

NAAQS Overview: Particulate Matter (PM) Standards

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Outline

Revisions to Particulate Matter NAAQS –
past, present and future:

- 1987
- 1997
- 2006
- 20XX

Public Health Risks Are Significant

Particles are linked to:

- **Premature death from heart and lung disease**
- **Aggravation of heart and lung diseases**
 - Hospital admissions
 - Doctor and ER visits
 - Medication use
 - School and work absences
- **And possibly to**
 - Lung cancer deaths
 - Infant mortality
 - Developmental problems, such as low birth weight, in children

PM Components: Fine and Coarse

Fine Particles

Combustion, gases to particles

Sulfates/acids
Nitrate
Ammonium
Organics
Carbon
Metals
Water



Sources:

Coal, oil, gasoline, diesel, wood combustion
Transformation of SO_x, NO_x, organic gases including biogenics
High temperature industrial processes (smelters, steel mills)
Forest fires



Exposure/Lifetime:

Lifetime days to weeks, regional distribution over urban scale to 1000s of km

Inhalable Coarse Particles

Crushing, grinding, dust

Resuspended dusts (soil, street dust)
Coal/oil fly ash
Aluminum, silica, iron-oxides
Tire and brake wear
Inhalable biological materials (e.g., from soils, plant fragments)



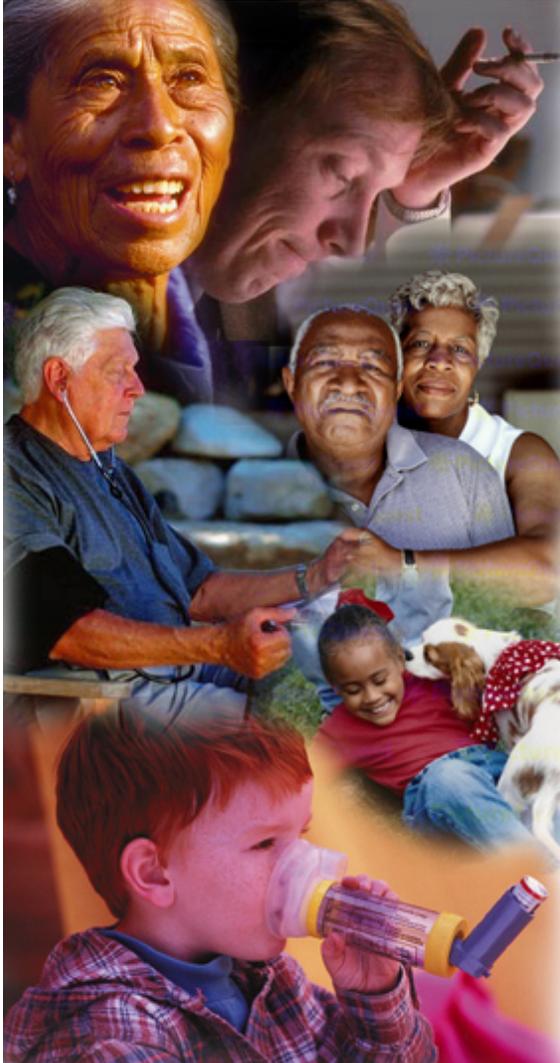
Sources:

Resuspension of dust tracked onto roads
Suspension from disturbed soil (farms, mines, unpaved roads)
Construction/demolition
Industrial fugitives
Biological sources

Exposure/Lifetime:

Coarse fraction (2.5-10) lifetime of hours to days, distribution up to 100s km

Some Groups Are More at Risk



- People with heart or lung disease
 - Conditions make them vulnerable
- Older adults
 - Greater prevalence of heart and lung disease
- Children
 - More likely to be active
 - Breathe more air per pound
 - Bodies still developing

National Ambient Air Quality Standards (NAAQS) for PM

1971 Standard set for total suspended particulate matter (TSP)

1987 Revised standard to focus on inhalable particles $\leq 10 \mu\text{m}$ (PM₁₀)

1997 Revised standard to emphasize fine particles $\leq 2.5 \mu\text{m}$ (PM_{2.5})

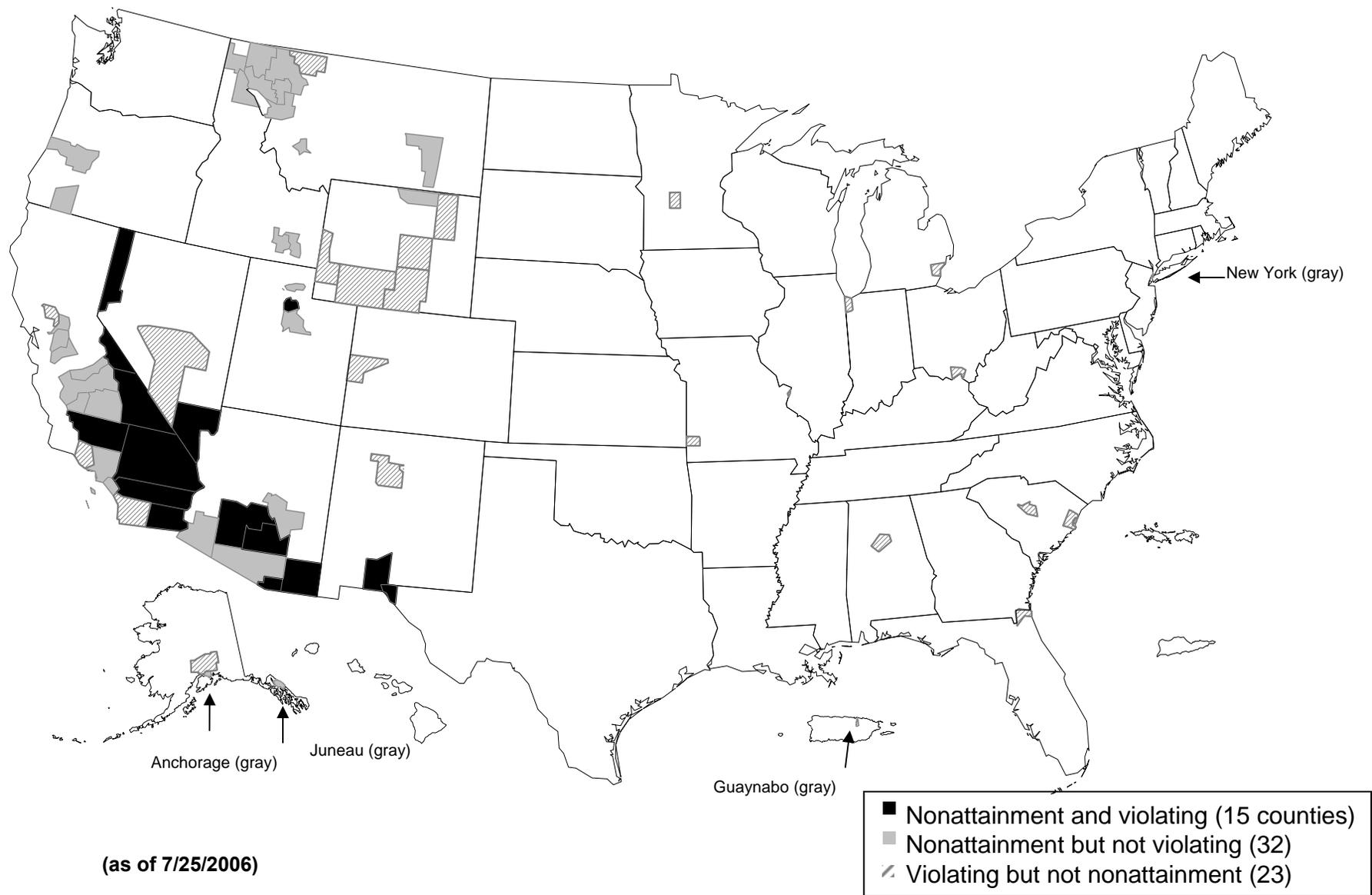
2006 Further revisions tightened daily PM_{2.5} standard

20XX Current review

The 1987 Standards

	1987 standards:
PM₁₀	Annual: 50 $\mu\text{g}/\text{m}^3$ 24-hr: 150 $\mu\text{g}/\text{m}^3$

PM₁₀ Designated Nonattainment and/or Violating (2003-2005) Counties



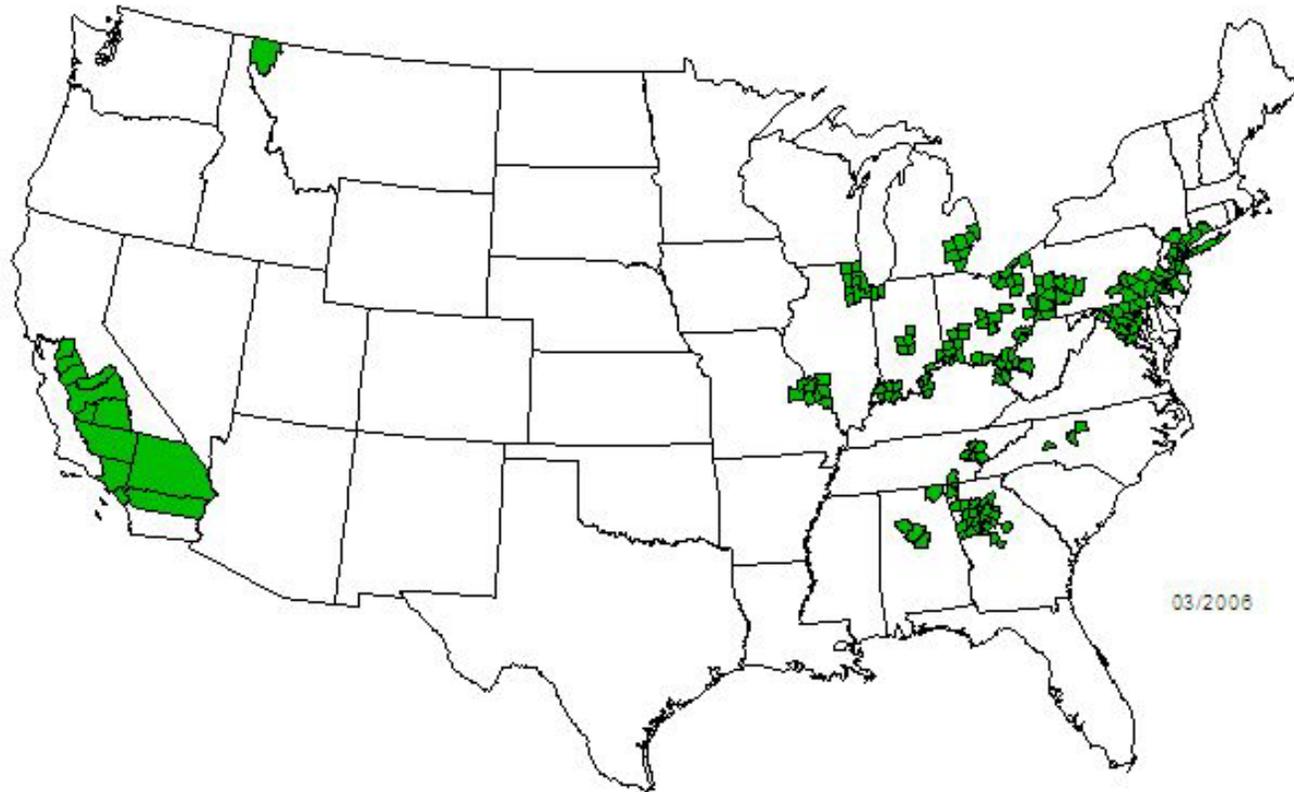
The 1997 Standards

	1997 standards:
PM_{2.5}	Annual: 15 $\mu\text{g}/\text{m}^3$ 24-hr: 65 $\mu\text{g}/\text{m}^3$
PM₁₀	Annual: 50 $\mu\text{g}/\text{m}^3$ 24-hr: 150 $\mu\text{g}/\text{m}^3$

→ **Designations became effective April 5, 2005**

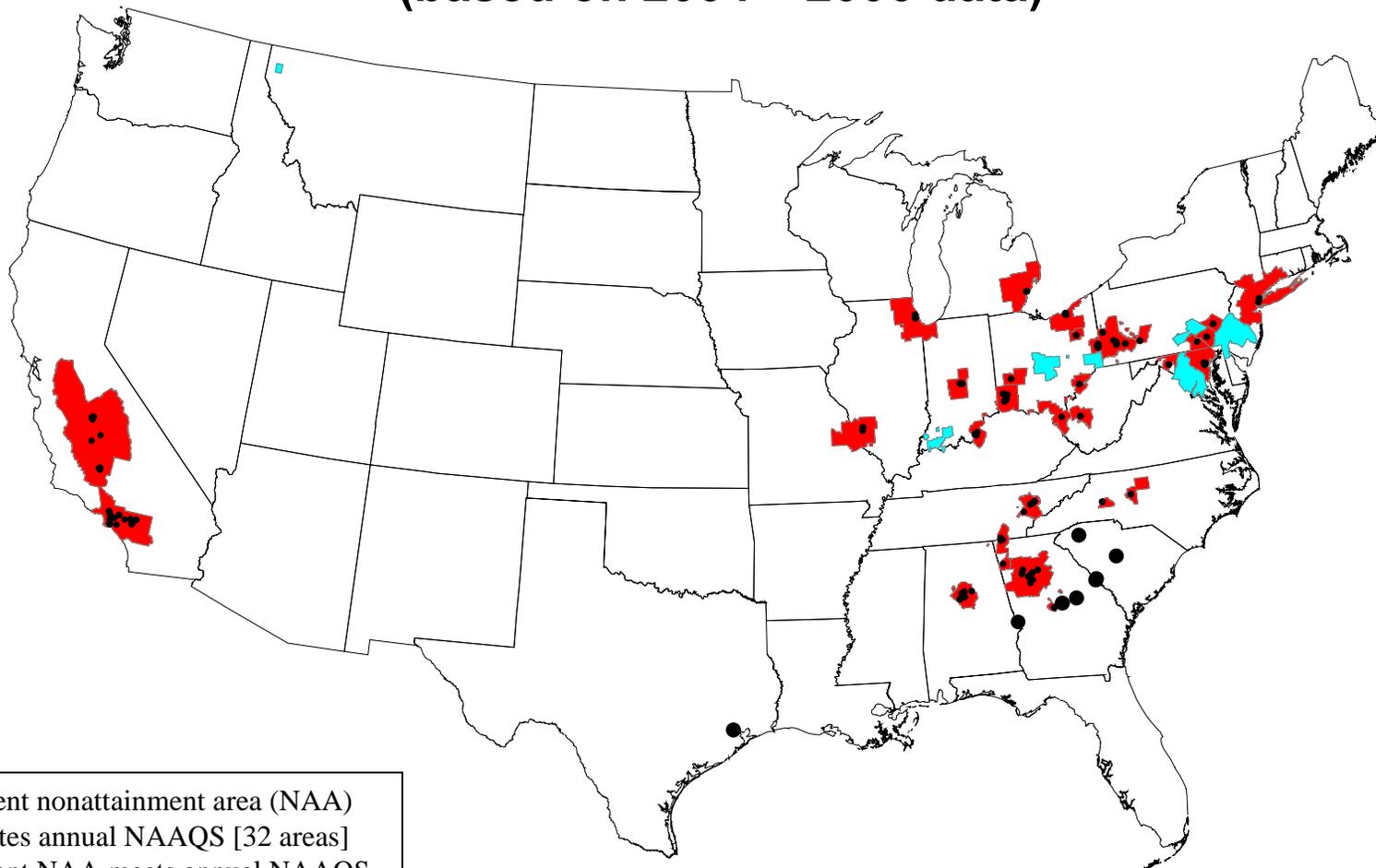
Counties Designated Nonattainment for PM_{2.5}

(March 2006)



Partial counties are shown as whole counties

1997 PM_{2.5} Annual Standard Design Values (based on 2004 – 2006 data)



- Current nonattainment area (NAA) violates annual NAAQS [32 areas]
- Current NAA meets annual NAAQS [7 areas]
- Sites in current NAA violate the annual NAAQS (94 sites)
- Sites not in a current NAA violate the annual NAAQS (8 sites)

- 7 NAA clean for annual NAAQS: Libby, Columbus (OH), Evansville, Harrisburg, Philadelphia, Washington, Wheeling, but ...
 - Philadelphia has designated NAA sites that are incomplete.
 - Only Evansville and Wheeling are also clean for the 24-hr NAAQS
- 8 additional violating sites (not in NAA) are located in 7 areas:
 - Greenville, SC (Unclassifiable area); Augusta, GA; Columbia, SC; Columbus, GA; Houston, TX; Washington County, GA; and Wilkinson County, GA

Significance of State Plans to Attain the 1997 PM_{2.5} Standards

- Among the criteria pollutants, PM_{2.5} poses among the greatest health risks
- Local and in-state sources are responsible for a significant portion of the PM_{2.5} problem and health risk
 - These sources are the focus of PM_{2.5} SIPs
- CAA requires these SIPs to demonstrate attainment as expeditiously as practicable to protect public health
- PM_{2.5} implementation rule describes the steps for determining required controls and the date that is as expeditious as practicable

2006 PM Standards

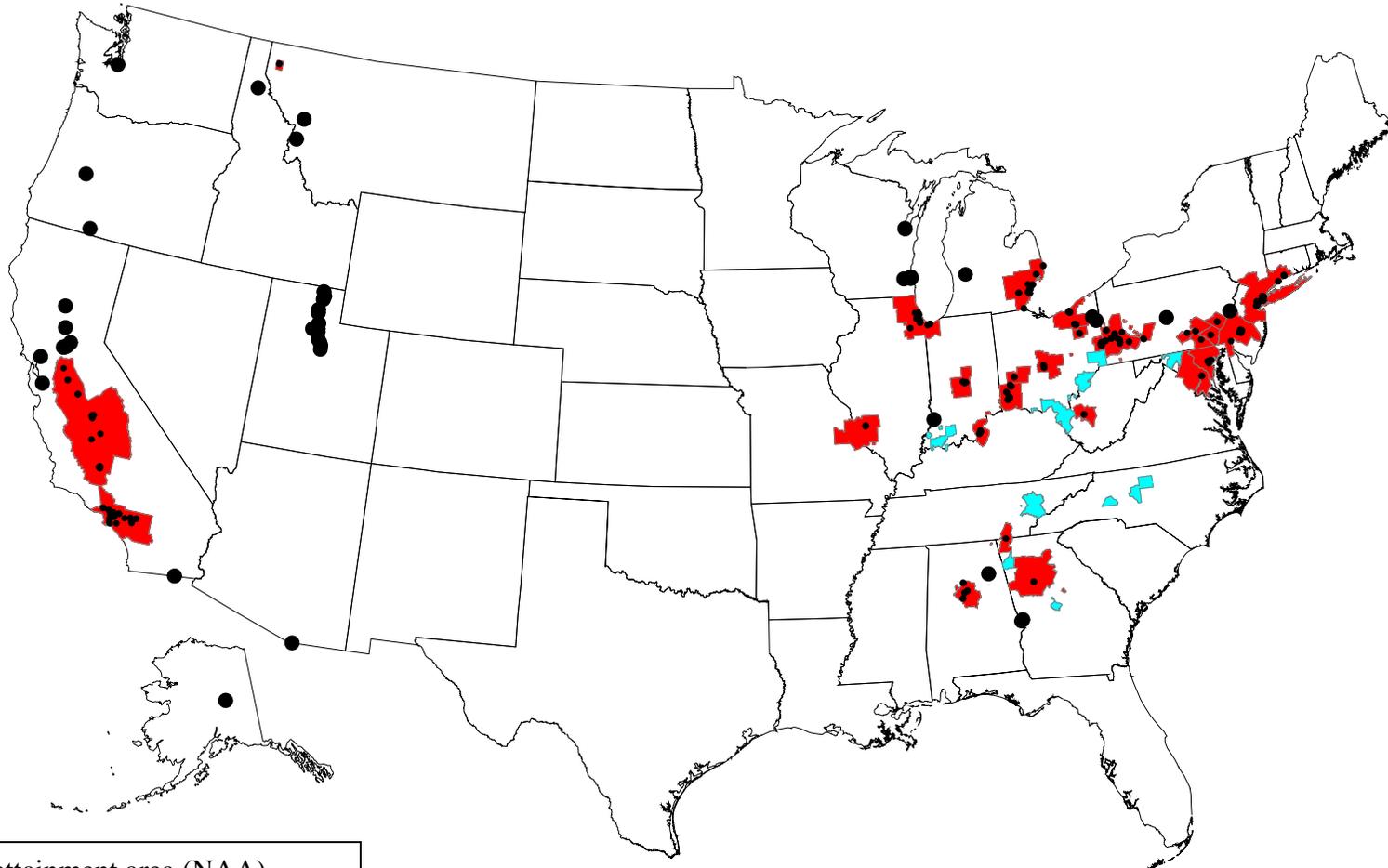
	1997 standards:	2006 standards:
PM_{2.5}	Annual: 15 $\mu\text{g}/\text{m}^3$ 24-hr: 65 $\mu\text{g}/\text{m}^3$	Annual: 15 $\mu\text{g}/\text{m}^3$ 24-hr: <u>35</u> $\mu\text{g}/\text{m}^3$
PM₁₀	Annual: 50 $\mu\text{g}/\text{m}^3$ 24-hr: 150 $\mu\text{g}/\text{m}^3$	Annual: <u>revoked</u> 24-hr: 150 $\mu\text{g}/\text{m}^3$

Benefits of the 2006 Standards

The benefits of meeting the revised 24-hr PM_{2.5} standards include estimated reductions of:

- 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
- 2 million days when people must restrict their activities because of particle pollution-related symptoms

Areas/Sites Violating 24-Hour PM_{2.5} NAAQS (based on 2004-2006 data)



- Current nonattainment area (NAA) violates 24-hr NAAQS [29 areas]
- Current NAA meets 24-hr NAAQS [10 areas]
- Sites in current NAA violate the 24-hr NAAQS [131 sites / 29 areas]
- Sites not in a current NAA violate the 24-hr NAAQS [48 sites / 32 areas]

Schedule for the Current Review

Major Milestones		Projected Completion Date	Projected CASAC Review Date
Workshops to Discuss Key Policy-Relevant Issues		July 2007 (complete)	
Integrated Review Plan	Draft Final	October 2007 (complete) February 2008	November 30, 2007 (complete)
Integrated Science Assessment	First Draft Second Draft Final	September 2008 March 2009 September 2009	November 2008 May 2009
Risk/Exposure Assessment	Plan First Draft Second Draft Final	October 2008 April 2009 November 2009 March 2010	November 2008 May 2009 January 2010
Policy Assessment/Rulemaking	ANPR Proposed Final	June 2010 January 2011 October 2011	August 2010

*Indicates that a single CASAC meeting will address both documents

Timeline for PM_{2.5} NAAQS Implementation

(1997, 2006, and 20XX standards)

April 2005	Effective date of Final designations for 1997 PM_{2.5} standards (signed December 2004)
April 2008	PM_{2.5} State plans due for 1997 standards
April 2009	Final designations for 2006 PM_{2.5} standards (to be signed December 2008)
April 2010 (2015 w/ extension)	Attainment date for areas designated “nonattainment” for 1997 standards
April 2012	PM_{2.5} State plans due for 2006 standards
April 2014 (2019 w/ extension)	Attainment date for areas designated “nonattainment” for 2006 standards
September 2009	Integrated Science Assessment for next review
March 2010	Risk/Exposure Assessment
October 2011	Rulemaking on revision to standards

Keep in Mind During State Planning for the Fine Particle Standards

- Current planning is focused on the 1997 annual standard
- If an area also violates **2006** 24-hour standard, consider measures on key source categories that contribute to high 24-hour concentrations
- If other areas in the state were designated attainment with the 1997 annual standard but are now violating, take steps to achieve clean air in these areas