Facts about Particle Pollution

April 2008

What is particle pollution?

Particle pollution, called particulate matter or PM, is a combination of tiny specks of soot, dust, and aerosols that are suspended in the air we breathe.

- **Particles are made up of different things**. "A mixture of mixtures" is how the U.S. Environmental Protection Agency (EPA) describes them.[1] PM can be solids, like dust, ash, or soot. PM can also be sulfate, nitriate, or carbonaceous aerosols.
- **Particles are different sizes**. The ones of most concern are small enough to lodge deep in the lungs where they can do serious damage. They are measured in microns. The largest of concern are 10 microns in diameter or smaller (PM_{10}). Fine particles are 2.5 microns in diameter or smaller ($PM_{2.5}$). Even smaller ultrafine particles can pass from the lung into the bloodstream just like oxygen molecules. By comparison, the diameter of a human hair is huge—it's 70 microns.
- **Particles come from different sources**. Burning fuel is a major source of the smallest types of particle pollution —whether from woodstoves, diesel trucks and buses, or coal-fired power plants. Larger particles also come from other sources, including construction, agricultural practices, and mining.

What are the health effects of particle pollution?

Short-term increases (over hours to days) in particle pollution have been linked to:

- death from respiratory and cardiovascular causes, including strokes[2,3,4]
- increased numbers of heart attacks, especially among the elderly and in people with heart conditions;[5]
- inflammation of lung tissue in young, healthy adults;[6]
- increased hospitalization for cardiovascular disease, including strokes;[7,8]
- hospitalization for asthma among children; and[9,10,11]
- aggravated asthma attacks in children.[12]

Year-round exposure to particle pollution has also been linked to:

- increased hospitalization for asthma attacks in children living near roads with heavy truck or trailer traffic;[13]
- stunted lung function growth in children and teenagers; [14,15]
- significant damage to the small airways of the lungs;[16]
- increased risk of heart attacks and strokes in older women;[17]
- increased risk of dying from lung cancer; and[18]
- greater risk of death from cardiovascular disease.[19]

How serious is the impact?

Here's one example: EPA scientists estimated that over **4,700 premature deaths occur each year in just nine cities** analyzed (Detroit, Los Angeles, Philadelphia, Pittsburgh, St. Louis, Boston, Phoenix, Seattle, and San Jose) even if those cities all met the current $PM_{2.5}$ standard.[20] Other studies have estimated the nationwide death toll to be tens of thousands annually.[21]

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Who is at risk?

Anyone may be affected by particle pollution, but several groups are most at risk:

- Children under 18;
- Adults 65 and older;
- Anyone with chronic lung disease, such as asthma, chronic bronchitis, or emphysema;
- Anyone with a cardiovascular disease, such as high blood pressure, coronary artery disease, or congestive heart failure; and
- Anyone with diabetes. [22]

How can you protect yourself and your family?

- **Check daily air quality levels and air pollution forecasts in your area**. Sources include local radio and TV weather reports, newspapers and online at www.epa.gov/airnow/. In some areas you can have the information emailed or sent to your cell phone.
- **Don't burn wood or trash**. Burning firewood and trash are among the major sources of particle pollution in many parts of the country. If you must use a fireplace or stove for heat, convert your woodstoves to natural gas, which produces far fewer emissions.
- **Avoid exercising outdoors when pollution levels are high**. Walk indoors in a shopping mall or gym or use an exercise machine. Always avoid exercising near high traffic areas. Limit the amount of time your child spends playing outdoors when the air quality is unhealthy.
- **Encourage your child's school district to reduce school bus emissions**. Most buses use heavily polluting diesel engines; newer fuels and engines are cleaner. Many school systems are using the EPA's Clean School Bus Campaign to clean up these dirty emissions. Schools can also forbid buses from idling at the building, to keep exhaust levels down.
- **Don't smoke or allow anyone to smoke indoors**. Cigarette smoke produces large amounts of particle pollution among its many toxic components.

What should be done to protect the public from particle pollution?

- **EPA needs to require old, dirty coal-fired power plants and industrial boilers to become cleaner, sooner**. EPA needs to tell these large plants that they must reduce their emissions that help form the smallest particles. Some states are considering stronger requirements that could reduce emissions even more.
- **Communities need to clean up old diesel equipment**. New diesel buses, trucks, and heavy equipment are cleaner than ever, thanks to clean up requirements EPA has put in place in the last decade. Diesel fuels are also much cleaner. However, old diesel engines last a long time. Diesel engines in school buses, highway trucks, and other equipment continue to operate for hundreds of thousands of miles, threatening the health of millions—especially those on or near highways—with dangerous exposure to diesel exhaust. Each community should move rapidly to retrofit and replace old diesel school buses and other equipment in the public diesel fleet.

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- **EPA needs to set more protective national air quality standards for particle pollution.** The national air quality standards are the clean air goals that the states and counties must reach. They drive all the federal, state, and local measures to clean up air pollution. EPA is currently reviewing the air quality standards for particle pollution. The American Lung Association and other public health and medical societies support strengthening the limits on fine particle pollution.[23]

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[23] See more information on the American Lung Association recommendations at http://www.cleanairstandards.org/.