

US EPA ARCHIVE DOCUMENT

Chicago Air Quality Overview

Chicago Area Locomotive and Railyard Meeting
July 13, 2010

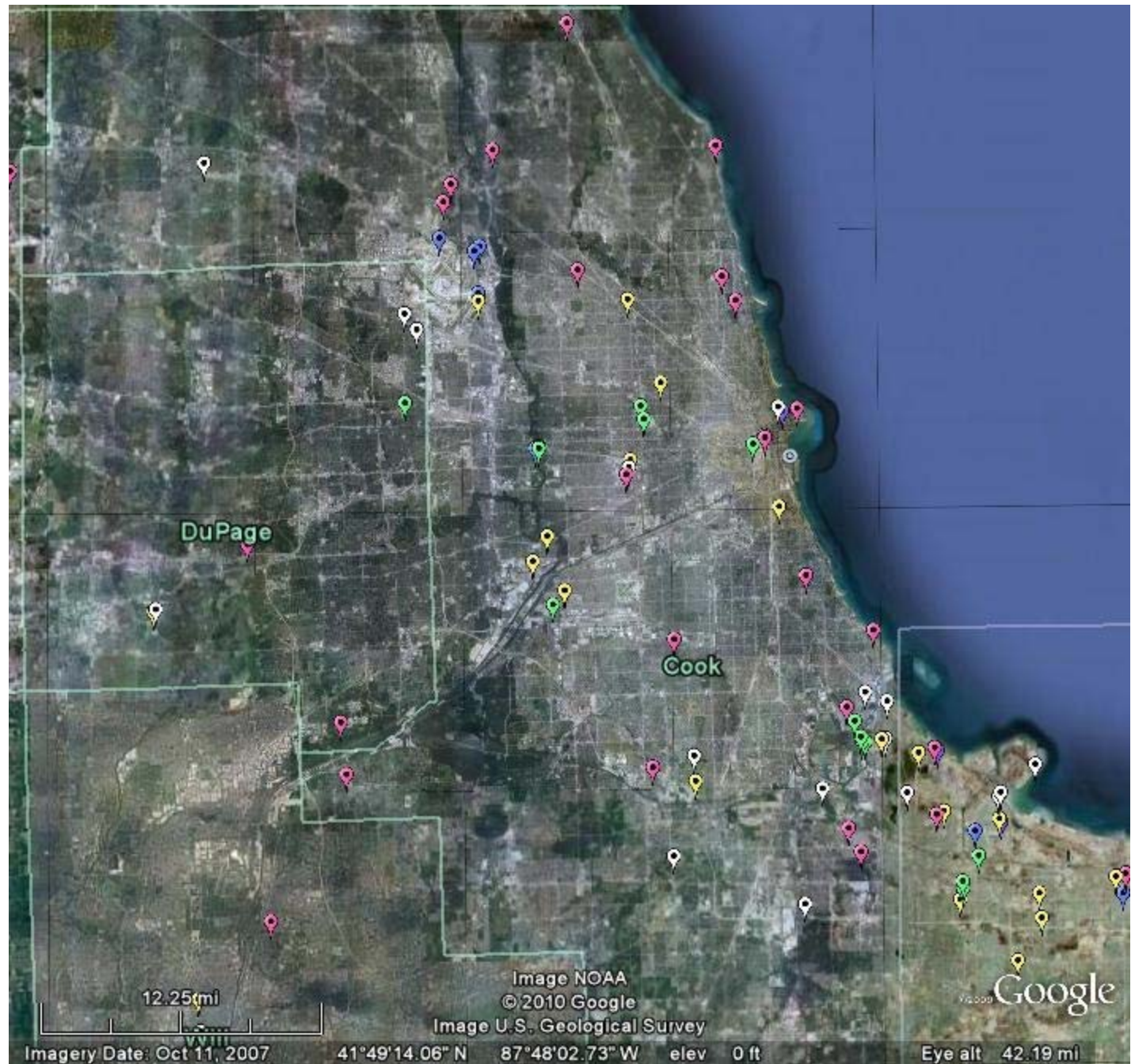
Michael Koerber
Lake Michigan Air Directors Consortium

Outline

- What is the current urban-scale air quality in the Chicago area?
 - How has air quality changed over the past 10 years and how is it expected to change over the next 10 years?
- Who is contributing to urban-scale air quality?
- Are there local-scale “hot spots”?

Current Air Quality

Air Monitoring Sites

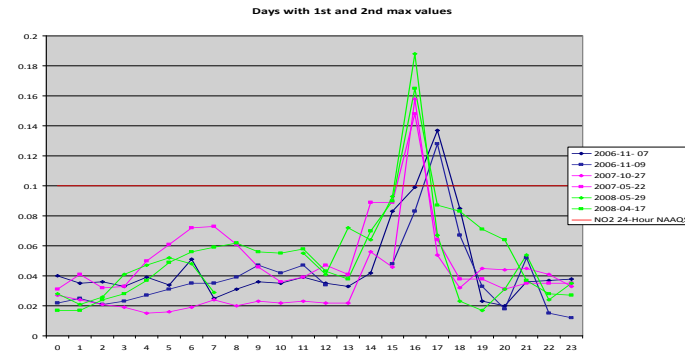


National Ambient Air Quality Standards

Pollutant	Air Quality Standard	Attainment Status
Carbon Monoxide	9 ppm, 8-hour	ATT
	35 ppm, 1-hour	ATT
Nitrogen Dioxide	53 ppb, annual	ATT
	100 ppb, 1-hour	NONATT
Sulfur Dioxide	75 ppb, 1-hour	NONATT
	500 ppb, 3-hour	ATT
Ozone	0.08 ppm, 8-hr (1997)	NONATT*
	0.075 ppm, 8-hr (2008)	NONATT*
Particulate Matter		
* PM10	150 ug/m3, 24-hour	ATT
* PM2.5	15.0 ug/m3, annual	NONATT*
	35 ug/m3, 24-hour	ATT
Lead	0.15 ug/m3, 3-month	ATT

**** = all sites measured
attainment for 2007-2009***

Chicago NO₂ Problem

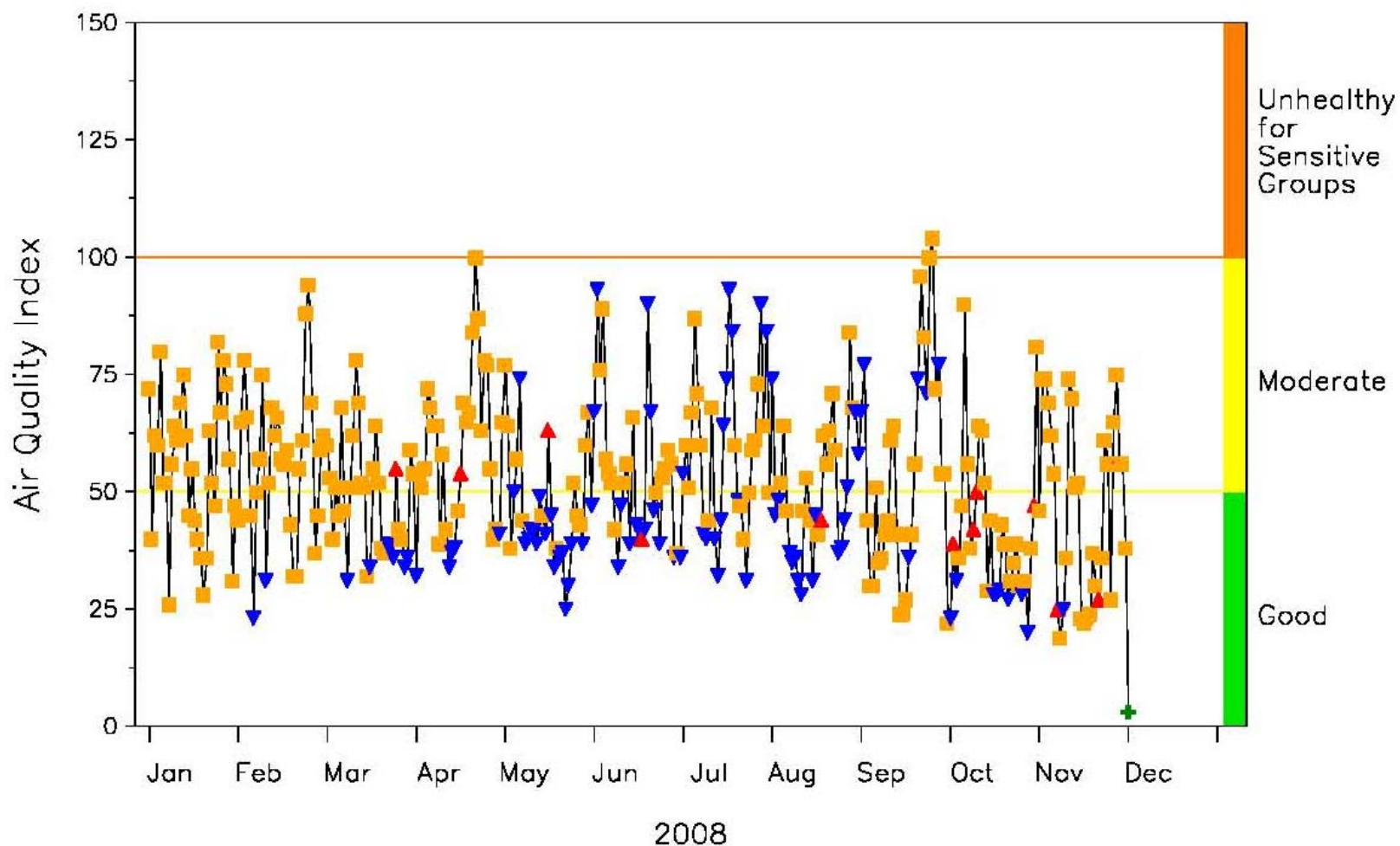


Daily Air Quality Index

Cook Co, Illinois

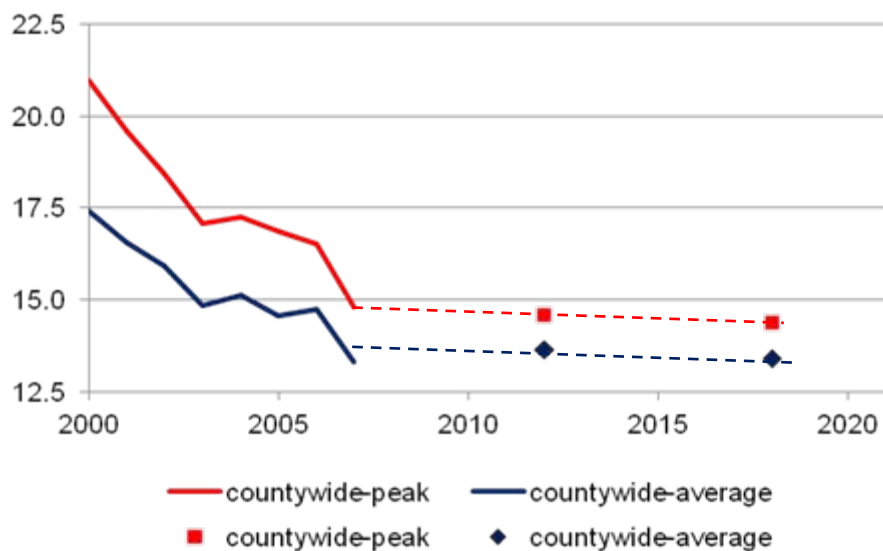
AirData

Main Pollutant (days): + CO (1) ▼ O3 (91) * SO2 (1) ■ PM2.5 (232) ▲ PM10 (11)

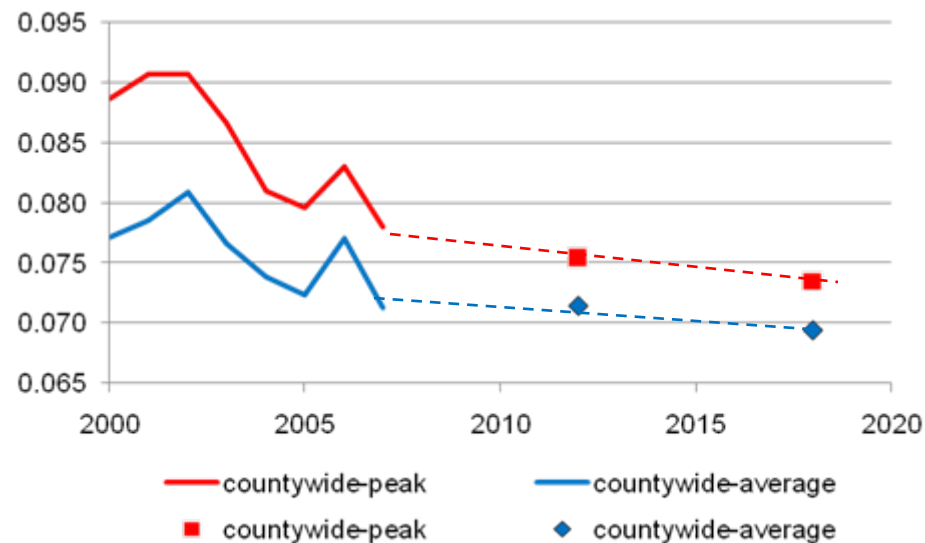


Chicago Air Quality Trends

Cook County – PM_{2.5} annual

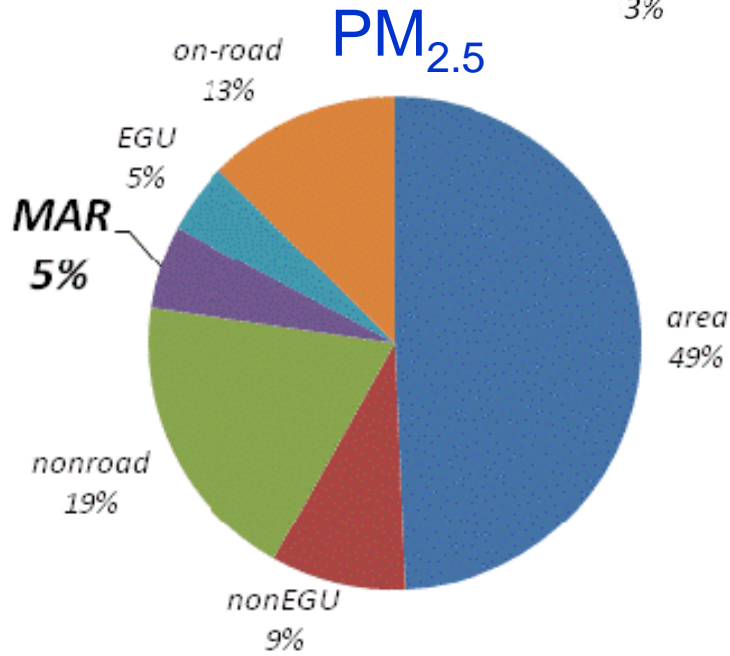
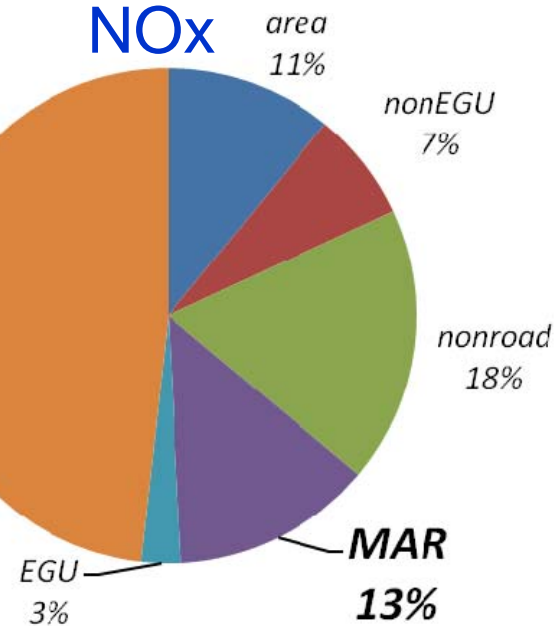
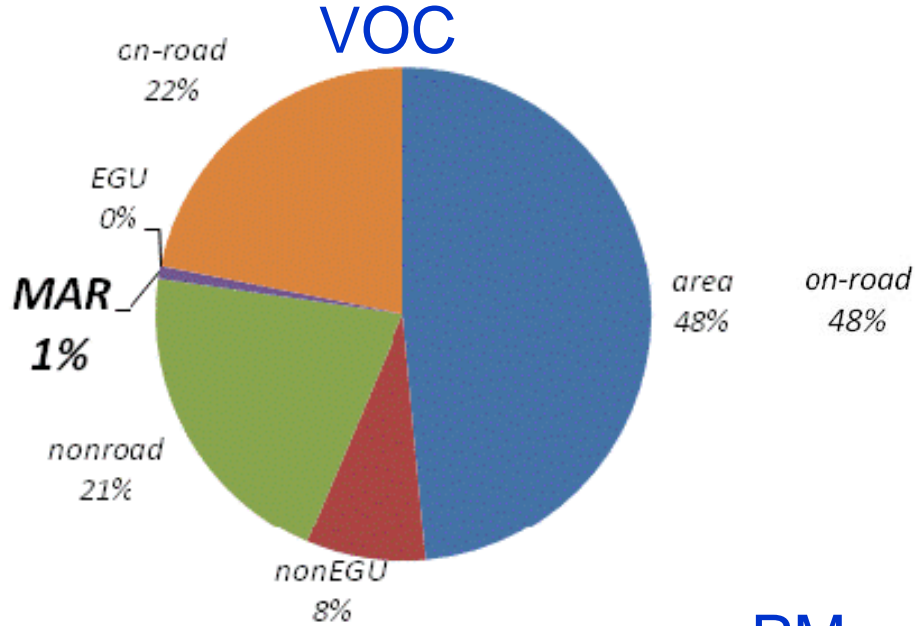


Cook County – 8-hr ozone



Contributing Sources

Ozone and PM_{2.5} Source Contributions

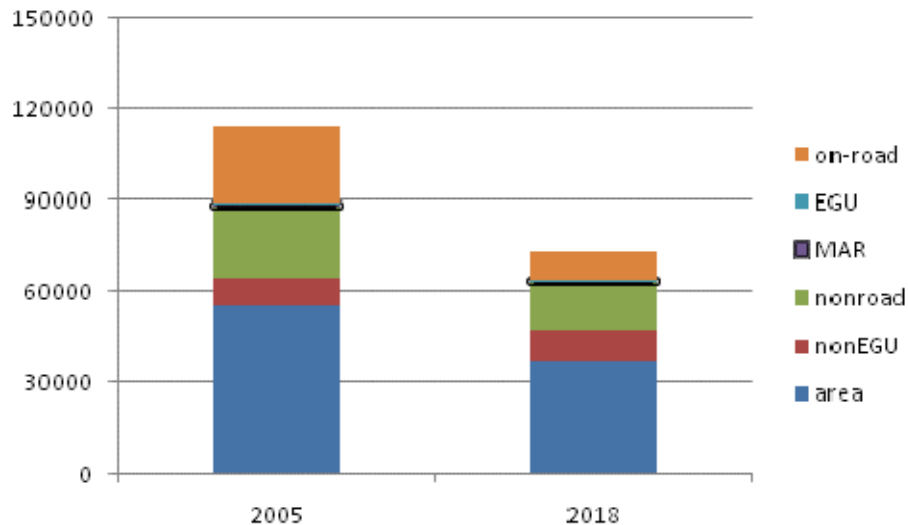


MAR = Marine
Aircraft
Rail
(note, most of the total
is from rail)

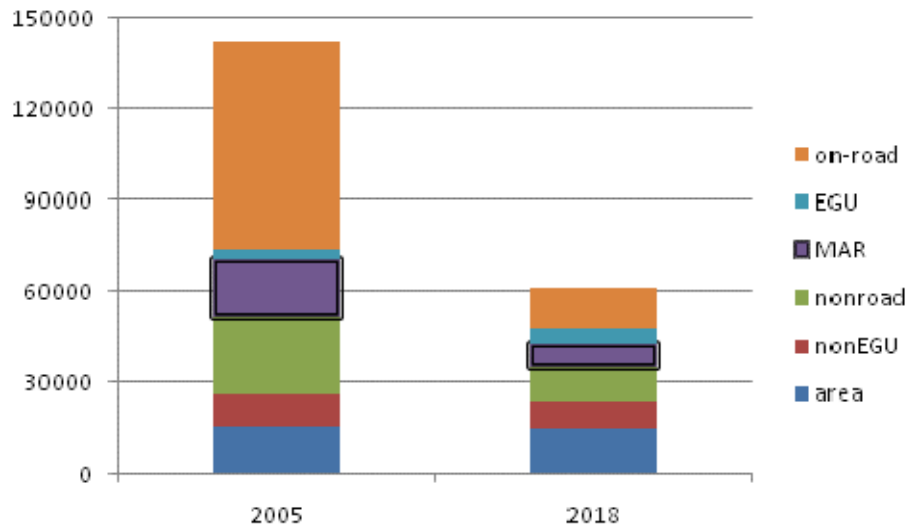
2005 Annual Emissions
Cook County, IL

Ozone and PM_{2.5} Source Contributions

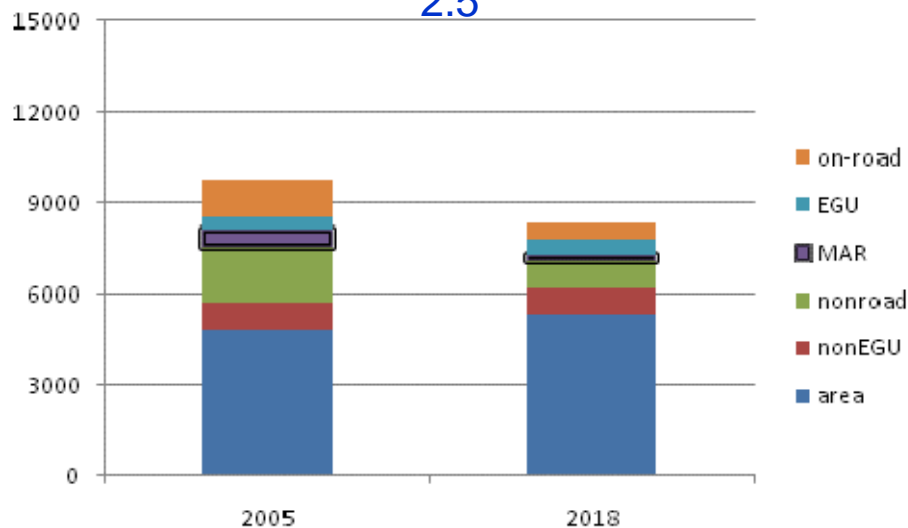
VOC



NOx



PM_{2.5}



Annual Emissions
Cook County, IL

Ozone and PM_{2.5} Source Contributions

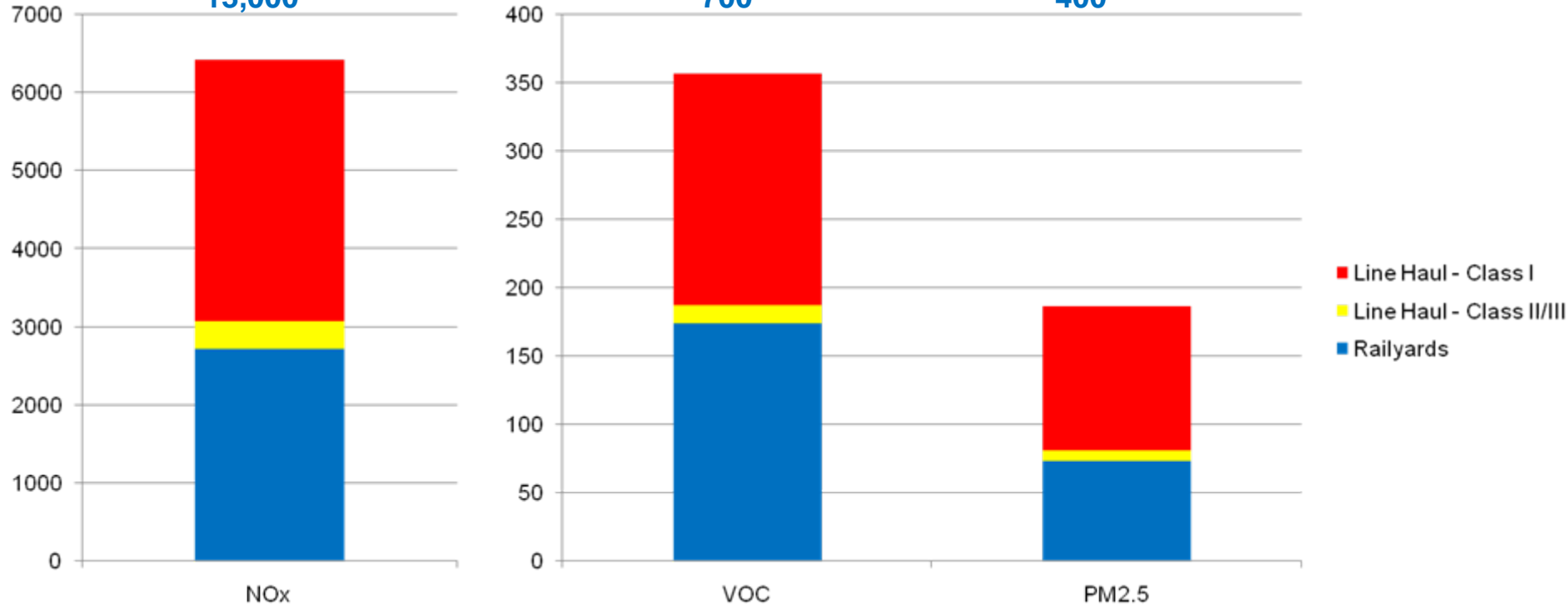
Improved rail estimates from ERTAC process

LADCO 2005 Inventory:

13,000

700

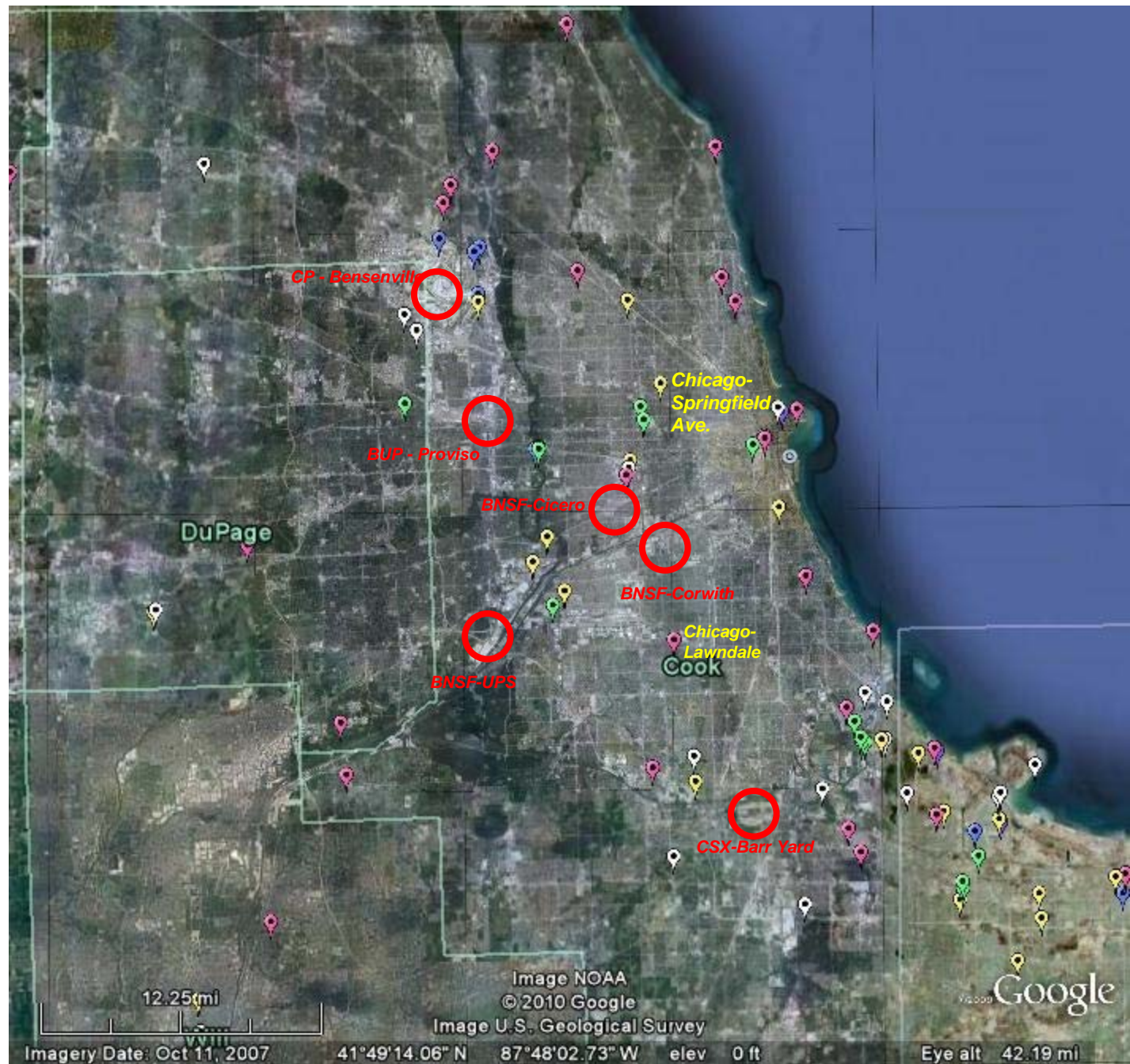
400



ERTAC annual emissions for Cook County (2008)

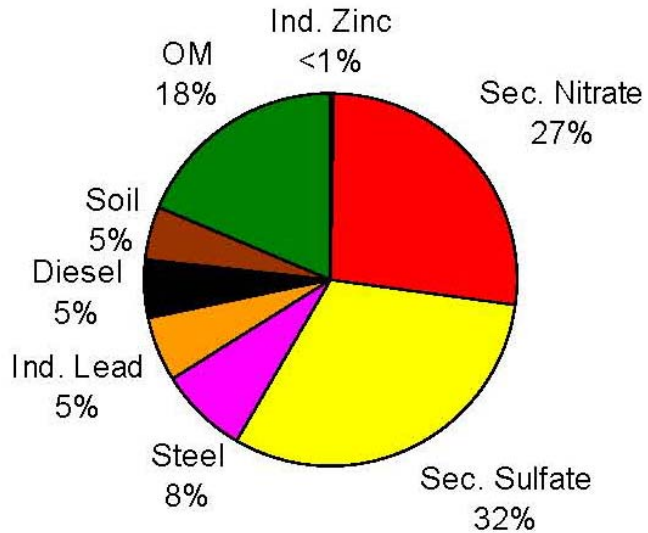
Note: does not include passenger trains and commuter lines

Air Monitoring Sites

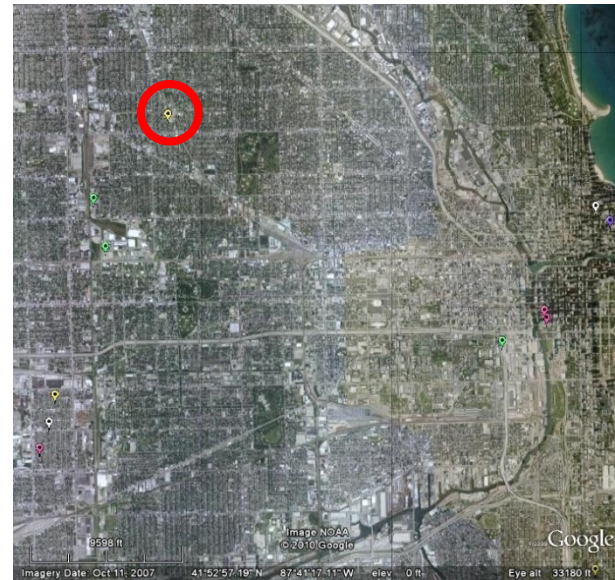
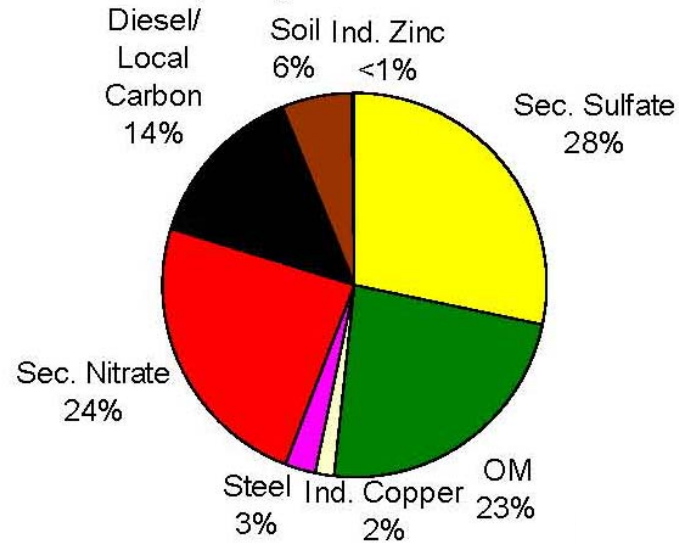


PM_{2.5} Source Contributions

Lawndale



Springfield

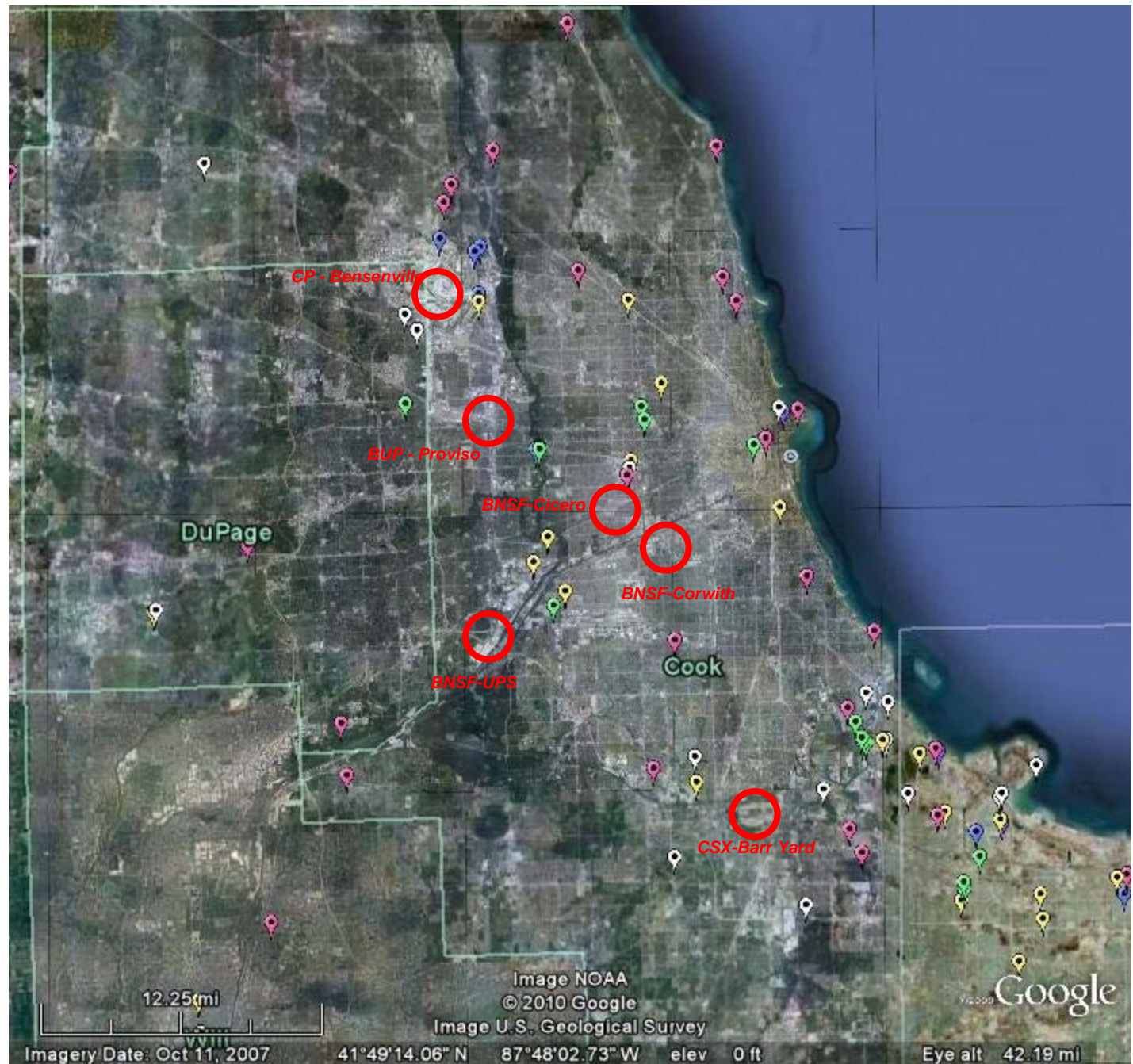


Local “Hot Spots”

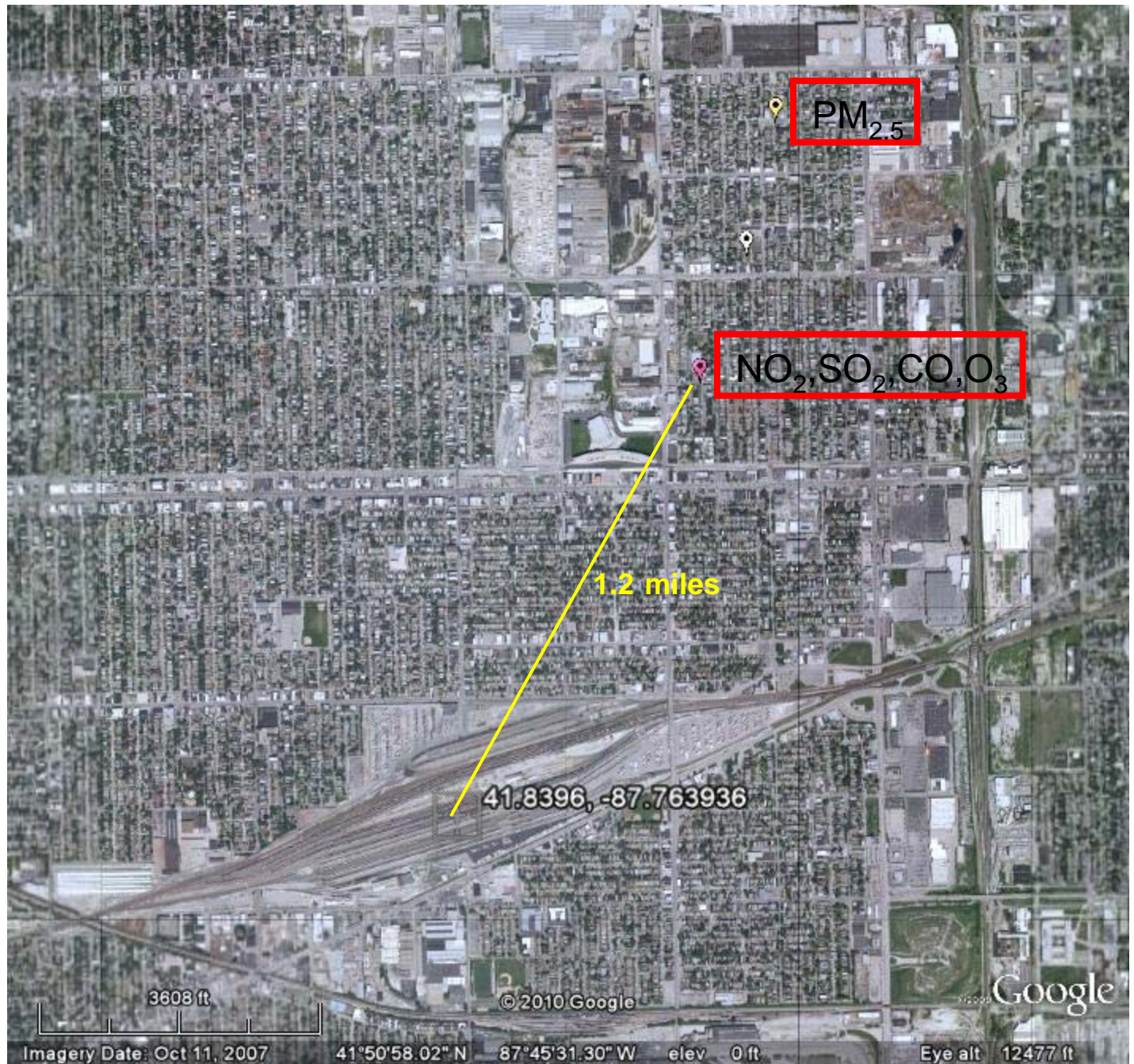
Why do we care about local hot-spots?

- Recent EPA movement for source-oriented monitoring
 - Pb: Monitors required in areas with sources of Pb > 1 TPY (proposed lower threshold of 0.5 TPY)
 - NO₂: At least 1 monitor required near a major road in urban areas ≥ 0.5 M people, and a second monitor required near a major road in urban areas with either population ≥ 2.5 M or road segment with AADT $\geq 250,000$ vehicles
 - SO₂: Monitors required at locations which meet one or more objectives, including source-oriented or highest concentration
- Environmental justice issues
 - Over 35M people live within 100 m of a major road

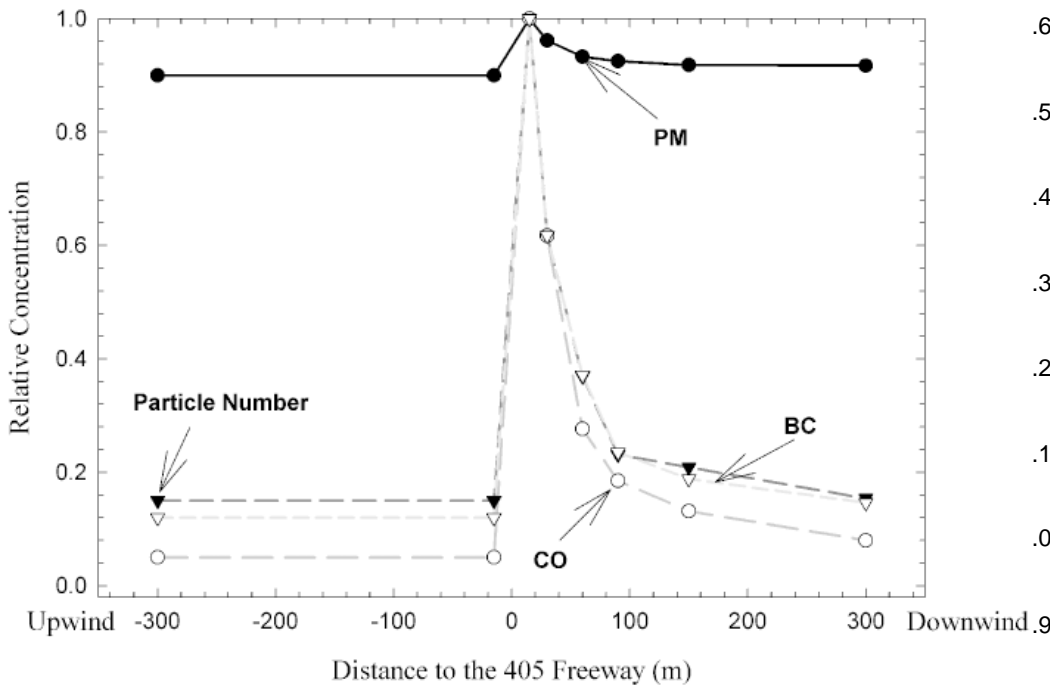
Air Monitoring Sites



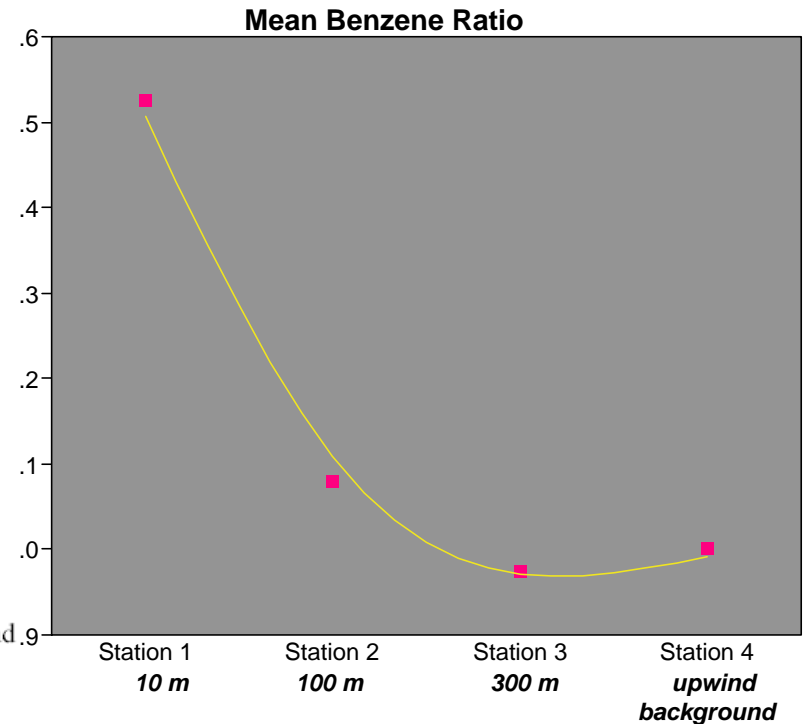
BNSF – Cicero Yard



Closeness Counts!

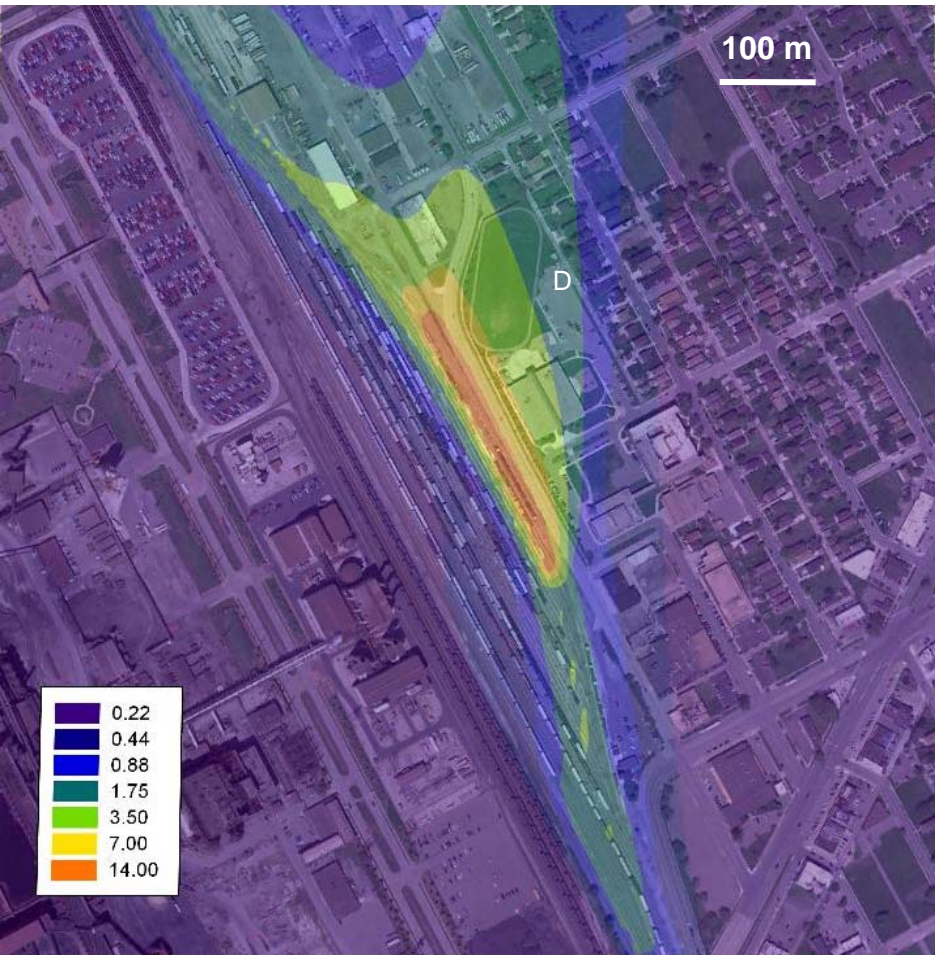


Cite: Zhu, Hinds, Kim, and Sioutas,
 "Concentration and Size Distribution of Ultrafine
 particles near a Major Highway", J. Air & Waste
 Management Assoc, 2002, 52, 1032-1042

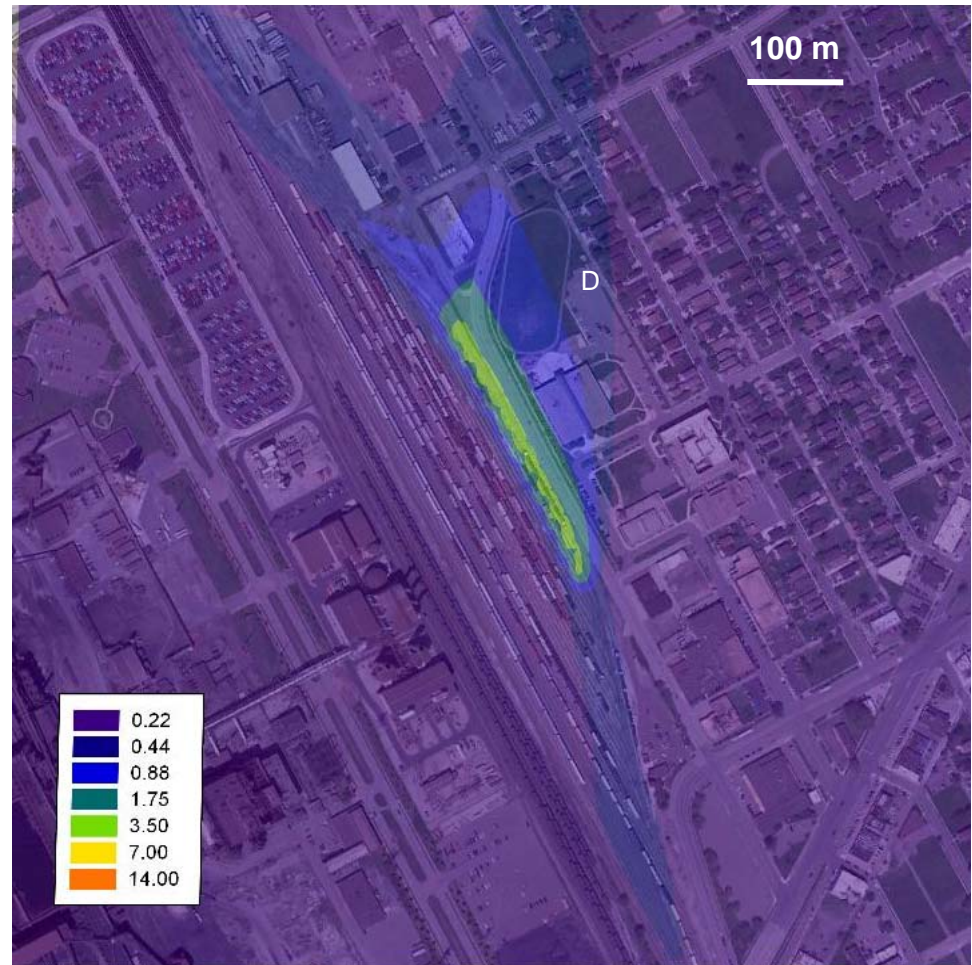


Cite: FHWA-EPA Las Vegas Near-Roadway
 Study

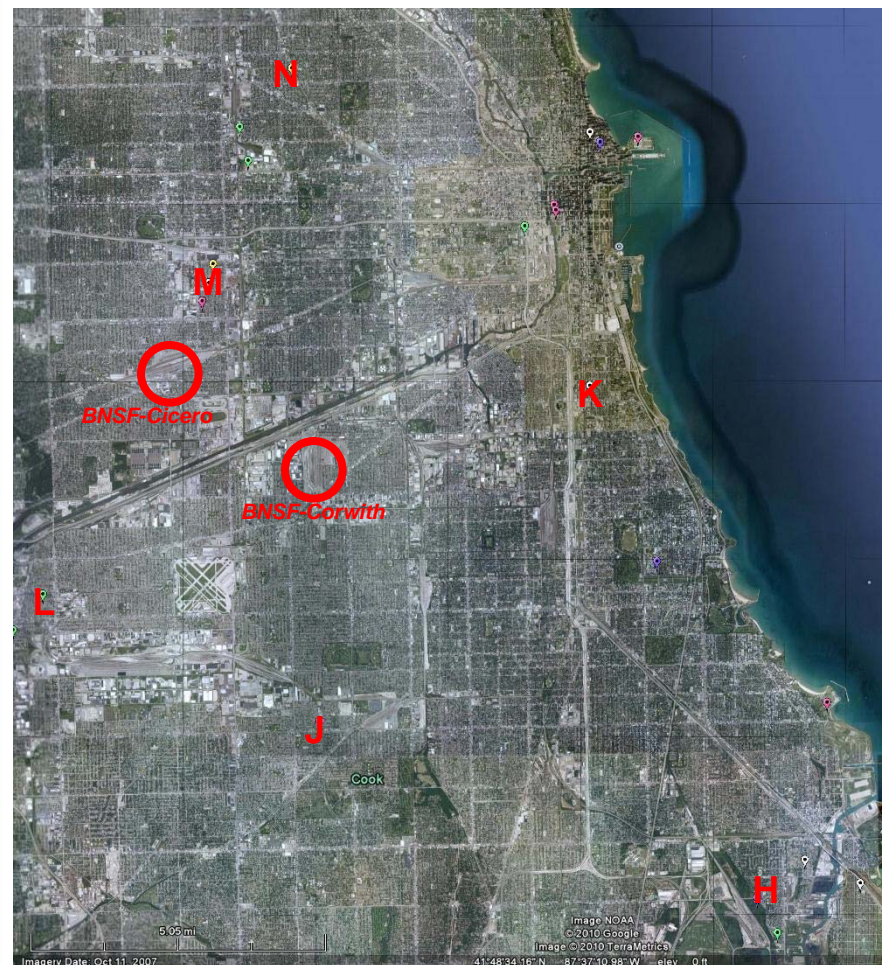
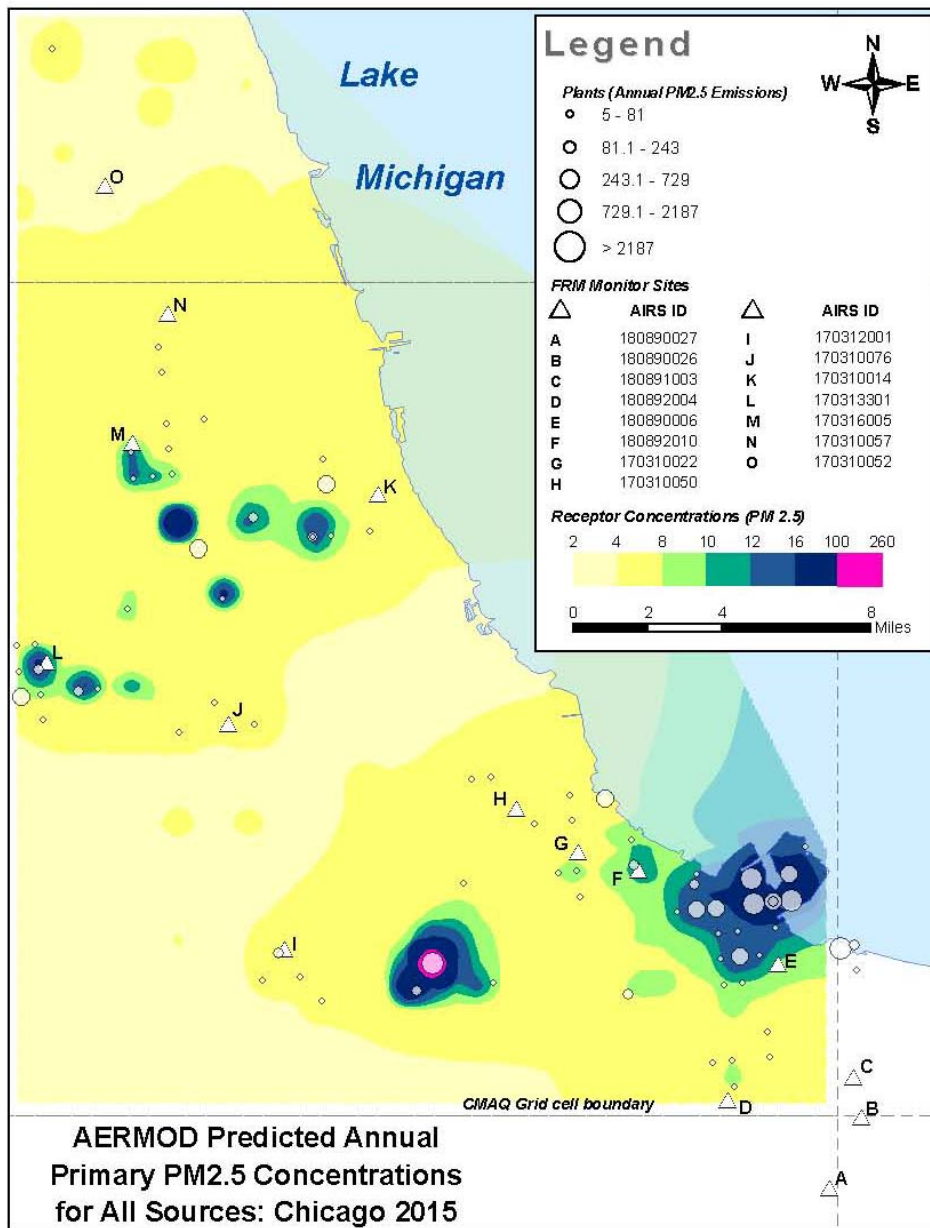
Modeled 24-hour average $\text{PM}_{2.5}$ mass,
11/19/07 meteorology and emissions*



Modeled 24-hour average $\text{PM}_{2.5}$ mass,
11/19/07 meteorology and 11/17/08 emissions**



(*) 95th percentile daily-average concentration for impact at the Dearborn station (D), Sep-Dec 2007
(**) emissions for same day of week one year later, after all four switcher locomotives were replaced with GenSet technology



Summary

- Existing monitoring data show that Chicago meets federal air quality standards for almost all regulated pollutants
 - Chicago air quality has improved significantly over the past decade; continued improvement is expected in the future
- Major emission source categories in Cook County include area, on-road, and nonroad (80% or more)
 - Rail contribution is on the order of 5 – 10% (in Cook County)
- Modeling information suggests there are local “hot spots” (not confirmed by monitoring data)