

July 17, 1997

FACT SHEET

EPA'S REVISED PARTICULATE MATTER STANDARDS

Today's Action:

- ◆ Today the Environmental Protection Agency announces new standards for particulate matter (PM) under the national ambient air quality standards (NAAQS). After reviewing hundreds of peer-reviewed scientific studies, the EPA has determined that these changes are necessary to protect public health and the environment.
- ◆ EPA is revising the primary (health-based) PM standards by adding a new annual PM_{2.5} standard set at 15 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and a new 24-hour PM_{2.5} standard set at 65 $\mu\text{g}/\text{m}^3$.
- ◆ EPA is retaining the current annual PM₁₀ standard of 50 $\mu\text{g}/\text{m}^3$ and adjusting the PM₁₀ 24-hour standard of 150 $\mu\text{g}/\text{m}^3$ by changing the form of the standard.
- ◆ EPA is revising the secondary (welfare-based) standards by making them identical to the primary standards. EPA believes that the PM_{2.5} and PM₁₀ standards, combined with the Clean Air Act-required regional haze program, will provide protection against the major PM-related welfare effects, including visibility impairment, soiling and materials damage.
- ◆ EPA is issuing new rules related to PM monitoring requirements under the new standards. One rule addresses the monitoring network design needed for the new PM_{2.5} standards. Other rules establish a new federal reference and equivalent methods for monitoring PM_{2.5}.
- ◆ Also, in a separate action, EPA is proposing rules to improve visibility by requiring states to develop programs to help reduce regional haze.

Background

Scientific Assessment Process for National Ambient Air Quality Standards

- ◆ When EPA reviews national ambient air quality standards for a pollutant such as PM, it develops a "criteria document" that represents a compilation and scientific assessment of all the health and environmental effects information available.
- ◆ EPA also develops a "staff paper" which is compiled by technical staff that interprets the most relevant information in the "criteria document" to be used in making policy decisions. It contains staff recommendations to the EPA Administrator regarding any revisions needed to the standards to protect public health and welfare.
- ◆ Both the "criteria document" and "staff paper" are based on thousands of peer-reviewed scientific studies and are part of an extensive scientific assessment process that includes an extremely rigorous scientific peer review and public comment process. Before these documents become the basis for policy decisions, they undergo repeated, detailed reviews by the scientific community, industry, public interest groups, the general public, and the Clean Air Scientific Advisory Committee -- a Congressionally mandated group of independent scientific and technical experts. As part of its mandate, the Clean Air Scientific Advisory Committee also makes recommendations to EPA on the adequacy of the standards.
- ◆ Based on the scientific assessments and taking into account the recommendations of the Clean Air Scientific Advisory Committee, the EPA Administrator must judge whether or not it is appropriate to revise the standards.

Scientific Review of the PM Standards

- ◆ The health- and welfare-based standards for particulate matter (measured as PM₁₀, particles 10 micrometers in diameter or smaller) were last revised in 1987. They were:
 - (1) a 24-hour standard set at 150 µg/m³, and
 - (2) an annual 24-hour standard set at 50 µg/m³.
- ◆ The 24-hour PM₁₀ standard was expressed in a "1-expected-exceedance" form. This standard was attained when the expected number of days per year (averaged over 3 years) that the standard was exceeded was less than or equal to 1.

- ◆ Since these PM₁₀ standards were established, a large number of important new studies have been published on the health effects of particulate matter. Many of these studies suggest that significant effects, such as premature mortality, hospital admissions, and respiratory illnesses, occur at concentrations below the previous standards.
- ◆ Drafts of the EPA "criteria document" were reviewed at public meetings of the Clean Air Scientific Advisory Committee (CASAC) in August and December of 1995 and February 1996. Based on comments from the public and the CASAC, EPA revised the "criteria document." In April 1996, EPA completed and made public its final "criteria document."
- ◆ Members of CASAC and the public reviewed drafts of the EPA "staff paper" at public meetings of the Clean Air Scientific Advisory Committee in December 1995 and May 1996. In July 1996, EPA completed and made public its final "staff paper." A public meeting of the Technical Subcommittee on PM monitoring issues was held in March 1996.
- ◆ The CASAC sent closure letters to EPA on both the "criteria document" and "staff paper" concluding that these documents provided an adequate basis for the EPA Administrator to make a decision on whether revisions to the primary and secondary particulate matter standards were appropriate.
- ◆ On June 12, 1996, EPA issued an advanced notice of proposed rulemaking on the ozone and particulate matter standards. The Agency announced that the schedule for both reviews was the same, explained the linkages between these two air pollutants, and gave advance notice of key issues for which public comment was sought. In addition, EPA held public meetings in St. Louis and Philadelphia on the health and environmental effects associated with ozone and particulate matter and on the implementation of possible revised standards.
- ◆ On December 13, 1996, EPA published a proposal to revise the particulate matter standards. EPA solicited comments for a proposed PM_{2.5} annual standard set at 15µg/m³ and a 24-hour standard of 50µg/m³. The Agency also asked for public comment alternative levels for PM_{2.5} standards and alternative forms based on concentration percentiles. The Agency proposed to retain the annual PM₁₀ standard and to revise the form of the 24-hour PM₁₀ standard.
- ◆ In January 1997, EPA held public hearings on the proposed standards in Salt Lake City, Chicago, Boston and Durham, NC.
- ◆ March 12, 1997 was the close of the public comment period. In addition to traditional methods of soliciting public comment, EPA set up email addresses

and toll-free phone number to encourage public participation in the process. EPA received more than 50,000 comments on the particulate matter standards.

- ◆ The Agency carefully reviewed and analyzed these comments and weighed this information before reaching its final decision on the revised standards.

What are the PM Effects of Concern?

- ◆ The characteristics, sources, and potential health effects of larger or "coarse" fraction particles (from 2.5 to 10 micrometers in diameter) and smaller or "fine" particles (smaller than 2.5 micrometers in diameter) are very different.
 - Coarse particles come from sources such as windblown dust from the desert or agricultural fields and dust kicked up on unpaved roads by vehicle traffic.
 - Fine particles are generally emitted from activities such as industrial and residential combustion and from vehicle exhaust. Fine particles are also formed in the atmosphere when gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds, emitted by combustion activities, are transformed by chemical reactions in the air.
- ◆ Coarse particles can accumulate in the respiratory system and aggravate health problems such as asthma. EPA's scientific review concluded that fine particles, which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects (e.g., premature mortality and hospital admissions) found in a number of recently published community epidemiological studies at concentrations that extend well below those allowed by the current PM₁₀ standards.
- ◆ These recent community studies find that adverse public health effects are associated with exposure to particles at levels well below the previous PM standards for both short-term (from less than 1 day to up to 5 days) and long-term (from generally a year to several years) periods.
 - These health effects include premature death and increased hospital admissions and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individuals with cardiopulmonary disease such as asthma); decreased lung function (particularly in children and individuals with asthma); and alterations in lung tissue and structure and in respiratory tract defense mechanisms.

- ◆ EPA believes that the new standards will protect and improve the lives of millions of Americans.
- ◆ EPA's final rules, in addition to regional haze rules, address the so-called "welfare" effects from particles for which the previous PM₁₀ secondary standards did not provide adequate protection. Chief among those is visibility impairment. Fine particulate matter adversely impacts visibility because it scatters and absorbs light.

Summary of the Final Rule

Primary Standards

PM_{2.5} Standards

- ◆ EPA changes the suite of PM₁₀ standards by adding two new primary PM_{2.5} standards set at 15 µg/m³, annual arithmetic mean, and 65 µg/m³, 24-hour average, to provide increased protection against the PM-related health effects found in the community studies.
- ◆ EPA's scientific review concluded that fine particles are a better surrogate for those components of PM most likely linked to mortality and morbidity effects at levels below the previous standards, while high concentrations of coarse fraction particles are linked to effects such as aggravation of asthma. The Clean Air Scientific Advisory Committee made a near unanimous (19 of 21 members) recommendation that new standards for PM_{2.5} be added while retaining PM₁₀ standards as an indicator for coarse fraction particles.

Averaging Times

- ◆ EPA has set PM_{2.5} standards with 24-hour and annual averaging times to protect against effects from short- and long-term exposure identified in the community studies.
- ◆ In developing a suite of PM_{2.5} standards designed to protect public health, EPA considered the combined effect of the standards rather than an approach that weighed short- and long-term exposure evidence, analyses, and standards independently.
- ◆ EPA concluded that much of the total annual risk associated with short-term exposures is likely to result from days when the PM levels are in the low- to mid-range, below the 24-hour peaks. As a result, lowering a wide range of PM_{2.5}

concentrations through an annual standard, as opposed to focusing on controlling peak 24-hour concentrations, is the best way to reduce total PM_{2.5} risk. EPA also believes that the 24-hour standard will provide additional protection for days with high PM_{2.5} concentrations, localized "hot spots," and risks arising from seasonal emissions, such as woodsmoke in the winter.

Form of the Standards

- ◆ The final rule establishes a new form for the annual PM_{2.5} standard. Areas will be in compliance with the new annual PM_{2.5} standard when the 3-year average of the annual arithmetic mean PM_{2.5} concentrations, from single or multiple community-oriented monitors, is less than or equal to 15 µg/m³. The use of averages from single or multiple community-oriented sites is more closely linked to the underlying health effects information, which relates area wide health statistics to averaged measurements of area wide air quality. EPA believes this more protective annual standard, with the supplemental protection afforded by the 24-hour standard, which is directed at peak concentrations and localized hot spots, will provide a protective target that will reduce area-wide population exposure to fine particles.
- ◆ For the new 24-hour PM_{2.5} standard, the form is based on the 98th percentile of 24-hour PM_{2.5} concentrations in a year (averaged over 3 years), at the population-oriented monitoring site with the highest measured values in an area. The 24-hour standard will limit peak concentration in areas with high seasonal concentrations and in areas with localized hot spots due to particular sources.
 - This form will reduce the impact of a single high exposure event that may be due to unusual meteorological conditions, and thus would provide a more stable basis for effective control programs.
 - The percentile form compensates for missing data and less-than-every-day monitoring, thereby reducing or eliminating the need for complex procedures previously required for the PM₁₀ attainment test.
 - The forms of both the 24-hour and annual standard were adjusted to provide additional protection for community settings with higher than average concentrations within an area.

Standard Level

- ◆ EPA establishes an annual $PM_{2.5}$ standard level of $15 \mu\text{g}/\text{m}^3$, in order to protect public health with an adequate margin of safety. Although health effects at lower annual concentrations are possible, the evidence for effects at such levels is highly uncertain and the likelihood of significant health risk becomes smaller at concentrations well below the $15 \mu\text{g}/\text{m}^3$ level and approaching background levels.
- ◆ After carefully reviewing public comments on the proposed standards, EPA changed the level of the 24-hour $PM_{2.5}$ standard from $50 \mu\text{g}/\text{m}^3$ in the proposal to $65 \mu\text{g}/\text{m}^3$. In conjunction with greater protection afforded by the changes to the forms and associated monitoring requirements, EPA believes that a 24-hour $PM_{2.5}$ standard set at $65 \mu\text{g}/\text{m}^3$ will provide an appropriate supplement to the annual standard and provides an adequate margin of safety in communities that meet the annual standard, but have infrequent or isolated 24-hour peaks. The resulting suite of PM standards will give greater flexibility to individual sources of pollution while still ensuring that public health is protected.

PM₁₀ Standards

Annual Standard

- ◆ Based on its assessment of the health and other available information, EPA retains the annual PM_{10} standard of $50 \mu\text{g}/\text{m}^3$ to protect against effects from both long- and short-term exposure to coarse fraction particles.

24-hour Standard

- ◆ EPA revises the PM_{10} 24-hour standard of $150 \mu\text{g}/\text{m}^3$ by replacing the 1-expected-exceedance form with a 99th percentile form, averaged over 3 years, to protect against short-term exposure to coarse fraction particles. The concentration-based percentile form is a more stable target for control programs and eliminates the need for complex data handling for missing values.
 - With the addition of fine particle standards, EPA has found that the original quantitative basis for the level of the previous 24-hour PM_{10} standard is no longer appropriate. However, the new health studies and information on coarse particles do not provide a basis for a lower standard level.

- Based on careful review of public comments, many of which expressed concern that a 98th percentile might not provide adequate protection against larger particles, EPA changed the form of the PM₁₀ 24-hour standard from the 98th percentile to the 99th percentile concentration-based form.

Secondary Standard

- ◆ EPA sets the secondary standards identical to the final primary standards, in conjunction with establishment of a regional haze program. This approach will provide appropriate protection against the welfare effects associated with particulate pollution including visibility impairment, soiling and material damage.

For More Information...

- ◆ Anyone with a computer and a modem can download the final standards and this fact sheet from the Clean Air Act Amendments bulletin board of EPA's electronic Technology Transfer Network (TTN) by calling (919) 541-5742 (look under "Recently Signed Rules"). For further information about how to access the board, call (919) 541-5384. The TTN can also be accessed through EPA's homepage on the Internet. The address is: <http://ttnwww.rtpnc.epa.gov>
- ◆ For technical questions about this standard, contact John H. Haines at EPA's Office of Air Quality Planning and Standards at (919) 541-5533.