



State Implementation Plans Could Rule Your Life

or why NAAQS Are Important

Chuck Sams

R9 Air Quality Program Manager

National Ambient Air Quality Standard

(NAAQS) 1970 CAA

- **National target for an acceptable concentration of a specific, criteria pollutant in air:**
 - **primary standard to protect public health** based entirely on health-related information, without considering the costs.
 - **secondary standard to protect public welfare** includes effects on soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, transportation, and other economic values, as well as personal comfort and well-being.

State Implementation Plan (SIP) 1970 CAA

- Subset of a State's Air Agency Rules.
Those rules dealing with the attainment and maintenance of NAAQS.

Includes

- Every guideline, letter, graph, table, legal & regulatory opinion, decision, and emission budget in a State's Air Agency files dealing with the attainment and maintenance of NAAQS.

Criteria Pollutants

- **Ozone**

- Secondary Pollutant:

- Sunlight + NO_x + VOCs

- **Particulate Matter**

- Secondary Pollutant:

- e.g. Particles derived from NO_x or VOCs

- Primary Pollutant:

- e.g. Soot Particles

- **Nitrogen Oxides**

- **Carbon Monoxide**

- **Lead**

- **Sulfur Dioxide**

Most Important NAAQS re: Fire

- **Ozone**
 - old 1-hour std: 0.120 ppm
 - new 8-hour std: 0.08 ppm

- **Particulate Matter**
 - old PM₁₀ std:
 - 150 µg/m³ average for 24 hours
 - 50 µg/m³ annual average
 - new PM_{2.5} std:
 - 65 µg/m³ average 24 hours
 - 15 µg/m³ annual average

NO_x + Sunlight + VOCs = Ozone

- **NO_x Reactions:**



- **VOC Reactions:**



***8-hour Ozone standard: 0.08 ppm**

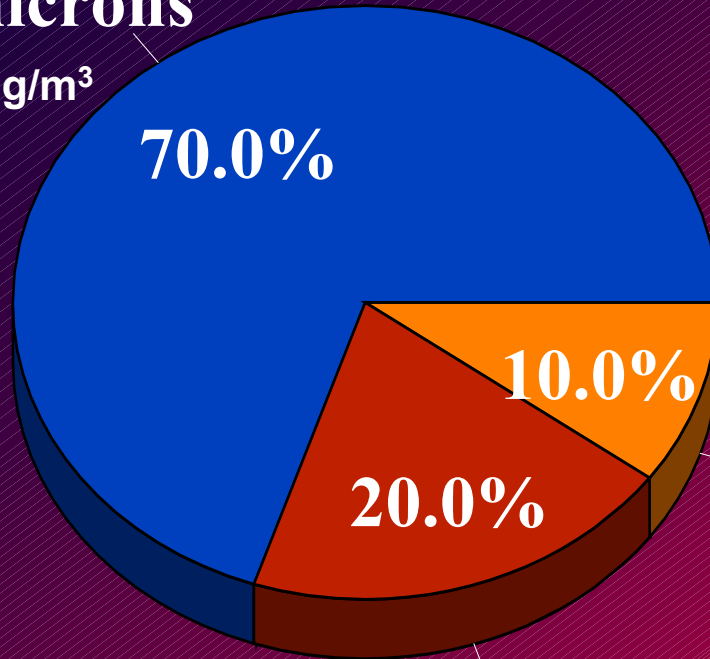
Particulate Matter

Smoke particles from wood are relatively small

(similar size to pollen)

< PM 2.5 microns

*Annual PM_{2.5} standard = 15 µg/m³



(similar size to fly ash)

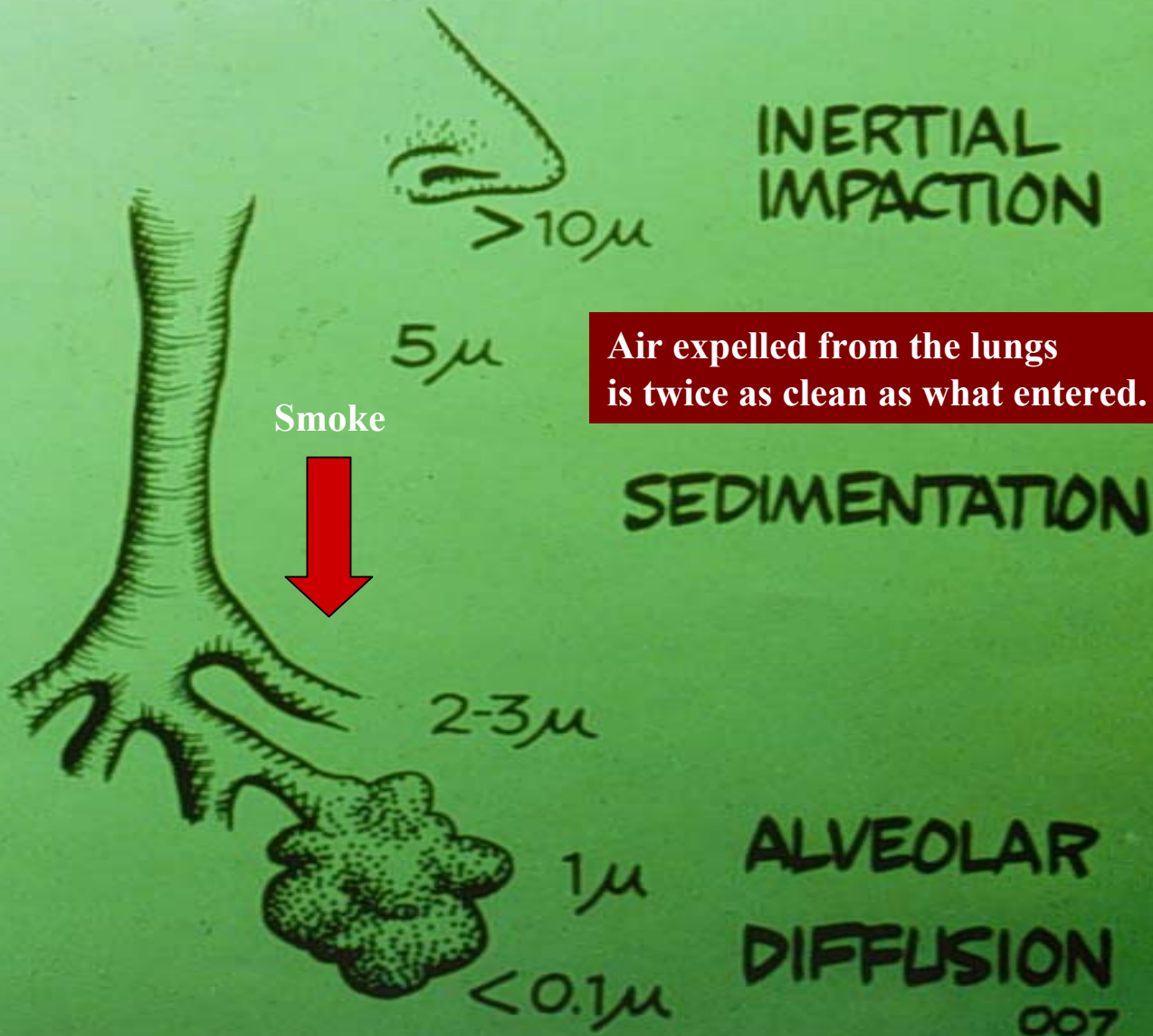
> PM 10 microns

PM 2.5-10 microns

(similar size to dust)



PARTICULATE DEPOSITION

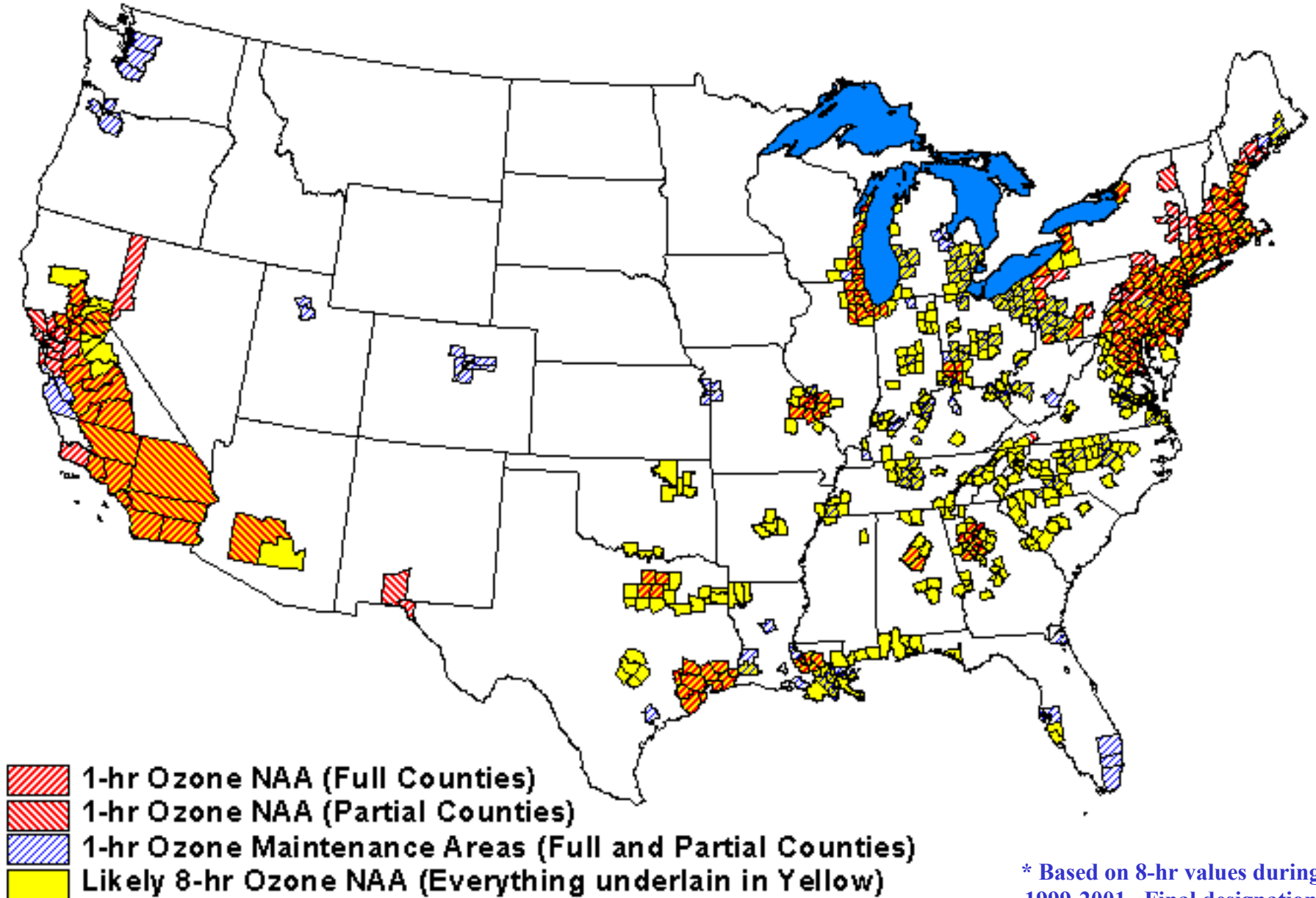


- No monitoring data from a Federal Reference Method Monitor?
Then, no violation of the NAAQS!

Even so,

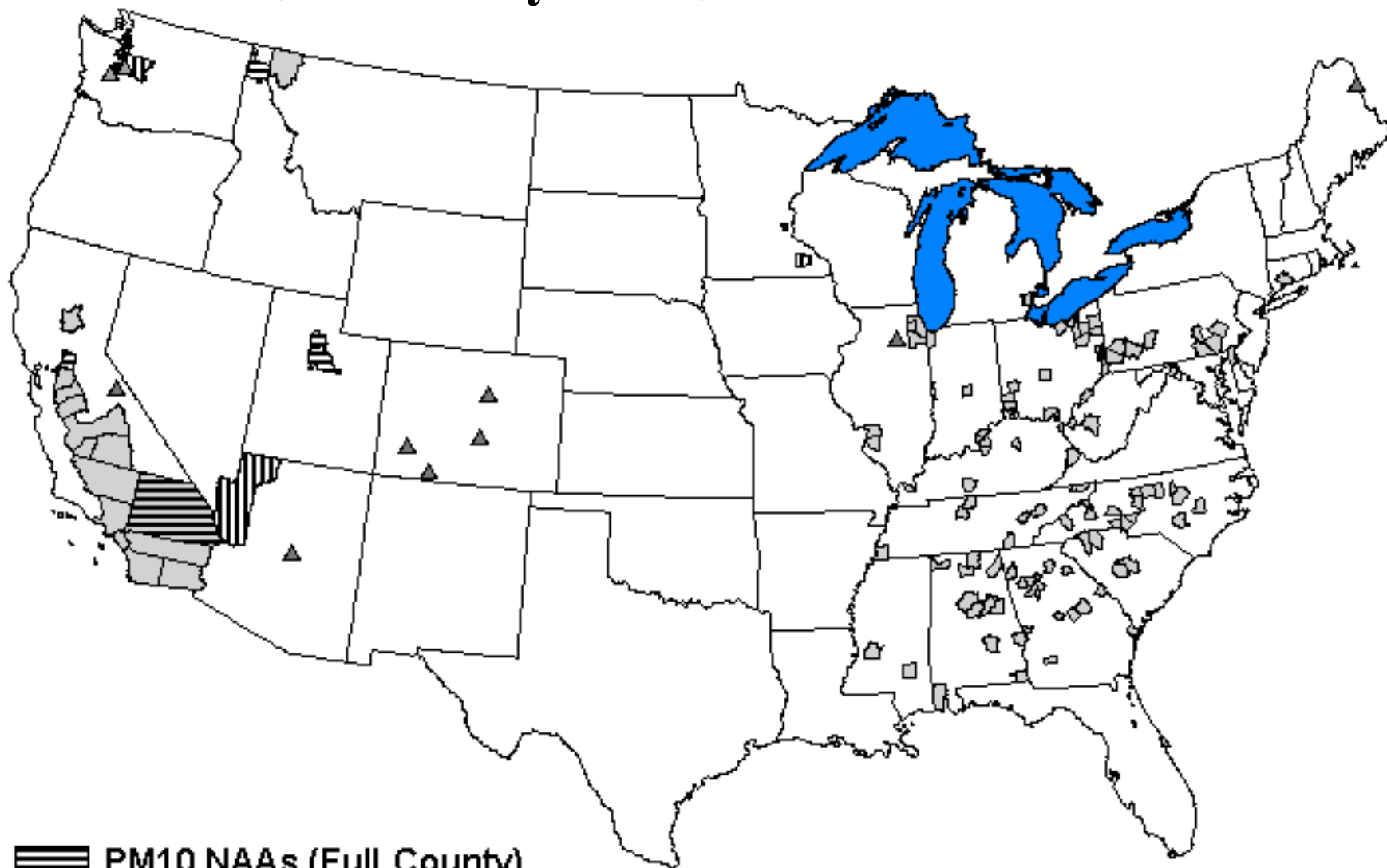
- High pollutant concentrations can lead to:
 - Placement of a FRM Monitor nearby
 - Reconsideration of the SMP and/or SIP
 - Stricter rules for you and your neighbors





1-hr and likely 8-hr Ozone Non-Attainment Areas*



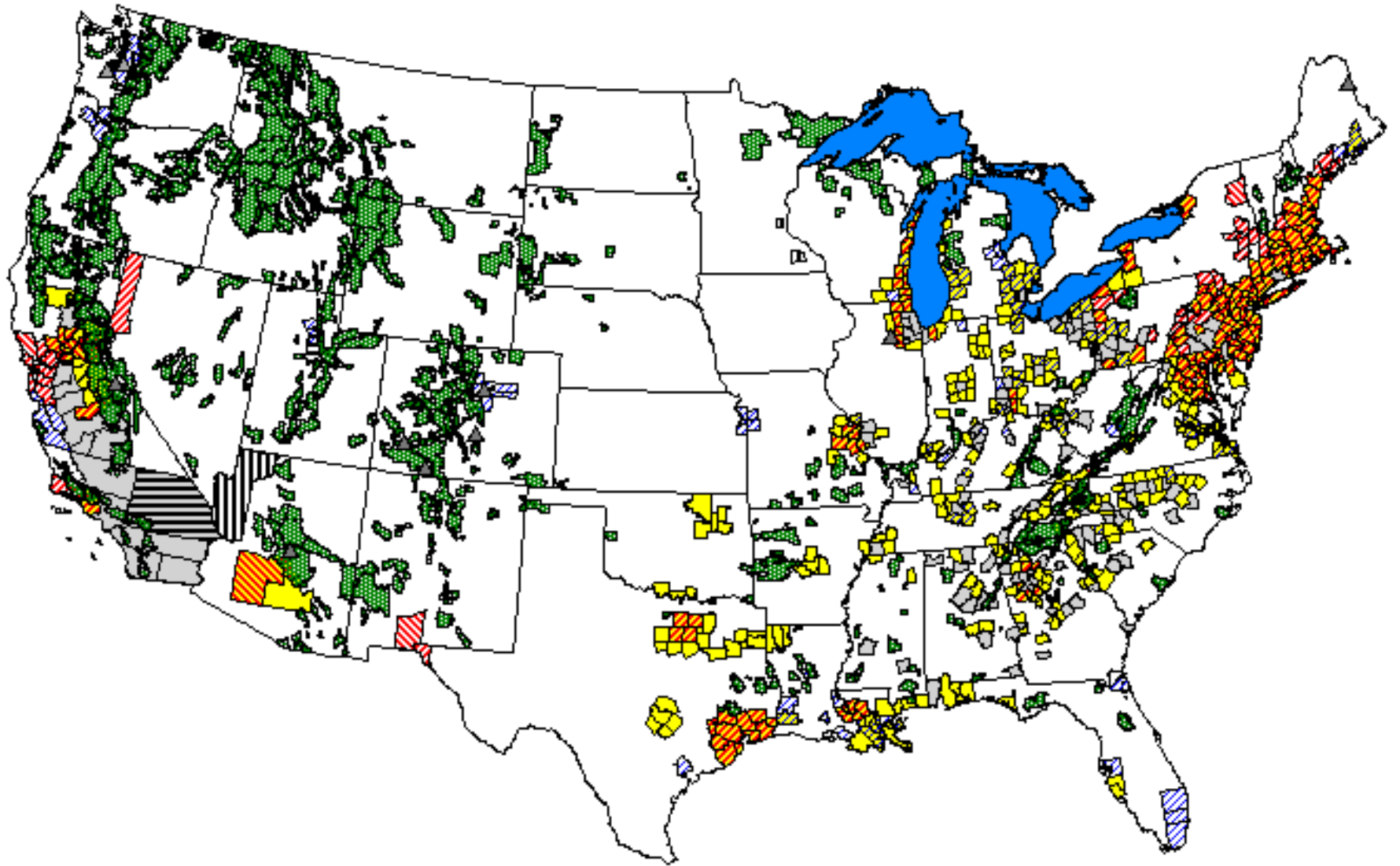
* Based on 8-hr values during 1999-2001. Final designation will be based on 2000-2002 data.

PM₁₀ and likely PM_{2.5} Non-Attainment Areas*



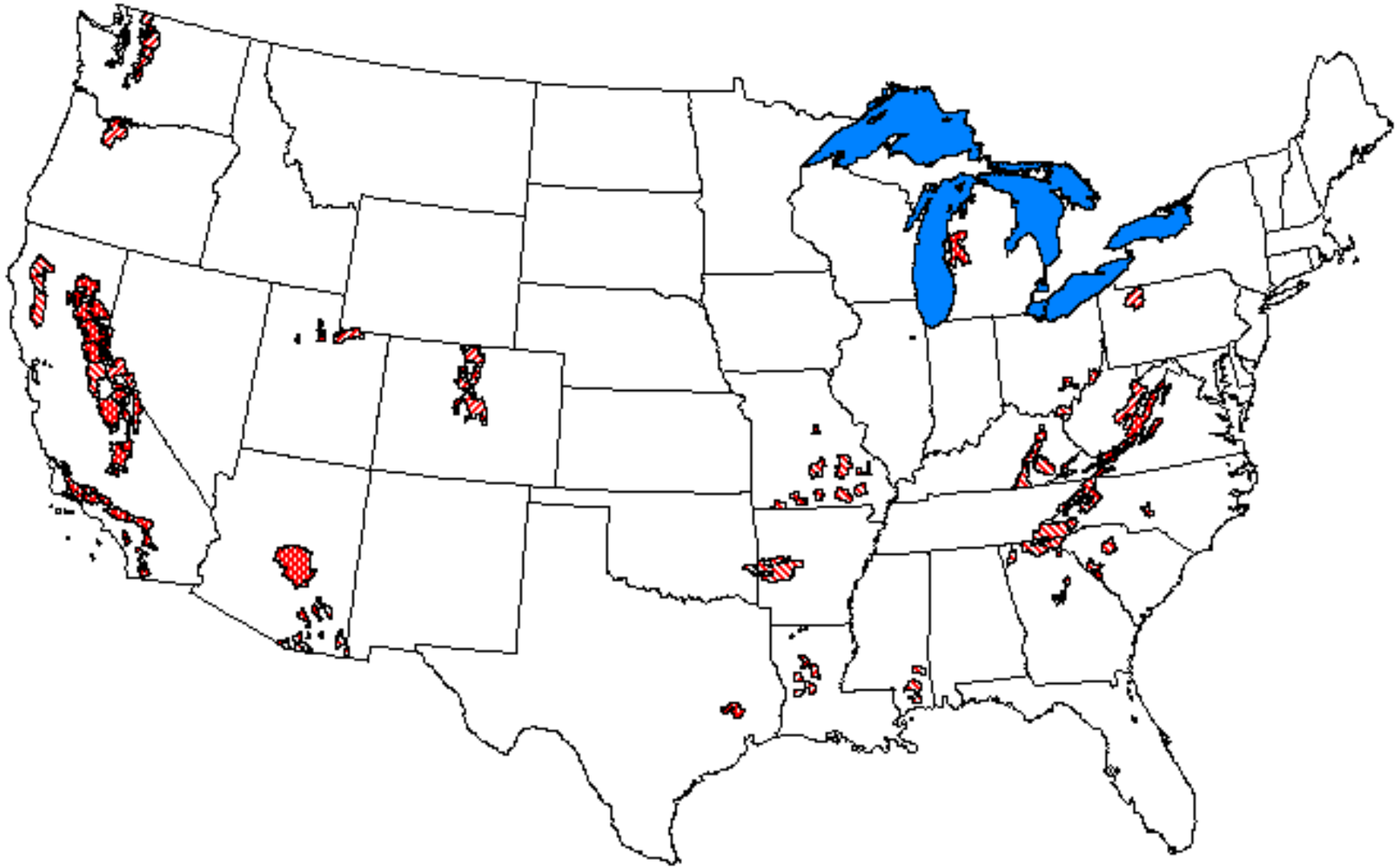
-  PM10 NAAs (Full County)
-  PM10 Maintenance Areas (Full County)
-  PM10 Maintenance Areas (Partial County)
-  PM2.5 NAA Counties (Everything underlain in Grey)



* Based on PM_{2.5} values during 1999-2001. Final designation will be based on 2000-2002 data.



Everything, including NFS Lands

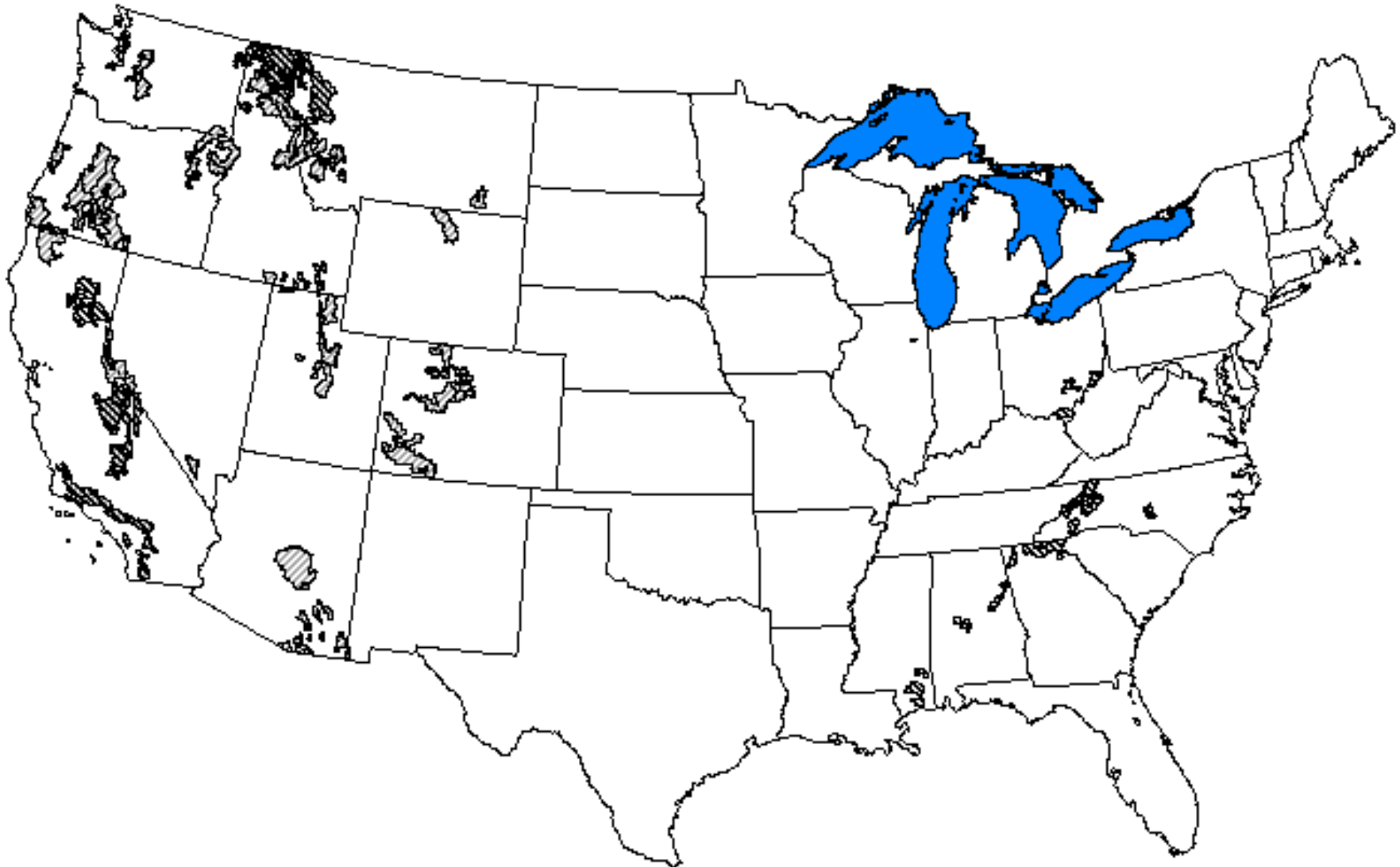
NFS Lands Potentially Affected by Ozone Standards*



-  Forests Potentially Affected by 8-hr Ozone Std
-  Forests Potentially Affected by 1-hr Ozone Std.

* Based on 8-hr values during 1999-2001. Final designation will be based on 2000-2002 data.

NFS Lands Potentially Affected by PM Standards



 **Forests Potentially Affected by PM2.5 Std**
 **Forests Potentially Affected by PM10 Std**

* Based on PM2.5 values during 1999-2001. Final designation will be based on 2000-2002 data.

EPA Proposes to Integrate Implementation of the Ozone and PM Standards

- Both pollutants are formed under similar atmospheric conditions by gases (e.g. NO_x and VOCs) emitted from the same type of sources.
- Both remain in the air for days, and can travel hundreds of miles from their origins.
- Both cause respiratory symptoms and other serious health problems in sensitive populations

EPA is developing a two-phase, integrated implementation strategy for the ozone, particulate matter, and regional haze programs.

Harmonization of 8-hr O₃, PM_{2.5}, & Regional Haze SIPs

EPA is developing a two-phase, integrated implementation strategy for the ozone, particulate matter, and regional haze programs -

- **April 25, 2003 – o₃ Non-Attainment designation**
- **Summer 2003 – Propose PM_{2.5} NAAQS Implementation Rule.**
- **End of 2003 – Finalize O₃ NAAQS Implementation Rule.**
- **Summer 2004 – Finalize PM_{2.5} NAAQS Implementation Rule.**
- **By December 2004 – Designate O₃ and PM_{2.5} Non-Attainment Areas.**
- **March to June, End of 2005? – Finalize PM_{2.5} Transport Rule (including o₃ and PM_{2.5} measures).**
- **By December 2007 – States submit SIPs.**
- **December 2009 – Attain NAAQS ??**

Compiled from information supplied by:

Jack Edwardson (EPA OAQPS) and

John Silvasi (EPA OAQPS)

General Conformity Rules

(i.e. Conformity of Federal Actions to a SIP)

You Should:

- Only apply Rules to Federal actions within Non-Attainment and Maintenance Areas (EPA & States regulate Federal activities to a greater extent than private...Section 176 CAA) ...HOWEVER...
- Make Conformity Determinations in conjunction with NEPA process, if practical.
- Determine your Forest's Emissions Inventory ASAP.
- Provide your NFS emission values for inclusion in your State's Emissions Budget.

General Conformity Rules

(i.e. Conformity of Federal Actions to a SIP)

You Should:

- Make Friends with your state's Air Quality Regulators

ASAP:

- Make your Forest's projected Emission Inventory part of your state's Emission Budget, and therefore the SIP
- and likely avoid having to make Conformity Determinations.

...However...???

General Conformity is coming
for Attainment Areas.

SO

Prepare and keep Emission Inventories updated
for all Forests.

Particulate Matter Related to Health Effects



- Increased premature deaths
- Aggravation of respiratory or cardiovascular illness
- Lung function decrements
- Increased work loss
- Changes in lung function/structure/natural defense

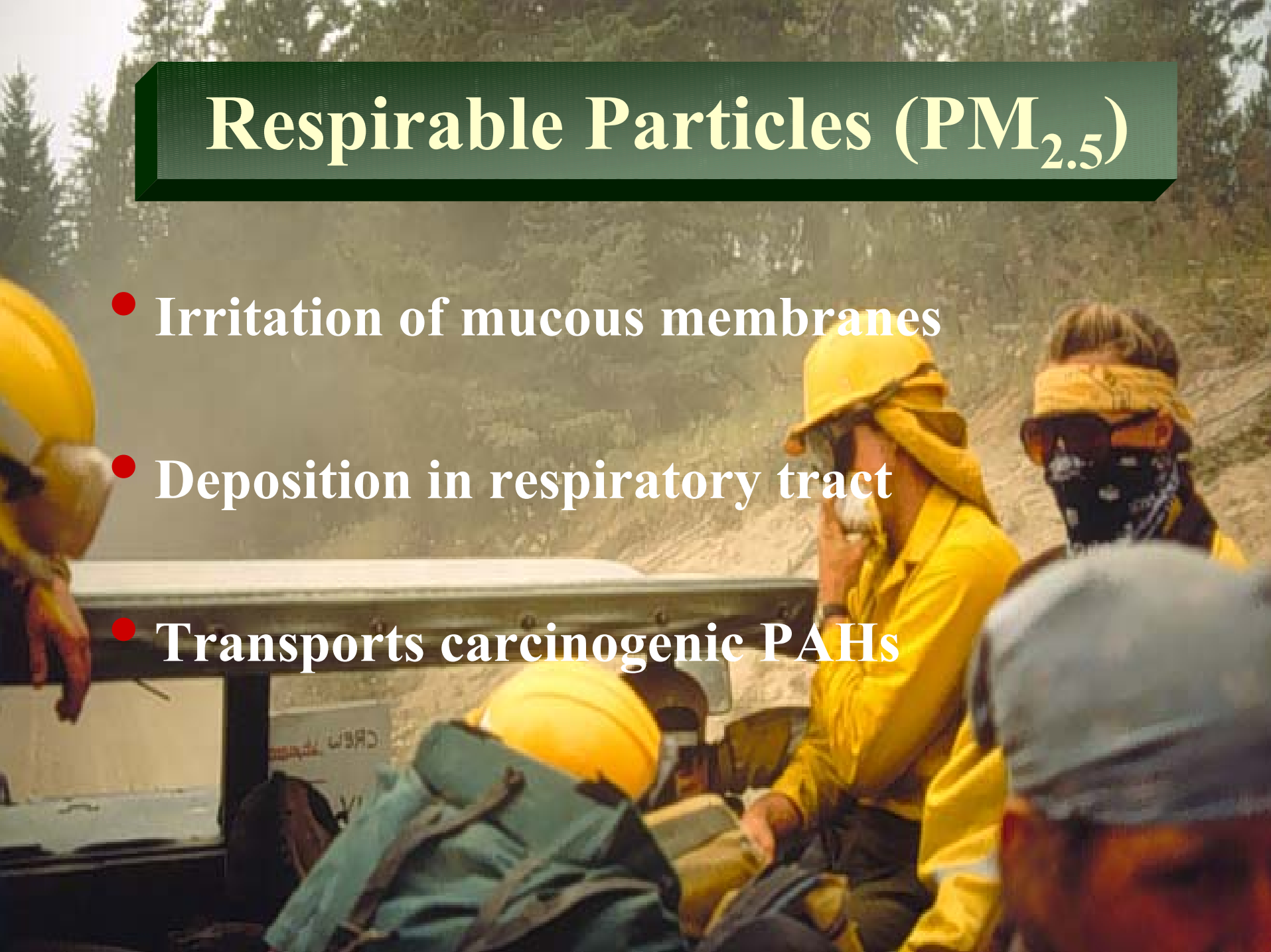
From a recent national study, 0.5% increase of daily deaths for each 10 mg/m³ increase in PM₁₀. Seattle and Spokane were two of the 90 cities in the study.

A dramatic landscape featuring a large, intense fire in the foreground, with bright orange and yellow flames rising from a field of tall grass. The sky is dark and stormy, with heavy, dark clouds and a small airplane flying in the distance. The overall scene is one of a natural disaster or a controlled burn in a field.

Questions

Respirable Particles (PM_{2.5})

- Irritation of mucous membranes
- Deposition in respiratory tract
- Transports carcinogenic PAHs



Carbon Monoxide (CO)

- **Colorless and odorless**
- **Reduces oxygen content of the blood**
- **Loss of mental acuity, motor skills, and time awareness**
- **Stresses heart**
- **May cause death**

Benzene

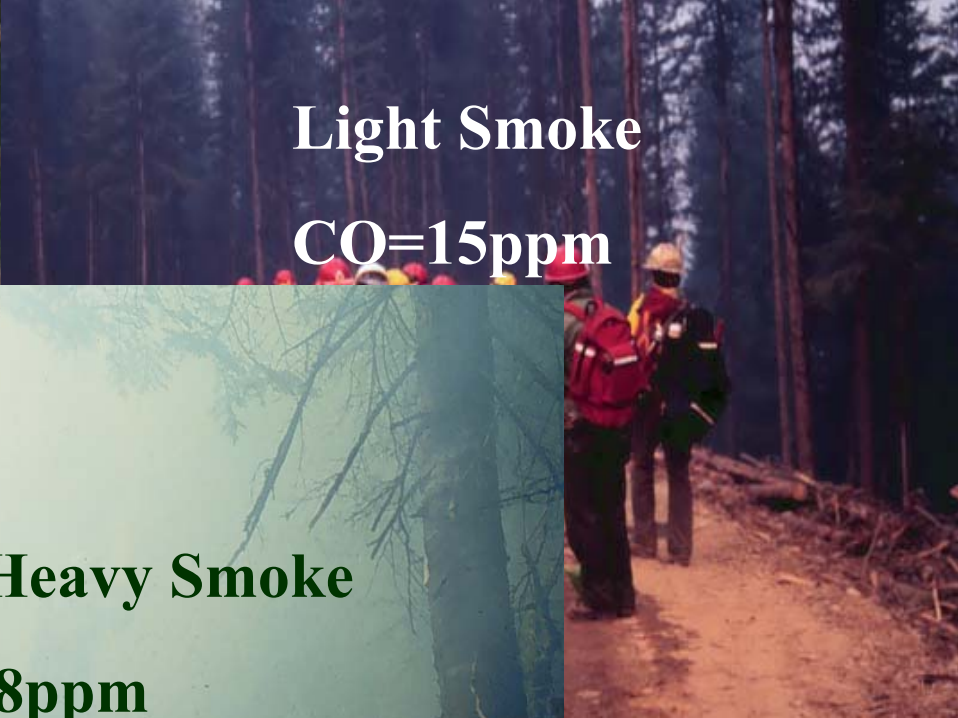
A photograph of firefighters in a forest. They are wearing red helmets and yellow jackets. One firefighter in the foreground is pouring water from a bucket onto a fire. The background is filled with smoke and trees.

- Irritating to mucous membrane
- Known carcinogen
- Respiratory failure at high concentrations

No Smoke
CO=0ppm



Light Smoke
CO=15ppm



Very Heavy Smoke
CO=58ppm



Moderate Smoke
CO=30ppm



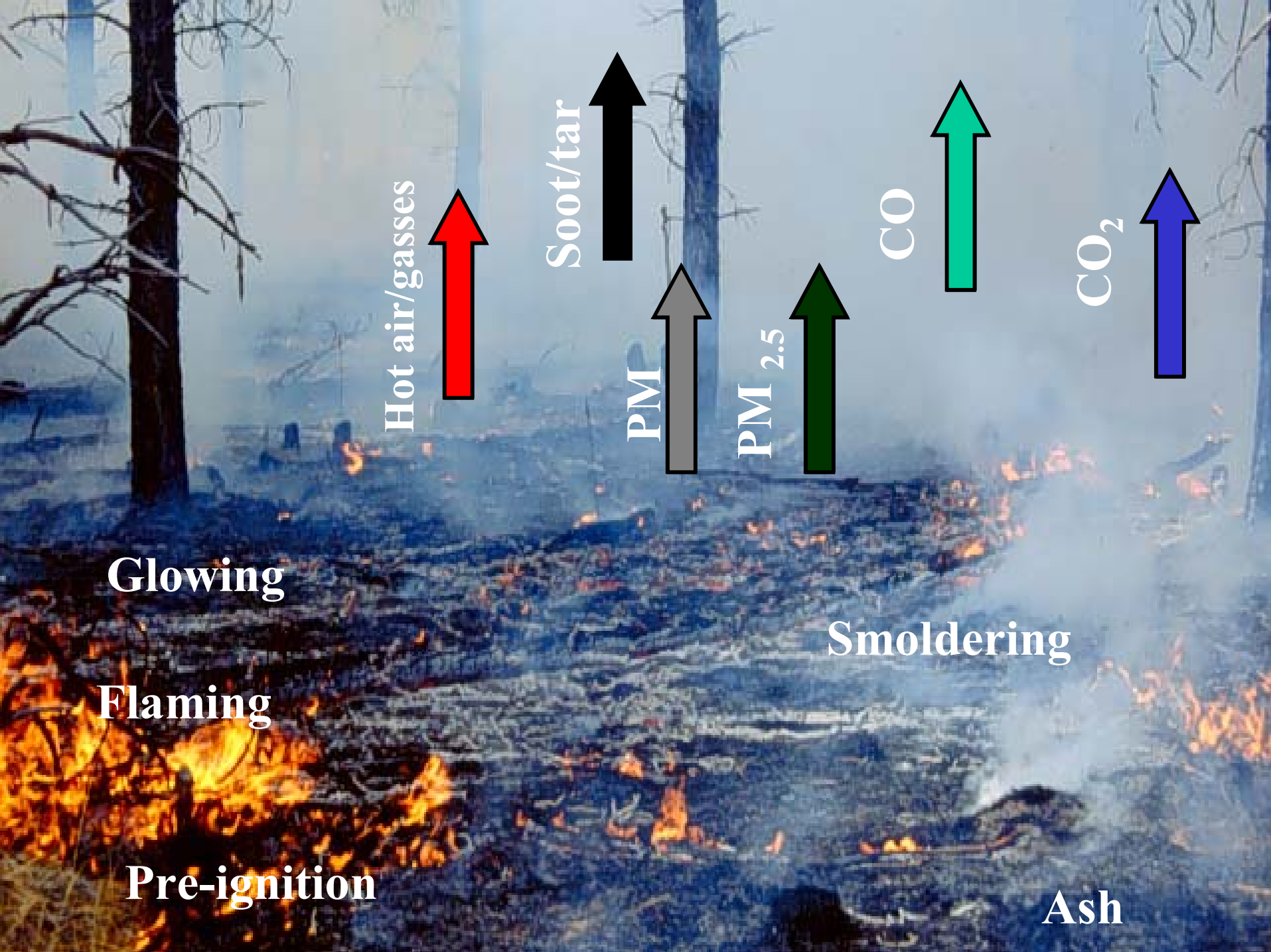
Heavy Smoke
CO=44ppm



Observations

- In a recent study 3% (prescribed fire) and 1-10% (wildfire) demonstrated exceedances for CO and PM.
- Mitigation for exposure is simply removal of personnel from smoke environment during normal rest rotation schedules.
- CO serves as a surrogate for PM 2.5, acrolein, and formaldehyde.





Hot air/gasses

Soot/tar

PM

PM_{2.5}

CO

CO₂

Glowing

Flaming

Pre-ignition

Smoldering

Ash

Carbon Monoxide (CO)

- 20-500 lbs/ton
- Criteria pollutant
- Generally limited concentrations from burning effects communities
- Adverse effects on fireline workers