

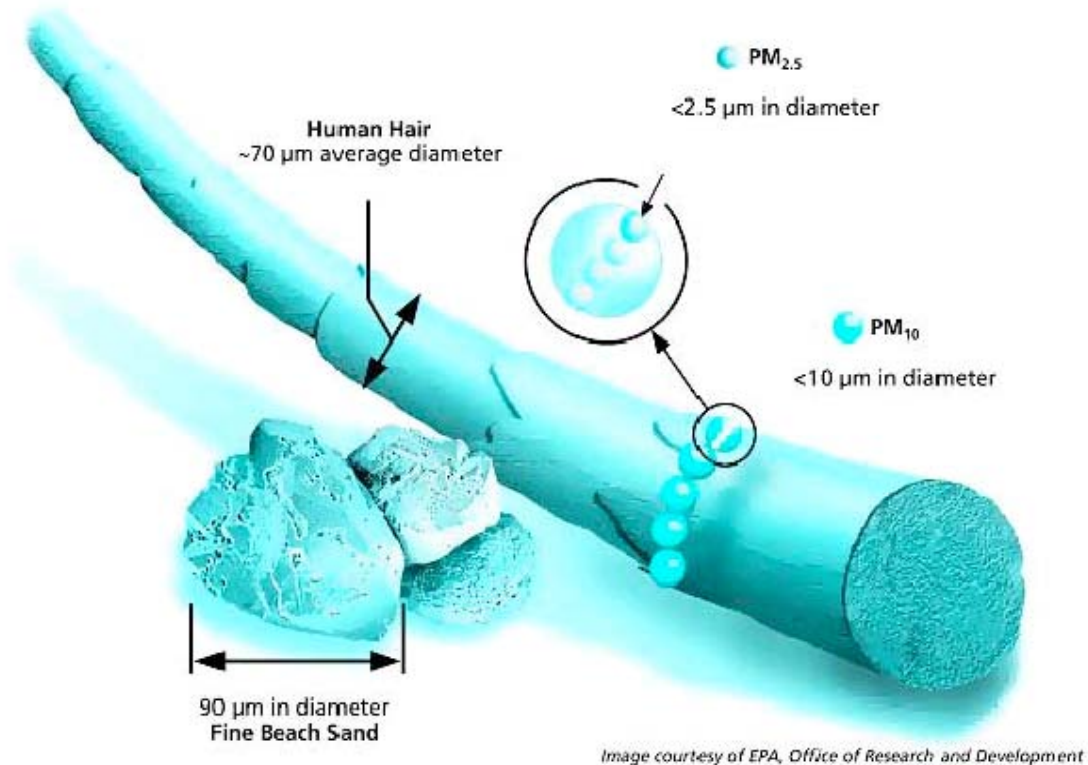
Fine Particle Pollution (PM_{2.5}) Issue Paper
August 8, 2008

BACKGROUND

- EPA's revised National Ambient Air Quality Standards for PM_{2.5} became effective on December 18, 2006. The annual PM_{2.5} standard of 15 ug/m³ was retained, but the 24-hour PM_{2.5} standard was changed from 65 ug/m³ to 35 ug/m³.
- The 24-hour PM_{2.5} standards were revised based on a number of health studies showing that short-term exposure to PM_{2.5} is associated with increased mortality and a range of serious health effects, including aggravation of lung disease, asthma attacks, and heart problems.

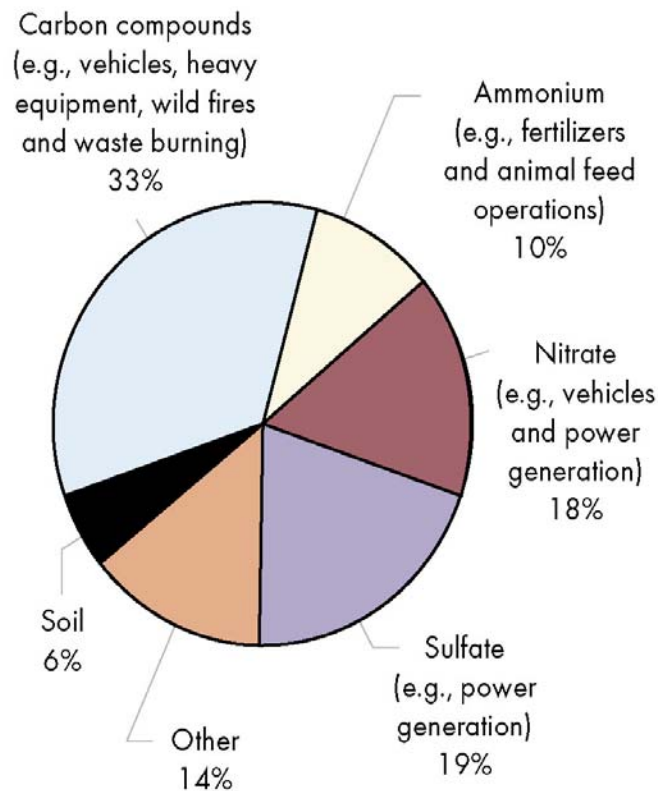
What are fine particles?

- Particulate matter is a complex mixture of extremely small particles and liquid droplets. Particles smaller than 2.5 microns diameter are "fine particles."



- Fine particles can be emitted directly or formed secondarily in the atmosphere. Particles emitted directly (also known as primary emissions) come from sources such as diesel engines, wood burning activities, and other industrial and commercial combustion processes.

- o “Secondary” particles are those that are formed by reactions of gases in the atmosphere. For example, sulfur dioxide gas from combustion of coal in power plants and industrial boilers reacts with other gases in the atmosphere to form sulfate particles. Similarly, nitrogen oxide gas from combustion sources such as automobiles and industrial facilities forms nitrate particles in the atmosphere.
- o Other secondary particles include organic carbon particles, which can be formed when certain volatile organic compounds react with other gases in the atmosphere. Sources of organic particles include burning activities, motor vehicle emissions, and other combustion activities.



What are the health impacts of fine particles?

Health effects associated with short-term exposure to fine particles include:

- ♣ Premature death in people with heart and lung disease
- ♣ Non-fatal heart attacks
- ♣ Increased hospital admissions, emergency room visits and doctor’s visits for respiratory diseases
- ♣ Increased hospital admission and ER visits for cardiovascular diseases
- ♣ Increased respiratory symptoms - coughing, wheezing and shortness of breath
- ♣ Lung function changes, especially in children and people with lung diseases such as asthma, heart rate variability and irregular heartbeat

The nationwide benefits of meeting the revised 24-hour PM2.5 standards include an estimated reduction of:

- ♣ 2,500 premature deaths in people with heart or lung disease;
- ♣ 2,600 cases of chronic bronchitis;
- ♣ 5,000 nonfatal heart attacks;
- ♣ 1,630 hospital admissions for cardiovascular or respiratory symptoms;
- ♣ 1,200 emergency room visits for asthma;
- ♣ 7,300 cases of acute bronchitis;
- ♣ 97,000 cases of upper and lower respiratory symptoms;
- ♣ 51,000 cases of aggravated asthma;
- ♣ 350,000 days when people miss work or school; and
- ♣ 2 million days when people must restrict their activities because of particle pollution related symptoms.

What are the PM2.5 levels in Wisconsin and Dane County?

Dane County PM2.5 Levels 2005-2007

Based on QA'd FRM monitoring data, Madison/Dane County violates the daily fine particle standard of 35 µg/m³. The design value for the period 2005 through the end of 2007 is **36.9 µg/m³ = 37 µg/m³**. To be in violation of the standard, the design value must be 35.5 µg/m³ or greater.

The 98th percentile value in 2005 is 40.1 µg/m³.
 The 98th percentile value in 2006 is 33.4 µg/m³.
 The 98th percentile value in 2007 is 37.3 µg/m³.

The nine highest values are listed in Table 1, along with the date and rank.

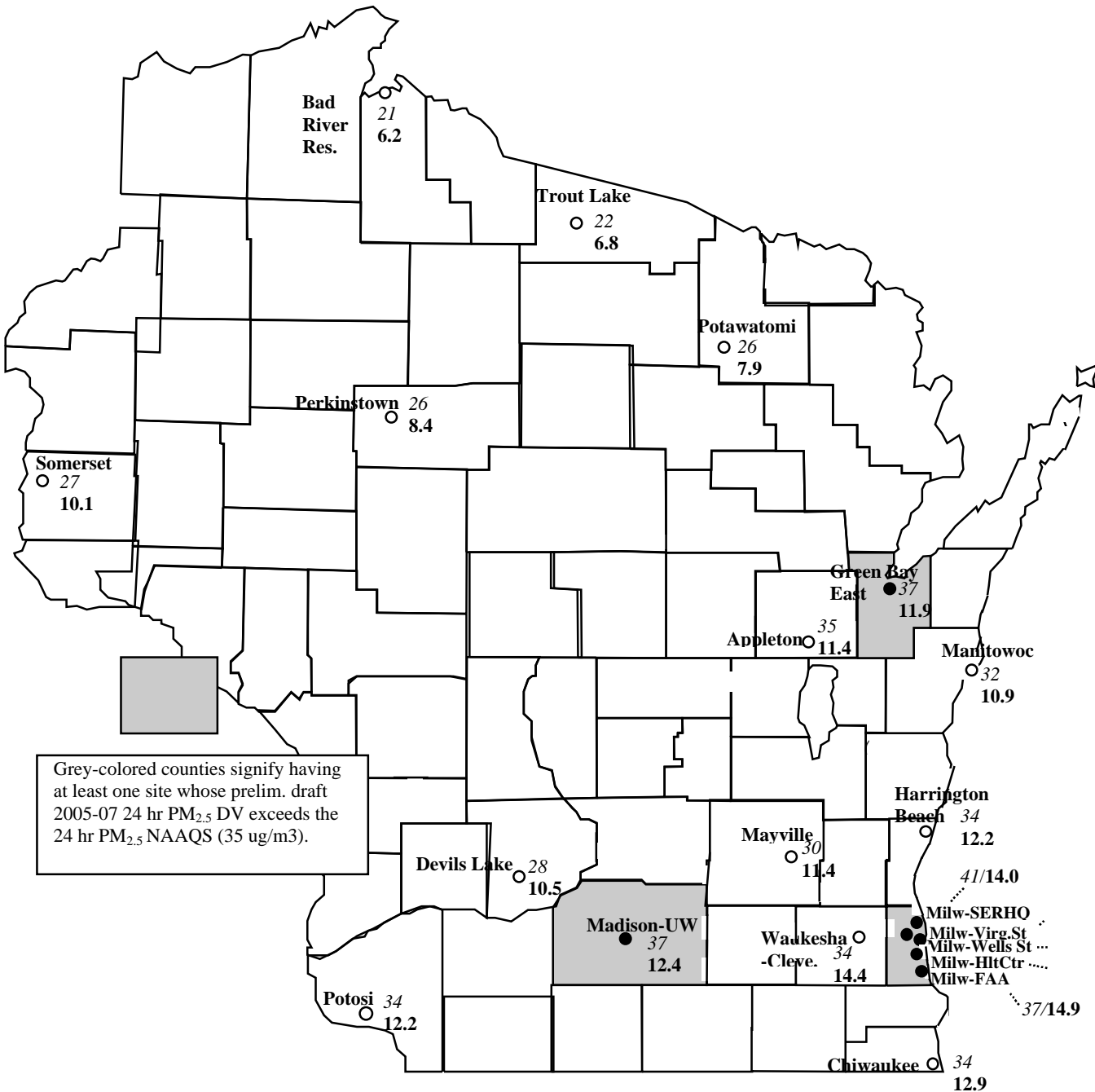
Table 1 – Nine Highest Daily Fine Particle Concentrations in Madison in 2007

Date	Concentration (µg/m³)	Rank	Monitoring Method
12/20	61.6	1	FRM
12/19	50.1	2	FRM
12/21	44.3	3	FRM
3/9	44.0	4	FRM
2/12	40.0	5	FRM
2/11	39.4	6	FRM
11/20	37.3	7	FRM
11/19	35.8	8	FRM
12/31	34.4	9	FRM

Historical analysis shows the highest pm2.5 days in Dane County are occurring during the winter months. In 2007, 14 of the 15 highest monitored values were in the winter. (Similarly, in 2006 - 12 of 15 days, in 2005 - 11 of 15 days, and in 2004, 12 of 15 days.)

The following map identifies the latest statewide PM2.5 design values:

Statewide PM2.5 Levels 2005-2007: 24 Hr and Annual PM_{2.5} Design Values (DVs)



Grey-colored counties signify having at least one site whose prelim. draft 2005-07 24 hr PM_{2.5} DV exceeds the 24 hr PM_{2.5} NAAQS (35 ug/m³).

Italicized #s: 2005-07 24 hr PM_{2.5} DV (ug/m³): 24 hr PM_{2.5} nat'l ambient AQ std (NAAQS): 35 ug/m³

Bold #s: Prelim. draft 2005-07 Annual PM_{2.5} DV (ug/m³): Annual PM_{2.5} NAAQS: 15 ug/m³

What are the main sources of fine particles?

2005 Emissions - Statewide

Sector	Statewide 2005 Summer Day Emissions (tons/day)				
	SO ₂	NO _x	VOC	PM _{2.5}	NH ₃
Onroad	8.2	392.9	169.1	6.9	18.5
Nonroad	15.4	158.8	327.0	15.4	0.2
MAR	7.9	59.0	5.5	1.8	0.03
Point (non-EGU)	168.6	107.2	106.5	14.8	1.0
Point (EGU)	539.4	229.3	4.8	9.8	1.9
Nonpoint	20.3	43.4	377.1	12.7	0.5
Agricultural	-	-	-	-	493.2
TOTAL	759.8	990.6	990.0	61.4	515.3
DANE CO.	33.2	62.5	67.1	3.4	21.2

MAR = Commercial Marine, Aircraft & Railroad emissions
Source: Wisconsin 2005 Base Year Inventory

What is the regulatory timeline for the designation process?

- States had until December 18, 2007, to recommend to EPA areas that should be designated as nonattainment.
- Governor Doyle recommended that all areas in Wisconsin should be designated as attainment. See 12-18-07 letter from Governor Doyle to EPA.
- EPA will review and consider those recommendations, and will notify states of any modifications EPA wishes to make to state recommendations. EPA will use 2005-2007 data when making final designations.
- If EPA intends to make a final designation that is different from a state recommendation, EPA must notify the state at least 120 days prior to final designation and provide them an opportunity to comment on the potential modification. EPA's 120-day letter is due in mid-August.
- EPA intends to complete final designations by December 18, 2008. In the event the Administrator has insufficient information to complete designations by December 18, 2008,

the date of final designations may be extended up to one year, but no later than December 18, 2009.

- SIP Schedule
 - Spring 2012 – Attainment Demonstrations Due
 - Spring 2014 – Attain Standards

What does a nonattainment designation mean?

- The Clean Air Act requires state and local governments to take steps to reduce fine particle pollution in nonattainment areas. State and local governments must detail these steps in plans demonstrating how they will meet the fine particle standards. Those plans are known as state implementation plans, or SIPs. States must submit their SIPs to EPA within three years after the Agency makes final designations.

Attainment Timetable

December 2007 – Wisconsin’s recommendation for designations due

December 2008 – EPA makes final designations

April 2009 – Effective date of designations

April 2012 – SIPs due

April 2014 – Attainment date

- Nonattainment areas also are subject to a measure known as “transportation conformity,” which requires local transportation and air quality officials to coordinate planning to ensure that transportation projects, such as road construction, do not affect an area’s ability to reach its clean air goals. Transportation conformity requirements become effective one year after an area is designated as nonattainment.
- Once designated, nonattainment areas also are subject to new source review requirements. New Source Review is a permitting program for industrial facilities to ensure that new and modified sources of pollution do not impede progress toward cleaner air.

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