

EPA Proposal to Revise the National Ambient Air Quality Standards for Particle Pollution

**Staff Presentation to the
Regional Air Quality Council
February 2, 2006**



Overview

- In December, 2005 the EPA announced proposed revisions to the NAAQS for particle pollution.
- The proposed revisions
 - strengthens the fine particle standard ($PM_{2.5}$) for both health and visibility,
 - refocuses the coarse particle standards on those particles ($PM_{10-2.5}$) that are associated with public health concerns.



Fine PM

Components/Sources

- Fine particles
(*Combustion, gases to particles*)
 - Sulfates/acids
 - Nitrate
 - Ammonium
 - Organics
 - Carbon
 - Metals
 - Water
- Sources
 - Gasoline, diesel, wood coal, oil, combustion
 - Transformation of SO_x, NO_x, organic gases including biogenics
 - High temperature industrial processes (smelters, steel mills)
 - Forest fires



Coarse PM

Components/Sources

- Inhalable Coarse Particles (*Crushing, grinding, dust*)
 - Resuspended dusts (soil, street dust/sand)
 - Coal/oil fly ash
 - Aluminum, silica, iron-oxides
 - Tire & brake wear
 - Inhalable biological materials
- Sources
 - Resuspension of dust tracked onto roads, applied sand
 - Suspension from disturbed soil (farms, mines, unpaved roads)
 - Construction and demolition
 - Industrial fugitives
 - Biological sources



Particulate Matter Health Issues

- Larger particles ($> \text{PM}_{10}$) deposit in the upper respiratory tract
- Smaller, inhalable particles ($< \text{ or } = \text{PM}_{10}$) penetrate deep into lungs
- Both coarse and fine can penetrate to lower lung
- Deposited particles may accumulate, react, be cleared or adsorbed



Particulate Matter Health Effects

- Many scientific studies have linked breathing particle pollution to a series of significant health problems, including:
 - **Aggravated asthma**
 - **Increases in respiratory symptoms like coughing and difficult or painful breathing**
 - **Chronic bronchitis**
 - **Decreased lung function**
 - **Premature death in people with heart and lung disease**



PM NAAQS

Rulemaking Schedule

- Proposal published January 17, 2006 includes simultaneous rulemakings
 - **PM NAAQS, Federal Reference Method, & Data Handling (Part 50)**
 - **Air Monitoring Regulations: Requirements for Reference & Equivalent Methods, Network Design Requirements (Parts 53 & 58)**
- Public comment Period: 90 days (April 17)
- Public Hearings to be held late February in Philadelphia, Chicago and San Francisco
- Final Rule to be signed by September 27, 2006



Current PM NAAQS

- **PM_{2.5}**
 - **24 hour standard** **65 $\mu\text{g}/\text{m}^3$**
 - Annual 98th percentile, averaged over 3 years
 - **Annual standard** **15 $\mu\text{g}/\text{m}^3$**
 - annual arithmetic mean, averaged over 3 years
- **PM₁₀**
 - **24 hour standard** **150 $\mu\text{g}/\text{m}^3$**
 - Standard can not be exceeded more than three times over any three year period.
 - **Annual standard** **50 $\mu\text{g}/\text{m}^3$**
 - Annual average



Proposed PM_{2.5} Standards

- 24-Hour standard 35 *ug/m*³
 - Annual 98th percentile, averaged over 3 years
- Annual standard 15 *ug/m*³
 - annual arithmetic mean, averaged over 3 years (retention of current standard)



Alternative PM_{2.5} Standards

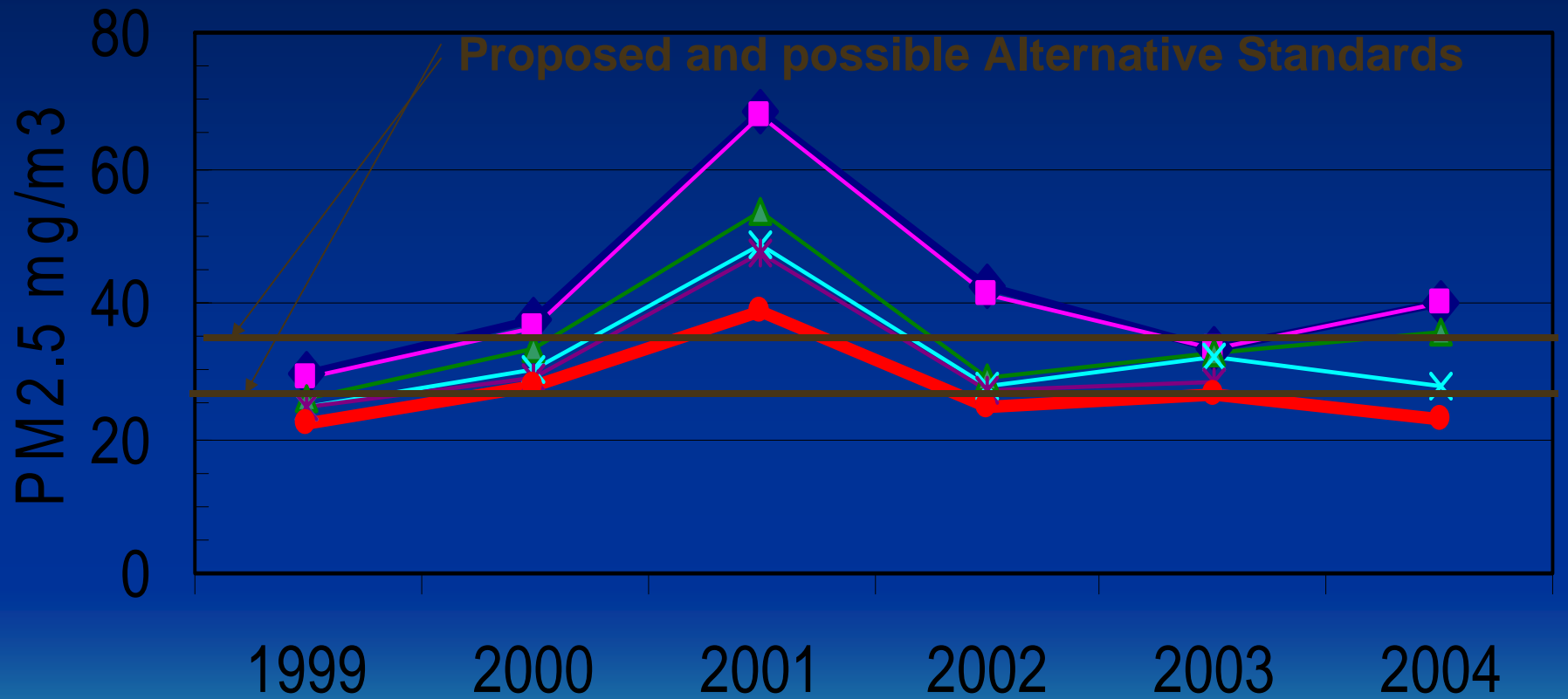
- Alternative 24-Hour standard
 - considering levels in the range of 30-35 $\mu\text{g}/\text{m}^3$.
 - taking comments on alternative approaches to selecting standard between 65 and 25 $\mu\text{g}/\text{m}^3$.
- Annual standard
 - considering levels in the range of 13 -14 $\mu\text{g}/\text{m}^3$.
 - taking comment on alternative views to selecting an standard as low as 12 $\mu\text{g}/\text{m}^3$.



Denver Metro Area 2002-04 Maximum PM_{2.5} Design Value

- | <u>Standard</u> | <u>24-Hr</u> | <u>Ave. Ann.</u> |
|-----------------|------------------------------|------------------------------|
| – CAMP | <u>24.6 ug/m³</u> | 10.0 ug/m ³ |
| – Commerce City | 24.2 ug/m ³ | <u>10.2 ug/m³</u> |
- DMA is currently well below the proposed standards.
- DMA is also currently below alternative standards under consideration by EPA.
- If an alternative approach to selecting the standards is chosen, the DMA would still meet the standard (but could be very close to the 24-hour standard), considering the ranges presented.

Maximum PM2.5 Levels CAMP-2105 Broadway



◆ 1st Max

■ 2nd Max

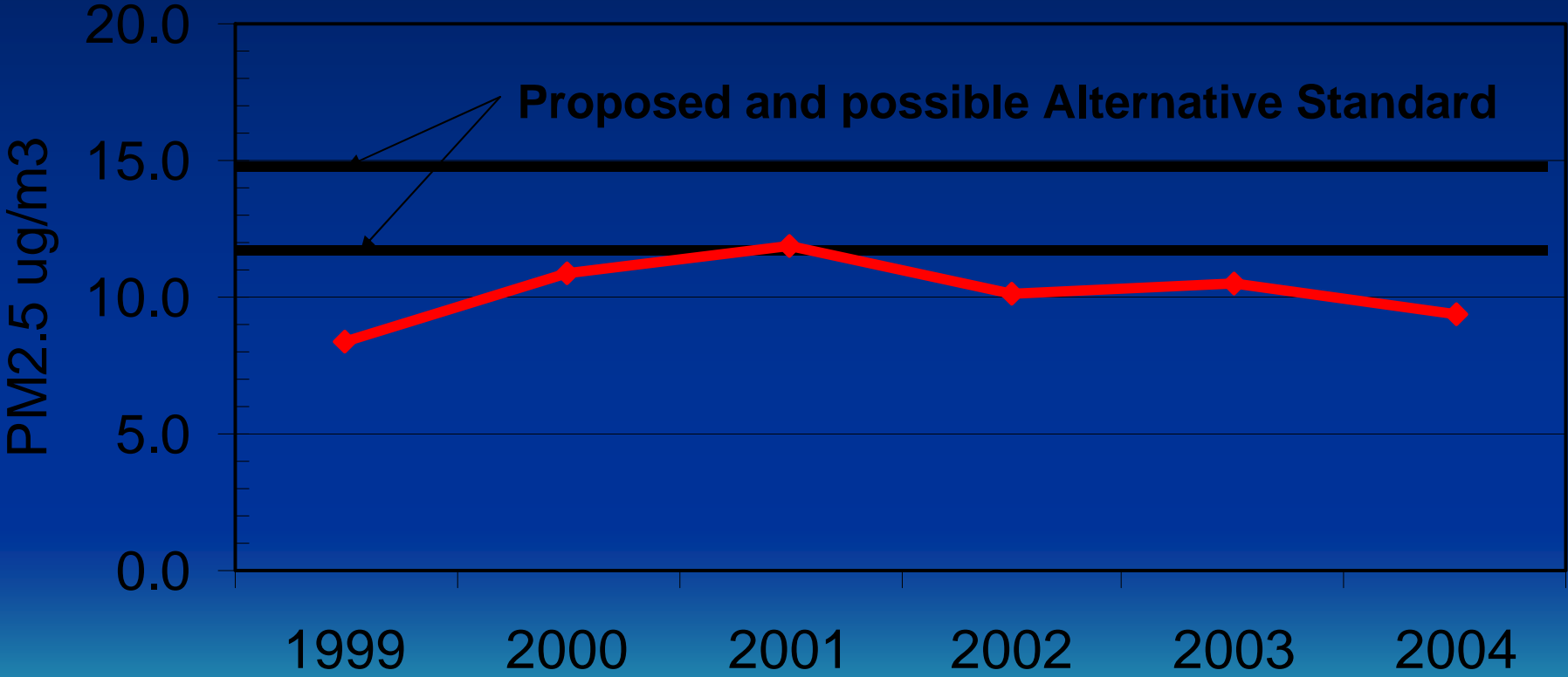
▲ 3rd Max

× 4th Max

* 5th Max

● Design Value

Ave. Annual PM2.5 Levels CAMP - 2105 Broadway



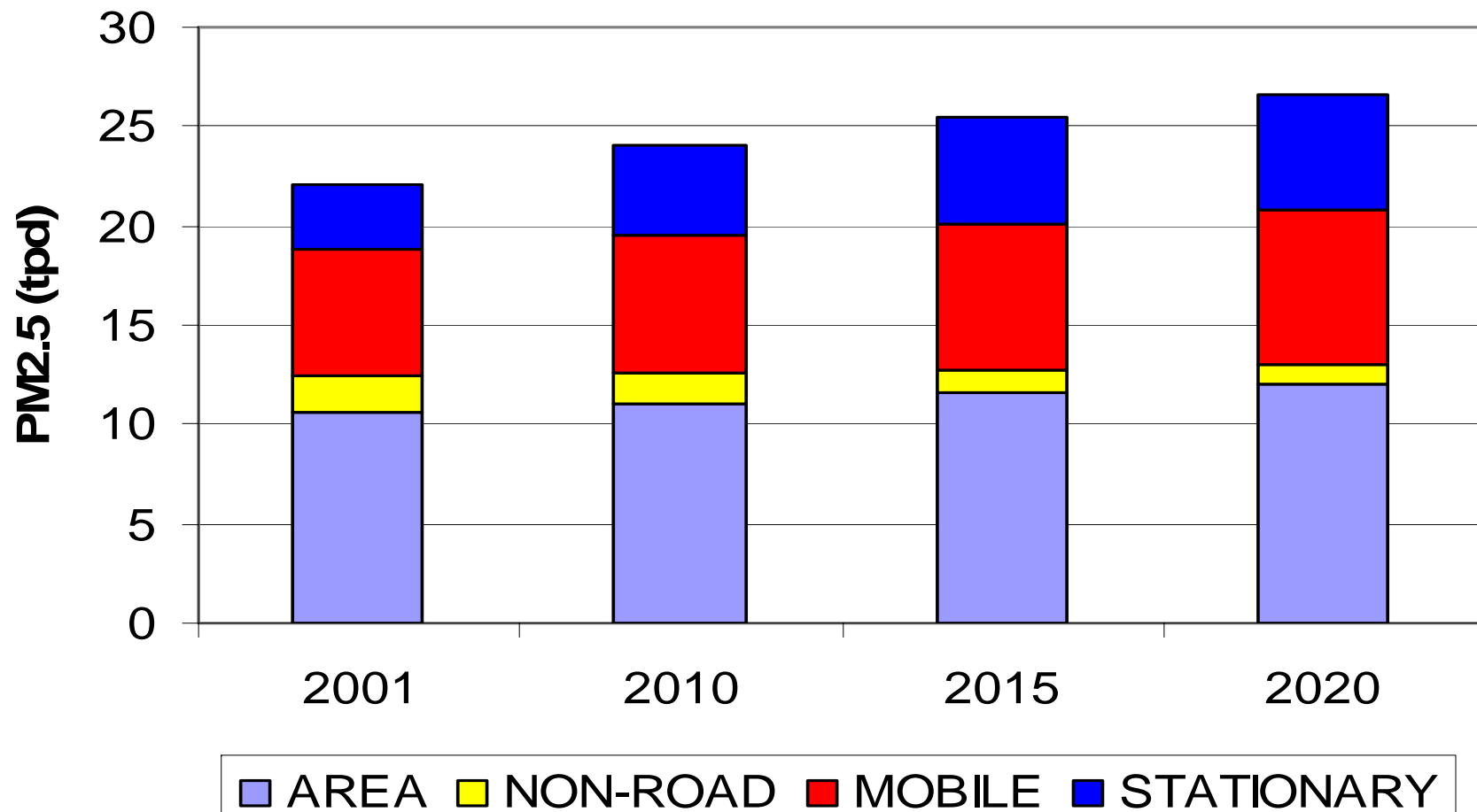
—◆— Ave. Annual

Proposed PM_{2.5} Secondary Standards

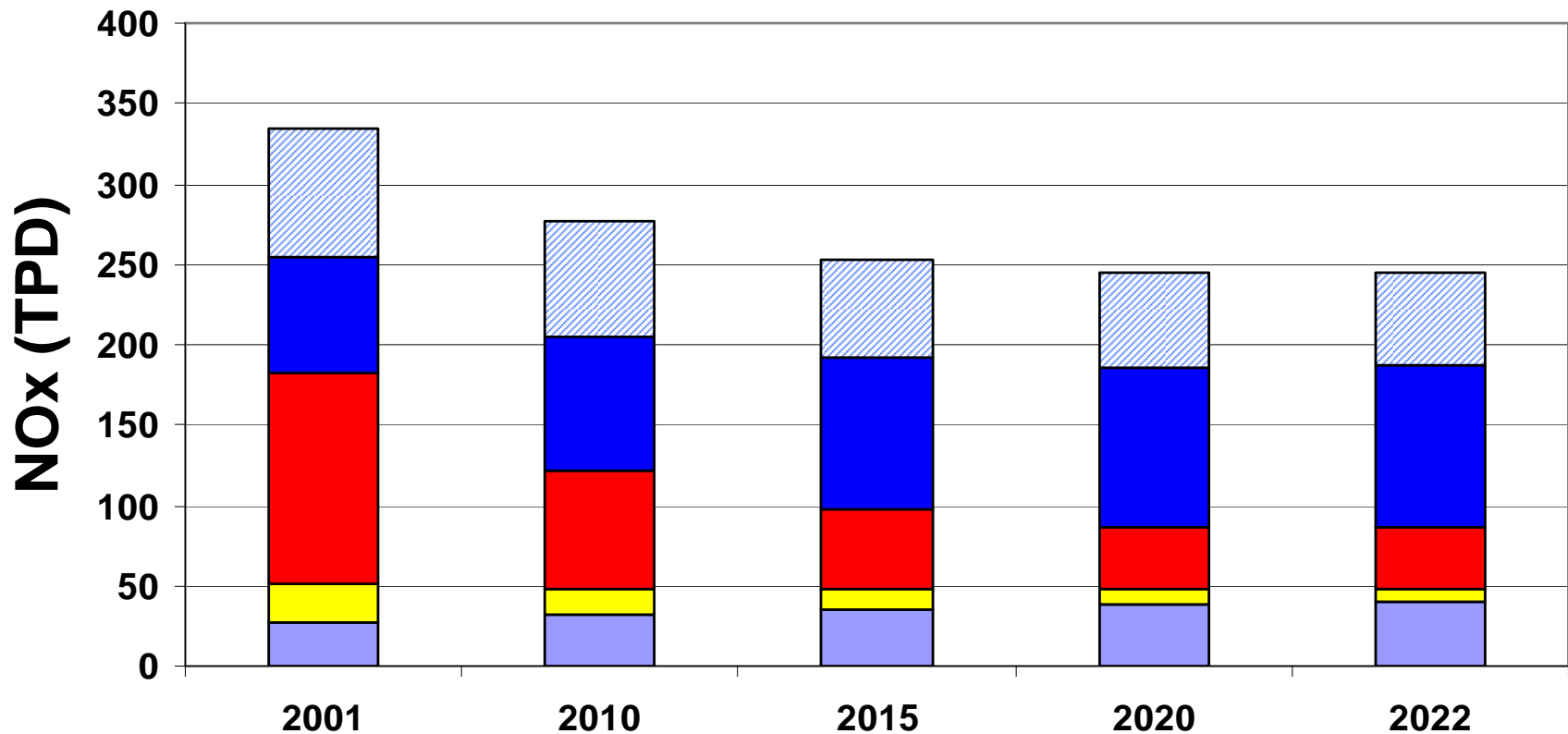
- 24-hour and annual secondary standards are identical to primary standards.
- EPA is also taking comments on whether to set a separate secondary PM_{2.5} standard designed to address visibility (principally in urban areas)
 - At levels within a range of 20-30 $\mu\text{g}/\text{m}^3$, and
 - On averaging times within a range of four to eight daylight hours.
- Analysis has not been done on the possible impact of the above “visibility” standard on the DMA.



Preliminary Primary PM_{2.5} Inventory Trend

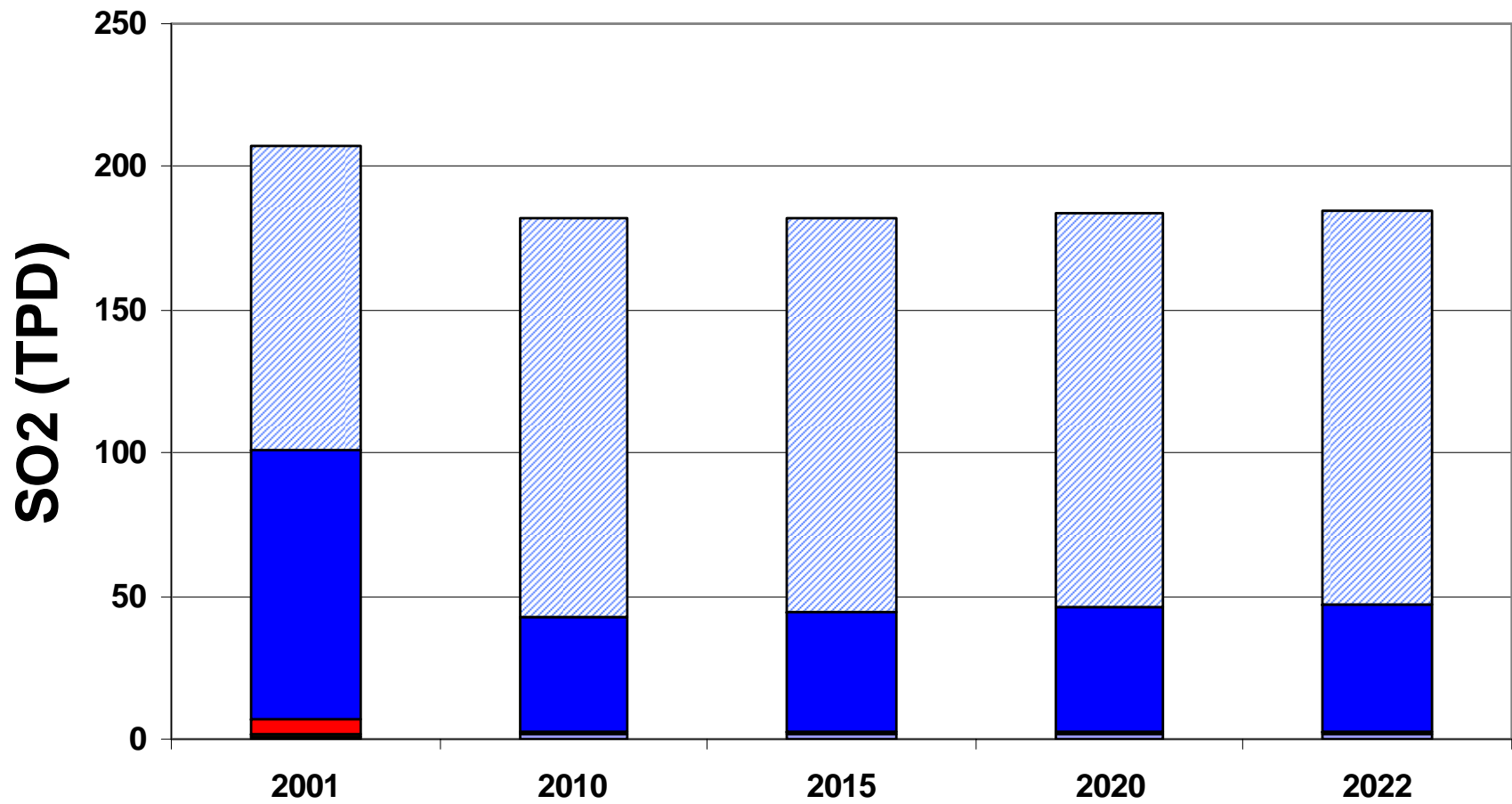


NO_x Emissions Trend



■ AREA ■ NON-ROAD ■ MOBILE ■ STATIONARY (Act.) ■ STATIONARY (Allow.)

SO₂ Emissions Trend



■ AREA ■ NON-ROAD ■ MOBILE ■ STATIONARY (Act.) ■ STATIONARY (Allow.)

Timeline if PM_{2.5} Standards are revised

- Promulgation Nov. 2006
- State Recommendations Nov. 2007
 - Based on 2004-2006 monitoring data
- Final Designations Nov. 2009
- Effective Date of Designations April 2010
- SIPs due April 2013
- Attainment Date April 2015
 - Based on 2012-2014 monitoring data
- Attainment Date w/extention. April 2020



Proposed PM_{10-2.5} Standards

- The proposed revisions would change the definition of the coarse particle (PM₁₀) standard to cover particles between 10 and 2.5 micrometers in diameter (aka PM_{10-2.5}, and “inhalable coarse particles”).
- Further define PM_{10-2.5} to focus on coarse particles found in urban areas
 - 24-hour standard 70 *ug/m*³
 - Annual standard none proposed
 - Secondary standards identical

Revoking Current PM₁₀ Standards

- Proposal revokes current PM₁₀ 24-Hr standard, except in areas that have both
 - violating monitors, and
 - a population of 100,00 and more
- Standards to remain in place until attainment and nonattainment designations of PM_{10-2.5} completed.
- EPA taking comments on retention of the 24-Hr PM₁₀ standards in areas with population smaller than 100,000 that are dominated by one or more large industrial sources.
- Immediately revoke current annual PM10 standards in all areas



PM₁₀₋₂₅ Monitoring

- The proposed monitoring regulations address Federal Reference Methods (FRM) and equivalent methods, for determining PM_{10-2.5} fraction.
- Current monitoring methodologies do not meet this criteria, thereby creating uncertainty in interpreting current monitoring data.



Proposed PM_{10-2.5} Standard to provide “Equivalent” Protection compared to current PM₁₀ Standard

- **Substantial uncertainties associated with limited body of epidemiological evidence on health effects related to exposure to PM_{10-2.5}.**
- **Uncertainties observed in effects are too large to use the reported air quality levels directly as a basis for setting a specific standard level.**
- **Therefore, EPA interpreted epidemiological evidence more generally and set a standard that would afford protection generally “equivalent” to current PM₁₀ standard.**



Impact of “Equivalent” Protection Concept on the West

	Average PM _{10-2.5} as % of PM ₁₀	“Equiv.” PM _{10-2.5} ug/m ³
Eastern Urban	20%	30
PM _{10-2.5} St'd.	47%	70
Denver Metro	70%	105
Arid West	80%	120

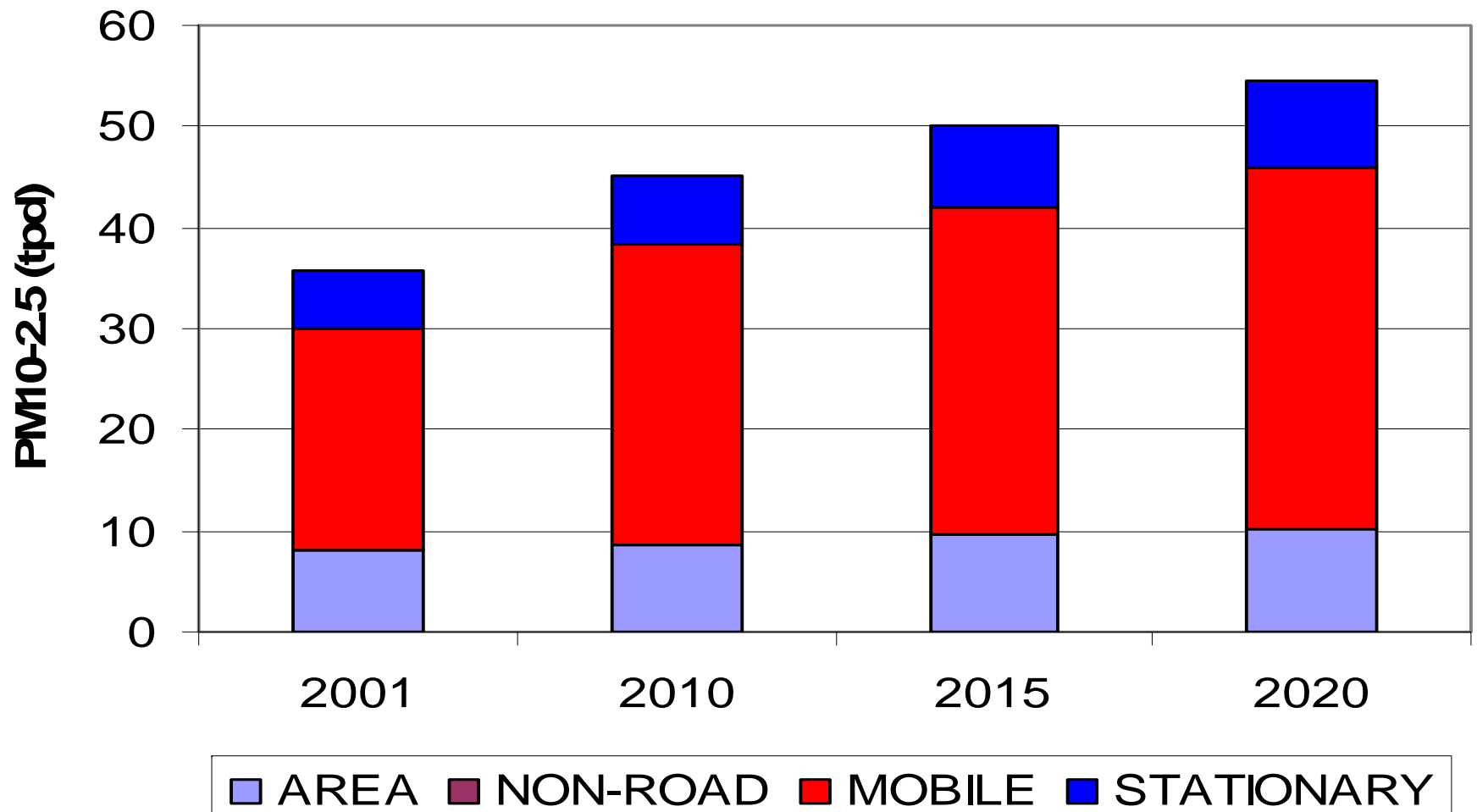
Current PM_{10-2.5} Design Value Estimates*

Monitor	2002	2003	2004	Average
CAMP FRMs	49.7	30.9	34.1	38
Comm. City FRMs	51.0	63.8	60.0	58

* PM_{10-2.5} design values calculated with existing monitored data are “estimates” because of the wide range of uncertainty depending on monitor equipment.



Preliminary PM_{10-2.5} Inventory Trend



Timeline if PM_{10-2.5} Standards are finalized

- Promulgation Nov. 2006
- State Recommendations July 2012
 - Based on 2009-2011 monitoring data
- Final Designations May 2013
- Effective Date of Designation July 2013
- SIPs due July 2016
- Attainment Date April 2018
 - Based on 2015-2017 monitoring data
- Attainment Date w/extension April 2023

