
# UPDATING AND SCREENING ASSESSMENT OF AIR QUALITY IN CHARNWOOD

***APRIL 2006***

CHARNWOOD BOROUGH COUNCIL

DIRECTORATE OF HOUSING AND HEALTH

Environmental Protection Section
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## EXECUTIVE SUMMARY

In December 2000 Charnwood Borough Council completed a first Review and Assessment of air quality in the Borough. The object of the project was to determine whether concentrations of seven pollutants identified by UK Government as being most concern to public health were likely to be above air quality objectives set in the National Air Quality Strategy. The objectives of the Strategy are based on levels at which there are considered to be no effect on human health.

In May 2003 an Updating and Screening Assessment was issued to review the findings of the original project by taking into consideration any changes that had occurred outside of the three Air Quality Management Areas that had been declared on the basis of the first assessment, as well as any improvements that had been made in the methods of predicting air quality changes.

Since the 2003 USA, further periodic updates within the Review and Assessment framework have been undertaken to examine and refine in more detail the predictions of how air quality is likely to change in each of those areas in relation to the possibility of potential breaches against the set objectives, in order to produce an Action Plan implementing changes that will ensure that the objectives are met.

We approached this next reporting phase of the policy guidance with three declared Air Quality Management Areas within the Borough.

1. **Loughborough Air Quality Management Area**
   Designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000

2. **GCR Air Quality Management Area**
   Designated in relation to a likely breach of the sulphur dioxide (fifteen minute mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000.

3. **Syston Air Quality Management Area**
   Designated in relation to a likely breach of the nitrogen dioxide (annual mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000

The outcomes of the Updating and Screening Assessment confirm many of our previous findings of our earlier submissions. Specifically in relation to each of the seven pollutants the results as summarised as follows:

**Benzene**

The air quality objective for benzene is not currently being breached and will not be exceeded in 2010.

**1, 3 butadiene**

The air quality objective for 1, 3 butadiene is not currently being breached.

**Carbon monoxide**

The air quality objective for carbon monoxide is not currently being breached.

**Lead**

The air quality objective for lead is not currently being breached and will not be exceeded in 2009

**Nitrogen dioxide**

Continued review (monitoring and evaluation) of the identified sites within the existing Loughborough AQMA

Continued review (monitoring and evaluation) of the A6 site at Birstall

**Sulphur dioxide**

Continued review (monitoring and evaluation) of the receptor points close to the engine sheds of the Great Central Railway, Loughborough within the existing AQMA

**Respirable particles ($PM_{10}$)**

A Detailed Assessment is required in relation to properties in the vicinity of the Lafarge Aggregates quarry in Mountsorrel, which may be subject to exposure levels in excess of 35 incidents of the 24 hour mean objective.

## CONTENTS

# GLOSSARY

| | |
|---|---|
| AADT | Annual Average Daily Traffic (vehicles per day) |
| AQMA | Air Quality Management Area |
| CBC | Charnwood Borough Council |
| CO | Carbon monoxide |
| DA | Detailed Assessment |
| DEFRA | Department for Environment Food and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges |
| EPAQS | Expert Panel on Air Quality Standards |
| FAQ | Frequently Asked Questions |
| GCR | Great Central Railway |
| LAQM | Local Air Quality Management |
| TG(03) | Technical Guidance Methodology issued by the Secretary of State. Last updated January 2006 |
| $mg/m^3$ | Milligrams of the pollutant per cubic meter of air |
| $\mu g/m^3$ | Micrograms of the pollutant per cubic meter of air |
| ppb | Parts per billion |
| ppm | Parts per million |
| NAEI | National Atmospheric Emission Inventory |
| NAQS | National Air Quality Strategy |
| NEMA | Nottingham East Midlands Airport |
| NO | Nitrogen monoxide |
| $NO_2$ | Nitrogen dioxide |
| $NO_x$ | Oxides of Nitrogen |
| $PM_{10}$ | Particles with diameter less than 10µm |
| QA/QC | Quality Assurance / Quality Control |
| R&A | Review and Assessment |
| $SO_2$ | Sulphur dioxide |
| TEOM | Tapered Element Oscillating Microbalance |
| UKAS | United Kingdom Accreditation Service |
| USA | Updating and Screening Assessment |
| UWE | University of the West of England |
| vpd | Vehicles per day |
| WHO | World Health Organisation |

# 1. INTRODUCTION

## 1.1 BACKGROUND

The impact of air quality on humans has long been established. Government experts have estimated that up to 24,000 people die prematurely every year because of the effects of air pollution.

Due to the successful implementation of the Clean Air Act many source of visible pollution, such as the heavy urban smog's of the 1950's, have been successfully reduced.

Today's concerns lie more predominantly with the pollutants that we are unable to see, and as such the Review and Assessment is designed to look in detail towards the seven most recognised indicators of air quality on human health to enable a more effective approach for tackling the risks, as well as the associated significant economic costs, that can be attributed to poor health.

There is still much that we do not know about the exact relationships between our health and the concentrations of the individual pollutants in the air that we breathe. The ongoing framework of the Review and Assessment process takes account however, of improvements that have been made in the methods of predicting air quality changes to establish if there have been any significant changes in the sources of pollution in the local area.

The conclusions of this report will allow for a robust reconsideration of the air quality work carried out to date. More importantly it will enable us to help develop and influence all of the plans and strategies that influence the local environment in order to improve on the generally good air quality that exists in the Borough.

The duty to carry out air quality review and asssessments was imposed on local authorities in 2000 following the implementation of the 1995 Environment Act. A potted history of air quality management in Charnwood can be summarised as follows.

| Year | Action |
|---|---|
| 2000 | A 'Stage 1' Screening Review and Assessment is completed identifying the need to progress to a more detailed 'Stage 3' review. |
| 2001 | A 'Stage 3' Review and Assessment is completed identifying potential breaches of UK national air quality standards and identifying the need to progress to a 'Stage 4' Assessment for a detailed assessment of traffic emissions . |
| 2001 | Three Air Quality Management Areas are declared in the Borough due to the predicted breaches of national air quality standards established in the Stage 3 Review and Assessment. |
| 2003 | A first Updating and Screening Assessment (USA) confirms the original findings of the 2001 report with respect to traffic pollution and identifies some sources of industrial emissions that require more detailed |

| | |
|---|---|
| | investigation. |
| 2004 | The 'Stage 4' Review and Assessment of traffic pollution is published which recommends some amendments to the AQMAs declared in 2001. |
| 2004 | A first Detailed Assessment of the industrial sources identified in the USA is published identifying the likelihood of breaches of an air quality standard due to a local industrial source . |
| 2004 | A revised Air Quality Management Order is issued amending the AQMAs in the Borough.<br>The AQMA in Birstall, declared in 2001 due to road traffic emissions, is revoked<br>The AQMA in Loughborough, declared in 2001 due to road traffic emissions, is retained, but with slight changes to its geographical coverage.<br>The AQMA in Syston, declared in 2001 due to road traffic emissions, is retained, but with slight changes to its geographical coverage.<br>A new AQMA is declared around the Great Central Railway engine sheds in Loughborough. |
| 2005 | A draft Air Quality Action Plan identifying approximately 40 potential actions to improve air quality is published and consulted upon. |
| 2005 | A draft Local Transport Plan is published by Leicestershire County Council for consultation which includes commitments relating to amny of the actions intended to address traffic pollution identified in the draft Air Quality Action Plan. |
| 2005 | An Air Quality Progress Report is published |

## 1.2 STATUTORY REQUIREMENTS

Section 82 of the Environment Act imposes a duty on all local authorities within the UK to periodically review air quality within their districts to assess compliance with the air quality objectives contained in the National Air Quality Strategy. The air quality objectives that must not be exceeded are outlined in section 1.3

If it is considered likely that there will be a breach of one or more of the objectives the local authority must submit a legal order designating an Air Quality Management Area (AQMA), and develop through consultation an action plan to ensure that the relevant objective(s) will be met. The Act and its associated regulations recommend time scales for completion of these duties.

## 1.3 NATIONAL AIR QUALITY OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy Objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Benzene** All Authorities | 16.25 µg/m$^3$ (5ppb) | Running Annual Mean | 31 December 2003 |
| **Benzene** Authorities in England and Wales only | 5 µg/m$^3$ (1.5ppb) | Annual Mean | 31 December 2010 |
| **Benzene** Authorities in Scotland and Northern Ireland only | 3.25 µg/m$^3$ | Running Annual Mean | 31 December 2010 |
| **1,3-Butadiene** | 2.25 µg/m$^3$ (1ppb) | Running Annual Mean | 31 December 2003 |
| **Carbon Monoxide** | 10 mg/m$^3$ (8.6ppm) | Maximum Running 8 hr Mean | 31 December 2003 |
| **Lead** | 0.5 µg/m$^3$ | Running Annual Mean | 31 December 2004 |
| **Lead** | 0.25 µg/m$^3$ | Running Annual Mean | 31 December 2008 |
| **Nitrogen Dioxide** | 200 µg/m$^3$ (105ppb) Not to be exceeded more than 18 times a year | 1 hour mean | 31 December 2005 |

| | | | |
|---|---|---|---|
| **Nitrogen Dioxide** | 40 µg/$m^3$ (21ppb) | Annual Mean | 31 December 2005 |
| **Respirable Particulates ($PM_{10}$)** | 50 µg/$m^3$ Not to be exceeded more than 35 times a year | 24 hour mean | 31 December 2004 |
| **Respirable Particulates ($PM_{10}$)** | 40 µg/$m^3$ | Annual Mean | 31 December 2004 |
| **Sulphur Dioxide** | 266 µg/$m^3$ (100ppb) Not to be exceeded more than 35 times a year | 15 minute mean | 31 December 2005 |
| **Sulphur Dioxide** | 350 µg/$m^3$ (132ppb) Not to be exceeded more than 24 times a year | 1 hour mean | 31 December 2004 |
| **Sulphur Dioxide** | 125 µg/$m^3$ (47ppb) Not to be exceeded more than 3 times a year | 24 hour mean | 31 December 2004 |

Conversions of ppm/ppb at 20°C and 1013mb

## 1.4 REVIEW AND ASSESSMENT TIMETABLE

| LAQM Activity | Completion Date | Which Authorities? |
|---|---|---|
| Updating and Screening Assessment | End of May 2003 | All authorities |
| Detailed Assessment | End of April 2004 | Those authorities which have identified the need for a Detailed Assessment in their May 2003 Updating and Screening Assessment |
| Progress Report | End of April 2004 | Those authorities which have identified the need for a Detailed Assessment in their May 2003 Updating and Screening Assessment |
| Progress Report | End of April 2005 | All authorities |
| **Updating and Screening Assessment** | **End of April 2006** | **All authorities** |
| Detailed Assessment | End of April 2007 | Those authorities which have identified the need for a Detailed Assessment in their May 2006 Updating and Screening Assessment |
| Progress Report | End of April 2007 | Those authorities which have identified the need for a Detailed Assessment in their May 2006 Updating and Screening Assessment |
| Progress Report | End of April 2008 | All authorities |
| Updating and Screening Assessment | End of April 2009 | All authorities |
| Detailed Assessment | End of April 2010 | Those authorities which have identified the need for a Detailed Assessment in their May 2009 Updating and Screening Assessment |
| Progress Report | End of April 2010 | Those authorities which have identified the need for a Detailed Assessment in their May 2009 Updating and Screening Assessment |

## 1.5 THE UPDATING & SCREENING PROCESS

The Updating & Screening Assessment (this document) is the first stage in the review and assessment process. It identifies all relevant changes since earlier screenings were completed and then uses simple tools to check if there is a current risk of the relevant pollution objectives being exceeded. Should this be the case the second stage, known as the Detailed Assessment, must then be carried out. If the Detailed Assessment concludes that the relevant air pollution objective will be exceeded then an Air Quality Management Area (AQMA) must be declared.

Guidance on the evaluative procedure to be followed during the Updating & Screening process has been issued by the Secretary of State with regard to the details of the assessment process. (Local Air Quality Management, Technical Guidance - LAQM.TG(03) Update – January 2006). This guidance will be referred to extensively within this document.

The Technical Guidance comprises a series of systematic checklists for each of the individual pollutants to be considered. These checklists ensure that all potential sources of pollution are evaluated and assessed thoroughly and consistently through the screening procedure.

This document utilises the format of these checklists in order to tailor our responses.

## 2. OBJECTIVES OF THE REPORT

a) To review and assess air quality in Charnwood by gathering information about all sources of air pollution and analysing this information based on the methodology outlined in Technical Guidance LAQM.TG(03) Update – January 2006 published by the Department for the Environment Food and Rural Affairs.

b) To establish which areas of Charnwood require a more detailed assessment of air quality.

## 3. THE BOROUGH OF CHARNWOOD

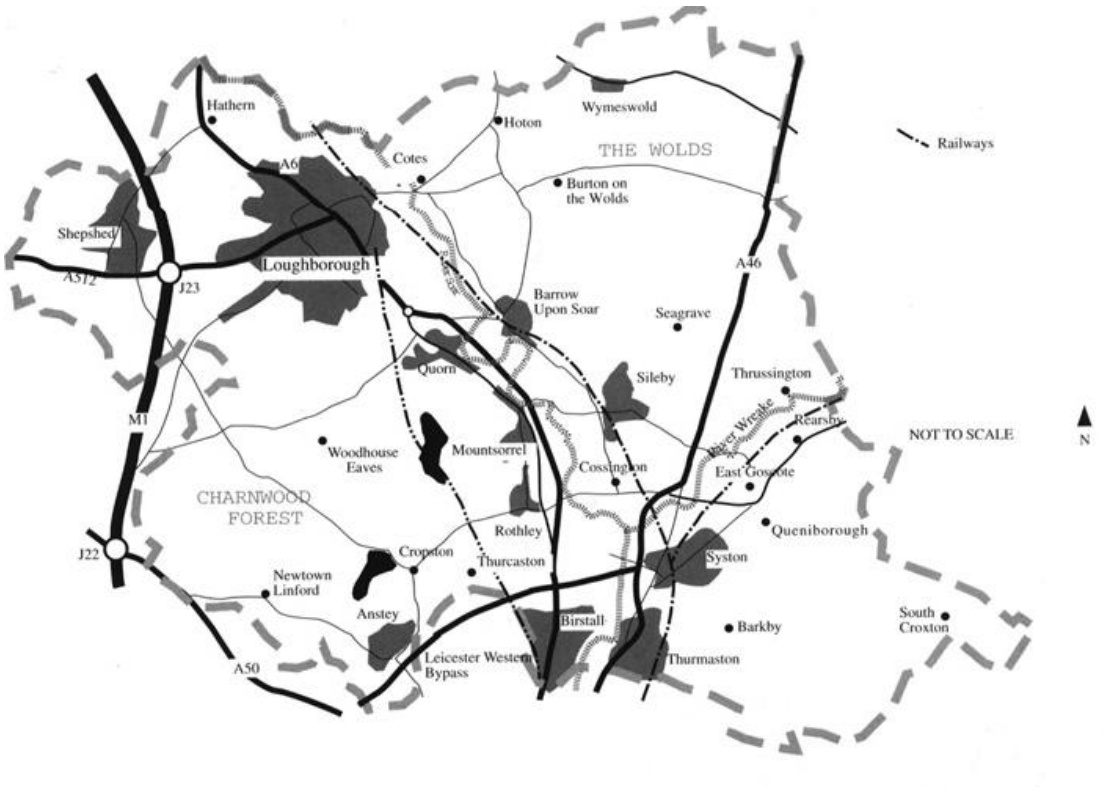
The Borough of Charnwood is located in the heart of the East Midlands sitting centrally in the triangle formed by Nottingham, Leicester and Derby. The Borough covers an area of 108 square miles and consists of a mix of urban settlements and rural farmland.

### Map of Charnwood Borough in Leicestershire


### The Borough of Charnwood

Just over one third of the 155,000+ population live in the thriving university town of Loughborough. The remaining residents are distributed between the northern town of Shepshed and the southern towns and villages on the outskirts of the city of Leicester including Anstey, Birstall, Thurmaston and Syston and the villages located along the Soar and Wreake river valleys.

Charnwood has a wide range of commercial and industrial activities. Loughborough is traditionally associated with the engineering sector, whilst the villages along the Soar and Wreake have long associations with the footwear, hosiery and knitwear industries. High technology industries are being rapidly attracted into the Borough, mirroring the national experience of the contraction of the traditional heavy industries. The changing industrial infrastructure of the Borough will continue to create challenges in relation to air quality management.




A substantial and varied transport network serves the Borough. The major road links include the M1 motorway, the A6 and the A46 all of which run to a greater or lesser extent through the Borough. The Ivanhoe and Great Central railway lines run through the central spine of the Borough, and the East Midlands airport is located approximately three miles from the north western boundary of Charnwood.

Generally ambient air pollution has never been considered to be of excessive concern for local residents in the Borough. However, as is the case in many parts of the country, the atmospheric emissions from certain individual point sources have caused considerable nuisance for those residents in the immediate vicinity. Some of these individual point sources will not have been highlighted through this report, as they are not producers of any of the seven key pollutants highlighted in the National Air Quality Strategy. This does not indicate a lack of concern by the authors of the report to generate solutions to these problems, but is simply due to the fact that they fall outside the remit of this report.

## 4. AIR QUALITY MONITORING IN CHARNWOOD

Since the late 1990s Charnwood Borough Council have been steadily expanding and improving the air quality monitoring network around the borough, focusing on areas where our investigations have led us to believe that poor air quality may be a threat to health.

Through this network we are seeing a picture of how air quality is changing and evolving. More importantly we are building up evidence and knowledge to allow us to positively influence the way in which changes in the area happen in order to protect and improve the air we all breathe.

### Monitoring Equipment

We use a variety of different types of portable equipment to monitor pollution. We also have a fixed air quality monitoring station, based in Loughborough, which contains state of the art monitoring equipment to record levels of nitrogen dioxide, sulphur dioxide and PM10 every 15 minutes.


It has a small weather station with a thermometer, wind direction vane and wind speed meter that help to interpret the information the station collects. We periodically place all of our portable monitoring equipment alongside the station to compare the results.

### Diffusion Tubes

The most commonly used monitoring device are diffusion tubes. These are small tubes that can be located virtually anywhere and provide an average pollution reading for the duration of time over which they are exposed (usually a month). The detail of information that they can provide is limited, so for example they will not show up any short-term peaks in air pollution. However they are an invaluable part of our air quality network because they are reliable, very easy to locate near pollution sources and provide good evidence of long-term trends. Different types of tube are used for nitrogen dioxide, sulphur dioxide, ozone and benzene. They cannot be used for PM10.

**Osiris PM Monitors**

We have invested in two pieces of portable equipment for monitoring PM10 and other respirable particles. This equipment is based on passing sampled air across a laser beam; the extent to which the beam is scattered determines the total particle content of the air. The equipment monitors in 'real-time' and so can give updated results every 15 minutes which is very useful for identifying short-term air pollution peaks which van be investigated with the help of wind speed and direction readings. The main drawback of the monitor is that it needs a continuous electrical supply, which limits the locations where it can be deployed.

**Lerian Street Box**

We acquired this monitor in order to measure sulphur dioxide levels. The equipment absorbs the pollutant onto an electrochemical sensor, which can provide pollution level readings every 15 minutes.

# 5. REVIEW AND ASSESSMENT OF BENZENE

## 5.1 INTRODUCTION

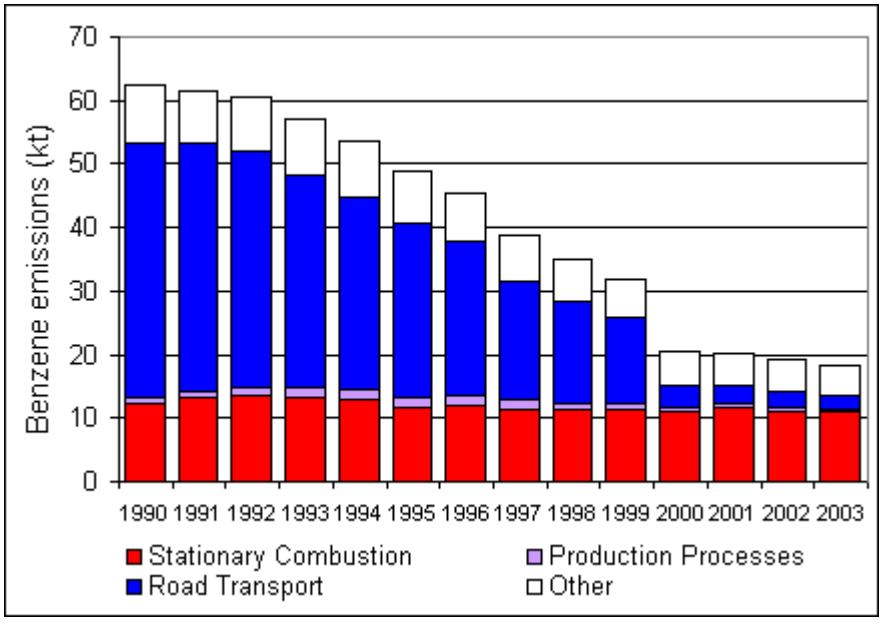
Benzene ($C_6H_6$) is a volatile aromatic hydrocarbon composed of a ring of carbon atoms with single hydrogen atoms attached to each.

In the UK the main source of benzene is the combustion and evaporation of petroleum products of which it is a constituent. The road transport sector is a major source, contributing 11% of the 2003 emission estimate total, where benzene is released either as an unburnt constituent of the fuel or as the product of the combustion of other hydrocarbons. Other significant sources include stationary combustion sources, production process, and evaporation due to spillage or other loss.

A steady decrease in benzene emissions has been seen since 1990 with the introduction in 1991 of cars equipped with catalytic converters.

Due to the nature of its source and its propensity to rapidly disperse in air, benzene is seen only of concern to human health in the immediate vicinity of its production, transfer and combustion.

Benzene is a carcinogen and long-term exposure to this pollutant can cause leukaemia. There is therefore no level of exposure at which there is zero risk.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 5.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

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Conversions of ppb at 20°C and 1013mb

## 5.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The absence of any identified significant point sources of benzene emissions either within or immediately outside the Borough, combined with historical long term monitoring data, leads to the conclusion that the air quality objective for benzene is not currently being breached and will not be exceed in 2004 (The date for achieving/maintaining the UK Air Quality Strategy objective).

## 5.4 CHECKLIST RESPONSE

| Checklist item (from Box 3.2 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data outside an AQMA | See section 5.5 |
| (B) Monitoring data within an AQMA | Not applicable. Charnwood BC has declared no AQMA for benzene. |
| (C) Very busy roads or junctions in built up areas | There are no roads that can be defined as 'very busy' within Charnwood, namely single carriageway roads with flows greater than 80,000 vehicles per day, dual carriageways with more than 120,000 vehicles per day, motorways with more than 140,000 per day, or junctions with a cumulative AADT of more than 80,000 **where the 2010 background concentration is expected to be above 2µgm$^{-3}$** that have not been considered in previous R&A reports and have had a >10% AADT increase. |
| (D) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of benzene in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood or the surrounding area since 2003. |
| (E) Industrial sources with substantially increased emissions, or new relevant exposure | No industrial sources have been identified in previous rounds of review and assessment as potentially significant sources of benzene.<br><br>Therefore, based on existing records there are no existing industrial sources, which have substantially increased (>30%) emissions. |

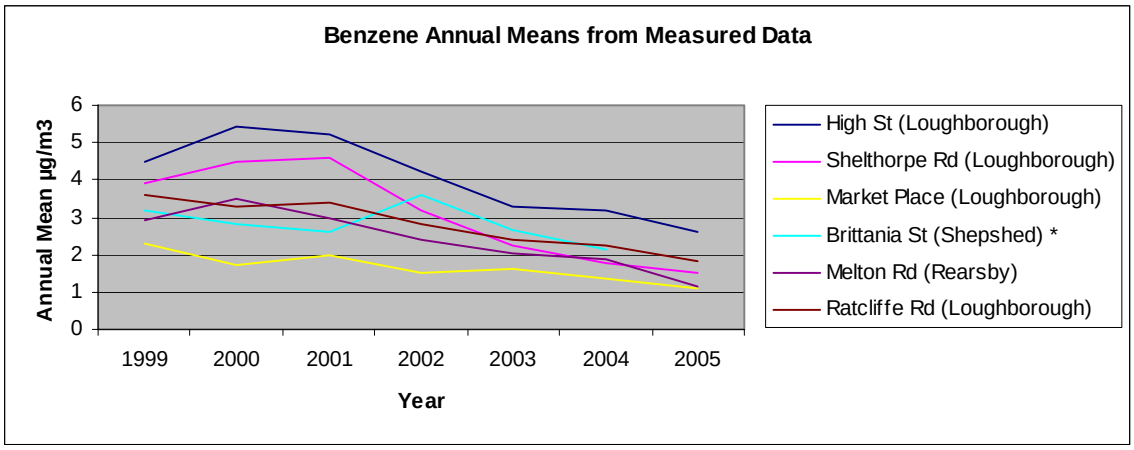
| | |
|---|---|
| (F) Petrol Stations | LAQM.TG(03) Update January 2006 suggests that petrol filling stations with a petrol throughput of more than 2,000 litres per year adjoining roads with more than 30,000 vehicles per day and with relevant receptor locations less than 10m away from the pumps may emit sufficient benzene to put the 2010 objective at risk of being exceeded. None of the petrol stations in Charnwood meet these criteria. |
| (G) Major fuel storage depots (petrol only) | There are no major fuel storage depots either within or near the boundary of Charnwood Borough Council |

## 5.5 EVIDENCE TO SUPPORT THE USA

Table 5.5 presents historical data derived from monitoring of benzene in Charnwood using passive diffusion tubes and calculated estimates of future benzene levels based on LAQM.TG(03) paragraph 3.23 and correction factors as shown in Box 3.4. The highest predicted annual mean concentrations are shown in **bold.**

**Table 5.5**

| Location | OS Grid | Historical calculated annual means from measured data (ug/m3) | | | | | | | Predicted concentrations for 2006 and 2010 based on the last 3 years data as base years (ug/m3) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 (2003) | 2006 (2004) | 2006 (2005) | 2010 (2003) | 2010 (2004) | 2010 (2005) |
| High St (Loughborough) | 453731 319589 | 4.5 | 5.4 | 5.2 | 4.2 | 3.28 | 3.18 | 2.61 | 2.78 | **2.87** | 2.50 | 2.44 | **2.52** | 2.19 |
| Shelthorpe Rd (Loughborough) | 454250 318665 | 3.9 | 4.5 | 4.6 | 3.2 | 2.25 | 1.77 | 1.52 | **1.91** | 1.60 | 1.45 | **1.67** | 1.40 | 1.28 |
| Market Place (Loughborough) | 453605 319532 | 2.3 | 1.7 | 2.0 | 1.5 | 1.63 | 1.37 | 1.12 | **1.38** | 1.24 | 1.07 | **1.21** | 1.08 | 0.94 |
| Brittania St (Shepshed) * | 447838 319632 | 3.2 | 2.8 | 2.6 | 3.6 | 2.68 | 2.15 | - | **2.27** | 1.94 | - | **1.99** | 1.70 | - |
| Melton Rd (Rearsby) | 465129 314384 | 2.9 | 3.5 | 3.0 | 2.4 | 2.01 | 1.86 | 1.13 | **1.70** | 1.68 | 1.08 | **1.49** | 1.47 | 0.95 |
| Ratcliffe Rd (Loughborough) | 454087 320392 | 3.6 | 3.3 | 3.4 | 2.8 | 2.41 | 2.23 | 1.84 | **2.04** | 2.01 | 1.76 | **1.79** | 1.77 | 1.54 |




* Monitoring at this site was suspended at the end of 2004 due to issues with the security of the diffusion tube (historical concentrations at the site were considered before this action was taken).

Monitoring of ambient benzene levels at a variety of sites around the Borough has been undertaken since 1996. The results strongly indicate that existing levels of benzene are below those specified in the National Air Quality Strategy in that none of the monthly average benzene concentrations monitored were above that of the 16.25 $\mu gm^{-3}$ objective. Also, predicated annual mean concentrations as shown in Table 5.5 suggest that no breach of a 5$\mu gm^{-3}$ threshold will occur in year 2010 as per LAQM.TG(03) Update January 2006.

Monitoring is carried out using Perkin Elmer samplers and Chromosorb 106 as the benzene absorbent. The exposure time at each site is one month.

Since 1999 Gradko have been the laboratory used for analysis and are UKAS accredited.

Sample sites, handling techniques and data ratification process are followed with consideration to Annex 1of LAQM.TG(03)

## 5.6 CONCLUSIONS OF THE USA

The Update and Screening Assessment review concludes that the air quality objective for benzene is not currently being breached and will not be exceeded in 2010. Furthermore, all benzene monitoring sites within the Borough are showing downward trends in terms of measured concentration (annual mean).

# 6. REVIEW AND ASSESSMENT OF 1,3 BUTADIENE

## 6.1 INTRODUCTION

1,3 Butadiene is a volatile hydrocarbon composed of four carbon and six hydrogen atoms.

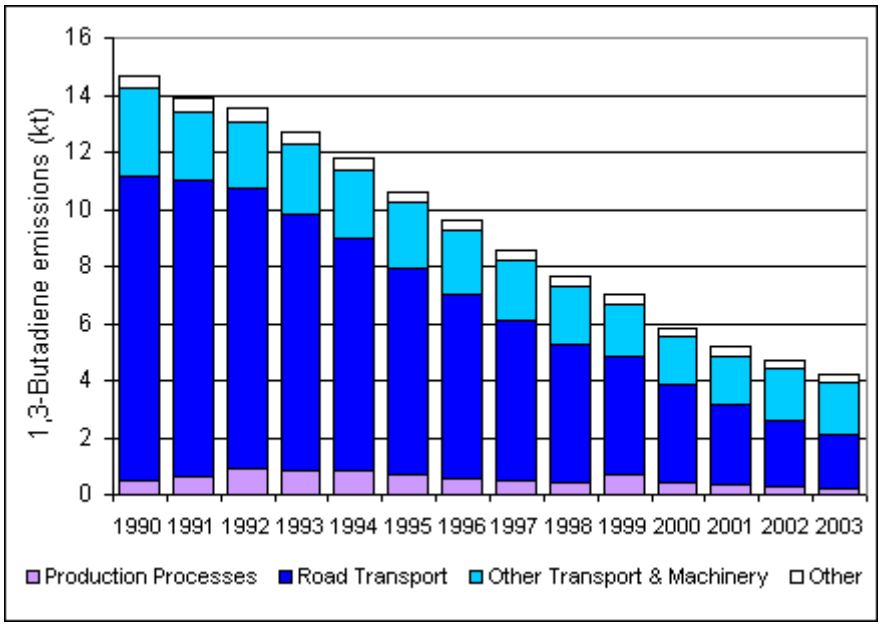
Emissions arise from the combustion of petroleum products and its manufacture and use in the chemical industry. The compound is not present itself in fuel, but is formed as a product of the combustion of the olefines in the fuel. It is therefore not present in road transport evaporative emissions.

In the UK the main source is from the road transport sector that contributed 83% of the 2003 total.

A significant decrease in emissions has been seen since 1990 with the introduction in 1991 of cars equipped with catalytic converters. A reduction in emissions by 72% was seen during the period 1990 to 2003.

Similar to benzene, 1,3 butadiene disperses fairly rapidly in air and is of concern only in the immediate vicinity of its source.

1,3 butadiene is a carcinogen which can cause cancers of the bone marrow, lymphomas, and leukaemia. There is therefore no level of exposure at which there is zero risk.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 6.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **1,3-Butadiene** | 2.25 µg/$m^3$ (1ppb) | Running Annual Mean | 31 December 2003 |

Conversions of ppb at 20°C and 1013mb

## 6.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The absence of any identified significant point sources of 1, 3 butadiene emissions combined with national monitoring data and predictions, leads to the conclusion that the air quality objective for 1, 3 butadiene is not currently being breached and will not be exceed in 2004 (The date for achieving/maintaining the UK Air Quality Strategy objective).

## 6.4 CHECKLIST RESPONSE

| Checklist item (from Box 4.2 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data | There is no current, and has been no historical monitoring of 1, 3 butadiene in Charnwood |
| (B) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of 1, 3 butadiene in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood or the surrounding area since 2003. |
| (C) Industrial sources with substantially increased emissions, or new relevant exposure | During the original Review and Assessment one installation was located in Charnwood that fell within the descriptions of relevant processes in Annex 2 Appendix E to LAQM.TG(03), namely Astra Zeneca, Bakewell Road, Loughborough (organic chemical manufacture, Authorisation AX 3991).<br><br>Information from the Environment Agency demonstrated that the process does not generate any emissions of 1, 3 butadiene and as such can be ignored as having substantially increased (>30%) emissions. |

## 6.5 CONCLUSIONS OF THE USA

The Update and Screening Assessment review concludes that the air quality objective for 1, 3 butadiene is not currently being breached.

# 7. REVIEW AND ASSESSMENT OF LEAD

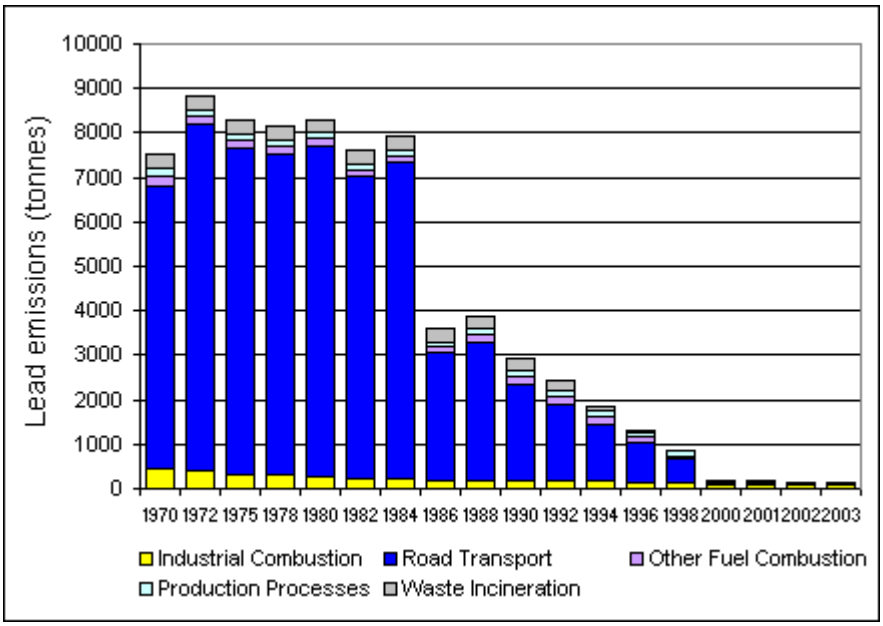
## 7.1 INTRODUCTION

Lead is an elemental metal. Most lead found in the atmosphere is in the form of very fine particulates of less than 1 micron (one thousandth of a millimetre) although some sources of lead generate larger particulates that tend to fall relatively quickly out of the atmosphere. The lead in particulates may be in its elemental form or as an alloy or compound.

Since 1970 lead emissions have declined by 98%. The majority of lead emissions in the UK used to come from petrol driven road vehicles. However stricter controls on the lead content of leaded fuels was first made in 1986, with leaded fuel being banned from sale in the UK since 1 January 2000. Emissions of lead are now restricted to a variety of industrial activities such as battery manufacture, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

Human exposure to lead is primarily through ingested food. However, whilst the percentage absorption of lead in the gastrointestinal tract is only 10% in adults, the level of absorption through the respiratory tract may be as high as 60%. Consequently, the inhalation of airborne lead has the potential to act as a significant vector for lead exposure.

Lead is bio-accumulative, concentrating within body tissue once absorbed, primarily in the bones, teeth, skin and muscle. It exhibits toxic effects by interfering with haemoglobin synthesis, causing neurological damage and affecting the kidneys, gastrointestinal tract, joints and reproductive system.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 7.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Lead** | 0.5 µg/$m^3$ | Running Annual Mean | 31 December 2004 |
| | 0.25 µg/$m^3$ | Running Annual Mean | 31 December 2008 |

## 7.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The absence of any identified significant point sources of lead emissions combined with regional predications of relatively low level background concentrations, leads to the conclusion that the air quality objective for lead is not currently being breached and will not be exceed in 2005 or 2009 (The dates for achieving/maintaining the UK Air Quality Strategy objectives).

## 7.4 CHECKLIST RESPONSE

| Checklist item (from Box 5.1 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data | There is no current, and has been no historical monitoring of lead in Charnwood |
| (B) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of lead in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood or the surrounding area since 2003. |
| (C) Industrial sources with substantially increased emissions, or new relevant exposure | During the original Review and Assessment one (existing) installation was located in Charnwood that fell within the descriptions of relevant processes in Annex 2 Appendix E to LAQM.TG(03), namely Fisher Scientific (UK) Ltd. Bishop Meadow Road, Loughborough (inorganic chemical manufacture, Authorisation AO 2639).<br><br>Information from the Environment Agency demonstrated that the process does not generate any emissions of lead and as such can be ignored as having substantially increased (>30%) emissions. |

## 7.5 CONCLUSIONS OF THE USA

The Update and Screening Assessment review concludes that the air quality objective for lead is not currently being breached and will not be exceeded in 2009.

# 8. REVIEW AND ASSESSMENT OF CARBON MONOXIDE

## 8.1 INTRODUCTION

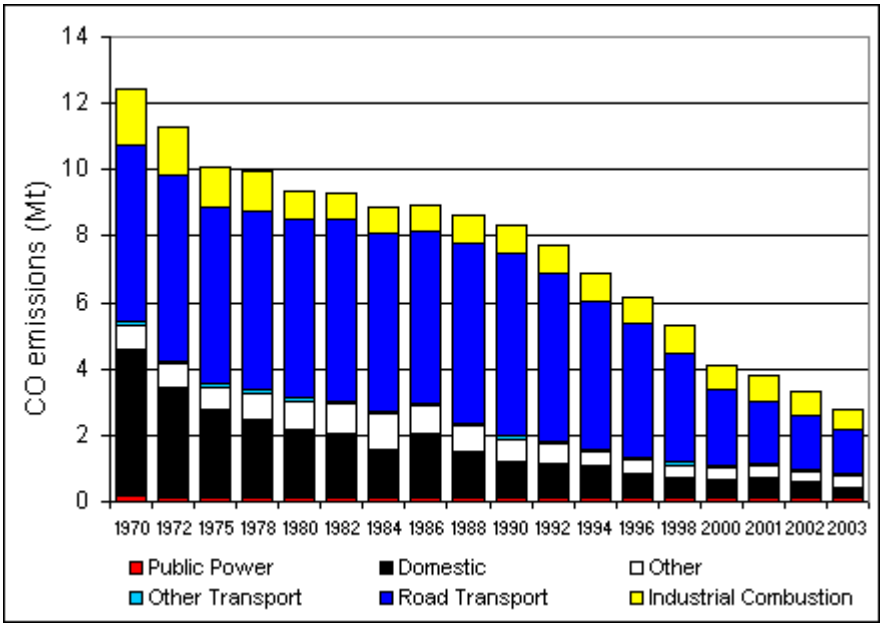
Carbon Monoxide (CO) is a colourless and odourless gas consisting of one carbon atom and one oxygen atom.

Carbon monoxide is largely produced due to the incomplete combustion of fuels containing carbon. Although CO is probably best known as a pollutant in restricted areas with poor ventilation - in particular domestic houses with badly maintained gas fired appliances where it can reach dangerously high concentrations; the main source of emissions in the UK is road transport.

Over the period 1970-2003 emissions decreased by 78% reflecting substantial emission reduction from road transport, domestic and agricultural sectors.

CO is only a significant pollutant in the wider environment near to heavily trafficked or congested roads. Concentrations fall away rapidly with distance from roads and CO is only therefore a pollutant of concern in the immediate vicinity of its production.

Prolonged exposure to high levels of CO can lead to death as it inhibits the distribution of oxygen around the body by blocking the carrier molecule in red blood cells. At lower levels the effect, whilst not fatal, can lead to impaired mental performance and coronary stress. Short-term exposure causes reversible effects whilst long-term exposure may lead to chronic health effects.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 8.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Carbon Monoxide** | 10 mg/$m^3$ (8.6ppm) | Maximum Running 8 hr Mean | 31 December 2003 |

Conversions of ppm at 20°C and 1013mb

## 8.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The absence of any significant road or point sources of carbon monoxide emissions combined with regional predications of relatively low level background concentrations, leads to the conclusion that the air quality objective for carbon monoxide is not currently being breached and will not be exceed in 2004 (The date for achieving/maintaining the UK Air Quality Strategy objective).

## 8.4 CHECKLIST RESPONSE

| Checklist item (from Box 2.2 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data | There is no current, and has been no historical monitoring of carbon monoxide in Charnwood |
| (B) Very busy roads or junctions in built-up areas | There are no roads that can be defined as 'very busy' within Charnwood, namely single carriageway roads with flows greater than 80,000 vehicles per day, dual carriageways with more than 120,000 vehicles per day, motorways with more than 140,000 per day, or junctions with a cumulative AADT of more than 80,000 **where the 2006 background concentration is expected to be above 1mgm$^{-3}$** that have not been considered in previous R&A reports and have had a >10% AADT increase. |

## 8.5 CONCLUSIONS OF THE USA

The Update and Screening Assessment review concludes that the air quality objective for carbon monoxide is not currently being breached.

# 9. REVIEW AND ASSESSMENT OF NITROGEN DIOXIDE

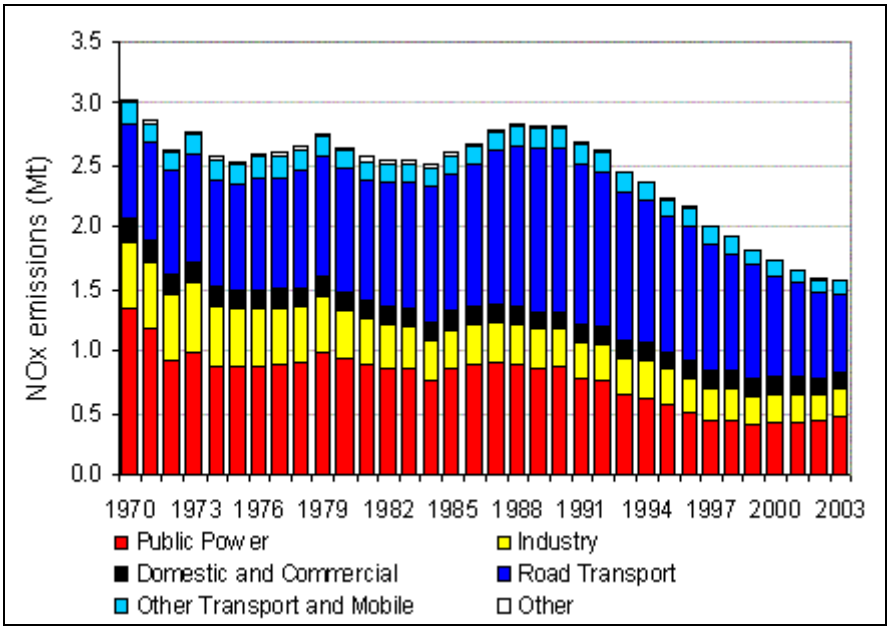
## 9.1 INTRODUCTION

Nitrogen dioxide ($NO_2$) is a gas formed from one nitrogen atom and two oxygen atoms.

Nitrogen dioxide is formed to a small extent directly in combustion processes. However, most nitrogen based combustion products are emitted as nitric oxide (NO). Nitric oxide is relatively unstable and is rapidly oxidised to nitrogen dioxide in air. When low level ozone (another atmospheric pollutant) is present, it is often the ozone molecule that contributes to this process. The relative proportions of nitric oxide and nitrogen dioxide generated from any source can be very variable and as such when both gases are being emitted they are often referred to as 'oxides of nitrogen' (NOx) The most significant source of these gases is road transport which accounts for 40% of the total UK emission.

Since 1989, total NOx emissions have declined by 45% as a result of a 52% decrease from road transport, due to the introduction of catalytic converters and stricter regulations and a 47% reduction from power stations.

The principal health effects of nitrogen dioxide relate to impaired lung performance from changes in structure and function and suspected hyper reactivity to allergens (causes of allergic response). Effects are reversible; however, ongoing exposure may lead to poorer lung function later in life. Exposure to high concentrations for short periods is considered more toxic than low concentration exposure for long periods.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 9.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Nitrogen Dioxide** | 200 µg/m$^3$(105ppb) Not to be exceeded more than 18 times a year | 1 hour mean | 31 December 2005 |
| | 40 µg/m$^3$ (21ppb) | Annual Mean | 31 December 2005 |

Conversions of ppb at 20°C and 1013mb

## 9.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The original review concluded that there were not likely to be any breaches of the hourly mean air quality objective but breaches of the annual mean were predicted at a number of roadside locations in the Borough. As a consequence three Air Quality Management Areas, covering a total of approximately 660 properties, were declared in 2001 on the basis of that report. A full copy of the 2001 Round 1, Stage 3 Review and Assessment is at http://www.charnwood.gov.uk/environment/2309.html along with maps of the AQMAs and a list of the properties within them.

The 2003 USA suggested that some locations in Charnwood might experience levels of nitrogen dioxide in excess of the annual average nitrogen dioxide objective. These locations were to become subject of a more detailed review and assessment. The locations are summarised below. No locations in Charnwood were likely to be subject to levels above the hourly mean nitrogen dioxide level.

- Properties very close to the A6 corridor on Derby Road, High Street and Leicester Road in Loughborough

- Properties on Ratcliffe Road in Loughborough
- All roads within the Loughborough AQMA that will be affected by the Epinal Way extension and other roads outside the AQMA that are predicted to experience significant traffic increases due to the new road.
- The A6 corridor through the village of Birstall
- The Melton Road corridor through the village of Syston

Following a further Detailed Review and Assessment the Birstall AQMA was rescinded in November 2004

## 9.4 CHECKLIST RESPONSE

| Checklist item (from Box 6.2 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data outside an AQMA | See section 9.5 |
| (B) Monitoring data within an AQMA | See section 9.5 |
| (C) Narrow congested streets with residential properties close to the kerb | There are no roads within Charnwood that meet the definition given in LAQM.TG(03) Update – January 2006, that have a flow greater that 10,000 vehicles per day. |
| (D) Junctions | As stated in LAQM.TG(03) Update – January 2006; "*This assessment is required where there was no previous assessment of junctions during previous rounds against the 2005 objectives*" and "*if you specifically included these types of location during previous rounds, then there is no need to proceed further with this part*"<br><br>Full consideration against the 2005 objectives was given to these types of location during our 2003 Updating and Screening Assessment. |
| (E) Busy streets where people may spend 1-hour or more close to traffic | There are no such streets in Charnwood with a traffic flow in excess if 10,000 vehicles per day. |

| | |
|---|---|
| (F) Roads with high flow of buses and/or HGVs | There are no roads in Charnwood that have a composition greater than 25% of buses and/or HGVs |
| (G) New roads constructed or proposed since the previous round of R&A | Since the last round of review and assessment the 'Epinal Way Extension' has been completed. The extension connected Ling Road and the southern part of the A6 corridor, north of Quorn.<br>Towards Quorn there is no relevant exposure within 10m, however as a consequence of the new road there has been an increase in traffic over the last 2-3 years through Ling Road, this will be considered in (H).<br><br>There are no new roads for which planning permission has been granted. |
| (H) Roads with significantly changed traffic flows, or new relevant exposure | As per (G) the only road that is believed to have seen significant (>25%) increase in traffic flow is Ling Road due to the Epinal Way extension.<br><br>A passive diffusion tube is located at the junction of Epinal Way and Ling Road (see Table 9.5.1). **Measured** monitoring data shows that for the last 3 years there has been a steady decrease in $NO_2$ levels in this area. A level of 33.0$\mu gm^{-1}$ was recorded during 2005.<br><br>Projected annual averages from this data suggest that the predicted annual mean will not exceed 40$\mu gm^{-1}$ during 2006. |
| (I) Bus stations | Since the closure of Loughborough bus station in 2001, there are no significant bus stations within Charnwood |

| | |
|---|---|
| (J) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of nitrogen dioxide in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood or the surrounding area since 2003. |
| (K) Industrial sources with substantially increased emissions, or new relevant exposure | No industrial sources have been identified in previous rounds of review and assessment as potentially significant sources of nitrogen dioxide.<br><br>Therefore, based on existing records there are no existing industrial sources, which have substantially increased (>30%) emissions. |
| (L) Aircraft | Nottingham East Midlands Airport is located approximately 5Km north of the Charnwood boundary.<br><br>LAQM.TG(03) Update - January 2006 suggests that once aircraft are 200m above ground level they make a negligible contribution to ground level nitrogen dioxide concentrations. The impact of NEMA can therefore be discounted.<br><br>There are no other sources of aircraft emissions in Charnwood. |

## 9.5 EVIDENCE TO SUPPORT THE USA

31 passive diffusion tubes situated at 29 different locations in Charnwood currently monitor nitrogen dioxide. All of these locations were chosen based on either the results of the original Review and Assessment or to meet long term commitments to provide data for the national nitrogen dioxide survey. Thirteen of the sites are currently situated within an existing AQMA (highlighted in the table with a *). Three of these tubes are co-located with a chemiluminescent analyser at the Durham Road, Loughborough location.

Results from these locations were assessed based on the guidance in LAQM.TG(03) Update - January 2006 and are expressed in detail in Table 9.5.1 along with a summary of all correction factors and biases that have been applied to the data.

**Table 9.5.1**

| | | Monitored Annual Means $\mu gm^{-1}$ | | | Projected 2006 Annual Averages $\mu gm^{-1}$ | | | |
|---|---|---|---|---|---|---|---|---|
| **Location** | **OS Reference (Position)** | **2003** | **2004** | **2005** | **From 2003** | **From 2004** | **From 2005** | **Highest** |
| Ratcliffe Road, Loughborough * | 454087 320392 | 44.8 | 41.3 | 36.4 | 40.89 | 38.98 | 35.36 | **40.89** |
| Shelthorpe Road, Loughborough | 454250 318665 | 39.7 | 30.0 | 28.8 | 36.23 | 28.32 | 27.98 | 36.23 |
| Forest Road, Loughborough | 452833 318776 | 40.7 | 33.6 | 32.9 | 37.14 | 31.71 | 31.96 | 37.14 |
| Nottingham Road, Loughborough | 454209 320193 | 40.1 | 36.0 | 35.7 | 36.60 | 33.98 | 34.68 | 36.60 |
| Haydon Road, Loughborough * | 452312 319620 | 42.0 | 38.0 | 34.5 | 38.33 | 35.87 | 33.52 | 38.33 |
| Alan Moss Road/Epinal Way, Loughborough * | 452176 319923 | 41.3 | 36.0 | 30.7 | 37.69 | 33.98 | 29.83 | 37.69 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ling Road/Epinal Way Loughborough | 453677 318190 | 39.3 | 36.5 | 33.0 | 35.87 | 34.45 | 32.06 | 35.87 |
| Leicester Road, Loughborough * | 454002 319253 | 41.8 | 40.1 | 40.3 | 38.15 | 37.85 | 39.15 | 39.15 |
| Derby Road, Loughborough * | 453297 319945 | 45.5 | 43.7 | 47.0 | 41.53 | 41.25 | 45.66 | **45.66** |
| Derby Road/Briscoe Avenue Loughborough * (2005 onwards) | 452702 320499 | - | - | 26.3 | - | - | 25.55 | 25.55 |
| Durham Road, Loughborough **Background** | 452358 320712 | 30.6 | 28.3 | 26.6 | 28.62 | 27.11 | 25.97 | 28.62 |
| Durham Road 2, Loughborough (2005 onwards) **Background** | 452358 320712 | - | - | 26.3 | - | - | 25.68 | 25.68 |
| Durham Road 3, Loughborough (2005 onwards) **Background** | 452358 320712 | - | - | 26.7 | - | - | 26.07 | 26.07 |
| Durham Road, Loughborough **Background - Real Time [See below also]** | 452358 320712 | 32.5 | 27.7 | 30.8 | 30.40 | 26.54 | 30.07 | 30.40 |
| Alan Moss Road/A6 Derby Road Loughborough * | 452909 320209 | 48.0 | 45.7 | 37.0 | 43.81 | 43.13 | 35.95 | **43.81** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| High Street, Loughborough * | 453731 319589 | 69.7 | 67.7 | 63.2 | 63.61 | 63.90 | 61.40 | **63.90** |
| Market Place, Loughborough * **Background** | 453605 319532 | 32.8 | 29.4 | 29.4 | 30.68 | 28.17 | 28.35 | 30.68 |
| Ashby Road, Loughborough * | 453190 319710 | 50.1 | 42.8 | 42.0 | 45.72 | 40.40 | 40.81 | **40.81** |
| Beacon Road, Loughborough **Background** | 453458 318813 | 24.2 | 25.1 | 22.9 | 22.63 | 24.05 | 22.36 | 24.05 |
| Rosebery Street, Loughborough **Background** | 452692 319921 | 26.6 | 24.4 | 24.0 | 24.88 | 23.38 | 23.43 | 24.88 |
| Melton Road Town Centre, Syston * | 462772 311689 | 37.9 | 30.7 | 34.2 | 34.59 | 28.98 | 33.23 | 34.59 |
| Melton Road/St Peters Road, Syston * | 462367 311251 | 42.4 | 37.0 | 33.1 | 38.70 | 34.92 | 32.16 | 38.70 |
| Melton Road, Syston * (2005 onwards) | 462350 311211 | - | - | 36.6 | - | - | 35.36 | 35.36 |
| Loughborough Road, Birstall | 459233 309560 | 41.0 | 33.0 | 36.6 | 38.35 | 31.61 | 35.73 | 38.35 |
| A6, Birstall | 459179 309862 | 44.8 | 38.5 | 39.9 | 40.89 | 36.34 | 38.77 | **40.89** |
| Humberstone Lane, Thurmaston | 460813 308756 | 45.4 | 42.1 | 39.9 | 41.43 | 39.74 | 38.77 | **41.43** |
| Ashby Road Central, Shepshed | 448086 318256 | 43.3 | 40.6 | 39.1 | 39.52 | 38.32 | 37.99 | 39.52 |
| Loughborough Road, Hathern | 450253 321928 | 43.9 | 37.7 | 37.1 | 40.06 | 35.58 | 36.04 | **40.06** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Baxtergate, Loughborough (2006 onwards) | 453687 319673 | - | - | - | - | - | - | - |
| Barrow Street, Loughborough (2006 onwards) | 453902 319489 | - | - | - | - | - | - | - |
| School Street, Loughborough (2006 onwards) | 453949 319624 | - | - | - | - | - | - | - |
| Fennel Street, Loughborough (2006 onwards) | 453693 319896 | - | - | - | - | - | - | - |

*** - Monitoring sites within a current AQMA**

**Notes :**
The figures in Table 9.5.1 are shown including correction factors used to amend the (raw) monitored diffusion tube data.

These factors are as follows:
2003[(1)] – multiplied by 0.96 for Gradko 20% TEA in water for 2003
2004 – multiplied by 1.1315 as the local diffusion tube under-read by 13.1%
2005[(1)] – multiplied by 0.99 for Gradko 20% TEA in water for 2005

[(1)]For 2003 & 2005 the factor was determined by application of the Bias Correction Spreadsheet (ver 03/06) from www.uwe.ac.uk/aqm/review/

All forward projections to Year 2006 were derived by use of the 'Year Adjustment Calculator' (ver 2.2a) from www.airquality.co.uk/archive/laqm/tools

## 3 Real Time Monitor Results

| Monitoring Year | Duration & data capture rate | Annual mean ($ug/m^3$)[1] | Number of exceedences of the 1hr mean |
|---|---|---|---|
| 2003 | Whole Year – 96.8% | 32.5 | 0 |
| 2004 | Whole Year – 94.7% | 27.7 | 0 |
| 2005 | Whole Year ~ 65% | 30.8 | 0 |

[1]A conversion factor of 1.91 has been applied to the raw data originally measured as ppb, as per Appendix B (pg A1-44) LAQM.TG assuming 20°C and 101.3 kPa

As the ~65% data capture recorded for 2005 was <90%; LAQM.TG(03) Update – January 2006 guidelines state that the 99.8$^{th}$ percentile should be used rather than a count of exceedences.

From the 22,651 data points captured throughout 2005, the 99.8$^{th}$ percentile is calculated as being 91.9$\mu gm^{-3}$

## 9.6 CONCLUSIONS OF THE USA

With reference to the forward predictions to 2006 taken from monitored data (Assessments A & B, as per Table 9.5.1), it is shown that at 8 locations the projected annual average will be greater than the 40$\mu gm^{-3}$ objective annual mean.

5 of theses sites are already situated **within** an existing AQMA for $NO_2$.

1) Ratcliffe Rd, Loughborough
2) Derby Rd, Loughborough
3) Alan Moss Rd/A6 Derby Rd, Loughborough
4) High St, Loughborough
5) Ashby Rd, Loughborough

3 sites are **outside** of an existing AQMA for $NO_2$

1) A6, Birstall
2) Humberstone Ln, Thurmaston
3) Loughborough Rd, Hathern

The methodology of LAQM.TG(03) Update – January 2006 states that it is *"advisable"* to project forward from a range of monitoring years and use the **highest** value obtained as the basis of the decision.

In 5 (including 2 of the sites outside of the existing AQMA) of the above 8 projections, the highest figure has been derived from the monitoring undertaken in 2003.

Only 4 sites would be in projected breach if the range of yearly analysis were to be taken forward from 2004, further reducing to 3 if projections were based purely on 2005 data. All of these sites falling within the existing AQMA.

Looking specifically at the 8 sites flagged in Table 9.5.1,which are also individually listed above, the 3-year trends shown at 4 of the sites are showing tangible downward progress.

Discounting the locations already covered by the existing AQMA, only the A6 site at Birstall is showing an upward $NO_2$ concentration trend in conjunction with an associated predicted annual mean greater than 40$\mu gm^{-1}$. It should be highlighted that this predicted exceedence is only evident when data is projected from the 2003 monitoring results.

As the A6 site has previously been subjected to a Detailed Assessment, and the forward projections from years 2004 & 2005 suggest that there is unlikely to be a breach of the 40$\mu gm^{-1}$ objective, it is felt that it is sufficient only to continue reviewing this location rather than progressing through to another DA.

# 10. REVIEW AND ASSESSMENT OF SULPHUR DIOXIDE

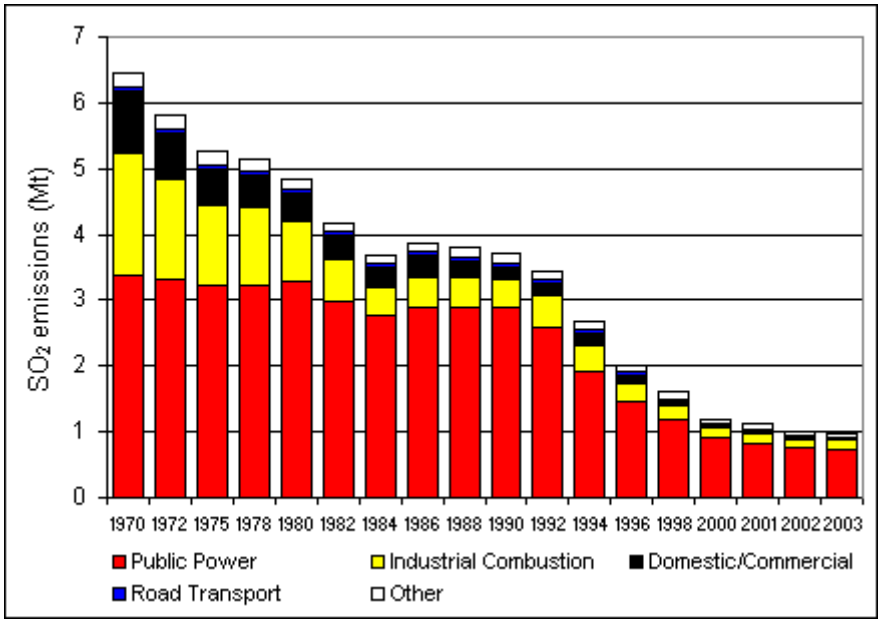
## 10.1 INTRODUCTION

Sulphur dioxide ($SO_2$) is a soluble gas consisting of one sulphur and two oxygen atoms. On dissolving in water it gives rise to an acidic solution of sulphuric acid.

The principal source of $SO_2$ is the electricity generating power stations followed by other industrial combustion plant - in particular refineries and iron and steel processes. Domestic sources of $SO_2$ can be significant in areas where there is still extensive use of solid fuel fires.

Since 1970 there has been a substantial overall reduction of more than 85% in $SO_2$ emissions.

Sulphur dioxide gives rise to concerns due to its local and global effect. Trans-national transportation of $SO_2$ in the atmosphere followed by its dry and wet deposition ("acid rain") has accounted for deforestation and lake acidification in continental Europe. In terms of its health effects the acidic nature of dissolved $SO_2$ causes irritation to lung tissue and may provoke attacks of asthma. The onset of these clinical effects can be very rapid after exposure to a sufficiently high concentration of the gas.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 10.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Sulphur Dioxide** | 266 µg/m$^3$(100ppb) Not to be exceeded more than 35 times a year | 15 minute mean | 31 December 2005 |
| | 350 µg/m$^3$ (132ppb) Not to be exceeded more than 24 times a year | 1 hour mean | 31 December 2004 |
| | 125 µg/m$^3$ (47ppb) Not to be exceeded more than 3 times a year | 24 hour mean | 31 December 2004 |

Conversions of ppb at 20°C and 1013mb

## 10.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

Some locations within Charnwood are at risk of being subject to exposure in exceedences to the air quality objectives. Specifically these are receptor points close to the engine sheds of the Great Central Railway in Loughborough.

As a result of a subsequent Detailed Assessment, the GCR Air Quality Management Area came into effect on 30$^{th}$ November 2005 in respect of likely breaches of the sulphur dioxide (fifteen minute mean) objective as specified in the Air Quality Regulations (England)(Wales) 2000.

## 10.4 CHECKLIST RESPONSE

| Checklist item (from Box 7.2 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data outside an AQMA | See section 10.5 |
| (B) Monitoring data within an AQMA | See section 10.5 |
| (C) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of sulphur dioxide in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood or the surrounding area since 2003. |
| (D) Industrial sources with substantially increased emissions, or new relevant exposure | No industrial sources have been identified in previous rounds of review and assessment as potentially significant sources of sulphur dioxide.<br><br>Therefore, based on existing records there are no existing industrial sources, which have substantially increased (>30%) emissions. |
| (E) Areas of domestic coal burning | There is very little use of solid fuel appliances in Charnwood for domestic heating. As an illustration our 2003 USA reported that only 49 of the total Council owned stock of 6900 properties had any form of solid fuel appliance.<br><br>Although there was/is no data to prove it, this is thought to reflect the amount of solid fuel appliances found in the private sector.<br><br>It is not considered that any part of the Borough has a density of more than 100 houses in a 500 x 500m area burning solid fuel as their primary source of heating. |

| | |
|---|---|
| (F) Small boilers >5MW$_{(Thermal)}$ | Information from an emissions inventory obtained from the original review and assessment confirm that there are two boiler plant sources greater >5MW$_{(Thermal)}$ within the Borough both of which operate at Loughborough University. Both of these burn natural gas, which is not considered to be a significant source of sulphur dioxide.<br><br>To the knowledge of the local authority no other new plant or changes to existing plant have occurred since the original review and assessment that requires other boiler plant to be considered further. |
| (G) Shipping | There are no local sources of shipping emissions |
| (H) Railway locomotives | See section 10.5<br>An AQMA is already declared in respect of an area around the Great Central Railway, Loughborough.<br><br>A second railway link within the borough, the Ivanhoe line, has no locations on the line where the diesel locomotives will be regularly stationary for more than 15 minutes. |

## 10.5 EVIDENCE TO SUPPORT THE USA

Charnwood currently monitors sulphur dioxide at three locations. One location has a UV fluorescence real time analyser and is co-located with a single diffusion tube; the other 2 sites use single diffusion tubes.

### a) Monitoring Data outside an AQMA

**Table 10.5.1**
**Summary of sulphur dioxide monitoring data at Durham Road, Loughborough**

| 2003 | |
|---|---|
| Maximum 15 minute mean concentration | 193.4μgm$^{-3}$ |
| Exceedences of 15 minute concentration @ 266μgm$^{-3}$ | 0 |
| Maximum 1 hour mean concentration | 158.8μgm$^{-3}$ |
| Exceedences of 1 hour concentration @ 350μgm$^{-3}$ | 0 |
| Maximum 24-hour mean concentration | 48.2μgm$^{-3}$ |
| Exceedences of 24-hour concentration @ 125μgm$^{-3}$ | 0 |
| Data capture | 97.7% |

| 2004 | |
|---|---|
| Maximum 15 minute mean concentration | 135.9μgm$^{-3}$ |
| Exceedences of 15 minute concentration @ 266μgm$^{-3}$ | 0 |
| Maximum 1 hour mean concentration | 71.3μgm$^{-3}$ |
| Exceedences of 1 hour concentration @ 350μgm$^{-3}$ | 0 |
| Maximum 24-hour mean concentration | 16.5μgm$^{-3}$ |
| Exceedences of 24-hour concentration @ 125μgm$^{-3}$ | 0 |
| Data capture | 96.6% |

| 2005 | |
|---|---|
| Maximum 15 minute mean concentration | 191.3μgm$^{-2}$ |
| Exceedences of 15 minute concentration @ 266μgm$^{-3}$ | 0 |
| Maximum 1 hour mean concentration | 73.2μgm$^{-3}$ |
| Exceedences of 1 hour concentration @ 350μgm$^{-3}$ | 0 |
| Maximum 24-hour mean concentration | 19.2μgm$^{-3}$ |
| Exceedences of 24-hour concentration @ 125μgm$^{-3}$ | 0 |
| Data capture | ~60% |

As the ~60% data capture recorded for 2005 was <90%; LAQM.TG(03) Update – January 2006 guidelines state that a percentile calculation should be used rather than a count of exceedences.

**4 15 Minute Mean Concentration**
From the 21,140 data points captured throughout 2005, the 99.9th percentile is calculated as being 56.7μgm$^{-3}$

**1 Hour Mean Concentration**
From the 5,943 data points captured throughout 2005, the 99.7th percentile is calculated as being 28.7μgm$^{-3}$

**24 Hour Mean Concentration**
From the 248 data points captured throughout 2005, the 99th percentile is calculated as being 12.8μgm$^{-3}$

Conversion factors of 2.66 have been applied to the raw data originally measured as ppb, as per Appendix B (pg A1-44) LAQM.TG assuming 20°C and 101.3 kPa

### b) Monitoring Data inside an AQMA

The GCR AQMA came into effect on 30th November 2005 in respect of likely breaches of the sulphur dioxide (fifteen minute mean). This decision was based upon a monitoring study conducted between December 2004 and April 2005.

No further periods of monitoring have been conducted since the recent declaration of this AQMA. It is however felt that the results (which are discussed fully in our previously submitted "Progress Report and Round 2 Further Assessment") in conjunction with the current operational procedures at GCR, are broadly representative of the current air quality of the area.

## 10.6 CONCLUSIONS OF THE USA

Sulphur dioxide emissions from the Great Central Railway are causing breaches of the short-term air quality objectives at nearby properties. The results from the four month monitoring exercise suggests that there may well be more than 35 instances where the 15 minute SO2 objective is exceeded at nearby receptor locations. This suggests that the declaration of the AQMA around the sheds was appropriate.

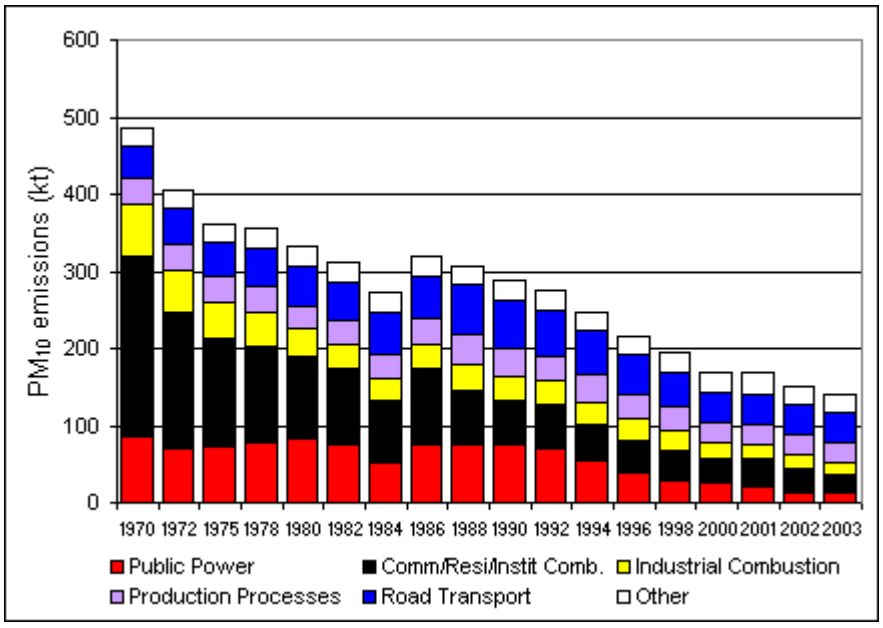
# 11. REVIEW AND ASSESSMENT OF PARTICLES ($PM_{10}$)

## 11.1 INTRODUCTION

The $PM_{10}$ respirable dust (particles measuring 10µm or less) standard was designed to identify those particles likely to be inhaled by humans. It has become the generally accepted measure of particulate matter in the UK and Europe

A wide range of emission sources contributes to $PM_{10}$ in the UK. Sources can be roughly divided into three main categories. *Primary particle emissions* come directly from combustion sources such as power generation and road traffic. *Secondary sources* are formed by chemical reactions in the atmosphere and consist mainly of sulphates and nitrates. Course particles come from a wide range of sources such as road traffic, construction work, mineral extraction, wind blown dusts, soils, sea salt and pollen.

Emissions of $PM_{10}$ have declined since 1970. This is primarily due to the reduction in coal use. Domestic emissions have fallen from 234 kilotonnes (48% of the total emission) in 1970 to 24 kilotonnes (17%) in 2003.




Data and Graph provided by UK National Atmospheric Emission Inventory

## 11.2 OBJECTIVES

Objectives for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of the pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The objectives adopted in the UK are part of the Air Quality Strategy published by the Government in January 2000. A summary of these objectives is given in the table below.

**5 Summary of the UK Air Quality Strategy objectives**

| Pollutant | Objective | Measured as | To be achieved (& maintained) by |
|---|---|---|---|
| **Respirable Particulates ($PM_{10}$)** | 50 µg/$m^3$ Not to be exceeded more than 35 times a year | 24 hour mean | 31 December 2004 |
| | 40 µg/$m^3$ | Annual Mean | 31 December 2004 |

## 11.3 CONCLUSIONS OF PREVIOUS ROUNDS OF REVIEW AND ASSESMENT

The original review concluded that there was no current evidence that the objective for PM10 will be breached. However Charnwood Borough Council remains concerned that traffic derived PM10 will impact on the same areas as is predicted for traffic derived nitrogen dioxide.

Some locations may be experiencing levels of respirable particulates in excess of the annual average objective:

- All roads within existing Air Quality Management Areas (for $NO_2$) in Charnwood
- Properties around the Lafarge Aggregates quarry in Mountsorrel.

## 11.4 CHECKLIST RESPONSE

| Checklist item (from Box 8.4 in TG(03) Update January 2006) | Updating and Screening Assessment |
|---|---|
| (A) Monitoring data outside an AQMA | See section 11.5 (A) - Tables 11.5.1 & 11.5.2 |
| (B) Monitoring data within an AQMA | Not applicable. Charnwood BC has declared no AQMA for $PM_{10}$. |
| (C) Busy roads and Junctions in Scotland | Not applicable |
| (D) Junctions | As stated in LAQM.TG(03) Update – January 2006; "*This assessment is required where there was no previous assessment of junctions during previous rounds against the 2004 objectives*".<br><br>Full consideration against the 2004 objectives was given to these types of location during our 2003 Updating and Screening Assessment. |
| (E) Roads with high flows of buses and/or HGVs | There are no roads in Charnwood that have a composition greater than 20% of buses and/or HGVs |
| (F) New roads constructed or proposed since last round of R&A | Since the last round of review and assessment the 'Epinal Way Extension' has been completed. The extension connected Ling Road and the southern part of the A6 corridor, north of Quorn.<br>Towards Quorn there is no relevant exposure within 10m, however as a consequence of the new road there has been an increase in traffic over the last 2-3 years through Ling Road, this will be considered in (G).<br><br>There are no new roads for which planning permission has been granted. |

| | |
|---|---|
| (G) Roads with significantly changed traffic flows, or new relevant exposure | As per (H) the only road that is believed to have seen significant (>25%) increase in traffic flow is Ling Road due to the Epinal Way extension.<br><br>Measured data from passive $NO_2$ diffusion tubes located at the junction of Epinal Way and Ling Road (see Chapter 9, Table 9.5.1) show that for the last 3 years there has been a steady decrease in $NO_2$ levels in this area. These results would suggest that there has been an overall improvement in air quality from vehicular derived traffic air pollutants possibly due to the improved flow of vehicles in the area.<br><br>As this road/junction was not identified during our 2003 Updating and screening Assessment to be in exceedence of the air quality objective with regard to PM10, we believe our conclusions drawn at that time are still valid. |
| (H) Roads close to the objective during the second round of R&A | See section 11.5 (B) - Table 11.5.3 |

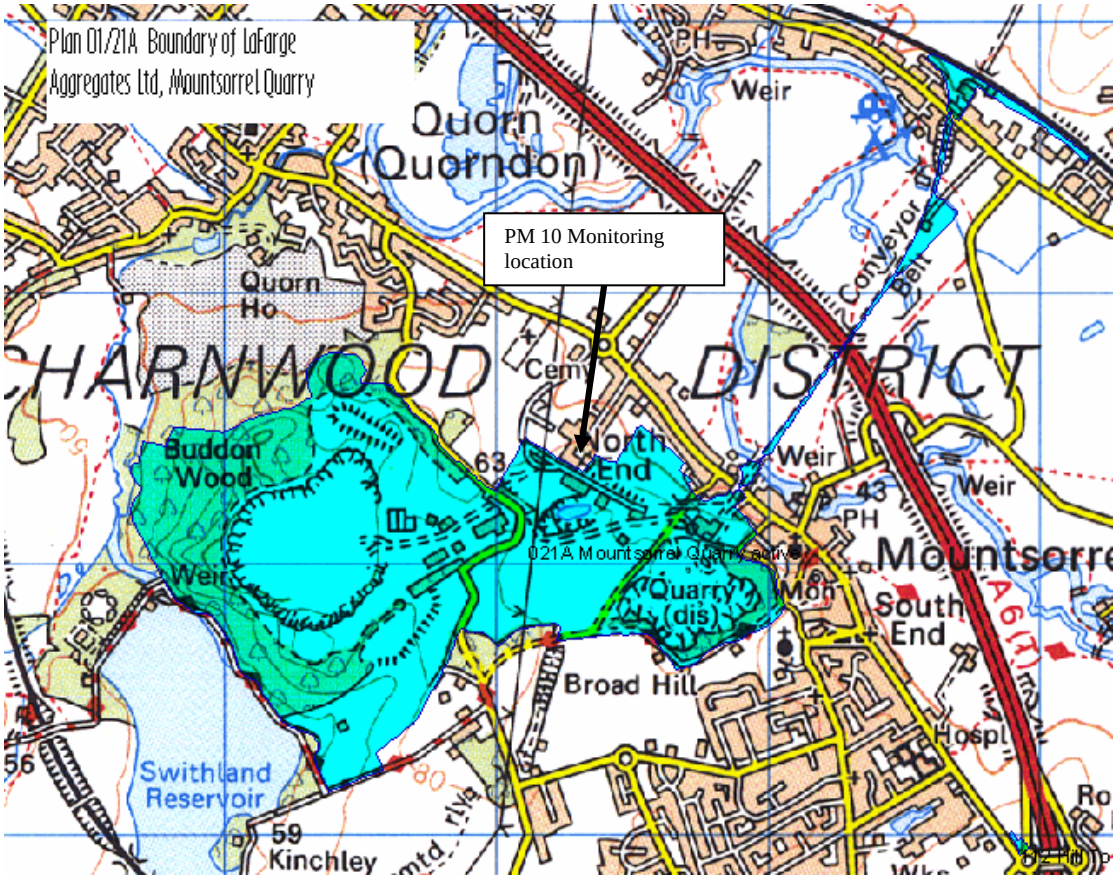
| | |
|---|---|
| (I) New industrial sources | No new industrial sources listed as a risk of emitting significant quantities of PM10 in Annex 2 Appendix E to LAQM.TG(03), have been introduced or had planning approval granted in Charnwood since 2003.<br><br>Work is due to commence on the 3rd April 2006 on the development of the Lafarge Aggregates – Brooksby Quarry, located at Brooksby, Melton Mowbray, Leicestershire.<br><br>This sand and gravel quarry will be located within the Borough of Melton, approximately 400m past the easterly edge of the CBC boundary, and adjacent to the A607.<br><br>The Charnwood villages of Thrussington, Rearsby and East Goscote would be the nearest receptor locations within Charnwood.<br><br>It is envisaged that there will be no significant dust events caused by HGV's on the A607. All lorries leaving the site will be wheel cleaned and those carrying sand would be sheeted thereby removing potential dust generation at source. Operations at the quarry would comply with best practice with mitigation measures, established on similar sites operated by the company, implemented.<br><br>We are currently looking in to the possibility of setting up a monitoring study at Rearsby. |
| (J) Industrial sources with substantially increased emissions, or new relevant exposure | No industrial sources have been identified in previous rounds of review and assessment as potentially significant sources of PM10.<br><br>Therefore, based on existing records there are no existing industrial sources, which have substantially increased (>30%) emissions. |

| | |
|---|---|
| (K) Areas of domestic solid fuel burning | There is very little use of solid fuel appliances in Charnwood for domestic heating. As an illustration our 2003 USA reported that only 49 of the total Council owned stock of 6900 properties had any form of solid fuel appliance.<br><br>Although there was/is no data to prove it, this is thought to reflect the amount of solid fuel appliances found in the private sector.<br><br>It is not considered that any part of the Borough has a density of more than 50 houses in a 500 x 500m area burning solid fuel as their primary source of heating. |
| (L) Quarries / landfill sites / opencast coal / handling of dusty cargoes at ports etc. | See section 11.5 (C) - Table 11.5.4<br><br>All other potential sources of fugitive emissions have been considered in previous rounds. |
| (M) Aircraft | Nottingham East Midlands Airport is located approximately 5Km north of the Charnwood boundary.<br><br>LAQM.TG(03) Update - January 2006 suggests that once aircraft are 200m above ground level they make a negligible contribution to ground level $PM_{10}$ concentrations. The impact of NEMA can therefore be discounted.<br><br>There are no other sources of aircraft emissions in Charnwood. |

## 11.5 EVIDENCE TO SUPPORT THE USA

All PM10 monitoring within Charnwood has to date been carried out outside existing AQMAs. Specifically this has involved a TEOM located at a fixed point near to the A6 corridor in Loughborough and two portable light scatter devices deployed at various locations around the Borough. The light scatter devices have been primarily used as means of investigating public complaints about various point sources and are often deployed for only short time intervals of one or two months. Much of the data gathered has therefore not been used for the purposes of this report. A summary of the recorded data from our fixed position TEOM is presented in section (A)

From November 2004 until December 2005 a monitoring study was carried out at 53 Hawcliffe Road, Mountsorrel, LE12 7AQ (OS 457305 315345) in respect to fugitive particulate emissions from the nearby Lafarge granite quarry.




The quarry site has been cited as being the source of dust in a handful of complaints from nearby residents received by this department over the last few years.

Annual gravimetric means for 2004 and 2010 from the estimated background maps are stated to be 28μgm$^{-1}$ and 25.6μgm$^{-1}$

The measured $PM_{10}$ results during 2005 are summarised below in section (B).

## (A) Monitoring data outside an AQMA

Table 11.5.1 summarises data recorded by the fixed position TEOM at Durham Rd, Loughborough.

**Table 11.5.1**

| Monitoring Year | Duration & data capture rate | Annual mean[1] (ug/m$^3$) | Number of exceedences of the 24hr mean |
|---|---|---|---|
| 2001 | Whole Year – 95% | 22.6 | 7 |
| 2002 | Whole Year – 97% | 22.5 | 5 |
| 2003 | Whole Year – 98% | 24.4 | 20 |
| 2004 | Whole Year – 98% | 20.4 | 2 |
| 2005 | Whole Year – 63% | 21.8 | 4 |

[1] Based on the guidance within LAQM.TG(03) Box 8.4 approach 2 & 3 to factor for gravimetric concentrations

Table 11.5.2 shows predicted $PM_{10}$ concentration in 2006 based on measured historical data and the predicted number of 24hr exceedences of the 50µgm$^{-1}$ threshold.

**Table 11.5.2**

| Monitoring Year | CG | $C_{sec}$ | $C_{prim}$ | $C_{prim\ 2006}$ | $C_{sec2006}$ | $CG_{2006}$ | Predicted 24hr exceedences of 50µgm$^{-1}$ in 2006[1] |
|---|---|---|---|---|---|---|---|
| 2003 | 24.4 | 14.09 | 4.51 | 4.63 | 9.35 | 19.78 | 3 |
| 2004 | 20.4 | 9.83 | 4.77 | 4.78 | 9.35 | 19.92 | 3 |

CG = Mean annual $PM_{10}$ concentration based on gravimetric monitoring technique
$C_{sec}$ = Estimated local secondary $PM_{10}$ concentration for year
$C_{prim}$= Estimated primary $PM_{10}$ concentration for year

[1] Based on the relationship shown in Figure 8.1 of TAQM.TG(03) :

**No. of 24-hr exceedences of 50µgm$^{-3}$ = -18.5 + 0.00145 * Am$^3$ + [206 / Am]**
*Where Am = Annual mean (gravimetric) µgm$^{-3}$*

Note: For the purposes of the calculations shown in Table 11.5.2 a fixed residual component of 5.8µgm$^{-3}$ gravimetric has been applied as stated under the FAQ's on the UWE website, dated 08/02/06.

As the 63% data capture recorded for 2005 was <90%; LAQM.TG(03) Update – January 2006 guidelines state that the 90$^{th}$ percentile should be used rather than a count of exceedences.

From the 22,000 data points captured throughout 2005, the 90$^{th}$ percentile is calculated as being 37.57µgm$^{-3}$

**(B) Roads close to the objective during the second round of R&A**

This section addresses the changes to the background $PM_{10}$ maps which have been revised to a 2004 base year.

As per LAQM.TG(03) Update – January 2006; we have identified roads previously predicted as having between 25 and 35 days exceedences of the 24 hour PM10 objective for locations where the associated (updated base year of 2004 ) background concentrations have increased. These locations are shown in Table 11.5.3

Assuming that a "back-prediction" to re-asses these 2004 predictions is being asked, then a revised set of figures derived from DMRB calculations* is shown when using the updated background levels at these sites.

**Table 11.5.3**

| Junction of: | And | Nearest receptor | Predicted PM10 Level in 2004 (using updated 2004 base year) |
|---|---|---|---|
| Shelthorpe Road (A6004) | Leicester Road (A6) | 149 Shelthorpe Road | 31.2µgm$^{-1}$ with 32 exceedences of the daily mean |
| Ashby Road Central, Shepshed (A514) | Ingleberry Road | 2 Ashby Road | 28.9µgm$^{-1}$ with 27 exceedences of the daily mean |
| Ashby Road (A514) | Epinal way (A6004) | 216 Ashby Road | 30.8µgm$^{-1}$ with 24 exceedences of the daily mean |
| Epinal Way (A6004) | Forest Road | 154 Forest Road | 31.5µgm$^{-1}$ with 33 exceedences of the daily mean |

* All DMRB calculations were based on the most recent available traffic data provided by Leicester County Council

It should also be noted when looking these 'modelled' measurements that monitoring studies from passive nitrogen dioxide diffusion tubes located nearby to each of the above sites have shown a steady decrease in $NO_2$ levels at these locations over the last 3 years. The $NO_2$ results possibly suggest that there has been an overall improvement in air quality from vehicular derived traffic air pollutants at these locations.

## (C) Monitoring data from Lafarge Quarry, Mountsorrel

**Table 11.5.4**

| Monitoring Month, 2005 | Data capture rate | Monthly Mean (ug/m$^3$) | Number of exceedences of the 24hr mean |
|---|---|---|---|
| Jan | 100% | 33.64 | 6 |
| Feb | 100% | 34.88 | 6 |
| Mar | 71% | 38.96 | 9 |
| Apr | 52% | 36.22 | 3 |
| May | 100% | 33.34 | 5 |
| Jun | 100% | 33.47 | 6 |
| Jul | 100% | 34.89 | 5 |
| Aug | 97% | 34.77 | 6 |
| Sep | 72% | 33.24 | 8 |
| Oct | 100% | 40.73 | 9 |
| Nov | 100% | 42.52 | 12 |
| Dec | 40% | 23.70 | 0 |
| **Year Total** | **86%** | **Annual Mean = 35.57** | **75** |

## 11.6 CONCLUSIONS OF THE USA

| Ref No. | Source | Detailed Assessment Required? | For what? |
|---|---|---|---|
| (A) | Monitoring data outside an AQMA | No | - |
| (B) | Monitoring data within an AQMA | n/a | - |
| (C) | Busy roads and Junctions in Scotland | n/a | - |
| (D) | Junctions | No | - |
| (E) | Roads with high flows of buses and/or HGVs | No | - |
| (F) | New roads constructed or proposed since last round of R&A | No | - |
| (G) | Roads with significantly changed traffic flows, or new relevant exposure | No | - |
| (H) | Roads close to the objective during the second round of R&A | No | - |
| (I) | New industrial sources | No | - |
| (J) | Industrial sources with substantially increased emissions, | No | - |

| | | | |
|---|---|---|---|
| | or new relevant exposure | | |
| (K) | Areas of domestic solid fuel burning | No | - |
| (L) | Quarries / landfill sites / opencast coal / handling of dusty cargoes at ports etc. | Yes | **Lafarge Quarry, Mountsorrel** Existence of >35 exceedences of the 24hr 50$\mu gm^{-1}$ mean |
| (M) | Aircraft | No | - |

## 12. CONCLUSIONS OF THE UPDATING AND SCREENING REVIEW AND ASSESSMENT

Based on the Updating and Screening methodology prescribed by the Department for Environment, Food and Rural Affairs under LAQM.TG(03) Update – January 2006; any further action and/or Detailed Assessments of air quality that are required in order to establish whether a breach of the air quality objectives are summarised as follows:

| Pollutant | Action |
|---|---|
| Benzene | No further action required |
| 1, 3 Butadiene | No further action required |
| Lead | No further action required |
| Carbon monoxide | No further action required |
| Nitrogen dioxide | Continued review (monitoring and evaluation) of the identified sites within the existing Loughborough AQMA<br><br>Continued review (monitoring and evaluation) of the A6 site at Birstall |
| Sulphur dioxide | Continued review (diffusion tube monitoring and evaluation) of the receptor points close to the engine sheds of the Great Central Railway, Loughborough within the existing AQMA |
| Respirable Particles ($PM_{10}$) | Detailed Assessment of the properties around the Lafarge Aggregates quarry in Mountsorrel |