EPA's Residential Wood Smoke Reduction Initiative

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC

www.epa.gov/woodstoves

Presentation Overview

- RWSRI and Great American Woodstove Changeout Overview
- Why should we care (health, safety, efficiency)?
- Outreach Tools available
- Funding Woodstove Changeouts

EPA's Voluntary Residential Wood Smoke Reduction Initiative

Major components

- Great American Woodstove Changeout Campaign (Main focus)
- "Burn Clean" National Education and Outreach Campaign
- Supporting & Developing Standards (voluntary and/or regulatory) for Fireplaces, Woodstoves and Outdoor Wood Boilers

What is The Great American Wood Stove Changeout?

A voluntary effort
to encourage people to
replace or “changeout”
their inefficient wood stoves with cleaner-burning technologies.

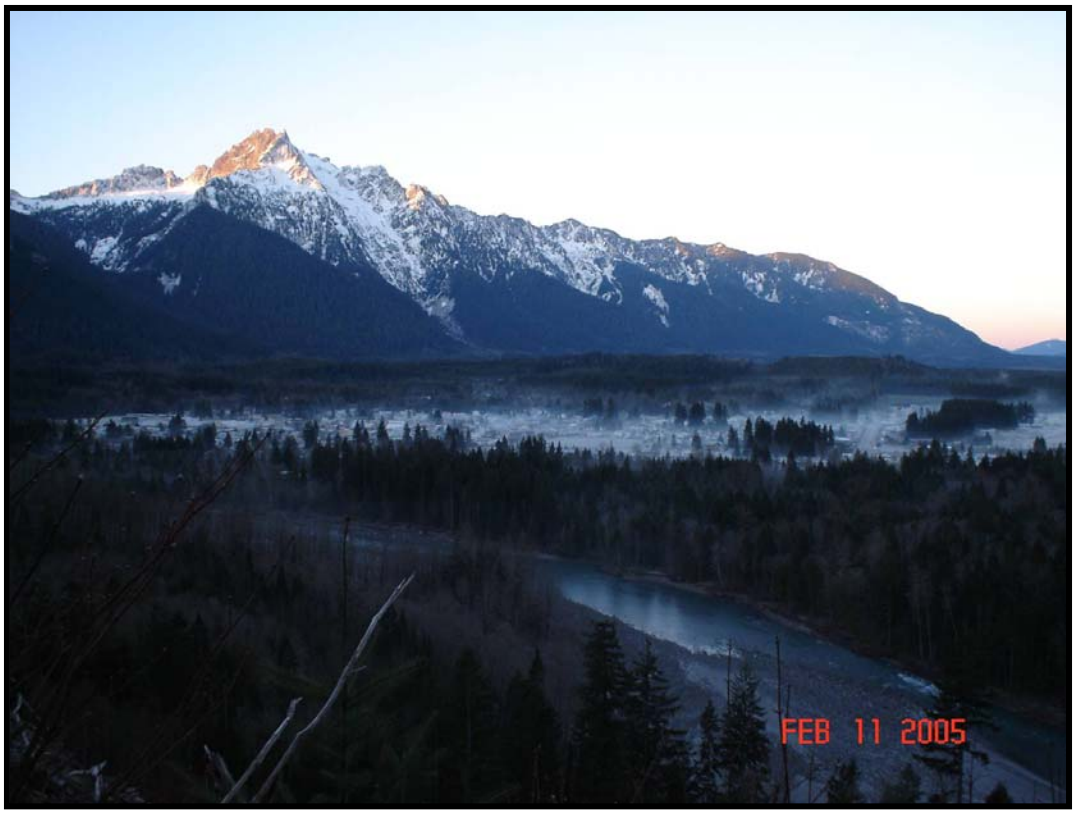
Why do we care about residential wood smoke?

- Residential wood burning in the U.S. emits 420,000 tons of fine particle pollution (PM2.5) emitted annually in U.S.

- Wood stoves contribute 80% of that amount, or 336,000 tons of PM2.5 per year

- To put it in perspective:
  - Changing out 1 old, dirty, inefficient stove is equivalent to taking 5 old diesel buses off the road

Wood smoke can be a significant air quality issue



A small community in Washington state
That's not fog, it's wood smoke

What else is in wood smoke?

- Benzene
- Toluene
- Aldehyde gases
- Polycyclic aromatic hydrocarbons
- Dioxin

Benefits of changing out all old wood stoves in the U.S.

Health Effect	Avoided Cases per year	Cost Savings per year
Mortality (adult)	5,000	$27,000,000,000
Non-fatal heart attacks	7,800	$670,000,000
Chronic Bronchitis	3,300	$1,200,000,000
Work Loss Days	650,000	$85,000,000
Asthma Exacerbation	91,000	$4,000,000
Hospital Admissions, Cardiovascular	2,400	$53,000,000
Hospital Admissions, Respiratory	2,400	$35,000,000
Total	NA	**$29 billion**

2006/2007 Residential $PM_{2.5}$ Indoor Air Quality Sampling

Preliminary Findings from University of Montana

- Sampling focused on 21* woodstove homes that were changed out during the winter of 2006-07
- 24-hour PM2.5 sampling inside the homes
- Average PM2.5 concentrations
  - Pre-changeout (in 21 homes): **53.4 µg/m3** (35ug/m3 is health-based standard)
  - Post-changeout (in 16 homes): **15.0 µg/m3**
- Average reduction in indoor PM2.5 due to woodstove changeout in 16 homes: **72%**

* - 5 homes eliminated from study for various reasons

Who's affected by wood smoke?

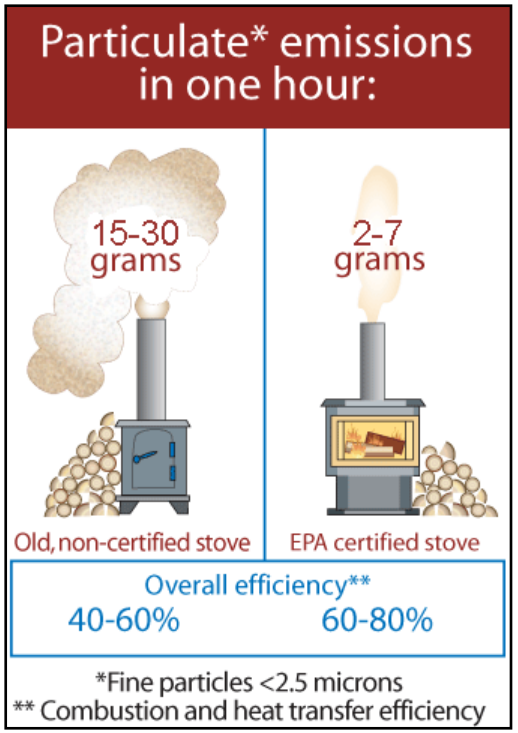
- Everyone, especially children and the elderly
- People with existing diseases such as:
  - Coronary artery disease
  - Heart failure
  - Asthma
  - Chronic bronchitis and emphysema

How can a Wood Stove Changeout help your community?

- Improves the health of children and your community
- It may help your area meet air quality standards for PM2.5
- Improves visibility
- Improves indoor air quality
- Addresses short-term PM2.5 exposures to wood smoke

Benefits for the Consumer

- **Cleaner Burning Technologies:**
  - Pollute less – 70% less PM2.5 outdoors, improves indoor air
  - Are more energy efficient
  - Use less fuel
  - Cut creosote buildup in chimneys, reducing fire risk
  - Save money and require less work



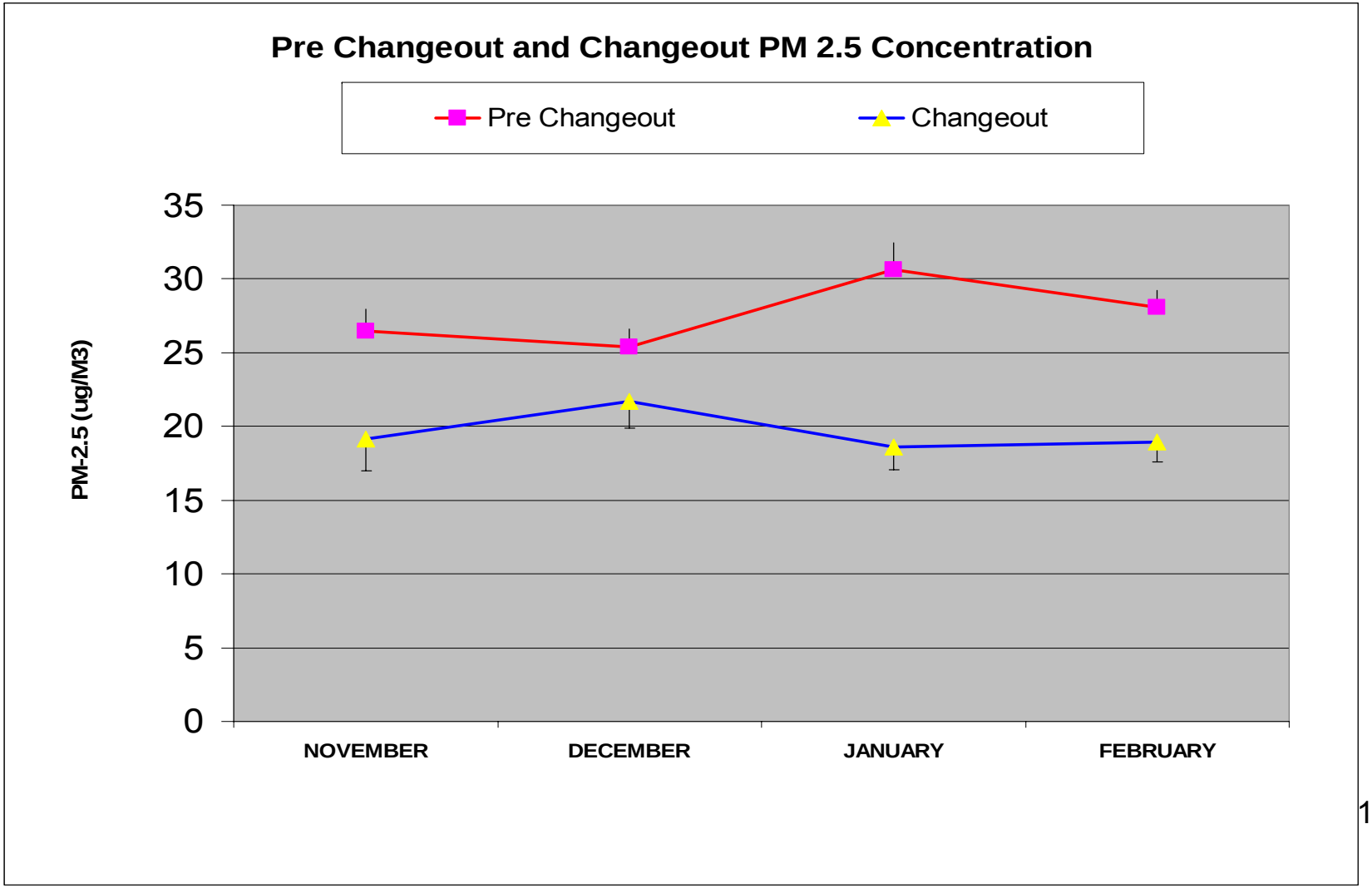
Success Stories

- **Truckee, CA: over seven-yr period**
  - Removed 912 non-EPA certified wood stoves and fireplace inserts
  - Leveraged funding via state gov't and Union Pacific Railroad
  - $300K donated, w/ approximately $306K expended
  - Program a blend of regulatory measures, ordinances, and incentives
- **Result:**
  - PM2.5 in Truckee reduced by approximately 30% from 1993 – 2006 - even while development increased by 70%

Success Stories

- Libby, MT
  - Non-attainment for PM2.5 annual standard
  - 82% of PM2.5 came from wood smoke
  - Changed out 1,100 wood stoves
  - Preliminary data suggests significant improvement in indoor and outdoor air quality

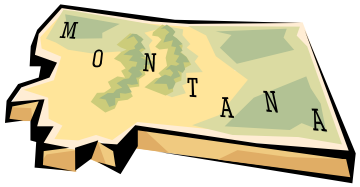
Libby, MT
Avg. 1999-06 vs. 2006-07



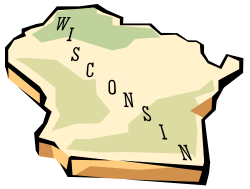
Wood stove changeouts are happening: 2005-2007

Darrington
Ferry County
Yakima
Bellingham
Spokane
Stevens County
Swinomish Tribe

Pinehurst
Cache Valley
Nez Perce Tribe

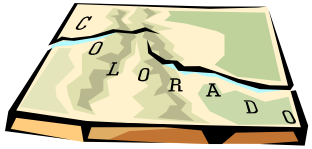


Libby



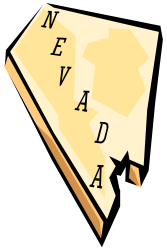
Oneida Nation

Southwest PA Counties



Delta County

Oakridge

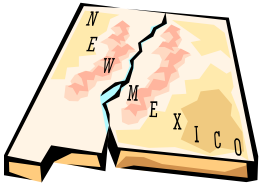


Washoe Co.

Dayton
Marietta

Parkersburg

Sacramento
Yolo-Solano
Butte County



Questa

Christiansburg

How do I get started?

- **Identify potential partners**
  - e.g. local elected officials, non-profits, industry
- **Identify sources of funding**
  - e.g. in-store discounts, supplemental environmental projects (SEPs), local utility companies, USDA and HUD grants
- **Develop a project plan**
  - determine staff, timing, resources and set goals

How can EPA help?

- Wood Stove Changeout "How To" Guide
  - Example brochures, posters, fact sheets, video footage available, case studies
- Strong Partnerships (e.g., hearth industry, American Lung Association)
- Wood Stove Changeout state implementation plan (SIP) credit guidance
- Options for securing funds, (e.g., limited grants, industry rebates, SEPs)
- Technical assistance
  - State/local benefits modeling

Outdoor Wood-fired Hydronic Heaters (OWHH) Program

- Program encourages manufacturers to develop cleaner-burning OWHH
  - Model OWHH rule (developed by EPA & NESCAUM) States, tribes and local authorities may opt to use
  - Information for consumers (hang tag w/ emission info)
  - Outreach and educational information on OWHH
- Program created through partnership with manufacturers

Voluntary Program for Firepla

- Targets “low mass fireplaces”
- Initiated by industry (kickoff – 5/23/07)
- Industry has developed standardized testing for fireplaces (ASTM method)
- Plans to establish emission targets for two phases
  - Phase I: by April 2008
  - Phase II: lower target 3 years after
- Considering SIP fireplace guidance to help States meet April 2008 PM2.5 SIP submittal deadline (by end of 2007?)

Summary

- GAWC a very effective tool for addressing PM and toxics
- Tools are available, but financial incentives are a challenge
- We have willing partners available to assist
- Voluntary efforts on OWHH and fireplaces ongoing
- Questions?

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The Great American Wood Stove Changeout

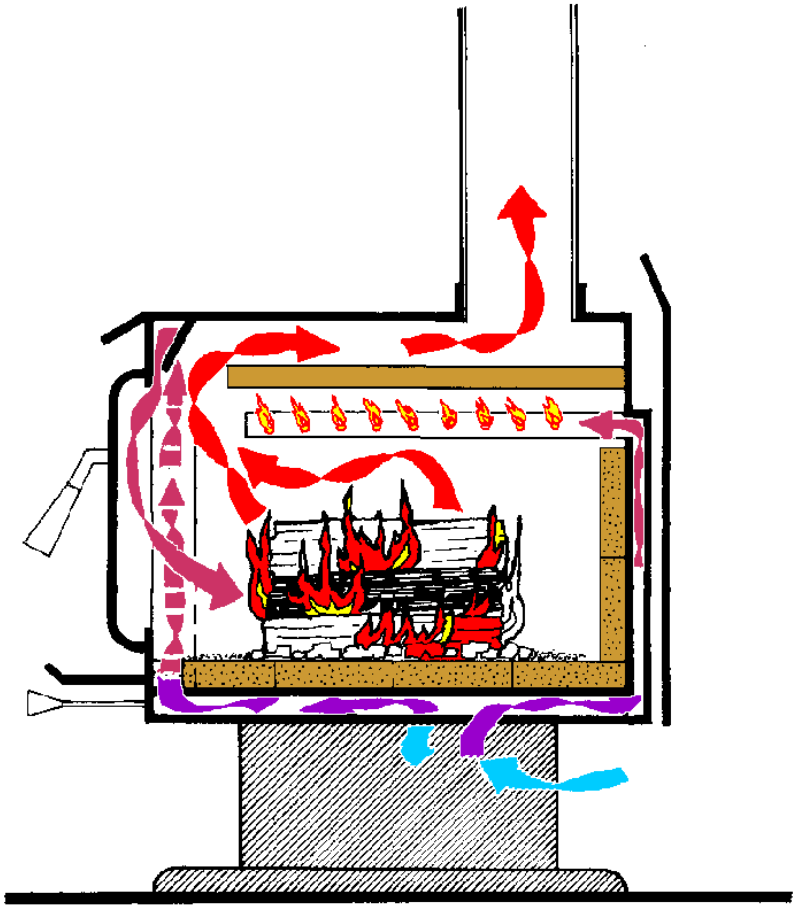
APPENDIX - Extra Slides to Main Presentation

Old “Conventional” Wood Stoves Built before 1990

EPA – Certified Woodstoves (after 1990)

Slide from Wood Heat Organization Inc

Inside a ‘non-cat’ wood stove

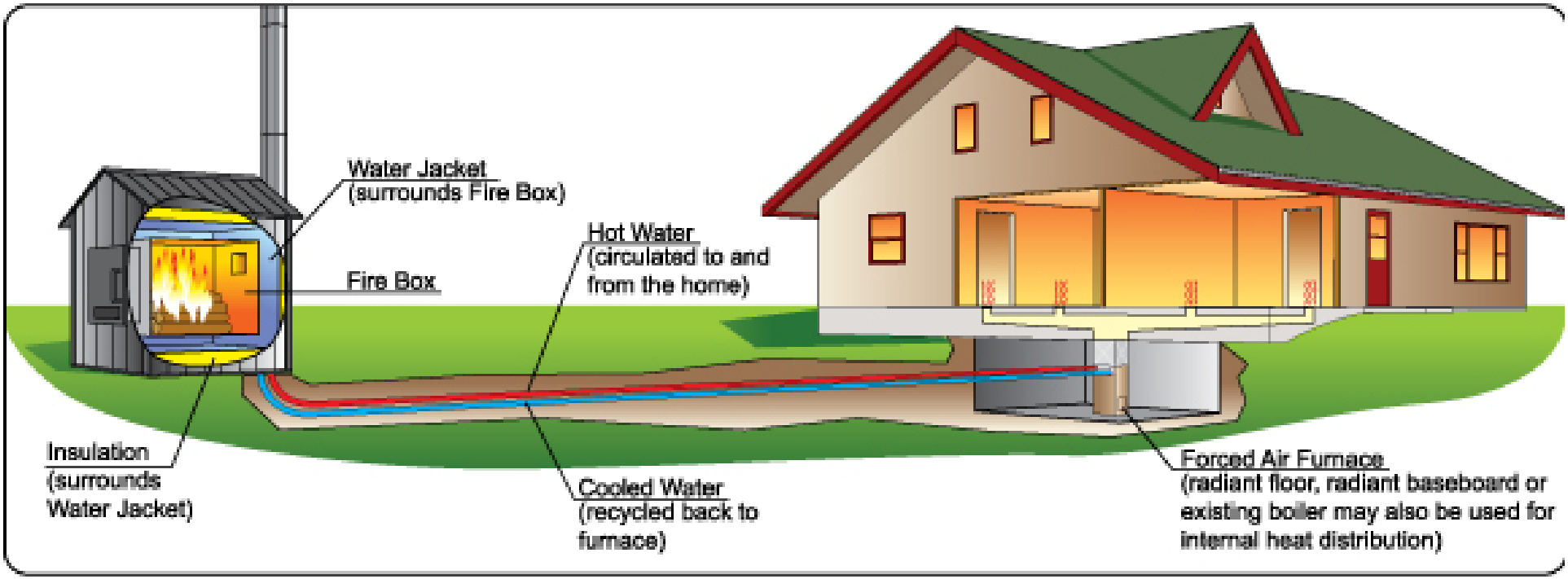


- Firebox insulation
- Large baffle
- Preheated combustion air

Wood Pellet Stove

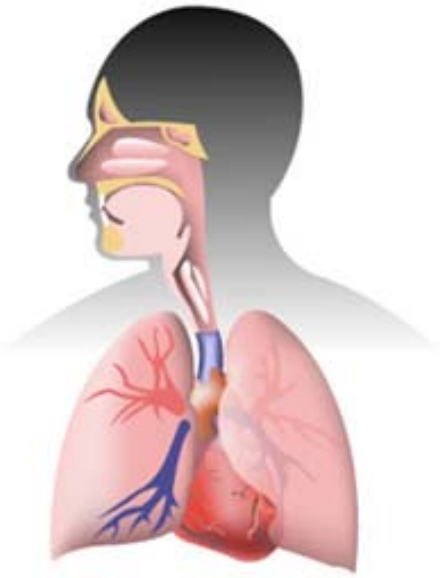
Gas and Propane Stoves

How an Outdoor Wood-fired Hydronic Heater (OWHH) Works



Particulate Matter

- Larger particles (> PM_{10}) deposit in the upper respiratory tract



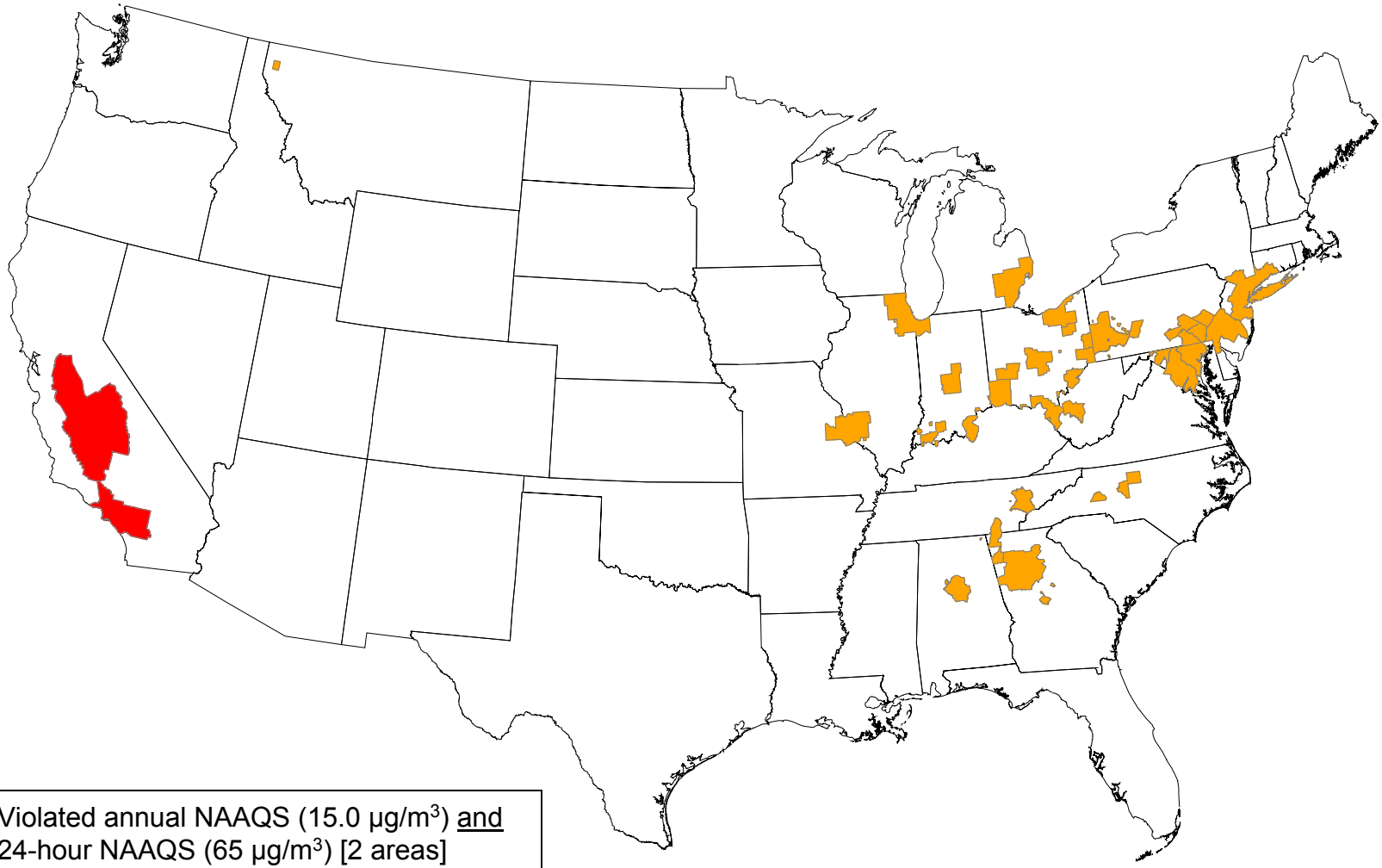
- Smaller, inhalable particles (≤ PM_{10}) penetrate deep into the lungs

Model of interior human lung

- Both coarse $PM_{10-2.5}$ and fine $PM_{2.5}$ can penetrate to lower lung
- Deposited particles may accumulate, react, be cleared or absorbed

Currently Designated $PM_{2.5}$ Nonattainment Areas - 1997 Standards

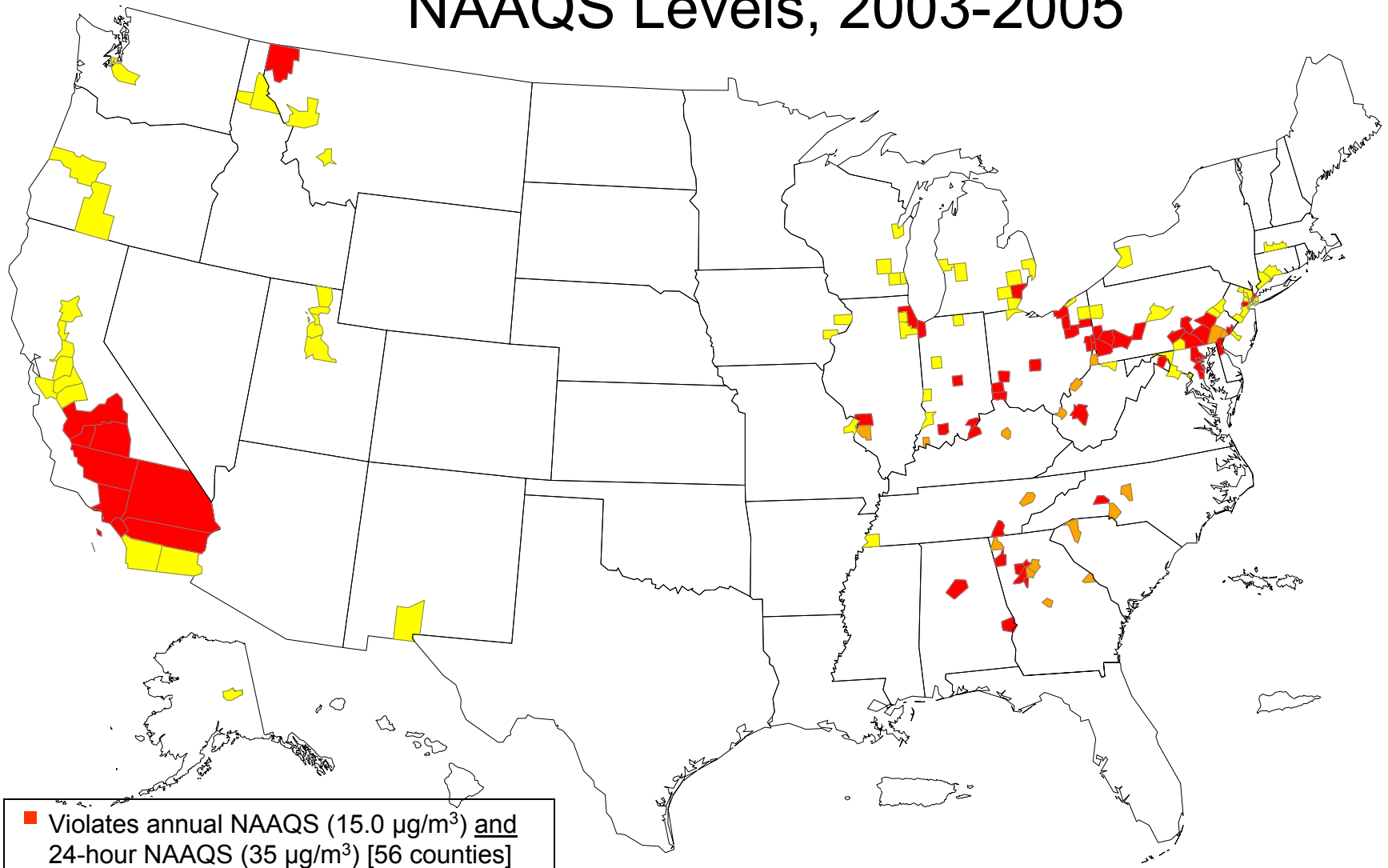
Violated annual and/or 24-hour NAAQS with designated data (2001-2003*)



- Violated annual NAAQS (15.0 µg/m^3) and 24-hour NAAQS (65 µg/m^3) [2 areas]
- Violated only 24-hour NAAQS (65 µg/m^3) [0 areas]
- Violated only annual NAAQS (15.0 µg/m^3) [37 areas]

* 2002-2004 data were considered in the designation process but all nonattainment designations were based on 2001-2003 data

Counties Exceeding New 24-hour NAAQS Levels, 2003-2005



- Violates annual NAAQS (15.0 µg/m^3) and 24-hour NAAQS (35 µg/m^3) [56 counties]
- Violates only 24-hour NAAQS (35 µg/m^3) [70 counties]
- Violates only annual NAAQS (15.0 µg/m^3) [17 counties]

- Data from AQS 7/10/2006
- Completeness criteria: 2006 CFR or 11+ samples per quarter