

FACT SHEET



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Criteria Pollutants: Particulate Matter (PM_{2.5}/PM₁₀)

Office of Air Quality - Air Programs Branch

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Description:

- Particulate matter (PM) is a complex mixture of particles, including dust, dirt, soot, smoke, and liquid droplets that are found in the air in sizes small enough to be inhaled. PM is also referred to as particle pollution.
- Coarse particles that are larger than 2.5 micrometers and smaller than 10 micrometers in diameter are referred to as PM₁₀. Fine particles that are 2.5 micrometers or smaller in diameter are referred to as PM_{2.5}. For comparison, the diameter of a human hair is approximately 70 micrometers.
- PM comes from many different sources, including residential-combustion activities (e.g., furnaces, air conditioners, wood fireplaces, and outdoor hydronic heaters). PM is also created from industrial-combustion activities (e.g., large boilers, process heaters and incinerators, and vehicle exhaust). Some particles are emitted directly into the air from cars, trucks, buses, homes, factories, construction sites, unpaved roads, stone crushing, and wood burning. Other particles are formed in the air as sunlight and water vapor chemically react with gases emitted from fuel combustion. The composition of particles varies widely.

National Ambient Air Quality Standards (NAAQS) for PM:

- The federal Clean Air Act (CAA) requires United States Environmental Protection Agency (U.S. EPA) to set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants that are considered harmful to public health and the environment. These include PM, as well as carbon monoxide, lead, nitrogen dioxide, ozone at ground level, and sulfur dioxide.
- The NAAQS set limits for the criteria pollutants in the ambient air. Limits established to protect human health are referred to as “primary standards.” Limits established to prevent environmental damage are referred to as “secondary standards.”
- The CAA requires periodic review of the science upon which the NAAQS are based, as well as the standards themselves. Primary and secondary NAAQS were first established in 1971 for total suspended particles (TSP). Standards for PM₁₀ were first established in 1987. Standards for PM_{2.5} were first established in 1997. The most recent revision to the PM standards was in December 2012, when U.S. EPA lowered the primary annual standard for PM_{2.5}.
- The primary and secondary PM_{2.5} standards include annual and 24-hour, or daily, standards. To attain the PM_{2.5} standards, air quality must meet both the annual and the 24-hour standards.
 - The primary annual PM_{2.5} standard is set at 9 micrograms per cubic meter (µg/m³) of air for the annual mean. To attain this standard, the three-year average of annual mean concentrations cannot exceed 9 µg/m³.
 - The secondary annual PM_{2.5} standard (used for visibility analyses) is set at 15 µg/m³ of air for the annual mean. To attain this standard, the three-year average of annual mean concentrations cannot exceed 15 µg/m³.

- The primary and secondary 24-hour PM_{2.5} standards are set at 35 µg/m³ of air for 24-hour concentrations. To attain the standards, the three-year average of the 98th percentile of 24-hour concentrations cannot exceed 35 µg/m³.
- The primary and secondary PM₁₀ standards are set at the level of 150 µg/m³ of air for 24-hour concentrations. To attain the standards, PM₁₀ measured over a 24-hour period cannot exceed the level more than once per year on average over three years.
- U.S. EPA designates areas that meet the standards as "attainment" and areas that violate the standards as "nonattainment." Nonattainment areas must take steps to attain the standards. U.S. EPA uses three complete, consecutive years of air quality monitoring data to determine whether air quality meets the standards.

Environmental Impacts:

- PM affects both human health and the environment. Elevated levels can occur year-round.
- Breathing PM can cause health problems for anyone. PM_{2.5} is so small that the particles can be inhaled deep into the lungs and are difficult to exhale. Sensitive groups such as the very young, the elderly, and those with heart or lung disease may be particularly vulnerable to ill health effects from exposure. Significant health problems linked to breathing PM include:
 - Aggravated asthma.
 - Increased respiratory symptoms such as wheezing, coughing, and difficult or painful breathing.
 - Chronic bronchitis.
 - Decreased lung function.
 - Premature death.
- PM can be carried long distances by the wind and affect areas far from the source.
- Depending on its chemical composition, PM can affect surface water, soil, and ecosystems; damage sensitive forests and farm crops; contribute to the effects of acid rain; and stain and damage stone and other materials, causing aesthetic damage to landmarks and municipal property.
- PM_{2.5} is a major cause of reduced visibility and haze in parts of the U.S.

IDEM's Role:

The Indiana Department of Environmental Management (IDEM) is responsible for protecting human health and the environment while providing for safe industrial, agricultural, commercial, and governmental operations vital to a prosperous economy. IDEM works in many ways to improve air quality and protect public health:

- Implements federal, regional, and state control measures and regulations.
- Operates an extensive air quality monitoring network to gather data on pollutants in the ambient air, identify air quality trends, and provide quality assured data to U.S. EPA for air quality designations.
- Issues daily "SmogWatch" air quality forecasts for PM_{2.5}, shares data with local, state, and regional forecasting partners, and provides data for U.S. EPA's AirNow website and the National Air Quality Index (AQI), a daily air quality report.
- Issues Air Quality Action Day (AQAD) advisories when air quality may be unhealthy for PM_{2.5}, to inform the public about ways to reduce harmful exposure and protect sensitive groups. AQADs for PM_{2.5} can occur anytime of the year.
- Issues permits to regulated sources that detail restrictions on PM emissions.
- Works with communities in nonattainment areas to implement programs to achieve the standards as quickly as possible.

- Educates citizens and businesses about their roles in improving air quality.

Citizen's Role:

There are many actions every citizen can take to reduce their contribution or exposure to PM:

- Stay informed by monitoring IDEM's "SmogWatch" website and air quality forecasts from your local news. When AQAD advisories are issued for your area, follow the tips to limit exposure for yourself or others who may be affected.
- Avoid using leaf blowers and other dust-producing equipment.
- Drive slowly on unpaved roads and other dirt surfaces.
- Compost leaves, twigs, and other yard waste instead of burning them. Avoid unnecessary open burning of vegetation, clean wood waste, and charcoal. Never open burn household trash.
- Keep automobiles properly maintained, including tire pressure.
- Carpool, walk, bike, or use public transportation when possible.
- Avoid idling by turning off the engine while waiting in drive-thru lanes (banks or restaurants) or picking up children from school. Combine errands when possible and avoid fast-starts.
- Reduce home energy consumption by turning off lights, televisions, and other appliances when not in use, to reduce emissions from energy production. Set your thermostat lower in the winter and higher in the summer. Insulate your home as best you can. Use energy efficient lighting and appliances, such as those with the ENERGY STAR® label.

Additional Information:

- IDEM's website provides additional information concerning air quality, including:
 - Daily SmogWatch air quality forecasts: smogwatch.IN.gov. Sign up for email or text message alerts at: <https://apps.idem.in.gov/smogwatch/SignUp.aspx>.
 - Overviews for the criteria pollutants including PM, and state implementation plans for attaining the NAAQS: idem.IN.gov/sips/common-criteria-pollutants.
 - Air quality monitoring data and reports: idem.IN.gov/airmonitoring/air-quality-data.
 - The nonattainment status for Indiana counties and townships: idem.IN.gov/sips/nonattainment-status-of-counties.
 - Impacts of pollutants from open burning and safer alternatives: idem.IN.gov/openburning/health-risks-and-environmental-impacts.
- U.S. EPA provides information concerning the NAAQS process on its website at: epa.gov/naaqs.
- AirNow and U.S. EPA's AQI are online at: airnow.gov.
- ENERGY STAR® certified products are listed online at: energystar.gov.
- For questions and concerns, feel free to call IDEM's Office of Air Quality at 317-233-0178 or 800-451-6027, option 4.