

## Justification of an Air Quality Standard for Nitrogen Dioxide

Extract from Department of the Environment (1996), Expert Panel on Air Quality Standards – Nitrogen Dioxide. London: The Stationery Office.

26. The Panel first considered whether there is evidence of a threshold concentration at which adverse health effects of short-term exposure to nitrogen dioxide cannot be detected. We concluded that experimental studies of healthy human beings have shown a threshold above 2000 ppb. People with asthma are clearly more sensitive to the effects of the gas. However, the balance of evidence from experimental inhalation studies suggests that adverse health effects are unlikely to occur in subjects with asthma below a threshold of about 200 ppb.
27. In contrast to these findings, which are based on studies taking place over limited time periods, usually less than two hours, epidemiological studies suggest that adverse health effects may occur at lower concentrations averaged over longer periods of time. These observations are based on levels of nitrogen dioxide recorded at fixed monitoring sites rather than personal exposure measurements and have involved exposures usually of several days or even more prolonged periods. In association with this, the health outcomes in such studies are related to the concentrations of nitrogen dioxide measured one or two days earlier. The Panel have, therefore, taken the view that there may be a lower threshold than is indicated by the short-term experimental studies, possibly as a consequence of a cumulative effect.
28. The Panel discussed the averaging time over which the proposed Standard should be measured and concluded that, since effects on health in experimental studies on people with asthma were detectable within an hour of exposure commencing, an hourly averaging period would be appropriate. In the best judgement of the Panel, ambient outdoor concentrations of nitrogen dioxide in the United Kingdom do not rise to levels at which fit, healthy people will experience adverse effects. However, in order to protect susceptible people, especially those with asthma and other chronic lung diseases, from acute effects we concluded that a figure below 200 ppb, the apparent experimental threshold, would be appropriate. Since the epidemiological studies suggest acute effects below this threshold, we decided that a margin of safety should be applied and recommended a Standard for nitrogen dioxide of 150 ppb measured over one hour.
29. Adherence to the proposed hourly Standard is likely to protect vulnerable people, such as those with asthma, from acute health effects. However, taking account of the epidemiological studies, indoor and outdoor, and the longer exposures that these have entailed, the Panel have concluded that a longer-term Standard is also desirable in order to protect against possible cumulative effects on the health of the population. We believe that the evidence to date is insufficient to decide on an appropriate figure and instead we recommend a strategy of reduction in the annual average concentrations of nitrogen dioxide in our towns and cities, in order to reduce the magnitude of any such effects. Since much new epidemiological evidence on the health effects of nitrogen dioxide will become available over the next few years, we recommend that a long-term Standard is reconsidered within the next three years.