

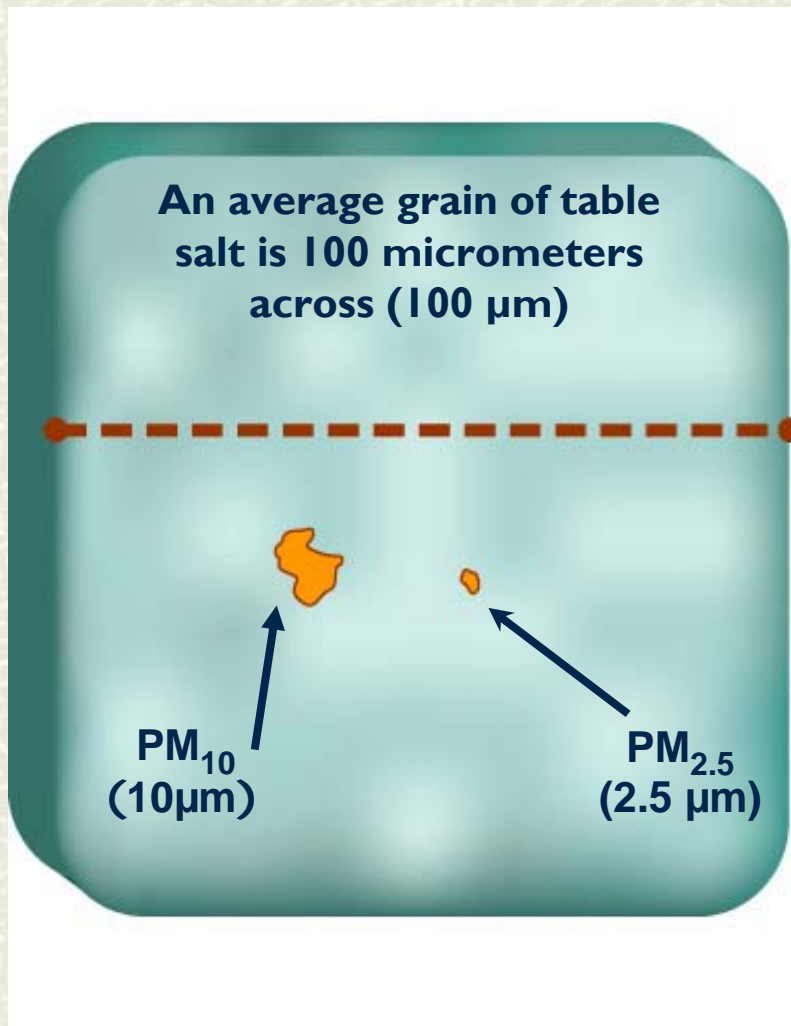
PM NAAQS Review

Second Draft Staff Paper

Presentation to the Clean Air Act Advisory Committee
April 8, 2005

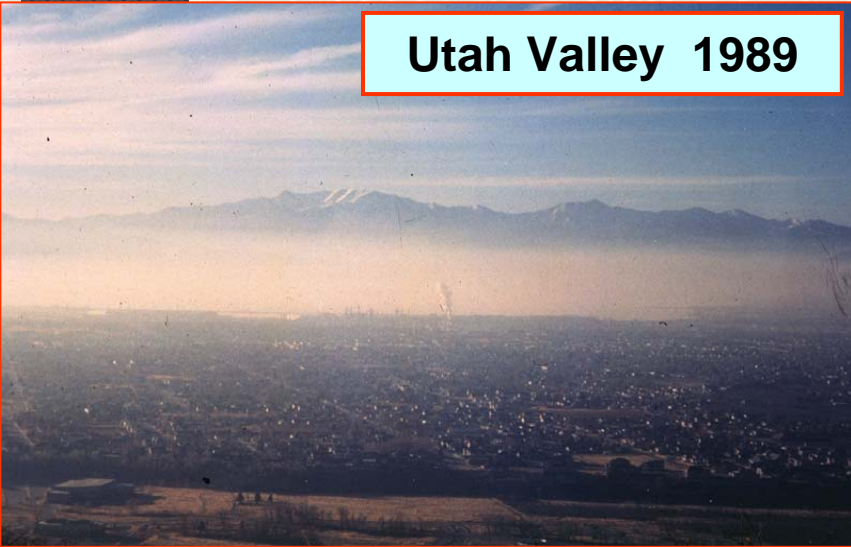
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Division, Office of Air Quality Planning & Standards, USEPA

What is particle pollution?



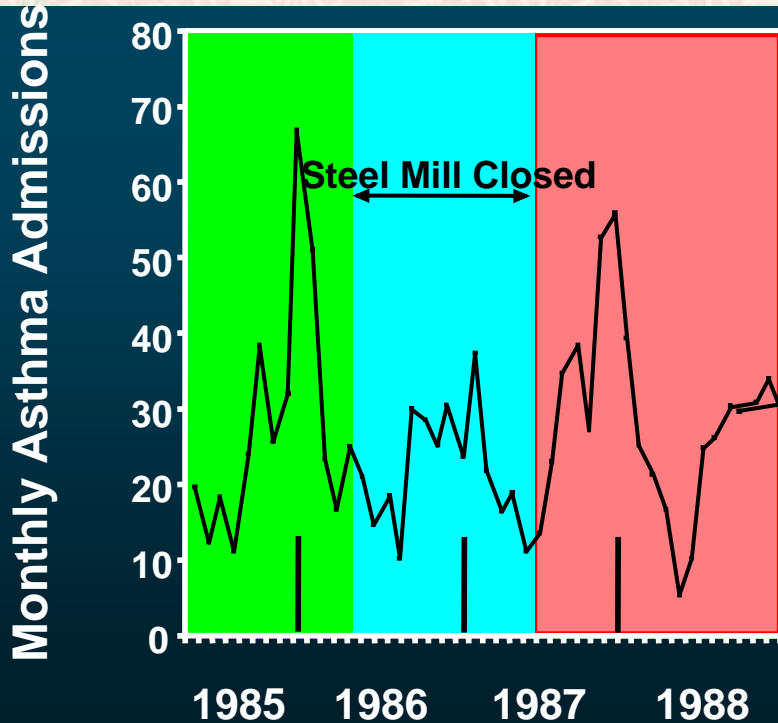
- **Particle pollution** is a complex mixture of extremely small particles and liquid droplets.
- **Fine particles – are smaller than 2.5 micrometers in diameter.** They come from combustion and conversion of gases (e.g. SO₂) to particles.
- **Thoracic coarse particles** (10-2.5 micrometers) come from mechanical processes, e.g. dust, dirt, traffic on roads.
- These two classes have distinct sources, and somewhat different health risks

Utah Valley 1989



1988-94 – Important new epidemiology

- Schwartz et al. daily mortality in 10 cities
- Harvard 6, 24 cities long-term studies
- Pope work in Utah Valley
- Pope et al. prospective cohort study
- Thurston hospital admission
- Follow-up studies of cause, morbidity, reanalyses
- Most studies use PM10, some fine particle indicators, components
 - Pope (ACS) study uses sulfate data and 50 city PM2.5 from IP Network established for first review



Pope showed health outcomes tracking steel mills closure and PM levels.

Where do we stand now on Health?

■ Numerous new studies have linked PM to:

- Premature death from heart and lung disease
- Aggravation of heart and lung diseases, including asthma
- Cardiac arrhythmias and heart attacks
- Coughing, wheezing and chronic bronchitis
- And *possibly* lung cancer mortality, infant mortality
- Continued concerns about coarse particles

■ Is PM composition important?

- Probably, but likely multiple “bad” actors
 - A number of studies found effects of different PM components (e.g. sulfates), some have not
 - Not enough information to exclude any component, focus on reducing mass from multiple sources
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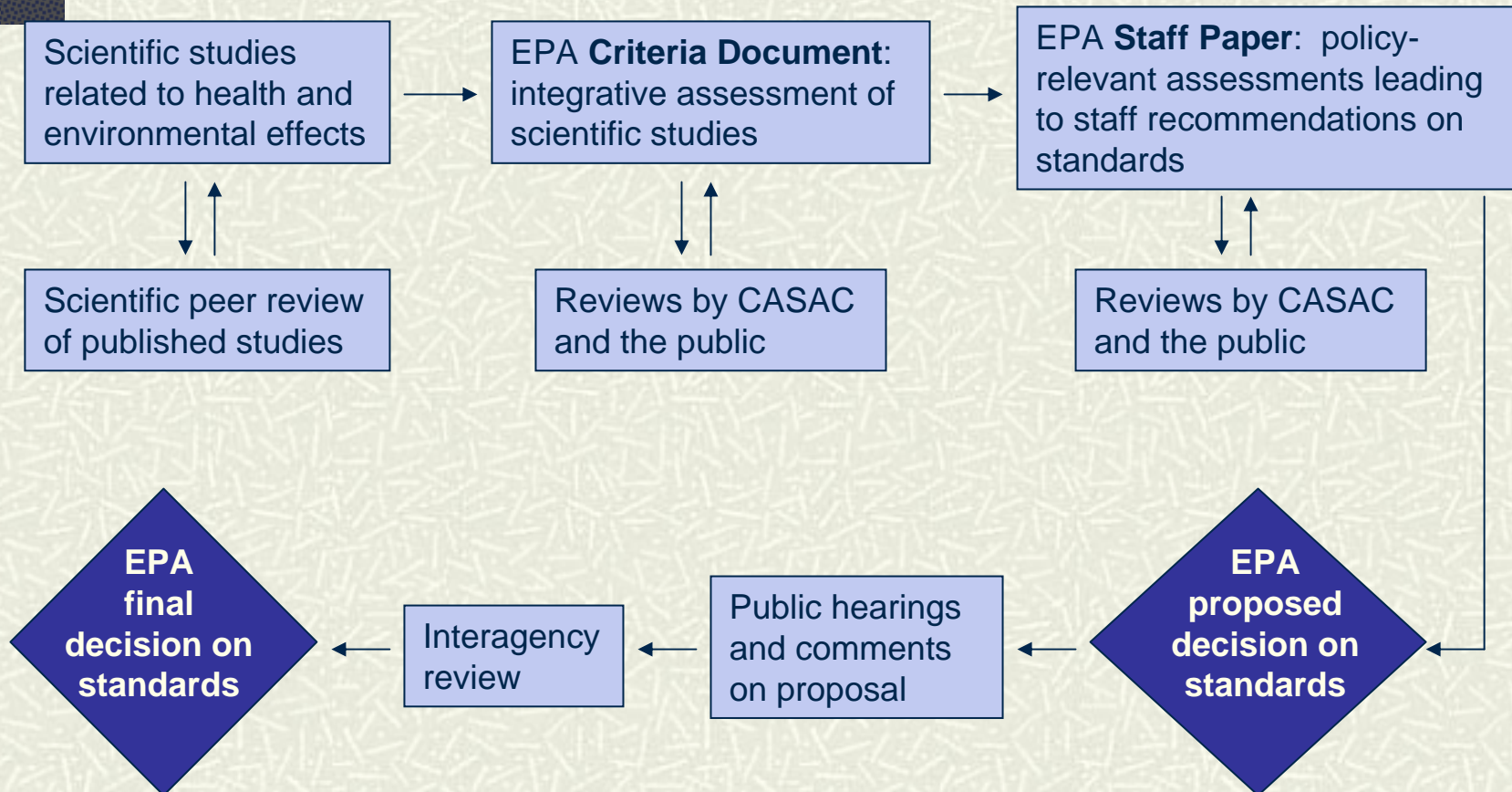
National Ambient Air Quality Standards

- # Standards are to be based on the latest scientific criteria
 - # Standards are to protect public health with an adequate margin of safety and to protect against adverse effects on public welfare
 - # Four major components of standards that determine degree of protection:
 - **Indicator:** e.g., PM₁₀, PM_{2.5}, O₃, SO₂
 - **Averaging Time:** e.g., 1-hr, 24-hr, annual average
 - **Form:** e.g., number of exceedances, percentile, mean
 - **Level:** e.g., 15 µg/m³
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History of PM NAAQS

- **1971** – EPA promulgates NAAQS for “total suspended particulate” (particles smaller than ~25-45 μm in diameter)
 - **1987** – EPA revises PM NAAQS, changing the indicator from TSP to PM_{10} to focus on “inhalable” particles ($< 10 \mu\text{m}$)
 - **1997** – EPA revises PM NAAQS to focus separately on the “fine” and “coarse” fractions of PM_{10}
 - New standards established for “fine” particles $< 2.5 \mu\text{m}$ in diameter ($\text{PM}_{2.5}$)
 - PM_{10} standards retained to focus on “coarse fraction” (particles between 2.5 and $10 \mu\text{m}$ in diameter)
 - **2006** – Complete review/revision of PM NAAQS (process underway)
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NAAQS Review Process



PM NAAQS Review Schedule

- Final PM Air Quality Criteria Document— October 2004
 - Completion of PM Staff Paper:
 - Second draft released for CASAC review and public comment January 31, 2005
 - CASAC review meeting April 6-7, 2005
 - Final PM Staff Paper by June 30, 2005
 - Rulemaking on PM NAAQS:
 - *Federal Register* proposal to be signed by December 20, 2005
 - Public comment period: 90 days
 - Final *Federal Register* notice to be signed by September 27, 2006
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Role of the Staff Paper

- Bridge the gap between scientific assessment (Criteria Document) and the policy decisions involved in reviewing and revising NAAQS
 - Based on the newly available science, are current standards adequate to protect health/welfare?
 - If revisions appropriate: what is appropriate range of choices for alternative standards?

 - Second draft PM Staff Paper reflects provisional staff recommendations, not EPA position
 - Final staff recommendations to be informed by CASAC review and public comment
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Second Draft PM Staff Paper

- # **Chapter 1:** Introduction
 - # **Chapter 2:** Characterization of Ambient PM
 - # **Chapter 3:** Policy-Relevant Assessment of Health Effects Evidence
 - # **Chapter 4:** Characterization of Health Risks
 - # **Chapter 5:** Staff Conclusions and Recommendations on Primary PM NAAQS
 - # **Chapter 6:** Policy-Relevant Assessment of PM-Related Welfare Effects
 - # **Chapter 7:** Staff Conclusions and Recommendations on Secondary PM NAAQS
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Staff Recommendations on Primary Standards: PM_{2.5}

Main Recommendation:

- Consideration should be given to revising the current PM_{2.5} primary standards to provide increased public health protection from the effects of both long- and short-term exposures to fine particles

Why?

- New scientific evidence suggests serious health effects of long-term exposure to PM_{2.5} at levels lower than current annual standard
 - New scientific evidence also suggests serious health effects of short-term exposure to PM_{2.5} at levels lower than current 24-hour standard
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Current PM NAAQS: PM_{2.5}

	Primary Standards	Secondary Standards
PM_{2.5}	15 ug/m ³ (annual) 65 ug/m ³ (24 hr)	Same as primary

Staff Recommendations on Primary Standards: $PM_{2.5}$

■ Staff Paper conclusion:

- $PM_{2.5}$ primary standards should continue to be based on both annual and 24-hour averaging times

■ Two alternatives recommended:

- Annual $PM_{2.5}$ standard at the current level of $15 \mu\text{g}/\text{m}^3$ together with a revised 24-hour $PM_{2.5}$ standard in the range of 35 to $25 \mu\text{g}/\text{m}^3$

OR

- Revised annual $PM_{2.5}$ standard, within the range of 14 to $12 \mu\text{g}/\text{m}^3$, together with a revised 24-hour $PM_{2.5}$ standard in the range of 40 to $35 \mu\text{g}/\text{m}^3$, to provide supplemental protection against episodic localized or seasonal peaks
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Staff Recommendations on Primary Standards: PM Coarse Fraction (PM_{10-2.5})

■ Main Recommendation:

- EPA should revise the current primary PM₁₀ standards in part by replacing the PM₁₀ indicator with an indicator of coarse particles that does not include fine particles (e.g., PM_{10-2.5})
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Current PM NAAQS: PM₁₀

	Primary Standards	Secondary Standards
PM₁₀	50 ug/m ³ (annual) 150 ug/m ³ (24 hr)	Same as primary

Staff Recommendations on Primary Standards: $PM_{10-2.5}$

■ Staff Paper recommendations:

- Consideration should be given to setting a 24-hour $PM_{10-2.5}$ standard about as protective as the current daily PM_{10} standard, with a level in the range of approximately 65 to 75 $\mu\text{g}/\text{m}^3$, 98th percentile, or approximately 75 to 85 $\mu\text{g}/\text{m}^3$, 99th percentile.
 - Also some support for consideration of a 24-hour $PM_{10-2.5}$ standard down to approximately 30 $\mu\text{g}/\text{m}^3$, 98th percentile, or 35 $\mu\text{g}/\text{m}^3$, 99th percentile, recognizing that a standard set at such a relatively low level would place a great deal of weight on very limited and uncertain epidemiologic associations.
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Staff Recommendations on Secondary Standards: Improving Visibility

Main Recommendation:

- Consideration should be given to revising the current secondary PM_{2.5} standards to provide increased and more targeted protection, primarily in urban areas, from visibility impairment related to fine particles

Why?

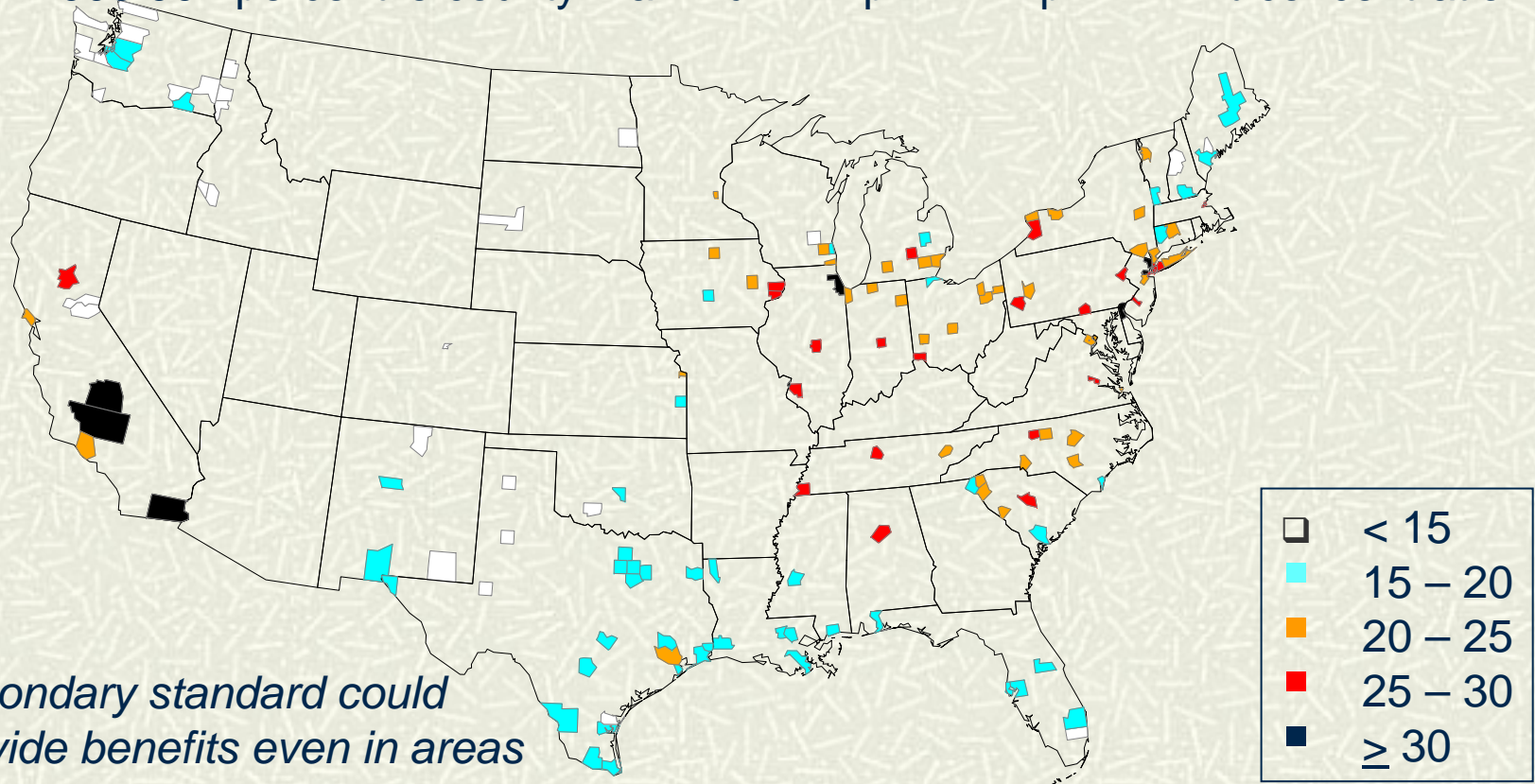
- Short-term PM_{2.5} concentrations best indicator of visibility impairment

Staff Paper recommendations:

- Consideration should be given to a 4- to 8-hour PM_{2.5} standard in the range of 30 to 20 µg/m³ to protect visual air quality primarily in urban areas
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Staff Recommendations on Secondary Standards: Improving Visibility

2001-2003 90th percentile county maximum 12 p.m. – 4 p.m. PM_{2.5} concentration



Secondary standard could provide benefits even in areas that may meet revised primary standards

Warning:

- For example only
- AQS continuous data not always comparable to FRM

Staff Recommendations on Secondary Standards: Other Welfare Effects

- # Current PM_{2.5} and PM₁₀ standards offer significant protection from negative welfare effects

 - # **Main recommendation:**
 - Maintain standards that control both PM_{2.5} and PM₁₀ to reduce long-term deposition of particles, such as nitrates and sulfates, which contribute to adverse impacts on vegetation and ecosystems and materials damage and soiling

 - Particle size less important than chemical composition, but information lacking to establish ecological indicator based on specific chemical components of PM
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Second Draft PM Staff Paper

Available on the web:

- Staff paper:
http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_cr_sp.html
 - Risk Assessment and technical documents:
http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_cr_td.html
 - Criteria Document:
<http://cfpub.epa.gov/ncea/cfm/partmatt.cfm>
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