



MELTON BOROUGH COUNCIL
AIR QUALITY
UPDATING AND SCREENING ASSESSMENT
2003

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SUMMARY

This document is Melton Borough Council's Updating and Screening Assessment of Air Quality in its area.

- ◆ *It makes judgements about air quality up to 2005 for designated pollutants and it takes into account the revised guidance and the target dates of 2003 and 2004 for certain pollutants.*
- ◆ *It takes into account the revised guidance LAQM. TG (03) issued by the government*

POLLUTANTS: – REVIEW and ASSESSMENT

CARBON MONOXIDE: *that the air quality objective for Carbon Monoxide will be met at 31 December 2003.*

BENZENE: *that the air quality objective for benzene will be met at 31 December 2003.*

1,3 BUTADIENE: *that the air quality objective for 1,3 butadiene will be met at 31 December 2003.*

LEAD: *that the air quality objective for Lead will be met at 31 December 2004 and that the revised objective for 2008 will also be met.*

NITROGEN DIOXIDE: *that there is a 'probability' the annual average air quality objective for NO₂ will not be met at 31 December 2005*

SULPHUR DIOXIDE: *that the air quality objectives for Sulphur Dioxide will be met at 31 December 2004 and 31 December 2005*

PM₁₀: *that the air quality objective for PM₁₀ will be met at 31 December 2004*

MAP OF THE AREA

Figure 1



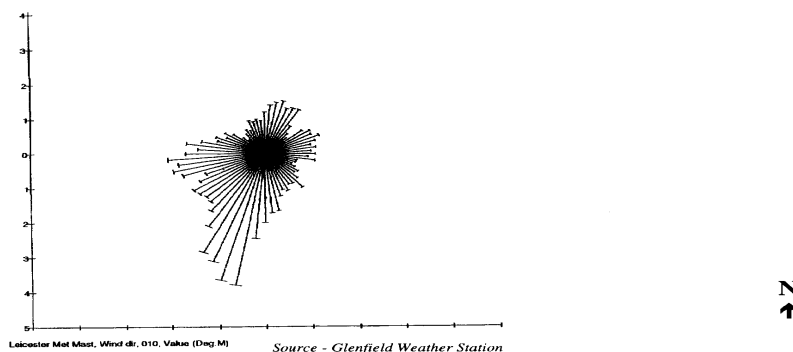
GEOGRAPHIC MAKE UP OF DISTRICT

Melton is a rural district with an area of approximately 48,000 Hectares. The population is about 48,000 of which around 25,000 live in the town of Melton Mowbray. Melton Mowbray is 18 miles from Nottingham, 15 miles from Leicester and approximately 20 miles from East Midlands Airport. There are more than 60 villages and 25 parish councils.

PREDOMINANT WIND DIRECTION

Wind direction has a major influence on the pollutants which originate elsewhere and which may ultimately affect the Borough. Below is a wind rose indicating the predominant direction as being south-westerly and westerly.

Figure 2



1. BACKGROUND

EFFECTS OF THE ENVIRONMENT ACT 1995

National Government:

- The **National Air Quality Strategy** establishes the framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the Strategy is based.
- Despite these measures areas of poor air quality will remain and these are deemed to be best dealt with using local measures implemented through the local air quality management regime.
- Revised guidance and regulations were produced in 2002/03 – the timetable and objectives being amended to comply with the EU Air Quality Daughter Directive, while providing the opportunity for stricter national objectives for some pollutants where this is considered appropriate.

Local Government:

- The role of the Local Authority Review and Assessment process is to identify these areas where it is considered likely that air quality objectives will be exceeded.
- Where the Review and Assessment shows that the Air Quality Objectives will not be met Local Councils must declare affected areas to be **Air Quality Management Areas**.
- In Air Quality Management Areas, Local Councils must prepare an **Action Plan**, with deadlines, to ensure that the Objectives are met.

Melton Borough Council

- Following the review and assessment of air quality in the Melton Borough at the end of 2000 the Authority deemed that the air quality objective for Nitrogen Dioxide at 31 December 2005 would not be met.
- An **Air Quality Management Area** was declared which includes properties within 10 metres of the central Melton town road routes.
- This latest review and assessment reviews the seven pollutants, once again, as required by the Environment Act 1995.

2. THE AIR QUALITY STANDARDS AND OBJECTIVES

The Air Quality Standards and Objectives have been revised and the limits set by the Air Quality Regulations 2000 and (Amendment) Regulations 2002 set out the objectives for the purposes of Local Air Quality Management. The revised Air Quality Objectives are shown in *Table 1.1*

TABLE 1.1 REVISED OBJECTIVES IN THE 2000 AIR QUALITY REGULATIONS

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25µg/m ³ (5ppb)	Running annual mean	31.12.2003
	5.00µg/m ³	Annual mean	31.12.2010
1.3-Butadiene	2.25µg/m ³ (1ppb)	Running annual mean	31.12.2003
Carbon monoxide	10.0mg/m ³	Maximum daily 8-hour mean	31.12.2003
Lead	0.5µg/m ³	Annual mean	31.12.2004
	0.25µg/m ³	Annual mean	31.12.2008
Nitrogen Dioxide	200µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	31.12.2005
	40µg/m ³	Annual mean	31.12.2005
Particulates (PM ₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31.12.2004
	40µg/m ³	Annual mean	31.12.2004
Sulphur dioxide	350µg/m ³ not to be exceeded more than 24 times a year	1 hour mean	31.12.2004
	125µg/m ³ not to be exceeded more than 3 times a year	24 hour mean	31.12.2004
	266µg/m ³ not to be exceeded more than 35 times a year	15 minute mean	31.12.2005

Notes:

ppb: parts per billion
 ppm: parts per million
 µg.m³: micrograms per cubic metre
 mg/m³: milligrams per cubic metre
 PM₁₀ particulates: particulates which are 10 µm (millionths of a metre) or less.

3. AIR QUALITY UPDATING AND SCREENING ASSESSMENT

3.1 The latest review and assessment is to be carried out on a phased basis.

- i) Updating and Screening Assessment using the methodology in LAQM TG(03). This involves the review of all seven pollutants set out in the Regulations to be completed by the end of May 2003. This part of the process is intended to identify any matters that have changed since the first review and assessment was completed and which may now require further assessment. Where the updating and screening assessment has identified a risk that an Air Quality Objective will be exceeded at a location with relevant public exposure, there is a requirement to undertake a detailed assessment. This is due to be completed by the end of April 2004.
- ii) The following pages contain the details of the updating and screening assessment for each of the seven key pollutants for the period up to the end of May 2003.
- iii) To provide a basis for local policy on air quality, integrating all Council functions, for example traffic management and land use planning.

Table 2.1

Examples of where the air quality objective should/should not apply		
Averaging Period	Objectives should apply at	Objectives should generally not apply at
Annual mean	<p>All background locations where members of the public might be regularly exposed.</p> <p>Building façades of residential properties, schools, hospitals, libraries etc.</p>	<p>Building facades of offices or other places of work where members of the public do not have regular access.</p> <p>Gardens of residential properties.</p> <p>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.</p>
24 hour mean and 8-hour mean	<p>All locations where the annual mean objective would apply</p> <p>Gardens of residential properties.</p>	<p>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.</p>
1 hour mean	<p>All locations where the annual mean and 24 and 8-hour mean objectives apply.</p> <p>Kerbside sites (e.g. pavements of busy shopping streets).</p> <p>Those parts of car parks and railway stations etc. which are not fully enclosed.</p> <p>Any outdoor locations to which the public might reasonably be expected to have access.</p>	<p>Kerbside sites where the public would not be expected to have regular access.</p>
15 min mean	<p>All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.</p>	

4. WHAT IS MELTON DOING ABOUT AIR QUALITY

4.1 Partnership with other Local Authorities

Geographically Melton Borough lies to the south-east and east of two large conurbations, Nottingham and Leicester, and pollution has no respect for administrative boundaries.

Melton Borough Council has both a legal and a practical need to consult its neighbouring Local Authorities. For these reasons, the **Leicester, Leicestershire and Rutland Air Quality Forum** has been established with the following aims:

- To co-ordinate the approach to Air Quality Review and Assessment throughout the former County of Leicestershire.
- To exchange emissions data, air quality data and other information of mutual interest.

4.2 Research Partnerships with Other Bodies

Leicester City Council is involved in various research projects aimed at developing computer dispersion models as air quality management tools. They have carried air quality modelling for our authority using **Airviro**, the results of which relate to Nitrogen Dioxide and are discussed in that part of the review.

4.3 The Council as Pollution Control Authority

Melton Council has an important role in enforcing legislation such as the Environmental Protection Act and the Clean Air Act. These activities control emissions to atmosphere from industry (and others) and provide a base of information for the Emissions Inventory.

4.4 Traffic and Transport

Nitrogen dioxide and particulates have been identified as the pollutants most likely to require local action to meet the Air Quality Objectives. The major source of these is motor vehicles.

The findings of this review and assessment will be relevant considerations for the Local Transport Plan.

4.5 Reduction of Traffic Emissions at Source

As well as reducing demand for car travel, there is considerable scope for reduction of vehicle emissions at source:

- Campaigns for the compulsory and voluntary reduction of emissions at source by attention to the condition and manner of use of motor vehicles will therefore form a useful complement to other control measures.
- Car technology is constantly improving. A 1970s car emits several times as much pollution as a new model. Leaded petrol is now no longer available.
- Aggressive driving uses 20-40% more fuel and produces 2-3 times as much toxic emission. Experiments have shown both in towns and on motorways that such driving produces very little actual reduction in journey-times.
- Short car journeys produce a disproportionate amount of pollution because the engine has not had time to warm up and the catalyst, where fitted, is not working at full efficiency. These are exactly the journeys which may be easily achievable by walking, cycling or by bus.

4.6 The Council as Land Use Planning Authority

The Government Guidance makes it clear that the planning process is a key element in improving air quality.

Planning can influence the location of polluting industries in relation to sensitive development. It can change the balance between the provision of parking and facilities for public transport in future developments. In the longer-term, it can reduce the actual need for travel and transport in future patterns of development on every scale.

Melton Borough's Local Plan was adopted in June 1999. In its review (*the Development Plan*), which is already taking place, air quality will be identified as one of the key sustainability issues.

Development Control is the link between these planning policy documents and individual planning applications. Local Plan policy is the primary material planning consideration in determining applications. Government Guidance on Air Quality and Land Use Planning now states that air quality considerations are, "...capable of being taken into account as material considerations in the determination of planning applications or appeals".

5. CARBON MONOXIDE

5.1 Introduction

Carbon monoxide (CO) is a colourless and odourless gas consisting of one carbon atom and one oxygen atom. It is largely produced due to the incomplete combustion of fuels containing carbon.

CO is best known as a pollutant in restricted areas with poor ventilation - in particular in domestic houses with badly maintained gas fired appliances where it can reach dangerously high concentrations. These sources only contribute 6% of the total CO generated in the UK. Similarly 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.

At high levels of CO, prolonged exposure 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.

5.2 Air Quality Objectives

The objective to be achieved at 31 December 2003 is a running 8-hour mean of 10.0 mg/m³

5.3 The National Perspective

The main source of carbon monoxide in the UK is road transport, which accounted for 67% of total releases in 2000.

Carbon monoxide concentrations adjacent to major roads have been modelled at national level. The results of this assessment suggest that existing policies will be sufficient to reduce maximum daily 8-hour mean concentrations of carbon monoxide below 10 mg/m³ by about 2003.

5.4 Background Concentrations

The estimated annual mean background concentration obtained from the Air Quality Website (www.airquality.co.uk/archive/laqm/tools.php) corrected for 2003 for the Borough is 0.2mg/m³.

5.5 Monitoring data

Monitoring of Carbon monoxide has been carried out using a roadside pollution monitor (RPM). The worst case situation from road traffic in the town of Melton was 1.12mg/m³ 8-hour running average, well below the target of 10mg/m³.objective for 31 December 2003.

5.6 Road Traffic Sources

There are no "very busy" road junctions in the Borough, defined as being where traffic flows exceed 80,000 vehicles per day. LCC classified traffic count (Appendix 1).

5.7 Updating and Screening Assessment Conclusion

The absence of any significant point source emissions and the fact that there are no roads with vehicle movements in excess of 80,000 per day **leads to the conclusion that the air quality objective for Carbon Monoxide will not be exceeded at 31 December 2003.**

6. BENZENE

6.1 Introduction

Benzene (C₆H₆) 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 distribution of petrol of which it is a constituent. Petrol vehicles are the main source 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 other motor vehicles, stationary combustion sources, some industrial activities and evaporation due to spillage or other loss. 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.

Benzene is a carcinogen, which over long-term exposure can cause leukaemia. There is therefore no level of exposure at which there is zero risk.

6.2 Air Quality Objectives

The objective for benzene is 16.25 µg/m³ at 31 December 2003.

6.3 National Perspective

A number of policy measures already in place, or planned for future years, will continue to reduce emissions of benzene. Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1% from the previous upper limit of 5%. The European Auto-Oil programme will further reduce for cars and light-duty vehicles, and emissions of benzene from storage and distribution of petrol are controlled by vapour recovery systems.

Forecasts based on national mapping suggest that the policy measures currently in place will achieve the 2003 objective at all urban and roadside/kerbside locations. The 2010 objective is also expected to be met.

6.4 Monitoring

Monitoring for benzene is not carried out. The results from the benzene diffusion tube situated at AUN site in the city of Leicester for Benzene is 1.34 µg/m³ annual mean.

6.5 Background Concentrations

The estimated annual mean background concentration for 2003 for the Borough area obtained from the National Air Quality website is predicted to be $0.2 \mu\text{g}/\text{m}^3$ at 31 December 2003.

6.6 Assessment of Industrial Sources

There is no industrial processing within the Borough area likely to emit Benzene.

6.7 Road Traffic Sources

There are no roads with traffic flows exceeding 80,000 vehicles per day.

6.8 Petrol Stations

The large petrol filling stations - greater than $1,000\text{m}^3$ volume of petrol unloaded per year - have been fitted with first stage petrol vapour recovery equipment. The smaller stations ($500\text{-}1,000 \text{m}^3$ unloaded per year) have also now been fitted with the same equipment.

Of the 7 larger petrol filling stations (fitted with Stage 1 petrol vapour recovery systems), 4 have throughputs in excess of $2,000\text{m}^3$ per annum. None of the petrol stations have properties that are adjacent. In the case of 1 station the nearest residential property is approximately 30 metres, in the case of the others the distance vary from approximately 70 to 100metres.

6.9 Major fuel storage depots (petroleum)

There are no major fuel storage depots in the Borough.

6.10 Industrial Sources

There are no industrial sources in adjacent authorities to Melton which are likely to affect Benzene levels within the Melton Borough.

6.11 Updating and Screening Assessment Conclusion

The absence of any identified significant point sources of Benzene emissions either within or outside the Borough and the absence of any traffic routes with flows of greater than 80,000 vehicles a day **leads to the conclusion that the air quality objective for Benzene is not currently being breached and will not be exceeded at 31 December 2003.**

7. 1,3-BUTADIENE

7.1 Introduction

1,3-butadiene is a volatile hydrocarbon composed of four carbons and six hydrogen atoms. In the UK the main source is from road vehicles with petrol engines. The compound is not present itself in fuel, but is formed as a product of the combustion of petrol and other products. 1,3 butadiene is also produced from a few industrial sources primarily specialising in the production of synthetic rubber for tyres. Similar to benzene, 1,3-butadiene disperses fairly rapidly in air and is only of concern in the immediate vicinity of its source. 1,3-butadiene is a carcinogen, which can cause cancer of the bone marrow, lymphomas, and leukaemia. There is therefore no level of exposure at which there is zero risk.

7.2 Air Quality Objective

The air quality objective is a running annual mean of $2.25 \mu\text{g}/\text{m}^3$ to be met at 31 December 2003

7.3 National Perspective

The increasing number of vehicles equipped with three-way catalysts will significantly reduce emissions of 1,3 butadiene in future years. Recently agreed further reductions in vehicle emissions and improvements to fuel quality as part of the Auto-Oil programme, are expected to further reduce emissions of 1,3-butadiene from vehicle exhausts. These measures are expected to deliver the air quality objective by the end of 2003

7.4 Monitoring

Monitoring for 1,3-Butadiene is not carried out.

7.5 Background Concentrations

The estimated annual mean background concentration for 2003 obtained from the Air Quality website is $0.13 \mu\text{g}/\text{m}^3$.

7.6 New and Existing Industrial Sources

There are no industrial sources in or adjacent to the Borough likely to be emitters of 1,3-butadiene nor are there likely to be any new operations within the area.

7.7 Updating and Screening Assessment Conclusion

The absence of any significant identified point source 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 exceeded at 31 December 2003.**

8. LEAD

8.1 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 (μ) (one thousandth of a millimetre) although some sources of lead generate larger particles which 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.

The majority of emissions of lead in the UK came from petrol driven road vehicles. Lead in the form of tetraethyl lead was added to petrol to enhance its octane rating. The other important source of airborne lead is primarily from smelting activities (9%). 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%.

Lead is bio-accumulative; namely, it concentrates 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.

8.2 Air Quality Objective

The air quality objective is $0.5 \mu\text{g}/\text{m}^3$ measured as an annual mean at 31 December 2004 and $0.25 \mu\text{g}/\text{m}^3$ measured as an annual mean to be achieved at 31 December 2008.

8.3 National Perspective

Levels of atmospheric lead have dropped dramatically since the early 1980s. The ban on sales of leaded petrol in the UK with effect from January 2000 has meant that there are only now a few sources of potentially industrial air polluting processes. National monitoring data generally indicates no exceedences of the 2004 or 2008 objectives.

8.4 Monitoring

No monitoring for Lead is carried out for Lead in the Borough.

8.5 Local Perspective

There are no local sources of lead emissions in Melton Borough and there are no proposed developments to create new processes.

8.6 Neighbouring Districts

There are no industrial sources of lead in any adjacent district.

8.7 Updating and Screening Assessment Conclusion

The absence of any industrial sources in or adjacent to the Borough area, leads to the conclusion that the air quality objective for Lead is not currently being breached and will not be exceeded at 31 December 2004 or at 31 December 2008.

9. NITROGEN DIOXIDE

9.1 Introduction

Nitrogen dioxide (NO₂) is a gas formed from one nitrogen molecule and two oxygen molecules. In sufficient concentrations in air it appears as a red/brown colour and it is in part this colouration which creates the discoloured 'smog' which can often be seen in the skyline of cities.

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. The most significant sources of these gases are road transport which accounts for about 50% of the total UK emissions; the electricity supply industry and other industrial and commercial sources, 17%. Nitrogen dioxide is of concern both locally and globally. Accumulations of the gas in the vicinity of sources can give rise to direct health effects whilst it also acts indirectly as a greenhouse gas.

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.

9.2 Air Quality Objectives

There are two objectives set for NO₂, both of which are to be achieved by 31 December 2005:

- i) an annual mean of 40 µg/m³ (21ppb)
- ii) an hourly mean of 200 µg/m³ (105ppb) which must not be exceeded more than 18 times a year.

9.3 National Perspective

The contribution of road transport to oxides of nitrogen (NO_x) emissions has declined significantly as a result of various policy measures. Further reductions are expected up until 2010 and beyond. Other significant sources of NO_x emissions include the electricity supply industry and other industrial and commercial sectors. These accounted for about 21% and 16% respectively in 1999. Emissions from both sources have also declined dramatically due to the fitting of low NO_x burners and the increased use of natural gas plant.

The annual mean objective of 40 µg/m³ is currently widely exceeded at roadside sites throughout the UK. National studies have indicated that the objective is likely to be achieved at all urban background locations outside London by 2005 but that the objective may be exceeded more widely at roadside sites throughout the UK in close proximity to busy road links.

9.4 Local Perspective

The conclusions of the Stage 3 Review and Assessment was that the annual average air quality objective for nitrogen dioxide of $40\mu\text{g}/\text{m}^3$ will be exceeded at 31 December 2005 at residential properties within 10 metres of the following roads within the town area:

Norman Way
Leicester Road/Wilton Road/Leicester Street/Burton Street junction
Sherrard Street
Norman Way/Thorpe Road junction.

An Air Quality Management area was declared in April 2001.

It is not considered that the objective will be exceeded in any other areas of the Borough.

9.5 Traffic Related Issues

Narrow congested streets

Junctions, busy streets where people may spend more than one hour or more

Roads with high flow of buses/HGV's

The streets are unchanged from the Stage 3 report. The congested area within the Town Centre is the subject of an Air Quality Management Area (AQMA).

New Roads

There are no new roads since the first round of assessment.

Roads close to the objective during the first round

The roads subject to the AQMA are the only ones NO_2 levels which are close to the objective level. Other diffusion tube results situated in roads adjacent show no increase in the annual average.

Roads with significantly changed traffic flows

Appendix 1 to the report includes the Leicestershire County Council classified traffic count of Melton roads. No other roads have any significant affect on NO_2 levels. The busy roads identified in the report contribute to the cause and effect of the declared AQMA.

Bus Stations

The town no longer has a bus station or a bus depot. There are no other bus stations in the Borough.

New industrial sources near Melton Borough

There are no new industrial sources in neighbouring authorities.

9.6 Industrial sources near Melton Borough with substantially increased emissions

There are no industrial sources in neighbouring authorities with substantially increased emissions.

9.7 Aircraft

The only major aircraft activity is at East Midlands International Airport in the North West Leicestershire District Council area – about 30 km from the centre of the Borough and about 20 km from the nearest boundary of the Borough. Emissions from aircraft from the Airport do not affect Melton Borough sufficiently to influence the objective level to be exceeded.

9.8 Monitoring Data

Since the declaration of the air quality management area in 2001 monitoring has continued using diffusion tubes and a chemiluminescent real time NO_x analyser was used for a period of 6 months on one of the main routes of the air quality management area. The range of monthly levels for that period are 34 – 49 µg/m³ giving an average for the 6 months of 37.5 µg/m³. There is no new or more up to date real-time monitoring data.

Diffusion tube data for an adjacent site and for the same period shows an average of 38.8 µg/m³. The 2002 annual average diffusion tube for sites located within the AQMA vary from 38.2 - 43.9 µg/m³. Given that the errors in results may be ±10%, there is a possibility of exceedence of the objective at 31 December 2005.

Leicester City Council has carried out further AIRVIRO air quality modelling on our behalf. Background levels at Ladybower have been used and weather data set for the year 2001 has been input into the model. Estimates are that there will be an exceedence of the annual mean objective at 31 December 2005.

9.9 Updating and Screening Assessment Conclusion

The results of the modelling work carried out together with the diffusion tube results, leads to the conclusion that the annual average air quality objective for nitrogen dioxide is not likely to be met at 31 December 2005 in the Melton town area as defined in section 9.4.

10. SULPHUR DIOXIDE

10.1 Introduction

Sulphur dioxide (SO₂) 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.

Sulphur dioxide gives rise to concern due to its local and global effect. Trans-national transport of SO₂ 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 local effects the acidic nature of dissolved SO₂ causes irritation to lung tissue and may provoke attacks of asthma. The onset of clinical effects upon exposure can be very rapid

10.2 Air Quality Objectives

The air quality objectives for sulphur dioxide are:

- i) 350 µg/m³ measured as a 1-hour mean, not to be exceeded more than 24 times a year by 31 December 2004.
- ii) 125 µg/m³ measured as a 24-hour mean not to be exceeded more than 3 times a year by 31 December 2004.
- iii) 266 µg/m³ measured as a 15 minute mean not to be exceeded more than 35 times a year by 31 December 2005

10.3 National Perspective

The main source of sulphur dioxide in the UK is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions.

10.4 Monitoring

No monitoring of SO₂ is carried out in the Borough.

10.5 Background Concentrations

From the air quality website, background concentrations at 2001 are estimated to be about 3 µg/m³ and estimated to be about 75% of that figure at the end of 2004 and 2005.

10.6 Industrial Sources

The significant emitters of sulphur dioxide are the Ratcliffe on Soar Power Station and the Barnstone Cement Works both outside the district and in Rushcliffe Borough Council area. The Environment Agency provided modelling data, the prediction of which was that in neither case were these likely to be a source of exceedence in the Melton area. The review and assessment concluded in 2003 took that process to Stage 2 and the conclusion was reached that the sulphur dioxide target objectives would be met.

No new industrial sources or small solid fuel boilers are anticipated to be established within the Borough.

10.7 Domestic Fuel

Domestic coal and other fuel burning has not been identified as a significant source. Information gathered during the Stage 1 Review, indicated that solid fuel is the fourth in the use table behind gas, electricity and oil.

10.8 Transport Sources

There are no aircraft, shipping, stationary railway locomotives or other major transport sources likely to contribute to the extent that sulphur dioxide pollution is concentrated in any particular location to cause exceedences of the objectives.

10.9 Updating and Screening Assessment Conclusion

The absence of any significant identified point sources or other contributors of sulphur dioxide emissions **leads to the conclusion that the air quality objectives for sulphur dioxide are not currently being breached and will not be exceeded at 31 December 2004 or 31 December 2005.**

11. PARTICULATES (PM₁₀)

11.1 Introduction

There are 3 main source categories:

- **Primary Combustion Particles** – particles emitted directly from combustion processes such as road traffic, power generation and industrial combustion processes.
- **Secondary Particles** – are formed by chemical reactions in the atmosphere and comprise principally of sulphates and nitrates.
- **Coarse or Other Particles** – these are from a wide range of non-combustion sources. These include dust from road traffic, wind blown dusts and soils and sea salt.

The largest man-made source in the UK is road transport. However, the contribution of all sources to pollutant levels will vary depending on the characteristics and activities in the surrounding area.

Traditionally, particulate pollution was thought to be a localised problem around its source. Recent evidence does, however, suggest that whole regions can experience elevated particulate levels.

Research has recently focused on the health effects of particulates. It is now considered that even low levels can be associated with respiratory and cardio-vascular illness and asthma.

11.2 Air Quality Objectives

The objectives are:

- i) 50µg/m³ measured as a daily mean, not to be exceeded more than 35 times a year by 31 December 2004
- ii) 40µg/m³ by 31 December 2004, measured as an annual mean

11.3 National Perspective

There has been significant progress in recent years in reducing emissions of particles from both the transport and industrial sectors and the total national annual UK emissions declined by nearly 40% in the period between 1990 and 1999.

Further reductions are expected in future years as a result of agreed additional policies or those that are currently under discussion.

Emissions from road transport will be reduced as a result of tightening emission controls and the reduction of sulphur content of diesel fuel which affects the emissions of particles from vehicles.

11.4 Monitoring

Monitoring for PM₁₀ is not carried out in the Borough.

The annual mean at the nearest AUN site in Leicester City is recorded as being 21µg/m³ for 2002 and 22µg/m³ for 2001 and 2000, well below the objective of 40µg/m³. The daily mean of 50µg/m³ (not to be exceeded more than 35 times a year) was also met in each of the previous 3 years at that site.

11.5 Background Levels

The background levels obtained from the Air Quality Website are:-

Annual mean background estimated for 2004 19 µg/m³ and 8 µg/m³ secondary particles for 2004.

11.6 Road Traffic Sources

As part of the First Stage Review and Assessment extrapolations and predictions were made using the road traffic data available. The worst case source and background were estimated to be 32.3 µg/m³ 24 hour mean, well under the target of 50 µg/m³ as set out in the objectives. This level is in spite of the fact that there is a road junction with greater than 10,000 vehicles per day.

Road traffic sources

Junctions/Roads with high flow of buses/HGVs

No area in the Borough or is judged to be near the objective either during the first round or the current round. The junctions with high traffic flows are in the town and were not judged to be near the objective level.

New Roads

There are no new roads since the first round of assessment.

Changed traffic flows

Roads in the Borough do not have any significant changed traffic flows. The classified traffic count data supplied by the Leicestershire County Council is appended to the report.

Roads close to the objective during the first round

No roads were near the objective during the last round.

11.7 Industrial Sources

There are no major significant sources of particulate emitters within the Borough area.

There are two significant sources in a neighbouring borough, Rushcliffe, the power station at Ratcliffe on Soar and Blue Circle Cement works at Barnstone. The Environment Agency have carried out modelling and do not consider that either will contribute to exceedences within the Melton Borough area.

11.8 Domestic Solid Fuel Sources

11.8.1 Methodology

Using the calculation methods (Box 8.8) and nomograms and figure 8.8 in LAQM TG(03), two representative “area types” have been chosen. A small village (approx 1 km² area) and a small town (approx 16 km² area). There is no “large town” –100 km².

Small Village – Croxton Kerrial

$$[\text{Ceff}] = [\text{C}] + (0.36 * [\text{A}]) + (0.56 * [\text{S}]) + (0.79 * [\text{W}])$$

[Ceff] is the effective number of coal burning households

[C] is the number of coal burning households

[A] is the number of anthracite burning households

[S] is the number of smokeless fuel burning households

[W] is the number of wood burning households

$$[\text{Ceff}] = [15] + (0.36 \times 15) + (0.56 \times 50) + (0.79 \times 15)$$

$$= 60$$

$$[\text{Deff}] = [\text{Ceff}] / (1-L)$$

[Deff] is the density of coal burning houses

L is the proportion of open space

$$[\text{Deff}] = 60 / 1 - 0.6$$
$$= 150$$

Estimate the background concentration from the web site = 19 µg/m³

Threshold density (figure 8.8) for that background level is 360 in a 500 x 500m grid area of Croxton Kerrial at 150, is well within that parameter.

Small Town – Melton Mowbray

Using the same formulae:

$$[\text{Ceff}] = [52] + (0.36 \times 4) + (0.56 \times 50) + (0.79 \times 2)$$

$$[\text{Ceff}] = 83$$

[Deff] = 88

Threshold density (figure 8.8) for that background level is 250 in a 500 x 500m grid area of Melton Mowbray at 88, is well within that parameter

11.9 Fugitive and Uncontrolled Sources

There are no major sources of uncontrolled dust emissions: There are no quarries, coal mines, major construction works or coal and material handling stock yards.

11.10 Updating and Screening Assessment Conclusion

The absence of any significant sources of PM₁₀ and from the calculation made concerning potential risk of road traffic and domestic solid fuel burning **leads to the conclusion that the objectives for PM₁₀ will not be exceeded at 31 December 2004.**

12. REFERENCES and SOURCES OF INFORMATION

- i) Air Quality (England) (Amendment) Regulation 2002 S.I. 2000 No. 3043
- ii) DEFRA:
 - The Air Quality Strategy for England and Wales (and the Addendum)
 - LAQM TG (03) - Part IV of the Environment Act 1995 Local Air Quality Management: Technical Guidance
 - LAQM PG (03) - Part IV of the Environment Act 1995 Local Air Quality Management: Policy Guidance
- iii) National background air quality maps :
www.airquality.co.uk/archive/laqm/tools.php

13. GLOSSARY OF TERMS

AADT – Annual average daily traffic.

Air Dispersion Modelling (ADMS) – Mathematical modelling calculations using emissions data. **ADMS Urban** – An air dispersion model developed specifically to deal with modelling urban pollution or pollution from many sources.

Air Quality Standard – The concentration of a pollutant in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards relating to the quality of air are also based (from medical evidence) on the effects of each pollutant on public health and sometimes also on the effects upon vegetation.

Air Quality Objective – This provides a policy target by outlining what the Government intends should be achieved in relation to the air quality standards.

Airviro – A computer based atmospheric dispersion model. Developed by the Swedish Meteorological and Hydrological Institute.

Annual Mean – The average of the concentrations measured or calculated for each pollutant for one year. Usually this is for a calendar year, but some pollutants are reported for the period April to March, known as a pollution year. This year avoids splitting a winter season between two years, which is useful for pollutants that have a higher concentration during the winter months.

AQMA – Air Quality Management Area.

Assessment – The consideration of whether estimated levels for the relevant future period are likely to exceed the levels set in the objectives.

AUN – Automated Urban Network.

Background concentration – Concentration of a particular pollutant thought to be present in an area which cannot be accounted for by dispersion modelling from local emissions, that is caused by, for example, transportation from long distances.

CO – Carbon Monoxide.

DETR – Department of the Environment, Transport and the Regions.

EMEP – Emissions, Monitoring and Evaluation Programme.

Emissions Inventory – A full list of sources which emit any pollutant into the atmosphere over a sustained period of time.

EPAQS – Expert Panel on Air Quality Standards.

Exceedence – A period of time where the concentration of a pollutant is greater than, or equal to, the appropriate air quality standard.

HSE – Health and Safety Executive.

LAQM – Local Air Quality Management.

Maximum hourly average – The highest hourly reading of air pollution obtained during the period under study.

NETCEN – National Environmental Technology Centre.

NMVOG – Non Methane Volatile Organic Compound.

NO₂ – Nitrogen Dioxide.

NO_x – Oxides of nitrogen.

NO – Nitric Oxide

O₂ – Ozone

Objective – Concentration of a pollutant required by UKNAQS to be achieved by a certain date.

Part A processes – Large emitters of pollution, for example power stations, regulation of which is controlled by the Environment Agency.

Part B processes - Smaller emitters of pollution, regulation of which is controlled by the local authority.

Percentile – A value found by listing a set of numbers in order and calculating the number above which a certain percent of the data set lies. For example, the 99th percentile of values in a data is the value that 99% of all the data in the set fall below, or equal.

PM₁₀ – Particulate matter with a diameter of 10µ or less.

QA/QC – Quality Assurance/Quality Control.

Review – The consideration of the levels of pollutants in the air for which objectives are prescribed in regulations and estimation of likely future levels.

Running Mean – A mean or series of means calculated for overlapping time periods and used in the calculation of several of the national air quality standards.

SCOOT – Split, cycle and off set Optimisation Technique (traffic light control computer system).

SO₂ – Sulphur Dioxide.

Stack Characteristics – Details pertaining to a chimney which will affect calculated concentrations. Therefore includes chimney height and diameter, temperature and velocity of emission and rate of pollutant emission.

TEOM – Tapered Element Oscillating Microbalance.

TSP – Total Suspended Particulates.

UKNAQS – United Kingdom National Air Quality Strategy.

UKEFD – UK Emission Factor Database which is available on the Internet (<http://www.londonresearch.gov.uk/emission/webhtm.htm>).

USA - Updating and Screening Assessment

VOC's – Volatile Organic Compounds.

T:ATA/Air Quality Report – USA May 2003