To give effect to the Act, regulations were gazetted in April, 1974. These regulations require the control of smoke emission from all motor vehicles and the control of carbon monoxide, hydrocarbons and oxides of nitrogen from new motor vehicles. In addition a regulation requiring the installation of vertical exhaust pipes, three metres in height, on new diesel vehicles was also gazetted.

Details of the regulations are as follows:—

- Since 19th April, 1974, it has been an offence for a registered motor vehicle to emit smoke which is visible for a continuous period of more than ten seconds.
- Since 1st January, 1974, it has been an offence for new motor vehicles weighing between 0.5 and 2.5 tonnes to emit carbon monoxide during idling at a concentration in excess of 4.5%.
- Since 1st January, 1975, the limit of 4.5% carbon monoxide at idling has applied to all new motor vehicles and new motor cycles.
- Since 1st January, 1974, it has been an offence for new passenger cars and other new motor vehicles with passenger car engines to emit carbon monoxide and hydrocarbons in excess of the values shown in the following table, when tested in accordance with a specified procedure equivalent to the Economic Commission for Europe test procedure.

Weight Tonnes	Carbon Monoxide Grams per test	Hydro-carbons Grams per test
0.5-2.5	100-220	8.0-12.8

- Since 1st January, 1975, new passenger cars and derivatives weighing between 0.5 and 2.5 tonnes have been required to be fitted with a device which prevents the emission of hydrocarbon vapours from the carburettor and petrol tank in excess of two grams, when tested in accordance with a specified procedure equivalent to the United States test procedure.
- From 1st January, 1976, the above regulation will apply to all motor vehicles weighing between 0.5 and 2.5 tonnes.
- From 1st January, 1976, new diesel vehicles weighing more than 2.5 tonnes (other than diesel vehicles which were ordered from the manufacturers prior to 1st July, 1974) are to be fitted with an exhaust pipe which terminates not less than 3 metres above ground. The exhaust pipe is to direct the engine exhaust gases into the atmosphere in an upward direction, within 30 degrees of the vertical, in any direction other than towards the nearside kerb of the road.
- From 1st July, 1976, new motor vehicles weighing between 0.5 and 2.5 tonnes will not be permitted to emit carbon monoxide, hydrocarbons and oxides of nitrogen in excess of the values shown below, when tested in accordance with a specified procedure equivalent to the United States 1973 test procedure:—

Carbon Monoxide	24.2 grams per kilometre
Hydrocarbons	2.1 grams per kilometre
Oxides of Nitrogen	1.9 grams per kilometre

- From 1st January, 1975, the lead content of petrol sold in Sydney, Newcastle and Wollongong has been limited to 0.64 gram per litre maximum.
- From 1st January, 1977, the limit will reduce to 0.45 gram per litre, and from 1st January, 1980, to 0.40 gram per litre.

Enforcement

The regulations are designed to ensure that every new motor vehicle complies with the desired emission standards when it is sold to the public. To establish whether the vehicles comply with the standards, the Commission tests randomly selected vehicles on a chassis dynamometer designed to simulate road conditions.

The penalties for failure to comply with the provisions of the Clean Air Act dealing with motor vehicles are at present $1000 for a corporation and $400 for an individual person. These were increased to $10,000 and $1000 respectively following the amendment of the Clean Air Act proclaimed in May, 1975.

The enforcement approach being used for motor vehicles is similar to that used in the past to control emissions from stationary sources. The owner of an offending vehicle, regardless of whether he is the manufacturer, distributor or private owner, is informed by notice that he has infringed a regulation and is required to take immediate steps to correct the cause of the infringement. If repeated offences occur, the other provisions of the Act, such as prosecution or withholding registration, can be invoked.

Control Strategy

The legislation that has been enacted in New South Wales provides a realistic and enforceable initial basis for dealing with photochemical smog and emissions from motor vehicles. With continued growth in the number of motor vehicles and industries emitting hydrocarbons and oxides of nitrogen, further legislative controls will be needed in the future. Continuing reviews of pollution levels and studies of the photochemical reactions that are occurring in the Sydney atmosphere are being carried out so as to provide the necessary scientific basis for further action.

For the present it has been decided to place emphasis on the reduction of hydrocarbons from motor vehicles (and stationary sources) as a first step in the prevention of photochemical smog, rather than on the reduction of oxides of nitrogen. The technology for this control is well advanced, and such control conserves energy.

Further study may show that the strategy of merely preventing oxides of nitrogen emissions from increasing is not adequate to prevent photochemical smog, and that reductions in atmospheric concentrations of this pollutant, as well as hydrocarbons, are required.

Emissions of carbon monoxide will be substantially reduced as a result of the emission standards for new vehicles that came (or will come) into force in 1974, 1975 and 1976. However, the reductions in atmospheric concentrations of this pollutant will not be adequate to achieve the World Health Organisation long-term goals, and more stringent controls will be necessary beyond 1976.

Recent developments in the design of low-emission engines make it technically feasible to achieve further substantial reductions in the levels of motor vehicle emissions in the future. Despite this, other measures (including some restriction of traffic in central city areas by the construction of roads to divert traffic away from these areas) could well be necessary to achieve satisfactory air quality in Sydney.

AIR POLLUTION FROM MOTOR VEHICLES

STATE POLLUTION CONTROL COMMISSION
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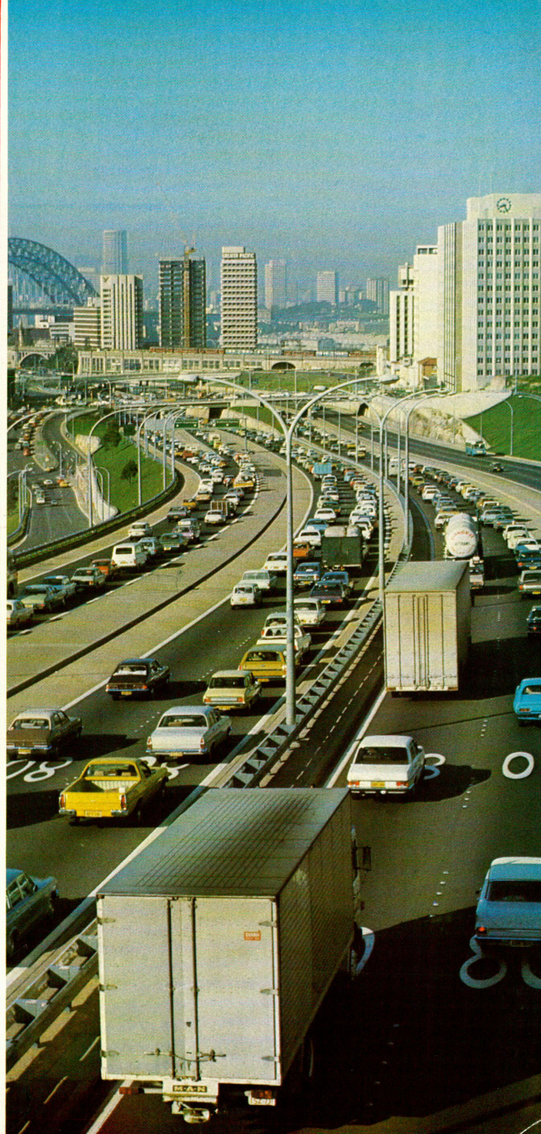

Introduction

Emissions from motor vehicles are the most pressing air pollution problem in New South Wales at the present time. The onset of photochemical smog in Sydney, the high concentrations of carbon monoxide in city streets and the discomfort caused by smoke and odorous emissions are examples of pollution problems to which motor vehicles are major contributors. Potentially harmful emissions of lead compounds and oxides of nitrogen also occur from motor vehicles.

Photochemical Smog

Photochemical smog consists of a number of substances, including ozone, nitrogen dioxide, peroxyacetyl nitrate and small particles termed, collectively, oxidants. These substances are formed in the atmosphere as a result of photochemical reactions between hydrocarbons and oxides of nitrogen, both of which are emitted in large volumes from motor vehicles. Photochemical smog usually occurs on sunny days in the warmer months, when a stationary high pressure system and low early-morning wind speeds also occur.

The effects of photochemical smog include vegetation damage, reduced visibility, rubber cracking and the fading of fabrics. Its main effects on people are irritation of the eyes and throat and more frequent attacks in asthmatics.

In retrospect it is now believed that the deterioration in visibility that occurred in the Sydney basin in the 1960's was at least partly due to the formation of photochemical smog. However, it was not until late in 1970, when measurements were commenced at a site outside the central city area, that substantial oxidant concentrations were recorded. The first incident of vegetation damage occurred in November, 1971, when the maximum hourly oxidant concentration reached 0.17 parts per million, resulting in severe damage to petunia seedlings at a plant nursery at Dundas. Rubber tests strips exposed during the 1973/74 summer also exhibited oxidant damage. Eye irritation has been reported on a few occasions, but these reports did not correlate with the oxidant concentrations recorded at the same time.

The maximum ozone concentrations in the Sydney basin have increased since continuous recordings commenced late in 1970. The maximum value yet reported was 0.28 parts per million in March, 1973. During the same year concentrations above the World Health Organisation long-term goal of 0.06 ppm were recorded on 85 days. Values in excess of 0.15 ppm were recorded on 15 days in 1972 and again in 1973, and adverse effects on plants, fabric and rubber occurred on some of those days. Eye irritation has frequently been reported in Japan and the United States at ozone concentrations above 0.15 ppm, but not so far in Sydney.

Carbon Monoxide

Petrol-engined motor vehicles contribute almost all the carbon monoxide that occurs in the atmosphere in the central city area of Sydney. Surveys conducted in 1968 showed that peak values of 80 ppm and a maximum eight-hours average concentration of 37 ppm occurred.

It was this data which provided the initial impetus for control of motor vehicle emissions in Australia. Continuous measurements of carbon monoxide have been made at the Queen Victoria Building, George Street, Sydney, since 1970, and continuous surveys over periods of three months were carried out in other streets in 1973. The maximum eight-hour concentration yet reported was 49 ppm in 1971, and in 1973 the World Health Organisation long-term goal (9 ppm) was exceeded on no fewer than 220 days.

Carbon monoxide is a toxic gas which when inhaled combines with the haemoglobin of the blood, so displacing oxygen and reducing oxygen transport through the body. There is no conclusive evidence that the uptake of carbon monoxide into the blood from exposure to the atmosphere in city streets causes obvious health damage. However, on the basis of a number of studies, increasing concern is being expressed that carbon monoxide exposure arising from traffic exhaust fumes may be a factor in heart disease. The low value of the long-term goal of 9 ppm recommended by the World Health Organisation reflects the concern of health authorities about the effects of long-term exposure to this pollutant.

Smoke and Odour Emissions

Smoke and odour emissions from motor vehicles, particularly those fitted with diesel engines, cause discomfort to many people. Smoke emissions generally have been associated with respiratory effects on sensitive people, particularly when the smoke is accompanied by gaseous pollutants such as sulphur dioxide. Tests carried out in areas of high traffic density, such as the Sydney Harbour Bridge toll gates, have shown that high concentrations of carcinogenic compounds are contained in the smoke, particularly that from diesel vehicles.

Checking an exhaust for carbon monoxide emission.

Odorous emissions from diesel vehicles are objectionable and cause more complaints from citizens than any other single air pollution cause. Complaints of diesel odours causing nausea are frequently made. As with many odorous substances, the precise compounds involved are unknown. However, detailed scientific and medical knowledge of the causes and effects of odorous emissions is not required before steps towards control are commenced. Their objectionable nature makes the need obvious.

Lead

Lead is a cumulative poison which when inhaled or ingested in sufficient amounts has caused severe health damage and even death. No proof exists that the concentrations that occur in the Sydney atmosphere, which arise mainly from motor vehicle emissions, have yet caused any adverse effects. However, such emissions do add to the total intake of lead and prudence suggests that they should be minimised to the extent that is practicable.

The National Health and Medical Research Council has recommended that action be taken to prevent any increase in lead emissions to the atmosphere. Most developed countries, largely on the grounds of prudence and practicability, have introduced restrictions on the lead content of petrol. Similar action has been taken in New South Wales.

Oxides of Nitrogen

Oxides of nitrogen, predominantly nitric oxide, are emitted from all combustion processes. These gases not only play an important role in the formation of photochemical smog, but also are primary pollutants which can cause adverse health effects.

Nitrogen dioxide formed from the oxidation of nitric oxide is the most damaging, but data on its effects at the low concentrations that occur in the Sydney atmosphere is meagre. The action taken to control oxides of nitrogen will be dominated by the strategy adopted to control photochemical smog. For the present, and again on the grounds of prudence, steps to prevent any increase in these emissions are indicated.

Legislation

The Clean Air Act was amended in November, 1972, to extend its provisions to the control of motor vehicle emissions. The Act contains provisions prohibiting a person or owner from using or selling a motor vehicle if when in operation it emits air impurities in excess of the prescribed standards. It also prohibits the sale or use of a motor vehicle if it is not fitted with the prescribed anti-pollution devices, and requires that such devices be properly maintained.

The Act empowers the Minister to issue orders prohibiting the use of motor vehicles in any area and at any time this is considered necessary. Powers are also included for the making of regulations dealing with the operation, inspection and testing of motor vehicles, and with the fuels used in their operation.