



Minnesota
Pollution
Control
Agency

Metro District,
Operations &
Planning

Health Effects of Motor Vehicle Pollution

February 2000

Many people know that exposure to vehicle exhaust in confined spaces can be dangerous. What people often fail to consider is that even in relatively open spaces, exhaust from thousands of vehicles can be unhealthy, too.

Because of this, the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (EPA) have established standards for the quality of air that surrounds us. Here are some of the health and environmental effects of motor vehicle pollution when air quality standards are not met.

Carbon Monoxide

Probably the most important standard relating to motor vehicle pollution is for carbon monoxide. Carbon monoxide is a colorless, odorless and tasteless gas, so it is impossible to notice until its effects are felt.

The effects of carbon monoxide exposure are due to its ability – 200 times stronger than oxygen's – to combine with hemoglobin in red blood cells. Since hemoglobin carries oxygen throughout the body, high carbon monoxide levels lead to oxygen starvation. This can be especially serious for people with respiratory problems or whose blood vessels are barely able to deliver enough oxygen to body tissues.

Thus, people who are suffering from heart disease like angina pectoris, where insufficient oxygen to the heart muscle creates attacks of chest pain, are sensitive to high carbon monoxide levels.

Another concern is for unborn babies. It appears that carbon monoxide is eliminated more slowly in the fetus than in the mother; therefore, a mother's exposure can result in

higher concentrations in the fetus. Exposure may have serious effects like reduced birth weight, greater risk of death at birth and lower activity levels.

The central nervous system, including the brain, is also sensitive to decreases in the amount of oxygen it receives. If the blood is laden with carbon monoxide rather than oxygen, and the body cannot compensate by increasing blood flow, the affected person may experience a slowing of responses, including reduced alertness, vision, manual dexterity and the ability to perform complex tasks. And once carbon monoxide is in the blood, it is not quickly eliminated. Four hours after high concentrations are reached, only half the carbon monoxide has left the body.

Ozone (Smog)

Ozone, also known as smog, forms when hydrocarbons and nitrogen oxides from vehicle exhaust are exposed to sunlight. (Unlike the protective layer of ozone present in the upper atmosphere, ozone produced at ground level can have serious health effects on people who suffer from lung diseases, asthma or emphysema.)

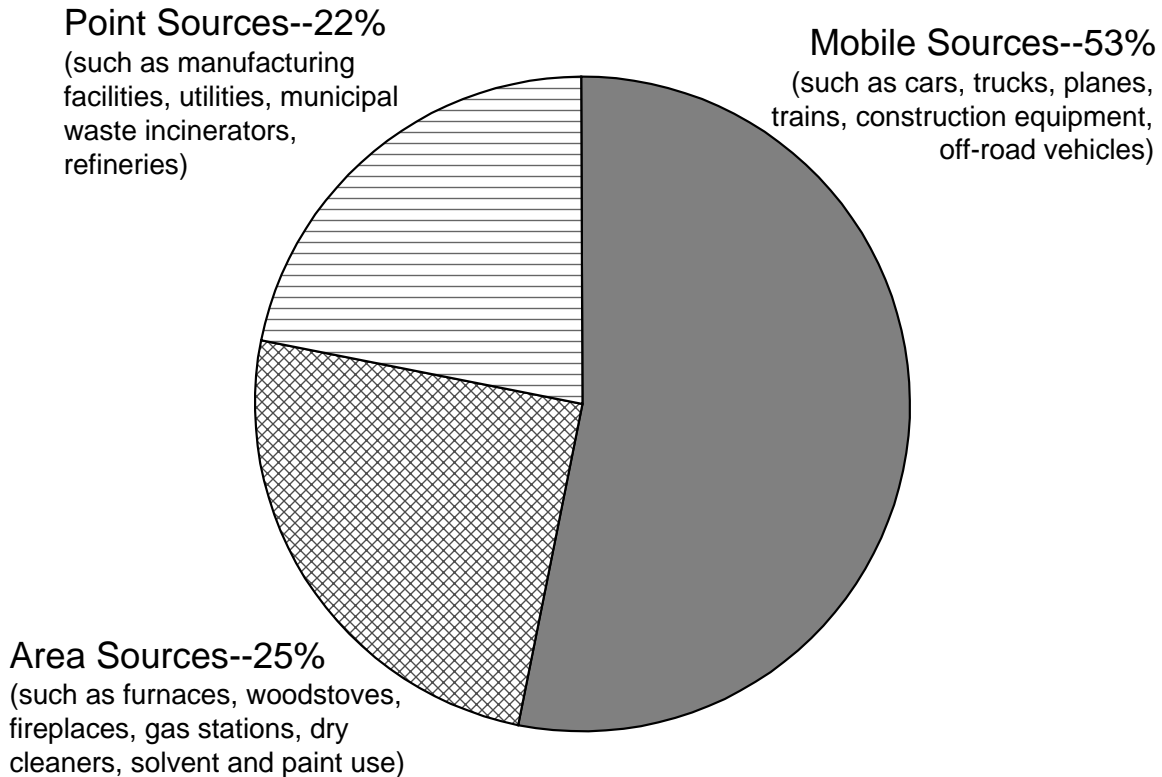
Even healthy people can suffer from exposure to smog, or ground-level ozone. In studies, lung functions of healthy people were limited when they exercised in the presence of ozone. The responses included chest pain, coughing, wheezing, congestion, sore throat and nausea.

Animal studies show that smog actually damages sensitive lung tissue, and this damage continues even after the exposure





Estimated Excess Cancer Risk from Toxic Air Pollutants in Minnesota



Minnesota Pollution Control Agency

has ended. Repeated or continued exposure can create scar tissue causing permanent damage and premature aging of the lungs. Increased susceptibility to respiratory infections may be another harmful effect.

Air Toxics

Air toxics are a category of air pollutant known to cause or suspected of causing cancer, birth defects or other serious health problems after long exposure. In 1998 and 1999, studies by the EPA and MPCA suggested that people across the country, including Minnesota, may have an elevated risk of cancer over a lifetime of inhaling toxic air

pollutants primarily from motor vehicles. (See “Excess Cancer Risk from Toxic Air Pollutants” graph, above.)

Because air toxics tend to enter the air from sources related to fossil fuel use in energy, transportation and manufacturing, urban areas have more frequently been found to have unhealthy levels of air toxics. These areas include the Twin Cities and its surrounding suburbs, and smaller cities such as Rochester, Mankato, Duluth and Alexandria. A few isolated areas in the northeast and northwest parts of the state have also been identified as having unhealthy levels for some of the pollutants.



Pollutants may also cause other non-cancer health effects, such as birth defects, and make existing heart and lung disease worse.

Carbon Dioxide

More than one-quarter of the carbon dioxide emitted into the air is from motor vehicles. Most scientists believe that the steady growth in the amount of carbon dioxide and other gases being released into the air is the major cause of global climate change. Increasing earth temperatures could lead to an increase in the severity of droughts, heat waves and extinction of animal and plant species and damage to coastlines from rising ocean levels.

It all adds up

At certain time and in some areas of the Twin Cities, the ambient levels of pollutants from vehicle exhausts can rise enough to become a health concern. And the problem is not confined to urban areas. Busy intersections in suburban areas can also become “hot spots” for motor vehicle pollutants. In one way or another, we all bear the annual health costs as the result of motor vehicle pollution.

Even people who never visit high-traffic areas can be affected. Studies in which air monitors have been attached directly to individuals have revealed the critical need to consider the total exposures of people who are exposed in many ways throughout the day – in cars, buildings, garages and homes. Studies in Denver and Washington, D.C., have shown that personal exposures to carbon

monoxide exceeded the federal eight-hour standards three times more often than levels measured at outdoor air quality monitors. Exposures increased as commuting times increased, but indoor exposures were also significant.

Indoor carbon monoxide concentrations were highest in public garages, followed by service stations, shopping malls, residential garages, restaurants, offices and auditoriums. The highest outdoor concentrations were observed on motorcycles, followed by concentrations in buses, automobiles and trucks, and on sidewalks and parking lots. While such exposures are usually brief, their effects may linger since carbon monoxide is slow to leave the body.

Where Can I Find Out More?

For more information, contact Becky Helgesen of the MPCA’s Metro District at (651) 282-6244 or toll-free/TDD (800) 657-3864.

For local assistance, contact:

Brainerd	(218) 828-2492
Detroit Lakes	(218) 847-1519
Duluth	(218) 723-4660
Marshall	(507) 537-7146
Rochester	(507) 285-7343