Revisions to National Ambient Air Quality Standards for Particle Pollution

Webinar for States and Local Agencies
December 19, 2012

Background on National Ambient Air Quality Standards

- The Clean Air Act requires EPA to review national ambient air quality standards every five years to determine whether the standards should be revised.
- The law requires the agency to ensure that:
  - "primary" standards are "requisite to protect public health with an adequate margin of safety"
  - "secondary" standards are "requisite to protect the public welfare from any known or anticipated adverse effects."
- EPA has national standards for fine particles and coarse particles.
- Exposures to fine particles can cause premature death and harmful effects on the cardiovascular system. Links to harmful respiratory effects including asthma attacks. The people most at risk include people with heart or lung disease (including asthma), older adults, children, and people of lower socio-economic status.

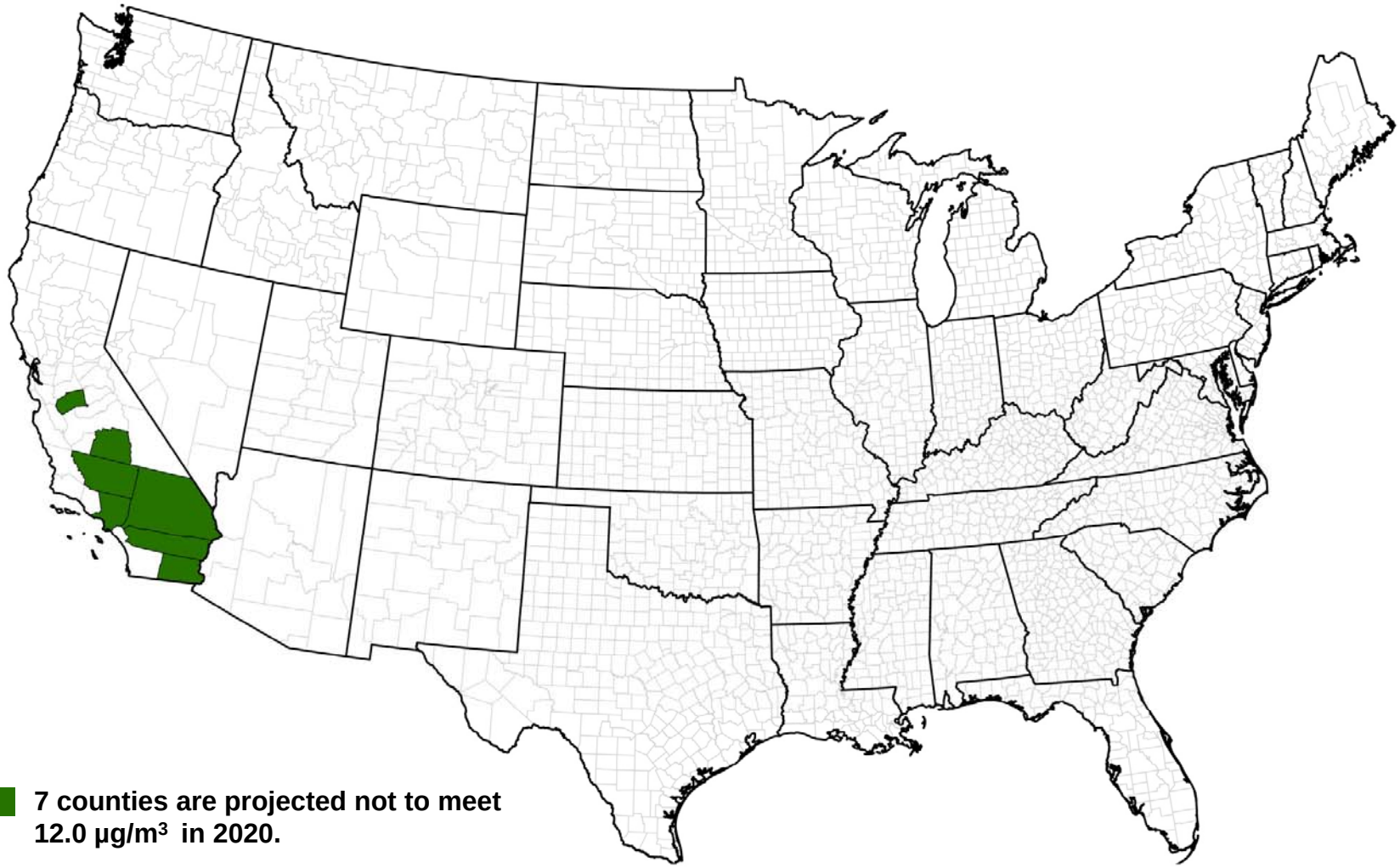
EPA's Revisions to the Air Quality Standards for Particle Pollution

- **Consistent with the requirements of the Clean Air Act and the latest science, EPA is revising one of the National Ambient Air Quality Standards (NAAQS) for fine particulate matter, also known as $PM_{2.5}$, to improve public health protection.**
- **Not revising the other particle pollution standards at this time.**

Details:

- EPA is strengthening the annual health standard for $PM_{2.5}$ to 12.0 micrograms per cubic meter ($\mu g/m^3$) . The existing annual $PM_{2.5}$ standard of 15.0 $\mu g/m^3$ was set in 1997.
  - An extensive body of scientific evidence shows that exposure to fine particle pollution can cause premature death and adverse cardiovascular effects, including increased hospital admissions and emergency department visits for heart attacks and strokes. Respiratory effects including asthma attacks.
  - An area will meet the standard if the three-year average of its annual average $PM_{2.5}$ concentration is less than or equal to 12.0 $\mu g/m^3$ at each monitor.
- 99% of U.S. counties with $PM_{2.5}$ monitors are projected to meet the revised annual standard in 2020.
  - Emissions reductions from existing rules will help the vast majority of U.S. counties meet the revised standards. These include clean diesel rules for vehicles and fuels, and rules to reduce pollution from power plants, locomotives, marine vessels and industrial processes, among others.

EPA Projections Show 99% of U.S. Counties with Monitors Would Meet the Annual Fine Particle Health Standard of 12 µg/m^3 in 2020



7 counties are projected not to meet 12.0 µg/m^3 in 2020.

All of these are already under requirements to reduce PM $_{2.5}$.

Source: PM NAAQS RIA
For more information: www.epa.gov/pm

NAAQS for Particle Pollution: More Information

- In addition to revising the **annual** $PM_{2.5}$ standard to 12.0 µg/m^3, EPA is retaining the **daily** $PM_{2.5}$ health standard of 35 µg/m^3 set in 2006.
  - Decisions consistent with the independent Clean Air Scientific Advisory Committee's support for an annual standard in the range of 11-13 µg/m^3 in conjunction with a daily standard no less stringent than 35 µg/m^3.
- Retaining the existing secondary standards for $PM_{2.5}$ to address PM-related effects on public welfare such as visibility impairment, ecological effects, damage to materials, and climate impacts.
- Retaining the existing standards for coarse particles (PM_{10}). These standards were issued in 1987.
- Received more than 230,000 public comments.

Scientific Support for New Health-Based Fine Particle Standard

- **A large body of scientific evidence supports the new $PM_{2.5}$ standard.**
  - EPA examined thousands of studies as part of this review.
  - New evidence includes more than 300 new epidemiological studies, many of which report adverse health effects even in areas that meet the 2006 $PM_{2.5}$ standards.

- **Due to their small size, fine particles ($PM_{2.5}$) can penetrate deep into the lungs**. Even the largest fine particle is about 30 times smaller than the diameter of the average human hair.
  - Fine particles can form when gases emitted from power plants, industries and cars react in the air or they can be directly emitted from sources such as factories and forest fires.

- **The new primary (health-based) annual $PM_{2.5}$ standard of 12.0 µg/m^3** will provide better health protection for children and adults, including lowering the risk of asthma attacks, strokes, heart attacks, respiratory illness, and premature death.

- **Meeting the standard will provide health benefits worth an estimated $4 billion to $9.1 billion** per year in 2020 -- a return of $12 to $171 for every dollar invested in pollution reduction. Estimated annual costs of implementing the standard are $53 million to $350 million.

Changes to the Air Quality Index (AQI)

- Updating the AQI to reflect the revisions to the $PM_{2.5}$ standard.
  - Color-coded tool to inform the public about how clean or polluted the air is and steps they can take to reduce their daily exposure to pollution.
  - Converts concentrations of fine particles to a number on a scale from 0 to 500.
- Changing 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.
- Setting the 100 level of the AQI (i.e., upper end of "Moderate" range) at the level of the 24-hour $PM_{2.5}$ standard.
- Retaining the upper end of the "Hazardous" category (AQI of 500) at the existing level of 500 $\mu g/m^3$.

Retain Current Secondary Standards to Address Impacts of Particle Pollution on Visibility

- Fine particles are the main contributors to haze in the air, impairing visibility in many of our urban areas and national parks.
- PM standards work in conjunction with the Regional Haze Program, which focuses on Class I areas such as national parks and wilderness areas, to achieve appropriate visibility protection across the country.
- EPA is relying on the existing secondary 24-hour $PM_{2.5}$ standard (35 µg/m^3) to protect against visibility impairment, and is not setting a distinct standard to protect visibility at this time.
  - EPA had proposed to set a separate standard to protect against PM-related visibility impairment
  - However, after considering analysis of recent air quality monitoring data and public comments, the Agency has determined that the current secondary 24-hour $PM_{2.5}$ standard will provide visibility protection that is equal to, or greater than, the Agency's target protection level of 30 deciviews. (A deciview is a yardstick for measuring visibility.)

Monitoring Particle Pollution

- EPA is updating monitoring requirements for fine particles, including a requirement for monitoring along heavily traveled roads in large urban areas, consistent with recent changes made to requirements for monitoring nitrogen dioxide and carbon monoxide.

- The agency anticipates that states will be able to relocate existing monitors (about 52 total) to meet the near-roadway requirement. The monitors will be phased in between 2015 and 2017 for urban areas with a population of 1 million or more. Data from these monitors will not be used in the 2014 round of designations.

- EPA is not increasing the size of the national $PM_{2.5}$ monitoring network, which consists of about 900 monitors; therefore, state workloads will be largely unaffected.

Changes to Clean Air Permitting Provisions

PSD grandfathering provision

- In response to public comments and upon reconsideration of the proposed grandfathering provision, EPA added a category of qualifying permit applications: those that have been determined to be complete on or before December 14, 2012 (the final rule signature date)

- Under the final rule, applications are grandfathered from meeting new requirements associated with the revised PM NAAQS if either:
  - The permitting agency has deemed the application complete on or before Dec. 14, 2012, or
  - The public notice for a draft permit or preliminary determination has been published prior to the date the revised PM standards become effective (60 days after publication in the Federal Register).
- For qualifying sources/projects, owners and operators must demonstrate that their emissions increases will not cause or contribute to a violation of the $PM_{2.5}$ NAAQS in effect at the time of the relevant grandfathering milestone, and not the revised primary annual $PM_{2.5}$ NAAQS.

Changes to Clean Air Permitting Provisions (Cont.)

Surrogacy approach for implementing proposed secondary visibility index standard under PSD

- EPA is not establishing a distinct secondary visibility index standard at time, accordingly, there is no longer a need for a surrogacy approach as proposed, and no such approach has been implemented as part of the final rule

Other PSD program elements

- No changes to the existing PSD increments or screening tools for $PM_{2.5}$, including the significant emission rates, significant impact levels and significant monitoring concentration.
- EPA will consider whether any such changes may be necessary or appropriate and will implement any changes as part of a separate notice-and-comment NSR implementation rule.

Existing Federal and State Rules Will Help Reduce Particle Pollution

- Federal 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 updated annual $PM_{2.5}$ standard by 2020. These federal programs include:
  - 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, NOx 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;
  - Rules to reduce the regional transport of air pollution
  - Emissions Standards for Reciprocating Internal Combustion Engines ; and
  - Amended New Source Performance Standards and Emissions Guidelines for Hospital/Medical/Infectious Waste Incinerators
- On-the-books state programs include rules on power plants or industrial facilities and wood smoke reduction programs.

2012 PM NAAQS Implementation Timeline

Milestone	Date
EPA issues Final Rule - includes PSD rule revisions/guidance	Dec 14, 2012
EPA issues Designations Guidance	Feb 2013
PM NAAQS effective date	Mar 2013
Exceptional Event Flagging Deadline (2010-12 data)	Jul 2013
Exceptional Event Documentation Submittal (2010-12 data)	Dec 2013
State Designation Recommendations to EPA EPA issues Proposed Implementation Rule	Dec 2013
EPA issues Infrastructure SIP guidance	Early 2014
Exceptional Event Flagging Deadline (2013 data)	Jul 2014
Exceptional Event Documentation Submittal (2013 data)	Aug 2014
EPA sends 120-day letters for designations	Aug 2014
EPA issues Final Area Designations EPA issues Final Implementation Rule	Dec 2014 / Effective Early 2015*
State Infrastructure SIPs due	Early 2016
Attainment Demonstration SIPs Due	2018
Attainment Dates	2020-2025 (depends on severity of problem)

*Three years of data from sites in the proposed near-road monitoring network would not be certified until 2018, and therefore would not be available for the initial designations process.

Designations and Future Implementation Rule

- Final Anticipated Designations Schedule
  - By December 2013, states and any tribes that choose to do so make designation recommendations for their areas.
  - By August 2014, EPA responds to states' and tribes' initial recommendations. States and tribes will then have the opportunity to comment on any modifications to their recommendations, and to provide new information and analyses to EPA if appropriate.
  - By December 2014, EPA makes final area designations.
  - In 2018: States and tribes submit implementation plans outlining how they will reduce pollution to meet the standards. (Plans are due to EPA three years after designations are effective, which is likely to be in early 2015).
    - State plans can include federal measures, as well as any needed local measures, to demonstrate that an area will meet the standards.
- Implementation Rule Schedule
  - EPA intends to finalize an implementation rule around the time of final area designations (Dec 2014).
  - Comment received on implementation discussion in PM NAAQS proposal will help inform the implementation rule proposal.

PM Advance

PM Advance is a collaborative effort by EPA, states, tribes, and local governments to encourage emission reductions in **attainment** areas to help them continue to meet the $PM_{2.5}$ NAAQS.

- Expect to begin program in January 2013.
- Signing up for PM Advance will NOT guarantee that your area will avoid future designations.
  - However, taking expeditious, robust actions could possibly help some areas clean up their air quality enough to affect designations.
  - Areas that are eventually designated can also benefit from early actions taken to reduce PM.
- Projected nonattainment areas can participate.

PM Advance (continued)

- Work with EPA to develop (within a year) and expeditiously implement your list of measures/programs targeting $PM_{2.5}$
- EPA support will be tailored to each area's needs
- To join, read the Jan. 2013 program guidance and send a sign-up letter to ADVANCE@epa.gov
- For more information, see www.epa.gov/ozoneadvance (site will be expanded in January to include PM Advance) or call Laura Bunte, Program Lead at (919) 541-0889

APPENDIX

EPA's Decisions on the 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**: 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**: EPA conducts quantitative assessments to characterize potential risks and exposures for just meeting the current standards and potential alternative standards
  - **Policy Assessment**: 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 the Clean Air Scientific Advisory Committee (CASAC) on multiple drafts of these assessment documents.
- Information on this process is available at http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html

2012 Decision Addresses Issues Raised in Litigation on 2006 PM NAAQS

- In 2009, the U.S. Court of Appeals (DC Circuit) remanded the primary annual $PM_{2.5}$ 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 illness in children and other vulnerable subpopulations from long-term exposures
- The court also remanded the secondary $PM_{2.5}$ 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_{10} standards
- The primary 24-hour $PM_{2.5}$ standard, as revised in 2006, was not challenged by litigants

Significant Impacts of $PM_{2.5}$ on Public Health

- Exposure to $PM_{2.5}$ linked to 130,000-320,000 premature deaths in the U.S. in 2005 (5.4% of all deaths) [1]
- Decreases in long-term $PM_{2.5}$ exposures in the U.S. have been associated with an estimated increase in average life expectancy [2]
- EPA estimates that meeting the new annual health-based $PM_{2.5}$ standard of 12.0 µg/m^3 will provide health benefits worth an estimated $4 billion to $9.1 billion per year in 2020– a return of $12 to $171 for every dollar invested in pollution reduction.
- Estimated annual costs of implementing the standard are $53 to $350 million.

[1] Source: Fann et al., 2012, Estimating the National Public Health Burden Associated with Exposure to Ambient $PM_{2.5}$ and Ozone, *Risk Analysis* 32(1) 81-95.

2 Pope CA III, Ezzati M, Dockery DW. 2009. Fine-particulate air pollution and life expectancy in the United States, *New England Journal of Medicine* 2009;360:376-386.

Correia, Andrew W., C. Arden Pope III, Douglas W. Dockery, Yun Wang, Majid Ezzati, Francesca Dominici. 2012. The Effect of Air Pollution Control on Life Expectancy in the United States: An Analysis of 545 US Counties for the Period 2000 to 2007. *Epidemiology*, December 3, 2012 online edition

Comments from Doctors and Health Groups

- **Independent scientific bodies agree that particulate matter continues to be a top health concern:**
  - "There is a broad consensus in the scientific community that particulate matter air pollution is harmful to human health."

    — Dr. Tee Guidotti, MD, MPH, DABT in Congressional testimony on behalf of the American Thoracic Society, June 2012

  - "Exposure to $PM_{2.5}$ over a few hours to weeks can trigger cardiovascular disease-related mortality and nonfatal events; longer-term exposure (e.g., a few years) increases the risk for cardiovascular mortality … and reduces life expectancy.…This body of evidence has grown and been strengthened substantially since the first American Heart Association scientific statement was published [in 2004]."

    — American Heart Association's Scientific Statement, May 2010

  - "Children are more vulnerable to the adverse effects of air pollution than are adults.… In children, particulate pollution affects lung function and lung growth."

    – American Academy of Pediatrics, Policy Statement, Reaffirmed 2009

PM Standards Have Changed Over Time

EPA has regulated particulates 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_{10})
  - Particles larger than 10 micrometers don't generally get past your nose
  - EPA set both 24-hour and annual PM_{10} standards at that time
- **1997:** EPA decided the fine and coarse fractions of PM_{10} should be considered separately
  - Added new indicator to focus on fine particles – $PM_{2.5}$; set initial annual and 24-hour $PM_{2.5}$ standards
  - Retained PM_{10} standards to provide protection for coarse particles (particles between 10 and 2.5 micrometers or $PM_{10-2.5}$)
- **2006:** EPA maintained standards for both fine and coarse particles
  - *Fine particles*: Revised level of 24-hour $PM_{2.5}$ standard (65 to 35 µg/m^3) and retained level of annual $PM_{2.5}$ standard (15 µg/m^3)
  - *Coarse particles:* retained 24-hour PM_{10} standard and revoked annual PM_{10} standard

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