CO - Carbon Monoxide

**What it is and how it gets in the air**

CO is a colorless, odorless gas that can be harmful when inhaled in large amounts. CO is released when something is burned. The greatest sources of CO to outdoor air are cars, trucks and other vehicles or machinery that burn fossil fuels. A variety of items in your home such as unvented kerosene and gas space heaters, leaking chimneys and furnaces, and gas stoves also release CO and can affect air quality indoors.

**Health Effects**

Breathing air with a high concentration of CO reduces the amount of oxygen that can be transported in the blood stream to critical organs like the heart and brain.

At very high levels, which are possible indoors or in other enclosed environments, CO can cause dizziness, confusion, unconsciousness and death.

NO2 - Nitrogen Dioxide

**What it is and how it gets in the air**

Nitrogen Dioxide (NO2) is one of a group of highly reactive gases known as oxides of nitrogen or nitrogen oxides (NOx). Other nitrogen oxides include nitrous acid and nitric acid. NO2 is used as the indicator for the larger group of nitrogen oxides.

NO2 primarily gets in the air from the burning of fuel. NO2 forms from emissions from cars, trucks and buses, power plants, and off-road equipment.

**Health Effects**

Breathing air with a high concentration of NO2 can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to emergency rooms. Longer exposures to elevated concentrations of NO2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO2.

O2 - Ozone

**Ground-Level Ozone**

Ozone at ground level is a harmful air pollutant, because of its effects on people and the environment, and it is the main ingredient in “smog."

## **How does ground-level ozone form?**

Tropospheric, or ground level ozone, is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC). This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight.

### **What are the health effects of ozone?**

Ozone in the air we breathe can harm our health, especially on hot sunny days when ozone can reach unhealthy levels. People at greatest risk of harm from breathing air containing ozone include people with asthma.

SO2 - Sulfur Dioxide

### **What is SO2?**

EPA’s national ambient air quality standards for SO2 are designed to protect against exposure to the entire group of sulfur oxides (SOx). SO2 is the component of greatest concern and is used as the indicator for the larger group of gaseous sulfur oxides (SOx). Other gaseous SOx (such as SO3) are found in the atmosphere at concentrations much lower than SO2.

Control measures that reduce SO2 can generally be expected to reduce people’s exposures to all gaseous SOx. This may have the important co-benefit of reducing the formation of particulate sulfur pollutants, such as fine sulfate particles.

Emissions that lead to high concentrations of SO2 generally also lead to the formation of other SOx. The largest sources of SO2 emissions are from fossil fuel combustion at power plants andother industrial facilities.

### **How does SO2 get in the air?**

The largest source of SO2 in the atmosphere is the burning of fossil fuels by power plants and other industrial facilities. Smaller sources of SO2 emissions include: industrial processes such as extracting metal from ore; natural sources such as volcanoes; and locomotives, ships and other vehicles and heavy equipment that burn fuel with a high sulfur content.

### **What are the health effects of SO2?**

Short-term exposures to SO2 can harm the human respiratory system and make breathing difficult. People with asthma, particularly children, are sensitive to these effects of SO2.

SO2 emissions that lead to high concentrations of SO2 in the air generally also lead to the formation of other sulfur oxides (SOx). SOx can react with other compounds in the atmosphere to form small particles. These particles contribute to particulate matter (PM) pollution. Small particles may penetrate deeply into the lungs and in sufficient quantity can contribute to health problems.

PM 10/2.5 - Particulate Matter 10 μm and 2.5 μm

**What is PM, and how does it get into the air?**

PM stands for particulate matter (also called particle pollution): the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Particle pollution includes:

PM10 : inhalable particles, with diameters that are generally 10 micrometers and smaller; and

PM2.5 : fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

How small is 2.5 micrometers? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle.

### **Sources of PM**

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals.

Some are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires.

Most particles form in the atmosphere as a result of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides, which are pollutants emitted from power plants, industries and automobiles.

## **What are the Harmful Effects of PM?**

Particulate matter contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems. Some particles less than 10 micrometers in diameter can get deep into your lungs and some may even get into your bloodstream. Of these, particles less than 2.5 micrometers in diameter, also known as fine particles or PM2.5, pose the greatest risk to health.

Fine particles are also the main cause of reduced visibility (haze) in parts of the United States, including many of our treasured national parks and wilderness areas.

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