Fine Particle Pollution, Emissions Inventories & Redesignation Request

Metropolitan Washington Air Quality Committee

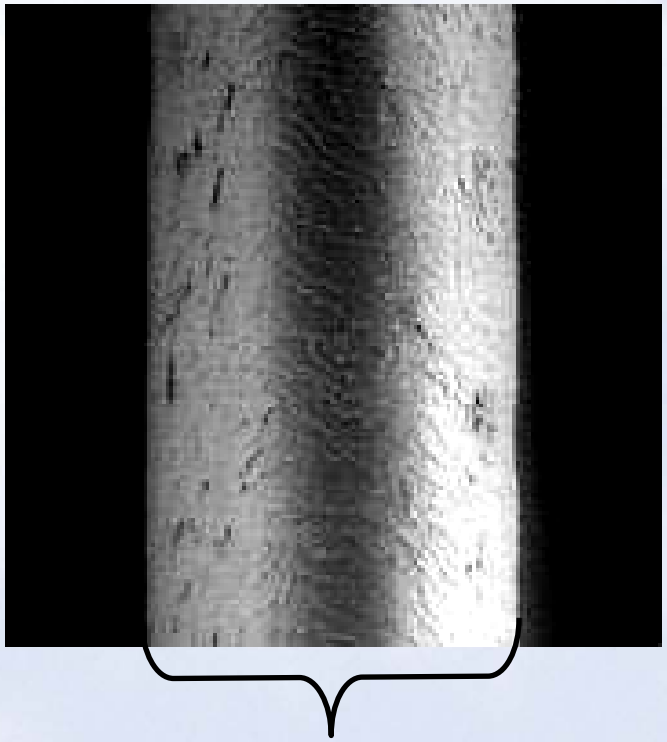
April 27, 2011

Air Pollution: Fine Particles

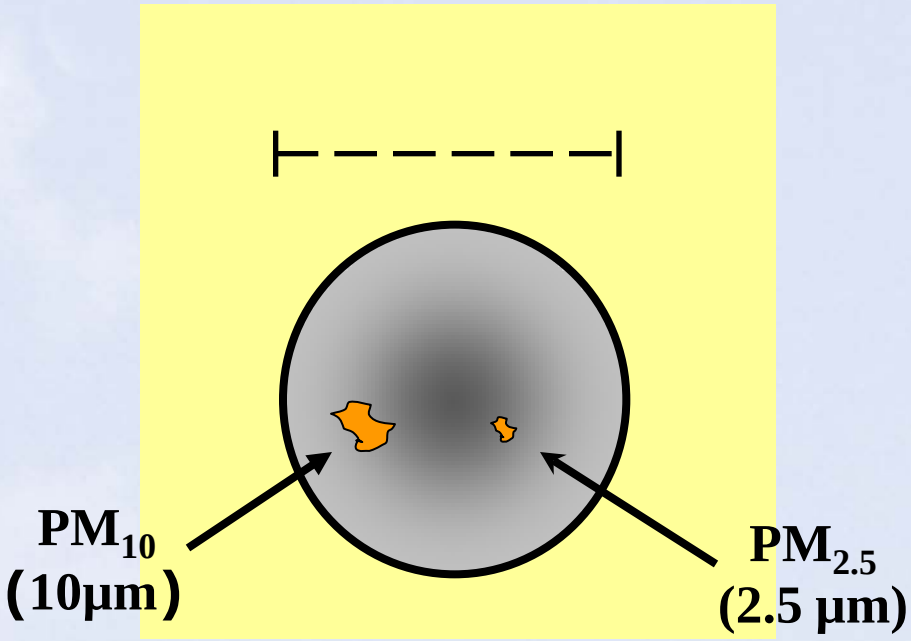
- Chemical, particulate matter or aerosol that modifies the natural characteristics of the atmosphere
- Created locally by emissions from coal combustion, cars & trucks, road construction
- Causes respiratory problems
- Impairs visibility

How Fine is Fine?

Particles are only a fraction of the size of a human hair



Human Hair (70 µm diameter)



Hair cross section (70 µm)

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Particle Pollution

- Mixture of microscopic solid and liquid particles suspended in air.
- Particles vary in size.
- The size of the particles is directly linked to their potential for causing health problems.
- Particle pollution can occur year-round.

Health Effects of Particle Pollution

Respiratory System Effects

- Chronic bronchitis
- Asthma attacks
- Respiratory symptoms (cough, wheezing, etc.)
- Decreased lung function
- Airway inflammation

Cardiovascular System Effects

- Heart attack
- Cardiac arrhythmia
- Changes in heart rate and heart rate variability
- Premature death

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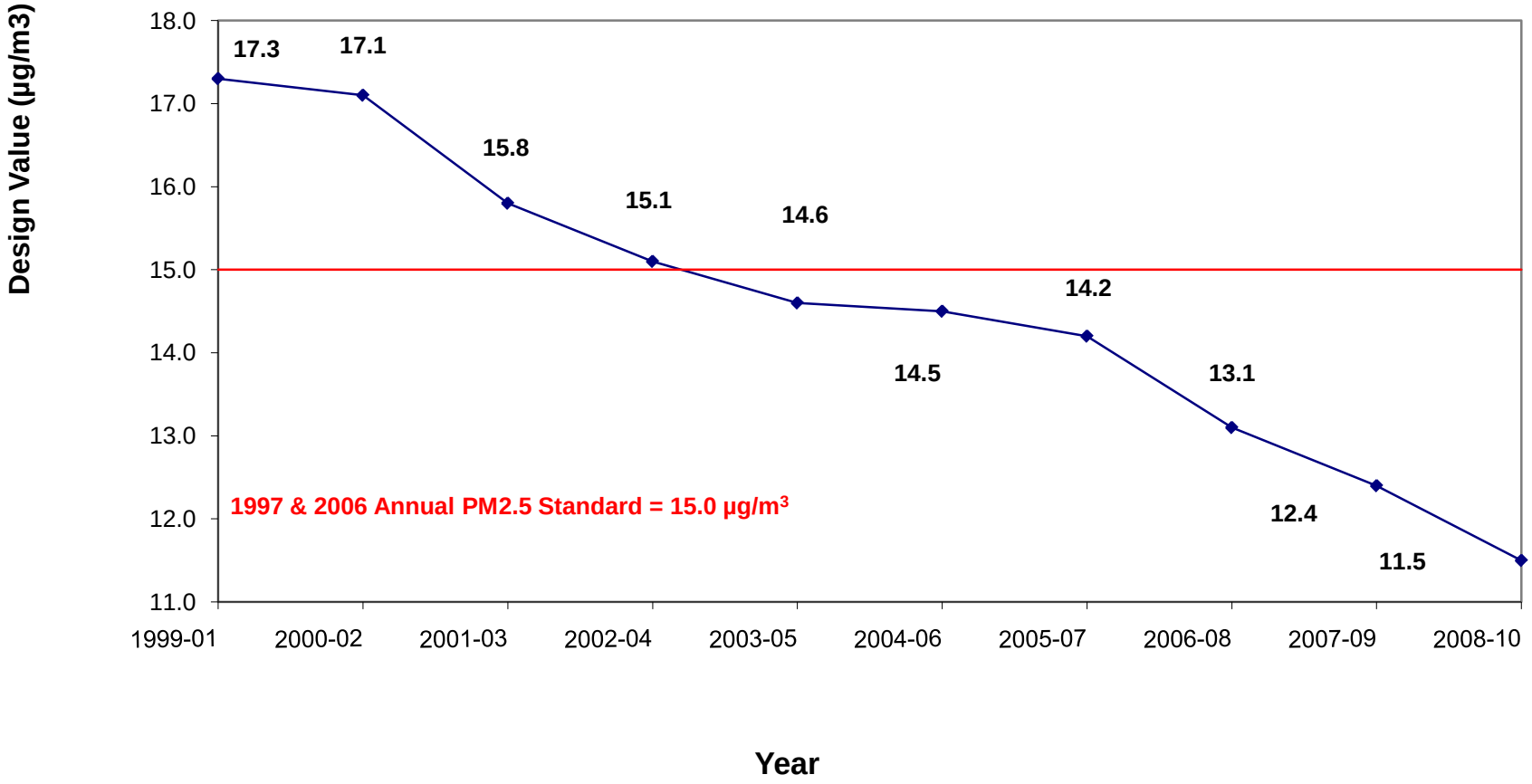
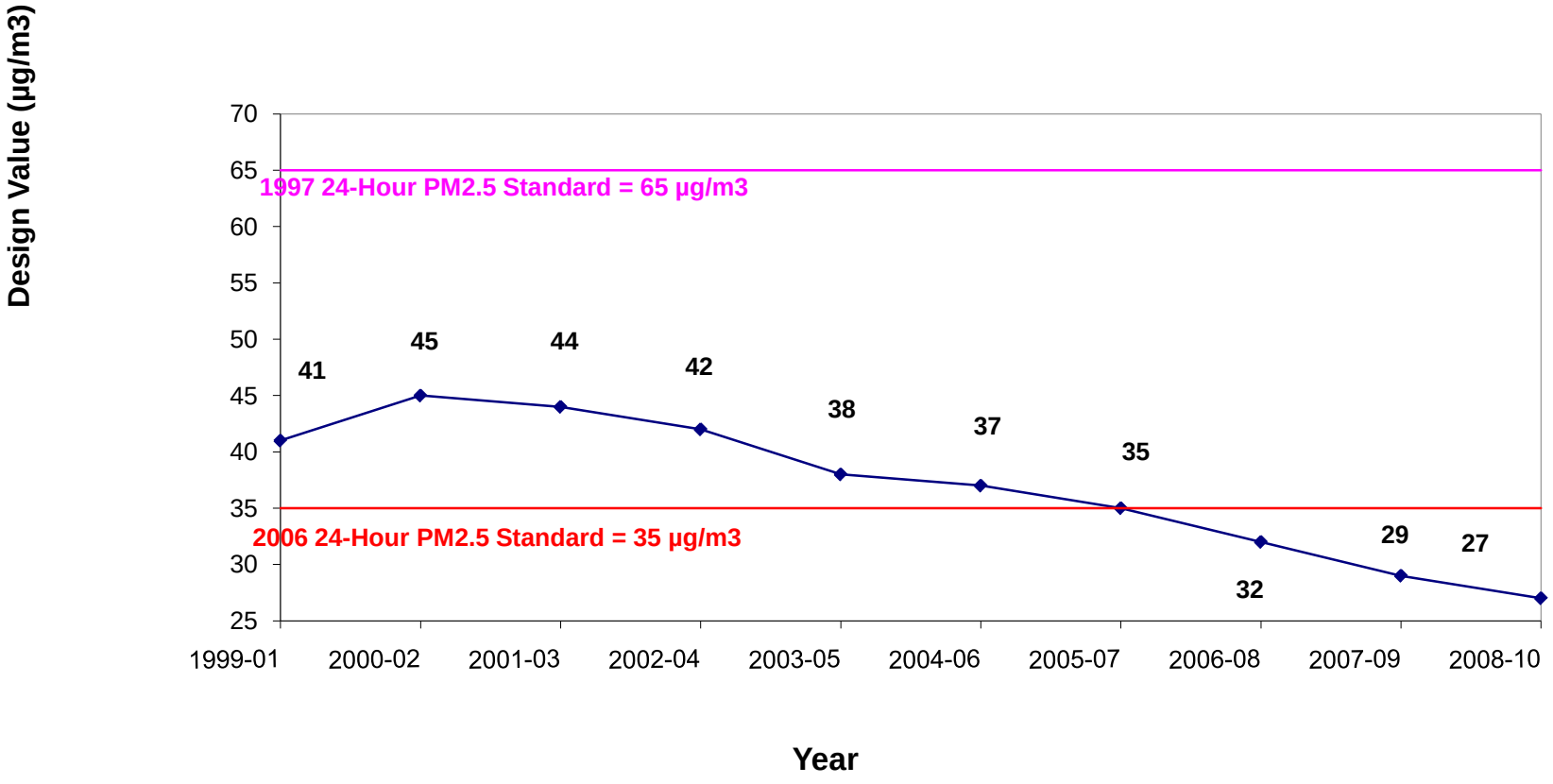
Annual PM2.5 Design Value
Washington, DC-MD-VA Nonattainment Area (1999-2010)



* Design value = 3-year avg of annual mean PM2.5 concentrations. 2010 data is draft.

24-Hour PM2.5 Design Value
Washington, DC-MD-VA Nonattainment Area
(1999-2010)



* Design value = 3-year average of 98th Percentile of PM2.5 concentrations. 2010 data is draft.

$PM_{2.5}$ SIP Planning (submitted to EPA, 2008)

Steps to Official "Attainment" Status

- 2005 - Air quality monitors indicate that average annual concentrations are below the national health standard
- 2008 – MWAQC, States submitted PM2.5 SIP showing attainment by 2009.
- EPA issues a "Clean Data Determination," 2009
- States request redesignation to attainment and submit a plan to maintain low levels of fine particle pollution for 10 years into future

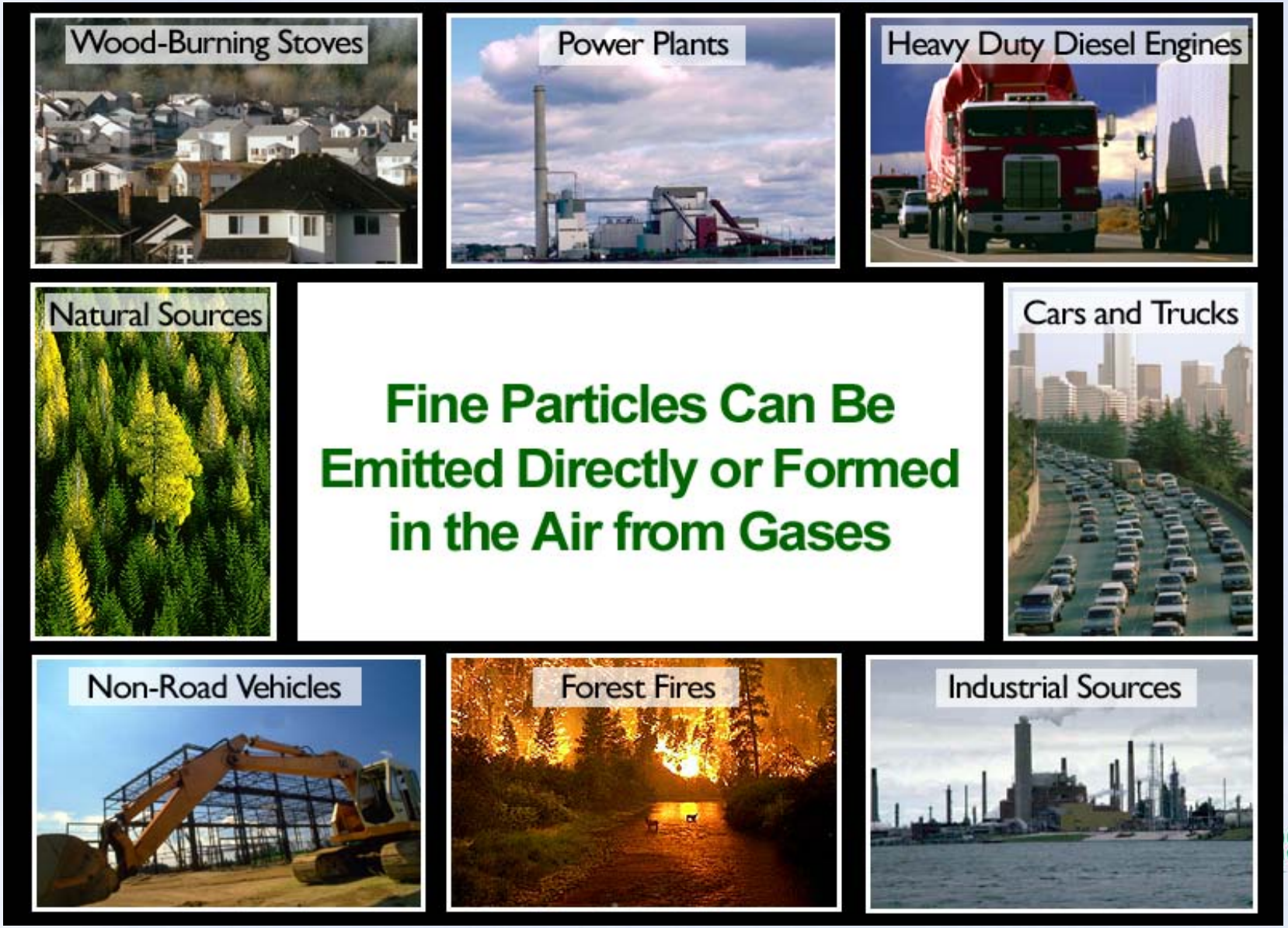
Benefits of Attainment

- Official recognition and public awareness:
  - Fine particle pollution ($PM_{2.5}$) levels are lower in the metropolitan Washington area than the level required by the federal health standard
  - Control measures such as cleaner engines, controls on power plants, diesel retrofit measures are working.
- Reduces a significant obstacle for locating new generation capacity (economic development)

Emissions Inventory (defined)

- An **emission inventory** is an accounting of the amount of pollutants discharged into the atmosphere. An emission inventory usually contains the total emissions for one or more specific greenhouse gases or air pollutants, originating from all source categories in a certain geographical area and within a specified time span, usually a specific year.

Sources of Particle Pollution



Emissions Inventory for SIP

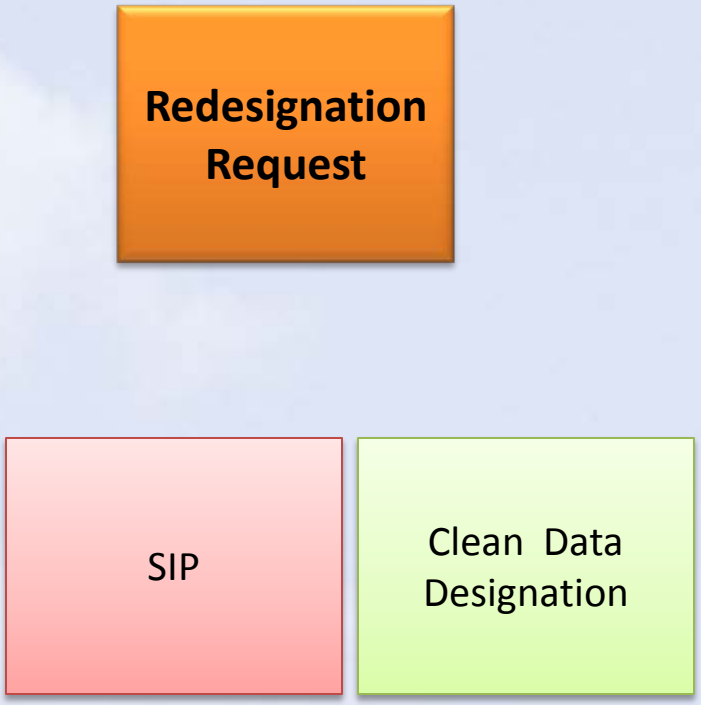
- A snapshot in time (one year) of the amount of emissions from 4 contributing sources. Used to measure changes in pollutants over time.
  - Point Source – Power plants, other big industries
  - Area Source – Open burning, residential wood burning, dust (unpaved roads), etc.
  - Nonroad Source - Construction equipment, lawn mower, locomotive, aircraft, etc.
  - Onroad Source – Motor vehicles

$PM_{2.5}$ Current Status

- MWAQC/States submitted PM2.5 SIP to EPA, 2008
- EPA published Clean Data Determination, 2009

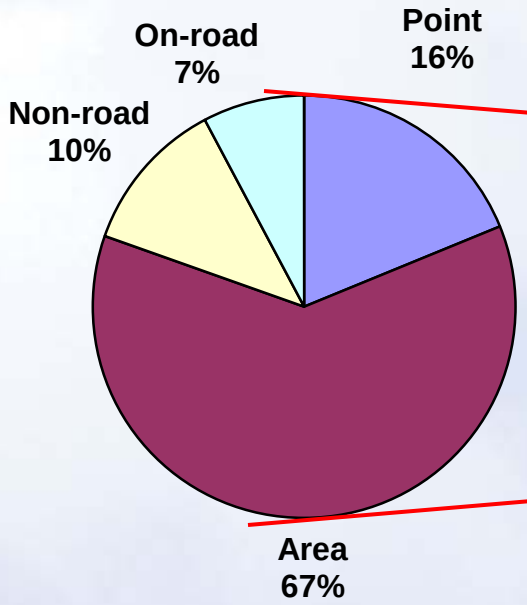
Redesignation Request

- MWAQC/States must request redesignation
- Redesignation Request must demonstrate emissions decline from 2002-2007.

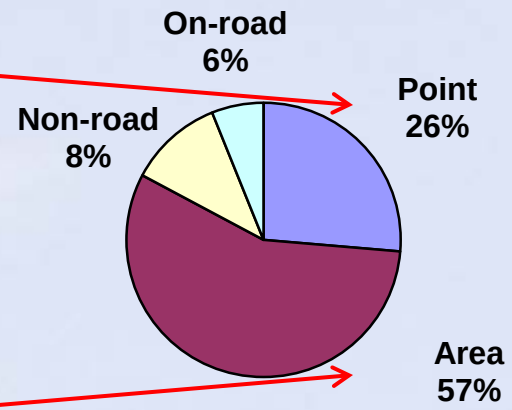


2002 vs 2007 Emissions

PM2.5
BY 2002 Emissions = 22,179.44 tpy



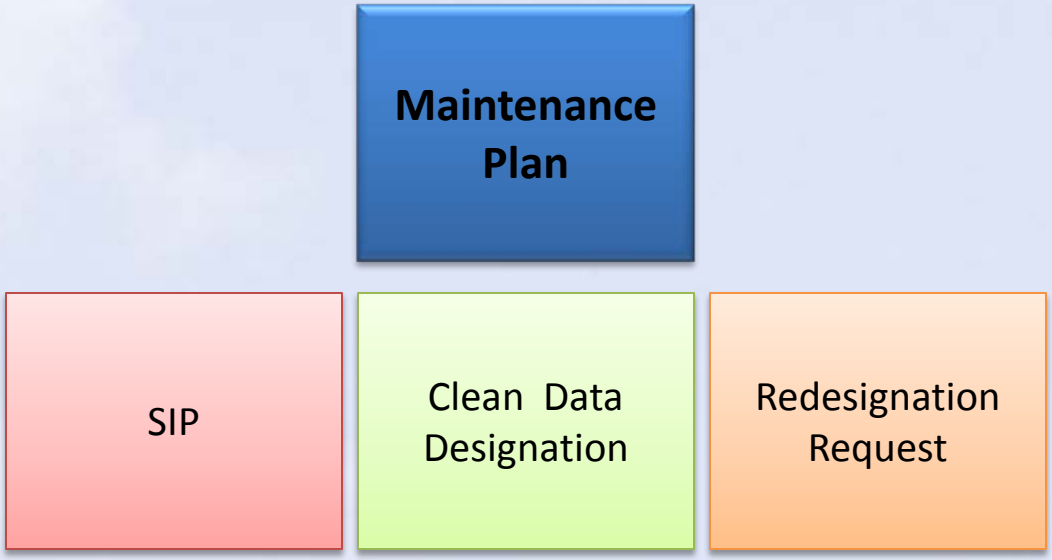
PM2.5
AY 2007 Emissions = 21,054.68 tpy



AY 2007 emissions are draft.

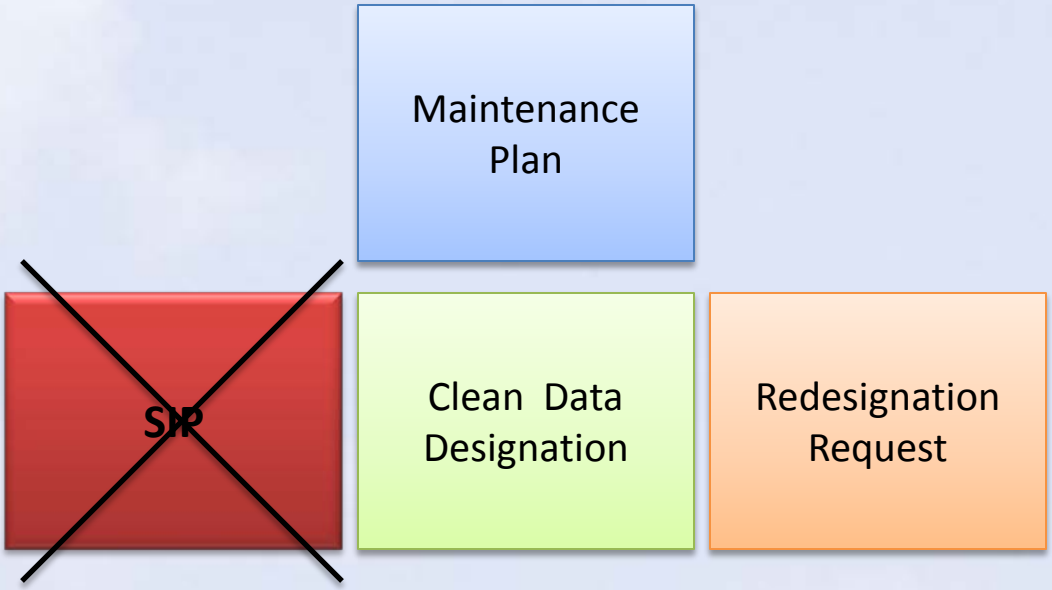
$PM_{2.5}$ Maintenance Plan

MWAQC/States must prepare a plan to maintain low PM2.5 levels for 10 years beyond EPA redesignation.



Withdraw $PM_{2.5}$ SIP

States will withdraw the PM2.5 SIP when they submit the Redesignation Request and Maintenance Plan.



$PM_{2.5}$ Redesignation and Maintenance

Models & Inventory Development

- Models are used for developing nonroad and mobile source inventories
- The models used to develop the 2002 inventories have been improved;
- EPA requires the latest models to be used
- The same model must be used to calculate emissions for all inventory years used in the plan (so older inventories need revision)

Change in Models since PM2.5 SIP



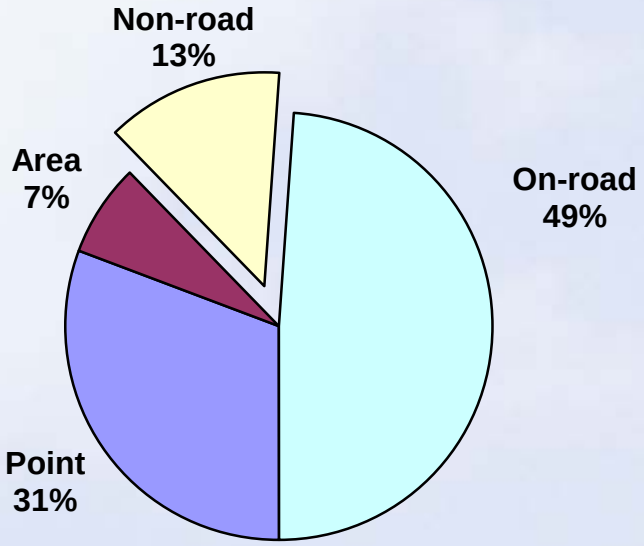
- Nonroad 2005A → Nonroad 2008A
- MOBILE6.2 → MOVES
- Travel Demand Model 2.1d → Travel Demand Model 2.3
- Vehicle Registration data 2005 → Vehicle Registration data 2011

Nonroad Emissions

Nonroad 2005A → Nonroad 2008A

NOx, $PM_{2.5}$, SO_2 (2002)

NOx, $PM_{2.5}$, SO_2 (2002,2007,2017, 2025)

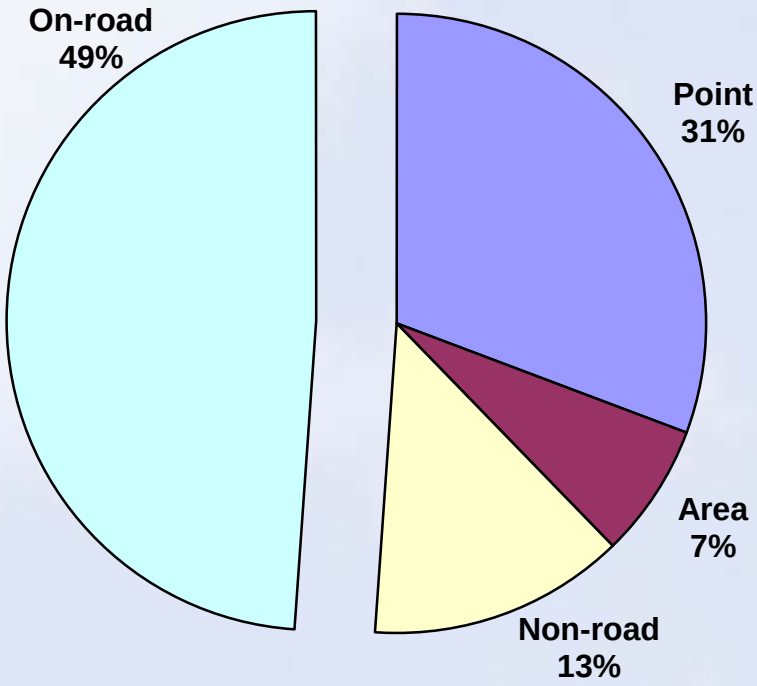


Mobile Emissions

MOBILE6.2 → MOVES

NOx, $PM_{2.5}$, SO_2 (2002)

NOx, $PM_{2.5}$, SO_2 (2002,2007,2017, 2025)



MOVES Vs MOBILE6.2

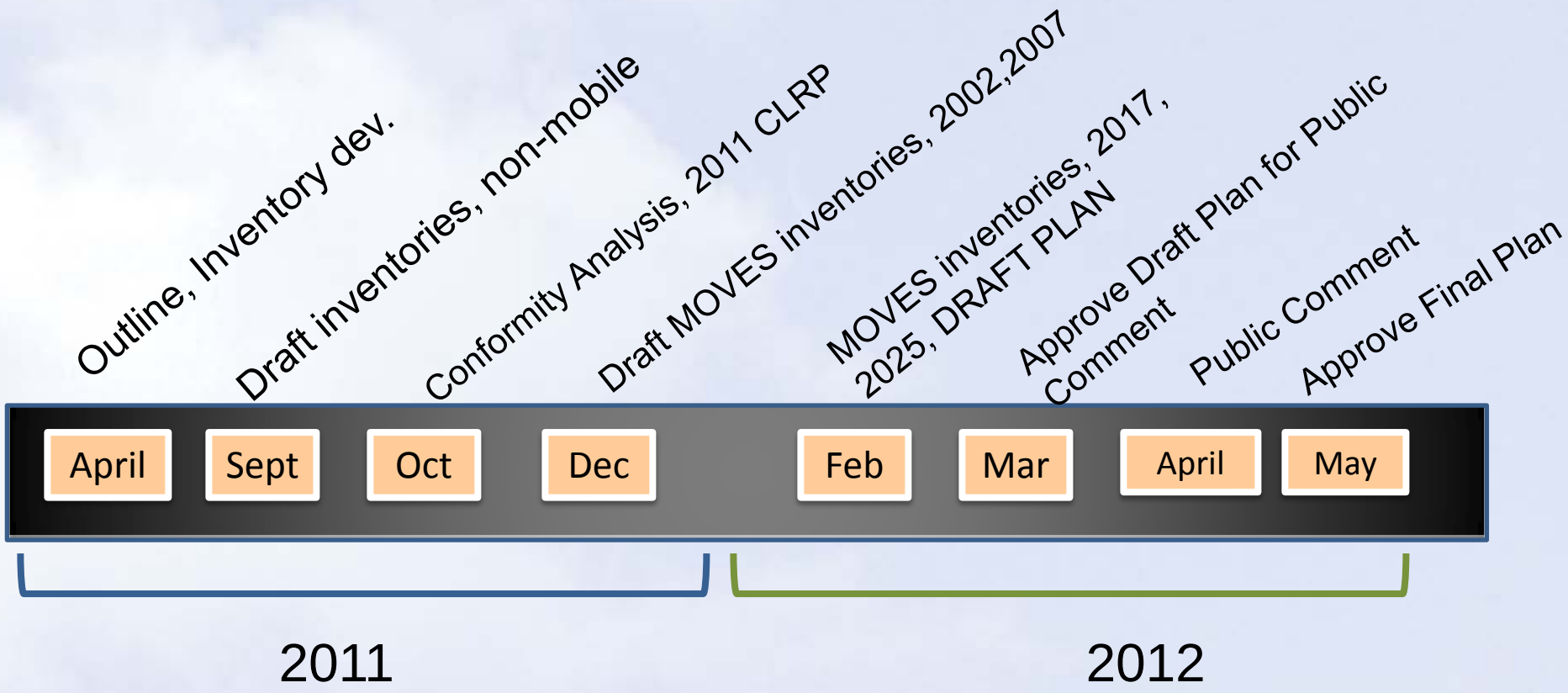
MOVES produces more emissions than Mobile6.2

NOX – 52% 

PM2.5 – 117% 

*Based on draft results for 2011.

Schedule


Outline, Inventory dev.
Draft inventories, non-mobile
Conformity Analysis, 2011 CLRP
Draft MOVES inventories, 2002,2007
MOVES inventories, 2017 , 2025, DRAFT PLAN
Approve Draft Plan for Public Comment
Public Comment
Approve Final Plan
April
Sept
Oct
Dec
Feb
Mar
April
May
2011
2012