Air Quality Monitoring in Mid Suffolk

The Environmental Control section has carried out air quality monitoring for a limited number of pollutants for several years.

Nitrogen dioxide has been the main focus of monitoring (by passive diffusion tubes), but we are also involved in a national survey of ammonia levels, and we have carried out monitoring of particulate matter (PM 10), during both 2001 and 2005.

Air Quality Assessments

Part IV of the Environment Act (1995) imposed a duty on local authorities to review and assess air quality within their district. These assessments are made with regard to the pollutants which are identified in the Air Quality Regulations, standards which have been set with regard to human health.

These pollutants, and the objectives that should be met are as follows:

Pollutant	Air Quality Objective (milligrams per cubic metre mg/m^3)	Measured As	Compliance Date
Benzene	16.25 mg/m^3	Running Annual Mean	1 December 2003
	5.0 mg/m^3	Annual Mean	31 December 2010
1,3 butadiene	2.25 mg/m^3	Running Annual Mean	31 December 2003
Carbon Monoxide	10 mg/m^3	Maximum daily running 8-hour mean	21 December 2003
Lead	0.5 mg/m^3	Annual Mean	31 December 2004
	.25 mg/m^3	Annual Mean	31 December 2008
Nitrogen Dioxide	200 mg/m^3 not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 mg/m^3	Annual Mean	31 December 2005

Pollutant	Air Quality Objective (milligrams per cubic metre mg/m^3)	Measured As	Compliance Date
Particulate Matter (PM10)	50 mg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31 December 2004
	40 mg/m^3	Annual Mean	31 December 2004
Sulphur Dioxide	350 mg/m^3 not to be exceeded more than 24 times per year	1-hour mean	31 December 2004
	125 mg/m^3 not to be exceeded more than 3 times per year	24-hour mean	31 December 2004
	266 mg/m^3 not to be exceeded more than 35 times per year	15-minute mean	31 December 2005

In response to the requirements of the Environment Act, and the Air Quality Regulations, Mid Suffolk District Council completed a three-stage review, culminating in a report in December 2001, which concluded that the air quality objectives would be met across the district.

A further 'Upgrading and Screening Assessment' was undertaken (May 2003), again, the conclusions were that the air quality objectives would be met. The findings of this report were endorsed by DEFRA (Department of the Environment, Food and Rural Affairs). Progress reports undertaken in 2004 and 2005 have confirmed that there is no breach of the air quality objectives.

The **Upgrading and Screening Assessment** is also available for viewing at the council offices, and at libraries across the district, and the 2006 upgrading and screening assessment will shortly be submitted to DEFRA.

Some Information on Pollutants

PM10 - Particulate Matter describes the fraction of airborne particulate matter that is less then 10 microns in diameter. Fine particles are of the greatest concern since they are capable of being easily transported over long distances on currents of air. Additionally, fine particles may be drawn into the respiratory system and may adversely affect health

There is a wide range of emission sources that contribute to PM10 concentrations:

- **Primary particle** emissions are derived from combustion sources including road traffic, power generation, industrial processes etc.
- **Secondary particles** are formed by chemical reactions in the atmosphere and comprised principally of sulphates and nitrates.
- **Coarse particles** are from a wide range of emission sources, including construction works, mineral extraction works, wind-blown dusts and soils, re-suspended dusts from road traffic, sea salt and biological particles.

Nitrogen Dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x, largely in the form of nitric oxide which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health, and is a respiratory irritant.

The principal source of nitrogen oxides emissions is road transport, which accounted for about 49 per cent of total UK emissions in 2000. Major roads carrying large volumes of high-speed traffic (such as motorways and other primary routes) are a predominant source, as are conurbations and city centres with congested traffic. In urban areas the contribution from road traffic emissions is therefore greater. For example, road traffic is estimated to account for over 75 per cent of nitrogen oxides emissions in London

Other significant sources of nitrogen oxides emissions are the electricity supply industry, and other industrial and commercial sectors. Emissions from these sources has reduced due to the use of low nitrogen oxides burners, and the increased use of natural gas plant.

Nitrogen oxides are also involved in the formation of low-level atmospheric ozone, which can have an adverse impact upon health. They remain in the atmosphere for approximately one day before they are oxidised to nitric acid, a contributory factor to acid rain.

Ozone is not included in the list of pollutants which have been given air quality objectives. The reason for this is that it is not a 'localised' pollutant. There is little that can be done at local level to control ozone levels.

It is formed by a 'cocktail' of pollutants - nitrogen dioxide and volatile organic compounds - which break down due to the action of sunlight, releasing highly reactive atomic oxygen (O) which reacts with atmospheric oxygen (O_2) to form ozone (O_3).

This reaction takes several hours however, and high ozone concentrations are often found up to 60km downwind of the source of pollution. It is not unusual for ozone in rural areas to build up in the afternoon when pollution from urban areas starts to reach those districts.

A significant proportion of ozone incidents in the UK are thought to be associated with 'imported' pollution, and the way forward is in terms of European and International agreements such as the Solvent Emissions Directive.

Whilst, in the stratosphere, ozone plays an important part in shielding the Earth from the harmful effects of the suns ultraviolet rays, at lower levels of the atmosphere it is an irritant to the eyes and the respiratory system.

Sulphur Dioxide is a corrosive gas which combines with water vapour to create acid rain

It is also associated with aggravation of asthma and chronic bronchitis, particularly when acting in synergy with particulate matter, such as in the infamous London smogs of the 1950's.

The main source of sulphur dioxide emissions in the UK is power stations, which accounted for more than 71 per cent of emissions in 2000. There are also significant emissions from other industrial combustion sources. The reduction in the use of coal as a domestic fuel means that domestic sources now account for just 4 per cent of the total emission, and, along with flue gas desulphurisation in power stations has led to a significant reduction in sulphur dioxide emissions.

Carbon Monoxide is a colourless, odourless and tasteless gas that is produced in the process of combustion, such as the burning of fossil fuels or the operation of a car engine. It is a toxic gas, and if present in high concentrations then it can be fatal. Once emitted into the atmosphere it is slowly oxidised to carbon dioxide.

The main source of carbon monoxide is road traffic, as it is formed by the incomplete combustion of fossil fuels. In 2000, road transport accounted for 67% of UK emissions. However, emissions have been falling steadily since the 1970's (due to improved efficiency and abatement technology in engine design and manufacture) and are expected to continue to decline.