

# SULFUR DIOXIDE



## What is sulfur dioxide?

Sulfur dioxide (SO<sub>2</sub>) is a colourless gas with a sharp, irritating odour. It is produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores that contain sulfur.

When sulfur dioxide combines with water, it forms sulfuric acid, which is the main component of acid rain. Acid rain can cause deforestation, acidify waterways to the detriment of aquatic life and corrode building materials and paints.

## Why do we measure sulfur dioxide?

Sulfur dioxide can affect the respiratory system, the functions of the lungs and irritate people's eyes.

When sulfur dioxide irritates the respiratory tract it causes coughing, mucus secretion, aggravates conditions, such as asthma and chronic bronchitis, and makes people more prone to respiratory tract infections. It can attach itself to particles and, if these particles are inhaled, these effects are increased.

In Queensland, heavy industry is not as intensive as in Europe and some parts of northern America where the potential for acid rain formation from sulfur dioxide emissions is much higher.

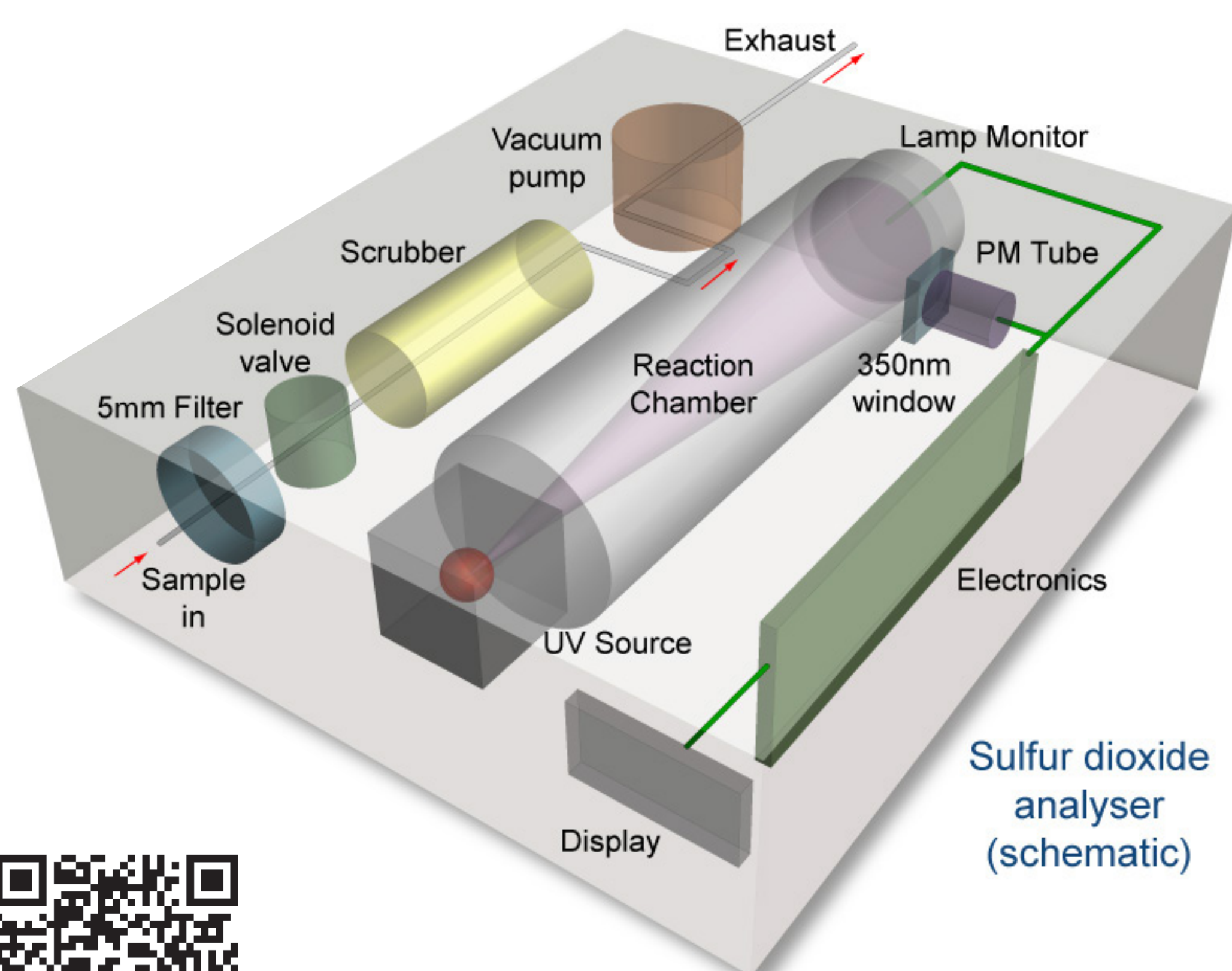
Queensland's weather conditions, and the low sulfur content of Australian fuels also reduce the potential for the formation of acid rain here.

## How do we measure sulfur dioxide?

Analysis of sulfur dioxide is based on fluorescence spectroscopy principles. Sulfur dioxide has a strong ultraviolet (UV) absorption at a wavelength of between 200 and 240 nanometres (nm). The absorption of photons at these wavelengths results in the emission of fluorescence photons at a higher wavelength.

The ambient air sample is first passed through a scrubber to remove chemicals that absorb at the same wavelength as SO<sub>2</sub>. The UV source, a zinc discharge lamp, radiates ultraviolet light at 215 nm into the reaction chamber where it interacts with the SO<sub>2</sub> molecules in the ambient air sample.

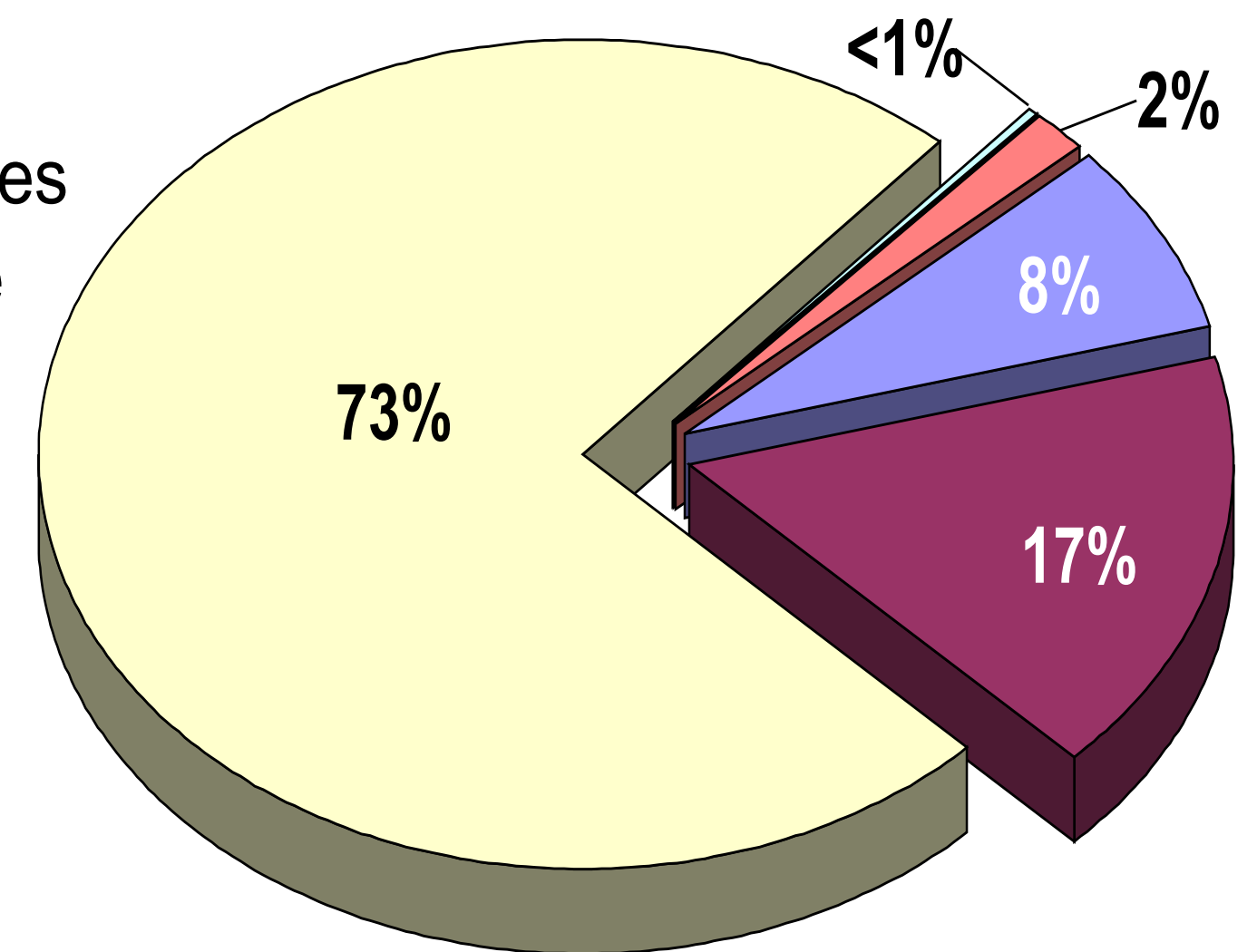
The fluorescence emitted is detected and measured at a right angle to the beam using a photomultiplier (PM) tube. The amount of fluorescence measured is directly proportional to the concentration of sulfur dioxide.



Sulfur dioxide analyser (schematic)

## Sources of sulfur dioxide

- motor vehicles
- other mobile
- industry
- area based
- biogenic
- burning



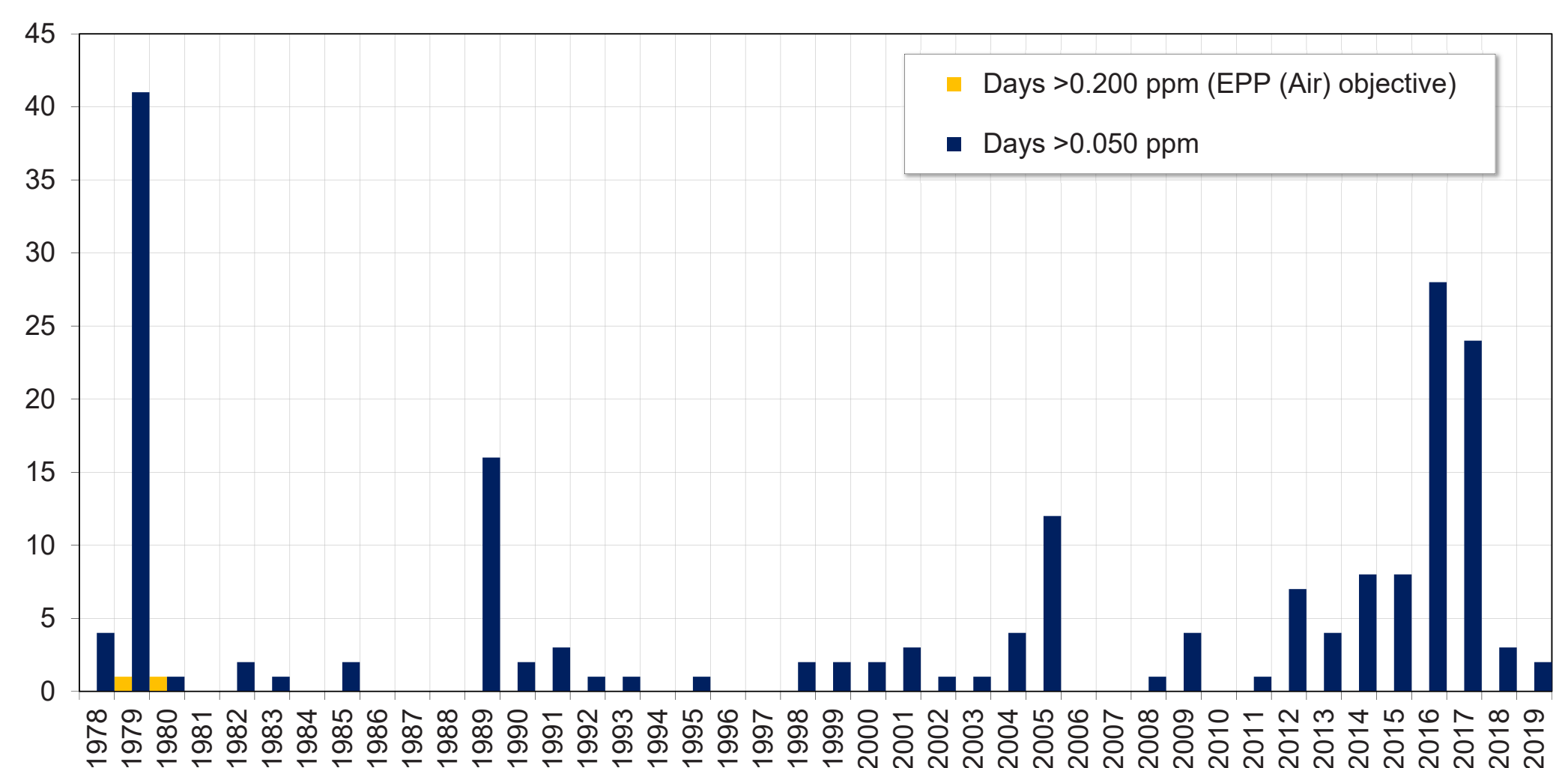
Sulfur dioxide emissions are mostly generated from the burning of fuels containing sulfur. Industrial facilities, particularly power stations and petroleum refineries, contribute most sulfur dioxide emissions into the air in South East Queensland.

Motor vehicle fuels have a low sulfur content compared to those used in industry and shipping. Sulfur dioxide emissions from motor vehicles are low compared to other forms of transport, such as shipping, boating, rail and air travel.

## Air quality standards

The National Environment Protection Measure for Ambient Air Quality (Air NEPM) standard for sulfur dioxide for a one-hour period is 0.20 parts per million (ppm), which is below the concentration where sensitive members of the population would be affected.

## How have sulfur dioxide levels changed?



Sulfur dioxide concentrations in the ambient (outdoor) air in South East Queensland are well below 0.20 ppm.

Levels in South East Queensland have been consistently low due to the small number of sulfur dioxide emission sources in the region.

The small upward trend in recent years reflects the use of oil with a higher sulfur content by refineries located at the Brisbane River mouth.

For more information about air quality in Queensland, visit <http://www.qld.gov.au/environment/pollution/monitoring/air/> or email: [air.sciences@des.qld.gov.au](mailto:air.sciences@des.qld.gov.au)

