

Chicago, Illinois

Air Quality Impacts on Transportation Planning

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Overview

- Clean Air Act and the National Ambient Air Quality Standards
- Causes of Air Pollution
- Illinois Status
- Potential Impacts on MPOs

Clean Air Act

EPA sets federal health standards for ambient air pollutants

NO₂

SO₂

Lead

CO

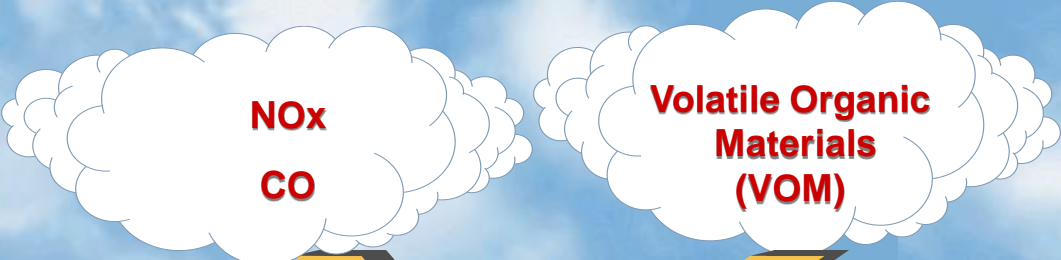
Ozone

Particulate
Matter

Ozone Formation Process



**Solar
Radiation**



**NOx
CO**

**Volatile Organic
Materials
(VOM)**



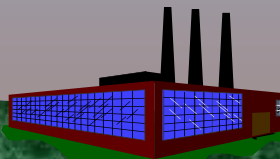
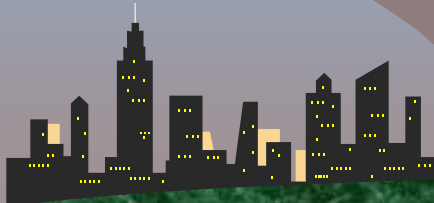
Ground Level Ozone (O₃)
Photochemical Oxidation (Smog)



Emissions



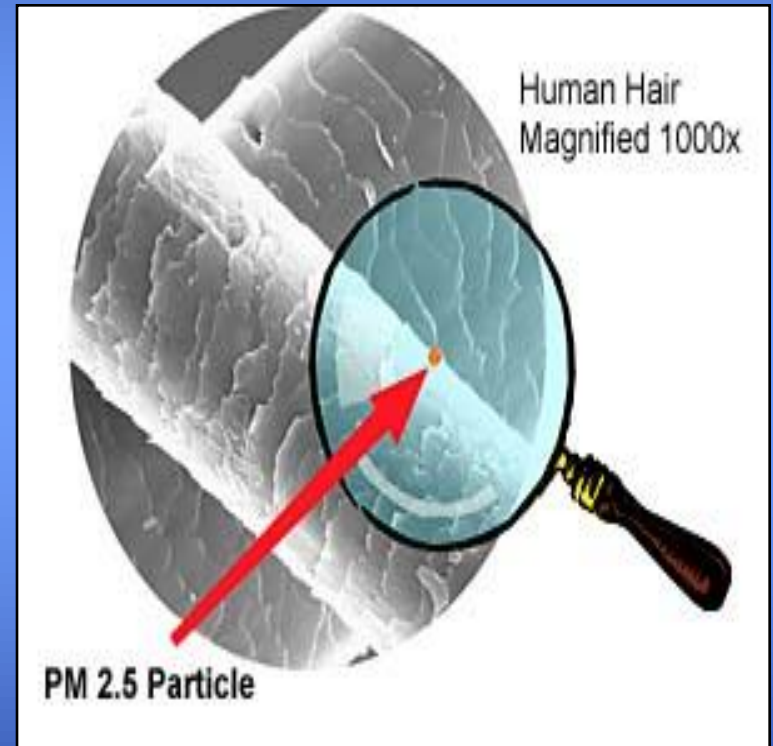
Emissions



Earth Surface

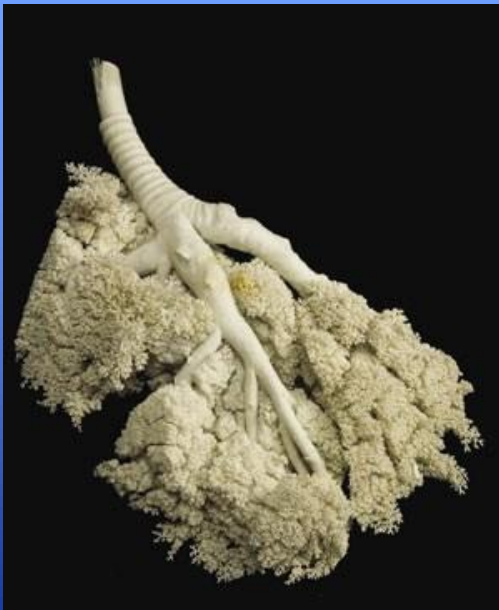
What is Fine Particulate Matter?

- Particulate matter, or PM, is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets.
- These small particles can be suspended in the air for long periods of time.
- Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope.



Particulate Matter

- Larger particles ($> PM_{10}$) deposit in the upper respiratory tract →
- Smaller, inhalable particles ($\leq PM_{10}$) penetrate deep into the lungs →



- Both coarse particulate matter and fine particulate matter can penetrate to lower regions of the lung
- Deposited particles may accumulate, react, be cleared or absorbed

PM Components: fine and coarse

Fine Particles

Combustion, gases to particles

Sulfates/acids
Nitrate
Ammonium
Organics
Carbon
Metals
Water



Sources:

Coal, oil, gasoline, diesel, wood combustion
Transformation of SO_x, NO_x, organic gases
including biogenics
High temperature industrial
processes
(smelters, steel mills)
Forest fires



Inhalable Coarse Particles

Crushing, grinding, dust

Resuspended dusts
(soil, street dust)
Coal/oil fly ash
Aluminum, silica,
iron-oxides
Tire and brake wear
Inhalable Biological
Materials
(e.g., from soils,
plant fragments)



Sources:

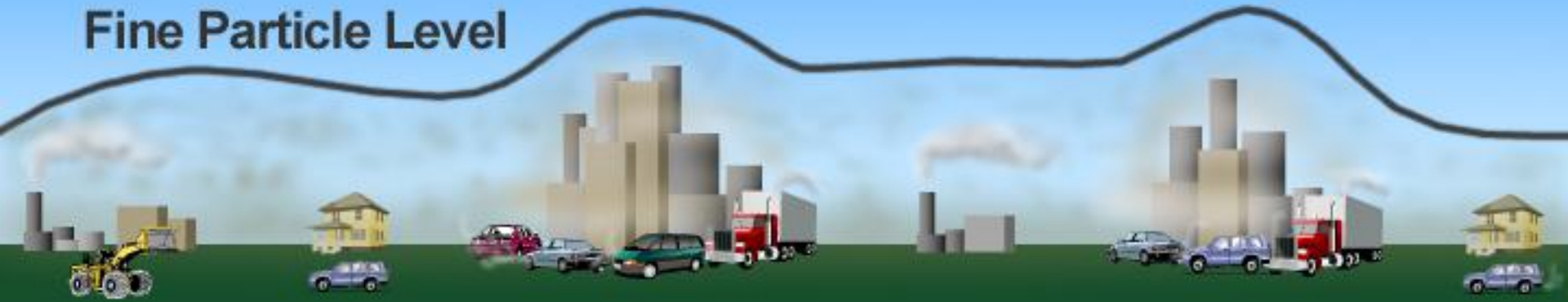
Resuspension of dust tracked onto roads
Suspension from disturbed soil (farms, mines,
unpaved roads)
Construction/demolition
Industrial fugitives
Biological sources

Particles May Be Transported Long Distances And Impact Large Numbers Of People

Wind Direction



Fine Particle Level



Small City w/
Power Plant

Town

Large City

Facility

Large City

Town

— 200-300 miles —

NAAQS Process

- CAA requires EPA to review standards every 5 years
- Clean Air Scientific Advisory Committee (CASAC) reviews pertinent health studies, recommends range for NAAQS standard
- EPA reviews CASAC recommendations and proposes level of standard
- EPA adopts level of standard after public comment period
- EPA gets sued

Nonattainment Designations

- 1997 Ozone and PM2.5 Standards
- 2006 NAAQS Revision: PM2.5
- 2008 NAAQS Revision: Ozone

NAAQS Standards

Pollutant	Primary Standard	Averaging Times
Carbon Monoxide	9 ppm 35 ppm	8-hour 1-hour
Ozone	0.075 ppm	8-hour
Lead	1.5 ug/m ³	Quarterly Ave
Nitrogen Dioxide	100 ug/m ³	Annual Mean
Particulate Matter (PM10)	150 ug/m ³	24-hour
Particulate Matter (PM2.5)	15.0 ug/m ³ 35 ug/m ³	Annual 24-hour
Sulfur Dioxide	0.03 ppm 0.14 ppm	Annual Mean 24-hour

“Current” Attainment Status

- Illinois is in attainment of the NAAQS for
 - Carbon Monoxide
 - Lead
 - Nitrogen Dioxide
 - Sulfur Dioxide
 - Particulate Matter (PM10)
- The Chicago and Metro-East St. Louis areas do not meet the 8-hour ozone and PM2.5 NAAQS

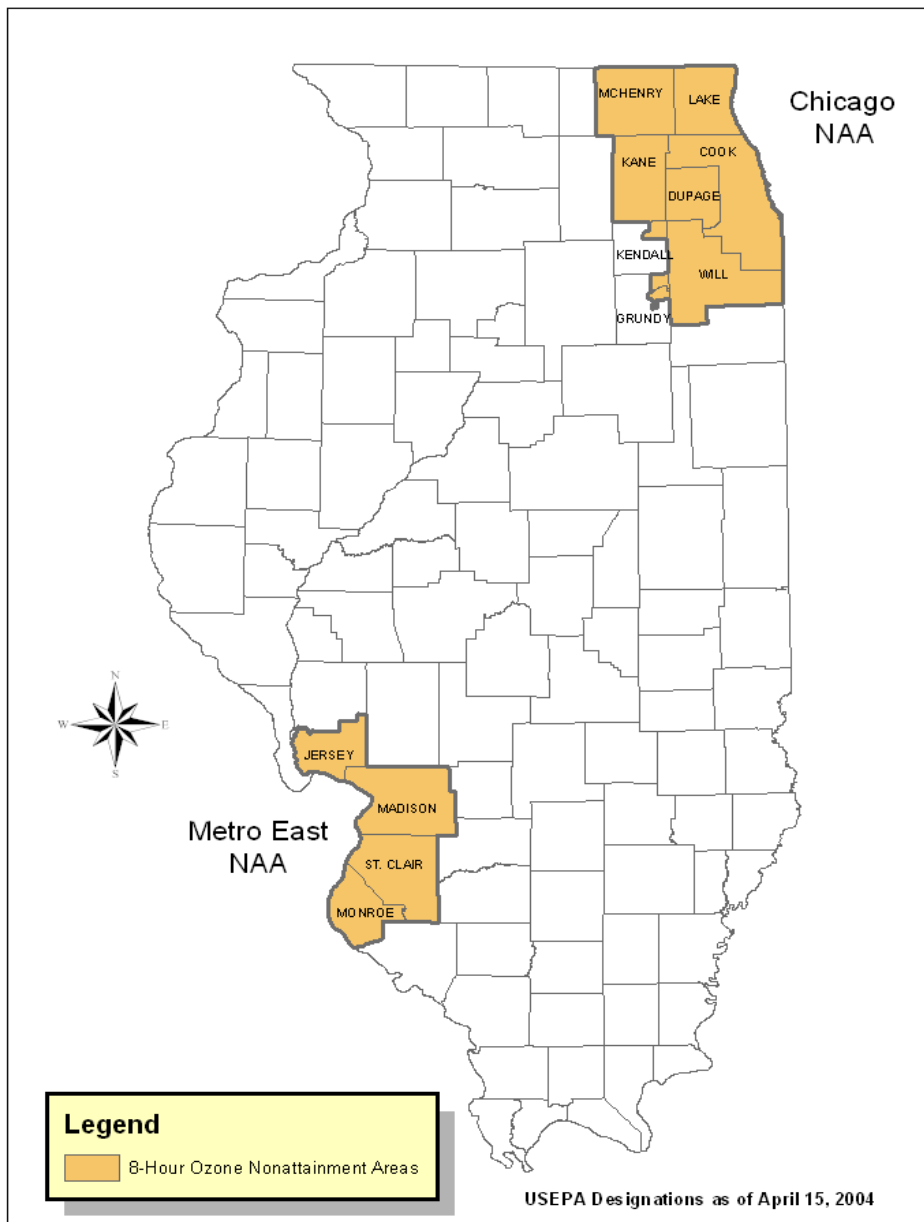
National Ambient Air Quality Standards

	1997	2006/2008
Ozone	0.08 ppm	0.075 ppm
PM _{2.5}		
annual	15 ug/m ³	15 ug/m ³
24-hour	65 ug/m ³	35 ug/m ³

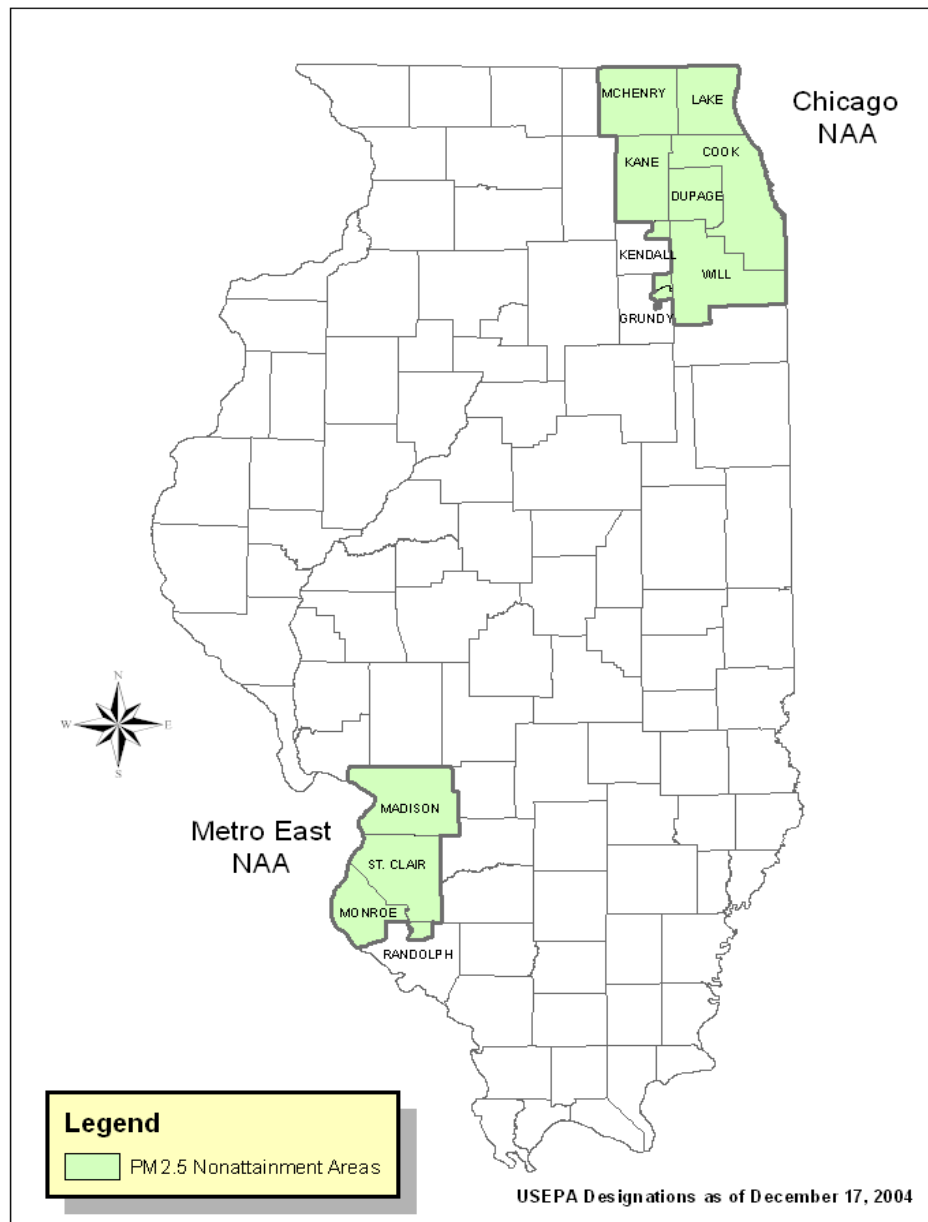
ppm = parts per million

ug/m³ = micrograms per cubic meter

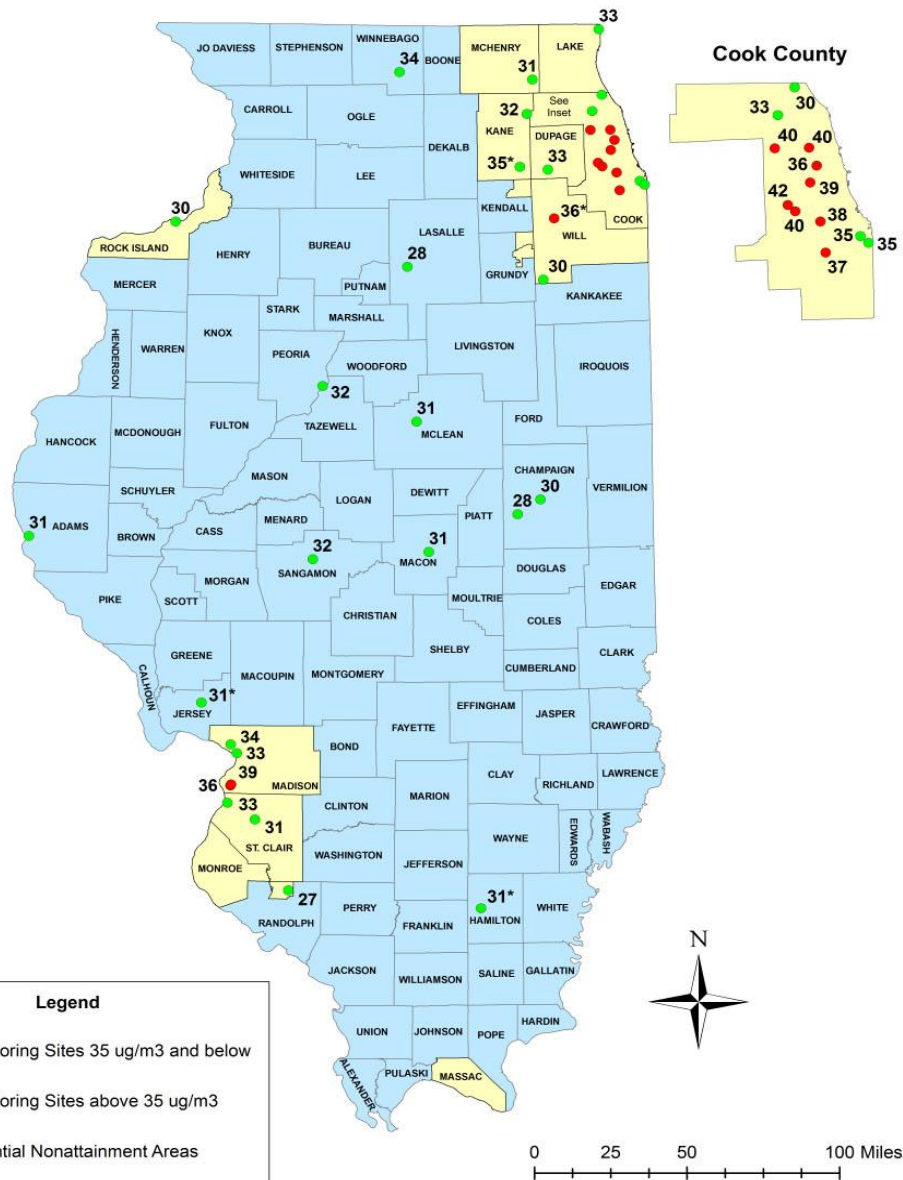
Illinois Ozone 8-Hour Nonattainment Areas



Illinois PM2.5 Nonattainment Areas



Potential PM2.5 Nonattainment Areas



Note: Monitoring sites with asterisks (*) have incomplete data for the period of 2004-2006.

Air Quality Plan (“SIP”)

- SIP = State Implementation Plan
- A plan containing the state’s strategy to meet air quality standards by a deadline established by the Clean Air Act
- The plan contains *enforceable* federal, state, and local control measures to reduce air pollution

SIP Elements

- Modeled Attainment Demonstration
- Base Year Emissions Inventory
- Required Stationary Source Controls
- Reasonable Further Progress (RFP)
- Other control measures needed to attain
- **Transportation Conformity**

Transportation Conformity

Requires that projects, plans & programs:

- Do not cause or contribute to any new air quality violation
- Do not increase the frequency or severity of existing violations
- Do not delay timely attainment of air quality standards or emissions reduction goals

Transportation Planning Impacts

- The CAA requires that transportation planning work in concert with air quality planning
- The SIP establishes specific pollutant motor vehicle emissions limits for specific years
- Motor vehicle emissions calculated from Plans and TIPs must be \leq the SIP budget in order for them to be approved by FHWA

Conformity Requirements

- Use of a transportation demand model to estimate VMT and vehicle speeds
- Use of USEPA's MOBILE6 model to determine vehicle emissions factors by speed
- Must be performed with each new or updated Plan or TIP

Expected Regulatory Dates 2006/2008 NAAQS

	PM_{2.5}	Ozone
Nonattainment Designations *	April 2009	June 2010
SIPs due *	April 2012	June 2013
Attainment	April 2014	June 2016

* Triggers conformity determination

Transportation Planning Impacts

(not all the news is bad)

- NAAs eligible to receive Congestion Mitigation and Air Quality Improvement (CMAQ) funding
- CMAQ can provide 80% of funding for transportation projects that improve air quality
- Could be affected by reauthorization of SAFETEA-LU

Summary

- Currently only the NE IL and Metro-East St. Louis areas currently violate the air quality standards
- New air quality standards could result in additional areas designated as nonattainment
- Several areas are near the standard now (Bloomington, Decatur, Peoria, Rock Island, Massac County)
- Nonattainment status would require areas to demonstrate conformity of their transportation plans and TIPs

Questions

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