

**FACT SHEET**  
**FINAL REVISIONS TO THE NATIONAL AMBIENT AIR QUALITY STANDARDS**  
**FOR PARTICLE POLLUTION (PARTICULATE MATTER)**

**SUMMARY OF ACTION**

- To better protect public health and welfare for millions of Americans across the country, EPA on September 21, 2006 issued the Agency's most protective suite of national air quality standards for particle pollution ever.
- Particle pollution, also called particulate matter or PM, is a complex mixture of extremely small particles and liquid droplets in the air. When breathed in, these particles can reach the deepest regions of the lungs. Exposure to particle pollution is linked to a variety of significant health problems. Particle pollution also is the main cause of visibility impairment in the nation's cities and national parks.
- The final standards address two categories of particle pollution: *fine particles* (PM<sub>2.5</sub>), which are 2.5 micrometers in diameter and smaller; and *inhalable coarse particles* (PM<sub>10</sub>) which are smaller than 10 micrometers. (A micrometer is 1/1000<sup>th</sup> of a millimeter; there are 25,400 micrometers in an inch.)
- EPA is strengthening the 24-hour fine particle standard from the 1997 level of 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to  $35\mu\text{g}/\text{m}^3$ , and retains the current annual fine particle standard at  $15\mu\text{g}/\text{m}^3$ . The Agency also is retaining the existing national 24-hour PM<sub>10</sub> standard of  $150\mu\text{g}/\text{m}^3$ .
- The Agency is revoking the annual PM<sub>10</sub> standard, because available evidence generally does not suggest a link between long-term exposure to current levels of coarse particles and health problems. EPA is protecting all Americans from effects of short-term exposure to inhalable coarse particles by retaining the existing daily PM<sub>10</sub> standard of 150 micrograms per cubic meter.
- Scientific studies have found an association between exposure to particulate matter and significant health problems, including: aggravated asthma; chronic bronchitis; reduced lung function; irregular heartbeat; heart attack; and premature death in people with heart or lung disease.
- EPA selected levels for the final standards after completing an extensive review of thousands of scientific studies on the impact of fine and coarse particles on public health and welfare. The Agency also carefully reviewed and considered public comment on the proposed standards. EPA held three public hearings and received about 120,000 written comments.
- The Agency provisionally assessed new, peer-reviewed studies about particle pollution and health (including some studies received during the comment period) to ensure that the

Agency was aware of new science before setting the final standards. That assessment did not materially change EPA's understanding of PM. EPA did not base its decision on these new studies, however, because they have not been through as rigorous a level of review as the science on which the Agency based its December 2005 proposal. EPA will consider these new studies during the next review of the PM standards.

- EPA has issued rules that will help states meet the standards by making significant strides toward reducing fine particles. These rules include the Clean Air Interstate Rule to dramatically reduce and cap particle pollution-forming emissions from power plants in the eastern United States, the Clean Diesel Program to dramatically reduce emissions from highway, nonroad and stationary diesel engines, and the Clean Air Visibility rule, which will reduce emissions affecting air quality in national parks.

## **THE FINAL STANDARDS**

- For both fine and coarse particles, EPA sets two types of standards: primary standards, to protect public health; and secondary standards, to protect the public welfare from effects including visibility impairment, damage to building and national monuments, and damage to ecosystems.

### ***Fine Particle Standards***

- EPA has two primary standards for fine particles: an annual standard, designed to protect against health effects caused by exposures ranging from days to years; and a 24-hour standard, designed to provide additional protection on days with high peak PM<sub>2.5</sub> concentrations.

#### **24-hour standards**

- o *Primary* -- EPA has substantially strengthened the primary 24-hour fine particle standard, lowering it from the current level of 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to  $35\mu\text{g}/\text{m}^3$ . EPA based this decision on an assessment of a significantly expanded body of scientific information. The assessment concluded that the standard should be strengthened to better protect the public from the health effects associated with short-term fine particle exposures.
- o *Secondary* -- The Agency has set the secondary standard at the same level as the primary standard ( $35\mu\text{g}/\text{m}^3$ ).

#### **Annual standards**

- o *Primary* -- EPA is retaining the primary annual standard at  $15\mu\text{g}/\text{m}^3$  based on its assessment of several expanded, re-analyzed and new studies that have increased the Agency's confidence in associations between long-term PM<sub>2.5</sub> exposure and serious health effects that were documented in the prior review. The assessment concluded that this standard continues to be appropriate to protect the public from health effects associated with long-term fine particle exposures.  
*Secondary* -- The Agency has set the secondary standard at the same level as the primary standard ( $15\mu\text{g}/\text{m}^3$ ).

## *Coarse Particle Standards*

### **24-hour standards**

- EPA is retaining the current 24-hour PM<sub>10</sub> standards to protect against health and welfare effects associated with exposure to some types of coarse particles. Short-term exposure to coarse particles in urban and industrial areas is associated with serious health effects. Retaining this standard will provide protection in all areas of the country against the effects of short-term exposure to such coarse particles.
- Scientific evidence links health problems to coarse particle exposure in urban and industrial areas, but evidence about exposure in rural areas is limited. The Agency is recommending that States focus their control programs on urban and industrial sources that are contributing to air quality violations.
- The Agency intends to characterize uncertainties in the currently available information on coarse particles as part of the Agency's ongoing PM research program.

### **Annual standards**

- EPA is revoking the annual PM<sub>10</sub> standards, because there is insufficient evidence linking health problems to long-term exposure to inhalable coarse particle pollution.

## **THE FORM OF THE STANDARDS**

- When EPA sets air quality standards, it also must specify the air quality statistics that the Agency will use to determine whether an area is meeting the standards. These statistics are known as the "form of the standard" and are derived separately for each standard.

### *Fine particles – form of the 24-hour standard*

- An area will meet the 24-hour standard if the 98<sup>th</sup> percentile of 24-hour PM<sub>2.5</sub> concentrations in a year, averaged over three years, is less than or equal to the level of the standard of 35 µg/m<sup>3</sup>. This is the same form as the current 24-hour standard.

### *Fine particles – form of the annual standard*

- An area will meet the annual PM<sub>2.5</sub> standard when the three-year average of the annual average PM<sub>2.5</sub> concentration is less than or equal to 15 µg/m<sup>3</sup>. This is the same form as the current annual standard.
- The revisions limit the conditions under which some areas may average measurements from multiple community-oriented monitors to determine compliance with the annual standard.

### ***Inhalable coarse particles – form of the 24-hour standard***

- An area will meet the 24-hour PM<sub>10</sub> standard when the 150µg/m<sup>3</sup> level is not exceeded more than once per year on average over a three year period. This is the same form as the current 24-hour standard.

## **SOURCES OF PARTICLE POLLUTION**

### ***Fine particles***

- Fine particles can be emitted directly, such as in smoke from a fire, or they can form from chemical reactions of gases such as sulfur dioxide, nitrogen dioxide and some organic gases.
- Sources of fine particle pollution (or the gases that contribute to fine particle formation) include power plants, gasoline and diesel engines, wood combustion, high-temperature industrial processes such as smelters and steel mills, and forest fires.

### ***Coarse particles***

- Coarse particles can be generally divided into rural, natural crustal material such as dust and urban particles such as road dust kicked up by traffic (called *resuspended* dust), construction and demolition, industries; and biological sources.

## **PARTICLE POLLUTION AND PUBLIC HEALTH**

- Thousands of new scientific studies on particulate matter have been published and peer-reviewed since EPA last reviewed the standards in 1997, and before the "cutoff date" for inclusion in the "criteria document" of studies for this review. These include several studies used in the 1997 review that have been extended, and the data reanalyzed.
- The majority of the studies assessed for the current review were published prior to 2003. To ensure that the EPA Administrator was fully aware of new science before making a final decision on the standards, EPA conducted a survey and provisional assessment of relevant new studies. The Agency did not rely on these studies in making its decision on the standards, however, because they have not been through as rigorous a level of review as the science on which the Agency based its December 2005 proposal. EPA will consider these studies in its next review.

### ***Exposure to fine particle pollution***

- **Health effects associated with short-term exposure to fine particles (PM<sub>2.5</sub>) include:**
  - o Premature death in people with heart and lung disease
  - o Non-fatal heart attacks
  - o Increased hospital admissions, emergency room visits and doctor's visits for respiratory diseases
  - o Increased hospital admission and ER visits for cardiovascular diseases
  - o Increased respiratory symptoms such as coughing, wheezing and shortness of breath
  - o Lung function changes, especially in children and people with lung diseases such as asthma.
  - o Changes in heart rate variability
  - o Irregular heartbeat

- **Health effects associated with long-term exposure to fine particles (PM<sub>2.5</sub>) include:**
  - o Premature death in people with heart and lung diseases, including death from lung cancer
  - o Reduced lung function
  - o Development of chronic respiratory disease in children

***Exposure to coarse particle pollution***

- **Health effects associated with short-term exposure to coarse particles include:**
  - o Premature death in people with heart or lung disease
  - o Hospital admissions for heart disease
  - o Increased hospital admissions and doctors' visits for respiratory disease
  - o Increased respiratory symptoms in children
  - o Decreased lung function
- Available evidence generally does not suggest a link between *long-term* exposure to coarse particles and health problems.

**IMPLEMENTING THE STANDARDS**

- The Clean Air Act requires EPA to designate areas as attainment (meeting the standards) or nonattainment (not meeting the standards) when the Agency sets a new standard, or revises an existing standard.
- **The following schedule will apply to areas not meeting the 24-hour fine particle standard:**
  - o States will make recommendations by Nov. 2007 for areas to be designated attainment (meeting the standards) and nonattainment (violating the standards).
  - o EPA will make designations by November 2009; those designations will become effective in April 2010.
  - o State Implementation Plans, which outline how states will reduce pollution to meet the standards, will be due three years after designations, in April 2013.
  - o States must meet the standards by April 2015, with a possible extension to April 2020.
- EPA has issued a number of rules to help states to meet the standards. These rules make significant strides toward reducing fine particle pollution both regionally and across the country. These rules include the Clean Air Interstate Rule to reduce emissions from power plants in the eastern United States; the Clean Diesel Program to reduce emissions from highway, nonroad and stationary diesel engines nationwide, and the Clean Air Visibility Rule to reduce emissions affecting air quality in national parks.
- EPA will not designate new attainment and nonattainment areas for the 24-hour PM<sub>10</sub> standards.

## **BENEFITS AND COSTS**

- While the Clean Air Act prevents EPA from considering costs in setting or revising National Ambient Air Quality Standards, the Agency does analyze the benefits and costs of implementing standards as required by Executive Order 12866 and guidance from the White House Office of Management and Budget.
- To estimate the benefits of meeting a standard, EPA uses peer-reviewed studies of air quality and health and welfare effects, sophisticated air quality models, and peer-reviewed studies of the dollar values of public health improvements.

When fully met, the revised 24-hour PM<sub>2.5</sub> standards are estimated to yield between \$9 billion and \$75 billion a year in health and visibility benefits in 2020. This estimate is based on the opinions of outside experts on PM and the risk of premature death, along with other benefits information.

- Based on published scientific studies alone, EPA estimates that the most likely benefits of meeting the revised 24-hour PM 2.5 standards will range from \$17 billion to \$35 billion.
- The benefits of meeting the revised 24-hour PM<sub>2.5</sub> standards include the value of an estimated reduction in:
  - 2,500 premature deaths in people with heart or lung disease.
  - 2,600 cases of chronic bronchitis.
  - 5,000 nonfatal heart attacks,
  - 1,630 hospital admissions for cardiovascular or respiratory symptoms,
  - 1,200 emergency room visits for asthma,
  - 7,300 cases of acute bronchitis,
  - 97,000 cases of upper and lower respiratory symptoms,
  - 51,000 cases of aggravated asthma,
  - 350,000 days when people miss work or school, and
  - 2 million days when people must restrict their activities because of particle pollution-related symptoms.
- As with any scientific analysis, actual results could be higher or lower. EPA will outline the uncertainties inherent in these estimates in a Regulatory Impact Analysis, which the Agency will issue shortly.
- EPA estimates the cost of meeting the revised 24-hour PM 2.5 standards at \$6 billion.
- The benefits of meeting the revised 24-hour standards are in addition to the benefits of meeting the 1997 annual fine particles standards, which EPA has retained.
- Based on recently updated estimates, meeting the annual standard will result in benefits ranging from \$20 billion to \$160 billion a year in 2015. These updated estimates include the opinion of outside experts on the risk of premature death, along with other benefits information. EPA estimates the cost of meeting the 1997 standards at \$7 billion.

## **BACKGROUND ON THE STANDARDS REVIEW**

- The Clean Air Act directs EPA to set National Ambient Air Quality Standards for pollutants that the Agency has listed as “criteria pollutants,” based on their likelihood of harming public health and welfare. EPA sets national air quality standards for six common air pollutants: ground-level ozone (smog), carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter.
- For each of these pollutants, EPA has set health-based or "primary" standards to protect public health, and "secondary" standards to protect the public welfare from harm to crops, vegetation, wildlife, buildings and national monuments, and visibility.
- The Clean Air Act requires EPA to review the standards once every five years to determine whether revisions to the standards are appropriate.
- EPA has regulated particulate matter since 1971. The Agency added specific standards for fine particles following its last review, in 1997.
- Under terms of a consent decree, EPA agreed to issue a proposal on the particulate matter standards by December 20, 2005; and committed to finalizing any revisions to the standards by September 27, 2006.
- The review of a standard begins with an assessment of science about the particular pollutant and its effects on public health and welfare. EPA’s National Center for Environmental Assessment undertakes an extensive scientific and technical assessment process during the standard review for any pollutant. The first step in the process is the preparation of an "Air Quality Criteria Document," an extensive assessment of scientific data pertaining to the health and environmental effects associated with the pollutant under review.
- EPA’s Office of Air Quality Planning and Standards then prepares a document (known as a "staff paper") that interprets the most relevant information in the "criteria document" and identifies: 1) factors EPA staff believes should be considered in the standard review; 2) uncertainties in the scientific data; and 3) ranges of alternative standards the staff believes should be considered. Technical staff then compiles a paper that outlines the policy implications of the science. This paper represents the views of the staff and, in final form, is ultimately used as the basis for staff recommendations to the EPA Administrator.
- Drafts of both the "criteria document" and the "staff paper," which are based on thousands of peer-reviewed scientific studies, receive extensive review by representatives of the scientific community, industry, public interest groups and the public, as well as the Clean Air Scientific Advisory Committee (CASAC) -- a group of independent scientific and technical experts established by Congress.
- As part of its mandate, CASAC makes recommendations to EPA on the adequacy of the existing standards and revisions it believes would be appropriate. Based on the scientific

assessments, and taking into account the recommendations of CASAC and public comments, the EPA Administrator must judge whether it is appropriate to propose revisions to the standards.

- EPA undertakes an extensive public review and comment process, considering and analyzing issues raised in public comments before announcing a final decision. As with every proposed and final rule, all other relevant federal agencies are given the opportunity to participate in the process.
- The law requires that the EPA Administrator set the primary standards at a level he judges to be “requisite to protect the public health with an adequate margin of safety” and establish secondary standards that are “requisite” to protect public welfare. The Clean Air Act defines welfare as including environmental effects such as visibility impairment, damage to crops and ecosystems, deterioration of manmade materials, among others.
- The Clean Air Act bars the Administrator from considering costs when setting the standards. The U.S. Supreme Court upheld this requirement in a 2001 decision.

#### **FOR MORE INFORMATION**

- Interested parties can download the notice from EPA's Web site at:  
<http://www.epa.gov/air/particles/actions.html>