



knock" additive in gasoline, in ceramics, ammunition, solder, cable coverings, in brass and bronze, and even in certain cosmetics.

Lead in natural deposits, if left undisturbed, is practically immobile in the environment. However, once released from smelters, automobile exhausts, dusts and smoke, it is spread globally. Currently, the most serious source — gasoline — accounts for 68 per cent of global lead emissions of 410 million kilograms a year.

Lead is a highly toxic element to man. Once released in the environment, it does not move readily through natural pathways to more remote locations and has a long environmental persistence compared to other heavy metals. Thus, there is not only widespread human exposure to lead

today but future generations will be exposed to lead which is already in the environment.

Because of its pervasive nature, lead reaches human beings in a number of ways: it may be directly inhaled, or reach the body through food, water, soils or dust. In Canada, the largest single source of lead emissions to the environment comes from automotive emissions.

#### Lead and health

Chronic exposure to low levels of lead in the environment is known to produce such symptoms as fatigue, headache, poor appetite, clumsiness and reduced mental capability. Recently, there has been increasing concern over neurological damage, affecting both intelligence and motor activity, caused by minute amounts of lead taken into the body over several years.

Children, from the fetal stage to about three years, are more susceptible to the adverse effects of lead for a number of reasons. Lead crosses the placental barrier with ease so that exposure may occur during prenatal development, a stage especially prone to the effects of toxic chemicals.

#### Lead in gasoline

Before 1920, all gasolines were lead-free. The discovery that the addition of tetraethyl lead to gasoline increased the octane rating and prevented "knocking" or "pinging" was made in 1921. The practice of adding lead to gasoline soon became entrenched in the technology of both the car manufacturing and the petro-

leum industries throughout the world.

In 1972, approximately 73 per cent of man-made lead emissions released in the Canadian atmosphere was from automobiles using leaded gasoline. However, to meet automobile emission standards for hydrocarbons and carbon monoxide, most manufacturers, since 1975, have been equipping automobiles with a catalytic converter. As converters can only operate effectively with lead-free gasoline — lead damages the catalyst activity — the demand for lead-free gasoline combined with the existing regulations on lead in gasoline led to a decrease in automotive lead emissions from a pre-regulation level of 12 800 tonnes a year in 1972 to 7 000 tonnes in 1982.

The latest national emission inventory, however shows that these emissions are still the largest single source of lead



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releases to the Canadian environment. Reducing the amount of lead in gasoline from 0.77 gram a litre to 0.29 gram a litre will result in reduction of over 60 per cent from 1982 levels of 7 000 tonnes a year. This level will also be adequate to ensure the proper operation of those vehicles and engines which require lead.

During the public review of this issue concerns were expressed by the motoring public and those who own utility machines such as lawnmowers and snow blowers that any further reduction in the current levels of lead in gasoline would seriously jeopardize the safe and efficient operation of the engines. Although lead serves an important role as a lubricant to prevent valve and valve seat wear in marine engines and trucks in heavy-duty use, lead levels can be substantially reduced to as low as 0.15 gram a litre without causing any valve recession problems.



Automobile exhausts account for the largest single source of lead emissions to the Canadian environment — about 410 kilograms a year.