

US EPA ARCHIVE DOCUMENT



# **Proposal to Revise the National Ambient Air Quality Standards for Particle Pollution**

**US EPA**

**Office of Air Quality Planning and Standards**

**July 12, 2012**



## Clean Air Act Requirements

- **The Clean Air Act requires EPA to set two types of National Ambient Air Quality Standards (NAAQS):**
  - **Primary (health-based) standards** that are “requisite” to protect public health with an “adequate margin of safety.”
    - “Requisite” means sufficient, but not more than necessary
    - “Adequate margin of safety” – intended to address uncertainties associated with scientific evidence, and to provide a reasonable degree of protection against hazards that research has not yet identified
  - **Secondary (welfare-based) standards** that are “**requisite** to protect the public welfare from any known or anticipated adverse effects.”
    - Welfare effects include “effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility and climate . . .”



## Clean Air Act Requirements, cont.

- EPA is required to review the NAAQS and the scientific information upon which they are based, every five years
  - Last review of PM NAAQS completed October 2006
- EPA is not allowed to consider costs in setting the standards
  - However, the agency may, and does, consider costs in developing strategies to implement the standards



## Overview of Action

- On June 14, 2012, in accordance with a court deadline, EPA proposed to strengthen the primary and secondary National Ambient Air Quality Standards (NAAQS) for fine particles, or  $PM_{2.5}$ 
  - Proposed rule was published in the *Federal Register* on June 29, 2012
- The proposed standards would be more protective of public health and welfare than the current standards
- Federal rules already issued will make tremendous progress toward meeting the stronger health and welfare standards
  - 99 percent of counties are projected to meet the proposed standards without the need for additional local measures
- This proposal reflects consideration of advice from the Clean Air Scientific Advisory Committee (CASAC), the agency's independent science advisors



## Specifically, EPA Is Proposing To

- Strengthen the annual primary PM<sub>2.5</sub> standard from 15.0 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to within a range of 12.0 to 13.0  $\mu\text{g}/\text{m}^3$ 
  - EPA also is seeking comment on alternative levels, down to 11.0  $\mu\text{g}/\text{m}^3$
- Retain the existing 24-hour primary fine particle health standard level of 35  $\mu\text{g}/\text{m}^3$
- Set a distinct secondary standard for PM<sub>2.5</sub> to address visibility effects associated with particles, primarily in urban areas. EPA is proposing two options for the level of this secondary 24-hour standard: 30 deciviews or 28 deciviews
  - EPA is also proposing to retain the current secondary standards to address non-visibility welfare effects
- Retain the 24-Hour PM<sub>10</sub> (coarse particle) standard
- Update the Air Quality Index (AQI) for PM<sub>2.5</sub>
- Update certain monitoring, data handling and permitting requirements for fine particles
  - EPA is not proposing to expand the number of monitors



## The Science is Clear: PM<sub>2.5</sub> Is A Significant Public Health Concern

- Long- and short-term exposures to PM<sub>2.5</sub> cause premature death and adverse cardiovascular effects, including heart attacks and strokes that result in hospitalizations and emergency department visits
- The evidence also links PM<sub>2.5</sub> exposure to harmful respiratory effects.
  - There is also emerging evidence that long-term exposure to fine particles is associated with infant mortality, low birth weight, and cancer
- Children, older adults, people with heart or lung disease (including asthma), and people living in poverty are considered most at risk for fine particle-related effects
- EPA reviewed thousands of studies in this review, including hundreds of new studies published since 2003
  - The new evidence includes more than 300 new epidemiological studies, many of which report adverse health effects even in areas that meet the current PM<sub>2.5</sub> standards



## The Proposed Standards Result From a Rigorous Scientific Process

- This PM NAAQS Review follows a well-established process, and is informed by several major assessments:
  - **Integrated Science Assessment (December 2009):** EPA reviews, synthesizes and assesses the most policy-relevant, peer-reviewed science on PM and its effects on health and the environment
  - **Risk and Exposure Assessments (June/July 2010):** EPA conducts quantitative assessments to characterize potential risks and exposures for just meeting the current standards and potential alternative standards
  - **Policy Assessment (April 2011):** EPA staff provides to the Administrator a broad range of policy options that could be supported by the available scientific evidence and the exposure and risk information
- EPA received advice from CASAC on multiple drafts of these assessment documents
- Information on the current review is available at:  
[http://www.epa.gov/ttn/naaqs/standards/pm/s\\_pm\\_index.html](http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html)





## Particle Pollution and Public Welfare

- Fine particles are linked to effects on visibility, climate impacts, effects on ecosystems, and damage to materials, such as public buildings and monuments.
- Some particles absorb sunlight, while others scatter it, reducing both the clarity and color of what people can see.
  - Some types of particles such as sulfates and nitrates, scatter more light during humid conditions
- Fine particles are the main contributors to haze in the air, including in many of our urban areas and national parks
- This standard would work in conjunction with the Regional Haze Program, which focuses on Class I areas such as national parks and wilderness areas, to achieve appropriate protection in areas across the country



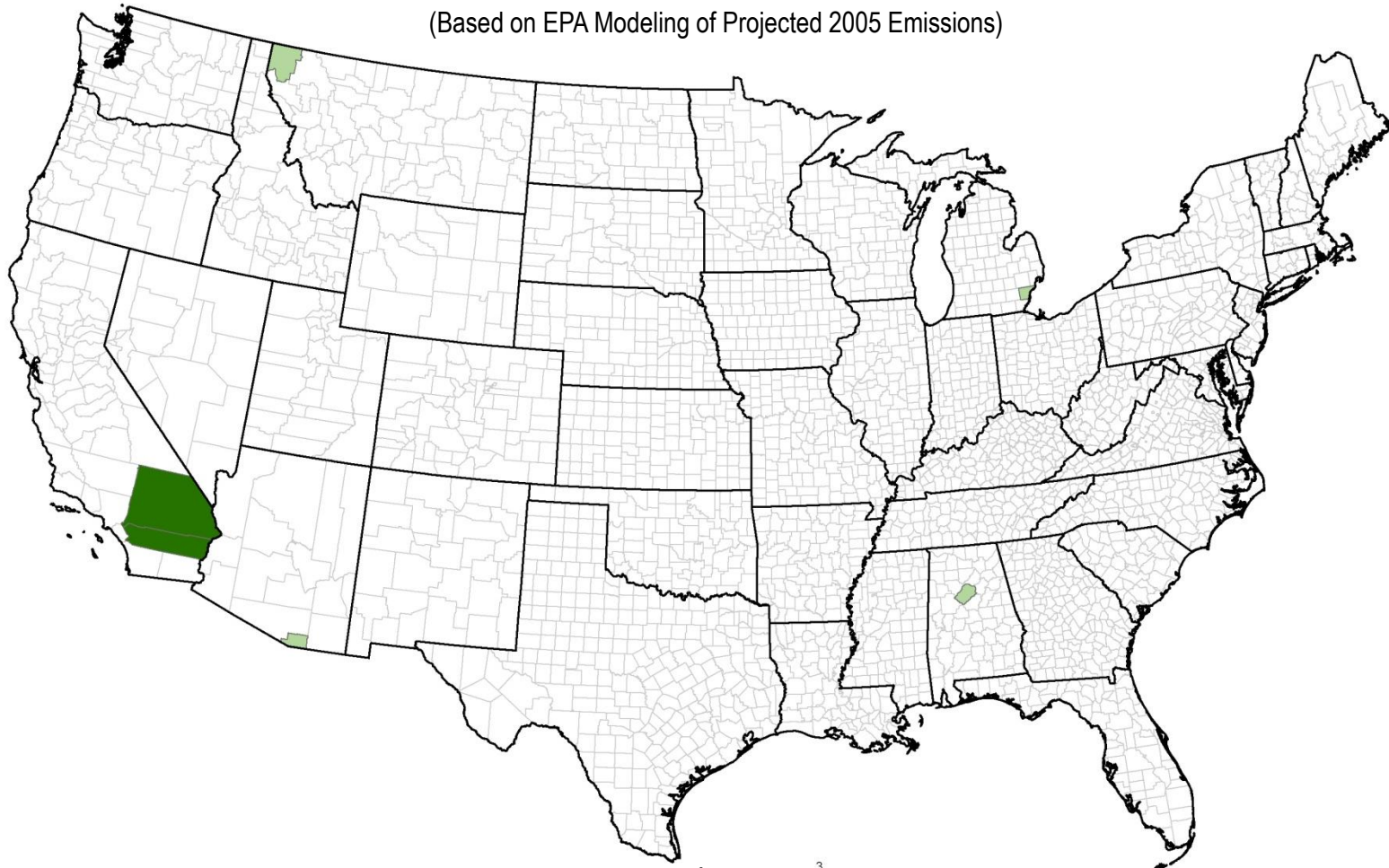


## Existing Federal Rules Will Help Reduce Particle Pollution

- Rules designed to reduce PM, ground-level ozone, and acid rain, along with rules that will reduce particles as a co-benefit of reducing toxic emissions, will help most areas of the country meet the proposed annual PM<sub>2.5</sub> standard by 2020
- These federal programs include:
  - The Cross State Air Pollution Rule;
  - The Mercury and Air Toxics Standards;
  - Mobile Source Standards: The Light-Duty Vehicle Tier 2 Rule, the Heavy Duty Diesel Rule, the Clean Air Nonroad Diesel Rule, NO<sub>x</sub> Emission Standard for New Commercial Aircraft Engines, Emissions Standards for Locomotives and Marine Compression-Ignition Engines, Control of Emissions for Nonroad Spark Ignition Engines and Equipment, Emissions Reductions from Oceangoing Vessels;
  - Regional Haze Regulations and Guidelines for Best Available Retrofit Technology Determinations;
  - Emissions Standards for Reciprocating Internal Combustion Engines ; and
  - Amended New Source Performance Standards and Emissions Guidelines for Hospital/Medical/Infectious Waste Incinerators

# EPA Projections Show Virtually All Counties Would Meet the Proposed Primary Fine Particle Standards in 2020

(Based on EPA Modeling of Projected 2005 Emissions)



2 counties are projected not to meet a proposed annual fine particle standard of  $13.0 \text{ ug/m}^3$  in 2020

4 additional counties are projected not to meet a proposed annual fine particle standard of  $12.0 \text{ ug/m}^3$  in 2020

Note: Future fine particle pollution levels were projected only for counties with monitoring data and within the contiguous 48 states

Modeled emissions reflect the expected reductions from federal programs including the Cross State Air Pollution Rule, the Mercury and Air Toxics Standards, the Light-Duty Vehicle Tier 2 Rule, the Heavy Duty Diesel Rule, the Clean Air Nonroad Diesel Rule, Regional Haze Regulations and Guidelines for Best Available Retrofit Technology Determinations, NO<sub>x</sub> Emission Standard for New Commercial Aircraft Engines, Emissions Standards for Locomotives and Marine Compression-Ignition Engines, Control of Emissions for Nonroad Spark Ignition Engines and Equipment, Emissions Reductions from Oceangoing Vessels, Emissions Standards for Reciprocating Internal Combustion Engines and Amended New Source Performance Standards and Emissions Guidelines for Hospital/Medical/Infectious Waste Incinerators, and an estimate of stationary source controls and additional reductions that were projected to be needed to attain existing PM<sub>2.5</sub> standards.



# THE PROPOSED STANDARDS



## Proposed **Primary Annual PM<sub>2.5</sub>** Standard

- EPA is proposing to revise the *level* of the annual standard from 15.0  $\mu\text{g}/\text{m}^3$  to a level within the range of 12.0 to 13.0  $\mu\text{g}/\text{m}^3$  to provide increased public health protection from effects associated with long- and short-term exposures
  - EPA considered a significantly expanded body of scientific information, air quality information, quantitative risk information, the uncertainties and limitations in that evidence and information, the conclusions of EPA experts; and advice from CASAC
    - Studies show health effects associated with lower PM<sub>2.5</sub> concentrations than had been observed in the last review, including well below the level of the current standard
  - EPA is soliciting comment on alternative standard levels down to 11.0  $\mu\text{g}/\text{m}^3$
- An area would meet the standard if the three-year average of its annual average PM<sub>2.5</sub> concentration is less than or equal to the level of the final standard at each monitor



## Proposed **Primary 24-Hour PM<sub>2.5</sub>** Standard

- EPA is proposing to retain the current 24-hour PM<sub>2.5</sub> standard at a level of 35 µg/m<sup>3</sup>
- Lowering the annual standard level (rather than the 24-hour standard level):
  - Provides the most effective and efficient way to reduce effects associated with both long- and short-term PM<sub>2.5</sub> exposures; and
  - Provides more protection in highly populated areas
- EPA is proposing to retain the current 24-hour PM<sub>2.5</sub> standard to provide protection for areas with high peak PM<sub>2.5</sub> concentrations
  - EPA believes that the proposed revised suite of standards, including a revised annual standard together with the current 24-hour standard would provide requisite public health protection



## Proposed **Primary PM<sub>10</sub>** Standard

- EPA is proposing to retain the current PM<sub>10</sub> (coarse) standard
  - Averaging time: 24-hours
  - Form: One-expected-exceedance
  - Level: 150  $\mu\text{g}/\text{m}^3$
- To reach this proposed decision, EPA considered the available scientific evidence, air quality information, and the uncertainties and limitations in that evidence and information; the conclusions of EPA experts; and advice from CASAC



## Proposed **Secondary PM** Standards

- EPA is proposing a distinct secondary standard for  $PM_{2.5}$  to provide protection against visibility impairment
  - Indicator: calculated  $PM_{2.5}$  light extinction indicator
  - Averaging time: 24-hours
  - Form: 90<sup>th</sup> percentile
  - Level: 30 or 28 deciviews (dv)
    - A deciview is a yardstick for measuring visibility: the higher the deciview level, the hazier the air appears
- EPA is also proposing to retain the current suite of PM secondary standards to address non-visibility welfare effects. They are:
  - annual  $PM_{2.5}$  standard of  $15.0 \mu\text{g}/\text{m}^3$
  - 24-hour  $PM_{2.5}$  standard of  $35 \mu\text{g}/\text{m}^3$  ;
  - 24-hour  $PM_{10}$  standard of  $150 \mu\text{g}/\text{m}^3$
- To reach this proposed decision, EPA considered the available scientific evidence, urban visibility preference survey studies, air quality information, and the uncertainties and limitations in that evidence and information, the conclusions of EPA experts; and advice from CASAC





## Proposed Changes to the Air Quality Index (AQI)

- EPA is proposing updates to the Air Quality Index (AQI), consistent with the proposed  $PM_{2.5}$  standards
  - The AQI is EPA’s color-coded tool used by state and local governments to help inform the public about how clean or polluted the air is and steps they can take to reduce their daily exposure to pollution
  - The AQI converts concentrations for fine particles to a number on a scale from 0 to 500
- EPA is proposing to change the upper end of the range for the “Good” AQI category (an index value of 50) by setting it at the level of the annual  $PM_{2.5}$  standard
- EPA is proposing to base the 100 level of the AQI (i.e., upper end of “moderate” range) on the level of the 24-hour  $PM_{2.5}$  standard
- EPA is proposing to retain the upper end of the “Hazardous” category (AQI of 500) at the existing level of  $500 \mu\text{g}/\text{m}^3$





# MONITORING, PERMITTING AND IMPLEMENTATION



# Ambient Air Monitoring

- EPA and the states will continue to run a robust network for monitoring  $PM_{2.5}$  levels
- The proposed rule includes several updates to monitoring requirements, including a proposed requirement for monitoring  $PM_{2.5}$  along heavily traveled roads
  - These near-roadway  $PM_{2.5}$  monitors would be required at one location in each urban area (a core-based statistical area, or CBSA) with a population greater than 1 million
  - EPA estimates 52  $PM_{2.5}$  monitors would be needed and that states could meet this requirement by relocating some monitors
- EPA is not proposing any changes to monitoring requirements for  $PM_{10}$



# Proposed Changes to Permitting Provisions

- EPA is proposing certain changes to its requirements for preconstruction permits to:
  - Ensure that changes to the PM standards will not delay pending permits, and
  - Reduce potential burdens to permit applicants
- EPA is proposing to grandfather permit applications if a draft permit or preliminary determination has been issued for public comment by the date the revised PM standards become effective
- EPA is proposing to implement a “surrogacy approach” that would allow, for purposes of the proposed secondary visibility index, permit applicants to rely on their analysis demonstrating that PM<sub>2.5</sub> emissions increases would not cause or contribute to a violation of the 24-hour mass-based standards



## Implementing the Standards

- Improving air quality is a partnership between the federal government, states and tribes. EPA will work closely with states and tribes to implement the particle pollution standards
- Once EPA sets a new air quality standard, or revises an existing standard, it then must designate areas as attaining or not attaining the standards
  - States with nonattainment areas must develop implementation plans showing how they will meet the standards
- The Clean Air Act requires states to meet the primary PM<sub>2.5</sub> standards within five years (2020). For certain areas, EPA can approve attainment dates of up to 10 years (2025), depending on the severity of the fine particle pollution problem and the availability of control measures
- The Clean Air Act requires states to meet secondary standards, such as the proposed 24-hour PM<sub>2.5</sub> secondary standard for visibility, as “expeditiously as practicable” but does not provide specific timeframes
  - Most areas that would meet the primary PM<sub>2.5</sub> standards are anticipated to also meet the proposed distinct secondary standard to address PM-related visibility impairment as well as the current secondary standards to address non-visibility welfare effects



## Expected Implementation Timeline for Proposed PM NAAQS

Milestone	Date
Signature—Final Rule	December 14, 2012
State Designation Recommendations to EPA	December 2013
Final Area Designations	December 2014*
Attainment Demonstration SIPs Due	2018
Attainment Dates	2020-2025 (depends on severity of problem)

\* Data from a proposed near-road monitoring network would not be available in time for use in making initial attainment and nonattainment designations.



## Opportunities to Comment

- Before issuing final standards, EPA will take comment and hold 2 public hearings
  - Public comments due by August 31, 2012
  - Comments should be labeled with Docket ID number EPA-HQ-OAR-2007-0492
  - Public hearings will be held in Philadelphia (July 17) and in Sacramento, Calif. (July 19)
- EPA will issue final standards by the court-ordered deadline of December 14, 2012
- For more information on the rule and how to comment, go to <http://www.epa.gov/pm>



## Contact Information

- For additional information on the PM NAAQS, please contact:
  - Beth Hassett-Sipple, US EPA, Office of Air Quality Planning and Standards
  - [hassett-sipple.beth@epa.gov](mailto:hassett-sipple.beth@epa.gov)
  - (919) 541-4605





# Additional Background Information



## PM Standards Have Changed Over Time

EPA has regulated particulate matter since 1971

- **1971:** EPA set standards covering all sizes of airborne particles, including dirt and other larger particles -- known as a “total suspended particulate, TSP”
- **1987:** EPA changed the standards to focus on particles 10 micrometers in diameter and smaller (PM<sub>10</sub>)
  - Particles larger than 10 micrometers don’t generally get past your nose
  - EPA set both 24-hour and annual PM<sub>10</sub> standards at that time
- **1997:** EPA decided the fine and coarse fractions of PM<sub>10</sub> should be considered separately
  - Added new indicator to focus on fine particles – PM<sub>2.5</sub>; set initial annual and 24-hour PM<sub>2.5</sub> standards
  - Retained PM<sub>10</sub> standards to provide protection for coarse particles (PM<sub>10-2.5</sub>)
- **2006:** EPA maintained standards for both fine and coarse particles
  - *Fine particles:* Revised level of 24-hour PM<sub>2.5</sub> standard (65 to 35 µg/m<sup>3</sup>) and retained level of annual PM<sub>2.5</sub> standard (15 µg/m<sup>3</sup>)
  - *Coarse particles:* retained 24-hour PM<sub>10</sub> standard and revoked annual PM<sub>10</sub> standard



## Litigation on 2006 PM NAAQS

- US District Court, DC Circuit remanded the *primary annual PM<sub>2.5</sub> standard* to EPA for further consideration of:
  - Whether it provides an adequate margin of safety from risk of *short-term* exposures
  - Whether it provides an adequate margin of safety against *morbidity in children and other vulnerable subpopulations* from long-term exposures
- The court also remanded the *secondary PM<sub>2.5</sub> standards* to EPA and concluded the Agency's decision to set secondary standards identical to primary standards was *unreasonable and contrary to the law*
  - EPA failed to identify a target level of protection, as required by the Clean Air Act
  - EPA did not address the issue of regional differences in relative humidity in its final decision
- The court upheld EPA's decisions on the PM<sub>10</sub> standards
- The primary 24-hour PM<sub>2.5</sub> standard, as revised in 2006, was not challenged by litigants
- The proposed decisions respond to the court remands



# PM<sub>2.5</sub> Has Significant Impacts on Public Health

<b>Estimated National PM<sub>2.5</sub> Health Burden (based on 2005 air quality)</b>	
Excess mortalities (adults)	130,000 to 320,000
Percentage of all deaths due to PM <sub>2.5</sub>	5.4%
<b><i>Impacts among Children</i></b>	
Emergency department visits for asthma	110,000
Acute bronchitis	200,000
Exacerbation of asthma	2,500,000
<b><i>Impacts among Adults</i></b>	
Loss work days	18,000,000
Heart attacks	180,000
Hospitalizations	
-cardiovascular effects	62,000
-respiratory effects	30,000

- Recent research provides evidence that decreases in long-term PM<sub>2.5</sub> exposures have been associated with an estimated increase in mean life expectancy
- These estimates are the total burden of PM<sub>2.5</sub>. They are not the estimated benefits of attaining the proposed standards



## Costs and Benefits of the Proposed Primary PM<sub>2.5</sub> Standards

- By law, EPA cannot consider costs in setting or revising national ambient air quality standards
- However, to inform the public, EPA analyzes the benefits and costs of implementing the standards
- Costs and benefits are lower than other rules because most reductions needed will be achieved by federal measures already in place (e.g., the Cross State Air Pollution Rule and the Mercury and Air Toxics Standards)
- At-risk populations include: children, older adults, persons with pre-existing heart or lung disease, and persons living in poverty

Projected Costs and Benefits Incremental to Attainment of Current Standards in 2020* (2006\$, 3% Discount Rate)		
	12/35	13/35
<b>Costs</b>	<b>\$69 million</b>	<b>\$2.9 million</b>
<b>Health Benefits</b>	<b>\$2.3 billion to \$5.9 billion</b>	<b>\$88 million to \$220 million</b>
<b>Net Benefits</b>	<b>\$2.3 billion to \$5.9 billion</b>	<b>\$85 million to \$220 million</b>

\*Estimated annualized costs and benefits are additional to those associated with meeting the current standards.