Motor Vehicle Emission Standards

Motor vehicles are a major source of air pollution in the large metropolitan regions of California. Their exhaust contains large quantities of hydrocarbons, oxides of nitrogen and carbon monoxide. Hydrocarbons are also emitted from the crankcase, fuel tank and carburetor. Controlling the emissions of these contaminants from motor vehicles is an essential step in the control of photochemical smog.

Recognizing that control of motor vehicle emissions is a vital part in a total program to improve air quality in California, the State Department of Public Health established a set of standards for the various motor vehicle emissions. These standards provide a technical basis for control programs. The standards define acceptable limits for emissions from an "average" vehicle.

Essentially, the Department based the standards on conditions in Los Angeles. Since air pollution in Los Angeles is known to be the most severe in the state, measures that would provide satisfactory air quality there would be adequate for other regions in the state.

Hydrocarbons and oxides of nitrogen are directly involved in the photochemical reactions in the atmosphere that result in smog. Nitrogen dioxide can also be injurious to health, cause vegetation damage, and impart an undesirable color to the atmosphere.

Carbon monoxide does not participate in the smog reaction, but it is a toxic substance. At sufficiently high concentrations, it can cause sickness. Since more than 95 percent of the carbon monoxide in the atmosphere of Los Angeles is of vehicular origin, control of its emission from motor vehicles should effectively reduce the atmospheric concentration of this contaminant.

The smoke standard was established to provide a guide-line for controlling the local nuisance effect of vehicle smoke.

Definition of Terms

Exhaust Emissions.—Exhaust emissions are defined as substances emitted to the atmosphere from any opening downstream from the exhaust manifold of a motor vehicle engine.

Crankcase Emissions.—Crankcase emissions are defined as substances emitted directly to the atmosphere from any opening leading to the crankcase of a motor vehicle engine. Crankcase gases which are conducted to the engine intake or exhaust systems are not included in the definition of crankcase emissions, but are defined as exhaust emissions.

Carburetor Emissions.—Carburetor Operating Losses: Carburetor operating losses are defined as the vaporized fuel emitted from the carburetor of a motor vehicle engine to the atmosphere while the engine is operating.

Carburetor Hot Soak Losses: Carburetor hot soak losses are defined as the vaporized fuel emitted from the carburetor of a motor vehicle engine to the atmosphere during the hot soak period, i.e., the period which begins immediately after the engine is turned off.

Fuel Tank Emissions.—Fuel tank emissions are defined as the vaporized fuel which escapes to the atmosphere from the fuel tank of a motor vehicle, except during tank filling.

Exhaust Emissions

The standards of emissions of motor vehicle exhaust contaminants are:

Hydrocarbons—275 parts per million by volume as hexane (0.165 mole percent carbon atoms).

Carbon Monoxide—1.5 percent by volume.

Oxides of Nitrogen—350 parts per million by volume as nitrogen dioxide.

However, effective January 1, 1970, the standards of emissions of motor vehicle exhaust will be:

Hydrocarbons—180 parts per million by volume as hexane.

Carbon Monoxide—1.0 percent by volume.

Oxides of Nitrogen—350 parts per million by volume as nitrogen dioxide.

Exhaust gas concentration shall be adjusted to a dry exhaust volume containing 15 percent by volume of carbon dioxide plus carbon monoxide. However, effective January 1, 1970, the exhaust gas concentration shall be adjusted by the ratio of $15/[\frac{1}{2}(\%CO)+\%CO_2+10(\%\ \text{Hydrocarbon})]$.