



## Health Impacts from Air Pollutants

The following air pollutants are commonly associated with industrial and vehicular emissions:

**Ozone (O<sub>3</sub>)** - Ground level ozone is what most people refer to as smog. It "...can increase the frequency of asthma attacks, cause shortness of breath, aggravate lung diseases, and cause permanent damage to lungs through long-term exposure. Elevated ozone levels are linked to increases in hospitalizations, emergency room visits and premature death." (EPA - CAA overview, 2019)

Ozone can:

- Make it more difficult to breathe deeply and vigorously.
- Cause shortness of breath, and pain when taking a deep breath.
- Cause coughing and sore or scratchy throat.
- Inflammate and damage the airways.
- Aggravate lung diseases such as asthma, emphysema, and chronic bronchitis.
- Increase the frequency of asthma attacks.
- Make the lungs more susceptible to infection.
- Continue to damage the lungs even when the symptoms have disappeared.
- Cause chronic obstructive pulmonary disease (COPD)." (EPA, 2019)

**Nitrogen Oxides (NO<sub>x</sub>)** - React with Sulfur Dioxide in the presence of sunlight to create ground level ozone, or smog.

**Sulfur Dioxide (SO<sub>2</sub>)** - Reacts with Nitrogen Oxides in the presence of sunlight to create ground level ozone, or smog.

"Both [sulfur dioxide and nitrogen dioxide]... cause multiple adverse respiratory effects including increased asthma symptoms, and are associated with increased emergency department visits and hospital admissions for respiratory illness. Both pollutants cause environmental damage, and are byproducts of fossil fuel combustion." (EPA - CAA overview, 2019).

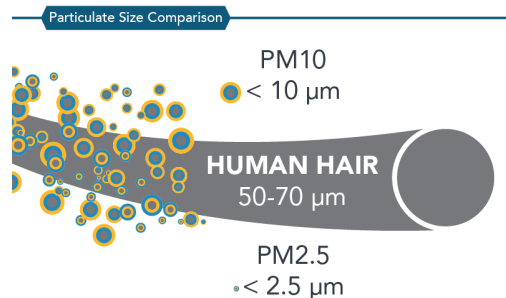
**Particulate Matter (PM<sub>10</sub> & PM<sub>2.5</sub>)** - "Both PM<sub>2.5</sub> and PM<sub>10</sub> can be inhaled, with some depositing throughout the airways, though the locations of particle deposition in the lung depend on particle size. PM<sub>2.5</sub> is more likely to travel into and deposit on the surface of the deeper parts of the lung, while PM<sub>10</sub> is more likely to deposit on the surfaces of the larger airways of the upper region of the lung. Particles deposited on the lung surface can induce tissue damage, and lung inflammation. Several adverse health



impacts have been associated with exposure to both  $PM_{2.5}$  and  $PM_{10}$ . For  $PM_{2.5}$ , short-term exposures (up to 24-hours duration) have been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. These adverse health effects have been reported primarily in infants, children, and older adults with preexisting heart or lung diseases. In addition, of all of the common air pollutants,  $PM_{2.5}$  is associated with the greatest proportion of adverse health effects related to air pollution, both in the United States and world-wide based on the World Health Organization's [Global Burden of Disease Project](#). Short-term exposures to  $PM_{10}$  have been associated primarily with worsening of respiratory diseases, including asthma and chronic obstructive pulmonary disease (COPD), leading to hospitalization and emergency department visits.”

“Long-term (months to years) exposure to  $PM_{2.5}$  has been linked to premature death, particularly in people who have chronic heart or lung diseases, and reduced lung function growth in children. The effects of long-term exposure to  $PM_{10}$  are less clear, although several studies suggest a link between long-term  $PM_{10}$  exposure and respiratory mortality. The International Agency for Research on Cancer (IARC) published a [review](#) in 2015 that concluded that particulate matter in outdoor air pollution causes lung cancer.” (California Air Resources Board – Inhalable Particulate Matter and Health, 2020)

“...scientific evidence shows that long- and short-term exposures to fine particle pollution, also known as fine particulate matter ( $PM_{2.5}$ ), can cause premature death and harmful effects on the cardiovascular system, including increased hospital admissions and emergency department visits for heart attacks and strokes. Scientific evidence also links PM to harmful respiratory effects, including asthma attacks.” (EPA - CAA overview, 2019)





**Volatile Organic Compounds (VOCs)** - The Texas Commission on Environmental Quality defines them as "secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans." (TCEQ - Definitions of terms used by Superfund, 2020)

List of common VOCs:

<https://www.atsdr.cdc.gov/substances/toxchemicallisting.asp?sysid=7>

(ASTDR – Toxic Substances Portal, 2008)

Overexposure to VOCs can cause a wide variety of health problems from short-term effects like dizziness and unconsciousness to long-term effects such as neurological problems, reproductive issues and cancer.

**Carbon Monoxide (CO)** - "Very high levels of CO are not likely to occur outdoors. However, when CO levels are elevated outdoors, they can be of particular concern for people with some types of heart disease. These people already have a reduced ability for getting oxygenated blood to their hearts in situations where the heart needs more oxygen than usual." (EPA, 2016).

"The entire nation meets the carbon monoxide air quality standards, largely because of emissions standards for new motor vehicles under the Clean Air Act." (EPA - CAA Overview, 2019).

**Lead (Pb)** - "Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood." (EPA, 2017).

Most of the nation "...meets national air quality standards except in areas near certain large lead-emitting industrial facilities. Lead is associated with neurological effects in children, such as behavioral problems, learning deficits and lowered IQ, and high blood pressure and heart disease in adults." (EPA - CAA Overview, 2019).



## Sources:

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- “Basic Information about Lead Air Pollution.” *EPA*, Environmental Protection Agency, 29 Nov. 2017, [www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution](http://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution).
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