

Particulate Matter:

The Facts



T A K E C A R E O F T E X A S . O R G

GI-274 (rev. 2/19)

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What is PM?

Particulate matter is a complex mixture of small particles and liquid droplets in the air. These particles can be made up of acids, organic chemicals, metal, dust, or soil. PM differs in many ways, including source, size, and composition. For example, particle pollution can be composed of natural coarse particles that are large and dark enough to be visible to the naked eye (e.g., dust) or fine particles from human activities that are extremely small and only visible through an electron microscope (e.g., particles released from cooking).

PM is regulated under two categories and includes PM₁₀, coarse particulate matter, and PM_{2.5}, fine particulate matter. PM₁₀ consists of particles that are 10 micrometers or less in diameter. PM_{2.5} consists of particles that are 2.5 micrometers or less in diameter. By comparison, the average diameter of human hair is 70 micrometers.

PM is a concern for both outdoor and indoor air quality. Except during windy conditions, coarse particles generally remain in the atmosphere for only a short time and are quickly removed by gravity. In contrast, fine particles may remain in the air for long periods (days to weeks) and can travel hundreds or thousands of miles away from their sources. The federal Clean Air Act requires the United States Environmental Protection Agency (EPA) to set outdoor air quality standards, including those for PM, to protect both public health (including sensitive groups) and the public welfare (for example: visibility or damage to crops and vegetation). The Texas Department of State Health Services (DSHS) issues guidelines addressing indoor air quality.

What are the health effects of PM?

Healthy people are unlikely to be affected by the low levels of particles present in outdoor air in Texas. Sensitive groups, such as the elderly, children, and those with diabetes, heart disease, or respiratory disease are potentially more likely to be affected by elevated levels of particle pollution.

Both particle size and composition appear to be related to the potential for PM to cause health problems. Scientific studies indicate that particles less than 2.5 micrometers in diameter are generally more harmful to human health than larger particles because they can be inhaled deeper into the lungs. Some scientific studies have suggested that exposure to high concentrations of some types of PM may be associated with potential adverse short- and long-term health effects, including:

- irregular heartbeat
- aggravated asthma
- decreased lung function
- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing
- increased blood coagulation factors that may contribute to increased risk of heart attack and stroke
- premature death in people with heart or lung disease

These associations are much less certain at concentrations at or below the current standard set by the EPA for PM in outdoor air. The EPA sets a 24-hour National Ambient Air Quality Standard of 150 micrograms per cubic meter for PM₁₀ and a 24-hour and annual NAAQS of 35 and 12 micrograms per cubic meter, respectively, for PM_{2.5}. Adverse short- and long-term effects are not expected to occur if people, including those in sensitive subpopulations, are exposed to levels of PM_{2.5} and PM₁₀ below their respective NAAQS.

How does PM affect the environment?

When PM is present in the air, it can absorb and reflect sunlight. This reduces clarity in the air and can cause haze, which may worsen in humid conditions. In addition, elevated PM can damage buildings, lakes and streams, and crops and plant life.

Where can I see daily PM levels in my area?

The TCEQ offers continuous ambient monitoring data from stations located at multiple sites. By visiting the TCEQ website, the public can view the latest hourly data <tceq.texas.gov/goto/pm2-5>. Other PM monitors collect a sample that must be analyzed in a laboratory. Once the results are received from the laboratory, these data are available at <tceq.texas.gov/goto/tamis>.

The TCEQ also offers air quality forecasts that include PM for nine metropolitan areas across the state. The public can subscribe at no cost to receive forecast e-mails at <public.govdelivery.com/accounts/TXTCEQ/subscriber/new>.

The EPA also maintains a website that uses Texas' monitors to forecast the quality of the air using a scale called the Air Quality Index. The AQI is on a scale of 0 to 500, with 100 corresponding to the NAAQS set by the EPA. Generally, a higher AQI value means a higher level of air pollution and a greater potential health concern for certain subsets of the general population. These forecasts can be found on the EPA's Air Now webpage at <airnow.gov>.

How can I reduce my exposure to PM?

If you are among those who are especially sensitive to PM and your activity involves prolonged or heavy exertion, you may want to reduce how long you spend exercising in areas with elevated PM or consider activities that involve less exertion. For example, go for a walk instead of a jog, or plan outdoor activities for days when ambient particulate levels are lower.

The highest outdoor levels of PM are generally near roadways or dusty areas, so you may want to avoid exercising in those areas. In addition, sensitive persons should use their best judgment and avoid other sources of PM, such as smoke from cigarettes, diesel exhaust, outdoor fires, wood or gas stoves, and candles. You should also avoid standing in front of smoke from any fire.

What is being done about outdoor PM?

The EPA reviews the health-based standard for PM and, based on those reviews, may change the standard. In December 2012, the EPA lowered the primary annual NAAQS for PM_{2.5} to 12.0 micrograms per cubic meter, while retaining the existing standards for PM₁₀.

The EPA estimates that reductions from federal and state rules that have already been finalized will help 99 percent of counties with monitors meet the newer, more stringent standard. Based on the most recent monitoring data, all areas of Texas are attaining the standard for PM_{2.5}. Harris County has monitored values closest to the revised PM_{2.5} standard; however, the highest annual PM_{2.5} levels have steadily decreased by 24 percent from 2008 to 2014. The improvements in air quality for particulate pollution have been achieved by TCEQ regulatory and voluntary efforts in cooperation with local governments, industry, and citizens.

Learn more about Texas air quality successes and how you can do your part at <TakeCareOfTexas.org/air-quality>.

What about indoor air quality?

The EPA has identified and characterized significant risks to public health from indoor environmental contaminants that are commonly found in homes, schools, offices, and other buildings where, on average, Texans are spending about 90 percent or more of their time. It is possible for indoor levels of air pollutants to reach up to two to five times higher, and occasionally even 1,000 times higher, than outdoor levels—according to the DSHS.

Common indoor air contaminants include radon, tobacco smoke, cleaning products, chemicals in upholstery foam, mold, combustion by-products, and volatile organic compounds.

Building systems, such as heating, ventilating, and air conditioning, also have a direct influence on the type and amount of exposure occupants may experience from environmental contaminants indoors.

For more information on indoor air quality visit:

- EPA, Indoor Air Quality—<epa.gov/iaq/>
- DSHS—<dshs.state.tx.us/iaq/>

Should I limit exercise and stay indoors because of PM concentrations?

The World Health Organization ranks physical inactivity as a major risk factor for heart disease, breast cancer, colon cancer, and diabetes. The Centers for Disease Control and Prevention found that 27.2 percent of adults and 16.6 percent of youth in Texas were inactive in 2014. For children, the risks of obesity are well documented.

Many people engage in physical exercise to prevent disease and obesity. Individuals must consider those benefits when making choices about whether to follow the EPA's recommendation to limit exercise outdoors and stay indoors because of concentrations of PM in ambient air.

A personal decision to limit outdoor activities should consider more than PM levels because there are other conditions that can increase health risks, such as high heat and humidity.

For more information on obesity risks, visit:

- Childhood Obesity Facts—<cdc.gov/obesity/data/childhood.html>
- Physical Activity for a Healthy Weight—<cdc.gov/healthyweight/physical_activity/>
- State Indicator Report on Physical Activity—<cdc.gov/physicalactivity/resources/state-action-guides.html>

What can I do to reduce PM in my area?

There are several things that you can do to reduce PM in your area:

- Set your thermostat a little higher in the summer and lower in winter.
- Participate in local energy-conservation programs.
- Keep car, boat, and other engines properly tuned, and repair engines that smoke.
- Avoid driving, or slow your vehicle speed, on dirt and unpaved roads.
- Carpool, use public transportation, bike, or walk when possible.

- Combine errands to reduce cold starts of your car and avoid extended idling.
- Consider using gas logs instead of wood in your fireplace or burn only dry, seasoned wood.
- Mulch or compost leaves and yard waste instead of burning.

Learn how to do your part to keep our air clean at <TakeCareOfTexas.org>.

How can I sign up to receive e-mail and text alerts?

You can subscribe to e-mail alerts about the TCEQ's air quality forecast, and text or e-mail alerts about other topics at <tceq.texas.gov/airquality/monops/ozone_email.html>.

You can also sign up to receive e-mail alerts through the EPA's EnviroFlash website at <enviroflash.info/>.

Related Web pages

- EPA General Page on Particulate Matter: <epa.gov/pm-pollution/particulate-matter-pm-basics>
- NAAQS for Particulate Matter: <epa.gov/criteria-air-pollutants/naaqs-table>
- TCEQ PM2.5 Data: Soot, Dust, Smoke: <tceq.texas.gov/agency/data/pm25.html>
- Take Care of Texas encourages all Texans to help keep our air and water clean, conserve water and energy, and reduce waste—<TakeCareOfTexas.org>
- Sign up for *Take Care of Texas News You Can Use*—a free monthly e-newsletter—at <TakeCareOfTexas.org/newsletter>

For More Information

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