

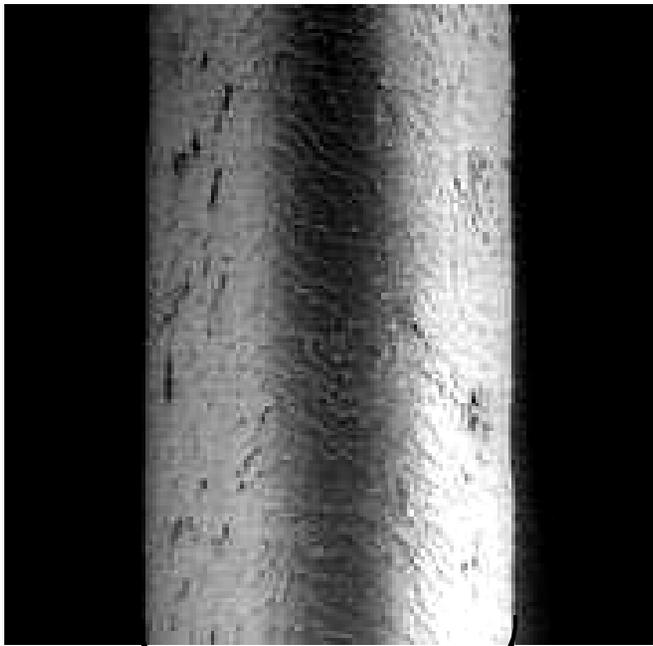


Fine Particles in the Air



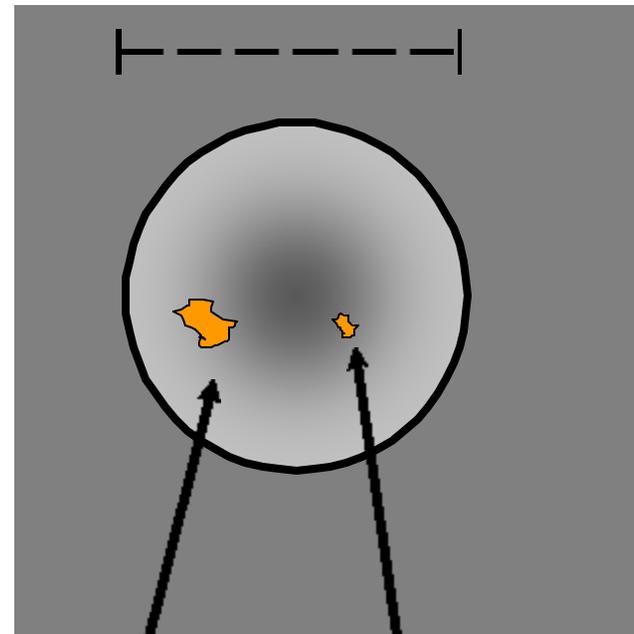
Particulate Matter: What is It?

A complex mixture of extremely small particles and liquid droplets



Human Hair (70 μm diameter)

Hair cross section (70 μm)



PM₁₀
(10 μm)

PM_{2.5}
(2.5 μm)

Wood-Burning Stoves



Power Plants



Heavy Duty Diesel Engines



Natural Sources



Fine Particles Can Be Emitted Directly or Formed in the Air from Gases

Cars and Trucks



Non-Road Vehicles



Forest Fires



Industrial Sources



Fine Particles: Why You Should Care



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 in children, such as low birth weight

Particles Affect the Lungs and Heart

- **Respiratory system effects**
 - Chronic bronchitis
 - Asthma attacks
 - Respiratory symptoms (cough, wheezing, etc.)
 - Decreased lung function
 - Airway inflammation
- **Cardiovascular system effects**
 - Heart attacks
 - Cardiac arrhythmias
 - Changes in heart rate and heart rate variability
 - Blood component changes

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

We Must Move Ahead

- Implementation of the fine particle standards is estimated to prevent:
 - Thousands of premature deaths from heart and lung disease every year
 - Tens of thousands of hospital admissions and emergency room visits
 - Millions of school and work absences due to aggravated asthma and other lung and heart diseases

Coming Soon: Fine Particle Forecasting & Mapping



Fine Particles Reduce Visibility



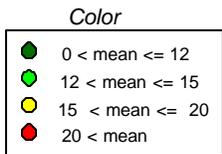
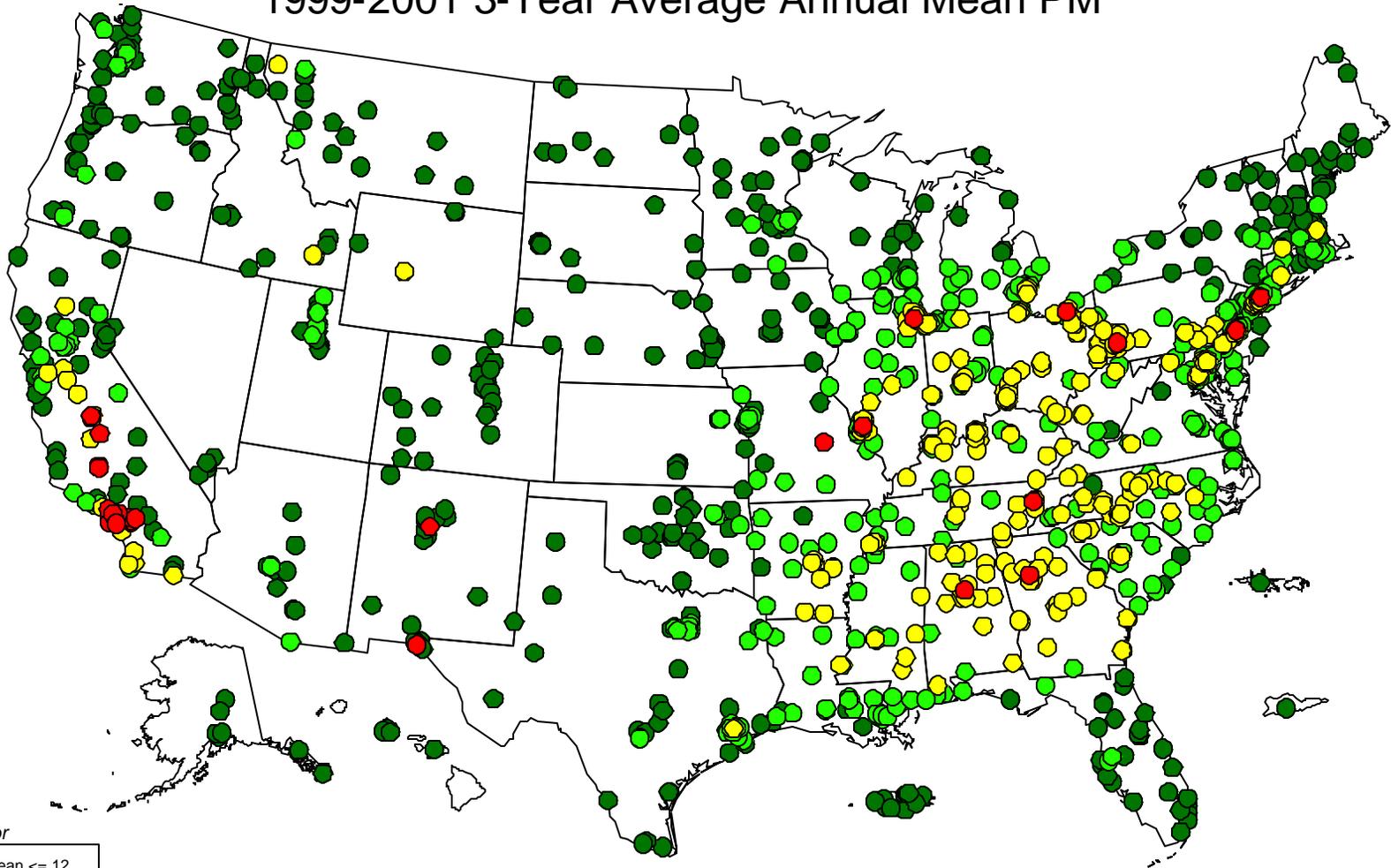
- Example: Chicago in the summer of 2000.
 - Left – a clear day: $\text{PM } 2.5 < 5 \mu\text{g}/\text{m}^3$
 - Right – a hazy day: $\text{PM } 2.5 \sim 35 \mu\text{g}/\text{m}^3$

Many Areas Are at Risk

- Fine particles can be transported long distances
- Fine particle pollution is a regional problem
- Eastern U.S. and California are the most affected
- Fine particles are a year-round problem

Fine Particles Nonattainment Most Likely in California and in the East

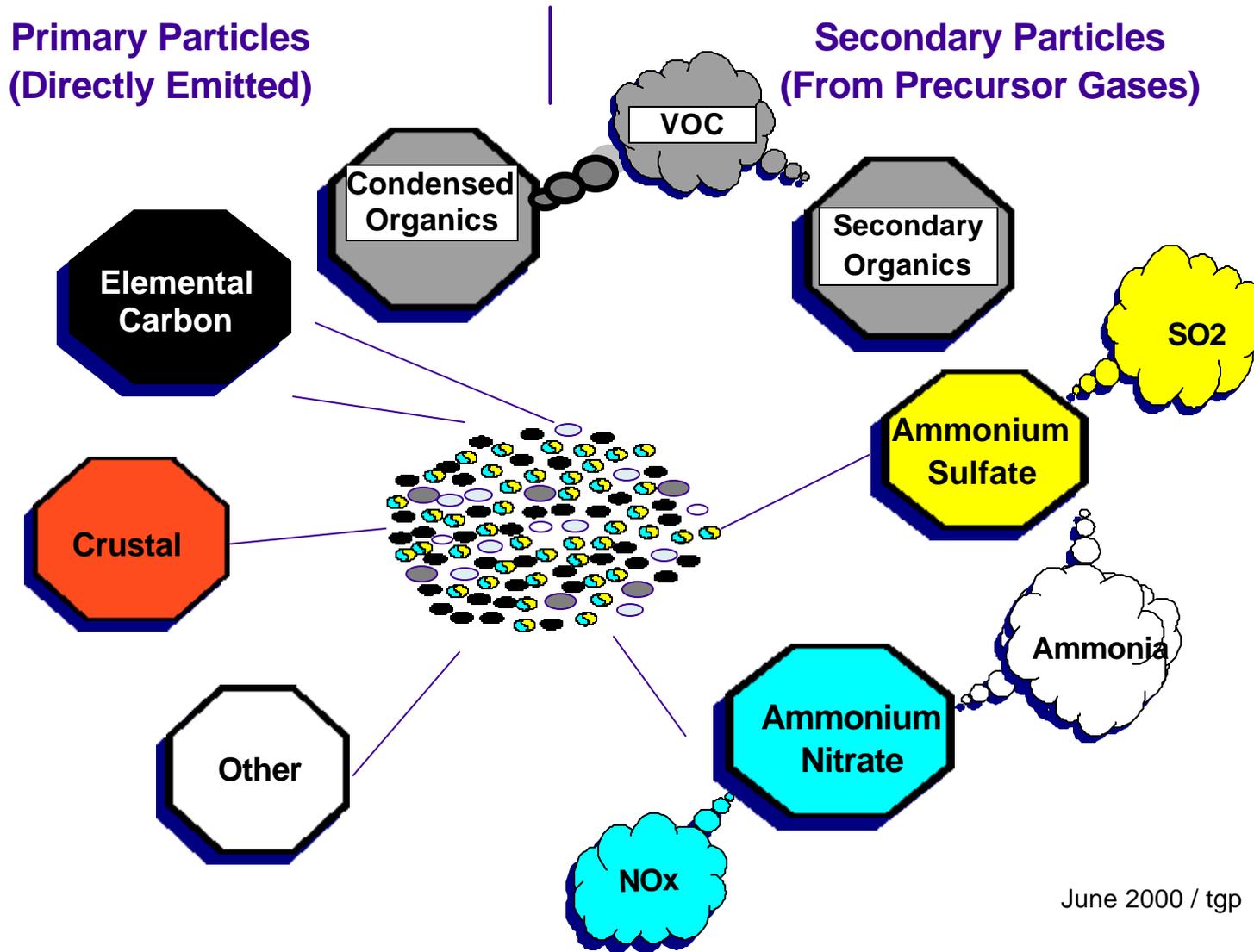
1999-2001 3-Year Average Annual Mean PM



Data from AQS 7/8/02. Sites that operated any time, 1999-2001 (n= 1202).

With Substitution

PM 2.5 In Ambient Air: A Complex Mixture



Particles May Be Transported Long Distances And Impact Large Numbers Of People

Wind Direction



Fine Particle Level



Small City w/
Power Plant

Town

Large City

Facility

Large City

Town

— 200-300 miles —

EPA's Role: Protecting and Improving Air Quality

- EPA set national air quality standards for fine particles in 1997
 - Annual std: 5 micrograms per cubic meter, averaged over 3 years
 - 24-hour std: 65 micrograms per cubic meter, 98th percentile averaged over 3 years
- New standards withstood all legal challenges
- Moving forward now to implement standards

Reducing Fine Particles

- Approach must include national, regional and local strategies
- National efforts under way:
 - Existing programs such as Acid Rain program and fuel sulfur limits
 - Rules not yet in effect, such as rule to control emissions from non-road vehicles & equipment
- The Clear Skies Act

The Clear Skies Act

- Market-based program to reduce emissions from power generators
- Would set mandatory caps on emissions of two key pollutants that form fine particles (sulfur dioxide and nitrogen oxides)
- Would bring many areas into attainment; others would be closer to attainment.

Some Local Reduction Programs

- Opportunities to address both air toxics and PM-10 nonattainment
 - **Making vehicles cleaner**
 - Diesel engine retrofit programs
 - Clean vehicle fleet programs
 - Diesel idling, smoking cars reduction programs
 - **Reducing the impact of burning**
 - Wood stove retrofit incentives
 - Open burning impact reduction
 - **PM Action Days**

PM_{2.5} Implementation Timeline

2003:

- Summer Propose implementation rule
- Sept. States/Tribes submit nonattainment area recommendations
- Dec. Propose PM-2.5 transport rule

2004:

- Summer Finalize implementation rule
- Dec. EPA designates nonattainment areas

2005:

- Spring EPA finalizes PM_{2.5} transport rule

2007:

- Dec. States/Tribes submit implementation plans

2009:

- Dec. Attain standards

Fine Particles: Summary

- Linked to serious health effects
 - premature death, heart and lung disease
- A complex problem
 - many types of pollutants from multiple emission sources
- EPA encourages early reductions
- EPA will work with states to meet the fine particle standards and to protect public health