework Directive (1996/62/EC)¹
- Its four “Daughter Directives” (DDs) covering different groups of pollutants (1st DD 1999/30/EC², 2nd DD 2000/69/EC³, 3rd DD 2002/3/EC⁴ and 4th DD 2004/107/EC⁵).

In June 2008, a new Directive came into force: the Council Directive on ambient air quality and cleaner air for Europe (2008/50/EC)⁶, known as the “Air Quality Directive”. This Directive consolidated the first three Daughter Directives, and was transposed into the Regulations in England, Scotland, Wales and Northern Ireland in June 2010. The 4th Daughter Directive remains in force.

The UK has statutory monitoring networks in place to meet the requirements of these Directives, with air quality modelling used to supplement the monitored data.

The results are submitted to the European Commission each year, in the form of a standard questionnaire which each Member State must complete. The UK’s annual submission, together with those from previous years, can be found on the Commission website: <http://cdr.eionet.europa.eu/gb/eu/annualair>.

This document presents an assessment of the UK’s compliance with the limit values, target values and long term objectives set out in the Air Quality Directive and the 4th Daughter Directive, and compares this with recent years. This is based upon the data submitted to the European Commission.

Links to the EU Directives on ambient air quality are provided on Defra’s web pages at www.defra.gov.uk/environment/quality/air/air-quality/eu/. The Air Quality Directive itself can also be found at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:152:0001:0044:EN:PDF>.

Further information on air quality in the UK can be found on Defra’s online UK Air Information Resource (UK-AIR), at <http://uk-air.defra.gov.uk/>.

2 Definition of Zones

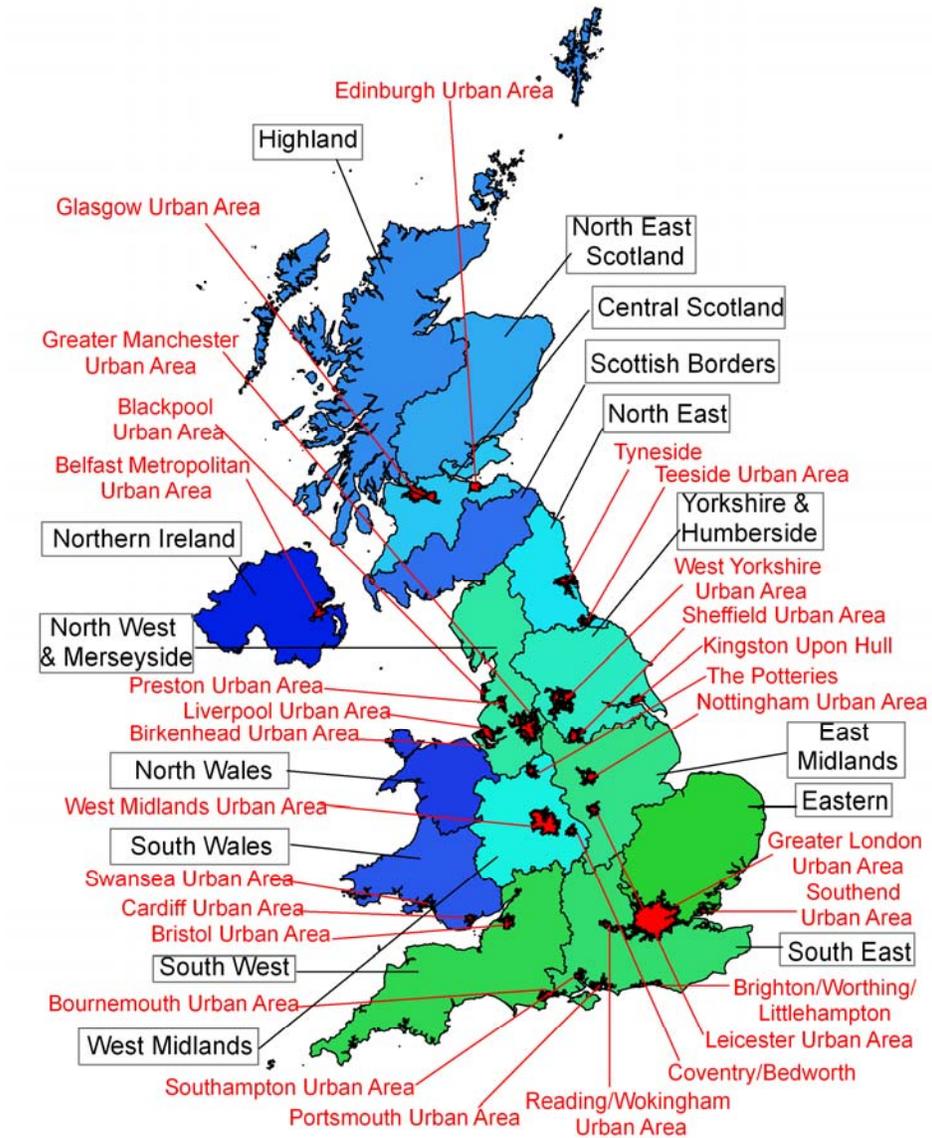
The UK is divided into 43 zones for air quality assessment. There are 28 agglomeration zones (large urban areas) and 15 non-agglomeration zones. Details are included in Form 2 of the Questionnaire (the annual compliance assessment report to the European Commission). Each zone is assigned an identification code: these are listed in Table 1 and the zones are illustrated in Figure 1.

Table 1 UK Zones and Agglomerations for Ambient Air Quality Reporting 2010

| Zone | Zone code | Ag or non-ag* |
|---------------------------------|-----------|---------------|
| Greater London Urban Area | UK0001 | Ag |
| West Midlands Urban Area | UK0002 | Ag |
| Greater Manchester Urban Area | UK0003 | Ag |
| West Yorkshire Urban Area | UK0004 | Ag |
| Tyneside | UK0005 | Ag |
| Liverpool Urban Area | UK0006 | Ag |
| Sheffield Urban Area | UK0007 | Ag |
| Nottingham Urban Area | UK0008 | Ag |
| Bristol Urban Area | UK0009 | Ag |
| Brighton/Worthing/Littlehampton | UK0010 | Ag |
| Leicester Urban Area | UK0011 | Ag |
| Portsmouth Urban Area | UK0012 | Ag |
| Teesside Urban Area | UK0013 | Ag |
| The Potteries | UK0014 | Ag |
| Bournemouth Urban Area | UK0015 | Ag |
| Reading/Wokingham Urban Area | UK0016 | Ag |
| Coventry/Bedworth | UK0017 | Ag |
| Kingston upon Hull | UK0018 | Ag |
| Southampton Urban Area | UK0019 | Ag |
| Birkenhead Urban Area | UK0020 | Ag |
| Southend Urban Area | UK0021 | Ag |
| Blackpool Urban Area | UK0022 | Ag |
| Preston Urban Area | UK0023 | Ag |
| Glasgow Urban Area | UK0024 | Ag |
| Edinburgh Urban Area | UK0025 | Ag |
| Cardiff Urban Area | UK0026 | Ag |
| Swansea Urban Area | UK0027 | Ag |
| Belfast Metropolitan Urban Area | UK0028 | Ag |
| Eastern | UK0029 | Non-ag |
| South West | UK0030 | Non-ag |
| South East | UK0031 | Non-ag |
| East Midlands | UK0032 | Non-ag |
| North West & Merseyside | UK0033 | Non-ag |
| Yorkshire & Humberside | UK0034 | Non-ag |
| West Midlands | UK0035 | Non-ag |
| North East | UK0036 | Non-ag |
| Central Scotland | UK0037 | Non-ag |
| North East Scotland | UK0038 | Non-ag |
| Highland | UK0039 | Non-ag |
| Scottish Borders | UK0040 | Non-ag |
| South Wales | UK0041 | Non-ag |
| North Wales | UK0042 | Non-ag |
| Northern Ireland | UK0043 | Non-ag |

ag = agglomeration zone, non-ag = non-agglomeration zone

Figure 1 UK zones and agglomerations for ambient air quality reporting 2010



Agglomeration zones (red)

Non-agglomeration zones (blue/green)

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3 Air Quality Assessment for 2010

The air quality assessment for each pollutant is derived from a combination of measured and modelled concentrations. Where both measurements and model results are available the assessment of compliance for each zone is based on the higher concentration of the two.

The results of the air quality assessment submitted to the European Commission are summarised in the tables below. The tables have been completed as follows:

- Where all measurements were within the relevant limit values, (or limit values with margins of tolerance where applicable) in 2010, the table shows this as "OK".
- Where compliance was determined by modelling or supplementary assessment, this is shown as "OK (m)".
- Where locations were identified as exceeding a limit value, target value or long-term objective, this is identified as ">LV", ">TV" or ">LTO" as applicable.
- Where an exceedence was determined by modelling or supplementary assessment, this is indicated by (m), as above.

Zones that complied with the relevant limit values, targets or long-term objectives are shaded blue, while those that did not are shaded red.

The abbreviation "n/a" (not applicable) means that an assessment is not relevant for this zone, such as for the NO_x vegetation critical level in agglomeration zones.

3.1 Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

Sulphur dioxide: the results of the air quality assessment for sulphur dioxide are presented in Form 8a of the Questionnaire.

In 2010, all zones and agglomerations within the UK complied with the limit values for 1-hour mean and 24-hour mean SO₂ concentration, set for protection of human health.

All non-agglomeration zones within the UK also complied with the critical levels for annual mean and winter mean SO₂ concentration, set for protection of ecosystems. (These are not applicable to built-up areas).

Nitrogen dioxide: the results of the air quality assessment for nitrogen dioxide for each zone are presented in Form 8b of the Questionnaire, and summarised in Table 2.

Three agglomeration zones - **Greater London Urban Area (UK0001)**, **Teesside Urban Area (UK0013)** and **Glasgow Urban Area (UK0024)** had locations which exceeded the 1-hour limit value (200 µg m⁻³) on more than the permitted number of occasions (18) during 2010.

The majority of zones and agglomerations in the UK had locations with measured or modelled annual mean NO₂ concentrations higher than the annual mean limit value (40 µg m⁻³). This was the case in 40 out of the 43 zones. Only the following three zones **met** the annual mean limit value in 2010:

- Blackpool Urban Area (UK0022)
 - Highland (UK0039)
 - Scottish Borders (UK0040)
- **all others showed some exceedences of the annual mean limit value.**

All non-agglomeration zones within the UK complied with the critical level for annual mean NO_x concentration, set for protection of vegetation.

Particulate matter: the results of the air quality assessment for PM₁₀ and PM_{2.5} for each zone are presented in Forms 8c and 9c of the Questionnaire respectively, and summarised in Table 3.

One zone had locations where modelled PM₁₀ concentrations exceeded the daily mean limit value of 50 µg m⁻³ on more than the permitted number of days (35): **Greater London Urban Area (UK0001)**. This (modelled) exceedence of the daily mean limit value remained after subtraction of the contribution from natural sources, as allowed by the Directive.

However, it should be noted that the UK has been granted a time extension for compliance with the daily mean PM₁₀ limit value in the Greater London Urban Area. The time extension means that the maximum margin of tolerance for this limit value is in force until 11th June 2011. This exemption applies for the period from 11th June 2008 to 10th June 2011.

Although the daily mean limit value was exceeded in this zone in 2010, **the daily mean limit value plus the maximum margin of tolerance (75 µg m⁻³ daily mean not to be exceeded on more than 35 times per calendar year) was not exceeded in 2010**. The UK was therefore compliant for daily mean PM₁₀ in 2010 for all zones and agglomerations.

Article 2 of the Commission Decision of 11th March 2011 requires the UK to provide the Commission with data indicating that the concentration levels in this zone have remained below the daily limit value plus the maximum margin of tolerance specified in Annex XI to Directive 2008/50/EC (daily mean of 75 µg m⁻³, not to be exceeded more than 35 times per calendar year). **The daily mean limit value plus the maximum margin of tolerance was also not exceeded during the period from 11th June 2008 to 31st December 2008 nor in 2009.**

All zones and agglomerations complied with the annual mean limit value of 40 µg m⁻³ for PM₁₀.

Annual mean concentrations of PM_{2.5} were below the target value in all zones and agglomerations.

Carbon monoxide, benzene and lead: the results of the air quality assessment for lead, benzene and CO are presented in Forms 8d, 8e and 8f of the Questionnaire respectively. All zones or agglomerations were compliant with the limit values for these three pollutants in 2010.

Ozone: the results of the air quality assessment for ozone for each zone are presented in Form 9a of the Questionnaire, and summarised in Table 4.

All zones and agglomerations were compliant with the two target values, which are based on the maximum daily 8-hour mean and on the AOT40 statistic⁴. The AOT40 statistic (expressed in µg m⁻³.hours) is the sum of the difference between hourly concentrations greater than 80 µg m⁻³ (= 40 ppb) and 80 µg m⁻³ over a given period using only the one-hour values measured between 0800 and 2000 Central European Time each day.

There are also two long-term objectives, one for human health, and one for vegetation. Forty-one zones and agglomerations were above the long-term objective (LTO) for health, and six zones were above the long-term objective for vegetation.

Table 2 Results of Air Quality Assessment for Nitrogen Dioxide in 2010

| Zone | Zone code | NO ₂ LV for health (1hr mean) | NO ₂ LV for health (annual mean) | NOx critical level for vegetation (annual mean) |
|---------------------------------|-----------|--|---|---|
| Greater London Urban Area | UK0001 | > LV | > LV | n/a |
| West Midlands Urban Area | UK0002 | OK | > LV | n/a |
| Greater Manchester Urban Area | UK0003 | OK | > LV | n/a |
| West Yorkshire Urban Area | UK0004 | OK | > LV | n/a |
| Tyneside | UK0005 | OK | > LV (m) | n/a |
| Liverpool Urban Area | UK0006 | OK | > LV (m) | n/a |
| Sheffield Urban Area | UK0007 | OK | > LV (m) | n/a |
| Nottingham Urban Area | UK0008 | OK | > LV (m) | n/a |
| Bristol Urban Area | UK0009 | OK | > LV | n/a |
| Brighton/Worthing/Littlehampton | UK0010 | OK | > LV (m) | n/a |
| Leicester Urban Area | UK0011 | OK | > LV | n/a |
| Portsmouth Urban Area | UK0012 | OK | > LV (m) | n/a |
| Teesside Urban Area | UK0013 | > LV | > LV (m) | n/a |
| The Potteries | UK0014 | OK | > LV (m) | n/a |
| Bournemouth Urban Area | UK0015 | OK | > LV (m) | n/a |
| Reading/Wokingham Urban Area | UK0016 | OK (m) | > LV (m) | n/a |
| Coventry/Bedworth | UK0017 | OK | > LV (m) | n/a |
| Kingston upon Hull | UK0018 | OK | > LV (m) | n/a |
| Southampton Urban Area | UK0019 | OK | > LV (m) | n/a |
| Birkenhead Urban Area | UK0020 | OK | > LV (m) | n/a |
| Southend Urban Area | UK0021 | OK (m) | > LV (m) | n/a |
| Blackpool Urban Area | UK0022 | OK (m) | OK (m) | n/a |
| Preston Urban Area | UK0023 | OK (m) | > LV (m) | n/a |
| Glasgow Urban Area | UK0024 | > LV | > LV | n/a |
| Edinburgh Urban Area | UK0025 | OK | > LV (m) | n/a |
| Cardiff Urban Area | UK0026 | OK | > LV (m) | n/a |
| Swansea Urban Area | UK0027 | OK | > LV (m) | n/a |
| Belfast Urban Area | UK0028 | OK | > LV (m) | n/a |
| Eastern | UK0029 | OK | > LV (m) | OK (m) |
| South West | UK0030 | OK | > LV | OK |
| South East | UK0031 | OK | > LV | OK (m) |
| East Midlands | UK0032 | OK | > LV (m) | OK (m) |
| North West & Merseyside | UK0033 | OK | > LV (m) | OK (m) |
| Yorkshire & Humberside | UK0034 | OK | > LV | OK |
| West Midlands | UK0035 | OK | > LV (m) | OK (m) |
| North East | UK0036 | OK | > LV (m) | OK (m) |
| Central Scotland | UK0037 | OK | > LV (m) | OK (m) |
| North East Scotland | UK0038 | OK | > LV | OK (m) |
| Highland | UK0039 | OK | OK | OK (m) |
| Scottish Borders | UK0040 | OK | OK | OK |
| South Wales | UK0041 | OK | > LV (m) | OK (m) |
| North Wales | UK0042 | OK | > LV (m) | OK |
| Northern Ireland | UK0043 | OK | > LV (m) | OK (m) |

Table 3 Results of Air Quality Assessment for PM₁₀ and PM_{2.5} in 2010 prior to Subtraction of Natural Sources.

| Zone | Zone code | PM ₁₀ LV (daily mean) | PM ₁₀ LV (annual mean) | PM _{2.5} Target value (annual mean) |
|---------------------------------|-----------|----------------------------------|-----------------------------------|--|
| Greater London Urban Area | UK0001 | > LV (m) * | OK | OK |
| West Midlands Urban Area | UK0002 | OK | OK | OK |
| Greater Manchester Urban Area | UK0003 | OK | OK | OK |
| West Yorkshire Urban Area | UK0004 | OK | OK | OK |
| Tyneside | UK0005 | OK | OK | OK |
| Liverpool Urban Area | UK0006 | OK | OK | OK |
| Sheffield Urban Area | UK0007 | OK | OK | OK |
| Nottingham Urban Area | UK0008 | OK | OK | OK |
| Bristol Urban Area | UK0009 | OK | OK | OK |
| Brighton/Worthing/Littlehampton | UK0010 | OK (m) | OK (m) | OK (m) |
| Leicester Urban Area | UK0011 | OK | OK | OK (m) |
| Portsmouth Urban Area | UK0012 | OK (m) | OK (m) | OK (m) |
| Teesside Urban Area | UK0013 | OK | OK | OK |
| The Potteries | UK0014 | OK | OK | OK |
| Bournemouth Urban Area | UK0015 | OK (m) | OK (m) | OK (m) |
| Reading/Wokingham Urban Area | UK0016 | OK (m) | OK (m) | OK |
| Coventry/Bedworth | UK0017 | OK (m) | OK (m) | OK |
| Kingston upon Hull | UK0018 | OK | OK | OK |
| Southampton Urban Area | UK0019 | OK | OK | OK |
| Birkenhead Urban Area | UK0020 | OK (m) | OK (m) | OK |
| Southend Urban Area | UK0021 | OK (m) | OK (m) | OK |
| Blackpool Urban Area | UK0022 | OK (m) | OK (m) | OK (m) |
| Preston Urban Area | UK0023 | OK (m) | OK (m) | OK |
| Glasgow Urban Area | UK0024 | OK | OK | OK |
| Edinburgh Urban Area | UK0025 | OK | OK | OK |
| Cardiff Urban Area | UK0026 | OK (m) | OK (m) | OK |
| Swansea Urban Area | UK0027 | OK | OK | OK |
| Belfast Urban Area | UK0028 | OK (m) | OK (m) | OK |
| Eastern | UK0029 | OK | OK | OK |
| South West | UK0030 | OK (m) | OK (m) | OK |
| South East | UK0031 | OK | OK | OK |
| East Midlands | UK0032 | OK | OK | OK |
| North West & Merseyside | UK0033 | OK | OK | OK |
| Yorkshire & Humberside | UK0034 | OK | OK | OK |
| West Midlands | UK0035 | OK | OK | OK |
| North East | UK0036 | OK | OK | OK |
| Central Scotland | UK0037 | OK | OK | OK |
| North East Scotland | UK0038 | OK | OK | OK |
| Highland | UK0039 | OK | OK | OK |
| Scottish Borders | UK0040 | OK (m) | OK (m) | OK (m) |
| South Wales | UK0041 | OK (m) | OK (m) | OK |
| North Wales | UK0042 | OK | OK | OK |
| Northern Ireland | UK0043 | OK | OK | OK (m) |

*Note: The UK has been granted a time extension to achieve compliance with the daily mean limit value for PM₁₀ in Greater London Urban Area. Consequently, the maximum margin of tolerance is in force for the duration of the extension. Following the subtraction of natural sources, the assessment indicated that concentrations of PM₁₀ in 2010 did not exceed the LV + maximum margin of tolerance in this zone.

Table 4 Results of Air Quality Assessment for Ozone in 2010

| Zone | Zone code | O ₃ TV and LTO for health (8hr mean) | O ₃ TV and LTO for vegetation (AOT40) |
|---------------------------------|-----------|---|--|
| Greater London Urban Area | UK0001 | Meets TV, >LTO | Meets TV, >LTO |
| West Midlands Urban Area | UK0002 | Meets TV, >LTO | OK |
| Greater Manchester Urban Area | UK0003 | Meets TV, >LTO (m) | OK |
| West Yorkshire Urban Area | UK0004 | Meets TV, >LTO (m) | OK |
| Tyneside | UK0005 | Meets TV, >LTO | OK |
| Liverpool Urban Area | UK0006 | Meets TV, >LTO | OK |
| Sheffield Urban Area | UK0007 | Meets TV, >LTO (m) | OK |
| Nottingham Urban Area | UK0008 | Meets TV, >LTO | OK |
| Bristol Urban Area | UK0009 | Meets TV, >LTO | OK |
| Brighton/Worthing/Littlehampton | UK0010 | Meets TV, >LTO (m) | OK |
| Leicester Urban Area | UK0011 | Meets TV, >LTO (m) | OK (m) |
| Portsmouth Urban Area | UK0012 | Meets TV, >LTO (m) | OK |
| Teesside Urban Area | UK0013 | Meets TV, >LTO (m) | OK |
| The Potteries | UK0014 | Meets TV, >LTO (m) | OK |
| Bournemouth Urban Area | UK0015 | Meets TV, >LTO (m) | OK |
| Reading/Wokingham Urban Area | UK0016 | Meets TV, >LTO | OK |
| Coventry/Bedworth | UK0017 | Meets TV, >LTO | OK |
| Kingston upon Hull | UK0018 | Meets TV, >LTO (m) | OK |
| Southampton Urban Area | UK0019 | Meets TV, >LTO (m) | OK (m) |
| Birkenhead Urban Area | UK0020 | Meets TV, >LTO (m) | OK |
| Southend Urban Area | UK0021 | Meets TV, >LTO | OK |
| Blackpool Urban Area | UK0022 | Meets TV, >LTO (m) | OK (m) |
| Preston Urban Area | UK0023 | Meets TV, >LTO (m) | OK |
| Glasgow Urban Area | UK0024 | Meets TV, >LTO (m) | OK |
| Edinburgh Urban Area | UK0025 | Meets TV, >LTO (m) | OK |
| Cardiff Urban Area | UK0026 | Meets TV, >LTO (m) | OK |
| Swansea Urban Area | UK0027 | Meets TV, >LTO | OK |
| Belfast Urban Area | UK0028 | OK | OK |
| Eastern | UK0029 | Meets TV, >LTO | Meets TV, >LTO |
| South West | UK0030 | Meets TV, >LTO | Meets TV, >LTO |
| South East | UK0031 | Meets TV, >LTO | Meets TV, >LTO (m) |
| East Midlands | UK0032 | Meets TV, >LTO | Meets TV, >LTO (m) |
| North West & Merseyside | UK0033 | Meets TV, >LTO | OK |
| Yorkshire & Humberside | UK0034 | Meets TV, >LTO | Meets TV, >LTO (m) |
| West Midlands | UK0035 | Meets TV, >LTO | OK |
| North East | UK0036 | Meets TV, >LTO (m) | OK |
| Central Scotland | UK0037 | Meets TV, >LTO | OK |
| North East Scotland | UK0038 | Meets TV, >LTO (m) | OK |
| Highland | UK0039 | Meets TV, >LTO (m) | OK |
| Scottish Borders | UK0040 | Meets TV, >LTO | OK |
| South Wales | UK0041 | Meets TV, >LTO | OK |
| North Wales | UK0042 | Meets TV, >LTO (m) | OK |
| Northern Ireland | UK0043 | OK | OK |

Measured exceedences of limit values, target values, long term objectives, information thresholds and alert thresholds are also listed within the annual air quality assessment questionnaire. Summary statistics for the exceedences identified at specific monitoring sites are provided in Table 5 to Table 9.

Table 5 Measured Exceedences of the NO₂ Limit Value for Health (1 hour mean)

| Site name | Zone code | Number of 1-hour exceedences of LV | Maximum 1-hour concentration ($\mu\text{g m}^{-3}$) |
|------------------------|-----------|------------------------------------|---|
| Camden Kerbside | UK0001 | 129 | 399 |
| London Marylebone Road | UK0001 | 539 | 332 |
| Billingham | UK0013 | 21 | 340 |
| Glasgow Centre | UK0024 | 56 | 1209 |
| Glasgow Kerbside | UK0024 | 97 | 365 |

Table 6 Measured Exceedences of the NO₂ Limit Value for Health (annual mean)

| Site name | Zone code | Annual mean concentration ($\mu\text{g m}^{-3}$) |
|--------------------------------|-----------|--|
| Camden Kerbside | UK0001 | 82 |
| Haringey Roadside | UK0001 | 45 |
| London Bloomsbury | UK0001 | 58 |
| London Hillingdon | UK0001 | 54 |
| London Marylebone Road | UK0001 | 98 |
| London Westminster | UK0001 | 52 |
| Tower Hamlets Roadside | UK0001 | 66 |
| Birmingham Tyburn Roadside | UK0002 | 51 |
| Manchester Piccadilly | UK0003 | 45 |
| Salford Eccles | UK0003 | 42 |
| Leeds Headingley Kerbside | UK0004 | 51 |
| Bristol Old Market | UK0009 | 63 |
| Leicester Centre | UK0011 | 42 |
| Glasgow Centre | UK0024 | 44 |
| Glasgow City Chambers | UK0024 | 49 |
| Glasgow Kerbside | UK0024 | 84 |
| Bath Roadside | UK0030 | 60 |
| Oxford Centre Roadside | UK0031 | 58 |
| York Fishergate | UK0034 | 49 |
| Aberdeen Union Street Roadside | UK0038 | 59 |

Table 7 Measured Exceedences of the Ozone Information Threshold Value

| Site name | Zone code | Number of 1-hour exceedences of alert threshold | Maximum 1-hour concentration ($\mu\text{g m}^{-3}$) |
|-----------|-----------|---|---|
| Weybourne | UK0029 | 9 | 376 |

Table 8 Measured Exceedences of the Ozone Alert Threshold Value

| Site name | Zone code | Number of 1-hour exceedences of information threshold | Maximum 1-hour concentration ($\mu\text{g m}^{-3}$) |
|-----------|-----------|---|---|
| Weybourne | UK0029 | 5 | 376 |

Table 9 Measured Exceedences of the ozone long term objective for health protection

| Site name | Zone code | Number of days with exceedences | Maximum 8-hour concentration ($\mu\text{g m}^{-3}$) |
|----------------------------|-----------|---------------------------------|---|
| London Eltham | UK0001 | 2 | 131 |
| London Harlington | UK0001 | 3 | 133 |
| London N. Kensington | UK0001 | 2 | 132 |
| London Teddington | UK0001 | 7 | 152 |
| London Westminster | UK0001 | 1 | 123 |
| Birmingham Tyburn | UK0002 | 3 | 140 |
| Birmingham Tyburn Roadside | UK0002 | 2 | 121 |
| Sandwell West Bromwich | UK0002 | 3 | 147 |
| Newcastle Centre | UK0005 | 1 | 137 |
| Liverpool Speke | UK0006 | 1 | 125 |
| Nottingham Centre | UK0008 | 2 | 128 |
| Bristol St Paul's | UK0009 | 1 | 124 |
| Reading New Town | UK0016 | 3 | 137 |
| Southend-on-sea | UK0021 | 1 | 122 |
| Port Talbot Margam | UK0027 | 1 | 122 |
| Norwich Lakenfields | UK0029 | 1 | 130 |
| Sibton | UK0029 | 4 | 158 |
| St Osyth | UK0029 | 1 | 123 |
| Weybourne | UK0029 | 9 | 270 |
| Wicken Fen | UK0029 | 2 | 143 |
| Charlton Mackrell | UK0030 | 2 | 145 |
| Yarner Wood | UK0030 | 3 | 145 |
| Harwell | UK0031 | 3 | 141 |
| Bottesford | UK0032 | 2 | 126 |
| Ladybower | UK0032 | 2 | 134 |
| Market Harborough | UK0032 | 3 | 148 |
| Northampton | UK0032 | 3 | 147 |
| Glazebury | UK0033 | 1 | 140 |
| High Muffles | UK0034 | 2 | 133 |
| Coventry Memorial Park | UK0017 | 3 | 142 |
| Leamington Spa | UK0035 | 3 | 153 |
| Leominster | UK0035 | 3 | 130 |
| Auchencorth Moss | UK0037 | 1 | 128 |
| Bush Estate | UK0037 | 1 | 130 |
| Eskdalemuir | UK0040 | 1 | 123 |
| Peebles | UK0040 | 2 | 123 |
| Cwmbran | UK0041 | 2 | 134 |

3.2 Fourth Daughter Directive 2004/107/EC

The results of the air quality assessment for arsenic (As), cadmium (Cd), nickel (Ni) and benzo[a]pyrene (B[a]P) for each zone are presented in Form 9b of the Questionnaire, and illustrated in Table 10.

All zones and agglomerations met the target values for arsenic and cadmium. Two zones exceeded the target value for nickel. Concentrations of B[a]P were above the target value in eight zones and below in all remaining zones.

Table 10 Results of Air Quality Assessment for As, Cd, Ni and benzo(a)pyrene in 2010

| Zone | Zone code | As TV | Cd TV | Ni TV | B(a)P TV |
|---------------------------------|-----------|--------|--------|----------|----------|
| Greater London Urban Area | UK0001 | OK | OK | OK | OK |
| West Midlands Urban Area | UK0002 | OK | OK | OK | OK |
| Greater Manchester Urban Area | UK0003 | OK | OK | OK | OK |
| West Yorkshire Urban Area | UK0004 | OK (m) | OK (m) | OK (m) | OK |
| Tyneside | UK0005 | OK (m) | OK (m) | OK (m) | OK |
| Liverpool Urban Area | UK0006 | OK (m) | OK (m) | OK (m) | OK |
| Sheffield Urban Area | UK0007 | OK | OK | OK | OK (m) |
| Nottingham Urban Area | UK0008 | OK (m) | OK (m) | OK (m) | OK (m) |
| Bristol Urban Area | UK0009 | OK | OK | OK | OK (m) |
| Brighton/Worthing/Littlehampton | UK0010 | OK (m) | OK (m) | OK (m) | OK |
| Leicester Urban Area | UK0011 | OK (m) | OK (m) | OK (m) | OK (m) |
| Portsmouth Urban Area | UK0012 | OK (m) | OK (m) | OK (m) | OK (m) |
| Teesside Urban Area | UK0013 | OK | OK | OK | > TV (m) |
| The Potteries | UK0014 | OK (m) | OK (m) | OK (m) | OK (m) |
| Bournemouth Urban Area | UK0015 | OK (m) | OK (m) | OK (m) | OK (m) |
| Reading/Wokingham Urban Area | UK0016 | OK (m) | OK (m) | OK (m) | OK (m) |
| Coventry/Bedworth | UK0017 | OK (m) | OK (m) | OK (m) | OK (m) |
| Kingston upon Hull | UK0018 | OK (m) | OK (m) | OK (m) | OK (m) |
| Southampton Urban Area | UK0019 | OK (m) | OK (m) | OK (m) | OK (m) |
| Birkenhead Urban Area | UK0020 | OK (m) | OK (m) | OK (m) | OK (m) |
| Southend Urban Area | UK0021 | OK (m) | OK (m) | OK (m) | OK (m) |
| Blackpool Urban Area | UK0022 | OK (m) | OK (m) | OK (m) | OK (m) |
| Preston Urban Area | UK0023 | OK (m) | OK (m) | OK (m) | OK (m) |
| Glasgow Urban Area | UK0024 | OK | OK | OK | OK |
| Edinburgh Urban Area | UK0025 | OK (m) | OK (m) | OK (m) | OK |
| Cardiff Urban Area | UK0026 | OK | OK | OK | OK |
| Swansea Urban Area | UK0027 | OK | OK | > TV (m) | OK |
| Belfast Urban Area | UK0028 | OK | OK | OK | > TV (m) |
| Eastern | UK0029 | OK | OK | OK | OK |
| South West | UK0030 | OK | OK | OK | OK (m) |
| South East | UK0031 | OK | OK | OK | OK |
| East Midlands | UK0032 | OK | OK | OK | OK |
| North West & Merseyside | UK0033 | OK | OK | OK | OK |
| Yorkshire & Humberside | UK0034 | OK | OK | OK | > TV |
| West Midlands | UK0035 | OK (m) | OK (m) | OK (m) | > TV (m) |
| North East | UK0036 | OK | OK | OK | > TV (m) |
| Central Scotland | UK0037 | OK | OK | OK | OK |
| North East Scotland | UK0038 | OK | OK | OK | OK (m) |
| Highland | UK0039 | OK (m) | OK (m) | OK (m) | OK |
| Scottish Borders | UK0040 | OK | OK | OK | OK (m) |
| South Wales | UK0041 | OK (m) | OK (m) | > TV (m) | > TV (m) |
| North Wales | UK0042 | OK (m) | OK (m) | OK (m) | > TV (m) |
| Northern Ireland | UK0043 | OK (m) | OK (m) | OK (m) | > TV |

4 Comparison with Previous Years

Table 11 to Table 16 summarise the results of the air quality assessment for 2010 and provide a comparison with the results of the assessments carried out in previous years. In Table 12, “n/a” (not applicable) indicates that there was no applicable margin of tolerance for the specified year

Table 11 (Part 1 of 2) Exceedences of Limit Values for Ambient Air Quality Directive (1st and 2nd Daughter Directives prior to 2008)

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 |
|-----------------|-----------------------|--|-------------------------------------|---|-------------------------------------|---|-------------------------------------|---|--|--------------------------------------|--------------------------------------|
| SO ₂ | 1-hour | None | None | None | None | 1 zone modelled (Eastern) | 1 zone modelled (Eastern) | 1 zone modelled (Eastern) | 1 zone modelled (Eastern) | None | None |
| SO ₂ | 24-hour ⁱ | None | None | None | None | 1 zone modelled (Eastern) | 1 zone modelled (Eastern) | None | 1 zone modelled (Eastern) | None | 1 Zone measured (Belfast Urban Area) |
| SO ₂ | Annual ⁱⁱ | None | None | None | None | None | None | None | None | None | None |
| SO ₂ | Winter ⁱⁱ | None | None | None | None | None | None | None | None | None | not assessed |
| NO ₂ | 1-hour ⁱⁱⁱ | 3 zones measured (London, Teesside, Glasgow) | 2 zones measured (London, Glasgow) | 3 zones measured (London, Glasgow, NE Scotland) | 2 zones measured (London, Glasgow) | 1 zone measured (Greater London Urban Area) | 2 zones measured (London, Bristol) | 1 zone measured (Greater London Urban Area) | 3 zones measured (London, Glasgow, South East) | 1 zone measured (Glasgow Urban Area) | 4 zones measured |
| NO ₂ | Annual | 40 zones (11 measured + 29 modelled) | 40 zones (9 measured + 31 modelled) | 40 zones (10 measured + 30 modelled) | 41 zones (8 measured + 33 modelled) | 39 zones (7 measured + 32 modelled) | 38 zones (8 measured + 30 modelled) | 39 zones (9 measured + 30 modelled) | 42 zones (10 measured + 32 modelled) | 36 zones (6 measured + 30 modelled) | 38 zones (6 measured + 32 modelled) |
| NO _x | Annual ⁱⁱ | None | None | None | None | None | None | None | None | None | None |

ⁱ No MOT defined, LV + MOT = LV

ⁱⁱ Applies to vegetation and ecosystem areas only. Critical Levels are already in force, no MOT.

ⁱⁱⁱ No modelling for 1-hour LV.

Table 11 is continued on next page.

Table 11 (Part 2 of 2) Exceedences of Limit Values for Ambient Air Quality Directive (1st and 2nd Daughter Directives prior to 2008)

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 |
|------------------|----------------|---|---|---|---|--|---|---|---|--|--|
| PM ₁₀ | Daily | 1 (modelled, after subtraction of natural contribution: time ext. granted.) | 3 zones (1 measured + 2 modelled) <i>1 zone modelled after subtraction of natural contribution</i> | 2 zones (1 measured + 1 modelled) <i>1 zone measured after subtraction of natural contribution</i> | 6 zones (3 measured + 3 modelled) | 30 zones (5 measured + 25 modelled) | 29 zones (3 measured + 26 modelled) | 27 zones (2 measured + 25 modelled) | 33 zones (10 measured + 23 modelled) | 18 zones (1 measured + 17 modelled) | 26 zones (5 measured + 21 modelled) |
| PM ₁₀ | Annual | None | None | None | 1 zone measured (Greater London Urban Area) | 2 zones (1 measured + 1 modelled) | 4 zones (1 measured + 3 modelled) | 2 zones (1 measured, London + 1 modelled, West Midlands Urban Area) | 15 zones (1 measured + 14 modelled) | 2 zones (Greater London Urban Area measured, Eastern modelled) | 2 zones (London measured, Manchester modelled) |
| Lead | Annual | None | None | None | None | None | None | None | None | None | None |
| Benzene | Annual | None | None | None | None | 1 zone modelled (Yorkshire & Humberside) | 2 zones modelled (Yorkshire & Humberside, Central Scotland) | None | 1 zone modelled (Greater London Urban Area) | not assessed | not assessed |
| CO | 8-hour | None | None | None | None | None | None | None | None | not assessed | not assessed |

Table 12 Exceedences of Limit Values Plus Margins of Tolerance (where applicable) for Ambient Air Quality Directive (1st and 2nd Daughter Directives prior to 2008). (This table only shows limit values that have been exceeded during 2001-2010).

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 |
|------------------|---------------------|------|-------------------------------------|-------------------------------------|---|---|---|---|---|---|---|
| SO ₂ | 1-hour | n/a | n/a | n/a | n/a | n/a | n/a | 1 zone modelled (Eastern) | 1 zone modelled (Eastern) | None | None |
| SO ₂ | 24-hour | n/a | n/a | n/a | n/a | n/a | n/a | None | 1 zone modelled (Eastern) | None | 1 zone measured (Belfast Urban Area) |
| NO ₂ | 1-hour ⁱ | n/a | 2 zones measured (London, Glasgow) | 2 zones measured (London, Glasgow) | 1 zone measured (Greater London Urban Area) | None | None |
| NO ₂ | Annual | n/a | 40 zones (9 measured + 31 modelled) | 40 zones (7 measured + 33 modelled) | 39 zones (6 measured + 33 modelled) | 38 zones (6 measured + 32 modelled) | 35 zones (6 measured + 29 modelled) | 34 zones (6 measured + 28 modelled) | 35 zones (5 measured + 30 modelled) | 19 Zones (5 measured + 14 modelled) | 21 Zones (4 measured + 17 modelled) |
| PM ₁₀ | Daily | None | None | None | None | None | None | 19 zones (1 measured + 18 modelled) | 18 zones (2 measured + 16 modelled) | 1 zone modelled (Greater London Urban Area) | 1 zone modelled (Greater London Urban Area) |
| PM ₁₀ | Annual | n/a | n/a | n/a | n/a | n/a | n/a | 1 zone modelled (Gr. London Urban Area) | 10 zones (1 measured + 9 modelled) | 1 zone modelled (Gr. London Urban Area) | 1 zone modelled (Gr. London Urban Area) |
| Benzene | Annual | n/a | None | None | None | None | None | None | None | not assessed | not assessed |

ⁱ No modelling for 1-hour LV

Table 13 Ambient Air Quality Directive (3rd Daughter Directive) Target Values

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 |
|----------------|----------------|------|------|---------------------------|------|------|------|------|
| O ₃ | 8-hour | None | None | 1 zone measured (Eastern) | None | None | None | None |
| O ₃ | AOT40 | None | None | None | None | None | None | None |

Table 14 Ambient Air Quality Directive (3rd Daughter Directive) Long Term Objectives

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 |
|----------------|----------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|
| O ₃ | 8-hour | 41 zones (19 measured + 22 modelled) | 39 zones (25 measured + 14 modelled) | 43 zones (35 measured + 8 modelled) | 41 zones (24 measured + 17 modelled) | 43 zones (41 measured + 2 modelled) | 37 zones (22 measured + 15 modelled) | 43 zones (36 measured + 7 modelled) |
| O ₃ | AOT40 | 5 zones (2 measured + 3 modelled) | 10 zones (8 measured + 2 modelled) | 41 zones (25 measured + 16 modelled) | 3 zones (1 measured + 2 modelled) | 41 zones (32 measured + 9 modelled) | 16 zones (9 measured + 7 modelled) | 7 zones (5 measured + 2 modelled) |

Table 15 4th Daughter Directive Target Values

| Pollutant | Averaging time | 2010 | 2009 | 2008 | 2007 |
|------------------|-----------------------|--|---|--|--|
| As | Annual | None | None | None | None |
| Cd | Annual | None | None | None | None |
| Ni | Annual | 2 zones modelled (Swansea, S Wales) | 2 zones modelled (Swansea, S Wales) | 2 zones modelled (Swansea, S Wales, measured at non-network site, so reported as m) | 1 zone (Swansea Urban area, measured but low data capture, so reported as m) |
| B[a]P | Annual | 8 zones, (2 zones measured Yorkshire & Humberside, N Ireland + 6 zones modelled; Teesside, Belfast, W Midlands, North East, S Wales, N Wales.) | 6 zones, (2 zones measured Yorkshire & Humberside, N Ireland + 4 zones modelled Teesside, Swansea, North East, S Wales) | 6 zones, (3 zones measured Yorkshire & Humberside, Teesside, N Ireland + 3 zones modelled Swansea, S Wales, Belfast) | 1 zone measured (Yorkshire & Humberside) |

Table 16 Ambient Air Quality Directive Target Value

| Pollutant | Averaging time | 2010 | 2009 |
|-------------------|-----------------------|-------------|-------------|
| PM _{2.5} | Annual | None | None |

References

- ¹ Council of the European Union (1996) "Directive 96/62/EC on Ambient Air Quality Assessment and Management". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0062:EN:NOT> (Accessed 21 July 2011)
- ² Council of the European Union (1999) "Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0030:EN:NOT> (Accessed 21 July 2011)
- ³ European Parliament and Council of the European Union (2000) "Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0069:EN:NOT> (Accessed 21 July 2011)
- ⁴ European Parliament and Council of the European Union (2002) "Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0003:EN:NOT> (Accessed 21 July 2011)
- ⁵ European Parliament and Council of the European Union (2004) "Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0107:EN:NOT>, (Accessed 21 July 2011)
- ⁶ European Parliament and Council of the European Union (2008) "Council Directive on ambient air quality and cleaner air for Europe (2008/50/EC)". [online]. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:EN:NOT> (Accessed 21 July 2011)