

## List of Monitored Pollutants

### Carbon Dioxide (CO)

Carbon monoxide is a colourless, odourless, poisonous gas that is produced by the incomplete combustion of carbon-containing fuels, such as fossil fuels and other hydrocarbons.

Exposure to very high concentrations of CO may promote the formation of carboxyhaemoglobin in the blood, which reduces the capacity to carry oxygen. Effects are most pronounced in those suffering from an existing disease which affects the delivery of oxygen to the heart or brain.

### Benzene (C<sub>6</sub>H<sub>6</sub>)

Benzene is a volatile organic compound. It is a minor constituent of petrol and is released from petrol-engined vehicle exhausts and due to fugitive emissions from petrol refining and distribution. Small amounts are derived from diesel fuel.

Benzene is a genotoxic human carcinogen, related to excess risk of leukaemia.

### 1,3-Butadiene (C<sub>4</sub>H<sub>6</sub>)

1,3-butadiene is a colourless, flammable gas at room temperature. It is used in industry for the production of rubber, but its main source is from the combustion of petrol and other automotive fuels.

1,3-butadiene is a genotoxic human carcinogen, linked to cancers of the lymphoid system and blood forming tissues, lymphomas and leukaemia.

### Lead (Pb)

Lead is a dense, dull grey, soft and malleable metallic element. It is extracted mainly from the ore galena (lead sulphide - PbS). Particulate lead in air results from activities such as fossil fuel combustion (including vehicles), metal processing industries and waste incineration. Its single largest industrial use world-wide is in the manufacture of batteries. As tetraethyl lead, it has been used for many years as an additive in petrol; however the sale of leaded petrol was banned in the UK on 1 January 2000.

Exposure to very high levels may result in toxic biochemical effects, causing problems in the synthesis of haemoglobin (found in red blood cells) and the

possible inhibition of intellectual development in infants. High levels exposure can also effect the kidneys, gastrointestinal tract, joints and reproductive system, and cause acute or chronic damage to the nervous system.

### **Nitrogen Dioxide (NO<sub>2</sub>)**

Oxides of nitrogen are produced by all combustion processes. These include nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), which together are known as nitrogen oxides (NO<sub>x</sub>). The majority of NO<sub>x</sub> emissions are in the form of NO. NO then reacts with ozone (O<sub>3</sub>) in the atmosphere to produce NO<sub>2</sub> which can give rise to adverse health effects.

About half of the emissions of NO<sub>x</sub> in the UK come from road transport. Other significant contributors are combustible fuel power stations and industry. Road transport has the greatest effect upon low-level NO<sub>x</sub> concentrations. The highest levels are found within a narrow band a few meters wide running alongside the busiest roads.

Short-term exposure to high concentrations of NO<sub>2</sub> may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. Asthmatics are particularly vulnerable.

### **Sulphur Dioxide (SO<sub>2</sub>)**

Sulphur Dioxide is an acidic gas found naturally in releases from volcanoes, oceans, biological decay and forest fires. Man-made sources are the combustion of fossil fuels, smelting, manufacture of sulphuric acid, conversion of wood pulp to paper, incineration of refuse and production of elemental sulphur.

The principal source of this gas in the UK is power stations burning fossil fuels which contain sulphur. The last 40 years have seen a decline in coal burning (domestic, industrial and in power generation) As a result, ambient concentrations of this pollutant in the UK have decreased steadily over this period.

Very high concentrations of SO<sub>2</sub> may constrict respiratory airways by stimulating nerves in the lining of the nose, throat and lung. Asthmatics and those with chronic lung disease will be particularly at risk.

### **Particulate Matter Less Than 10µm In Diameter (PM<sub>10</sub>)**

PM<sub>10</sub> is a complex mixture of organic and inorganic substances present in the atmosphere both as liquids and solids. It can be divided into 3 main groups:

#### Primary Particulates (fine particles)

- Formed by combustion processes;
- Emitted directly to atmosphere;
- <2.5µm diameter.

#### Secondary Particulates (fine particles)

- Formed in atmosphere from reaction between NO<sub>x</sub> and SO<sub>2</sub>;
- <2.5µm depending on humidity.

#### Tertiary Particulates (course particles)

- Formed by non-combustion processes;
- Contain crustal materials from road transport, the construction industry, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles.
- >2.5µm.

The principal source of PM<sub>10</sub> in the UK used to be as a result of domestic coal burning for heating. However, with the introduction of smokeless zones and alternative fuels, the main source of PM<sub>10</sub> is now from diesel engines.

Due to its size, PM<sub>10</sub> penetrates deep into the lungs. Long-term exposure to PM<sub>10</sub> is associated with a marked reduction in life expectancy, primarily due to increased heart and lung disease and lung cancer mortality. Impaired lung function in both children and adults has also been identified. Short-term exposure is associated with increased mortality in susceptible individuals, such as those with asthma and COPD (chronic, obstructive, pulmonary disorder).

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