

Federal Highway Administration's Particulate Matter  
Research Program

EPA Emission Inventory Conference  
Atlanta, Georgia  
April 16, 2002

Kevin N. Black  
Federal Highway Administration

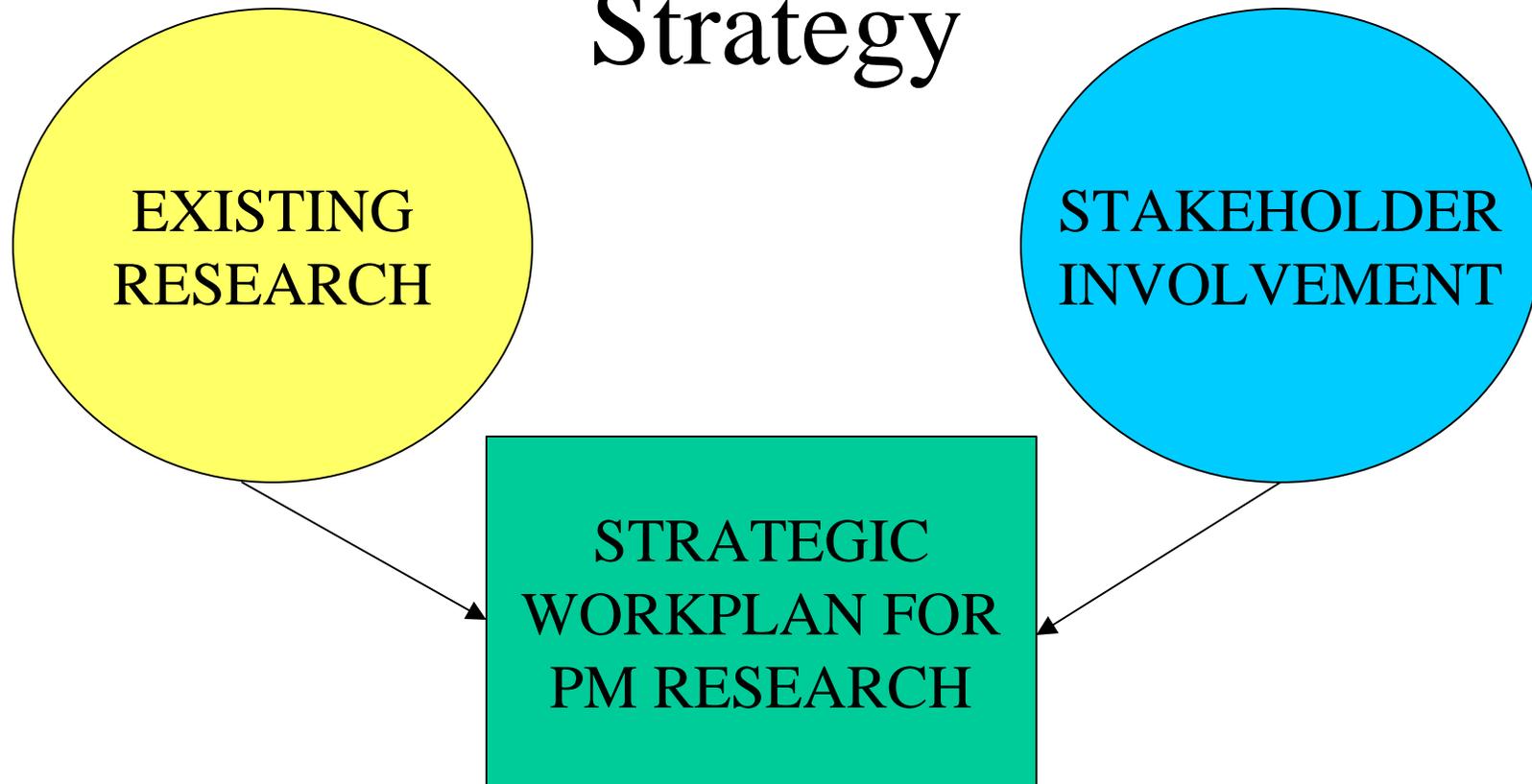
# Structure of the PM Research Strategy

Phase 1: Determine the highway/mobile source contribution to particulate matter pollution by evaluating previous studies, recommending needed research

Phase 2: Initiate projects identified in recommended research; determine cities to study correlation of traffic and emission concentrations of PM

Phase 3: Collect and analyze vehicle activity data and ambient air PM concentrations in selected cities

# Process Used to Develop Strategy



# Phase 1 : Develop Research Plan

Literature review

Workshop

Recommendations

Strategy Document

***Strategic Workplan  
for Particulate  
Matter Research:  
2000 to 2004***



U.S. Department of Transportation  
**Federal Highway Administration**

# Recommendations

Fourteen projects covering five focus areas monitoring, characterization, sources, modeling, control strategies

First project is to collect both traffic and emission concentration data in close proximity to one another to attempt to correlate traffic activity and PM concentrations

Figure outlines projects needed to answer questions

**Key Questions:**

What areas will be in nonattainment?

What kind of problem is PM: local, regional or both?

What is the transportation contribution to PM?

What are the most cost-effective control strategies for transportation sources?

**Proposed Projects:**



Figure 3. Connection Between Transportation Issues and Research Agenda

# Phase 2: Determining Sampling Sites and Data Requirements

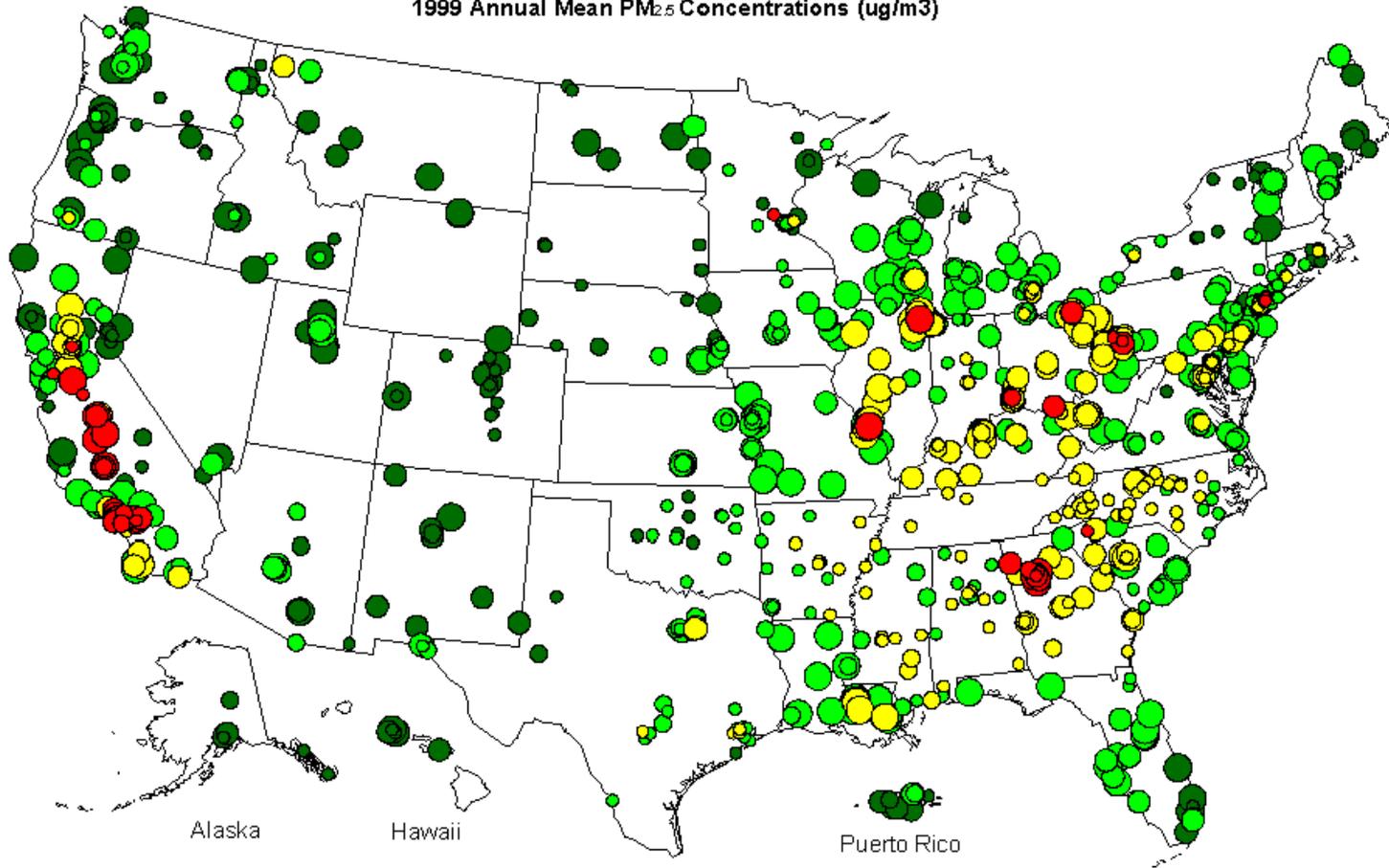
Locations should be in areas anticipated to have PM Exceedances

Determine locations with the following data

Air Quality Data (PM10, PM2.5, Speciation, Other Pollutants, Meteorological)

Traffic Data (VMT, Peak Volumes, Local, Regional, Seasonal, Speed, Vehicle Type)

1999 Annual Mean PM<sub>2.5</sub> Concentrations (ug/m<sup>3</sup>)



**Data Completeness**

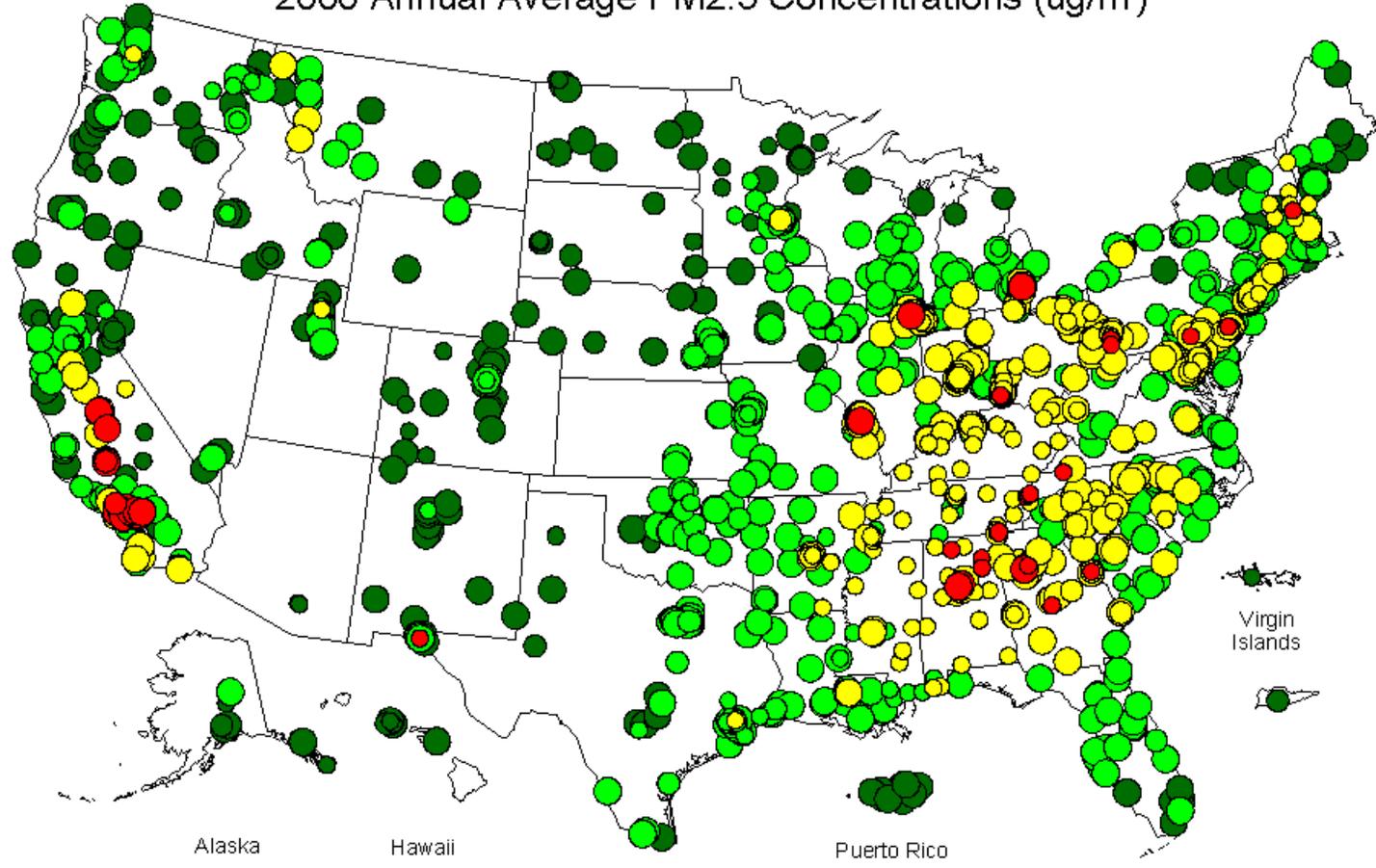
- < 4 quarters
- one or more quarters with < 11 samples
- All quarters with at least 11 samples
- All quarters 75% or more complete

**Concentration (ug/m<sup>3</sup>)**

- > 20
- 15 - 20
- 10 - 15
- 0 - 10

Source: US EPA AIRS Data base as of 7/12/00 without data flagged as 1, 2, 3, 4, T, W, Y, or X

## 2000 Annual Average PM2.5 Concentrations (ug/m<sup>3</sup>)



Alaska

Hawaii

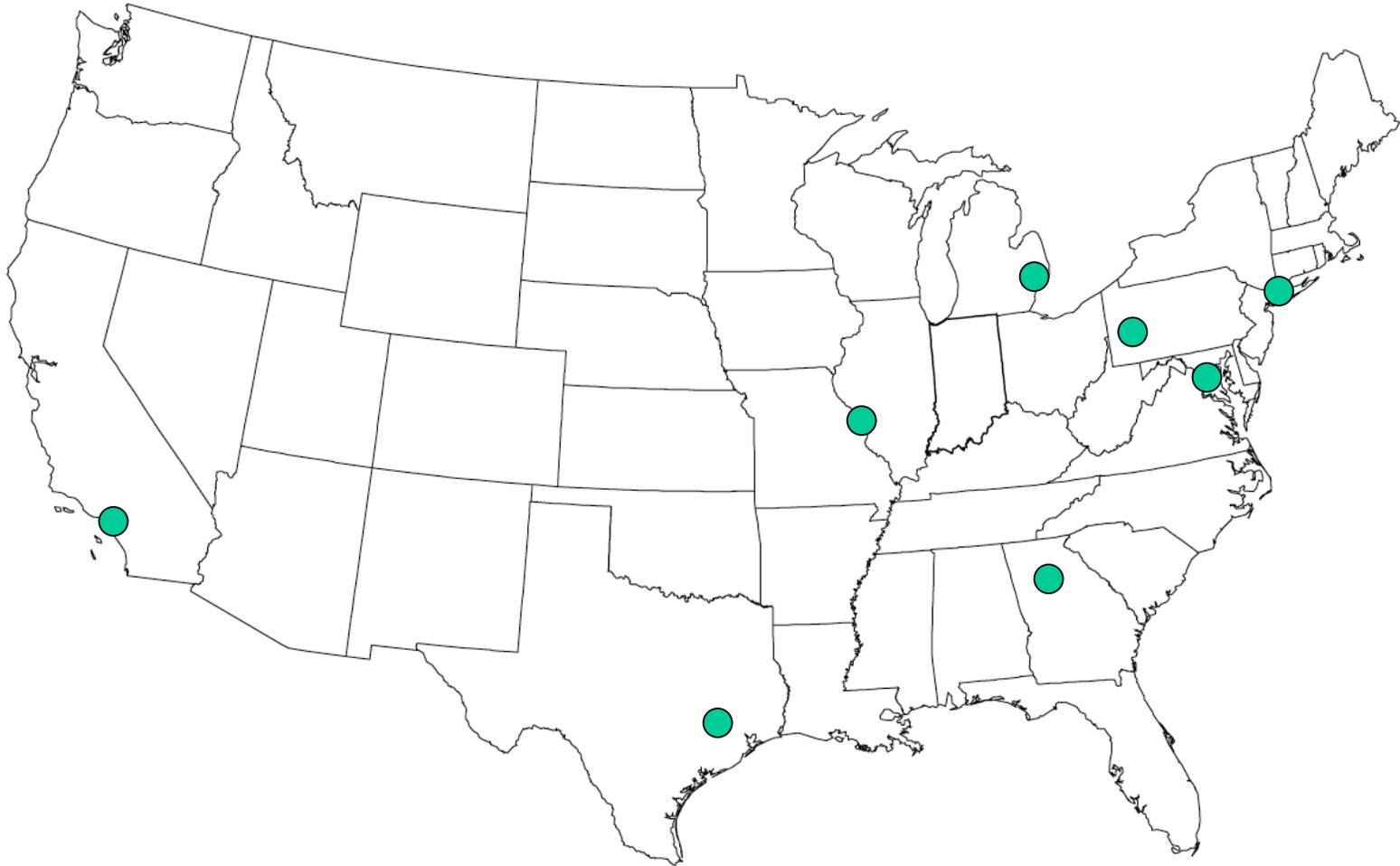
Puerto Rico

Virgin Islands

- |  |           |
|--|-----------|
| ○ < 4 quarters                           | ● >20     |
| ○ one or more quarters with < 11 samples | ● 15 - 20 |
| ○ All quarters with at least 11 samples  | ● 10 - 15 |
| ○ All quarters 75% or more complete      | ● 0 - 10  |

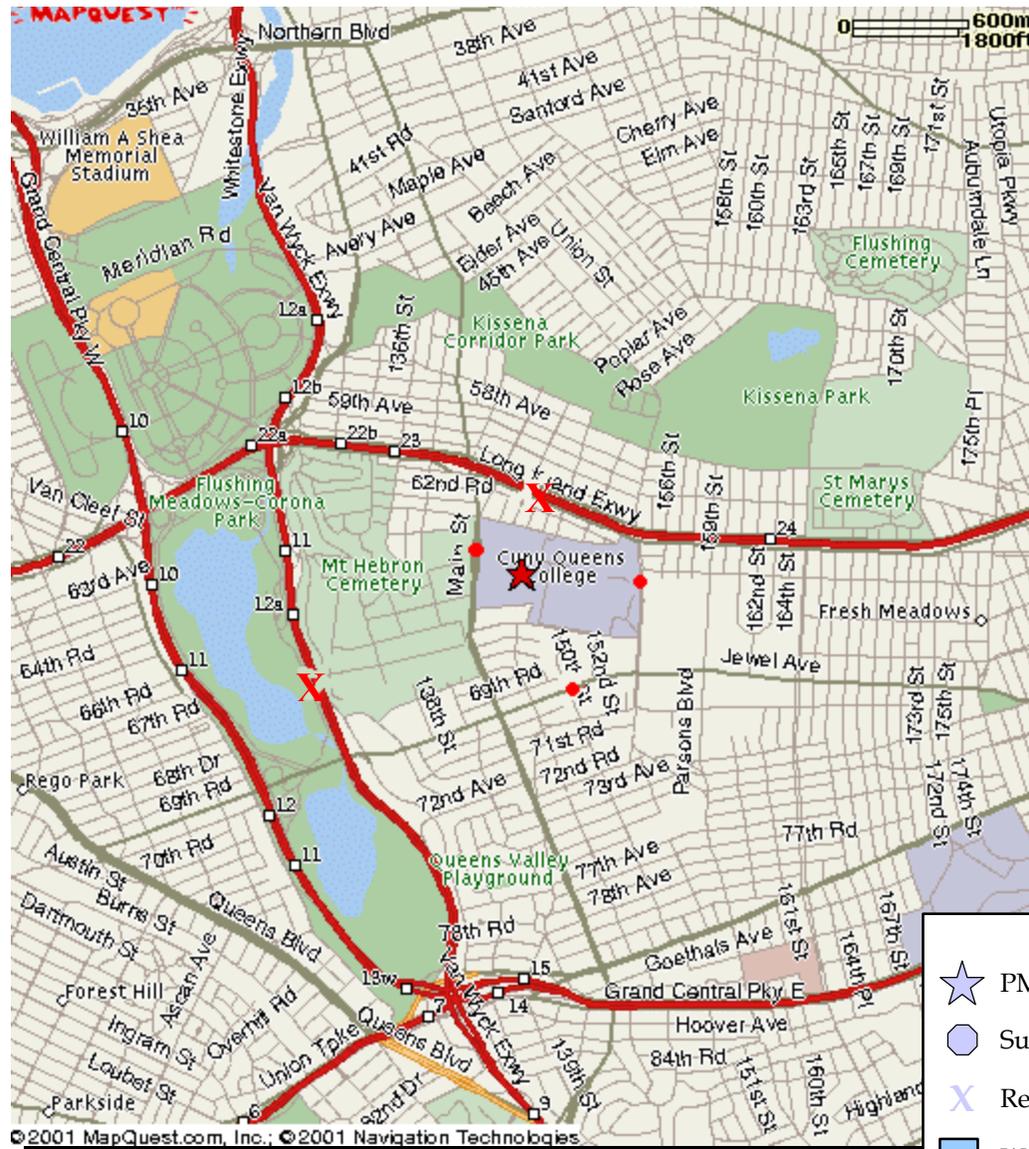
Source: US EPA AIRS Data base as of 7/10/01 without data flagged as 1, 2, 3, 4, T, W, Y, or X

# Location of the FHWA and EPA Monitoring Sites





# New York City/Queens, New York



### Legend

- ★ PM Monitoring Supersite
- Supplemental Traffic Counter
- X Regional Traffic Counter
- Weigh-in-Motion Detector

# Phase 3: Analyze the Data and Evaluate the Relationships

Study the effects and Influences of:

Variations in Concentration during day

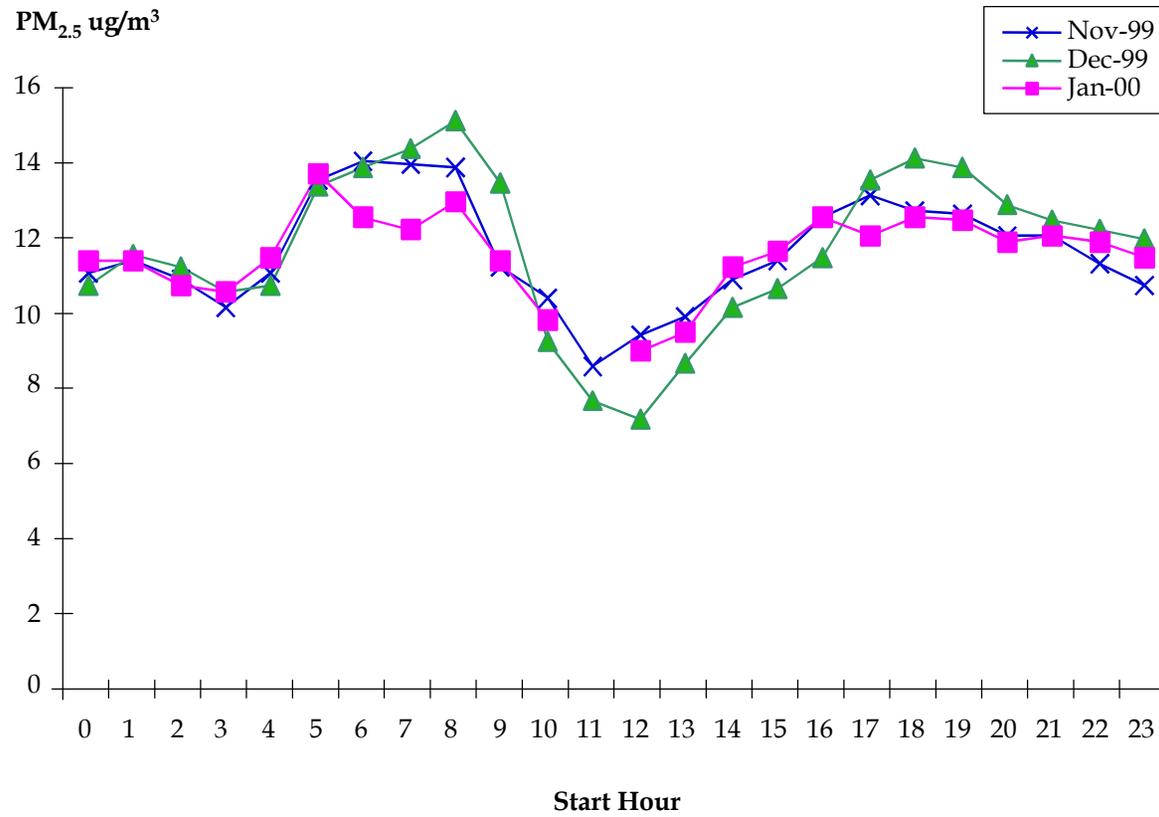
Variations in Concentrations Seasonally

Variations in Vehicle Classes

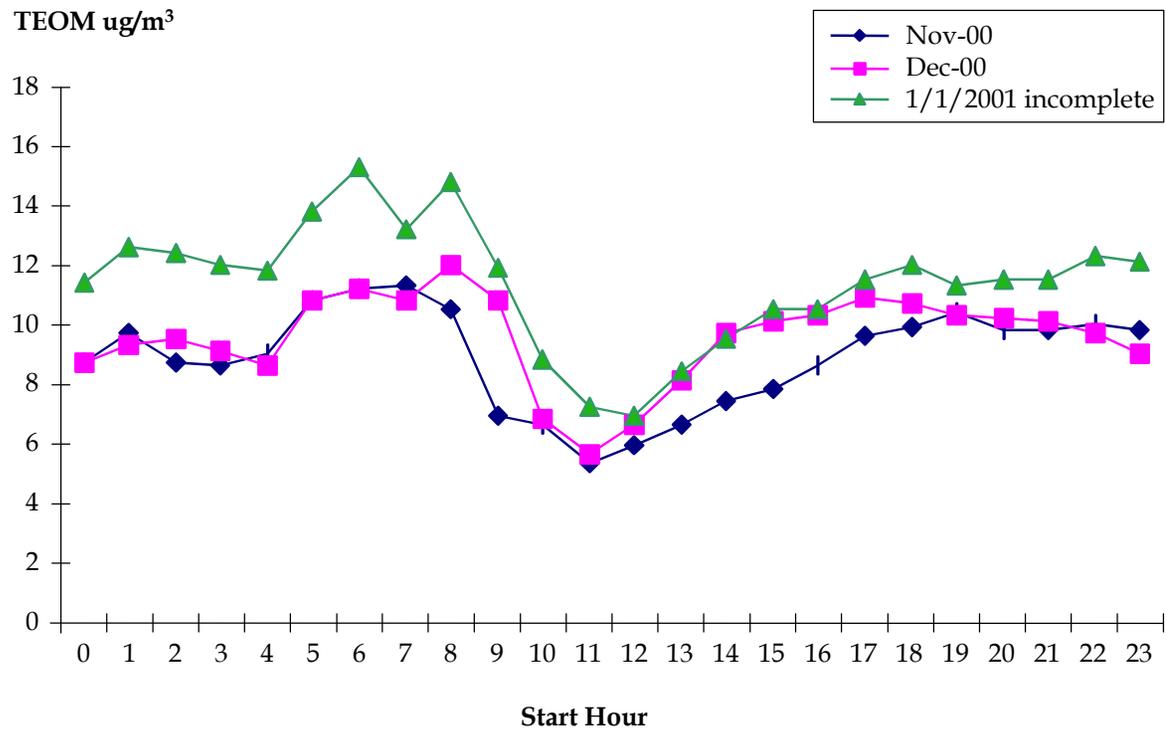
Variations in Geographical Locations

Atmospheric Transport

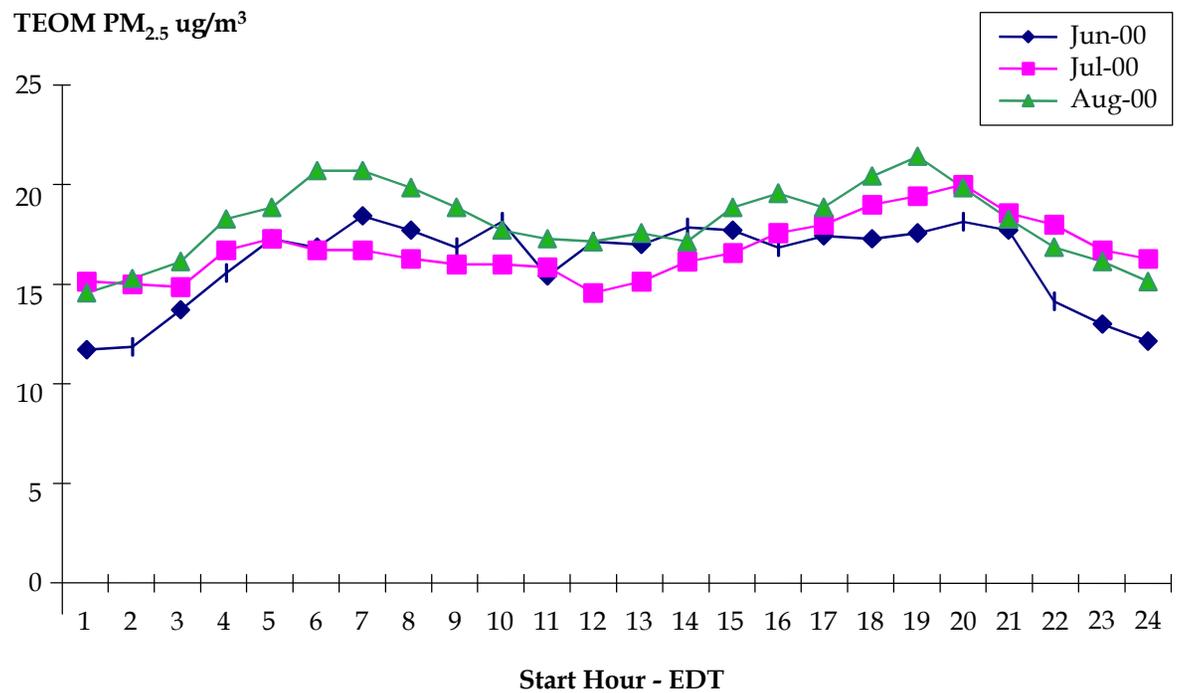
Fugitive Dust



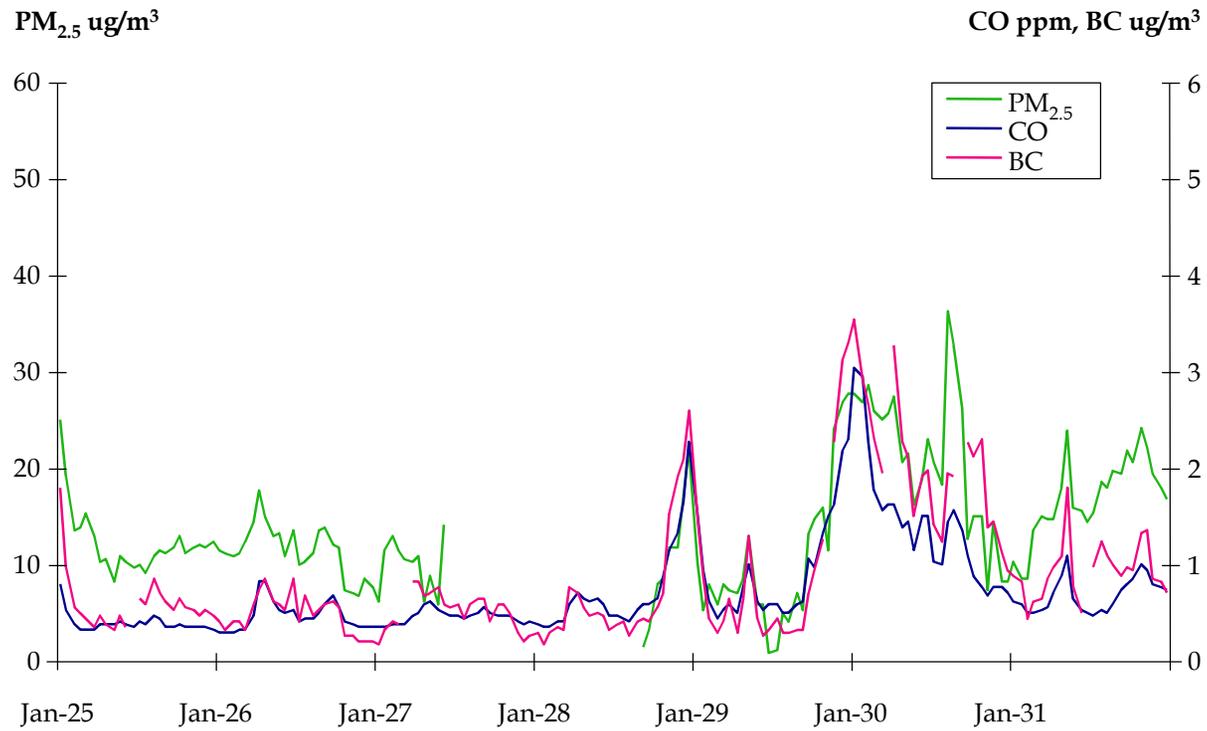
**PM<sub>2.5</sub> Concentration versus Hour of Day** *Winter of 1999*



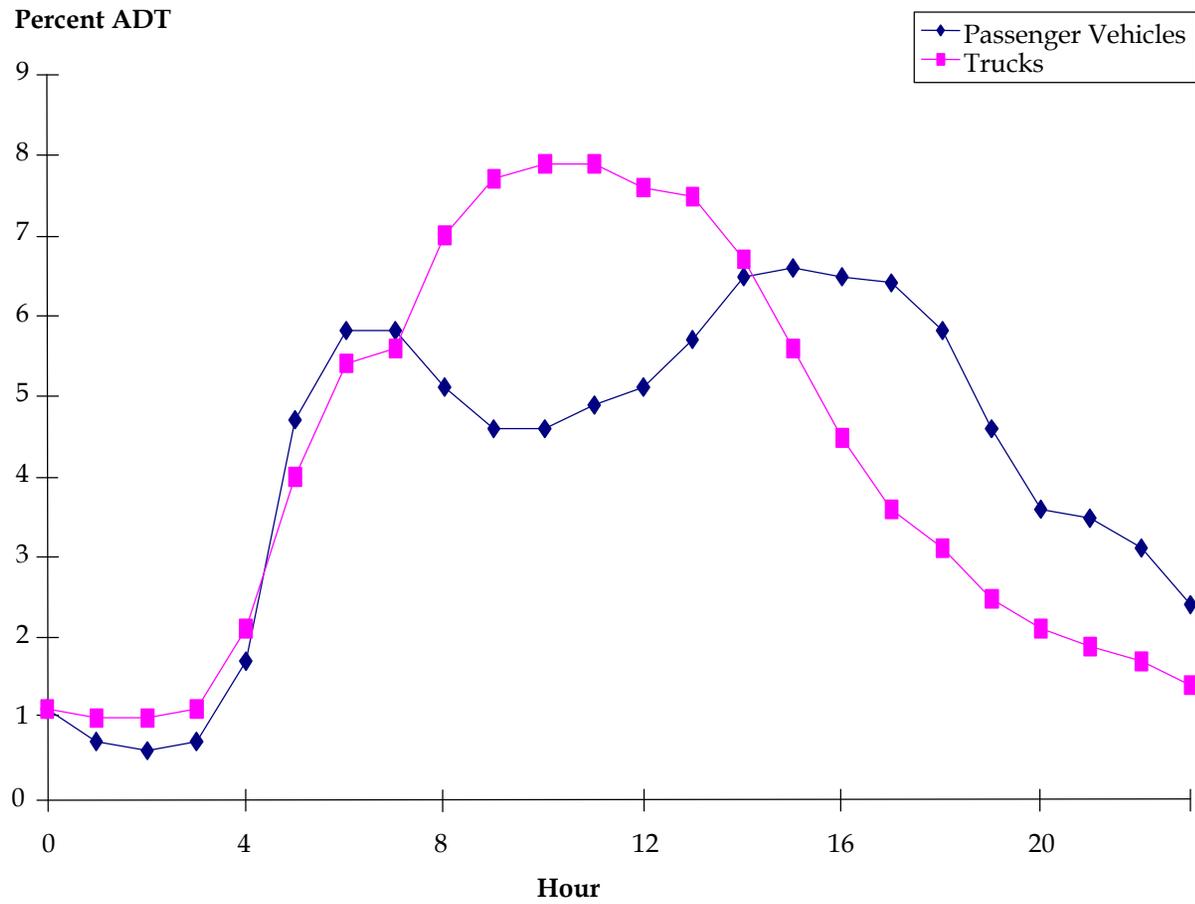
**PM<sub>2.5</sub> Concentration versus Hour of Day** *Winter of 2000*



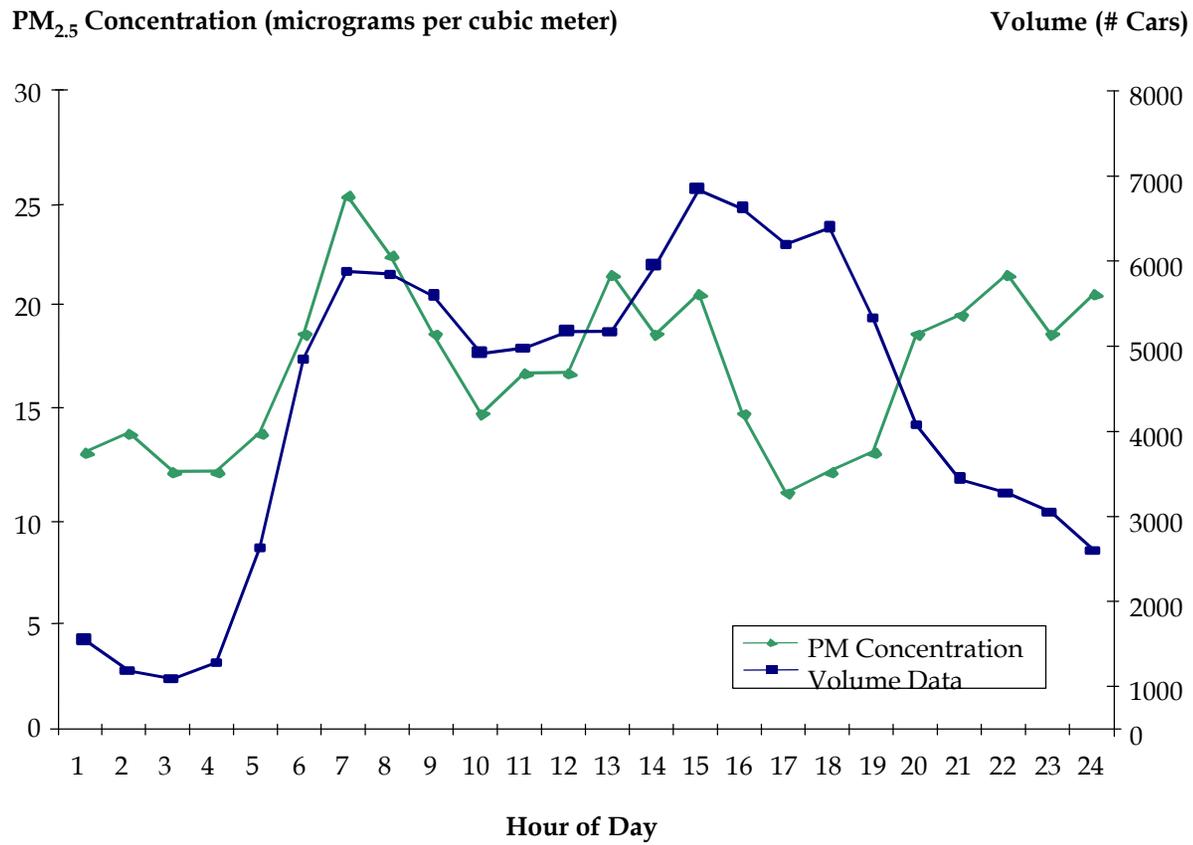
PM<sub>2.5</sub> Concentration versus Hour of Day *Summer of 2000*



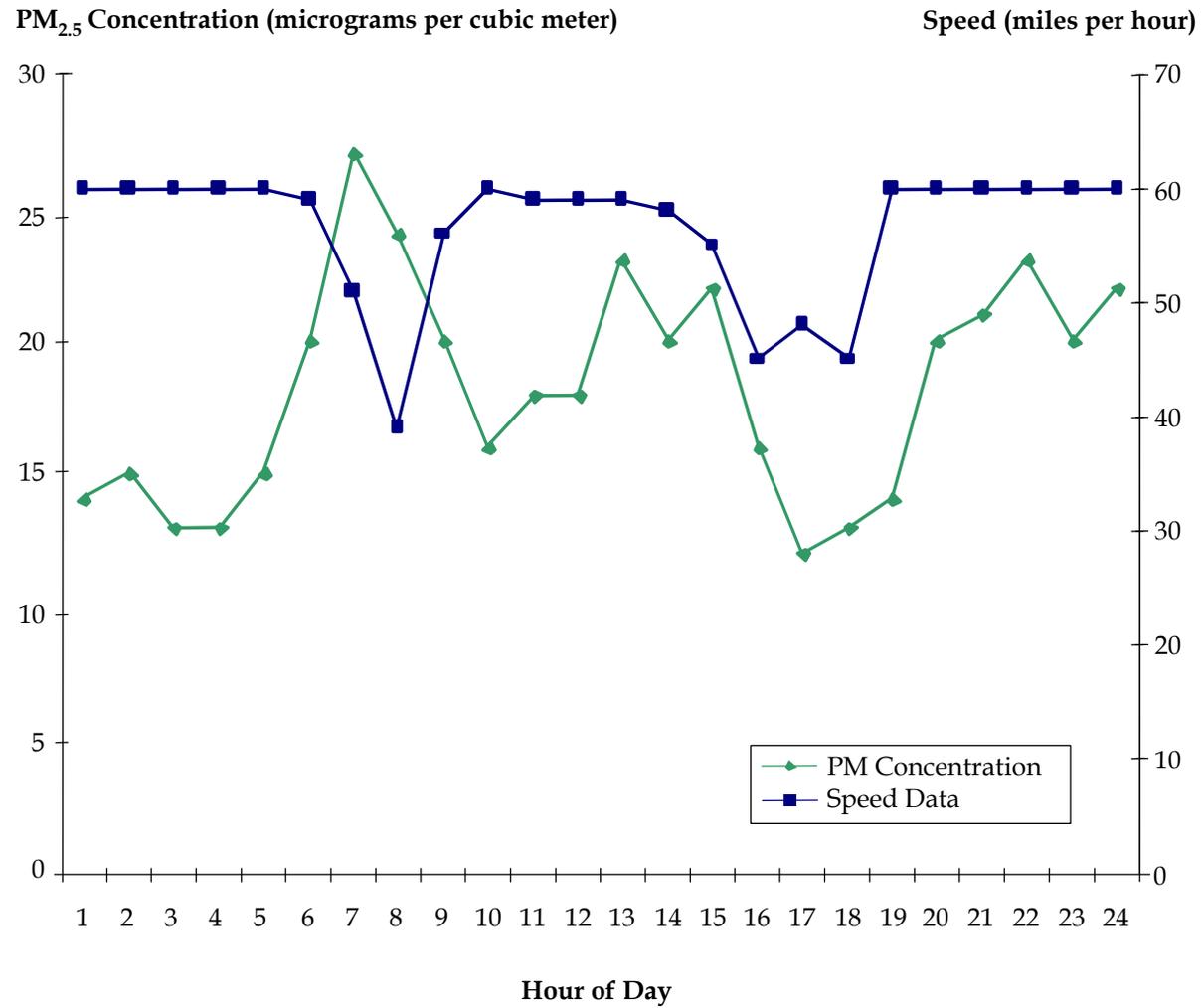
**Time-Series Plot of  $PM_{2.5}$ , CO, and Black Carbon**     *January 25-31, 2000*



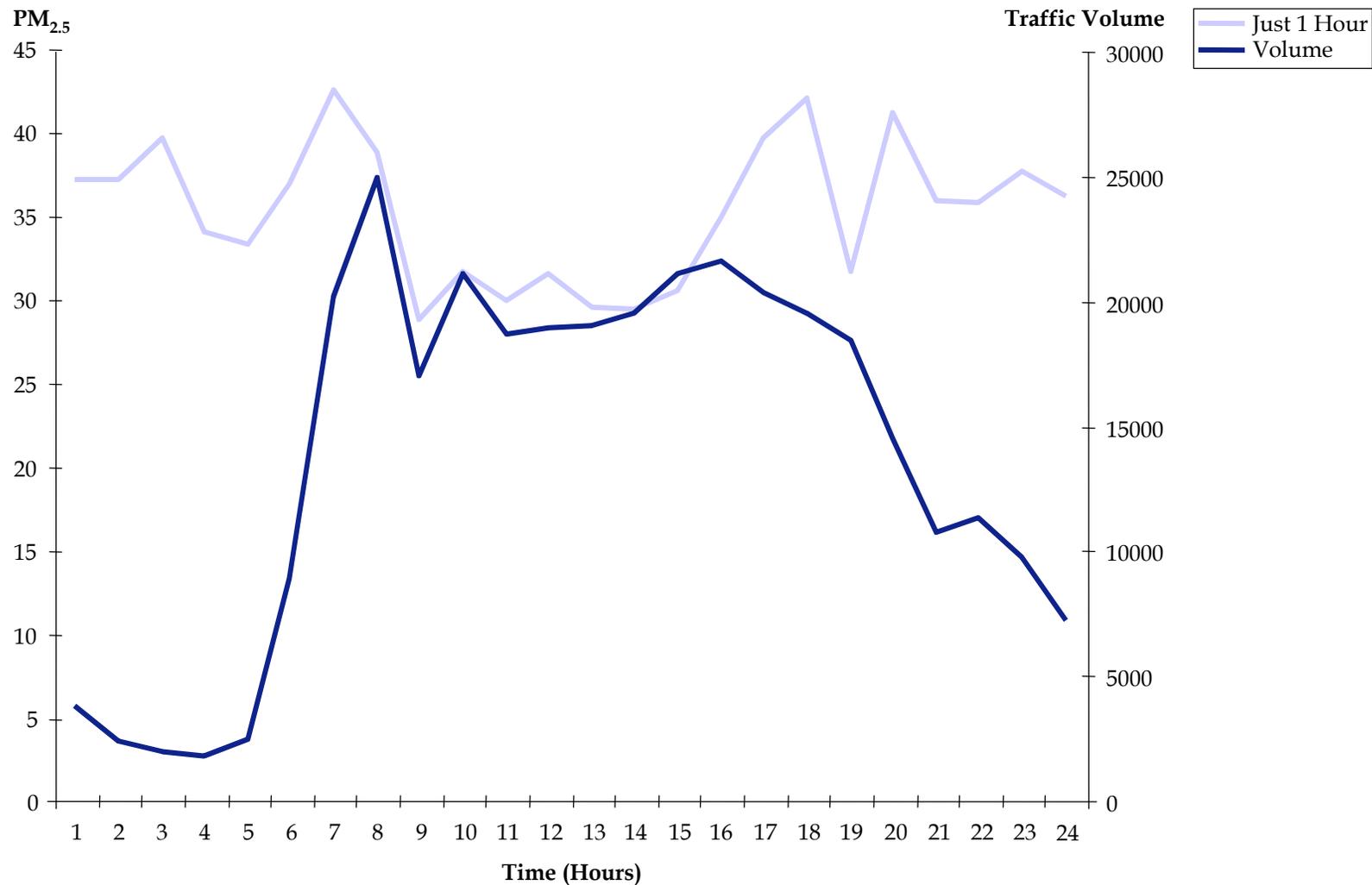
**Average Weekday Vehicle Class Distributions on SR-167, Kent, Washington 2000**



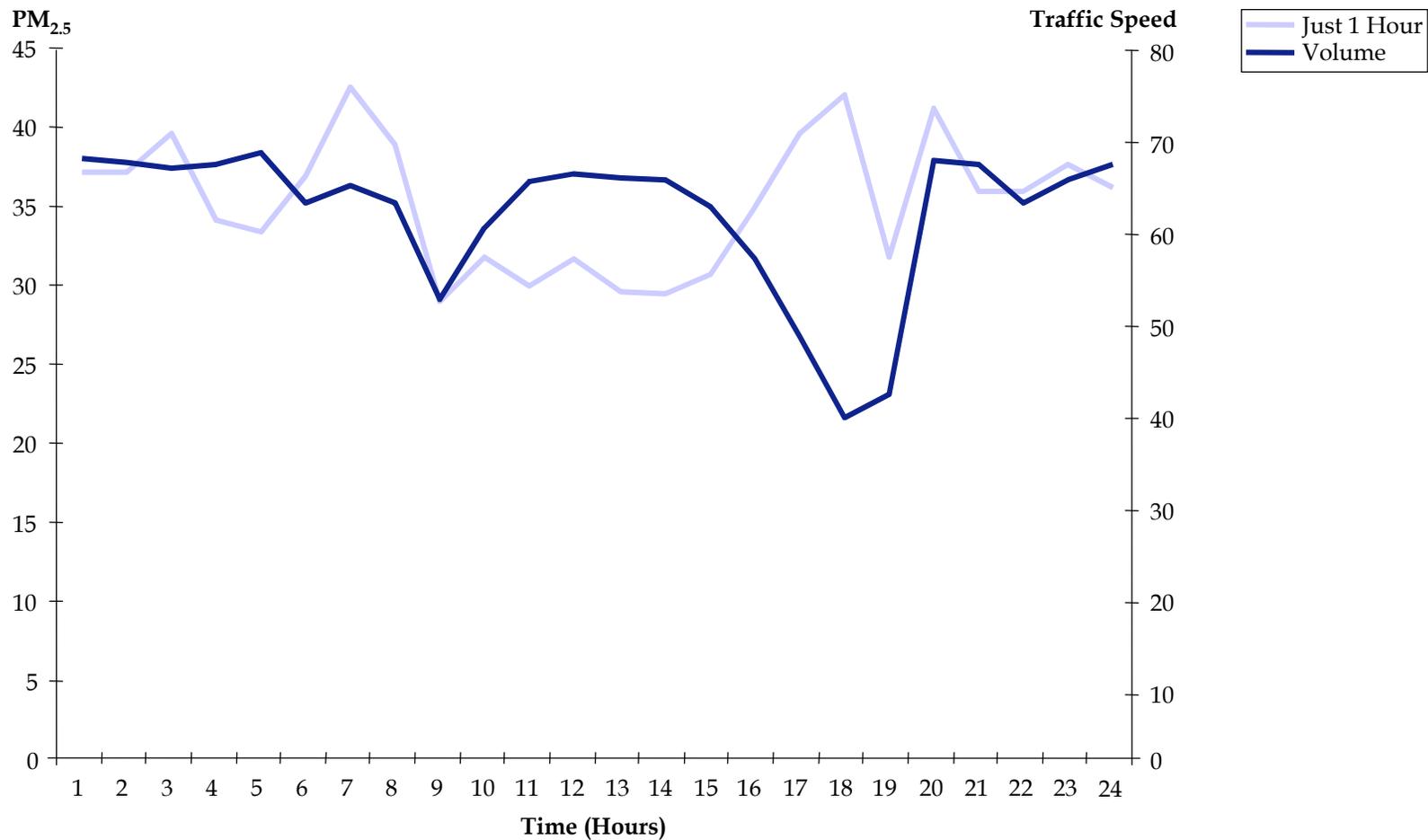
**PM<sub>2.5</sub> Concentration versus SR-167 Volume, Kent, Washington** *June 27, 2000*



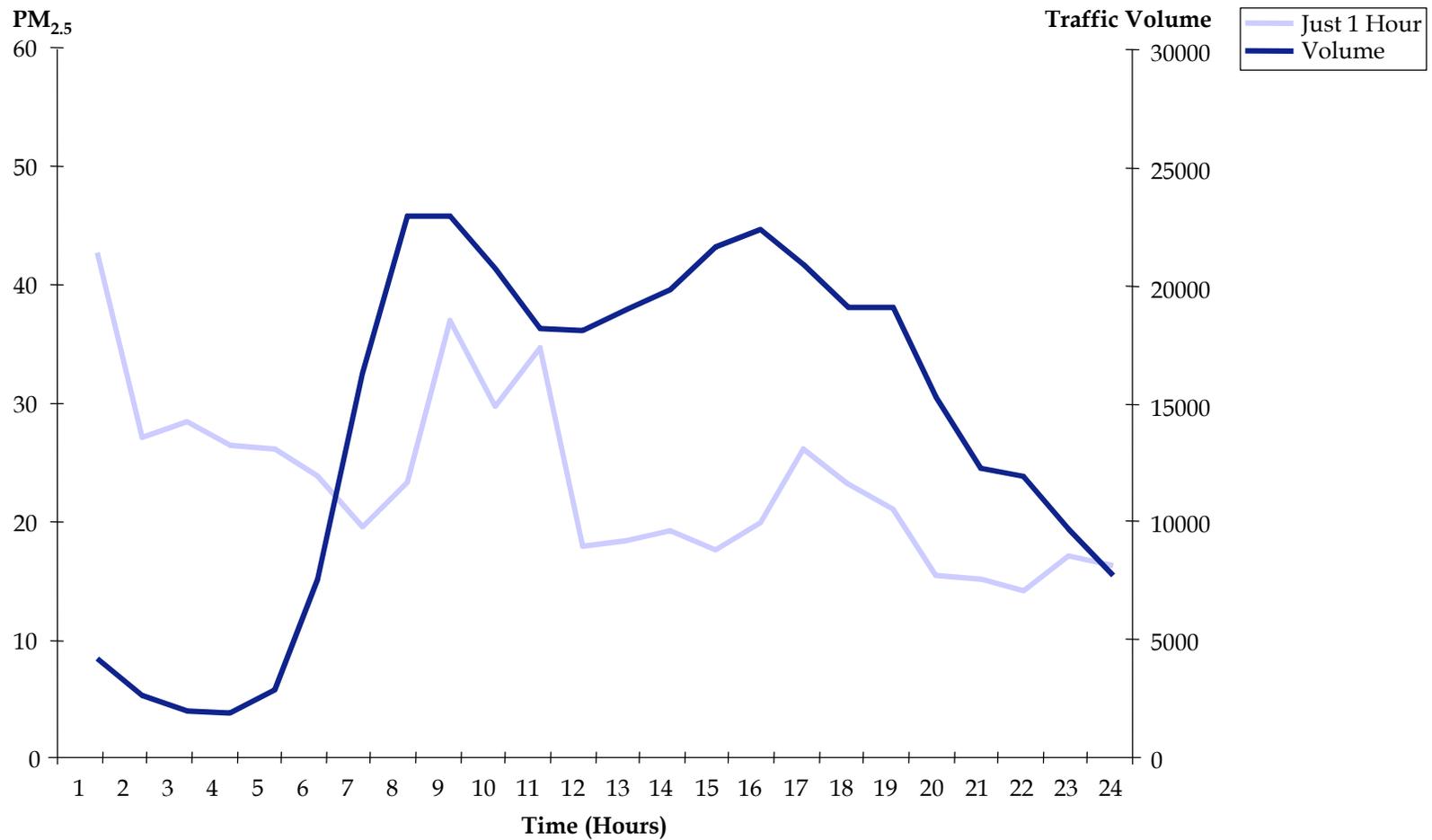
**PM<sub>2.5</sub> Concentration versus SR-167 Speed, Kent, Washington** *June 27, 2000*



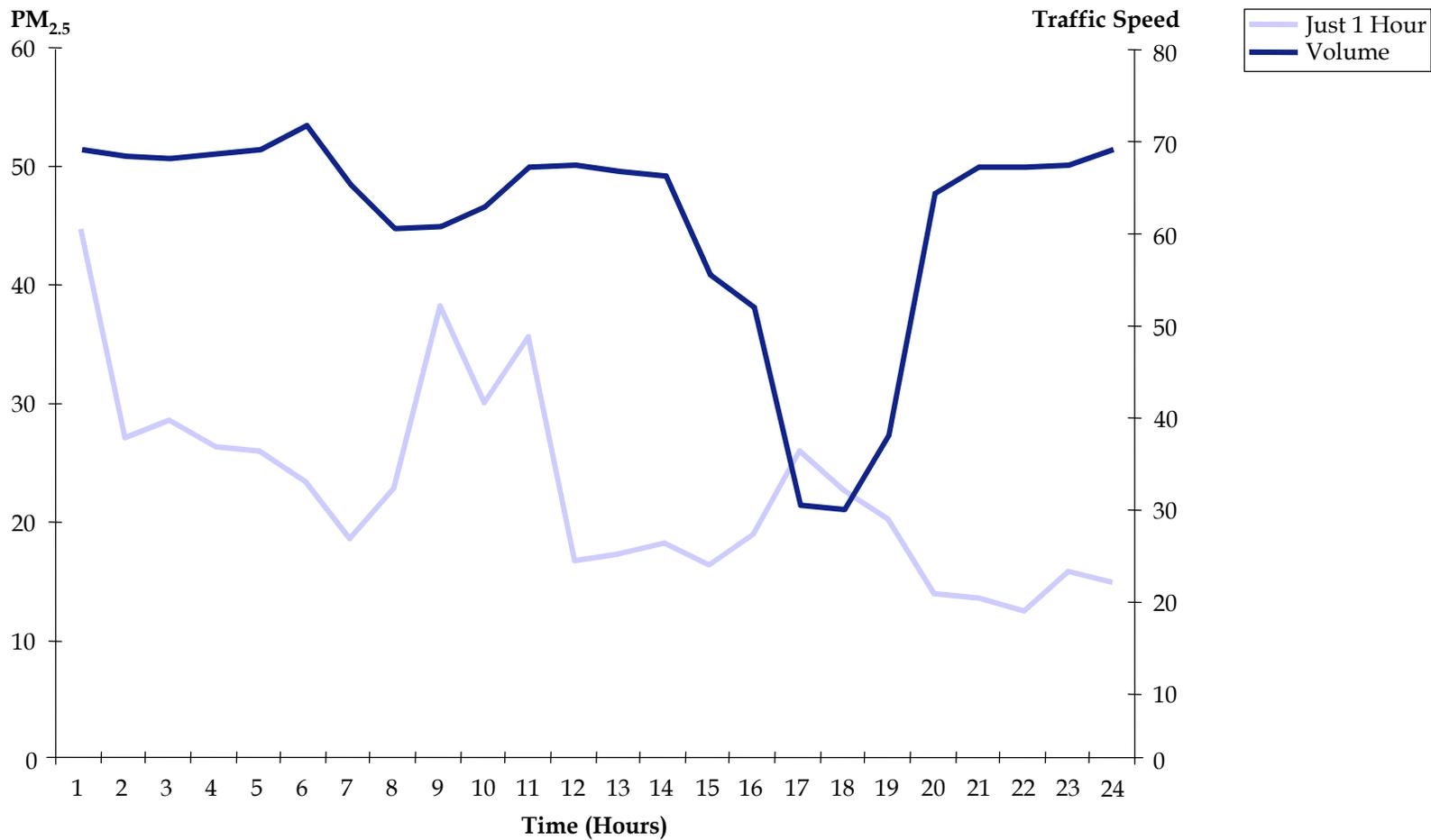
**PM<sub>2.5</sub> Concentrations in Relation to Traffic Volume** *May 3, 2000*



**PM<sub>2.5</sub> Concentrations in Relation to Traffic Speed**    *May 3, 2000*



**PM<sub>2.5</sub> Concentrations in Relation to Traffic Volume** *February 17, 2000*



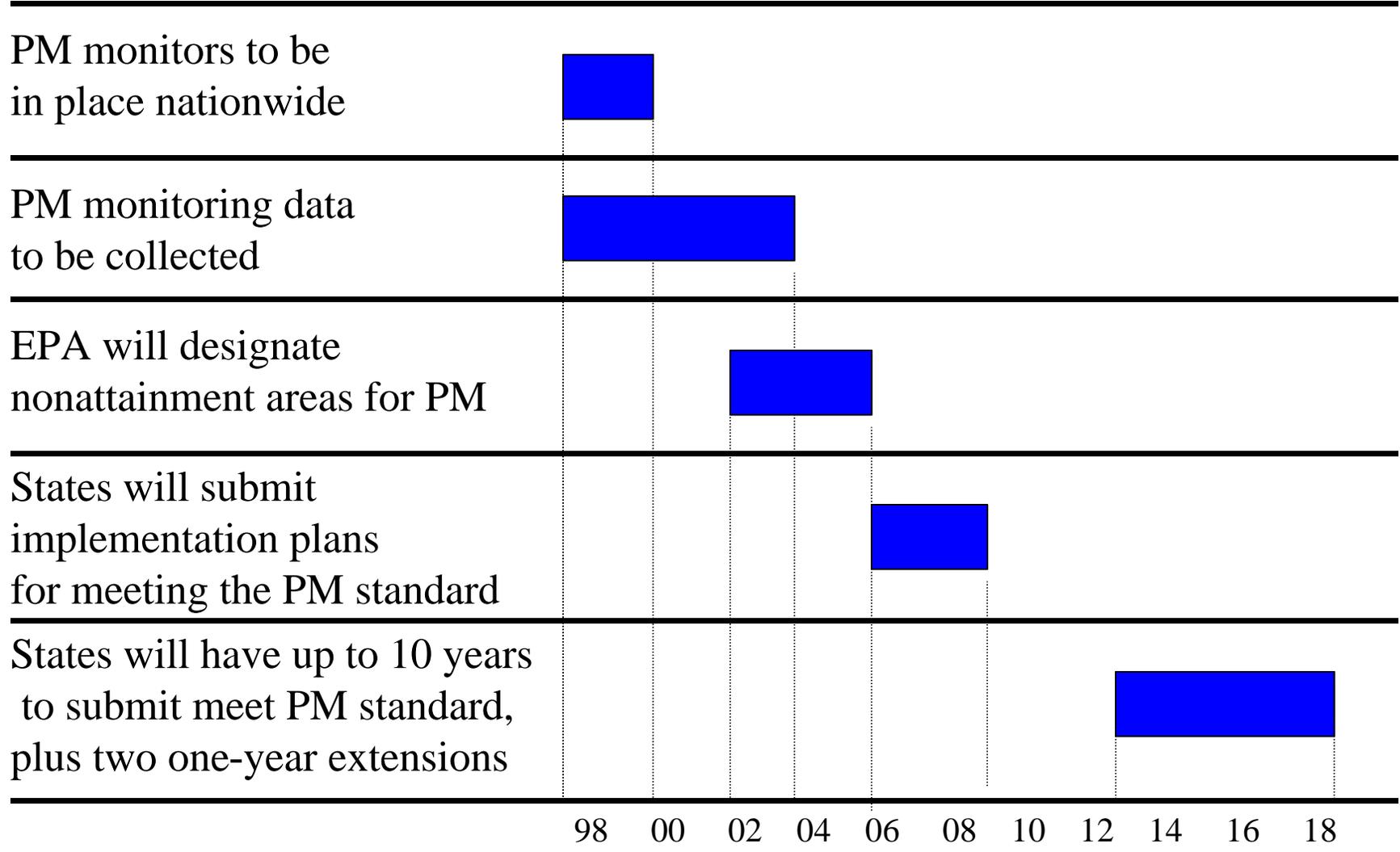
**PM<sub>2.5</sub> Concentrations in Relation to Traffic Speed** *February 17, 2000*

# Schedules for PM Research Projects

No definite schedule established for all projects

Project schedule will likely be influenced by implementation of new PM2.5 standard

Current schedule may change depending on legal challenges or rulings



*Figure A-1. Time Frame for Implementation of PM<sub>2.5</sub> Standard*

# Related Issues

Air toxics

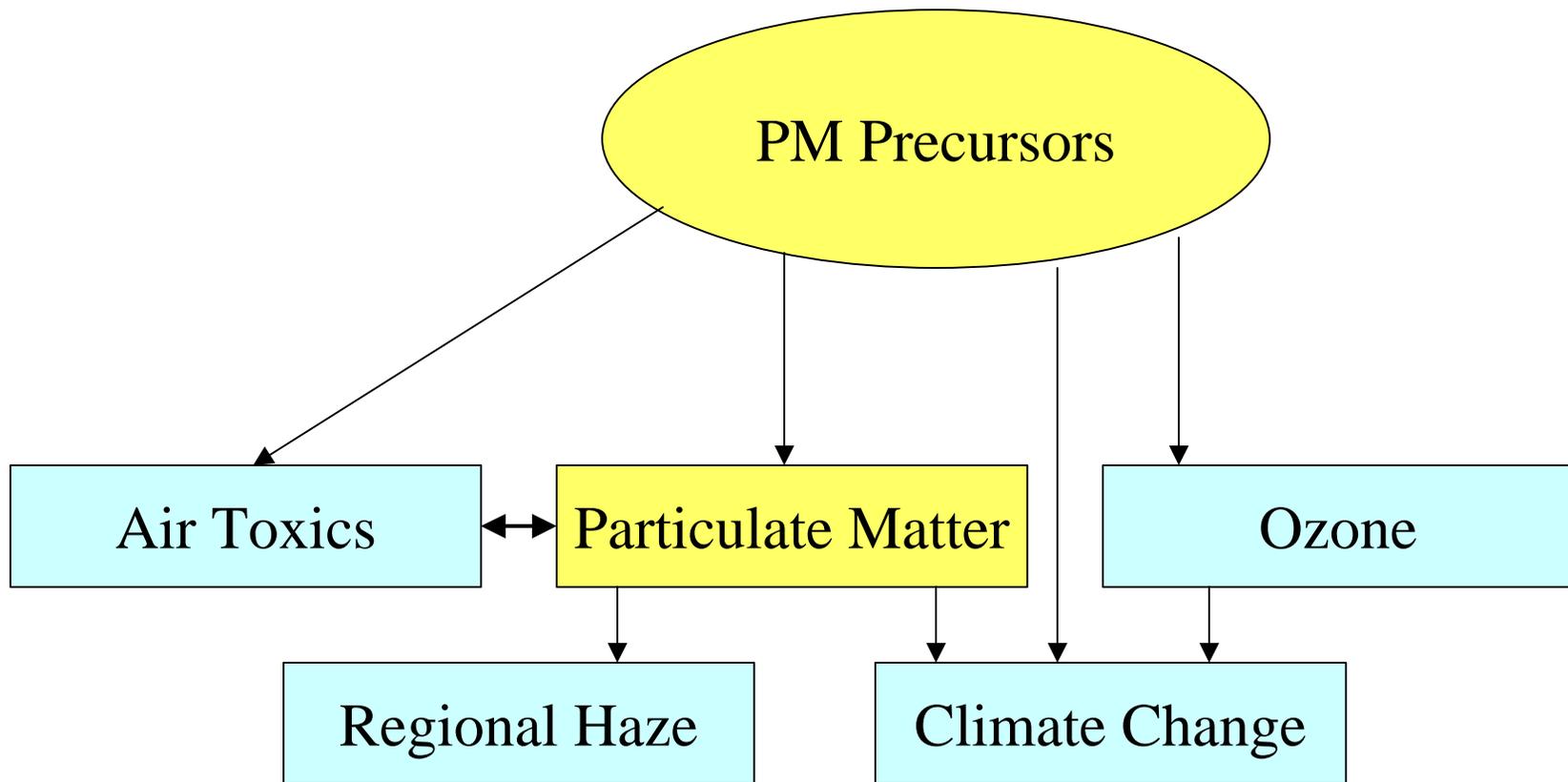
Mobile source air toxics (MSATs)

acetaldehyde, acrolein, benzene, 1,3-butadiene,  
formaldehyde, MTBE, POM, toluene

Greenhouse Gases (GHG)

carbon dioxide

# Consideration of Other Pollutants and Atmospheric Processes



# Conclusion

FHWA PM Research Program and Projects Defined

Traffic - Emission Analysis Project Underway

Analysis Reports Developed Quarterly

More information?

Kevin Black

202-366-9485

Kevin.N.Black@fhwa.dot.gov