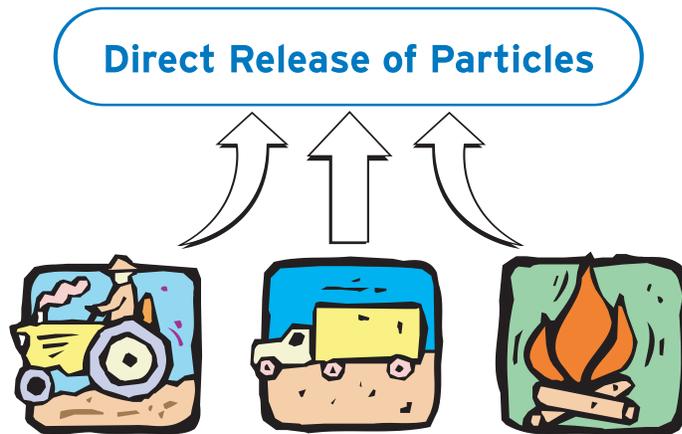


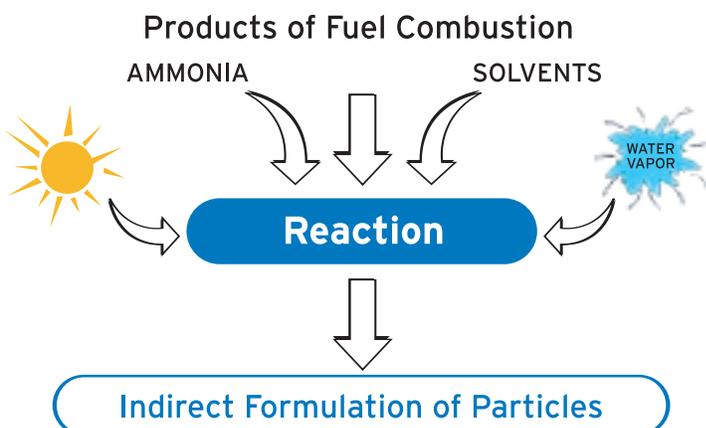
# PARTICULATE MATTER

## What is particulate matter?

Particulate matter (PM) is the term for particles and liquid droplets suspended in the air. Particles emitted directly into the air are known as “direct” or “primary” PM. Other particles are formed indirectly in the atmosphere from the chemical reaction of gaseous pollutants known as “precursors.” Sources of direct PM and PM precursors include factories, power plants, vehicles, construction activity, and natural sources such as fires and windblown dust.



Particles can be emitted directly into the atmosphere (above) or formed indirectly through chemical reactions (below).



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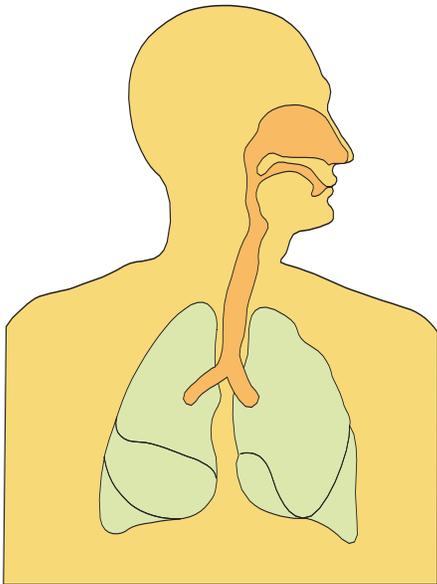
### WHO SHOULD USE THIS BROCHURE?

This brochure is intended for transportation officials and other stakeholders involved in transportation planning and project development and the transportation conformity process. It provides a brief overview of particulate matter, highlights key aspects of transportation conformity in particulate matter nonattainment and maintenance areas, and provides a few resources for additional information.

U.S. Department of Transportation  
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### How do particles affect your health?

Many scientific studies have linked breathing PM 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, and premature death. Certain people, such as older adults, children, and those with existing respiratory problems, may have a higher risk for PM-related health effects. Short-term exposure can aggravate lung disease, cause asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections. Long-term exposure has been linked to reduced lung function and the development of chronic bronchitis.

### What is the difference between PM<sub>10</sub> and PM<sub>2.5</sub>?

Particles come in a wide variety of sizes and have been historically assessed based on size, typically measured by the diameter of the particle in micrometers. PM<sub>10</sub> refers to particles that are 10 micrometers in diameter or less. PM<sub>2.5</sub>, or fine PM, refers to particles that are 2.5 micrometers in diameter or less. (Note: a human hair is about 70 micrometers in diameter and a grain of sand is about 90 micrometers in diameter). Areas of the country are designated nonattainment or attainment separately for the PM<sub>10</sub> and PM<sub>2.5</sub> standards.

### What are the National Ambient Air Quality Standards for PM?

Both PM<sub>10</sub> and PM<sub>2.5</sub> have two standards related to the average concentration over different time periods:

|   |                               |
|---|-------------------------------|
| <b>PM<sub>10</sub> Annual</b>   | <b>50 µg/m<sup>3</sup> **</b> |
| To attain this standard, the expected annual arithmetic mean PM <sub>10</sub> concentration at each monitor within an area must not exceed 50 µg/m <sup>3</sup> .                                       |                               |
| <b>PM<sub>10</sub> 24-hour</b>  | <b>150 µg/m<sup>3</sup></b>   |
| Not to be exceeded more than once per year.   |                               |
| <b>PM<sub>2.5</sub> Annual</b>  | <b>15.0 µg/m<sup>3</sup></b>  |
| To attain this standard, the 3-year average of the annual arithmetic mean PM <sub>2.5</sub> concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m <sup>3</sup> . |                               |
| <b>PM<sub>2.5</sub> 24-hour</b>   | <b>65 µg/m<sup>3</sup></b>    |
| To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 µg/m <sup>3</sup> .                  |                               |
| ** µg/m <sup>3</sup> is micrograms per a cubic meter.   |                               |

### When are air quality plans for PM<sub>2.5</sub> due, and when must areas attain the standards?

State implementation plans (SIPs) for PM<sub>2.5</sub> are due by April 5, 2008. Areas must attain the standards as expeditiously as practicable, with a maximum attainment date of April 2010. An extension of an additional one to five years may be possible for certain areas based on the severity of the problem and the availability of control measures. Attainment must be demonstrated based on monitoring data for the three years prior to the attainment date. Under interagency consultation requirements, transportation agencies should be involved in the development of the SIP, transportation-related control measures, and the SIP motor vehicle emissions budgets.

### How does surface transportation contribute to PM?

Motor vehicles (i.e., cars, trucks, and buses) emit direct PM from their tailpipes, as well as from normal brake and tire wear. In addition, vehicles cause dust from paved and unpaved roads to be re-entrained, or re-suspended, in the atmosphere. Also, highway and transit project construction may cause dust. Finally, precursors in vehicle exhaust may react in the atmosphere to form PM, including nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), and additionally for PM<sub>2.5</sub>, sulfur oxides (SO<sub>x</sub>) and ammonia (NH<sub>3</sub>).



**How many areas are currently designated nonattainment for PM<sub>2.5</sub> or PM<sub>10</sub>?**

Nonattainment designations for PM<sub>2.5</sub> became effective on April 5, 2005. There are 39 PM<sub>2.5</sub> nonattainment areas comprised of 208 counties or partial counties. Currently, there are 87 PM<sub>10</sub> nonattainment and maintenance areas, mostly in the Western United States.

**Attainment and Nonattainment Areas in the U.S.: PM<sub>2.5</sub> Standards**

- Attainment (or Unclassifiable) Areas (2,933 counties)
- Nonattainment Areas (177 entire counties, 31 partial counties)

**What are the transportation conformity requirements for particles?**

Conformity applies to metropolitan transportation plans and transportation improvement programs (TIPs), and FHWA and FTA projects in metropolitan and rural PM<sub>10</sub> and PM<sub>2.5</sub> nonattainment and maintenance areas. Key components of conformity are detailed in the Transportation Conformity Rule (40 CFR Parts 51 & 93) and include using the latest planning assumptions and emissions model, interagency and public consultation, timely implementation of transportation control measures in approved SIPs, regional emissions analysis, and in some cases localized or “hot-spot” analysis.

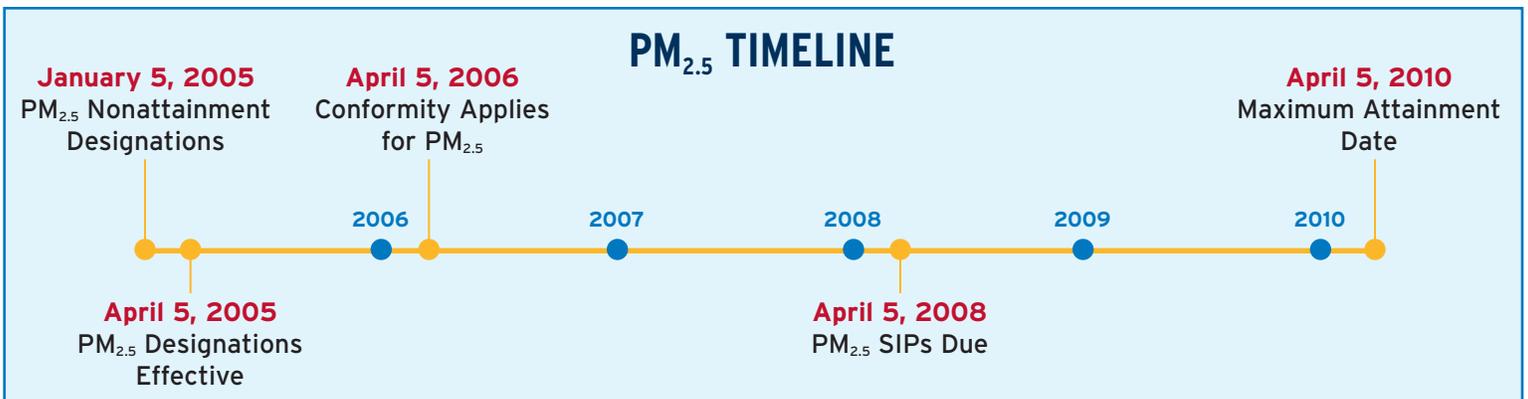
**When does transportation conformity apply for PM<sub>2.5</sub>?**

Transportation conformity for PM<sub>2.5</sub> will apply one year from the effective date of nonattainment designations, or April 5, 2006. By that date, FHWA/FTA must determine conformity of metropolitan transportation plans and TIPs in PM<sub>2.5</sub> nonattainment areas, or conformity will lapse. During a conformity lapse, FHWA/FTA funding and approvals are restricted to certain types of projects that are exempt from the conformity rule (i.e., safety projects, etc.), transportation control measures in approved SIPs, and project phases that have already been authorized. In addition, after April 5, 2006, project-level conformity determinations

must be made prior to final NEPA approval and/or project authorizations for non-exempt Federal projects or project phases.

**What conformity tests apply for PM?**

Once a SIP motor vehicle emissions budget is approved or found adequate by EPA, projected emissions from an area’s planned transportation system must be no greater than the budget. Prior to an adequate or approved budget, it must be demonstrated that projected emissions from the planned transportation system are no greater than emissions from a “no-build” scenario, or no greater than emissions in a baseline year – 1990 (PM<sub>10</sub>) or 2002 (PM<sub>2.5</sub>).



### What PM precursors must be considered in conformity?

In both PM<sub>10</sub> and PM<sub>2.5</sub> areas, directly emitted PM from motor vehicle tailpipes, as well as from normal brake and tire wear, must be considered in conformity. In addition, in PM<sub>10</sub> areas, VOCs and/or NO<sub>x</sub> are considered if EPA or the State air agency finds that they are a significant contributor to the PM<sub>10</sub> problem. In PM<sub>2.5</sub> areas, NO<sub>x</sub> must be considered unless EPA and the State air agency find that it is not a significant contributor to the PM<sub>2.5</sub> problem. VOCs, SO<sub>x</sub>, and NH<sub>3</sub> are to be considered in PM<sub>2.5</sub> areas, only if EPA or the State air agency finds that they are significant contributors to the PM<sub>2.5</sub> problem. Once submitted SIP budgets are found adequate or approved, only those precursors that have identified budgets in the SIP need to be considered in conformity.

### When must road dust be considered in conformity?

For PM<sub>10</sub> areas, road dust from paved and unpaved roads should be included in all regional emissions analyses. For PM<sub>2.5</sub> areas, road dust is included before a SIP is submitted and budgets are found adequate or approved if EPA or the State air agency finds that it is a significant contributor to the PM<sub>2.5</sub> problem. After a SIP budget is found adequate or approved, road dust is included in the PM<sub>2.5</sub> regional emissions analysis if the budget includes road dust.

### When must construction dust be considered in conformity?

Dust from transit and highway project construction in PM<sub>10</sub> and PM<sub>2.5</sub> areas must only be included in the regional emissions analysis if the SIP identifies it as a contributor (PM<sub>10</sub>) or significant contributor (PM<sub>2.5</sub>) to the nonattainment problem.

### How are PM emissions estimated?

Estimates of vehicle miles traveled (VMT) are multiplied by emission factors from EPA's latest approved emissions model to estimate PM emissions. Emissions from exhaust, and tire and brake wear, as well as applicable precursor emissions are currently estimated using MOBILE6.2 (EMFAC 2002 in California). In certain areas, estimates of dust from roads and construction may be required using EPA's AP-42 methodology.

### When must project-level localized analysis be performed?

Qualitative localized, or hot-spot, analysis is required for all non-exempt FHWA and FTA projects in PM<sub>10</sub> nonattainment and maintenance areas. In addition, quantitative analysis may be required for PM<sub>10</sub> once EPA develops guidance. As of January 2006, EPA has not yet finalized any regulatory requirements for hot-spot analysis in PM<sub>2.5</sub> areas.

### What are some of the things that should be part of interagency consultation for PM<sub>2.5</sub>?

Interagency consultation will play an important role in making transportation conformity determinations in the PM<sub>2.5</sub> nonattainment areas. Typical issues for interagency discussion include:

- How to coordinate, based on the geographic/political boundaries of the nonattainment area (i.e., who is responsible for various requirements).
- How to coordinate transportation planning cycles for a nonattainment area with more than one State and/or MPO.
- Selection of interim emission test to demonstrate conformity before a SIP is submitted.
- Selection of analysis years.
- Latest planning assumptions.
- Significance of on-road mobile contribution to dust emissions, and other precursor emissions.
- Development of SIP control measures and budgets.

### What can transportation agencies do to reduce PM?

PM emissions can be reduced in a number of ways, such as more stringent standards for engines and fuels, diesel retrofit programs, accelerated retirement programs, and idling-reduction programs. Other control measures that can be implemented locally include diesel retrofits of buses and trucks, on-road street sweepers and paving non-paved roads. Research is underway to identify other cost-effective strategies that transportation agencies could implement to reduce PM.

## WHERE CAN I GET MORE INFORMATION?

- **FHWA's Transportation Conformity Website:**  
[www.fhwa.dot.gov/environment/conform.htm](http://www.fhwa.dot.gov/environment/conform.htm)
- **EPA's Transportation Conformity Website:**  
[www.epa.gov/otaq/transp/traqconf.htm](http://www.epa.gov/otaq/transp/traqconf.htm)
- **EPA's PM2.5 Designations:**  
[www.epa.gov/pmdesignations](http://www.epa.gov/pmdesignations)
- **EPA's PM Basics:**  
[www.epa.gov/oar/particlepollution](http://www.epa.gov/oar/particlepollution)