Harborough District Council

Air Quality Update & Screening Assessment

May 2003

Environmental Services Section

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EXECUTIVE SUMMARY

Under Part IV of the Environment Act 1995 there is a requirement for all Local Authorities to assess their local air quality and to predict future conditions against the National Air Quality Objectives.

This report has been compiled as part of the second round of the air quality assessment for Harborough District Council. The Update and Screening Assessment has been carried out in accordance with the requirements of the DEFRA guidance TG (03) and policy guidance LAQM.PG (03).

The purpose of this report is to review the findings of the original Review and Assessment undertaken in 2001 and to:

- Identify any changes that have occurred in the district which may effect the air quality, and:
- Take into account any improvements that have occurred in the prediction methods used for assessing the future air quality.

The pollutants examined in this report are Benzene, 1,3 Butadiene, Carbon Monoxide, Lead, Nitrogen Dioxide, Sulphur Dioxide and Particulates.

The findings of the Update and Screening Assessment are as follows:

- **Benzene – It is very unlikely that the objective for Benzene will be exceeded by the year 2003 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.**

- **1,3 Butadiene - It is very unlikely that the objective for 1,3 Butadiene will be exceeded by the year 2003 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.**

- **Carbon Monoxide - It is very unlikely that the objective for Carbon Monoxide will be exceeded by the year 2003 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.**

- **Lead - It is very unlikely that the objective for Lead will be exceeded by the year 2004 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.**

- **Sulphur Dioxide - It is very unlikely that the objective for Sulphur Dioxide will be exceeded by the year 2004 therefore it is not**

anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.

- **Nitrogen Dioxide – It is very unlikely that the objectives for Nitrogen Dioxide will be exceeded for by the year 2005 for the areas outside the Air Quality Management Area (AQMA). At this stage it is not possible to confirm the air quality standards within the AQMA as we are waiting for ratified data. A further assessment will be required to confirm these initial findings and when the data is available.**

- **Particulates – It is anticipated that the objectives for Particulates will not be exceeded for areas outside the AQMA by the year 2004. With regards to the levels within the AQMA, unfortunately the data is not yet available and a further assessment will be required.**

A further progress report will be submitted at the end of April 2004.

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1. INTRODUCTION

During the early part of the 1990s the Department of the Environment, Transport and the Regions (DETR) started to develop a framework for air quality control to comply with the 'EC Ambient Air Quality Assessment and Management Directive'. From this directive it was clear that member states would have to monitor levels of pollutants and draw up and implement action plans where those levels were exceeded

When the Environment Act 1995 was published it contained a section which specifically referred to air quality and the production of a strategy. The approach was intended to be from both a national and a local level.

The Government published the first National Air Quality Strategy in 1997 and it included recommended maximum levels of eight pollutants, which were attained by the Expert Panel on Air Quality Standards (EPAQS). Since then the National Air Quality Strategy has been reviewed and the amended version was published in January 2000. The amended strategy identified seven key air quality objectives that have various time scales by which they should be met.

An initial review and assessment of the air quality in Harborough District was completed in January 2001. This concluded that there was the possibility that the national objective for the annual average for nitrogen dioxide would not be met in one location in Lutterworth town centre due to emissions from road traffic vehicles.

Consequently an Air Quality Management Area was declared for part of Lutterworth in July 2001. A more detailed review and assessment of this area is still being undertaken. Following the publication of the results of this assessment, air quality action plans will be developed to address the problems in this area.

The purpose of this report is to carry out a further update and screening assessment of the sir quality in the district. This would take into consideration any changes that have occurred in the area and also to take into account any new guidance that has been developed following the experiences learnt from the initial review and assessment process.

1.1 THE NATIONAL AIR QUALITY OBJECTIVES

Seven key pollutants have been identified by the National Strategy for local authorities to investigate. The current objectives are shown below in Table A

Table A: Air Quality Standards

Pollutant	Air Quality Objective Levels	Averaging Period	Air Quality Objective Dates
Benzene	16.25 µg/m^3 5µg/m^3	running annual mean Annual mean	31st December 2003 31st December 2010
1,3-Butadiene	2.25 µg/m^3	running annual mean	31st December 2003
Carbon Monoxide CO	11.6 µg/m^3	Maximum daily running 8 hour mean	31st December 2003
Lead Pb	0.5 µg/m^3 0.25 µg/m^3	annual mean annual mean	31st December 2004 31st December 2008
Nitrogen Dioxide NO_2	200 µg/m^3 40 µg/m^3	1hourly mean not to be exceeded 18 times a year annual mean	31st December 2005
PM_{10} (Particulates)	50 µg/m^3 40 µg/m^3	24 hour mean not to be exceeded 35 times a year annual mean	31st December 2004
Sulphur Dioxide SO_2	125 µg/m^3 350 µg/m^3 266 µg/m^3	24 hour mean not to be exceeded 3 times a year 1 hourly mean not to be exceeded 24 times a year 15 minute mean not to be exceeded 35 times a year	31st December 2004 31st December 2004 31st December 2005

1.2 AIMS AND OBJECTIVES OF THE REPORT

This report has been prepared in accordance with the Environment Act 1995 to assess the air quality in the Harborough District. It examines the various air pollution sources both within the District and external sources likely to have some effect.

The aims of the report are:

- To carry out an update and screening assessment of the air quality in Harborough in accordance with the methodology outline in the Technical Guidance Note LAQM. TG(03) published by the Department for the Environment, Food and Rural Affairs.

- To assess whether there are any areas in the district where it is anticipated there may be a breach of the National Air Quality Objectives which would require a more detailed review and assessment.

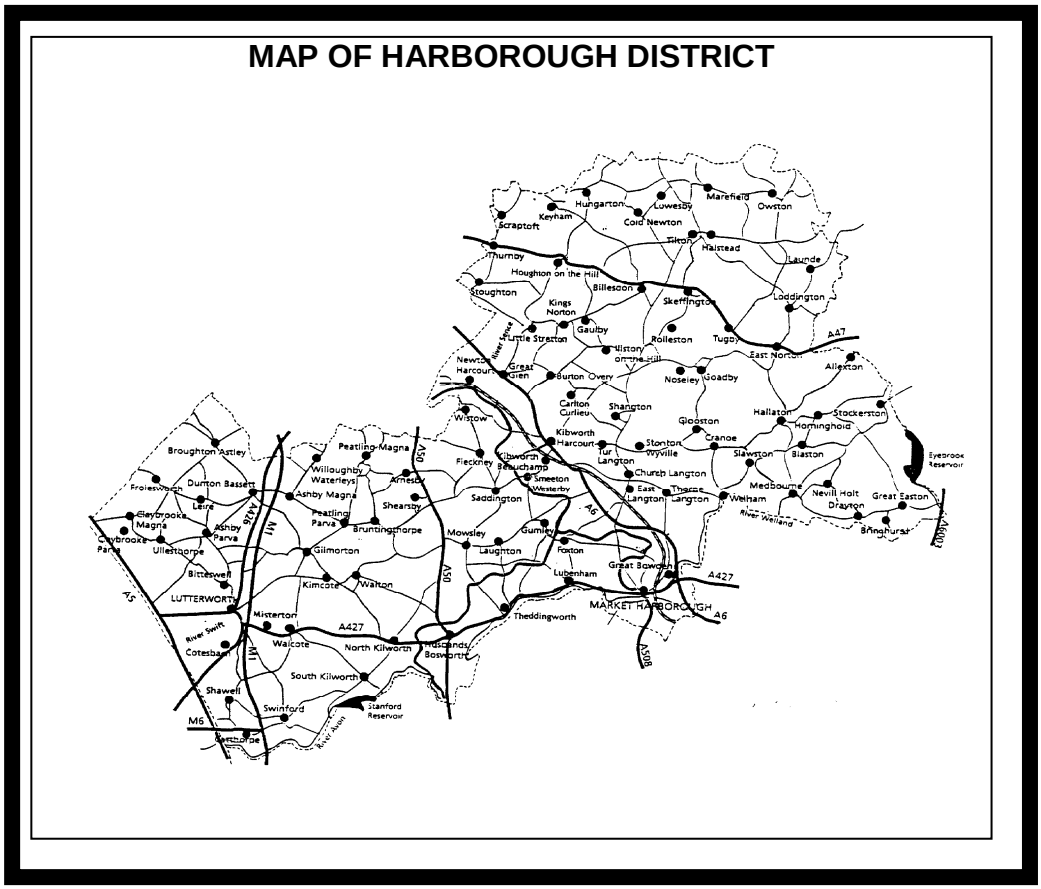
1.3 THE LOCAL AREA

Harborough District Council covers approximately 230 square miles of Southern Leicestershire and is shown in figure one. Approximately 75,000 people live within the District a third of which are in one of the three main population centres - Market Harborough, Lutterworth and Broughton Astley. After these two settlements the population is shared between four larger villages - Fleckney, Great Glen, Kibworth, and Thurnby - and almost 90 other villages serving rural communities.

The District borders on to the suburbs of Leicester in the north and is dissected by a number of major roads, these include the M1, and a small section of the M6 and the A426 in the west, and the A6, A47 and A50 in the eastern side. These roads are a major part of the East Midlands road network and consequently are heavily used.

The good communication links have encouraged a number of industrial estates to develop, containing medium sized businesses carrying out a range of coating and spraying activities, moulding, and timber processes. In the south west of the District there is a cluster of mineral activities including sand and gravel extraction, cement batching plants and other associated products. Within Market Harborough there is only one major established industry, The Harboro Rubber Company Ltd.

Figure 1



At the extreme western side of the District is Magna Park, which is a major distribution and warehousing site, covering approximately 7.4 million sq. ft. A number of the major manufacturers within the UK are located on this site. This site attracts a great deal of traffic as most of the products are transported by road. The nearby town of Lutterworth is affected by the increase in road traffic

2. REVIEW AND ASSESSMENT OF CARBON MONOXIDE

2.1 INTRODUCTION

Carbon Monoxide (CO) is a colourless, odourless gas, which is formed by the incomplete combustion of organic substances or those that are essentially carbon such as coke. Complete combustion in the presence of Oxygen leads to the formation of Carbon Oxide, whereas if there is a light deficiency of Oxygen some Carbon Monoxide is formed. Most combustion processes will produce some Carbon Monoxide and the concentration produced will clearly depend on the efficiency of combustion.

The most important general exposures of individuals to the gas come from cigarettes and vehicles. Combustion systems in vehicles are designed to operate most efficiently when there is sufficient air to oxidise the carbon in the fuel. When the engine is cold or badly tuned, or when the engine is idling or moving slowly, it will depart from this optimal condition and produce more Carbon Dioxide. Thus where weather conditions are not a factor high concentrations are likely near to busy roads where traffic queuing is common. The Carbon Dioxide is rapidly dispersed, once emitted, as distance from the road is increased. Therefore it is mainly a local pollutant rather than a trans-boundary pollutant and over a period of months the photochemical reaction will destroy high concentrations.

It is likely that the people at risk from exposure to high levels of Carbon Monoxide are those who already have a disease affecting the delivery of Oxygen to the heart or brain. The foetus, young people and the elderly are also likely to be at risk.

The Government and devolved administrations have adopted an 8-hour running mean of 11.6mg/m^3 (10ppm) as an air quality standard for carbon monoxide (CO), with the new objective for the standard of 10mg/m^3 to be achieved as a maximum daily running 8-hour mean by the end on 2003.

2.2 THE NATIONAL PERSPECTIVE

The main source of carbon monoxide in the UK is road transport, in particular petrol-engined vehicles and this accounts for about 67% of emissions.

The UK national network of monitoring sites has shown considerable variation in the measured concentrations, which is largely dependent on meteorological conditions. There have been no measured exceedances of the objective at any site during the monitoring period between 1999-2001. It has been noted that under certain meteorological circumstances the levels of carbon monoxide can accumulate, resulting in higher concentrations at urban background or city centre sites.

2.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

It is very unlikely that the objectives for carbon monoxide will be exceeded by the year 2003 and therefore a Stage 3 of the Review and Assessment would not be required.

2.4 INFORMATION USED FOR THE UPDATING AND SCREENING ASSESSMENT

The following information has been obtained:

- Traffic flow data for the main roads in the District
- Details of published information on likely background Carbon Monoxide levels

2.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

In general the District is likely to have low levels of background Carbon Monoxide, much below the standard that has been set. The published annual mean background carbon monoxide concentration for 2001 has been estimated at 0.28mg/m^3. Using published correction factors for Carbon Monoxide the estimated concentration of the pollutant for 2003 would be in the region of 0.22mg/m^3.

The Annual Average Daily Traffic flow data can be found in appendix *. The count data for 2001 indicates that there are no locations in the district where the flow would exceed the threshold criteria of 80,000 vehicles on a single tract road, 120,000 for a dual carriageway and 140,000 vehicles for a motorway. Consequently it was felt that there would be no requirement to carry out a screening assessment for road sources.

2.6 CONCLUSIONS

- With regards to monitoring data, are any current maximum daily running 8-hour concentrations greater than 10mg/m^3?

  NO

- With regards to road traffic, are there any busy roads or junctions where the predicted annual mean concentrations in 2003 is greater than 2mg/m^3?

  NO

IT IS VERY UNLIKELY THAT THE NATIONAL OBJECTIVE FOR CARBON MONOXIDE WILL BE EXCEEDED AND THEREFORE IT WILL NOT BE NECESSARY TO PROCEED BEYOND THE UPDATE AND SCREENING ASSESSMENT.

Environmental Services Section

May 2003

3 REVIEW AND ASSESSMENT OF BENZENE

3.1 INTRODUCTION

Benzene is a colourless, aromatic hydrocarbon and has a characteristic sweet odour. It is a known carcinogen and represents a risk to health that is dependent on length of exposure time. There is no absolute safe level for Benzene.

In the UK the main atmospheric source of Benzene is the combustion and distribution of petrol of which Benzene currently accounts for approximately 2% by volume. Motor vehicle exhaust emissions contain some unburned Benzene and they also contain Benzene formed from the combination of other components in the petrol during the combustion process.

Other sources of Benzene would be associated with the industrial processes, which either handle, stock or emit Benzene.

The Government and devolved administrations have adopted a running annual mean of 16.25 $\mu g/m^3$ (5ppb) for benzene. This objective should be achieved by the end of 2003. However in light of current advise from the Department of Health's' Committee on Carcinogenicity of Chemical Food, Consumer Products and the Environment a further objective for an annual mean of 5mg/m³ has been adopted and this objective should be met by 2010.

3.2 THE NATIONAL PERSPECTIVE

Motor vehicles are the most important single source on a national basis accounting in 1996 for 64% of the total UK annual emission of 41 ktonnes. Petrol vehicles account for most of these emissions as diesel fuel represents only a relatively small source.

No Air Quality Management Areas were declared from the first round of the review and assessment process and this is in line with national studies that have been undertaken. It is not anticipated that road traffic should be considered as a significant

3.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

It is very unlikely that the objective for Benzene will be exceeded by the year 2003 therefore a Stage 3 Review and Assessment for benzene would not be required.

3.4 INFORMATION USED FOR THE UPDATE AND SCREENING ASSESSMENT

The following information was reviewed:

- Benzene monitoring data for two sites within the District
- Details of published information available on Benzene levels
- Details of relevant industrial sources within the District (Appendix 1)

3.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

It is anticipated that the national policies will deliver the Air Quality Objectives for benzene by 2003. It is expected that even the busiest roadside locations will not exceed the objective level. It is anticipated that only at roadside locations with heavy number of road vehicles, could there be any exceedances of the 2010 objective.

3.5.1 MONITORING

Passive sampling using diffusion tubes has been undertaken at two locations in the district and the results are summarised in table 3.1. A full breakdown of the results can be found in appendix 2

Table 3.1

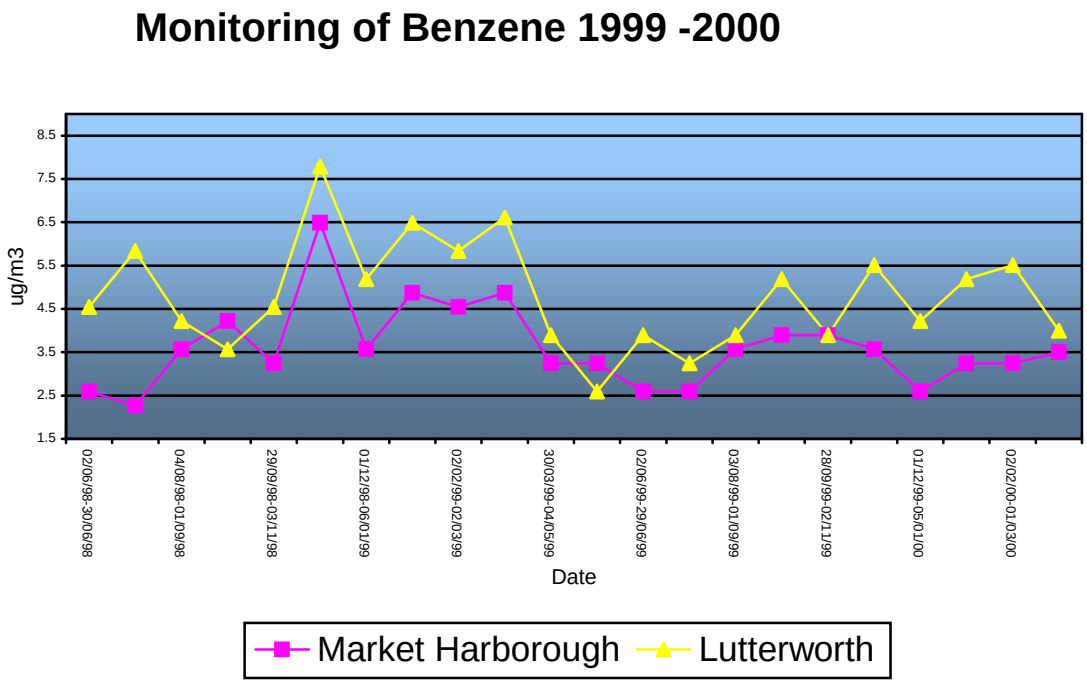
March 1999 – April 2000								
Location	Running Mean Value ($\mu g/m^3$)		Max. Value ($\mu g/m^3$)		**Corrected Running Mean Value ($\mu g/m^3$)** **2003**		**2010**	
	1999	2000	1999	2000	**1999**	**2000**	**1999**	**2000**
Market Harborough Leicester Road	4.22	3.26	6.488	3.893	**1.328**	**2.66**	**0.98**	**1.97**
Lutterworth Market Street	5.43	4.25	7.785	5.514	**1.71**	**3.46**	**1.27**	**2.57**

The survey undertaken was on a very small scale and the purpose of the survey was to act as a screening tool. However from these limited results it appears that there would be no exceedances of the objectives.

In general the District is likely to have low levels of background Benzene, much below the standard that has been set. The estimated annual mean background concentrations for 2001, 2003 and 2010 have been mapped for the whole of the UK.

The estimated levels of benzene indicate that the annual average levels would not exceed the objective levels. The highest estimated annual mean levels

recorded where at the boundary of the district where it joins with Leicester City Council. However the estimated levels are still well within the limits of the objective standards.



3.5.2 INDUSTRIAL SOURCES

There are no major industrial processes in Harborough District which have the potential to emit large quantities of benzene. Government guidance advises that due to tighter controls of emissions from petrol stations with a throughput of less than 1000m³/annum should not be regarded as significant sources. There are twelve petrol stations currently authorised under Part B of the Environmental Protection Act 1990 for petrol vapour recovery. These petrol stations have a throughput greater than 1000m³/annum however none are adjacent to busy roads with more than 30,000 vehicles per day. Consequently it is felt that they would not be regarded as significant sources.

3.5.3 ROAD TRAFFIC SOURCES

There are no “busy roads” as defined by the Technical Guidance document LAQM. TG(03) and none of the estimated annual average levels of benzene for 2010 are anticipated to be in excess of 2µ/m³. Consequently it is not anticipated that there will be a risk of the 2010 objective being exceeded.

3.6 CONCLUSIONS

Are there any running annual means greater than 16.25µ/m³?

NO

Are there any means greater than 5µ/m³?

NO

Are there any significant industrial sources?

NO

It is very unlikely that the objective for Benzene will be exceeded by the year 2003 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.

4. UPDATE & SCREENING ASSESSMENT OF 1,3-BUTADIENE

4.1 INTRODUCTION

1,3-Butadiene is a colourless, flammable hydrocarbon with a pungent odour used mainly in industrial processes. It is very similar to Benzene in that it is a known carcinogen and the risk to human health is related to the length of exposure.

It is released as a product of incomplete combustion, although it is not present in either petrol or diesel prior to combustion.

The gas is fairly reactive and has a lifetime of approximately 4 hours so it should be considered as a local rather than a trans-boundary pollutant.

The Government and devolved administrations have adopted a maximum running annual mean of 2.25μg/m^3 as an air quality standard for 1,3-Butadiene, with an objective for the standard to be achieved by the end of 2003.

4.2 THE NATIONAL PERSPECTIVE

1,3-Butadiene in the atmosphere is mainly derived from the combustion of petrol and other materials. It is formed during the combustion process from olefins in the fuel. It is also an important industrial chemical that is kept in bulk at a few sites throughout the UK.

The UK national atmospheric inventory for 1,3-Butadiene showed that in 1995 67% of national annual emissions arose from petrol vehicles and 13% arose from industrial processes.

It is anticipated that as the number of vehicles equipped with three way catalysts increases the emissions of 1,3-Butadiene will decreases though to some degree the increase in the use of diesel as a road vehicle fuel will counter this. However it is the anticipated view of Government that national policies will ensure that the Air Quality Objective for 1,3-Butadiene will be met by the end of 2003.

4.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

It was very unlikely that the objective for 1,3-Butadiene will be exceeded by the year 2003 therefore a Stage 3 Review and Assessment would not be required.

4.4 INFORMATION USED FOR THE UPDATE AND SCREENING ASSESSMENT

The following information has been reviewed:

- Details of published information available on 1,3-Butadiene
- Details of any new significant sources outside the District.

4.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

It is anticipated that even at the busiest roads or most congested roads in the district the air quality objective for 1-3 Butadiene will be met. The maximum running annual mean concentrations of this pollutant measured at urban background/ centres and roadside locations are already below the objective limit.

The published mean background concentrations of 1-3 Butadiene for 2001 and 2003 are 0.15µ/m³and 0.12µ/m³ respectively. Both of these value are well within the objective limits.

There are no current or planned industrial processes within Harborough district or the neighbouring authorities, which could emit significant quantities of 1-3 Butadiene.

4.6 CONCLUSIONS

Are any current running annual means greater than 2.25µ/m³?

NO

Are there any new industrial processes emitting a significant amount of the pollutant?

NO

It is very unlikely that the objective for 1-3 Butadiene will be exceeded by the year 2003 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.

5. REVIEW AND ASSESSMENT OF SULPHUR DIOXIDE

5.1 INTRODUCTION

Sulphur dioxide is the principal pollutant associated with acid deposition usually after oxidation to sulphuric acid. It is derived from the combustion of fossil fuels. Concentrations throughout Europe have declined during the last fifty years because of the general move away from the use of coal as a domestic heating fuel.

High concentrations of sulphur dioxide can still occur in less developed European countries and exceptionally high local concentrations do occur throughout Europe where there are specific combustion processes.

Air pollution episodes with sharp increases in smoke and sulphur dioxide have been associated with acute effects on health. The best known example was the London smog in the 1950's, which lasted of several days. During this episode an estimated 4,000 deaths were recorded mainly amongst the elderly and sick, together with a steep rise in respiratory ailments.

The health effects of sulphur dioxide are that it produces bronchio-constriction, which has as increased effect on asthmatic patients.

The Government and the devolved administrations have adopted three objectives for sulphur dioxide which are dependant the length of time members of the public might reasonably expected to be exposed to the pollutant:

- 350μg/m³ as a 1 hour mean, not to be exceeded more than 24 times per year, to be achieved by the end of 2004

- 125μg/m³ as a 24 hour mean, not to be exceeded more than 3 times per year, to be achieved by the end of 2004

- 266μg/m³ as a 15 minute mean, not to be exceeded by more than 35 times per year, to be achieved by the end of 2005.

5.2 THE NATIONAL PERSPECTIVE

In the UK emissions of sulphur dioxide are principally as a result of the combustion of fossil fuels. Non nuclear power stations account for more than 71% of the total UK emissions and other industrial combustion processes account for a further 16%. Vehicles and road transport are not a significant source and contribute less than 1% of the total emissions.

In the urban areas in the UK sulphur dioxide levels have shown a marked decline since the 1960's. Domestic sources only account for about 4% of the total sulphur dioxide emissions. It is anticipated that only in areas where domestic coal burning is still widespread or in the local vicinity of small

combustion plant is there a likelihood of the national objectives being exceeded.

5.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

It is very unlikely that the objectives for sulphur dioxide will be exceeded by the years 2004 and 2005, therefore a Stage 3 of the Review and Assessment will not be required.

5.4 INFORMATION USED FOR THE UPDATE AND SCREENING ASSESSMENT

The following information has been reviewed:

- Monitoring data from the two sites within the District
- Details on published information on background levels
- Details of relevant Part A and Part B Processes
- Information on the existence of, or planned combustion processes with a thermal rating >5MW using sulphur dioxide rich fuels
- Details of any significant sources outside the District

5.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

5.5.1 MONITORING

Monitoring for sulphur dioxide was undertaken for several years at two locations in the District using 8 port bubblers. These were used purely as a screening tool and were placed at urban background sites. The survey finished in 2000.

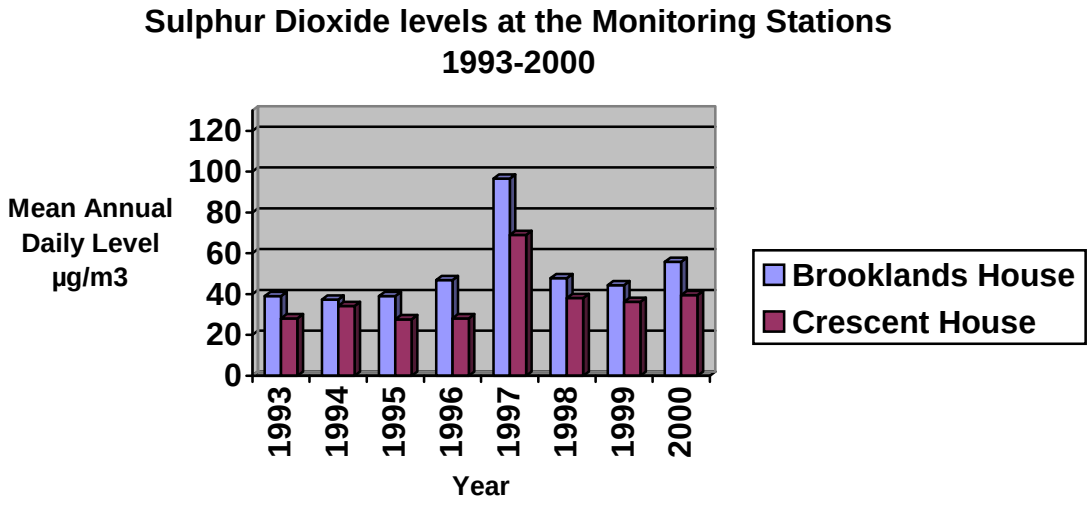
The corrected measured daily average sulphur dioxide concentration can be used as a direct comparison to the 24-hour mean objective.

It can be assumed that the 15-minute air quality objective is unlikely to be exceeded if the maximum daily mean concentration is less than 80μg/m³, and the 1-hour mean will not likely be exceeded if the maximum daily mean concentration is less than 200 μg/m³.

The results of the survey can be found in figure 5.1. If taken in isolation, the results for 1997 would indicate that there is a significant problem with sulphur dioxide. However when taken in context with all of the other results it was decided that they were not sufficiently significant to warrant a more detailed assessment.

With the exception of the 1997 monitoring results, the maximum daily mean concentration is 69.03µg/m³ which indicates that the 15-minute and 1-hour Air Quality Objectives for sulphur dioxide will not be exceeded.

Fig 5.1 Sulphur Dioxide Monitoring Results



It must be noted that the above information is historical data, however it has been corrected due to the use of the net acidity titration method. It was only used as a screening tool to give an indication of the levels of sulphur dioxide in the district.

From the published background data available, the annual mean background level in 2001 was 2.45µ/m³. It is estimated that the background levels for 2004 and 2005 will be in the region of 75% less than the 2001 values. This confirms the fact that no exceedances of the national objectives are anticipated.

5.5.2 OTHER POTENTIAL SOURCES

During the first round of the review and assessment process, a number of power stations situated in the Trent Valley to the North-West of the District were identified as potential emitters of large quantities of sulphur dioxide. However an assessment of the Environment Agency published information on these Part A Processes confirmed that the concentration of pollutants emitted would not be significant to the District.

There have been no new industrial processes since the first review that would contribute significant levels of sulphur dioxide.

The combustion plants located within the District appear to be well below 5 MW power rating and would not have a significant influence on the overall concentrations of sulphur dioxide.

Harborough district does not have a significant density of coal burning properties therefore it is felt that there would be no significant contribution form this source to the overall levels of sulphur dioxide in the area.

5.3 CONCLUSION

- With regard to the monitoring data does the maximum daily bubbler result exceed 80µ/m³?

NO

- Are there any new industrial processes with the potential to emit significant levels of sulphur dioxide?

NO

- Are there any other potential sources of sulphur dioxide in the district?

NO

It is very unlikely that the objective for sulphur dioxide will be exceeded by the years 2004 and 2005 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.

6. REVIEW AND ASSESSMENT OF LEAD

6.1 INTRODUCTION

Direct human exposure to lead can occur through the inhalation of particulate lead in ambient air or through the ingestion of lead contaminated food or water.

Although normally only a small fraction of total lead intake occurs through inhalation, lead in air may also contribute to exposure indirectly for example through deposition in dust on crops.

Once lead has been absorbed into the body it can be stored in a number of organs where it does not really do much damage. However, a small proportion of lead, round 2%, is found in the blood system and it is this lead that can cause health problems. The most significant health problem is the effect it has on the central nervous system and in particular on the developing brain of a child.

The Government and the devolved administrations have adopted an annual mean of 0.5 ug/m3 as an air quality standard for lead, with an objective for the standard to be met by the end of 2004. In addition, a lower air quality objective of 0.25 ug/m^3 is to be achieved by 2008.

6.2 THE NATIONAL PERSPECTIVE

As a result of an agreement between the European Parliament and the Environment Council on the Directive on the Quality of Petrol and Diesel Fuels there has been a ban on the sale of leaded petrol in the UK since 1st January 2000. Emissions of lead are now restricted to a variety of industrial applications, for example the manufacture of batteries, pigments in paints and glazes, alloys, radiation shielding, tank lining and piping.

The UK national network of monitoring sites had recorded a significant decline in the levels of lead measured at the urban background and kerbside sites over the period 1994-98 and it is anticipated that this level will fall lower with the removal of lead in petrol.

Existing national policies are expected to deliver the air quality objectives in both 2004 and 2008. Only local authorities with significant industrial sources, which have the potential to release elevated levels of lead in relevant locations, are expected to proceed beyond the First Stage review and assessment.

No Air Quality Management Areas with respect to the objectives for lead were declared in the UK during the first stages of the review and assessment process for air quality.

6.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

It is very unlikely that the objectives for lead will be exceeded by the years 2004 and 2008, therefore a Stage 3 review and Assessment would not be required.

6.4 INFORMATION USED FOR UPDATE AND SCREENING ASSESSMENT

The following information was reviewed:

- Monitoring data from the two sites at Market Harborough
- Details of published information on likely background lead levels
- Details of relevant Part A and Part B Authorised Processes (Appendix 1)
- Planned development within the District
- Details of any significant sources of lead in neighbouring areas

6.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

6.5.1 MONITORING

A stage two review and assessment was carried out for lead in the district due to the presence of a battery plant, authorised under Part A of the Environmental Protection Act 1990.

In 1999, the Department of Environment, Transport and the Regions (DETR) commissioned a 12 month study to determine the ambient concentrations of lead in the local vicinity of a wide-variety of industrial processes.

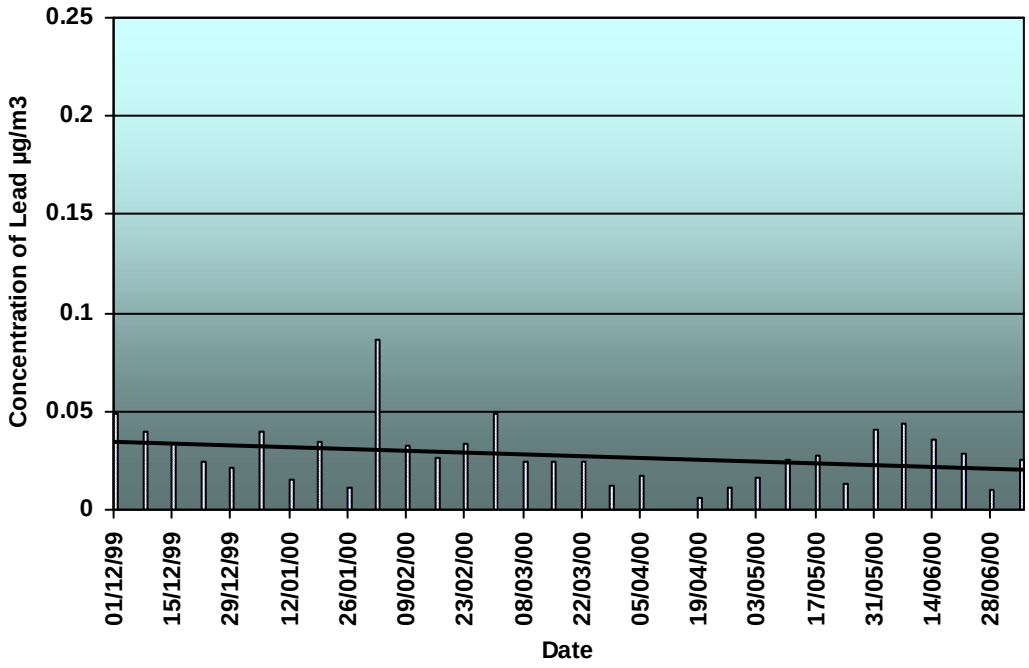
The location of the battery manufacturing plant in Market Harborough is in close proximity to domestic dwellings and consequently as part of this study, a Partisol 2000 sampler was installed in a domestic garden as a location representative to maximum public exposure to lead from the plant.

It was assumed that as far as road traffic emissions are concerned the influence on lead levels recorded at the site would be negligible. This was due to the fact that EC legislation which came into force on the 1st January 2000, prohibited the use of leaded petrol in Member States. As there were no other lead emitters in the vicinity of the battery plant, all the lead monitored was specific to the plant.

The results of the monitoring indicated that the levels of lead in the vicinity of the battery plant were well within the objective standards. Since the

monitoring was undertaken the plant has ceased operating therefore it is anticipated that any lead levels in the area would be reduced.

Lead levels from the continuous monitor at Caxton Street



6.6 CONCLUSIONS

Are there currently any annual means greater than 0.5µg/m³ or 0.25µg/m³

NO

Are there any new industrial process likely to emit significant amounts of lead?

NO

It is very unlikely that the objective for lead will be exceeded by the years 2004 and 2008 therefore it is not anticipated that it will be necessary to proceed beyond the Update and Screening Assessment.

7. REVIEW AND ASSESSMENT OF NITROGEN DIOXIDE

7.1 INTRODUCTION

Nitrogen Oxides (No_x) are formed during high temperature combustion processes from the oxidation of Nitrogen in the air or fuel. The major oxides to come out of these reactions are Nitric Oxide (NO) and Nitrogen Dioxide (NO_2).

Initially Nitric Oxide is initially the predominate gas, however complex reactions take place in the atmosphere in the presence of oxidants such as ozone (O_3) to produce Nitrogen Dioxide (NO_2).

It is Nitrogen Dioxide which is associated with adverse effects on human health and at relatively high concentrations the pollutant can cause inflammation of the airways. Long term exposure to Nitrogen Dioxide may effect lung function and may also enhance the response to allergens in sensitive individuals.

Nitrogen Oxides have a lifetime of approximately 1 day by which they are usually converted to Nitric Acid (HNO_3). The Nitric Acid is in turn removed from the atmosphere by direct deposition to the ground or transfer to aqueous droplets (i.e. clouds or rainwater) thereby contributing to acid deposition.

Nitrogen Oxides are also a precursor of ozone.

The Government and devolved administrations have adopted an annual mean of 40μg/m³, and a 1-hour mean of 200 μg/m³ not to be exceeded more than 35 times a year as air quality standards for nitrogen dioxide to be achieved by the end of 2005.

7.2 THE NATIONAL PERSPECTIVES

Road transport is thought to account for about 49% of the total UK emissions of NO_x the electricity supply industry for about 24% and the industrial and the commercial sectors for about 23%.

National policies and European directives are expected to reduce the emissions of NO_x by 2005, however in areas in close proximity to major roads it is anticipated that without additional measures the Air Quality Objectives for nitrogen dioxide will not be met.

It is anticipated that the annual mean objective for nitrogen dioxide will be more demanding to achieve than the 1-hour objective. It is therefore excepted that provided there is not a large stationary source, if the annual mean objective is met it is unlikely that the 1-hour objective will be exceeded

7.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

There was a predicted exceedance of the Air Quality Objective for annual mean Nitrogen Dioxide concentration in the vicinity of the automatic analyser in Market Street Lutterworth.

An Air Quality Management Area was declared for all areas where the exceedance coincides with housing or other residential accommodation, schools or hospitals.

7.4 INFORMATION USED FOR THE UPDATE AND SCREENING ASSESSMENT.

The following information was reviewed:

- Details of any monitoring data throughout the district
- Road traffic data
- Details of any industrial or other potential sources in the district.

7.5 FINDING OF THE UPDATE AND SCREENING ASSESSMENT

7.5.1 MONITORING DATA

Information to follow

7.5.2 NARROW CONGESTED STREETS

In accordance with the definition in LAQM.TG(03), the only street which falls within the definition of a narrow congested street is Market Street in Lutterworth. Following the original Review and Assessment process this location was declared an Air Quality Management Area. This street will be subjected to a more detailed review as part of the Stage 4 assessment

7.5.3 ROAD TRAFFIC JUNCTIONS

A busy junction is defined in LAQM.TG(03) as one where there are more than 10,000 vehicles and there is relevant exposure of a premise within 10m of the kerb.

Following this definition there is only one junction in the district which could be classed as a busy junction. Using the DMRB model it was predicted that there would be no exceedance of the air quality objectives for the area. The results can be found in appendix 3.

7.5.4 BUSY STREETS WHERE PEOPLE MAY SPEND 1 HOUR OR MORE CLOSE TO TRAFFIC

Using the definition in LAQM.TG(03) there are no streets that would fall within this criteria where the traffic exceeds 10,000 vehicles per day.

7.5.5 ROADS WITH HIGH FLOWS OF BUSES AND/OR HGV'S

There are no roads within the district that have a proportion of buses and/or HGV's greater than 25% of the total traffic .

7.5.6 NEW ROADS CONSTRUCTED SINCE THE ORIGINAL ASSESSMENT

There has only been one significant new road constructed since the original review and assessment procedure. The A6 by-pass around Great Glen has now been fully opened. This has had a significant impact on the amount of traffic passing through the village. By re-routing the road there are no relevant exposures within 10m of the road therefore any further assessment will not be required.

7.5.7 ROADS CLOSE TO THE AIR QULAITY OBJECTIVE DURING THE FIRST REVIEW AND ASSESSMENT PROCESS

Apart from the area of Lutterworth which is part of the Air Quality Management Area there are no other roads in the district where the original assessment predicted annual mean concentration was between 36 µg/m^3 and 40µg/m^3 at the closest receptor.

7.5.8 ROADS WITH SIGNIFICANTLY CHANGED TRAFFIC FLOES

There are no roads within the district with a traffic flow greater than 10,000 where there has been a significant increase in the traffic flow since the original review and assessment.

7.5.9 BUS STATIONS

There are no bus stations within the district.

7.5.10 NEW INDUSTRIAL SOURCES

There have been no new industrial sources in the district since the original review and assessment was undertaken.

7.5.11 INDUSTRIAL SOURCES WITH SIGNIFICANTLY INCREASED EMISSIONS

There are no industrial processes that have the potential to emit excessive quantities of nitrogen dioxide.

7.5.12 AIRCRAFT

There are no significant airfields in the district that would contribute to elevated levels of nitrogen dioxide. East Midlands airport is approximately 40km to the north of the district. LAQM.TG(03) advises that once an aircraft has reach an altitude of 200m or more it would not make a significant contribution to ground-level concentrations of nitrogen dioxide. Therefore it is not anticipated that this airport will have any impact on the nitrogen dioxide levels in Harborough district.

7.6 CONCLUSIONS

Are there any current exceedances in the monitoring data both inside and outside the Air Quality Management Area?

NOT AVAILABLE AT PRESENT

Are there any significant impacts from road traffic in the district?

NO

Are there any other significant sources of nitrogen dioxide in the district?

NO

Early indications suggest that outside the Air Quality Management Area it is not anticipated that there would be an exceedence in the National Air Quality objectives. However due to a lack of ratified data for the district a further report will be required to confirm this. In addition there is currently no data available for the monitoring station within the AQMA therefore a further report will be required on receipt of this information

8. UPDATE AND SCREENING ASSESSMENT OF PM_{10}

8.1 INTRODUCTION

The ability of a particle to remain suspended in the air depends essentially on its size, shape and density. These same properties determine where in the human respiratory tract a particle comes to rest when inhaled. Generally spherical particles below about 10μm diameter have the greatest likelihood of reaching the deepest parts of the lungs, where the air spaces or alveoli are situated and carry out the essential processes of respiration.

Particles up to 20μm may be deposited in the nose and throat and airways to the lungs. Almost all particles larger than 7μm are deposited in the nose and throat and only 20-30% of particles between 1 and 7 μm are deposited in the lung's air spaces, although about 60% of very fine particles below 0.1 μm are deposited in air spaces. Clearly the potential damage which can result is related to the distance the particle travel and it's subsequent size.

There is an established link between respiratory or cardiovascular ill-health and exposure to fine particles.

The Government and the devolved administrations have adopted two air quality objectives for fine particles (PM_{10}), which are equivalent to the EU Stage 1 Limit Values. The objectives are 40 μg/m³ as the annual mean, and 50 $\mu g/m^3$ as the fixed 24-hour mean to be exceeded no more than 35 days per year, to be achieved by the end of 2004.

8.2 THE NATIONAL PERSPECTIVE

There are a number of emission sources that contribute to the overall PM_{10} concentrations.

- **Primary Combustion Particles** – these are particles emitted directly from combustion processes such as road traffic, power generation, industrial combustion processes etc. These particles are generally less than 2.5μg and often below 1μg in diameter.

- **Secondary Particles** – these are particles formed in the atmosphere following their release in the gaseous phase. These include sulphates and nitrates, formed from emissions of SO_2 and NO_X; these particles are generally less than 2.5μg in diameter

- **"Course" or "other" particles** – the "course" or "other" particles comprise of emissions from a wide range of non-combustion sources. These include re-suspended dust from road traffic, construction and mineral extraction processes, the wind blown dusts and soils and sea salt. These particles are generally greater than 2.5μg in diameter.

During the Review and Assessment it is important to have regard the source of the Particulates as the expected reduction in particle emissions in future years is different for each type of source.

Emissions from road vehicles will be governed by legislative changes to vehicle emission standards, whilst secondary particles will largely by controlled by changes to legislative changes effecting power generation and control of emissions of sulphur dioxide and oxides of nitrogen in industry and transport generally. Emissions of the coarse particles are largely uncontrolled and they are not anticipated to decline in future years.

It is anticipated that through national and international policies and legislative changes, emissions from road transport and industrial processes will generally be controlled. PM_{10} data from the monitoring sites within the Automatic Urban and Rural Networks indicates that with the exception of a kerbside site in London, the annual mean objective will be met. However the Government advise that with existing national policy measures and atypical meteorology, exceedances of the national air quality objectives might be found in the following areas:

- areas adjacent to busy road

- areas in the vicinity of industrial plant or which have significant uncontrolled or fugitive emissions (e.g. Quarry processes)

8.3 FINDINGS OF THE ORIGINAL AIR QUALITY REVIEW AND ASSESSMENT

The original review concluded that:

The risk of the air quality objectives being exceeded were negligible, however concern was expressed as to whether there would be a future exceedance from traffic related sources.

8.4 INFORMATION USED FOR THE UPDATE AND SCREENING ASSESSMENT

The following information has been reviewed:

- Details of any monitoring data throughout the district

- Road traffic data

- Details of any industrial or other potential sources in the district.

8.5 FINDINGS OF THE UPDATE AND SCREENING ASSESSMENT

8.5.1 MONITORING DATA OUTSIDE THE AQMA

There has been no local monitoring carried outside the Air Quality Management Area. From the background maps published by the National Air Quality Emissions Inventory (NAEI) the background levels of PM10's in the district vary between 17.8µg/m³ and 25µg/m³ for 2001 and between 17.2µg/m³ and 23.3µg/m³ for 2004.

8.5.2 MONITORING DATA INSIDE THE AQMA

Information to follow

8.5.3 ROAD TRAFFIC JUNCTIONS

A busy junction is defined in LAQM.TG(03) as one where there are more than 10,000 vehicles and there is relevant exposure of a premise within 10m of the kerb.

Following this definition there is only one junction in the district which could be classed as a busy junction. Using the DMRB model it was predicted that there would be no exceedance of the air quality objectives for the area. The results can be found in appendix 3.

8.5.4 ROADS WITH A HIGH FLOW OF BUSES AND/OR HGV'S

There are no roads within the district that have a proportion of buses and/or HGV's greater than 25% of the total traffic .

8.5.5 NEW ROADS CONSTRUCTED SINCE THE ORIGINAL ASSESSMENT

There has only been one significant new road constructed since the original review and assessment procedure. The A6 by-pass around Great Glen has now been fully opened. This has had a significant impact on the amount of traffic passing through the village. By re-routing the road there are no relevant exposures within 10m of the road therefore any further assessment will not be required.

8.5.6 ROADS CLOSE TO THE AIR QUALITY OBJECTIVE IN THE FIRST ROUND OF REVIEW AND ASSESSMENTS

During the original review and assessment process there were no roads identified where it was anticipated that there would be more than 30 breaches of the 24hour national air quality objective of 50µg/m³. Therefore it is not anticipated that a more detailed assessment would be required.

8.5.7 ROADS WITH SIGNIFICANTLY CHANGES TRAFFIC FLOWS

There are no roads within the district with a traffic flow greater than 10,000 where there has been a significant increase in the traffic flow since the original review and assessment.

8.5.8 BUS STATIONS

There are no bus stations within the district.

8.5.9 NEW INDUSTRIAL SOURCES

There have been no new industrial sources in the district since the original review and assessment was undertaken.

8.5.10 INDUSTRIAL SOURCES WITH SIGNIFICANT INCREASED EMISSIONS

There are no industrial processes that have the potential to emit excessive quantities of PM_{10}'s.

8.5.11 AREAS OF DOMESTIC SOLID FUEL BURNING.

LAQM TG(03) advises that areas where there is significant burning of solid fuel in domestic properties a more detailed assessment of the air quality should be undertaken. Following an analysis of the data held in the authority regarding domestic fuel use it does not appear that there is any part of the district where there are more than 50 properties in a 500 x 500 meter square where the primary heating source is solid fuel.

8.5.12 QUARRIES/LANDFILL SITES/ OPENC CAST COAL HANDLING

There are two sand and gravel quarries in the district however there are no relevant exposure sites therefore it is not felt necessary to carry out a more detailed assessment.

8.5.13 AIRCRAFT

There are no significant airfields in the district that would contribute to elevated levels of PM_{10}'s.

8.6 CONCLUSIONS

Are there any current exceedances in the monitoring data both inside and outside the Air Quality Management Area?

NOT AVAILABLE AT PRESENT

Are there any significant impacts from road traffic in the district?

NO

Are there any other significant sources of particulates in the district?

NO

Early indications suggest that it is not anticipated that there would be an exceedence in the National Air Quality objectives. However due to a lack of ratified data for the district a further report will be required to confirm this.

9. CONCLUSIONS OF THE UPDATE AND SCREENING ASSESSMENT

Generally the air quality in Harborough District is very good and it is anticipated that the situation will continue to improve due to national strategies.

Following the Update and Screening Assessment it is anticipated that the national air quality objectives will be met for:

- **Benzene**
- **1,3-Butadiene**
- **Carbon Monoxide**
- **Sulphur Dioxide**
- **Lead**

At the present time it is not possible to confirm that the objectives for Nitrogen Dioxide and Particulates will be met due to the lack of data available. It is anticipated that this information will be accessible in the very near future and a further report will follow to confirm the findings of these two pollutants.

Appendix 1

Industrial Processes in Harborough District

Process	Company Name and Address	Emissions	Map Ref.
Concrete	Hanson Premix Mkt. Harborough	PM_{10}	**742 878**
Concrete	Lafarge Concrete Products Shawell	PM_{10}	536 804
Concrete	Lafarge Readymix Ltd Dunton Basset	PM_{10}	534 804
Concrete	Lafarge Readymix Ltd Shawell	PM_{10}	535 805
Concrete	Lafarge Concrete Products Shawell	PM_{10}	535 806
Painting	Clarkes of Great Glen Kibworth	PM_{10} , VOC	672 925
Rubber	The Harboro Rubber Company Ltd Mkt. Harborough	PM_{10} , VOC	742 874
Painting	Walton Bruntingthorpe	PM_{10} , VOC	605 886
Painting	King Trailer Ltd Mkt. Harborough	PM_{10}	745 878
Coating of Metal	G M Contractors North Kilworth	PM_{10} , VOC	622 836
Foundry	Follsain Wearparts Lutterworth	VOC, SO_2, NO_x, CO	546 852
Coating Manufacture	Applied Finishes Ltd Fleckney	PM_{10} , VOC	650 925
Wood Based Products	Whitmores Timber Co Ltd Claybrooke Magna	PM_{10}	450 875
Odourisation of Natural Gas	Transco Mkt. Harborough	CH_4	Not available
Odourisation of Natural Gas	Transco Tur Langton	CH_4	Not available
Concrete	Lafarge Readymix Ltd. Shawell	PM_{10}	Mobile plant
Petrol Vapour Recovery	Esso Service Station	Bu, B Pb VOC	

	Mkt. Harborough		
Petrol Vapour Recovery	Lutterworth Ford Lutterworth	Pb VOC	
Petrol Vapour Recovery	Texaco Star Lutterworth	Bu, B Pb VOC	
Petrol Vapour Recovery	Market Service Station, Mkt. Harborough	Bu, B Pb VOC	
Petrol Vapour Recovery	Save Service Station, Mkt., Harborough	Bu, B Pb VOC	
Petrol Vapour Recovery	Sainsbury's Supermarket Mkt. Harborough	Bu, B Pb VOC	
Petrol Vapour Recovery	Esso Service Station Nth Kilworth	Bu, B Pb VOC	
Petrol Vapour Recovery	Thurnby Garage Thurnby	Bu, B Pb VOC	
Petrol Vapour Recovery	Texaco Star Mkt. Harborough	Bu, B Pb VOC	
Petrol Vapour Recovery	Walcote Service Station Walcote	Bu, B Pb VOC	
Waste Oil Burner	Western Avenue Garage, Mkt. Harborough	VOC	

Key:

PM10 = Particulates
NH4 = Ammonia
HCL = Hydrochloric Acid
H2S = Hydrogen Sulphide
VOC = Volatile Organic Compounds
SO2 = Sulphur Dioxide
NOX = Oxides of Nitrogen
CO = Carbon Monoxide
Bu = 1,3-butadiene
B = Benzene

Appendix 2

Harborough District Council
Benzene Results 1998-200

	Concentration in ppb		Concentration in ug/m3	
Period	**Mkt. Harborough**	**Lutterworth**	**Mk Harborough**	**Lutterworth**
15/4/98 - 28/4/98	1.9	1.6	6.163	5.19
28/4/98 - 2/6/98	0	0	0	0
2/6/98 - 30/6/98	0.8	1.4	2.595	4.541
30/6/98 - 4/8/98	0.7	1.8	2.271	5.839
4/8/98 - 1/9/98	1.1	1.3	3.568	4.217
1/9/98 - 29/9/98	1.3	1.1	4.217	3.568
29/9/98 - 3/11/98	1	1.4	3.244	4.541
3/11/98 - 1/12/98	2	2.4	6.488	7.785
1/12/98 - 6/1/99	1.1	1.6	3.568	5.19
6/1/99 - 2/2/99	1.5	2	4.866	6.488
2/2/99 - 2/3/99	1.4	1.8	4.541	5.839
02/03/99 - 30/3/99	1.5	1.9	4.866	6.613
Annual Running mean	**1.3**	**1.66**	**4.22**	**5.43**
30/03/99 - 04/05/99	1	1.2	3.244	3.892
04/05/99 - 02/06/99	1	0.8	3.244	2.595
02/06/99 - 29/06/99	0.8	1.2	2.595	3.892
29/06/99 - 03/08/99	0.8	1	2.595	3.244
03/08/99 - 01/09/99	1.1	1.2	3.568	3.892
01/09/99 - 28/09/99	1.2	1.6	3.893	5.19
28/09/99 - 02/11/99	1.2	1.2	3.893	3.892
02/11/99 - 01/12/99	1.1	1.7	3.568	5.514
01/12/99 - 05/01/00	0.8	1.3	2.595	4.217
05/01/00 - 02/02/00	1	1.6	3.244	5.19
02/02/00 - 01/03/00	1	1.7	3.244	5.514
01/03/00 - 05/04/00	1.1	1.2	3.5	4
Annual Running mean	**1.02**	**1.31**	**3.26**	**4.25**

Update and Screening Assessment

Environmental Services Section

May 2003

Appendix 3

Results of the DMRB Assessment for the Junction of A4304 and A508

Results for the junction of Coventry Road and High Street Market Harborough							
Pollutant	**Annual mean**				**For comparison with Air Quality Standards**		
	Background concentration	**Road traffic component**	**Total**	**Units**	**Metric**	**Value**	**Units**
CO	0.28	0.16	0.44	**mg/m^3**	**Annual mean***	0.44	**mg/m^3**
Benzene	0.31	0.18	0.49	**$\mu g/m^3$**	**Annual mean**	0.49	**$\mu g/m^3$**
1,3-butadiene	0.16	0.19	0.35	**$\mu g/m^3$**	**Annual mean**	0.35	**$\mu g/m^3$**
NO_x	37.9	32.7	70.6	**$\mu g/m^3$**	**Not applicable**		
NO_2	23.6	7.8	31.4	**$\mu g/m^3$**	**Annual mean***	31.4	**$\mu g/m^3$**
PM_{10}	20.0	3.75	23.75	**$\mu g/m^3$**	**Annual mean**	23.8	**$\mu g/m^3$**
					Days >50$\mu g/m^3$	10	**Days**