

FIRST STAGE REVIEW OF AIR QUALITY IN WREXHAM COUNTY BOROUGH

SUMMARY

This report contains the Stage 1 review and assessment of local air quality in Wrexham County Borough as required under section 82 of Part IV of the Environment Act 1995. This Stage 1 review and assessment is designed to identify areas, within Wrexham County Borough, at risk of exceeding the objectives prescribed in the Air Quality Regulations 1997.

In compiling this report information on potential emission sources has been collated and assessed to determine whether levels of the specific pollutants, targeted by the National Air Quality Strategy, are likely to exceed recommended Air Quality Standards. Information provided by neighbouring local authorities has been included in the assessment along with local, regional and national air quality statistics. It is not possible at this stage to state whether any air quality objective is definitely going to be breached within the County Borough. The Stage 1 review and assessment has highlighted those areas and pollutants that require further investigation.

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INTRODUCTION

1. The National Air Quality Strategy and Local Air Quality Management

The Government's approach to improving air quality should be seen within the overall framework of sustainable development. There is a clear fit between sustainable development and the health of people and the environment

(Review of the United Kingdom National Air Quality Strategy 1998 DETR)

1.1 The air in the UK is significantly cleaner than in the 1950s and 1960s but whilst levels of sulphur dioxide and smoke have fallen considerably, other pollutants have increased in significance. In some areas particularly congested urban centres emissions from traffic, industry and other sources can still affect the quality of life.

1.2 In 1995 the U.K. Government published a strategic policy framework for air quality management. The Secretary of State adopted a National Air Quality Strategy, under Part IV of the Environment Act 1995, which provides a framework for air quality management and control. The United Kingdom National Air Quality Strategy was published in March 1997.

1.3 The key elements of the Strategy are health-based Air Quality Standards and Objectives. The Standards are based on an assessment of the effect of each pollutant on public health, and reflect recommendations made by the Expert Panel on Air Quality Standards (EPAQS).

1.4 The Environment Act 1995 introduced the concept of Local Air Quality Management (LAQM). Local authorities are required to review the air quality in their area and assess it against the objectives specified for seven pollutants. The Air Quality Regulations 1997 prescribe air quality objectives to be achieved by 2005 in respect of benzene, nitrogen dioxide, sulphur dioxide, particulates (PM10), carbon monoxide, lead and 1,3-butadiene. These are listed in Table 1.

1.5 Local authorities must determine whether the prescribed air quality objectives are likely to be achieved in their areas by the end of 2005. The Department of the Environment, Transport and the Regions (DETR) and the National Assembly for Wales (formerly the Welsh Office), have produced detailed guidance notes on Local Air Quality Management. This guidance has been followed in compiling this report.

They recommend a phased approach involving three stages:

- **Stage 1**

All local Authorities must undertake a first stage review and assessment for each of the pollutants for which there is a prescribed objective. This consists of an initial screening of industrial, transport and other sources of pollutants, which may have a significant impact within an authority's borders. The information on potential emission sources is collated and assessed to determine whether levels of the specific pollutants, targeted by the strategy, are likely to exceed recommended Air Quality Standards. Information provided by neighbouring local authorities is also included in the assessment along with local, regional and national air quality information.

- **Stage 2 & Stage 3**

The aim of the second stage review and assessment is to provide a further screening of pollutant concentrations, which the stage 1 review and assessment has suggested may be significant.

Monitoring and modelling of these pollutants may be undertaken. If the assessment predicts that the levels included in the relevant air quality objective will not be achieved by the end of 2005, the local authority will undertake a detailed and accurate third stage air quality review and assessment.

If these detailed assessments establish the likelihood of a specific air pollution problem, an Air Quality Management Area may be declared, and an action plan

drafted in order to bring pollutant levels down to within Air Quality Standards by the year 2005.

Table 1. The Standards and Objectives of the Air Quality Strategy.

<u>NATIONAL AIR QUALITY STRATEGY</u>			
Pollutant	Standard		Objective to be achieved by 2005
Benzene	5ppb	running annual mean	5ppb
1,3 - Butadiene	1ppb	running annual mean	1ppb
Carbon Monoxide	10ppm	running 8-hour mean	10ppm
Lead	0.5ug/m ³	annual mean	0.5ug/m ³
Nitrogen dioxide	150ppb	1 hour mean	150 ppb, hourly Mean*
	21ppb	annual mean	21ppb, annual mean
Ozone	50ppb	running 8-hour mean	50ppb measured as the 9th percentile of daily maximum 8 hour running mean* (equivalent to 10 exceedences per year)
Particles (PM ₁₀)	50ug/mg ³	running 24 hour mean	50ug/m ³ measured as the 99th percentile of daily maximum running 24 hour mean* (equivalent to 4 exceedences per year)
Sulphur dioxide	100 ppb	15 minute mean	100ppb measured as the 9.99th percentile of 15 minute mean* (equivalent to exceedences of 35 periods of 15 minutes per year).

ppm=parts per million; ppb=parts per billion; ug/mg³=microgrammes per cubic meter; mg/m³=milligrammes per cubic meter; *=these objectives were regarded as provisional in the strategy

The main sources of these pollutants are road transport, energy generation, industrial processes and domestic emissions.

Review and Assessment Process

A Desk top study to collate information relating to air quality in the areas outlined below:

1. Part A and Part B Authorised processes with reference to Appendix 1a and 1b
2. Traffic statistics for all the major roads
3. Information regarding future developments that may have an impact on air quality
4. National data relating to background concentrations
5. Current monitoring data
6. Information from other sources within the borough and Information regarding neighbouring sources of emissions from neighbouring local authorities

Sources of information used in this assessment

Internal (WCBC)

Public Protection Department – Environmental Protection
Highways and Transportation Services
Planning Department – Policy/Implementation

External

The Environment Agency
The Operators of Part A and B processes
Neighbouring Local Authorities
Community Councils
Department of the Environment, Transport and the Regions

References

The United Kingdom National Air Quality Strategy 1997
ISBN 0 10 1358725, HMSO Publications

Review and assessment: Pollution Specific Guidance, LAQM. TG4(98)

DETR Air Quality Internet site

2. The Control of Air Pollution

2.1 Local Authorities have the lead role in local air quality management. The Environment Agency plays its part through the regulation and control of emissions from Integrated Pollution Control (IPC) processes and liaison with local authorities.

2.2 Part A processes are generally large industrial processes with the potential to cause significant industrial pollution and are controlled by the Environment Agency. There are eight Part A processes in the County Borough. Local authorities control Part B Processes which are industrial processes where the pollution is to atmosphere. There are currently forty-nine Part B processes in the County Borough (including petrol filling stations). These processes require authorisation from Wrexham County Borough Council as the enforcing authority under Part I of the Environmental Protection Act 1990. The authorisation has the objective of ensuring that the *best available techniques not entailing excessive cost* (BATNEEC) are employed for preventing releases of certain prescribed substances that may be harmful to health or the environment. A map showing the location of Part A and Part B processes within Wrexham County Borough is presented overleaf together with a detailed list of these processes.

2.3 There are a number of smaller industrial processes within the County Borough, which do not require authorisation. The statutory nuisance provisions of Part III of the Environmental Protection Act 1990, provides the necessary powers to deal with pollution problems arising from such processes.

2.4 Local authorities are also responsible for controlling smoke and nuisance from commercial and domestic sources. Smoke from both domestic and industrial sources is controlled under the Clean Air Act 1993 and the Environmental Protection Act 1990.

3. Wrexham County Borough

3.1 Wrexham County Borough is situated in Northeast Wales. Bounded by the Clwydian Hills to the west and the undulating Shropshire and Powys countryside to the south. Approximately 70% of the County Borough could be properly described as *rural* where agriculture is the predominant land use. Wrexham is bordered by the Welsh unitary authorities of Flintshire, Denbighshire and Powys, and to the north and east by Chester City in Cheshire, and North Shropshire and Oswestry districts in Shropshire. Wrexham County Borough's total population (as at mid 1997) is estimated to be 125,000. Over 80% of people live within defined urban areas, in the centre of Wrexham itself and in the surrounding urban villages of Rhosllanerchrugog, Brymbo, Ruabon, Acrefair, Plas Madoc, Cefn Mawr, Llay and Gwersyllt.

3.2 The Integrated Transport White paper – DETR, Welsh Transport Policy Statement and the Road Traffic Reduction Act 1997 require strategies to reduce road traffic on a local level. Wrexham County Borough Council's Draft Unitary Development Plan acknowledges that new development must maintain the existing settlement pattern and character, and be integrated with the existing transport network to help reduce the overall need to travel and encourage the use of alternatives to the car. This is also widely reflected in the Council's recently published Integrated Transport Strategy.

3.3 Approximately 300 hectares of employment land is set aside for development up to 2011. This is significant in terms of the potential impact on local air quality, through emissions from industrial processes and the subsequent increase in traffic to and from sites. Wrexham Industrial estate contains many of the industrial processes in the County Borough.

3.4 For the purposes of air quality management, it would appear that new developments are likely to have the most significant effects on Wrexham Town Centre, Wrexham Industrial Estate, Brymbo and Broughton, Abenbury/East Wrexham. In addition there are an increasing number of active landfill, mineral extraction and quarrying operations within the County Borough which need to be considered in terms of their impact on local air quality. A detailed list of proposed development sites and a location map of mineral working is contained in Appendix 3.

4. Wrexham County Borough Council Air Quality Management

4.1 Wrexham Maelor Borough Council created a number of Smoke Control Areas (SCA's) under the Clean Air Acts of 1956 and 1968. Currently two thirds of the urbanised area of Wrexham town are designated Smoke Control Areas. This has had a significant impact on air quality in Wrexham town centre. A map of the designated smoke control areas is shown as fig 1.

4.2 Wrexham County Borough Council's Public Protection Department, is responsible for monitoring air quality within the County Borough. The Department undertakes a wide range of pollution monitoring activities:

- Sulphur dioxide and smoke monitoring has been undertaken by the Council since 1968. Monitoring was originally set up to assess the value of the smoke control programme. Although the results were essentially only of local value, results from the single monitoring site currently in use are now fed into the National Survey. Smoke and SO₂ will continue to be monitored and the results fed into the National Survey.
- The Public Protection Department has implemented a programme of air quality monitoring initially to cover the pollutants nitrogen dioxide, ozone and benzene. Monitoring sites within the Borough have been determined after assessing traffic flow counts provided by the Transportation and Engineering Services Department. Comparisons can be made between air quality at busy urban kerbside sites and air quality at sites more removed from busy traffic.
- With effect from 1st May 1996, nitrogen dioxide diffusion tube monitoring sites have been set up at various locations within the Borough. These sites have been chosen to meet the criteria specified by the National Environmental Technology Centre (NETCEN), who have been commissioned by the Department of the Environment, Transport and the Regions to oversee the National Nitrogen Dioxide Diffusion Tube Network. The diffusion tubes are left exposed to the atmosphere for a period of one month, whereupon they are collected and sent for laboratory analysis.
- Ozone diffusion tube monitoring sites have also been established, which measure levels of ozone in Wrexham town centre, as well as in quieter, more rural locations within the Borough.
- There is also a monitoring site for benzene. The location is a busy urban thoroughfare in the town centre of Wrexham where results would be expected to be higher than those existing at quieter locations with less traffic movements.

5 POLLUTANTS

5.1 Fine Particulates (PM10)

5.1.1 Description and Source

Atmospheric levels of PM10 (particulate matter less than 10 microns in diameter) are composed of three main sources: Primary particles which are emitted directly by combustion processes and are generally less than 2.5 microns and often less than 1 micron. Secondary particles are those which are formed in the atmosphere from chemical reaction and include sulphates and nitrates formed from the reactions of emissions of Sulphur dioxide (SO²) and oxides of nitrogen (Nox) (these are generally 2.5 microns). The third category are coarser particles formed from a variety of sources including wind-blown dusts, fires, resuspended road dust and tyre debris, construction, mining and quarrying activity.

Primary particle emissions make the largest proportional contribution to local air quality. Secondary particles are formed in the atmosphere via processes that are slow compared to airborne travel times, so that European sources as well as UK emissions of the precursors of secondary particles can make significant contributions to UK concentrations of PM10. The policy issues regarding the control of particle concentrations are comparable to ozone, which is also a transboundary pollutant requiring international co-operation for its control.

5.1.2 Health Effects

In UK towns and cities, past concentrations of particulates in the form of smog, from the burning of coal during the winter months on domestic fires, was responsible for high mortality amongst the elderly and chronically ill. The Clean Air Act 1956 included the concept of smoke control areas. In the town of Wrexham the majority of households are situated within smoke control areas. These have proved to be a most effective way of reducing ground level particulate (smoke) concentrations.

There is growing evidence that it is the finer fraction of particles PM_{2.5} or smaller, that has the greater significance for health. Particles with a diameter of less than about 4 microns penetrate deeply into the lungs and therefore can cause aggravation to susceptible individuals who suffer from respiratory or cardiovascular disease. Particulates can also affect asthmatics and trigger hay fever and eczema.

Standard and Objectives for PM10

The Government has adopted a running 24-hour average of 50 $\mu\text{g m}^{-3}$ Air Quality Standard, with an objective for the Standard to be achieved as the annual 99th percentile of daily maximum running 24-hour averages (that is no more than four days exceeding the Standard in a year), by the end of 2005.

5.1.3 Nationally current monitoring networks show that the Standard is being exceeded at all monitoring stations across the UK. Concentrations of particulates are highest in the winter months and lowest in the summer. A significant proportion of the current annual average PM10 is due to secondary particles. Transboundary pollution is estimated to account for up to 35%-40% of annual mean concentrations of fine particles at urban background locations in a typical year. It is acknowledged that it will not be possible for many local authorities to meet the current objective through action at local level.

Of the primary sources road transport is predicted to be the dominant contributor to particulate levels in most major towns and cities of the UK. Although many of the sources of PM10 are outside the control of individual local authorities this is a significant local contribution.

5.1.4 Stage 1 review and assessment

Sources of PM 10 within the County Borough include road traffic, industrial sources, quarrying, mineral extraction, landfill operations, and domestic coal burning.

5.1.5 Current Monitoring

There is currently one volumetric station within Wrexham, which monitors particulates (smoke) in accordance with the national survey standards. It is currently located at the Trading Standards Department, Ruthin Road, Wrexham. In addition Sulphur dioxide is also monitored using the same apparatus at the same location.

- **Smoke**

Monitoring carried out at the Trading Standards Department, Ruthin Road, Wrexham during 1997 and 1998 has shown concentrations of smoke to be $10\mu\text{g}/\text{m}^3$ and $7\mu\text{g}/\text{m}^3$ respectively, measured as annual mean figures. These levels compare very favourably with the recommended Air Quality Standard of $50\text{mg}/\text{m}^3$, and indeed are significantly lower than results obtained ten years ago.

Background monitoring for PM10 present in the air has also been undertaken at various locations within the Borough, using a Partisol 2000 Air Sampler. At the former Brymbo Steel works site monitoring has been carried out during winter and summer months. Some elevated levels of PM10 have been identified as occurring during the winter months which may be attributable to seasonal variation, or local coal fire burning within the community of Brymbo.

Local regional data indicates a **particulate background concentration of 17.6 - 20 $\mu\text{g}/\text{m}^3$** on the air quality internet site <http://www.environment.detr.gov.uk/airq/aqinfo.htm>.

5.1.6 Assessment of Potentially Significant sources

The stage 1 review has indicated the following potential local sources of PM10, which require a stage 2 assessment to determine whether they are significant sources:

- **Industrial Sources**

Within the County Borough there is one Part A process of the type listed in Appendix 1a (Other mineral fibres, PG3/3):

Owens Corning Fibreglass (GB) Limited, Wrexham Industrial Estate

In addition a second Part A Process (Non-Ferrous Metals) will also be reviewed:

Deeside Aluminium Ltd, Wrexham Industrial Estate

One Part B Process of the type listed in Appendix 1b (Rubber processes, PG6/28):

Clwyd Compounders Limited, Gardden Industrial Estate, Ruabon, Wrexham

And the following potential local sources from uncontrolled or fugitive emissions

Kronospan Ltd, Maesgwyn Farm, Holyhead Road, Chirk
H.H. Wardle Metals Ltd, The Aluminium Refinery, Fenns Bank,
Whitchurch, Shropshire
Animal Waste Services Ltd, Tyddyn Daniel, Bedwell Road, Marchwiel,
Wrexham

- **Local coal burning**

In urban villages, and areas not covered by Smoke Control Areas (SCAs) which may be responsible for winter episodes of elevated PM10 levels associated with poor dispersion.

- **Traffic**

Limited information is currently available with regard to emissions from traffic within the County Borough therefore further work needs to be carried out to determine the impact of traffic related emissions on future air quality. Appendix 2 contains transport related information.

- **Landfill and Mineral extraction operations** across the County Borough. Appendix 3 contains a location plan of these operations.

- **Neighbouring Local Authority Sources**

One potential industrial source located in Flintshire: Castle Cement

5.1.7 Recommendations

Given the nature of PM10 a Stage 2 and 3 assessment will be necessary to focus on locations where the highest PM10 concentrations are likely to occur, and to determine whether there is a significant risk of the proposed objective being exceeded by the end of 2005.

5.2 Sulphur Dioxide (SO₂)

5.2.1 Description and Source

Sulphur dioxide is particularly soluble in water and dissolves to give an oxidised acidic solution known as sulphuric acid which is well known for its role in acid rain. Up until the 1960s the main source of sulphur dioxide in towns and cities was the domestic, commercial and industrial burning of coal. The increased use of alternative energy sources such as natural gas has caused a considerable fall in these emissions. UK emissions of sulphur dioxide are now dominated by fossil fuel power stations with additional significant emissions from the industrial sector.

5.2.2 Health Effects

Sulphur dioxide causes its effects by stimulating nerves in the lining of the nose, throat and airways of the lung. The latter effect is most likely to occur in those suffering from asthma and chronic lung disease. The effects of sulphur dioxide exposure on sensitive subjects appear almost immediately at the start of exposure. Air pollution episodes, where sudden increases in the ground level concentration of smoke and sulphur dioxide occur, have been associated with acute effects on health.

Standard and Objectives for Sulphur Dioxide

The current provisional Standard for sulphur dioxide is a 100ppb (267ug/m³) as a 15-minute mean measured as the 99.9th percentile in a calendar year (35 exceedences from 35,040 measurements) to be achieved by 2005.

5.2.3 Despite reductions in annual average concentrations, peak concentrations are still exceeding the level recommended by EPAQS in both urban and rural locations. The analysis of 1995 data has indicated that high levels were caused by the plumes from large combustion plant point sources, plumes from smaller combustion plant point sources and diffuse low level sources, in areas where coal remains a popular domestic heating fuel. Measures being taken to control emissions from combustion plant of greater than 20MW mean that the objective will be achieved by 2005 in most areas of the UK.

5.2.4 Stage 1 Review and Assessment

Sources of SO₂ within the County Borough include industrial processes and coal burning.

5.2.5 Current Monitoring

Monitoring carried out at the Trading Standards Department, Ruthin Road, Wrexham during 1997 and 1998 has shown concentrations of sulphur dioxide to be 16ug/m³ and 11ug/m³ respectively, measured as annual mean figures indicating levels well below the standard.

Local regional data indicates an SO₂ background concentration of 6.71 – 10.36 ug/m³ according to information on the air quality internet site (<http://www.environment.detr.gov.uk/airq/aqinfo.htm>).

5.2.6 Assessment of Potentially Significant Sources

• Industrial Sources

Within Wrexham County Borough there are no significant part A or Part B processes

• Local coal burning

In the urban villages and areas not covered by Smoke Control Areas (SCAs) which may be responsible for winter episodes of elevated SO₂ levels. This aspect will be investigated further as part of the stage 2 Review for Particulates.

5.2.7 Recommendations

The risk of the Air Quality Objective for SO₂ being exceeded by the end of 2005 however, is likely to be negligible. Wrexham County Borough Council will continue to monitor for smoke/SO₂ and feed results into the National Network. Additional SO₂ monitoring will be undertaken in traditional coal burning areas.

5.3 Nitrogen dioxide (NO₂)

5.3.1 Description and Source

Nitrogen molecules are almost inert but combine with oxygen to form various oxides of nitrogen gases (NO_x). Nitric oxide (NO) and nitrogen dioxide (NO₂) are significant man made oxides of nitrogen. Globally levels of NO₂ produced naturally are greater than emissions produced through man's activities. All combustion processes produce some NO_x but only NO₂ is associated with adverse effects on health. In the UK motor vehicles account for 50% of NO_x emissions, with power stations and other industrial sources accounting for 32%. In urban areas the majority of NO_x measured near roads is from motor vehicles. This pollutant is intensified by the presence of hydrocarbons and ozone, which react together in sunlight to form a photochemical smog.

5.3.2 Health Effects

Nitrogen dioxide may have both acute (short term) and chronic (long-term) effects on health, particularly in people with asthma. At high concentrations nitrogen dioxide causes inflammation of the airways. Long term exposure to nitrogen dioxide may effect lung function. Indoor exposure may increase the level of respiratory infections in children. There is also evidence that exposure to nitrogen dioxide enhances the response to allergens in sensitive individuals.

Standard and Objectives for NO₂

The Strategy includes two provisional Objectives for nitrogen dioxide – 150ppb (286.5ug/m³) measured as a 1 hour mean and 21ppb (40.1ug/m³) measured as an annual mean – both to be achieved by 2005.

5.3.3 Total annual emissions of oxides of nitrogen (NO_x) have reduced by 25% between 1990 and 1996. There has been a similar reduction in road transport emissions over the same period. Despite these reductions hourly average and annual average concentrations in excess of the levels of the objectives are being recorded at many background and roadside locations across the UK. It is predicted however, that considerable reductions in NO_x will result from existing measures, including the limited application of additional local measures (traffic management). This should lead to compliance with the strategy objectives in all parts of the country except London and a few large urban areas.

5.3.4 Stage 1 Review and Assessment

Sources of NO₂ within the County Borough include road traffic and industrial sources.

5.3.5 Current Monitoring

- The Nitrogen dioxide monitoring site within the Borough which is showing the highest concentrations is 3/5 Grosvenor Road, Wrexham. The annual mean for 1997 was 17 ppb and for 1998 19.5 ppb. Grosvenor Road was chosen as a monitoring site for Nitrogen dioxide due to the relatively high stop/start traffic flow. The levels are within the Air Quality Standard of 21ppb measures as an annual mean.
- Monitoring at two of the Borough's established nitrogen dioxide sites, Sherwell Avenue and St David's Crescent has ceased with effect from November 1998, after accumulating 2½ years of data. These monitoring sites have been relocated to Plas Madoc and the Redwither Complex on Wrexham Industrial Estate.

Local regional data indicates Nitrogen dioxide background concentrations of approximately 13 – 17 ug/m³ according to information on the air quality internet site (<http://www.environment.detr.gov.uk/airq/aqinfo.htm>)

5.3.6 Assessment of Potentially Significant Sources

The Stage 1 review has indicated the following local sources of N02 that require further investigation as part of a Stage 2 assessment.

- **Industrial sources**

Within the County Borough there is one significant Part A process of the type listed in Appendix 1a (Other mineral fibres, PG3/3)

Owens Corning Fibreglass (GB) Limited, Wrexham Industrial Estate, Wrexham

In addition a second Part A Process (Non-Ferrous Metals) will also be reviewed:

Deeside Aluminium Ltd, Wrexham Industrial Estate, Wrexham

- **Road Traffic emissions**

Limited information is currently available with regard to emissions from road traffic within the County Borough therefore further work needs to be carried out to determine the impact of traffic related emissions on future air quality.

5.3.7 Recommendations

Given the link with emissions from road traffic a Stage 2 assessment will be required to focus on locations where the highest nitrogen dioxide concentrations are likely to occur, and to determine whether there is a significant risk of the proposed objective being exceeded by the end of 2005.

5.4 Carbon Monoxide (CO)

5.4.1 Description and Source

Carbon monoxide is a product of the incomplete combustion of organic substances. It is a greenhouse gas which influences atmospheric chemistry. The main source of carbon monoxide in the UK is currently road transport. As a result the highest concentrations of carbon monoxide are found close to major roads with heavy traffic flows.

5.4.2 Health Effects

When inhaled carbon monoxide can enter the bloodstream and disrupt the supply of essential oxygen to the body's tissues. The formation of carboxyhaemoglobin substantially reduces the capacity of the blood to carry oxygen and deliver it to the tissues. At high concentrations, poisoning, loss of consciousness and death may occur. The EPAQS recommendation is intended to limit the exposure of the population, including susceptible individuals (suffering from coronary heart disease and angina).

Standard and Objectives for Carbon Monoxide

The current Objective for carbon monoxide is 10ppm (11.65 mg/m³) measured as a running 8-hour mean to be achieved by 2005. This is derived from the Air Quality Standard recommended by EPAQS in their 1994 report.

5.4.3 Eight-hour mean concentrations of carbon monoxide being recorded in urban background locations are already below 10ppm. Traffic management measures taken to achieve the objectives for other traffic related pollutants in busy urban areas will lead to further reductions. An assessment of likely 8-hour concentrations at roadside locations across the UK suggest that policy measures already in place should lead to concentrations at all roadside locations falling below 10ppm by 2003. The Government proposes to adopt a new objective of achieving the 10ppm level in all areas by 2003.

5.4.4 Stage 1 Review and Assessment

Sources of CO within the County Borough include petrol vehicles and some industrial processes.

No monitoring is currently being carried out

Local regional data indicates carbon monoxide background concentrations of 0.25 – 0.27mg/m³ according to information on the air quality internet site (<http://www.environment.detr.gov.uk/airq/aqinfo.htm>)

5.4.6 Assessment of Potentially Significant Sources

There are no roads within the County Borough with average daily traffic levels likely to be greater than 50,000. There are no significant Part A processes with regard to carbon monoxide. There are no Part B processes likely to release significant quantities of CO.

The risk of the Air Quality Objective for CO being exceeded by the end of 2005 should be considered negligible.

5.4.7 Recommendations

No further investigation required. The rationale for any future monitoring of Carbon monoxide will be regularly reviewed as part of the Air Quality Strategy for Wrexham County Borough.

5.5 Benzene

5.5.1 Description and Source

Benzene is an aromatic hydrocarbon that readily vaporises from a liquid to a gas. In the UK the main atmospheric source is the distribution and combustion of petrol and some authorised processes. Motor vehicles are the most important single source of benzene accounting for 64% of UK annual emissions in 1996. The main outdoor sources of benzene are currently identified as petrol engine vehicle exhausts, petrol refining, distribution and uncontrolled emissions from petrol station forecourts without petrol vapour recovery systems.

5.5.2 Health Effects

Benzene is a genotoxic human carcinogen. It is absorbed into the body through the lungs and skin and distributed to the bone marrow. It has the potential to cause non-lymphocytic leukaemia. No safe level can be specified for ambient air concentrations. Therefore exposure to benzene should be kept as low as possible.

Standard and Objectives for Benzene

The current objective for benzene is 5ppb (16.2ug/m³) measured as a running annual mean to be achieved by 2005. This is derived from the Air Quality Standard derived from EPAQS 1994 report.

5.5.3 Annual mean concentrations of benzene being recorded in urban background locations are already well below 5ppb. Policy measures already in place should result in the Objective being achieved at all urban and background and roadside locations by 2003. The Government proposes that the existing Objective should be replaced with a new Objective of achieving the 5ppb Standard in all areas by 2003.

5.5.4 Stage 1 Review and Assessment

The main source of atmospheric benzene within the County Borough are petrol stations (through the storage and unloading of petrol).

5.5.5 Current Monitoring

Commencing from the 1 May 1996, a diffusion tube site for benzene has been recorded background concentrations at 3/5 Grosvenor Road, Wrexham. The annual mean concentration of benzene recorded for 1997 and 1998 was 1.2ppb. Levels are therefore comfortably within the Air Quality Standard discussed above.

Local regional data indicates an urban background of approximately 0.52 – 0.66 ppb according to information on the air quality internet site (<http://www.environment.detr.gov.uk/airq/airinfo.htm>)

5.5.5 Assessment of Potentially Significant Sources

The Environmental Protection Act 1990 has recently made provision for local authorities to authorise larger petrol filling stations. This means that during the unloading from petrol tankers a vapour recovery system must be employed in order to prevent releases of petrol vapour to atmosphere. Wrexham County Borough Council has authorised 14 Petrol filling stations to date, which have vapour recovery systems in place.

The risk of the Air Quality Objective for benzene being exceeded by the end of 2005 should be considered negligible.

5.5.7 Recommendations

No further investigations required. The rationale for any future monitoring of benzene will be regularly reviewed as part of the Air Quality Strategy for Wrexham County Borough.

5.6 1,3 Butadiene

5.6.1 Description and Source

An aliphatic hydrocarbon gas released from car exhausts. It can effectively be removed by catalytic converters on motor vehicles. The main source is from the combustion of petrol and other fossil fuels, and from some specific authorised processes, such as the production of synthetic rubber for tyres.

5.6.2 Health Effects

Of most concern is the induction of cancers of the lymphoid system and blood forming tissues, lymphomas and leukaemias. Like benzene 1,3 butadiene is a genotoxic carcinogen, and so no absolutely safe level can be defined.

Standard and Objectives for 1,3 Butadiene

The current Objective for 1,3 butadiene is 1ppb (2.2ug/m³) measured as a running annual mean to be achieved by 2005.

5.6.3 Motor vehicles are the dominant source of 1,3 butadiene. The reductions in emissions arising from the increase in the numbers of vehicles equipped with three-way catalysts should lead to the Objective being achieved in urban background locations and most roadside locations by 2000.

Annual mean concentrations being recorded in urban background locations are already well below 1ppb. Policy measures already in place should lead to concentrations at all roadside locations falling below 1ppb by 2003. The Government proposes to replace the current Objective with a new Objective of achieving 1ppb in all areas of the UK by 2003.

5.6.4 Stage 1 Review and Assessment

Sources of 1.3 butadiene within the County Borough are road vehicles.

5.6.5 Current Monitoring

No local authority monitoring currently being carried out

5.6.6 Assessment of Potentially Significant Sources

Within Wrexham County Borough there are currently no authorised processes that use 1,3 Butadiene.

Therefore the risk of the Air Quality Objective being exceeded by the end of 2005 should be considered negligible.

5.6.7 Recommendations

No further investigation required. The rationale for any future monitoring of 1.3 butadiene will be regularly reviewed as part of the Air Quality Strategy for Wrexham County Borough.

5.7 Lead

5.7.1 Description and Source

Most of the national airborne emissions of lead emanate from petrol engine vehicles. It has been used to increase the octane rating of petrol. It is also released during the manufacture of batteries, pigments, alloys, plastics and ammunition. Secondary non-ferrous metal smelters may contribute to emissions of lead in industrial areas.

5.7.2 Health Effects

Airborne lead is absorbed into the body through the lungs and accumulates in bone, teeth, skin and muscle. Exposure to high levels of lead can cause toxic biochemical effects in humans leading to problems with the synthesis of haemoglobin, effects on the kidneys, joints and reproductive system and acute or chronic damage to the nervous system. The possible effect of lead on brain development in children has been of great concern. It is not possible to identify a threshold for effects of lead on health.

Standard and Objective for Lead

The current Objective for lead is $0.5\mu\text{g}/\text{m}^3$ measured as an annual mean to be achieved by 2005. This was adopted from the World Health Organisation's revised guideline of $0.5\mu\text{g}/\text{m}^3$ as an annual average.

5.7.3 The reduction in the lead content of leaded petrol and the increasing use of unleaded petrol have led to significant reductions in urban lead levels. By 2005 lead levels in most urban areas are predicted to be $0.1 - 0.2\mu\text{g}/\text{m}^3$. The ban on the sale of leaded petrol by 2000 should push levels even lower. At the majority of industrial sites in the UK, BATNEEC authorisations (ensuring that best available techniques not entailing excessive cost are implemented) will have sufficiently reduced lead emissions to achieve the current Objective.

The Government intends that there should be two Objectives for lead: $0.5\mu\text{g}/\text{m}^3$ as an annual mean to be achieved by 31 December 2004 and the EPAQS recommended Standard of $0.25\mu\text{g}/\text{m}^3$ as an annual mean, as an additional Objective to be achieved by 2008.

5.7.4 Stage 1 Review and Assessment

Sources of lead within the County Borough Council include some industrial processes and petrol vehicles.

5.7.5 Current Monitoring

No local authority monitoring is currently being carried out

Local regional data indicates a Lead background concentration of $28 - 40 \text{ ng}/\text{m}^3$ according to information on the air quality internet site (<http://www.environment.detr.gov.uk/airq/airinfo.htm>)

5.7.6 Assessment of Potentially Significant Sources

As discussed above the introduction of unleaded petrol has resulted in a major decline in lead levels across the UK. Within Wrexham County Borough there are no Part A or Part B processes with the potential to emit significant levels of lead.

The risk of the Air Quality Objective for lead being exceeded by the end of 2005 should be considered negligible.

5.7.7 Recommendations

No further investigation required. The rationale for any future monitoring of Lead will be regularly reviewed as part of the Air Quality Strategy for Wrexham County Borough

6.0 Summary of recommendations

Pollutant	Stage II	Rationale
Fine Particulates PM10	YES	Given the nature of PM10 and the high background levels nationally
Sulphur Dioxide (SO ₂)	NO	Long term monitoring has demonstrated that levels have continued to decline in recent years
Nitrogen Dioxide (NO ₂)	YES	Traffic and industrial sources to be examined in more detail
Carbon Monoxide (CO)	No further investigation required	Policy measures already in place should lead to Objective being met by 2003
Benzene	No further investigation required	No industrial sites emit benzene National policy regarding petrol vehicles should reduce the likelihood of exceedence of Objective for benzene
1,3 Butadiene	No further investigation required	as benzene
Lead	No further investigation required	Introduction of unleaded petrol has resulted in a national decline Authorisations will have sufficiently reduced lead emissions from industries in the County Borough

In addition as part of the stage 2 assessment the Public Protection Department will produce a detailed emissions inventory

7.0 Recommendations

This report has identified two pollutants, particulates (PM10) and Nitrogen dioxide (NO₂), which may not meet the Air Quality standards, adopted by the Government. It is therefore necessary to carry out a stage 2 review and assessment. This will include the collation of data with regard to traffic emissions and further monitoring of particulates (PM10) and Nitrogen dioxide. The current air quality monitoring carried out as part of Wrexham County Borough Council's Air Quality Strategy will continue and will be expanded in those areas where further monitoring is required. The methodology will be described within the scope of the second stage review and assessment.

8.0 Consultation

Consultation in relation to the Stage 1 Review and Assessment:

- Wrexham County Borough Council
- DETR
- The Environment Agency
- Part A and Part B Process Operators
- Community Councils
- Wrexham Agenda 21 Forum
- Local Environmental Groups
- Schools

Further public consultation will be carried out with regard to the results of the stage 1 review to assist in the development and implementation of the stage 2 review.

Traffic Statistics

The only significant road in the County Borough with regard to average daily flow >20,000 is the A483(T) with average daily flow in the region of 36,000 along its busiest sections.

In addition there are a total of seven sites which are in or around Wrexham town centre. At the present time no local future growth factors are available but future predicted traffic growth is unlikely to exceed 3% per annum at any of the seven locations.