# Recommended Annual PM2.5 Nonattainment Area Designations in Illinois

October 2013

Illinois Environmental Protection Agency
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www.epa.state.il.us

# Overview

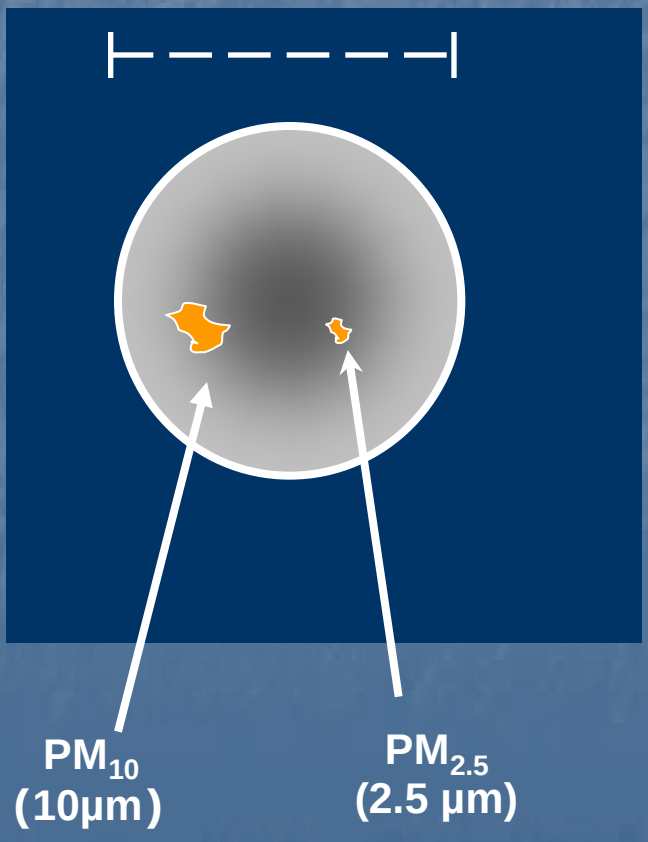
- Background on $PM_{2.5}$
- New Primary Annual $PM_{2.5}$ Standard
- Requirements and Timeline to meet the new $PM_{2.5}$ standard
- Boundary Designation Process
- Proposed Illinois Nonattainment boundaries for the new $PM_{2.5}$

# Particulate Matter

- PM = All particulate matter
  - PM10 = All particulate matter less than or equal to 10 microns in diameter
  - $PM_{2.5}$ = All particulate matter less than or equal to 2.5 microns in diameter

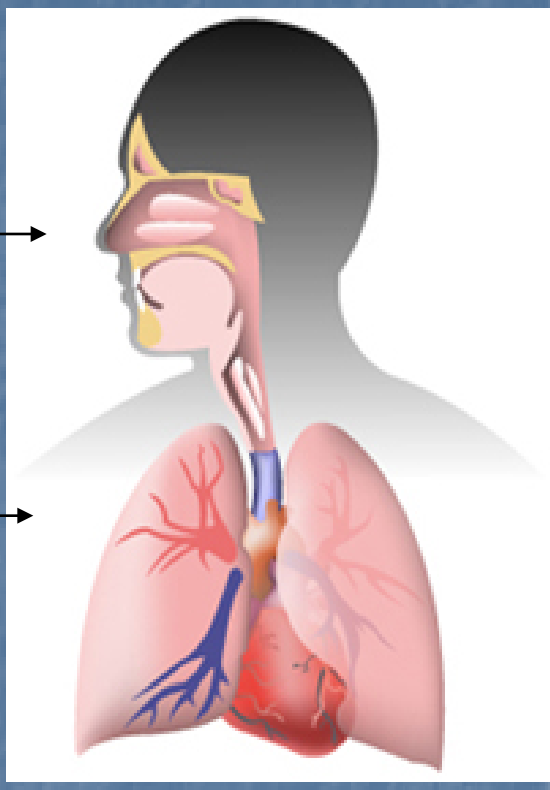
Human Hair (70 µm diameter)

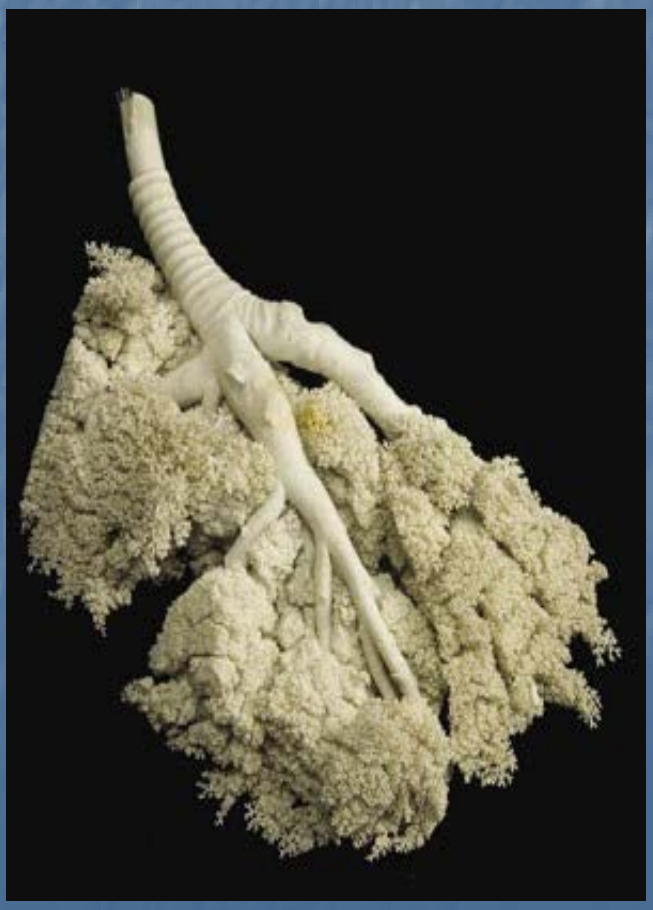
Hair cross section (70 µm)



# *Particulate Matter*

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





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

# Public Health Risks from $PM_{2.5}$ Are Significant

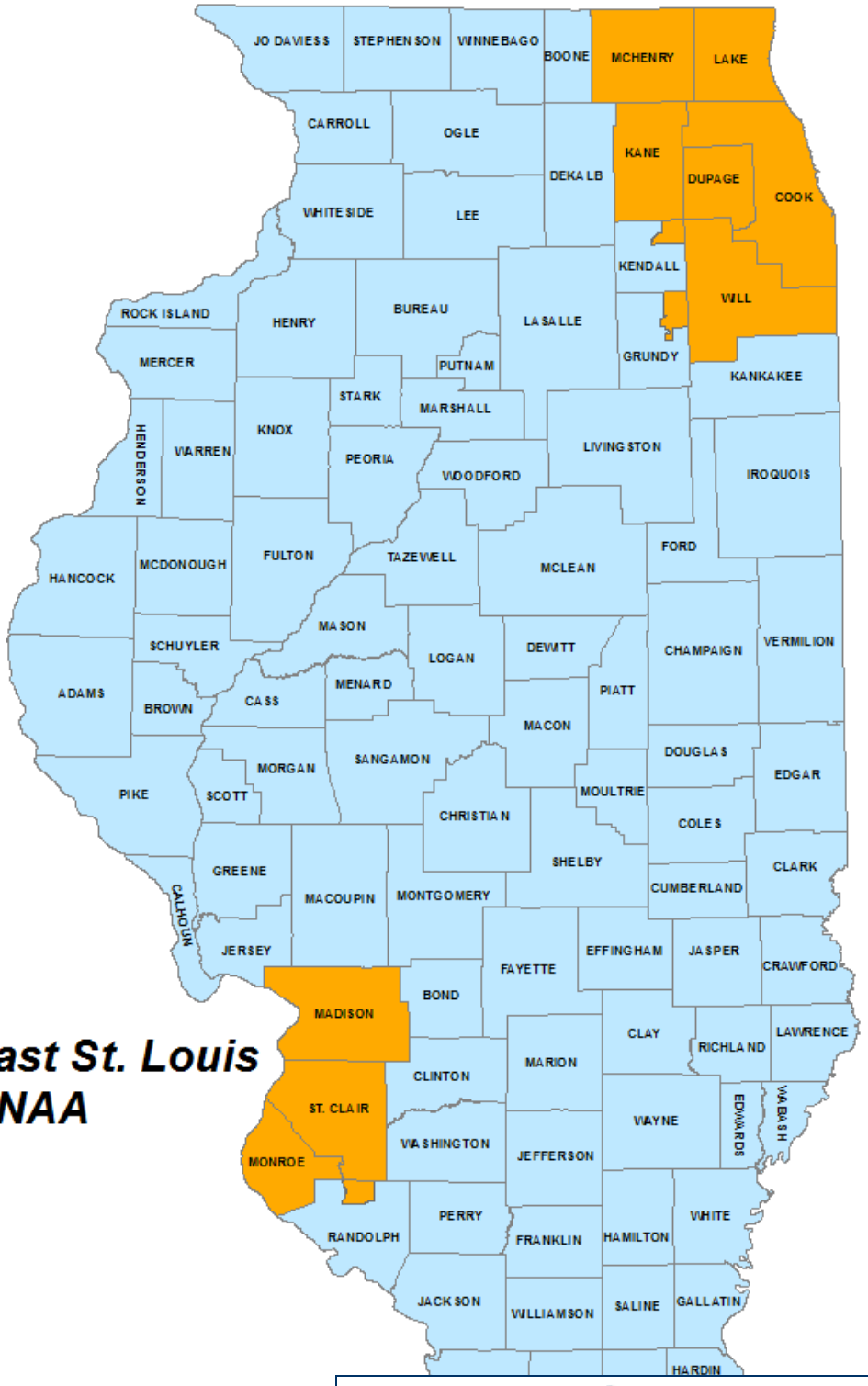
**Particles are linked to:**

- **Premature death from heart and lung disease**
- **Aggravation of heart and lung diseases**
- **Increases in:**
  - Hospital admissions
  - Doctor and ER visits
  - Medication use
  - School and work absences
- **And possibly to**
  - Lung cancer deaths
  - Infant mortality
  - Developmental problems, such as low birth weight in children

# What is a Nonattainment Area?

- The Clean Air Act defines a nonattainment area as the area that is violating the national ambient air quality standard OR a nearby area that is contributing to a violation of the standards.
- The $PM_{2.5}$ standards are based on averaging air quality measurements both annually and on a 24 hour basis.
- The annual standard for $PM_{2.5}$ is met whenever the 3 year average of the annual mean $PM_{2.5}$ concentrations for designated monitoring sites in an area is less than or equal to 12.0 $\mu g/m^3$.
- The 24 hour standard for $PM_{2.5}$ is met whenever the 3 year average of the annual 98th percentile of values at designated monitoring sites in an area is less than or equal to 35 $\mu g/m^3$.

# 1997 Annual PM2.5 NAA/MA Areas




***Chicago Maintenance Area***

***Metro-East St. Louis NAA***

- Areas that exceeded the 1997 National Ambient Air Quality Standard (NAAQS) for Annual PM2.5 (15 ug/m3)

# EPA's PM2.5 Standards: Old and New

| Primary | 2006 Standards | | 2012 Standards | |
|---|---|---|---|---|
| | **Annual (retained)** | **24-hour** | **Annual (strengthened)** | **24-hour** |
| **$PM_{2.5}$ (Fine Particles)** | **15 µg/m³** Annual arithmetic mean, averaged over 3 years | **35 µg/m³** 24- hour average, 98th percentile, averaged over 3 years | **12 µg/m³** Annual arithmetic mean, averaged over 3 years | **35 µg/m³** 24- hour average, 98th percentile, averaged over 3 years |
| Secondary **$PM_{2.5}$ (Fine Particles)** | **15 µg/m³** Annual arithmetic mean, averaged over 3 years | **35 µg/m³** 24- hour average, 98th percentile, averaged over 3 years | **15 µg/m³** Annual arithmetic mean, averaged over 3 years | **35 µg/m³** 24- hour average, 98th percentile, averaged over 3 years |

# Designation Requirements

Section 107(d)(1) of the CAA governs the process for area designations

- Applicable when NAAQS is promulgated or revised
- Addresses designations of nonattainment or attainment/unclassifiable
- Provides states an opportunity to make recommendations for NAA to USEPA within 1 year of promulgation
  - Letter provided by the Governor of the State to USEPA
- Sets the Timeline for meeting the NAAQS
- Requires areas to be designated nonattainment if they do not meet the standard or contribute to ambient air quality in a nearby area that does not meet the standard – Not optional

# Expected Timeline for 2012 Revised Primary Annual $PM_{2.5}$ NAAQS

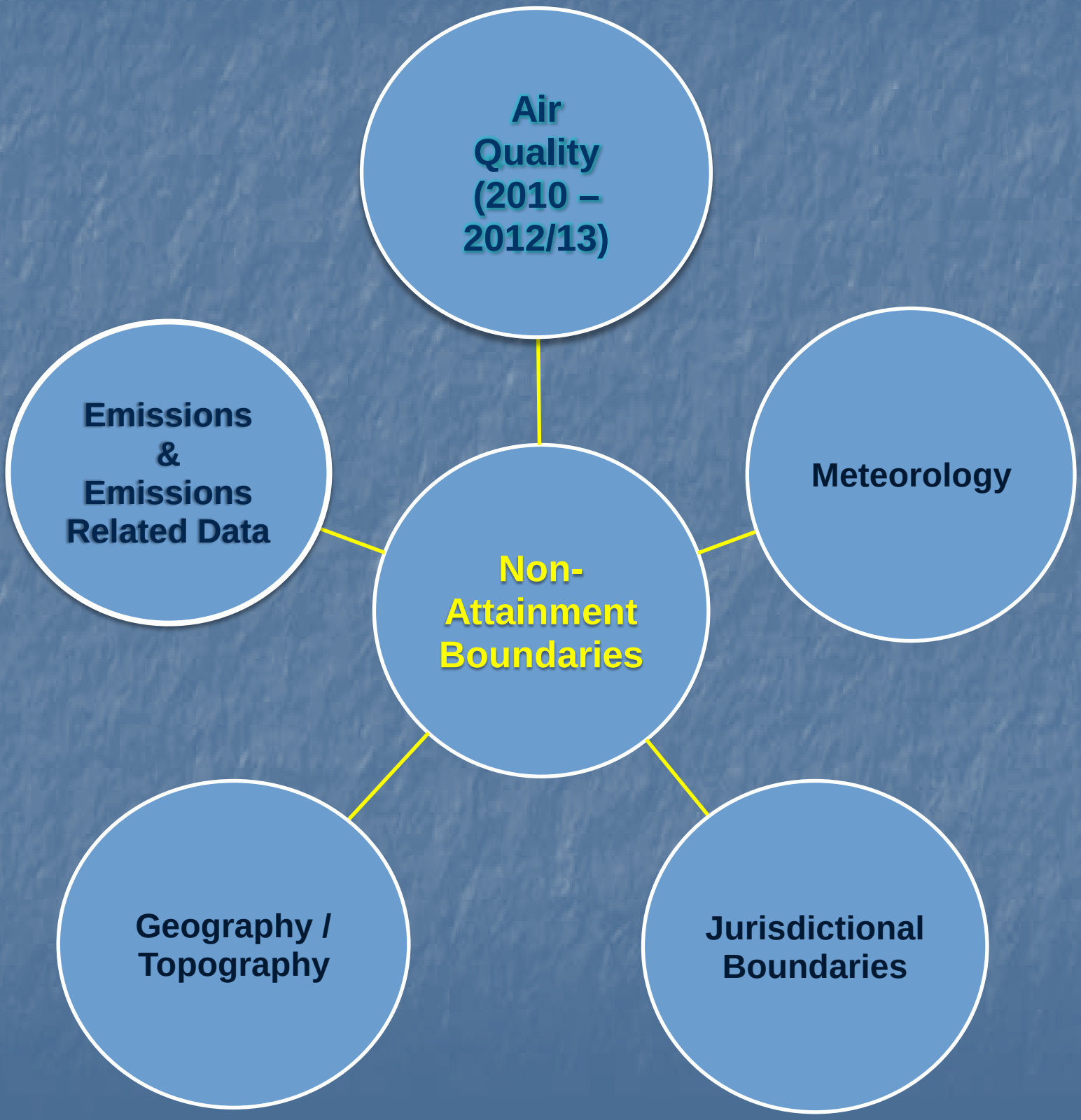
| Milestone | Date |
|---|---|
| Promulgated – Revised Primary Annual PM2.5 NAAQS | December 14, 2012 (78 FR 3086, January 15, 2013) |
| State Designation Recommendation to USEPA due | December 13, 2013 |
| USEPA notifies the State of Modifications | 120 Days prior to final – No later than August 14, 2014 |
| USEPA Final Designations | December 12, 2014 |
| SIP Due | August 2016 |
| Attainment Date | December 2021 (mod) 2025 (serious) |

# Boundary Designations Guidance

- USEPA Issued guidance for states to consider on April 16, 2013
- Areas with monitored violations must be classified as "***nonattainment***"
- Nonattainment areas should contain the area violating (the area around the monitor) and any adjacent counties that have the potential to contribute to the violation
- NO Presumptive boundary – "Reasonable Starting Point" (CBSA)
- Evaluated and determined on a Case by Case Basis (Study Areas)
- 5 Factors to consider: air quality data; emissions data & emissions related data; meteorology; geography/topography; and jurisdictional boundaries
- All other areas will be classified as "***attainment/unclassifiable***"

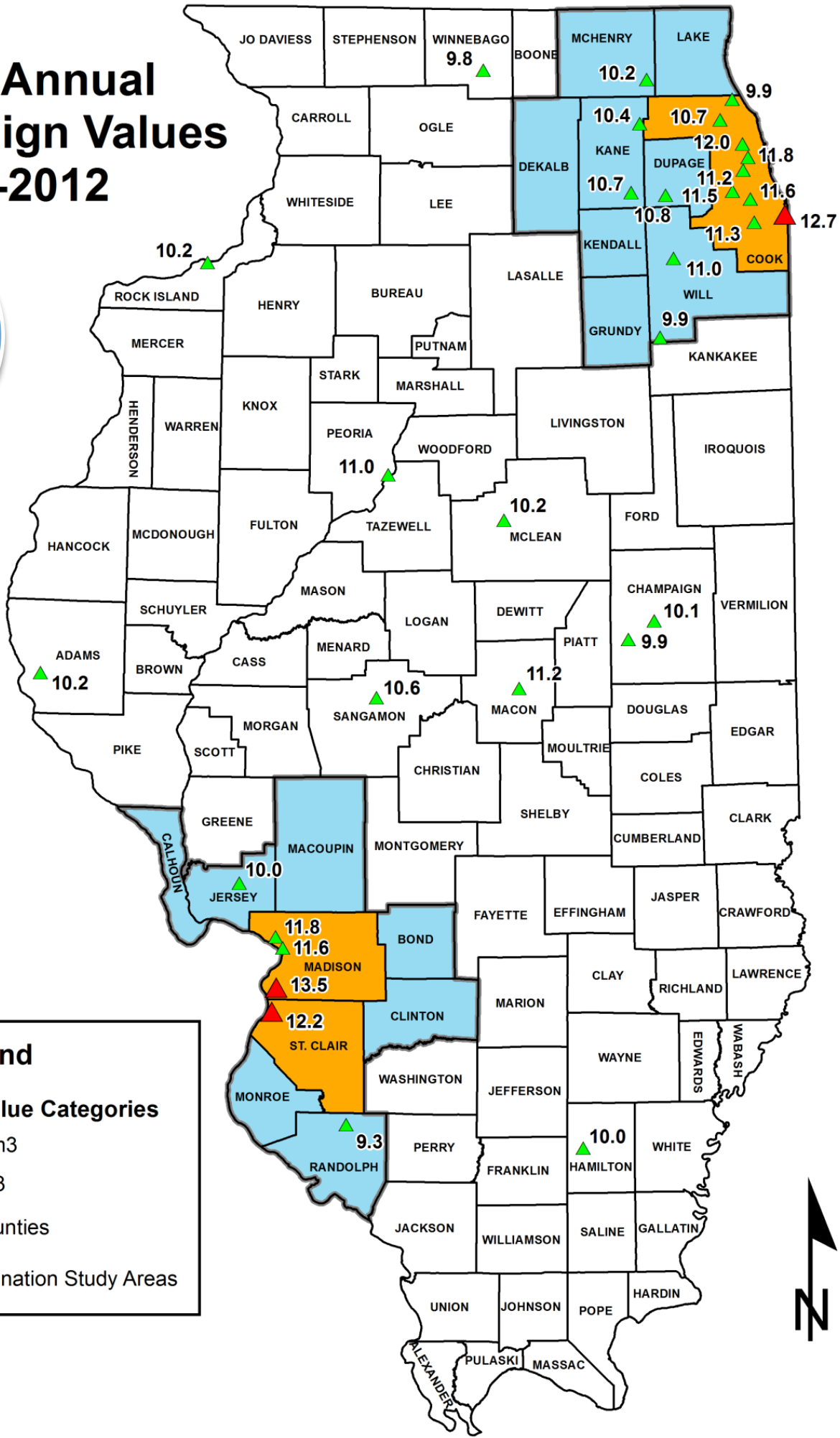
# 5 Designation Factors

(Weight of Evidence Approach)



# Illinois Annual PM2.5 Design Values 2010-2012

Air Quality

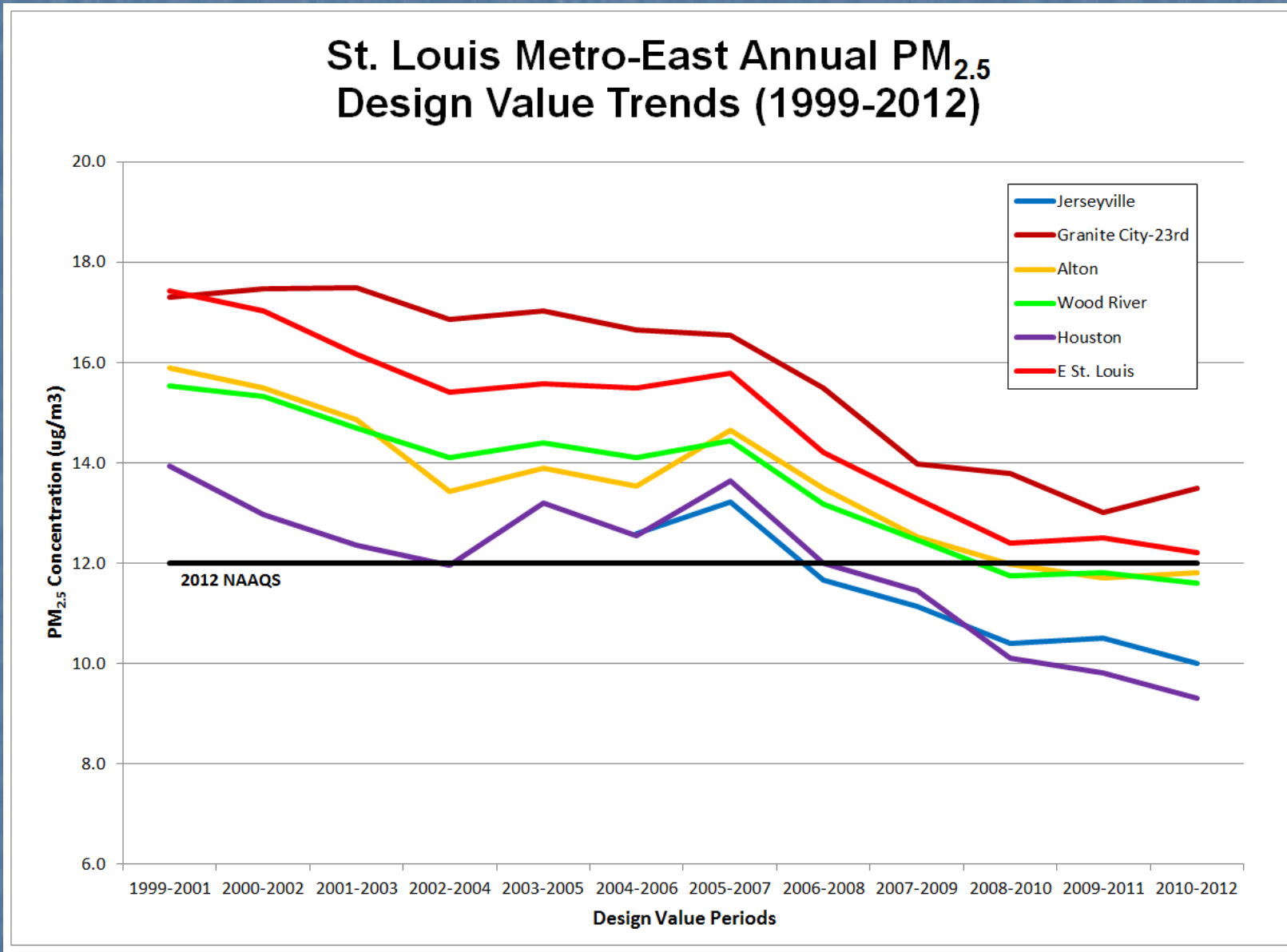



## Legend

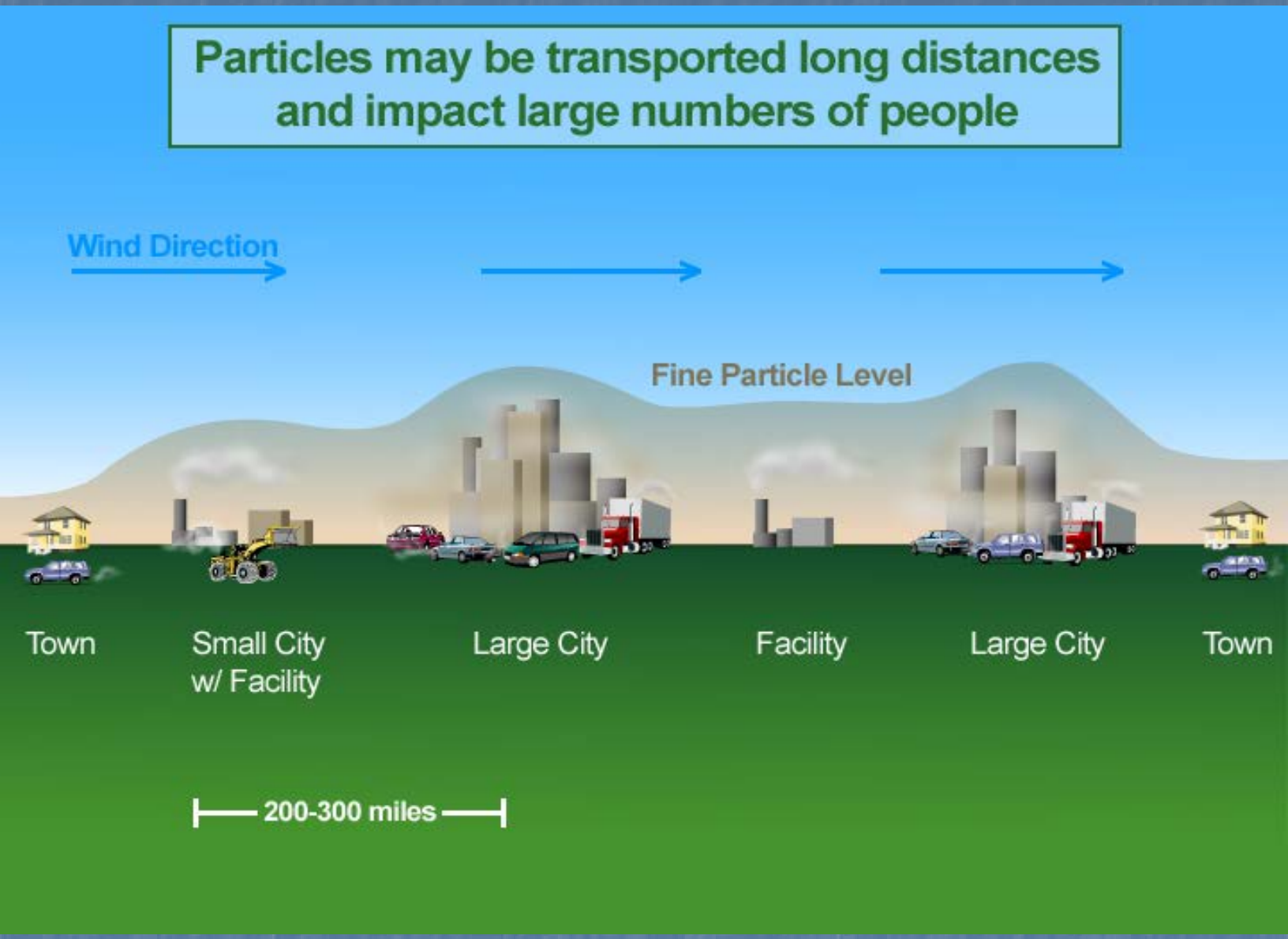
### Annual Design Value Categories

- <= 12.0 ug/m3
- > 12.0 ug/m3
- Violating Counties
- PM2.5 Designation Study Areas

# PM2.5 Trends by Monitor

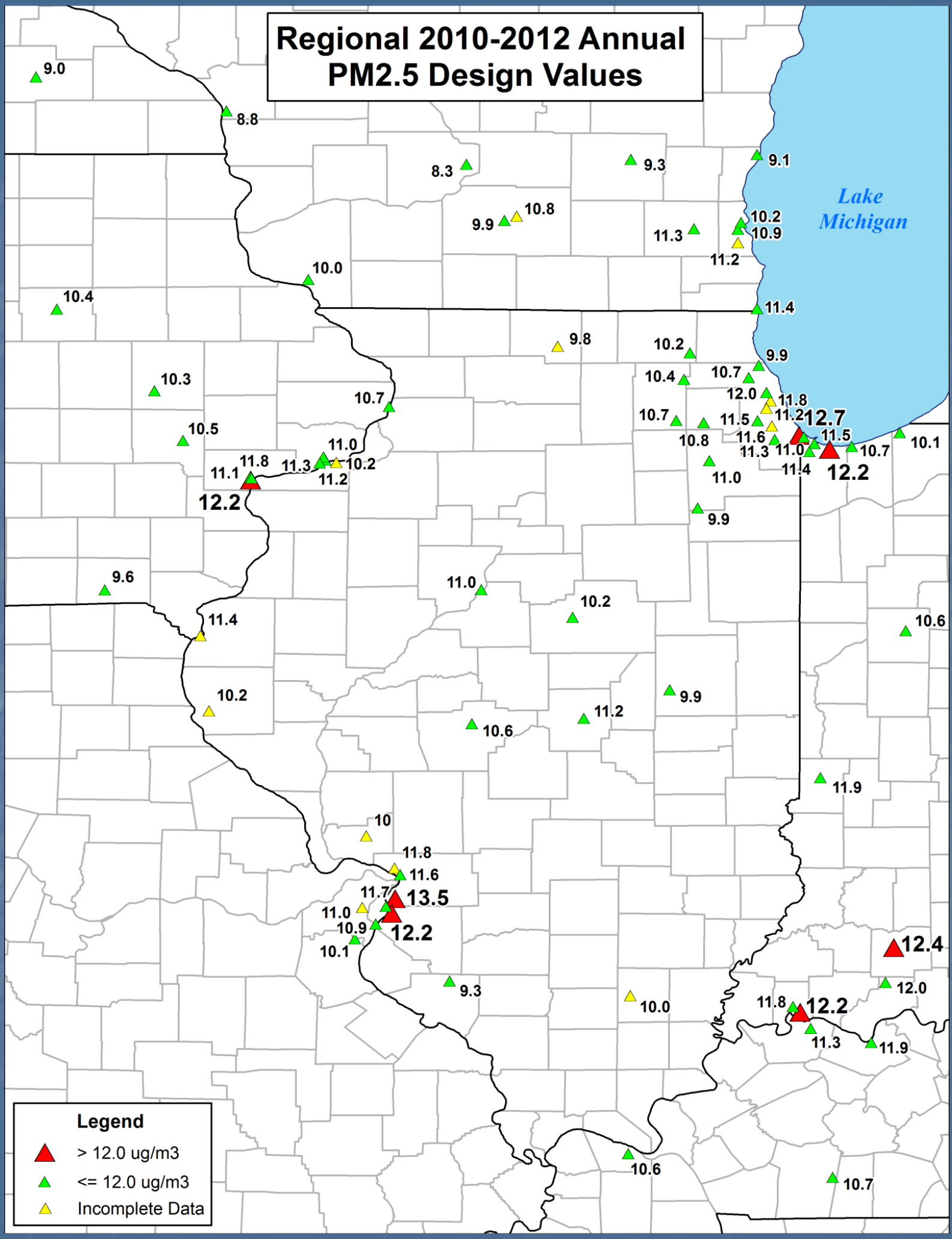


# Fine Particle Concentrations are Affected by Nearby Sources and Transported Emissions




*Analytical Challenge in the Designations Process:*

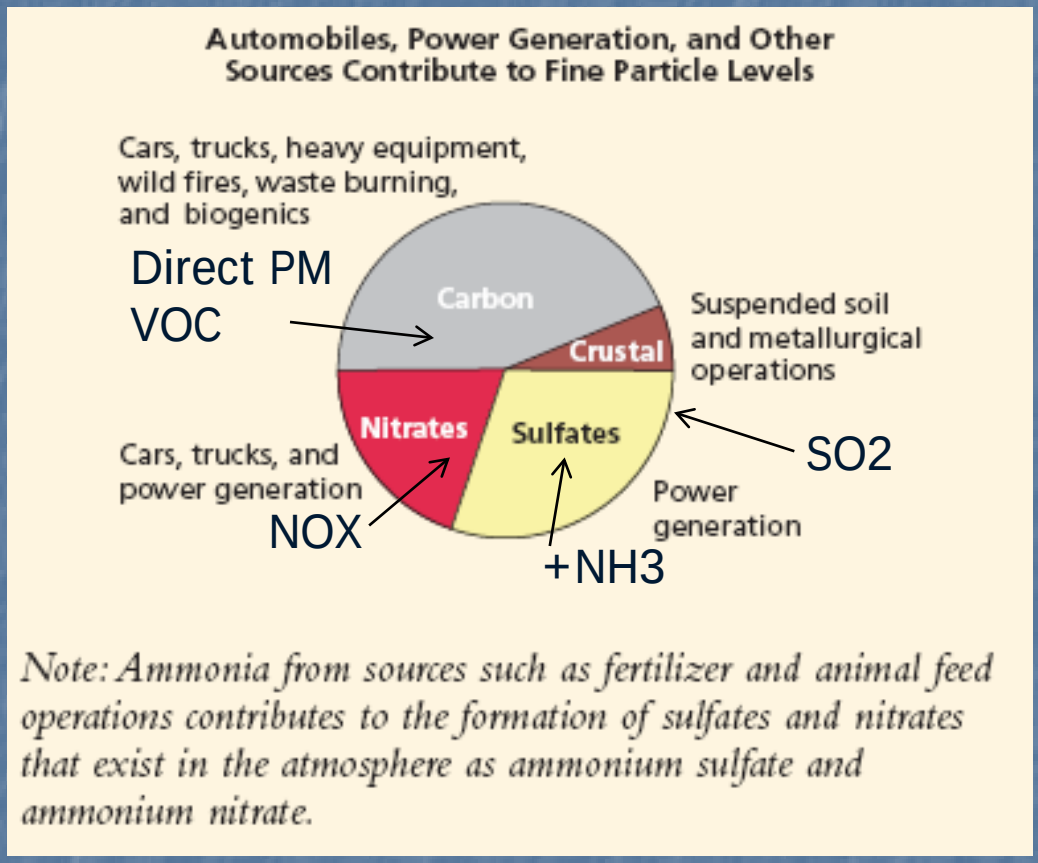
*- Identifying the nearby areas and sources that contribute to PM2.5 violations*


Regional 2010-2012 Annual
PM2.5 Design Values
Lake
Michigan
9.0
8.8
8.3
9.3
9.1
9.9
10.8
10.2
10.9
11.3
11.2
10.0
10.4
11.4
9.8
10.2
9.9
10.3
10.4
10.7
12.0
11.8
10.7
11.2
12.7
10.5
11.5
11.6
11.5
10.7
10.1
11.0
11.8
11.3
11.3
11.0
10.2
11.4
12.2
11.1
11.2
12.2
11.0
9.9
9.6
11.0
10.2
11.4
10.6
10.2
9.9
11.2
10.6
11.9
10
11.8
11.6
11.7
13.5
11.0
10.9
12.2
10.1
12.4
9.3
10.0
12.0
11.8
12.2
11.3
11.9
10.6
10.7
Legend
> 12.0 ug/m3
<= 12.0 ug/m3
Incomplete Data

# What is the composition of PM2.5 and where does it come from?

## Major Components

- Ammonium Sulfate
- Ammonium Nitrate
- Organic
- Carbonaceous Mass
- Elemental Carbon
- Crustal Material

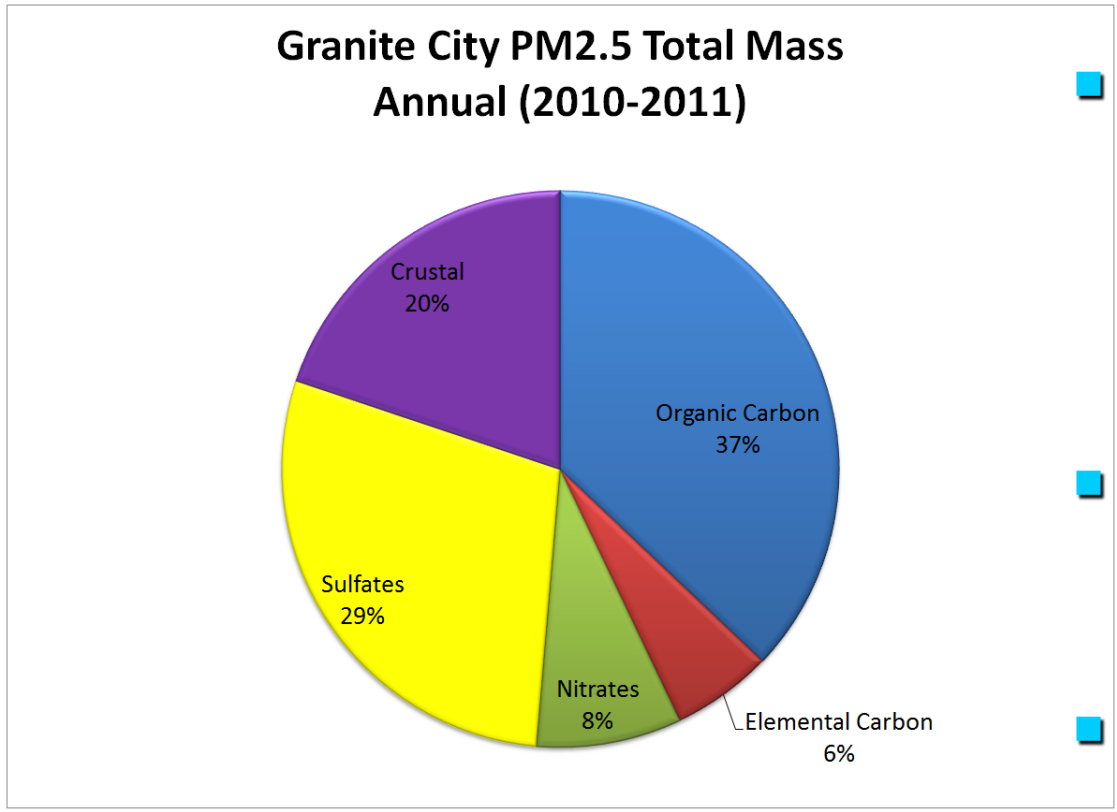


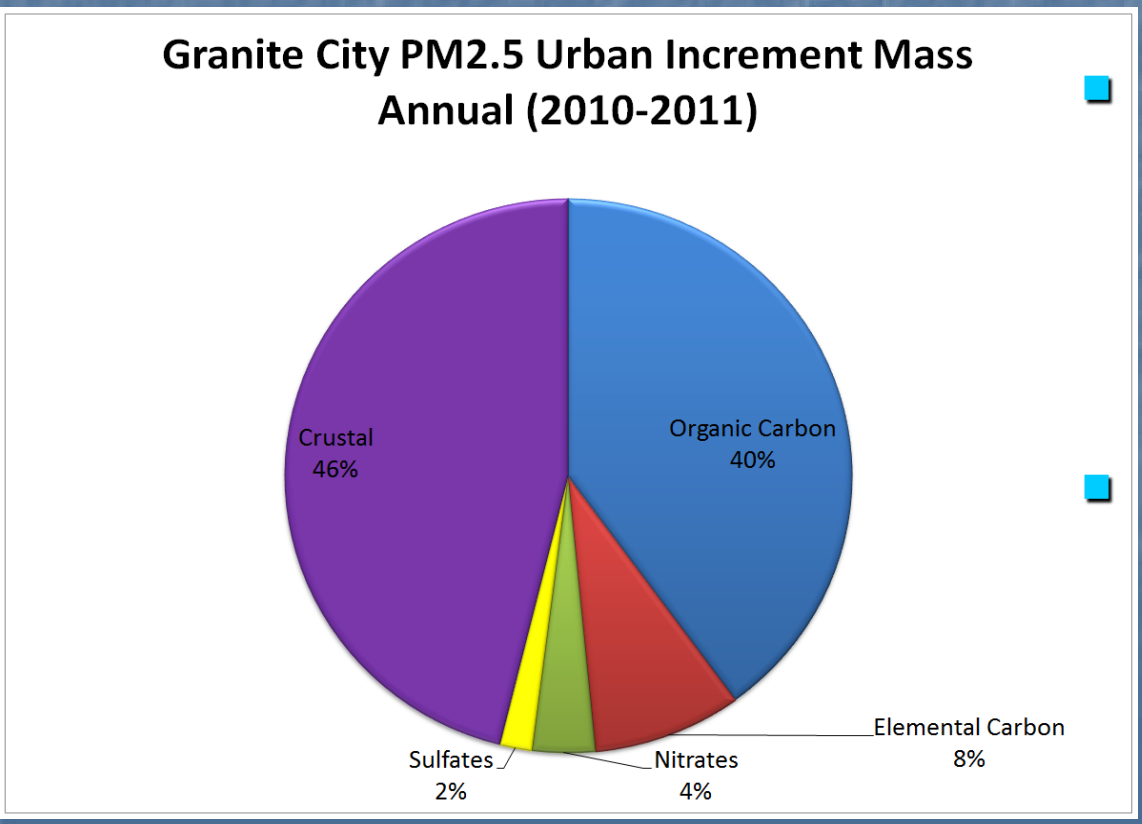

**From:** *The Particle Pollution Report: Current Understanding of Air Quality and Emissions through 2003*

The chemistry is complicated and particle formation is dependent on other pollutants and atmospheric conditions

# Urban Increment Analysis

## St. Louis Study Area – Gateway Medical Center




- Goal is to estimate the local contribution to Urban PM2.5
- Total Mass = (Regional + Urban)
- Uses PM2.5 Compositional data
- PM2.5 Contributed by dominant nearby area emissions
- = Urban PM2.5 – Regional PM2.5 Background Concentrations

Emissions
&
Emissions
Related Data

# Where are Emission Sources located?


Wood-Burning Stoves


Forest Fires


Heavy Duty Diesel Engines


Natural Sources

**Particle pollution is a complex mixture derived from many sources**


Cars andTrucks

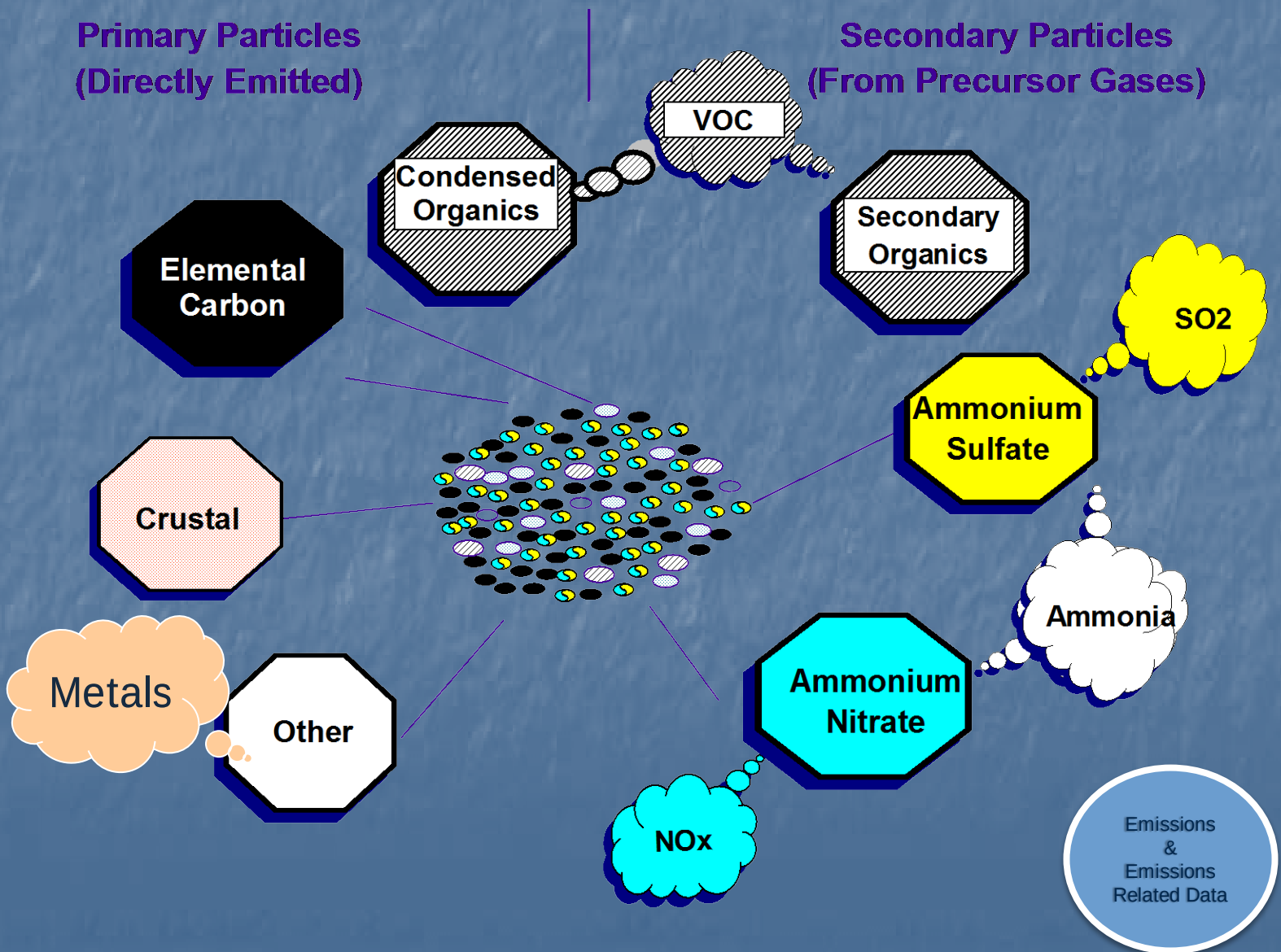

Non-Road Vehicles


Leaf Burning


Industrial Sources

# Emissions

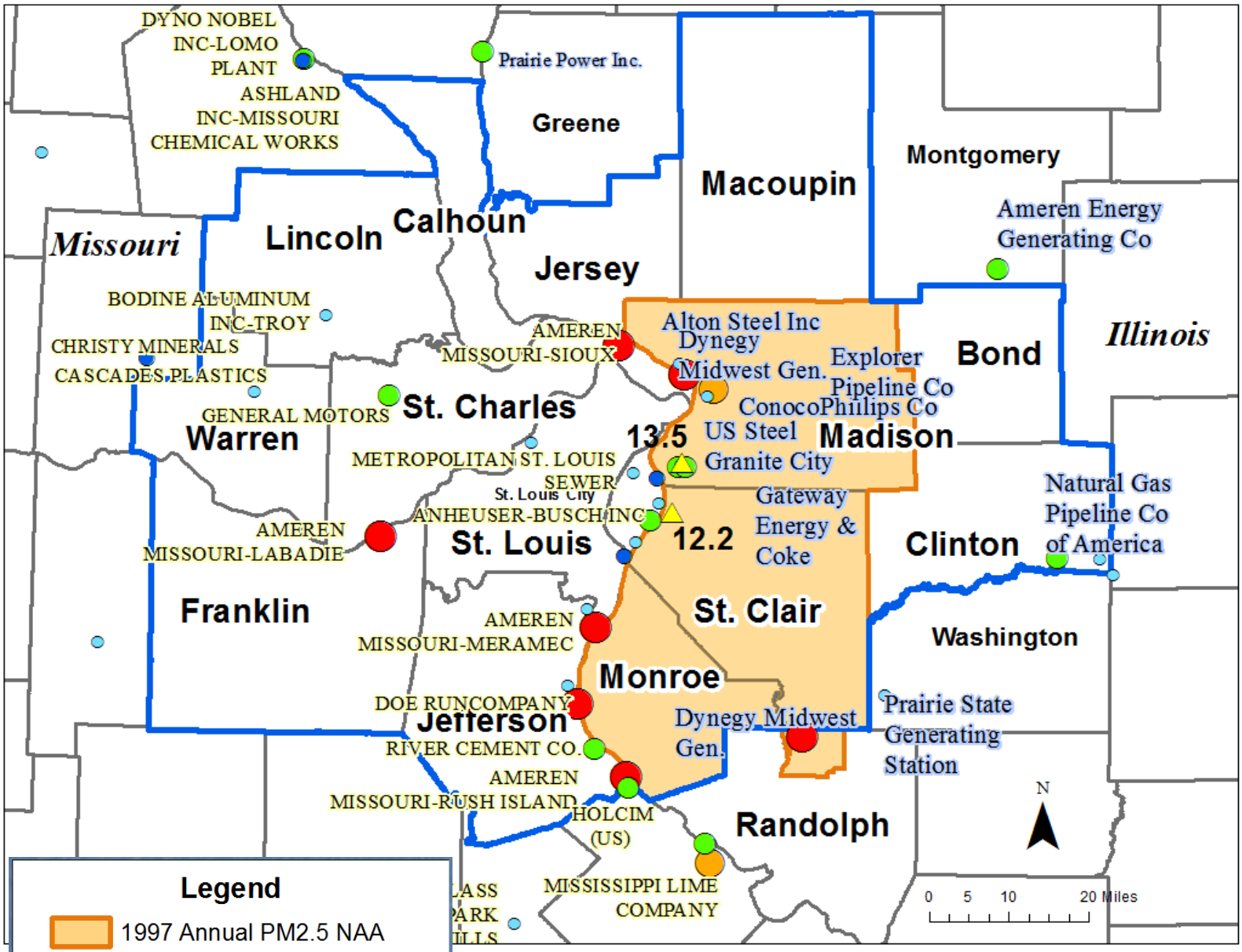
- What are the emissions of Direct PM2.5 and Precursors from nearby contributing counties?
  - Precursor emissions include: NOx, SO2, VOC and NH3 (2011 NEI Emissions)
  - PM2.5 in Ambient Air is a Complex Mixture



# St. Louis MO-IL MSA

## 2011 Emissions

(Sum of Total Direct and Precursor PM2.5 Emissions (PM2.5,NH3,NOx, SO2,VOC)

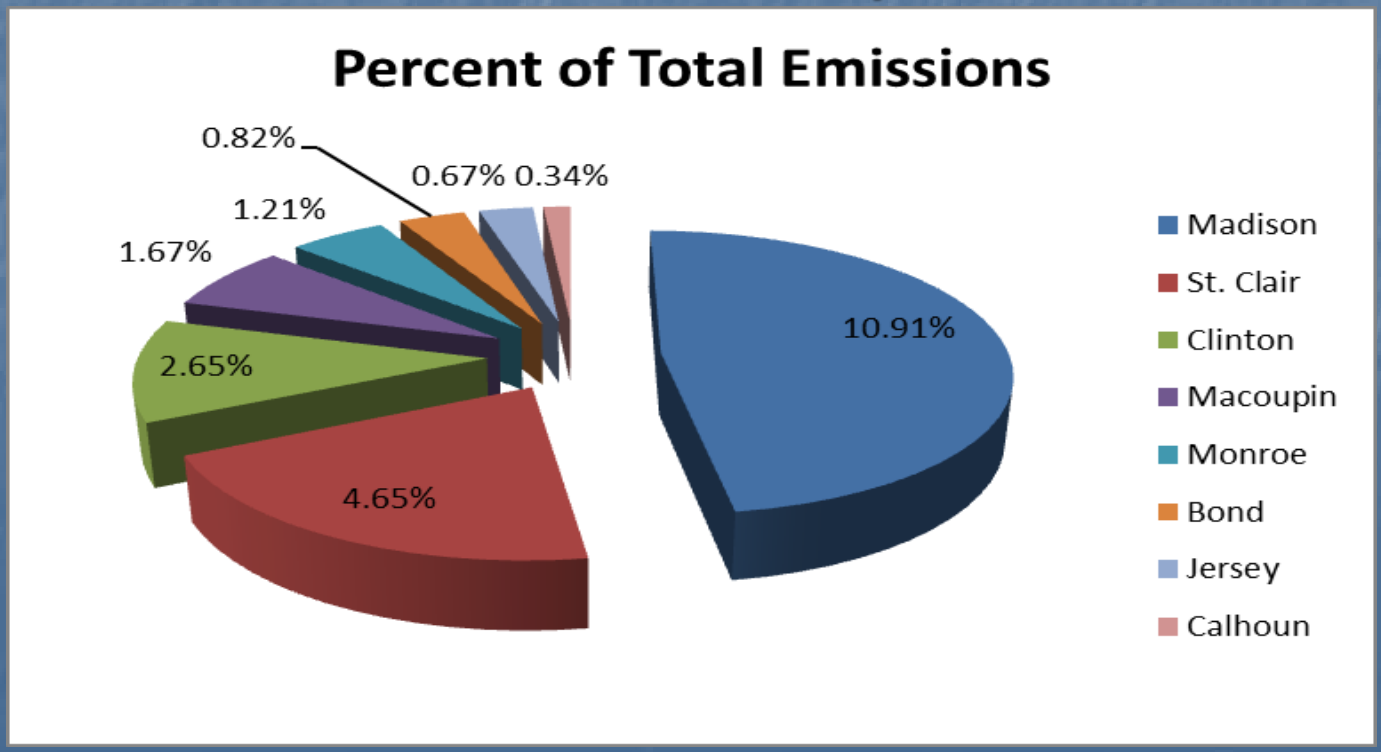


# St. Louis MO-IL MSA

## 2011 NEI Emissions

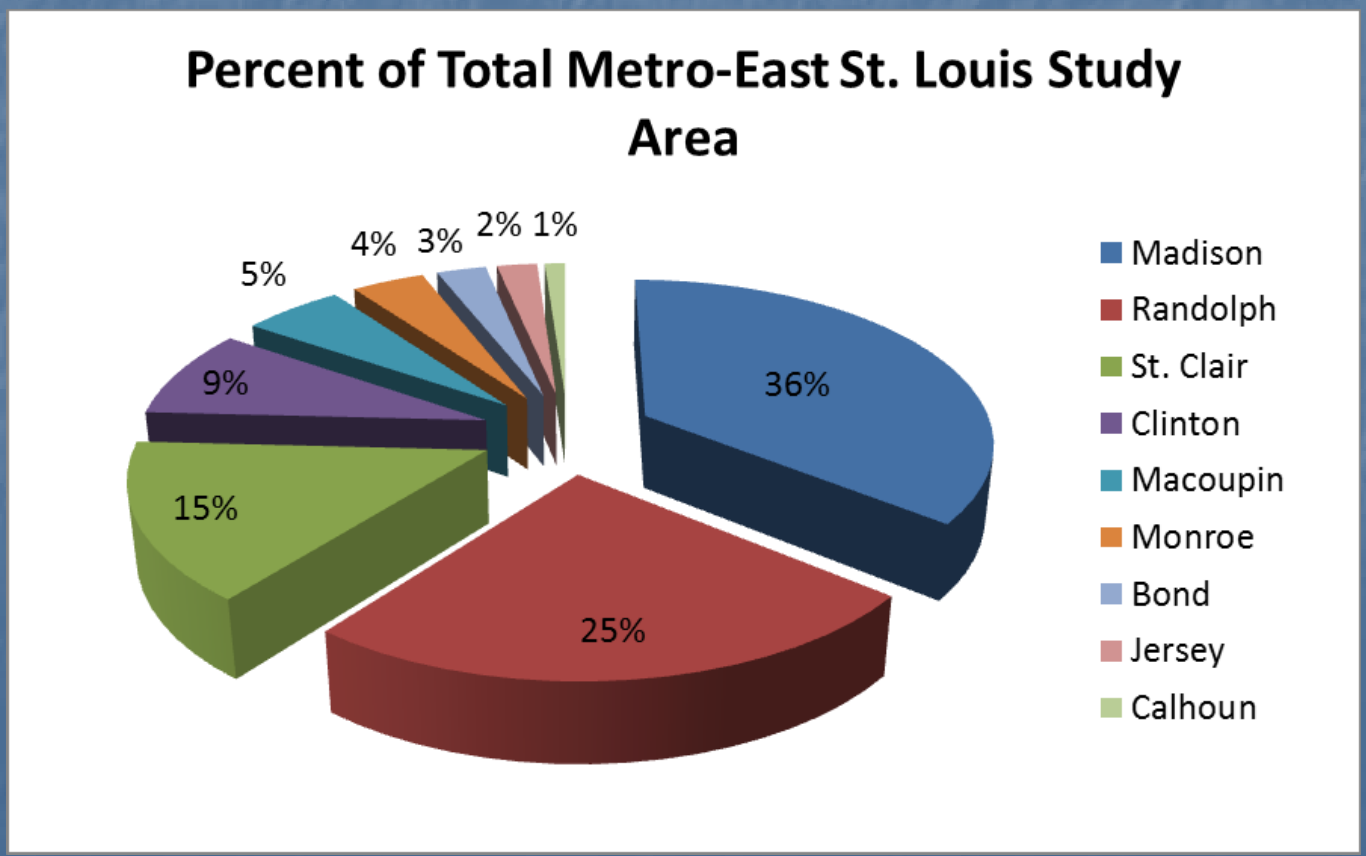
| Illinois Counties | PM2.5 | NOx | NH3 | SO2 | VOC | Total TPY | Percentage (all Pollutants) |
|---|---|---|---|---|---|---|---|
| Madison | 3,824.01 | 16,049.56 | 1244.9 | 13,280.71 | 9,036.73 | 43,435.91 | 10.91% |
| St. Clair | 3,271.48 | 7,901.27 | 1195.97 | 295.62 | 5,850.16 | 18,514.50 | 4.65% |
| Clinton | 1,153.79 | 4,596.53 | 3010.98 | 378.14 | 1,423.65 | 10,563.09 | 2.65% |
| Macoupin | 1,613.39 | 1,865.45 | 1716.8 | 24.3 | 1,425.22 | 6,645.16 | 1.67% |
| Monroe | 775.91 | 2,223.18 | 823.57 | 53.56 | 945.14 | 4,821.36 | 1.21% |
| Bond | 706.46 | 1,201.65 | 605.54 | 13.41 | 751.52 | 3,278.58 | 0.82% |
| Jersey | 603.63 | 857.42 | 497.86 | 27.28 | 681.49 | 2,667.68 | 0.67% |
| Calhoun | 199 | 599.71 | 190.05 | 40.93 | 318.66 | 1,348.35 | 0.34% |
| Illinois MSA | 12,147.67 | 35,294.77 | 9,285.67 | 14,113.95 | 20,432.57 | 91,274.63 | 22.93% |
| | | | | | | | |
| **Missouri Counties** | | | | | | | |
| St. Louis | 5538.21 | 38672.94 | 1761.41 | 15810.56 | 30568.32 | 92,351.44 | 23.20% |
| Franklin | 2441.27 | 14,733.98 | 1312.84 | 58025.06 | 3941.06 | 80,454.21 | 20.21% |
| Jefferson | 1737.72 | 11,464.65 | 250.34 | 43777.64 | 6124.25 | 63,354.60 | 15.92% |
| St. Charles | 2,059.48 | 17,937.41 | 1,020.31 | 5,441.90 | 9921.89 | 36,380.99 | 9.14% |
| St. Louis City | 1716.86 | 10301.94 | 759.53 | 3139.73 | 8602.42 | 24,520.48 | 6.16% |
| Lincoln | 345.16 | 2063.71 | 882 | 39.03 | 1914.01 | 5,243.91 | 1.32% |
| Warren | 273.93 | 1,908.80 | 669.64 | 23.42 | 1549.94 | 4,425.73 | 1.11% |
| Missouri MSA | 14,112.63 | 97,083.43 | 6,656.07 | 126,257.34 | 62,621.89 | 306,731.36 | 77.07% |
| | | | | | | | |
| MSA Total | 26,260.30 | 132,378.20 | 15,941.74 | 140,371.29 | 83,054.46 | 398,005.99 | |

## Illinois Counties Only - MSA

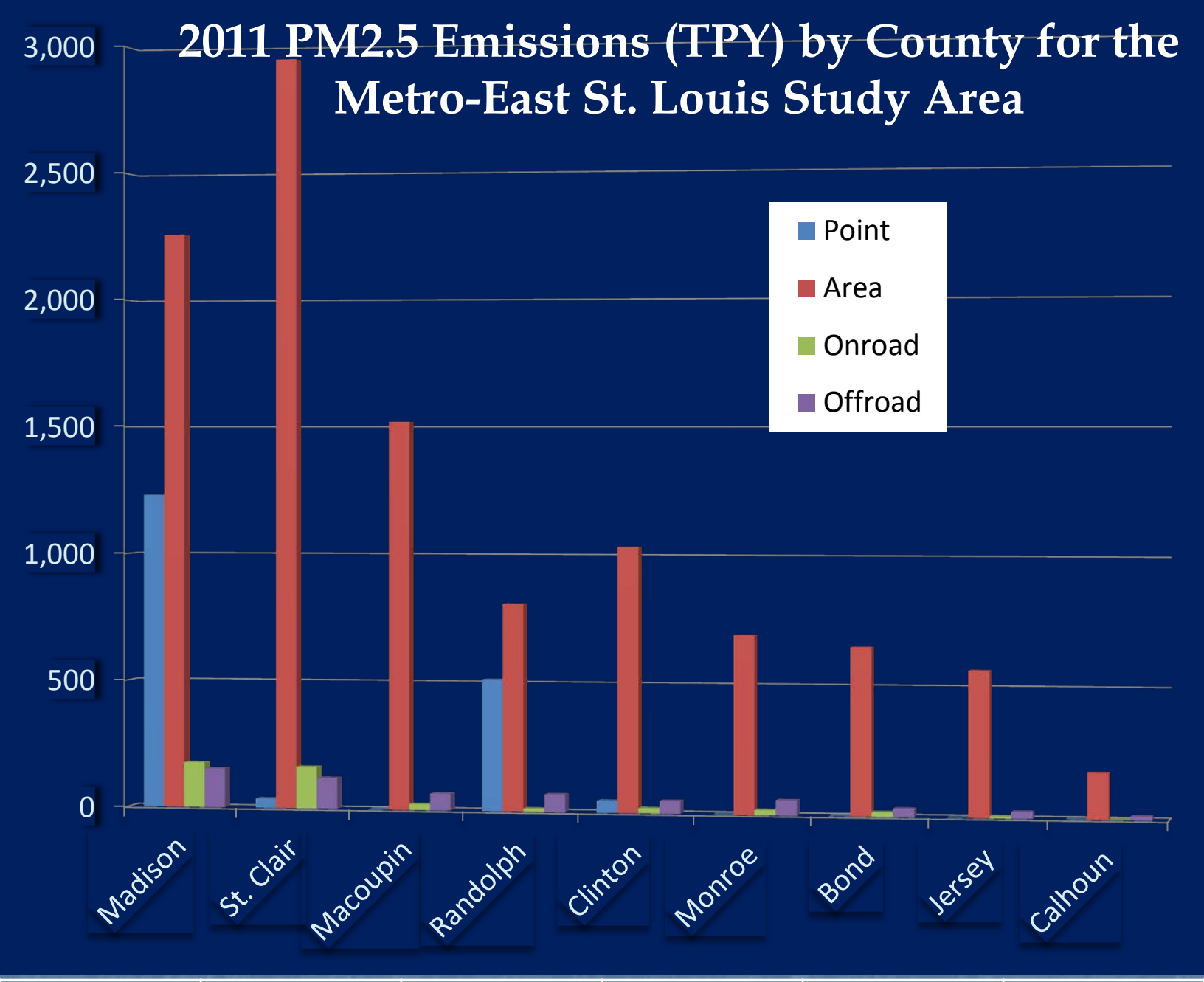


# 2011 NEI Emissions in Metro-East Study Area

| Illinois Counties | PM2.5 | NOx | NH3 | SO2 | VOC | Total TPY | Percent of Total |
|---|---|---|---|---|---|---|---|
| Madison | 3,824.01 | 16,049.56 | 1244.9 | 13,280.71 | 9,036.73 | 43,435.91 | 35.82% |
| Randolph | 1,408.47 | 7,031.70 | 987.39 | 19,137.10 | 1,429.31 | 29,993.97 | 24.73% |
| St. Clair | 3,271.48 | 7,901.27 | 1195.97 | 295.62 | 5,850.16 | 18,514.50 | 15.27% |
| Clinton | 1,153.79 | 4,596.53 | 3010.98 | 378.14 | 1,423.65 | 10,563.09 | 8.71% |
| Macoupin | 1,613.39 | 1,865.45 | 1716.8 | 24.3 | 1,425.22 | 6,645.16 | 5.48% |
| Monroe | 775.91 | 2,223.18 | 823.57 | 53.56 | 945.14 | 4,821.36 | 3.98% |
| Bond | 706.46 | 1,201.65 | 605.54 | 13.41 | 751.52 | 3,278.58 | 2.70% |
| Jersey | 603.63 | 857.42 | 497.86 | 27.28 | 681.49 | 2,667.68 | 2.20% |
| Calhoun | 199 | 599.71 | 190.05 | 40.93 | 318.66 | 1,348.35 | 1.11% |
| **Study Area Total** | 13,556.14 | 42,326.47 | 10,273.06 | 33,251.05 | 21,861.88 | 121,268.60 | 100.00% |

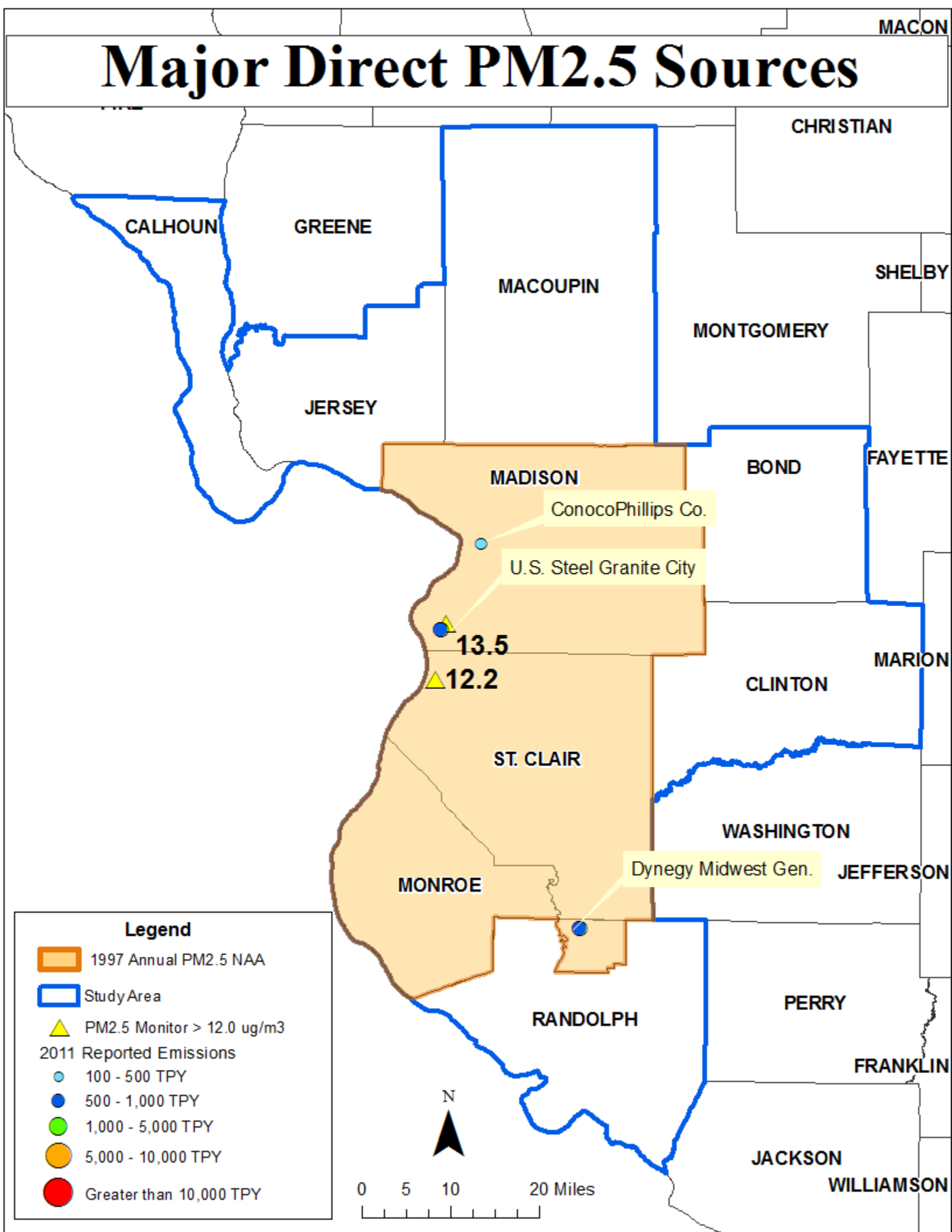


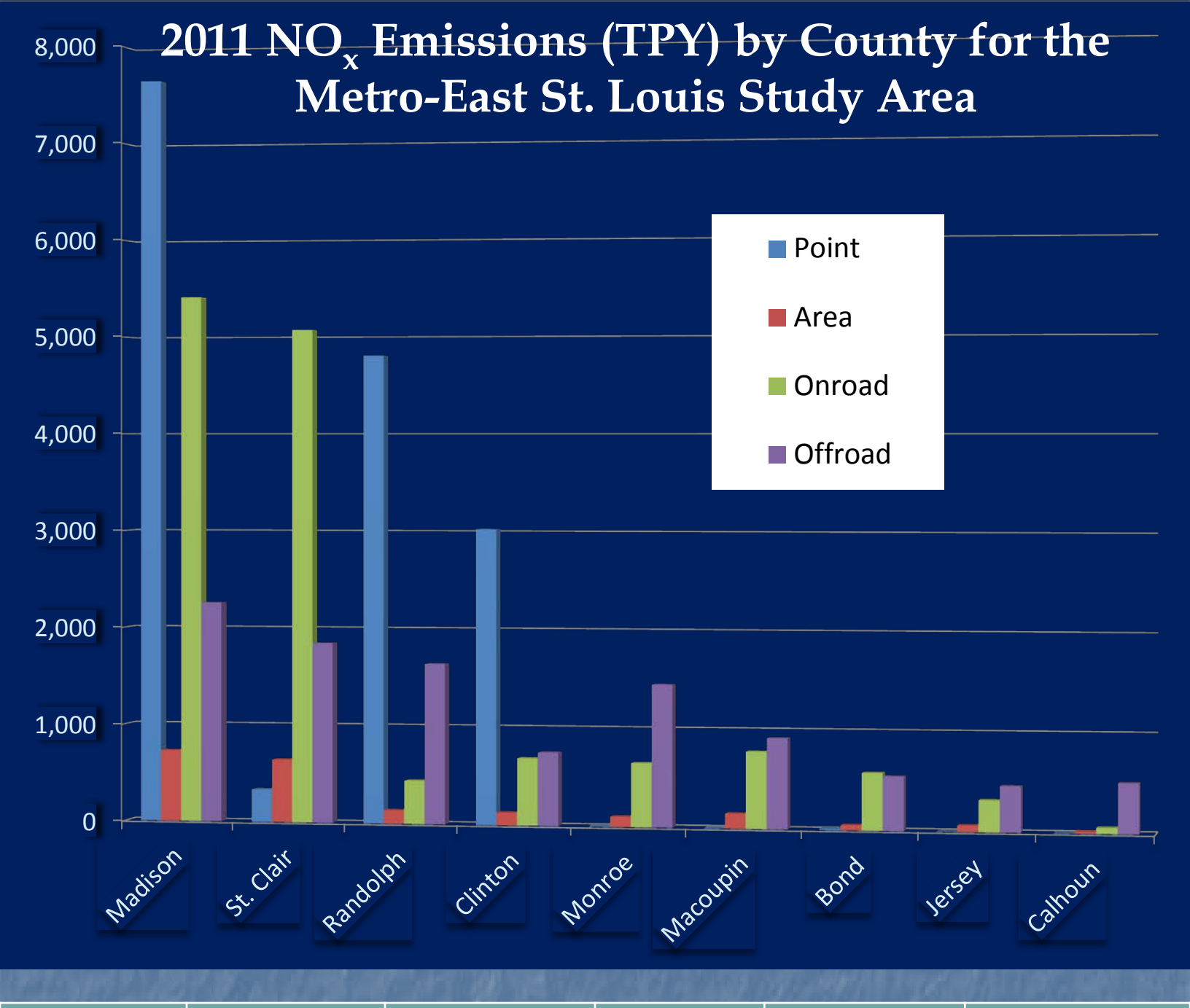
# 2011 PM2.5 Emissions (TPY) by County for the Metro-East St. Louis Study Area



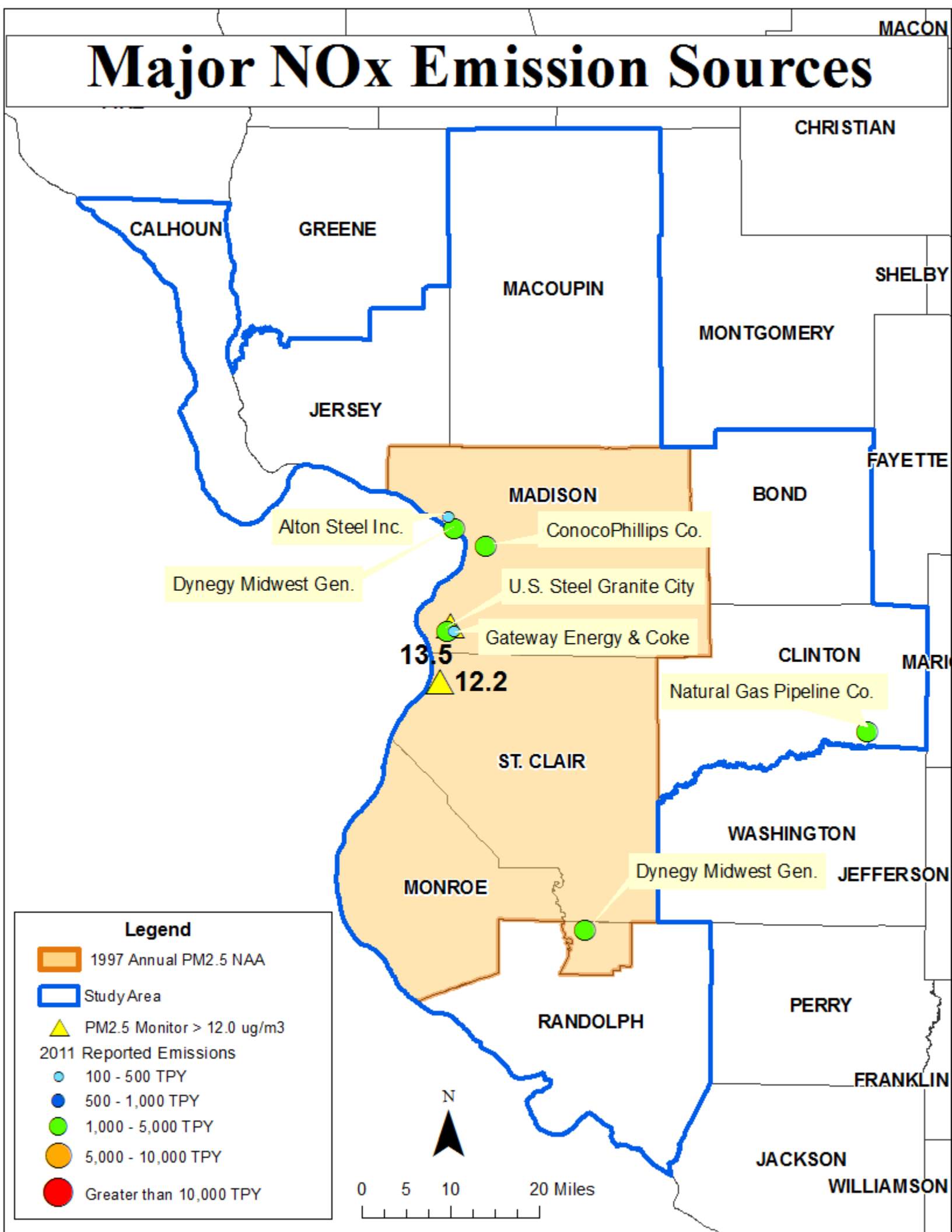

| County | Point | Area | Onroad | Offroad | Total TPY |
|---|---|---|---|---|---|
| **Madison** | 1,232.23 | 2,260.02 | 176.97 | 154.79 | 3,824.01 |
| **St. Clair** | 38.32 | 2,945.95 | 165.03 | 122.19 | 3,271.48 |
| **Macoupin** | 1.46 | 1,520.91 | 24.14 | 66.88 | 1,613.39 |
| **Randolph** | 514.80 | 810.67 | 13.03 | 69.97 | 1,408.47 |
| **Clinton** | 48.22 | 1,034.07 | 20.89 | 50.61 | 1,153.79 |
| **Monroe** | 0.51 | 695.52 | 20.26 | 59.62 | 775.91 |
| **Bond** | 1.72 | 652.15 | 18.88 | 33.71 | 706.46 |
| **Jersey** | 0.00 | 566.49 | 9.44 | 27.70 | 603.63 |
| **Calhoun** | 0.50 | 180.13 | 1.86 | 16.51 | 199.00 |

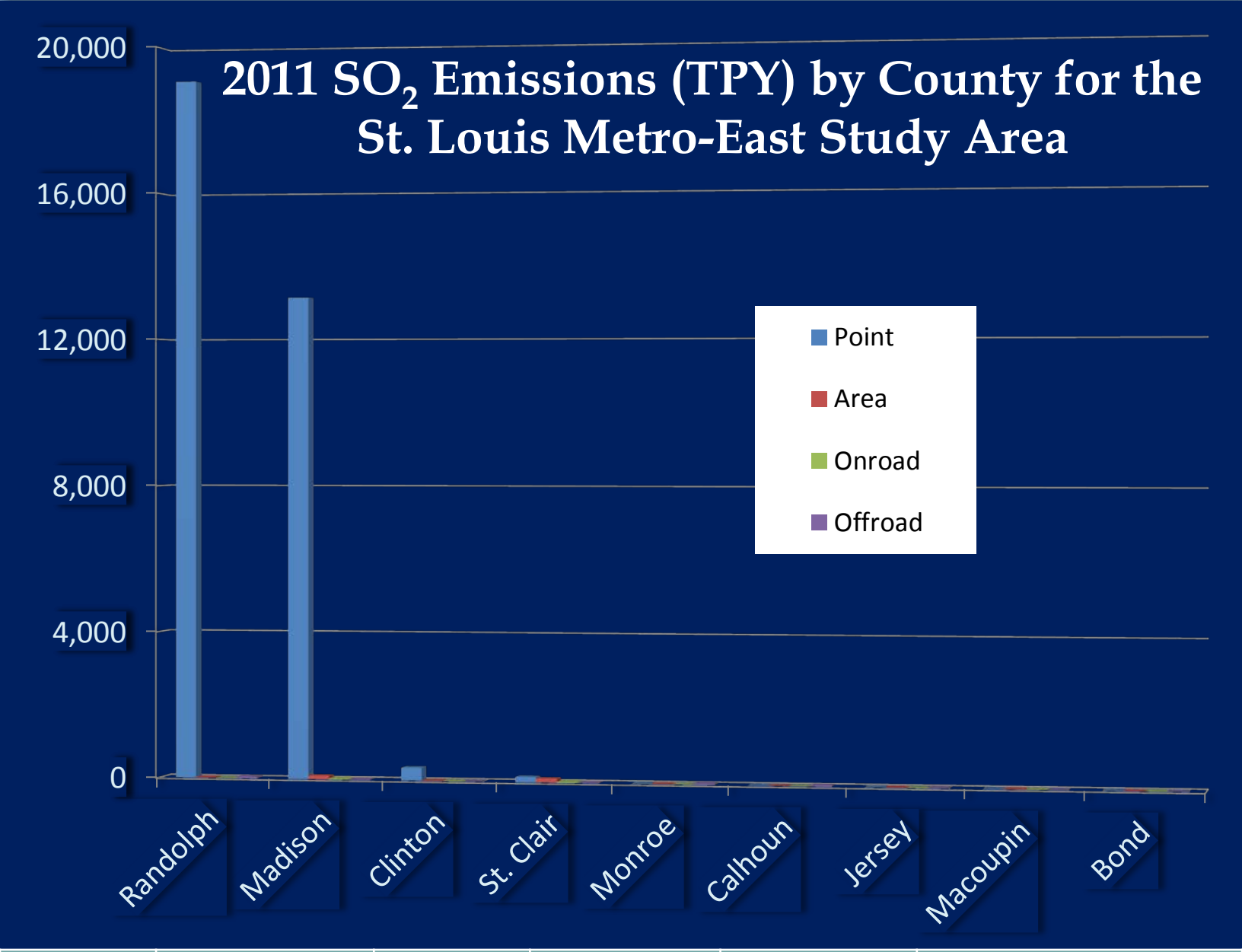
# Major Direct PM2.5 Sources



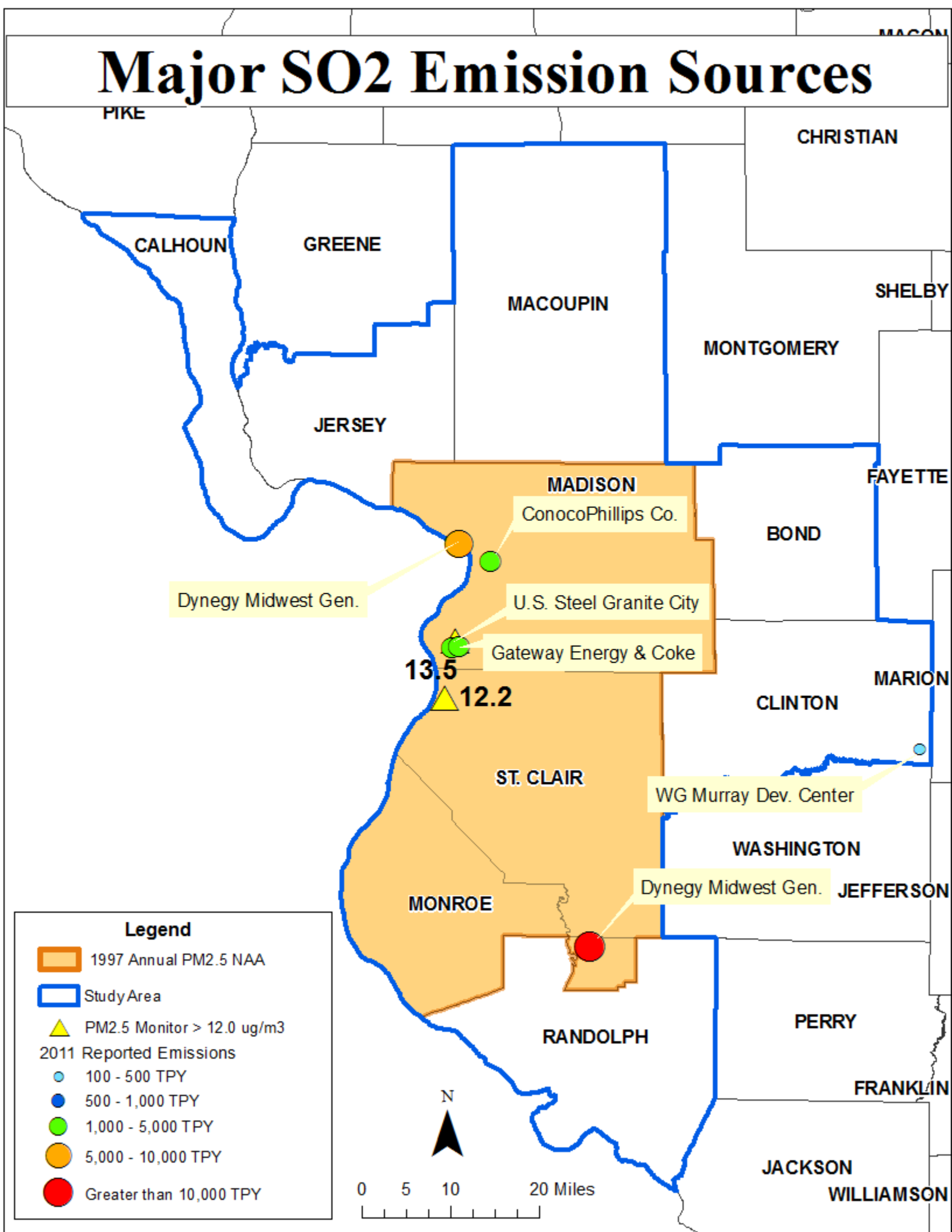



| County | Point | Area | Onroad | Offroad | Total TPY |
|---|---|---|---|---|---|
| **Madison** | 7,648.65 | 731.19 | 5,411.02 | 2,258.69 | 16,049.56 |
| **St. Clair** | 337.23 | 646.36 | 5,069.61 | 1,848.07 | 7,901.27 |
| **Randolph** | 4,803.65 | 139.67 | 445.72 | 1,642.66 | 7,031.70 |
| **Clinton** | 3,025.57 | 131.99 | 688.74 | 750.24 | 4,596.53 |
| **Monroe** | 8.25 | 108.04 | 654.08 | 1,452.80 | 2,223.18 |
| **Macoupin** | 5.20 | 155.12 | 783.80 | 921.34 | 1,865.45 |
| **Bond** | 14.78 | 54.40 | 583.13 | 549.34 | 1,201.65 |
| **Jersey** | 0 | 67.98 | 323.13 | 466.31 | 857.42 |
| **Calhoun** | 0.01 | 25.37 | 63.45 | 510.88 | 599.71 |

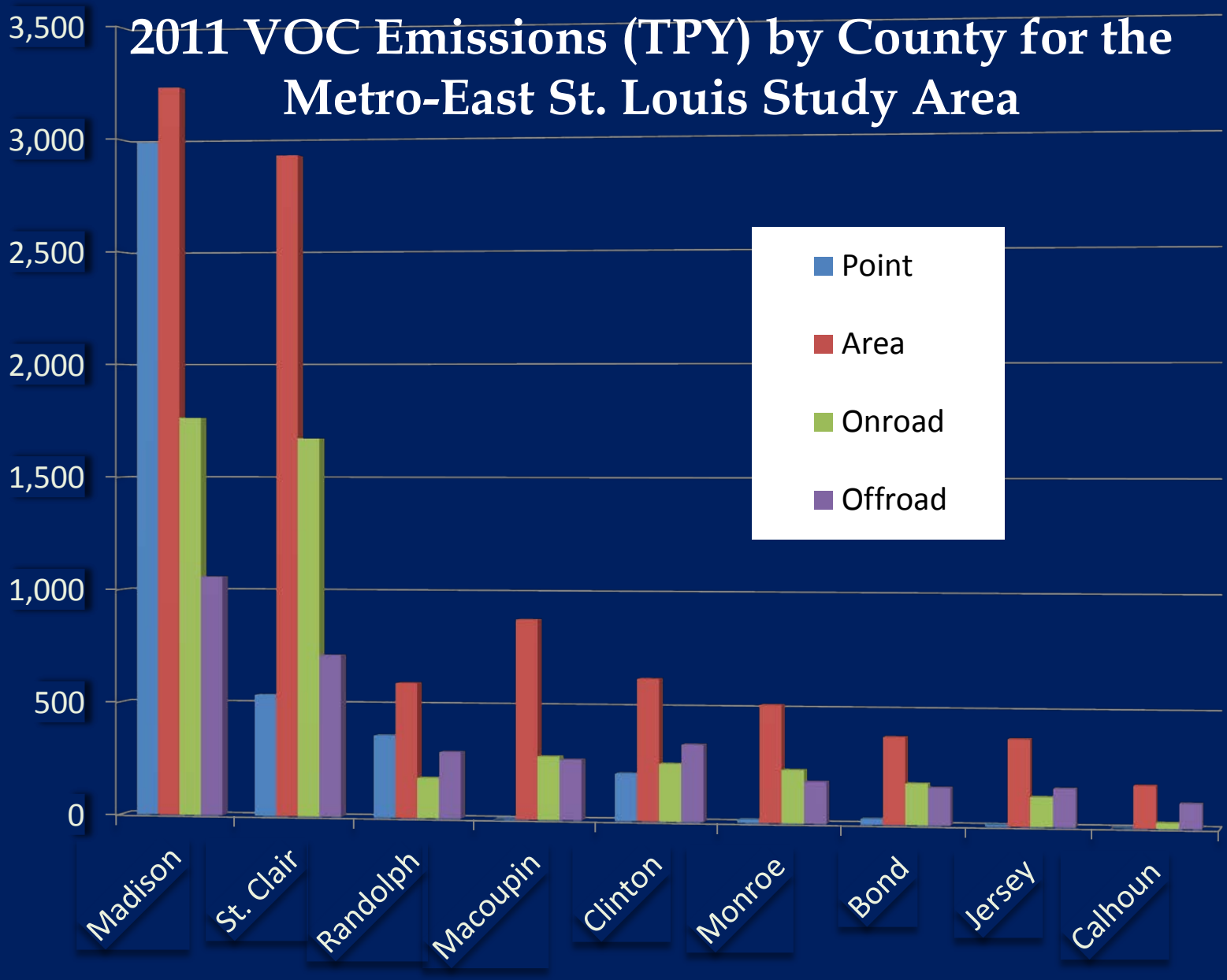

Major NOx Emission Sources
MACON
CHRISTIAN
CALHOUN
GREENE
MACOUPIN
SHELBY
MONTGOMERY
JERSEY
FAYETTE
MADISON
BOND
Alton Steel Inc.
ConocoPhillips Co.
Dynegy Midwest Gen.
U.S. Steel Granite City
Gateway Energy & Coke
13.5
12.2
CLINTON
Natural Gas Pipeline Co.
ST. CLAIR
WASHINGTON
Dynegy Midwest Gen.
JEFFERSON
MONROE
PERRY
RANDOLPH
FRANKLIN
JACKSON
WILLIAMSON
Legend
1997 Annual PM2.5 NAA
Study Area
PM2.5 Monitor > 12.0 ug/m3
2011 Reported Emissions
100 - 500 TPY
500 - 1,000 TPY
1,000 - 5,000 TPY
5,000 - 10,000 TPY
Greater than 10,000 TPY
N
0 5 10 20 Miles



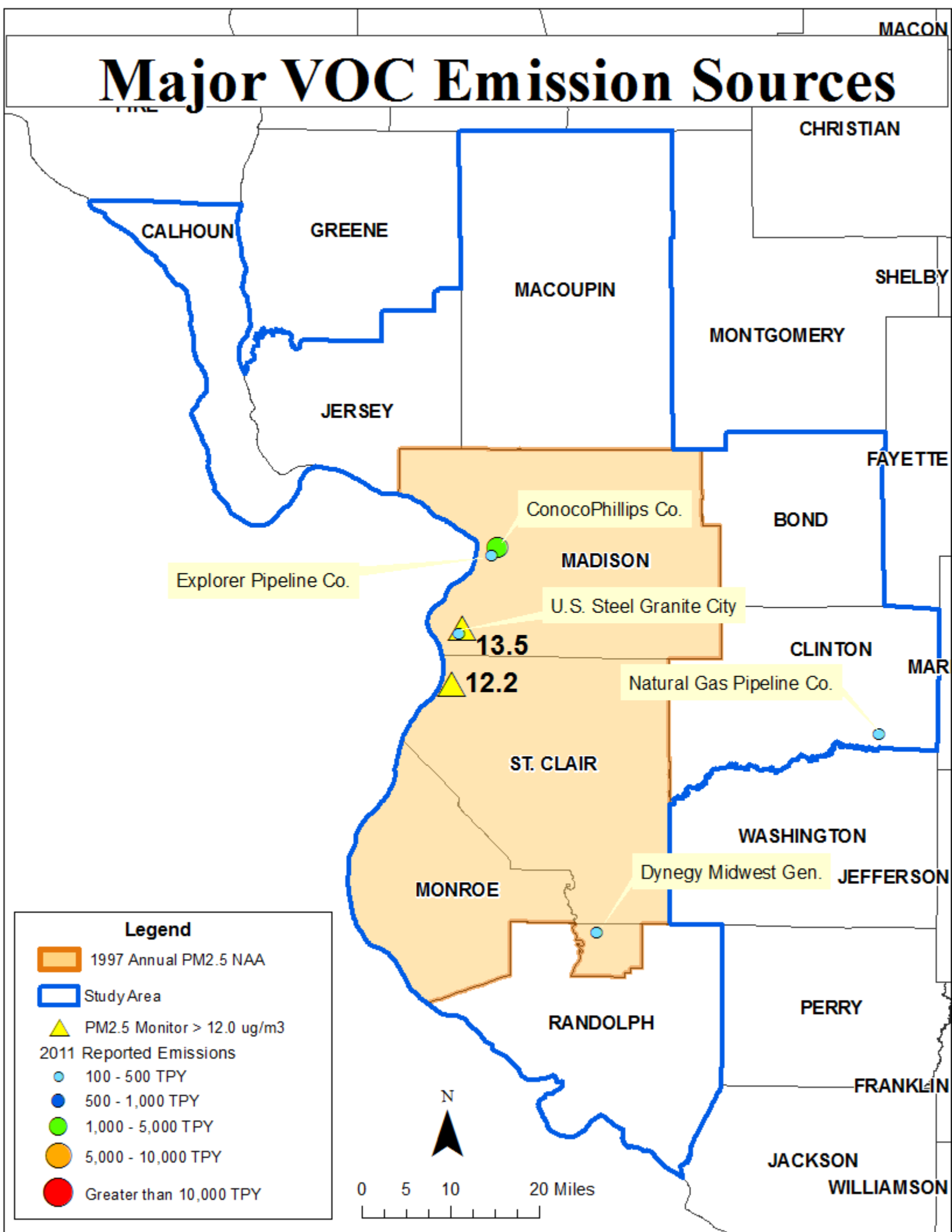

| County | Point | Area | Onroad | Offroad | Total TPY |
|---|---|---|---|---|---|
| **Randolph** | 19,070.72 | 16.72 | 2.63 | 47.02 | 19,137.10 |
| **Madison** | 13,136.21 | 101.01 | 28.49 | 15.00 | 13,280.71 |
| **Clinton** | 357.78 | 12.88 | 3.77 | 3.70 | 378.14 |
| **St. Clair** | 147.38 | 108.99 | 27.00 | 12.24 | 295.62 |
| **Monroe** | 0.10 | 11.17 | 3.58 | 38.72 | 53.56 |
| **Calhoun** | 0.00 | 2.28 | 0.37 | 38.27 | 40.93 |
| **Jersey** | 0 | 7.27 | 1.91 | 18.10 | 27.28 |
| **Macoupin** | 0.02 | 16.47 | 4.17 | 3.64 | 24.30 |
| **Bond** | 0.19 | 7.13 | 2.75 | 3.34 | 13.41 |


Major SO2 Emission Sources
PIKE
CHRISTIAN
CALHOUN
GREENE
MACOUPIN
SHELBY
MONTGOMERY
JERSEY
MADISON
FAYETTE
ConocoPhillips Co.
BOND
Dynegy Midwest Gen.
U.S. Steel Granite City
Gateway Energy & Coke
13.5
12.2
MARION
CLINTON
ST. CLAIR
WG Murray Dev. Center
WASHINGTON
Dynegy Midwest Gen.
JEFFERSON
MONROE
PERRY
RANDOLPH
FRANKLIN
JACKSON
WILLIAMSON
Legend
1997 Annual PM2.5 NAA
Study Area
PM2.5 Monitor > 12.0 ug/m3
2011 Reported Emissions
100 - 500 TPY
500 - 1,000 TPY
1,000 - 5,000 TPY
5,000 - 10,000 TPY
Greater than 10,000 TPY
N
0 5 10 20 Miles

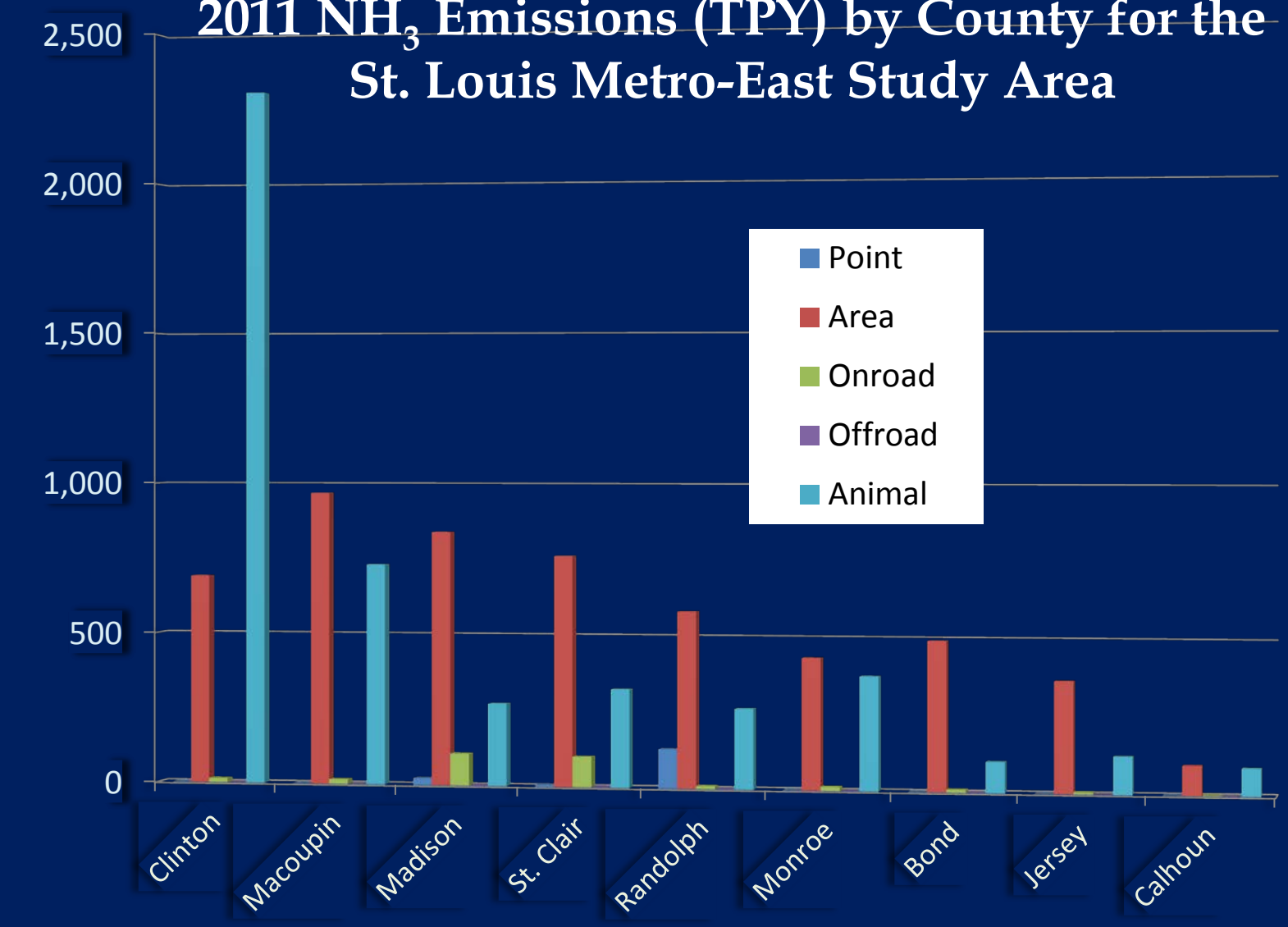
# 2011 VOC Emissions (TPY) by County for the Metro-East St. Louis Study Area




| County | Point | Area | Onroad | Offroad | Total TPY |
|---|---|---|---|---|---|
| **Madison** | 2,985.15 | 3,230.54 | 1,762.02 | 1,059.03 | 9,036.73 |
| **St. Clair** | 537.71 | 2,924.06 | 1,673.50 | 714.89 | 5,850.16 |
| **Randolph** | 363.19 | 595.13 | 177.59 | 293.41 | 1,429.31 |
| **Macoupin** | 2.18 | 878.72 | 278.42 | 265.91 | 1,425.22 |
| **Clinton** | 208.70 | 623.59 | 253.05 | 338.31 | 1,423.65 |
| **Monroe** | 15.05 | 514.86 | 232.92 | 182.31 | 945.14 |
| **Bond** | 25.43 | 381.36 | 180.68 | 164.06 | 751.52 |
| **Jersey** | 7.44 | 377.85 | 129.21 | 166.99 | 681.49 |
| **Calhoun** | 0.07 | 183.88 | 25.27 | 109.44 | 318.66 |

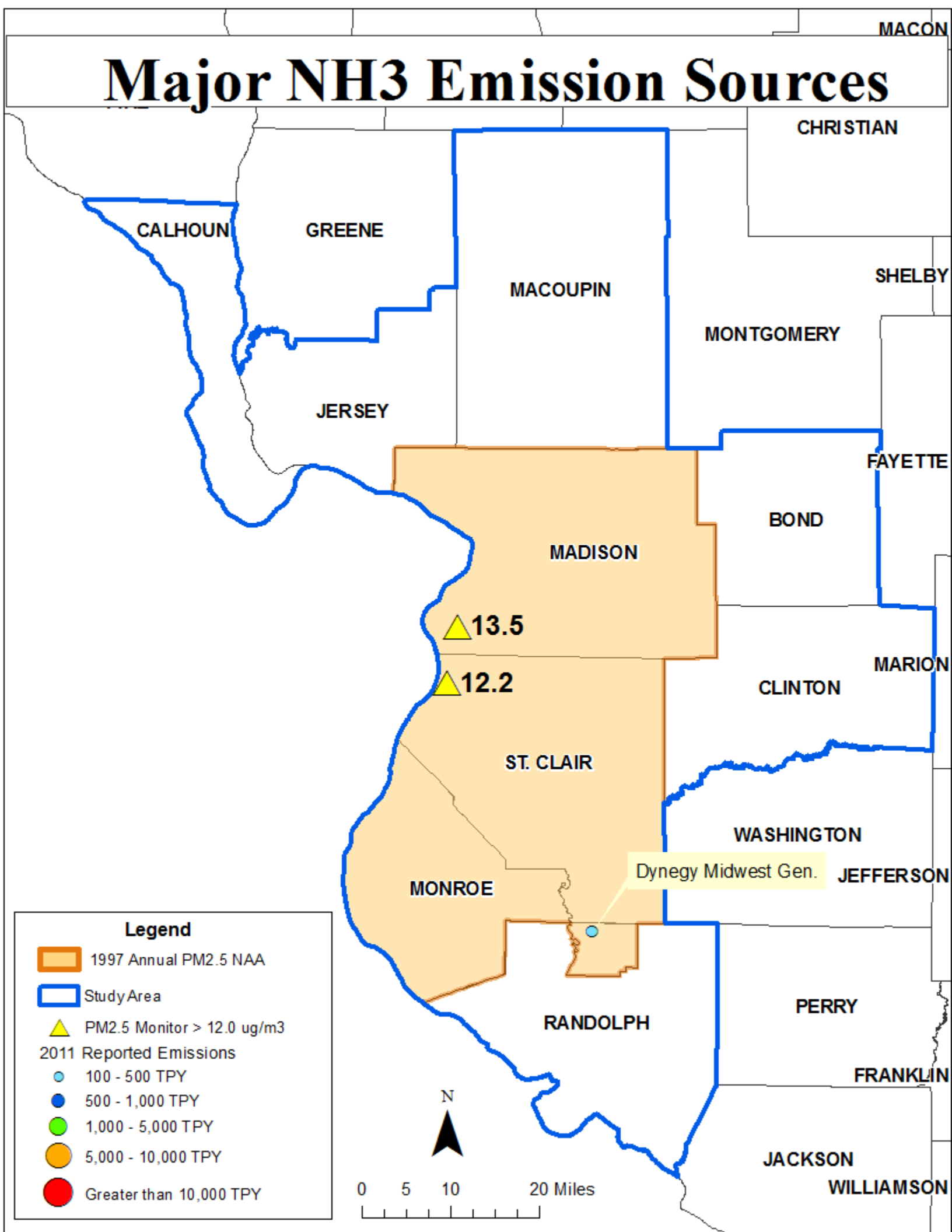

Major VOC Emission Sources
MACON
CHRISTIAN
CALHOUN
GREENE
MACOUPIN
SHELBY
MONTGOMERY
JERSEY
FAYETTE
BOND
ConocoPhillips Co.
MADISON
Explorer Pipeline Co.
U.S. Steel Granite City
13.5
12.2
CLINTON
MAR
Natural Gas Pipeline Co.
ST. CLAIR
WASHINGTON
Dynegy Midwest Gen.
JEFFERSON
MONROE
PERRY
RANDOLPH
FRANKLIN
JACKSON
WILLIAMSON
Legend
1997 Annual PM2.5 NAA
Study Area
PM2.5 Monitor > 12.0 ug/m3
2011 Reported Emissions
100 - 500 TPY
500 - 1,000 TPY
1,000 - 5,000 TPY
5,000 - 10,000 TPY
Greater than 10,000 TPY
N
0 5 10 20 Miles

# 2011 $NH_3$ Emissions (TPY) by County for the St. Louis Metro-East Study Area




| County | Point | Area | Onroad | Offroad | Animal | Total TPY |
|---|---|---|---|---|---|---|
| **Clinton** | 0.31 | 691.37 | 14.31 | 0.64 | 2,304.34 | 3,010.98 |
| **Macoupin** | 0.12 | 968.66 | 15.72 | 0.77 | 731.52 | 1,716.80 |
| **Madison** | 23.49 | 839.95 | 106.17 | 2.21 | 273.08 | 1,244.90 |
| **St. Clair** | 6.29 | 762.42 | 100.90 | 1.75 | 324.62 | 1,195.97 |
| **Randolph** | 129.43 | 581.80 | 10.13 | 1.02 | 265.02 | 987.39 |
| **Monroe** | 0.16 | 433.66 | 13.52 | 0.92 | 375.31 | 823.57 |
| **Bond** | 0.40 | 492.85 | 10.07 | 0.41 | 101.81 | 605.54 |
| **Jersey** | 0.0 | 366.02 | 7.36 | 0.39 | 124.10 | 497.86 |
| **Calhoun** | 0.00 | 97.39 | 1.44 | 0.34 | 90.88 | 190.05 |

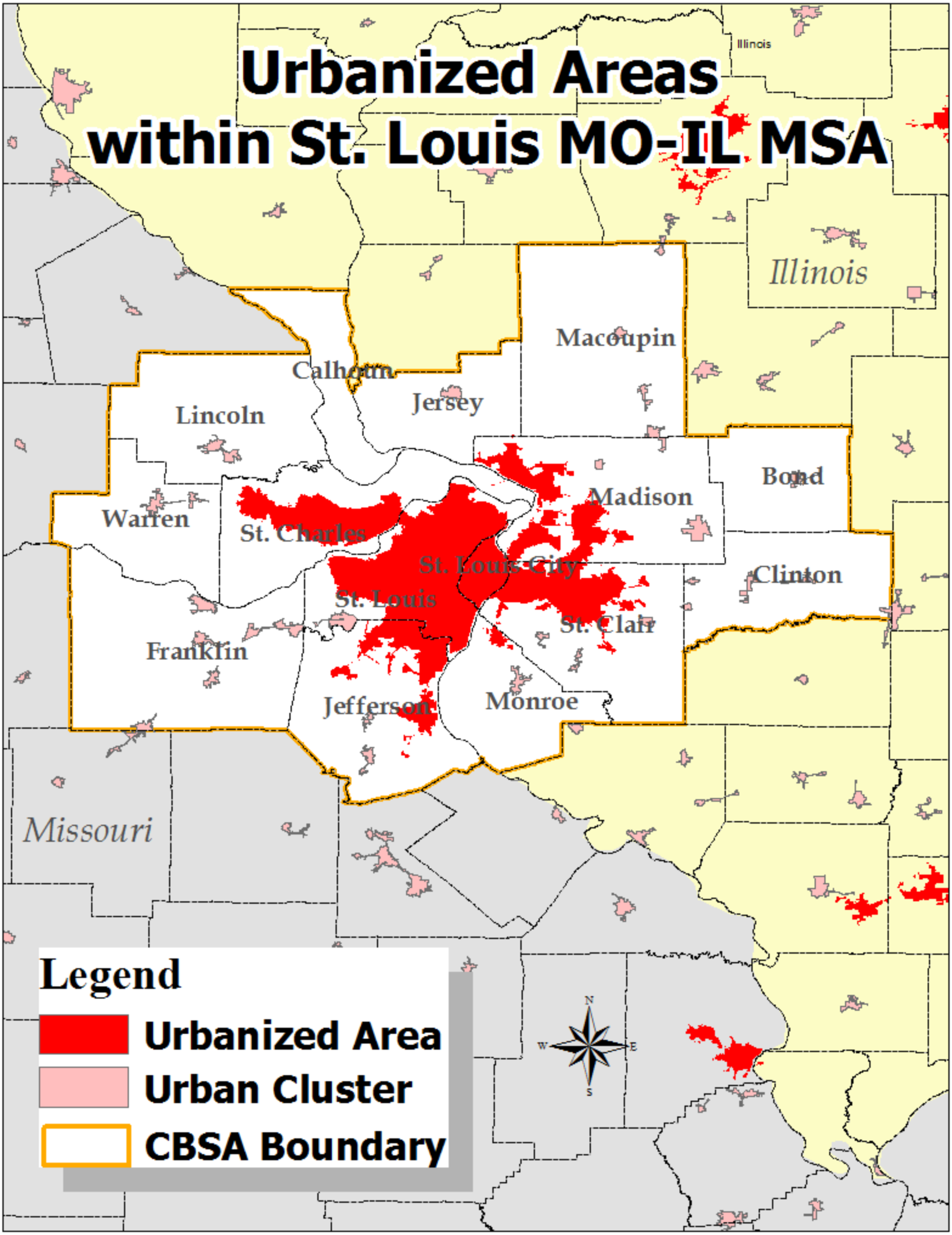
# Major NH3 Emission Sources



Emissions & Emissions Related Data

# Emission Related Data

- What type of Area is it?
  - Large Metropolitan Area
  - How many counties make up the Study Area?
    - Metropolitan Statistical Area (MSA)
    - Core Based Statistical Area (CBSA)
  - How do the counties in the study area compare in terms of emissions related data
    - Population Density and Degree of Urbanization
    - Traffic and Commuting Patterns

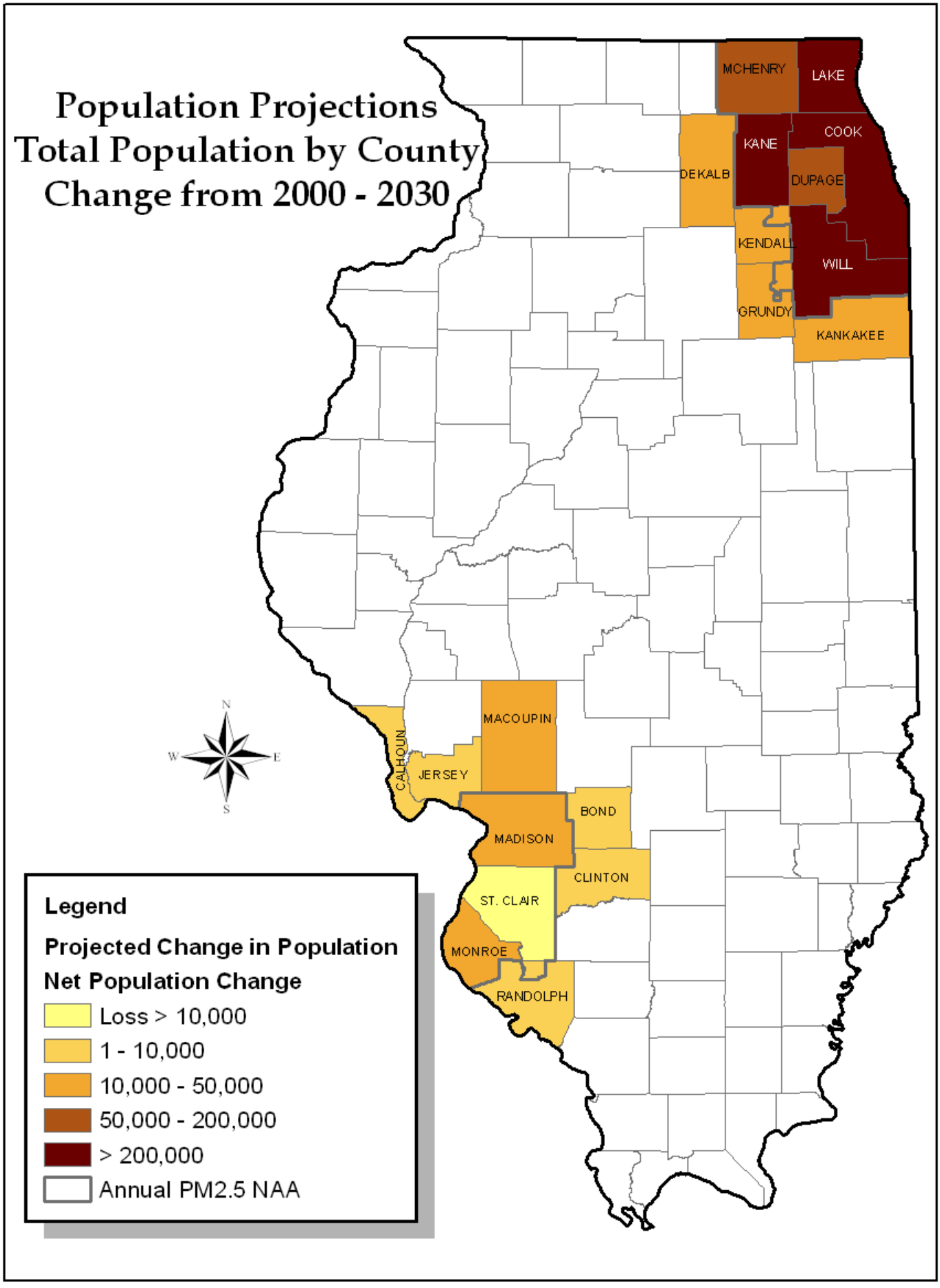

Urbanized Areas
within St. Louis MO-IL MSA
Illinois
Illinois
Macoupin
Calhoun
Jersey
Lincoln
Bond
Madison
Warren
St. Charles
St. Louis City
Clinton
St. Louis
St. Clair
Franklin
Jefferson
Monroe
Missouri
Legend
Urbanized Area
Urban Cluster
CBSA Boundary
N
W
E
S

# Population Statistics
# 2010 Population - Percent of MSA

| State | County | 2010 Population | Land Area (Sq. Miles) | Population Density (Persons per sq. mile) | Percent of MSA | Cumulative Percent |
|---|---|---|---|---|---|---|
| **MO** | St. Louis County | 999,026 | 507.805 | 1967 | 35.9% | 35.9% |
| **MO** | St. Charles | 361,745 | 560.421 | 645 | 13.0% | 48.9% |
| **MO** | St. Louis City | 319,102 | 61.924 | 5153 | 11.5% | 60.3% |
| **IL** | St. Clair | 270,380 | 663.808 | 407 | 9.7% | 70.0% |
| **IL** | Madison | 269,282 | 725.018 | 371 | 9.7% | 79.7% |
| **MO** | Jefferson | 219,092 | 656.796 | 334 | 7.9% | 87.6% |
| **MO** | Franklin | 101,535 | 922.811 | 110 | 3.6% | 91.2% |
| **IL** | Lincoln | 52,684 | 630.49 | 84 | 1.9% | 93.1% |
| **MO** | Macoupin | 47,791 | 863.574 | 55 | 1.7% | 94.8% |
| **IL** | Clinton | 37,837 | 474.233 | 80 | 1.4% | 96.2% |
| **IL** | Warren | 32,564 | 431.314 | 75 | 1.2% | 97.4% |
| **MO** | Monroe | 27,619 | 388.292 | 71 | 1.0% | 98.4% |
| **IL** | Jersey | 22,950 | 369.157 | 62 | 0.8% | 99.2% |
| **IL** | Bond | 17,768 | 380.203 | 47 | 0.6% | 99.8% |
| **IL** | Calhoun | 5,089 | 253.816 | 20 | 0.2% | 100.0% |

# Population Statistics
# 2012 Population - Percent of Total Study Area

| County | 2012 Population | Land Area (Sq. Miles) | Population Density (Persons per sq. mile) | Percent of Study Area | Cumulative Percent | Rank |
|---|---|---|---|---|---|---|
| St. Clair | 268,858 | 664 | 405 | 36.6% | 36.6% | 1 |
| Madison | 267,883 | 725 | 369 | 36.5% | 73.2% | 2 |
| Macoupin | 47,231 | 864 | 55 | 6.4% | 79.6% | 3 |
| Clinton | 38,061 | 474 | 80 | 5.2% | 84.8% | 4 |
| Monroe | 33,357 | 388 | 86 | 4.5% | 89.3% | 5 |
| Randolph | 32,956 | 578 | 57 | 4.5% | 93.8% | 6 |
| Jersey | 22,742 | 369 | 62 | 3.1% | 96.9% | 7 |
| Bond | 17,644 | 380 | 46 | 2.4% | 99.3% | 8 |
| Calhoun | 5,014 | 254 | 20 | 0.7% | 100.0% | 9 |

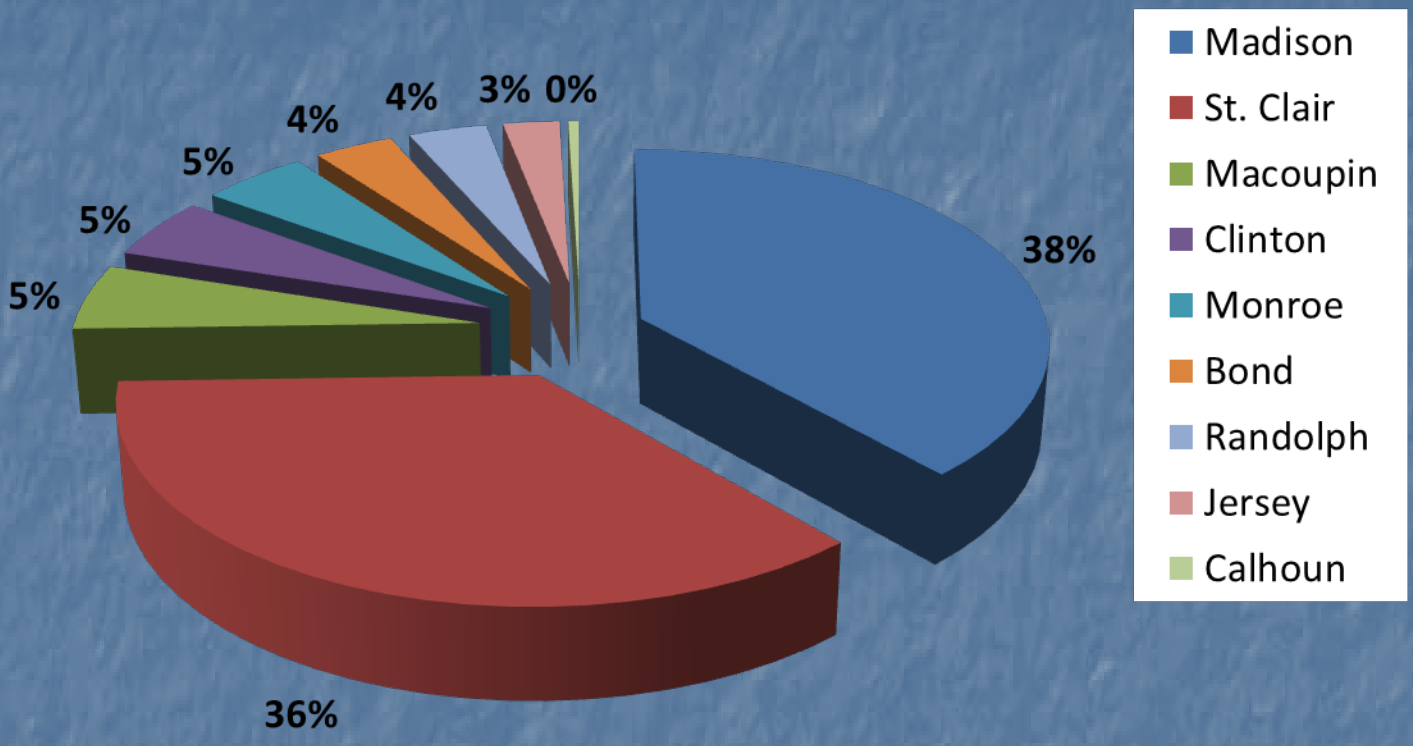

Population Projections
Total Population by County
Change from 2000 - 2030
MCHENRY
LAKE
COOK
KANE
DUPAGE
DEKALB
KENDALL
WILL
GRUNDY
KANKAKEE
MACOUPIN
CALHOUN
JERSEY
BOND
MADISON
CLINTON
ST. CLAIR
MONROE
RANDOLPH
N
W
E
S
Legend
Projected Change in Population
Net Population Change
Loss > 10,000
1 - 10,000
10,000 - 50,000
50,000 - 200,000
> 200,000
Annual PM2.5 NAA

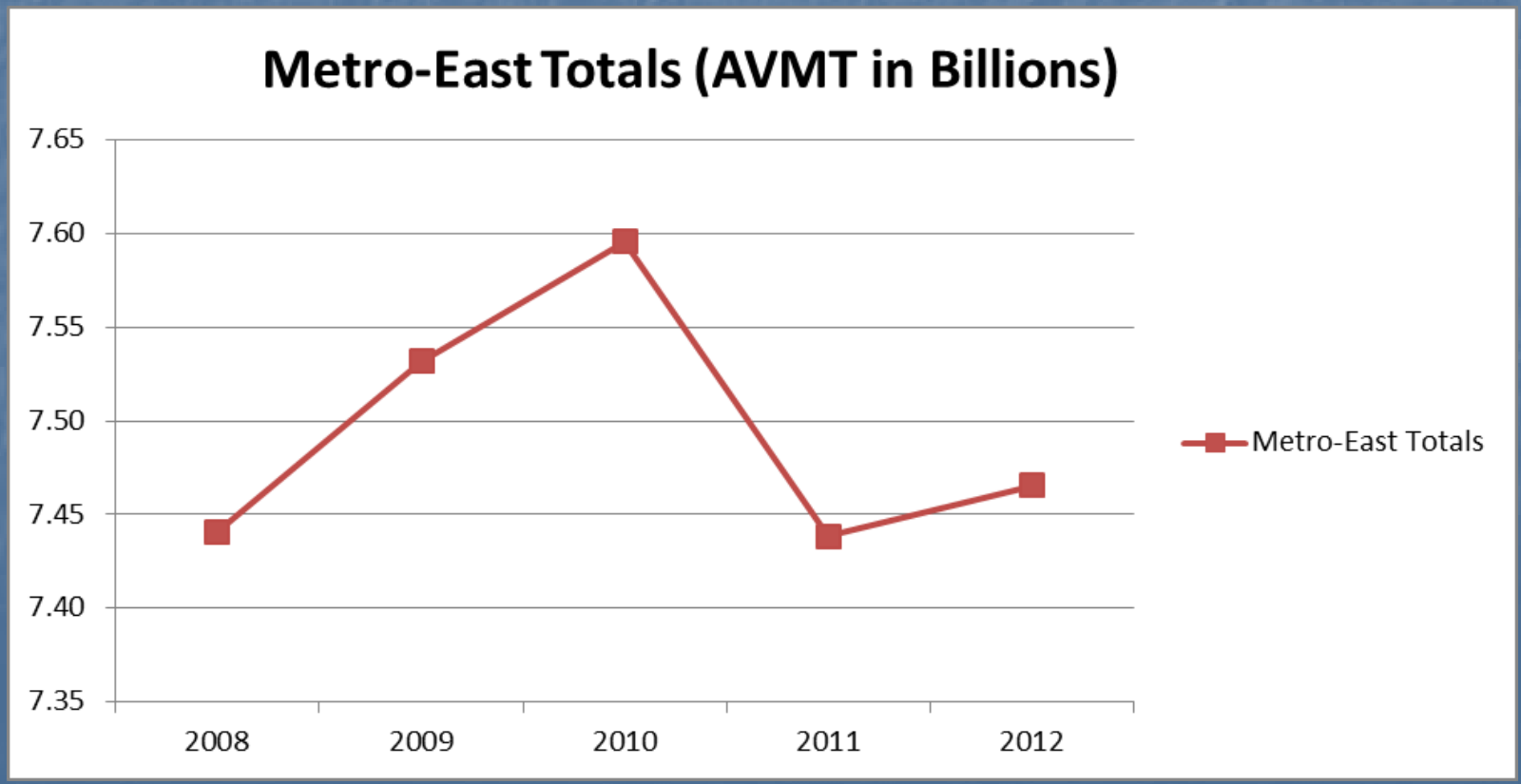
# Illinois Travel Statistics 2012

## Metro-East St. Louis Study Area

| Metro-East St. Louis Study Area | Annual Vehicle Miles Traveled (AVMT) |
|---|---|
| Madison | 2,871,571,136 |
| St. Clair | 2,692,290,691 |
| Macoupin | 405,479,774 |
| Clinton | 376,916,651 |
| Monroe | 359,252,144 |
| Bond | 266,809,047 |
| Randolph | 265,392,190 |
| Randolph (Baldwin Twp.) | 15,923,531 |
| Jersey | 191,487,505 |
| Calhoun | 36,525,557 |

# Percent by County - Annual VMT in the Metro-East Study Area



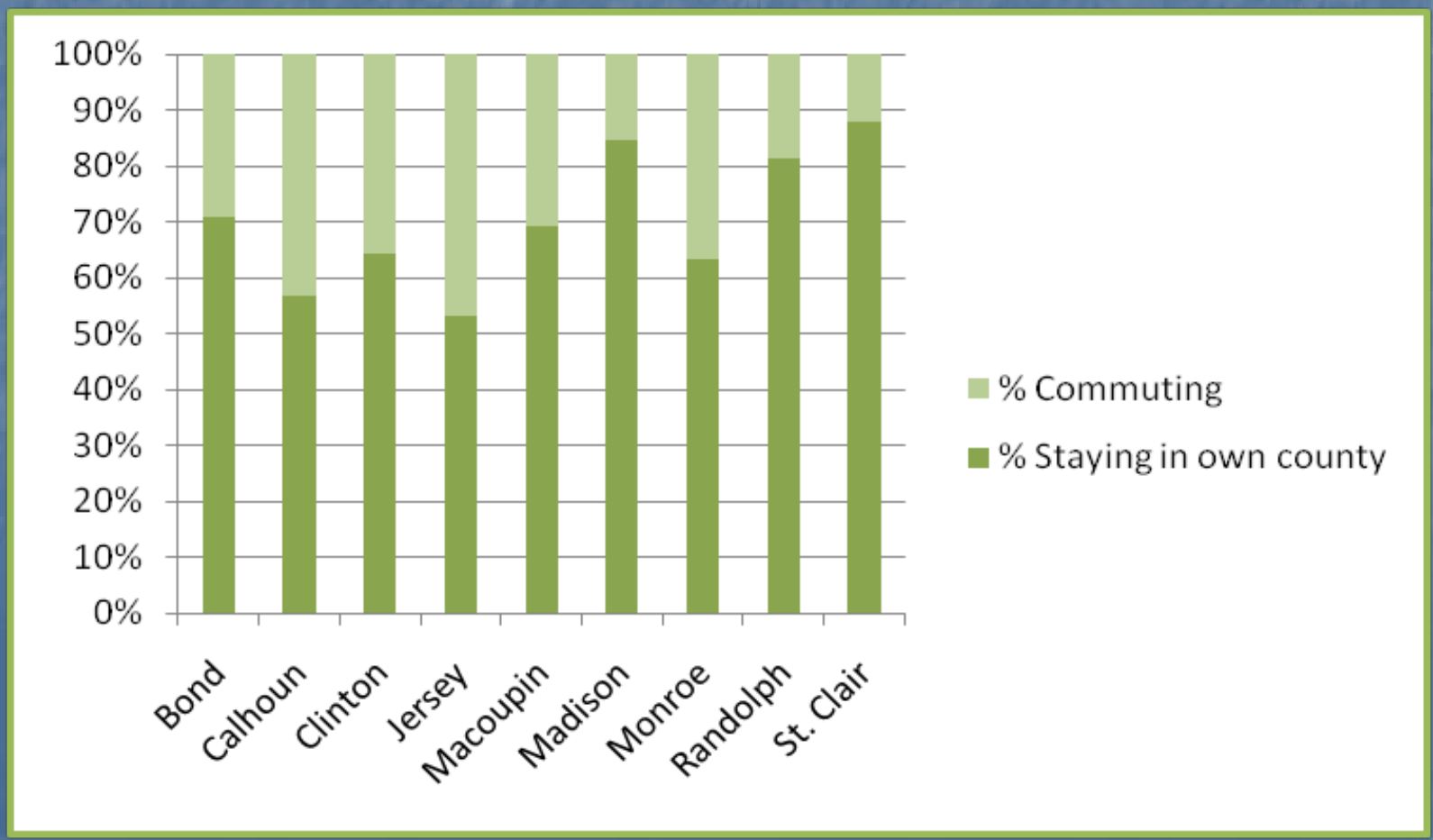



# Residence County to Workplace Statistics

## St. Louis Study Area

| RESIDENCE COUNTY | % Staying in own County | % Commuting |
|---|---|---|
| Bond | *71.0%* | *29.0%* |
| Calhoun | *56.9%* | *43.1%* |
| Clinton | *64.3%* | *35.7%* |
| Jersey | *53.3%* | *46.7%* |
| Macoupin | *69.4%* | *30.6%* |
| ***Madison*** | *84.8%* | *15.2%* |
| **Monroe** | *63.5%* | *36.5%* |
| **Randolph** | *81.4%* | *18.6%* |
| ***St. Clair*** | *88.0%* | *12.0%* |

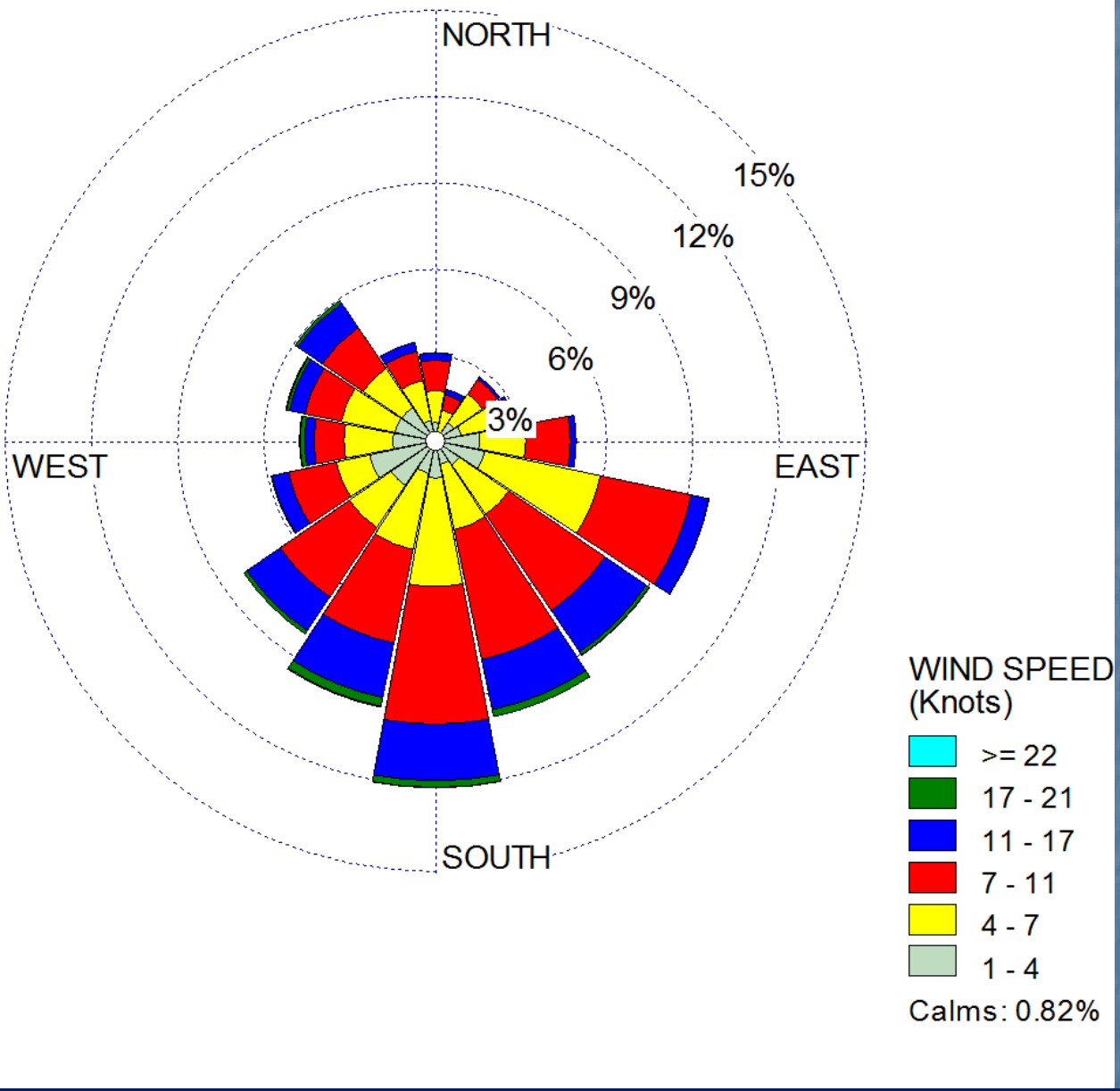
## Percent of Total 2006-2010 Commuting Patterns within St. Louis Study Area



# St. Louis Study Area - High Days

## Pollution Rose for Granite City
## 2010 - 2012
## Days > 15 ug/m3

Meteorology

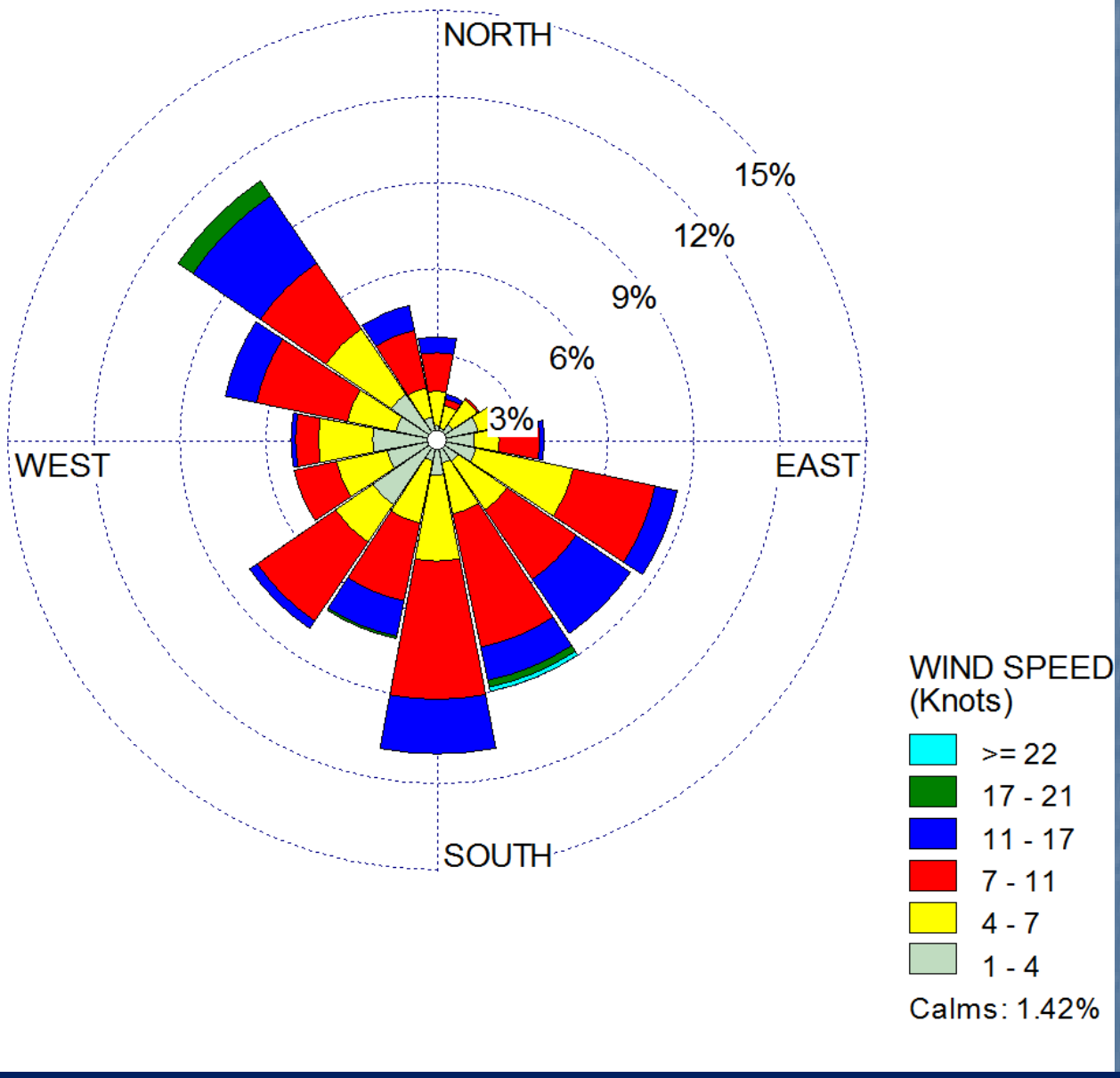



- Typical Wind Patterns
  - Percentage of time the wind blew from each direction on days when PM2.5 concentrations were > 15 ug/m3 (149 days, Lambert International Airport)

# St. Louis Study Area - High Days

## Pollution Rose for East St. Louis
## 2010 - 2012
## Days > 15 ug/m3

Meteorology

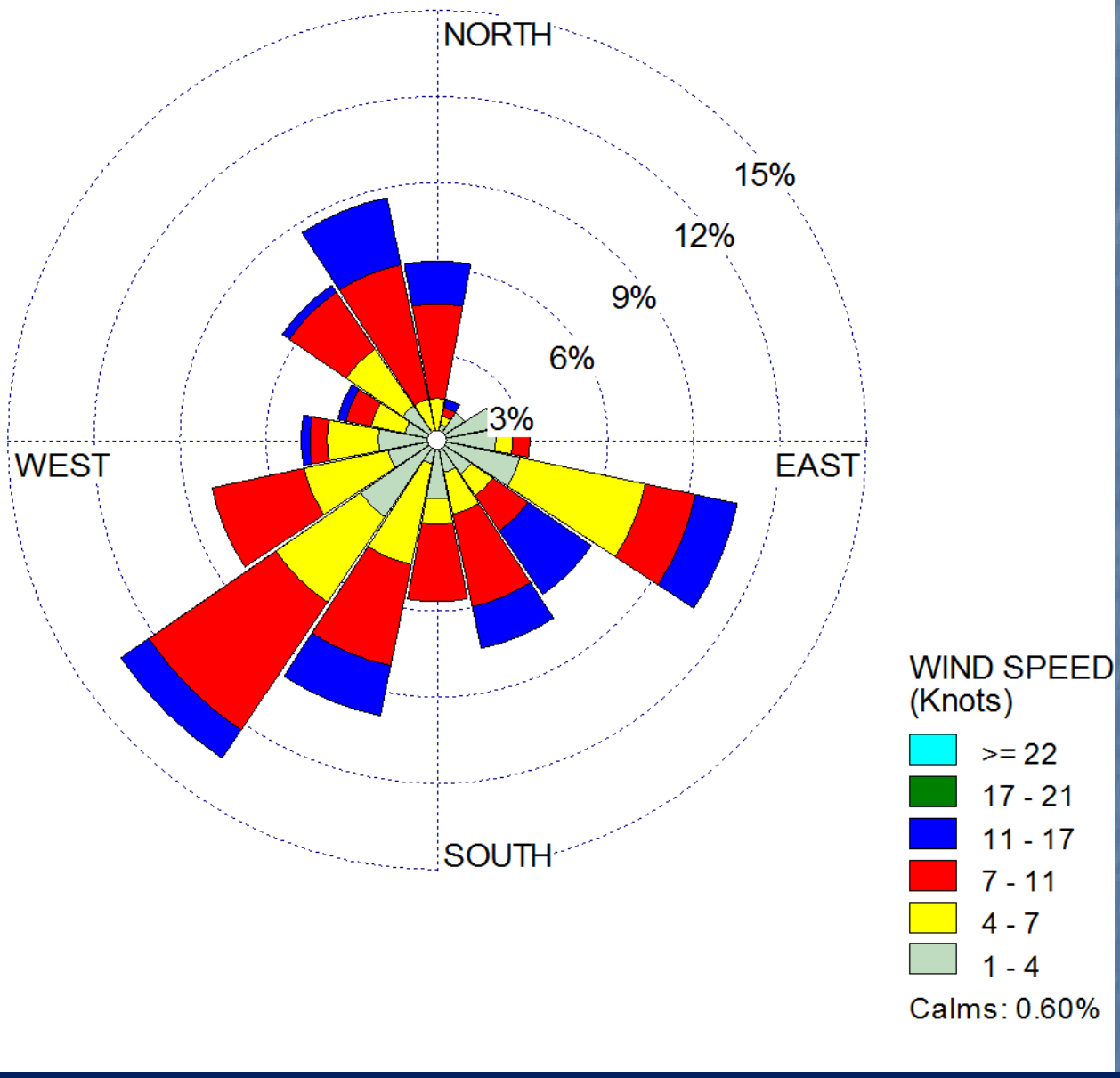



- Typical Wind Patterns
  - Percentage of time the wind blew from each direction on days when PM2.5 concentrations were > 15 ug/m3 (53 days, Lambert International)

# St. Louis Study Area - High Days

## Pollution Rose for East St. Louis
## 2010 - 2012
## Days > 20 ug/m3

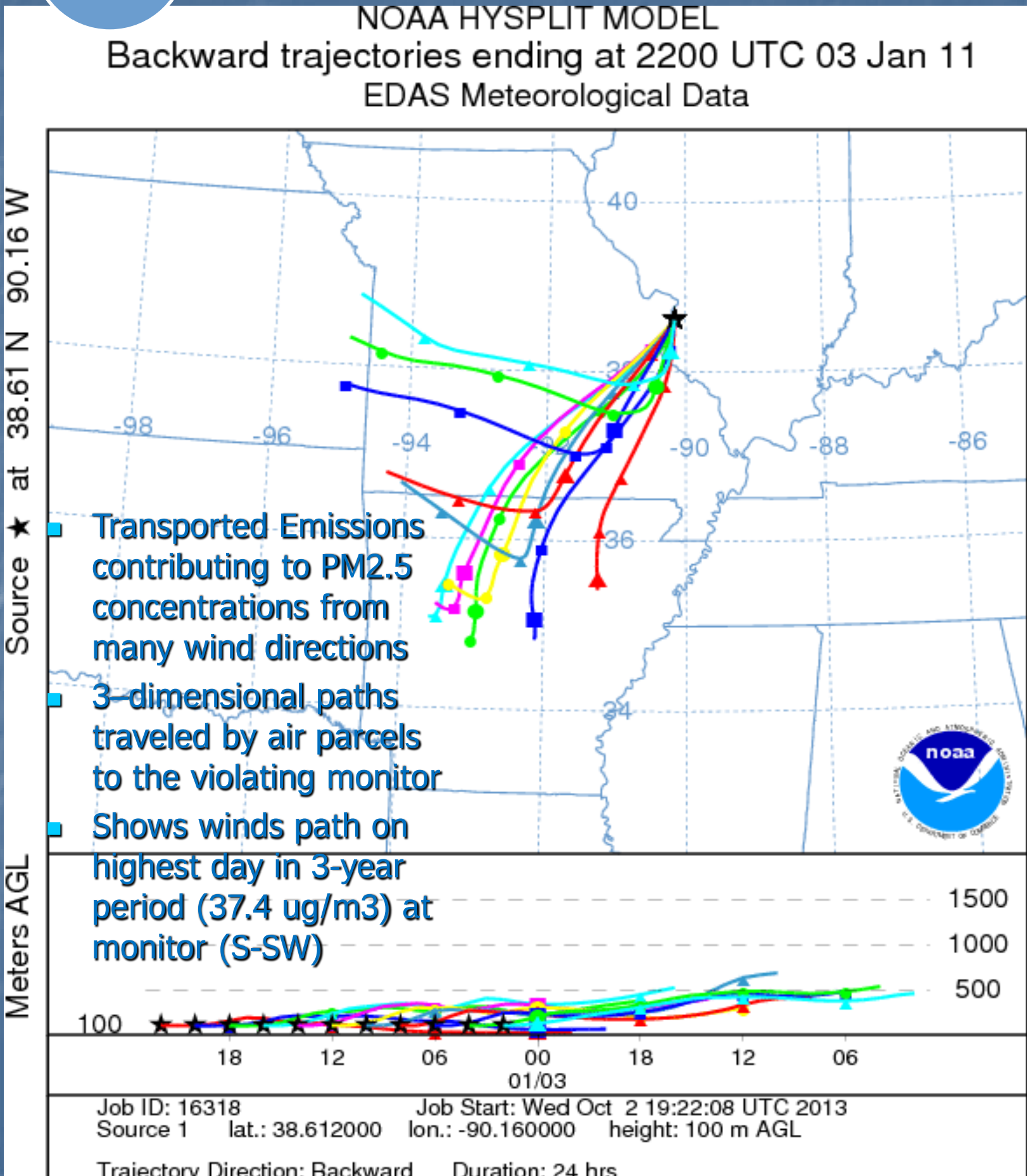
Meteorology




- Typical Wind Patterns
  - Percentage of time the wind blew from each direction on days when PM2.5 concentrations were > 20 ug/m3 (14 days, Lambert International)

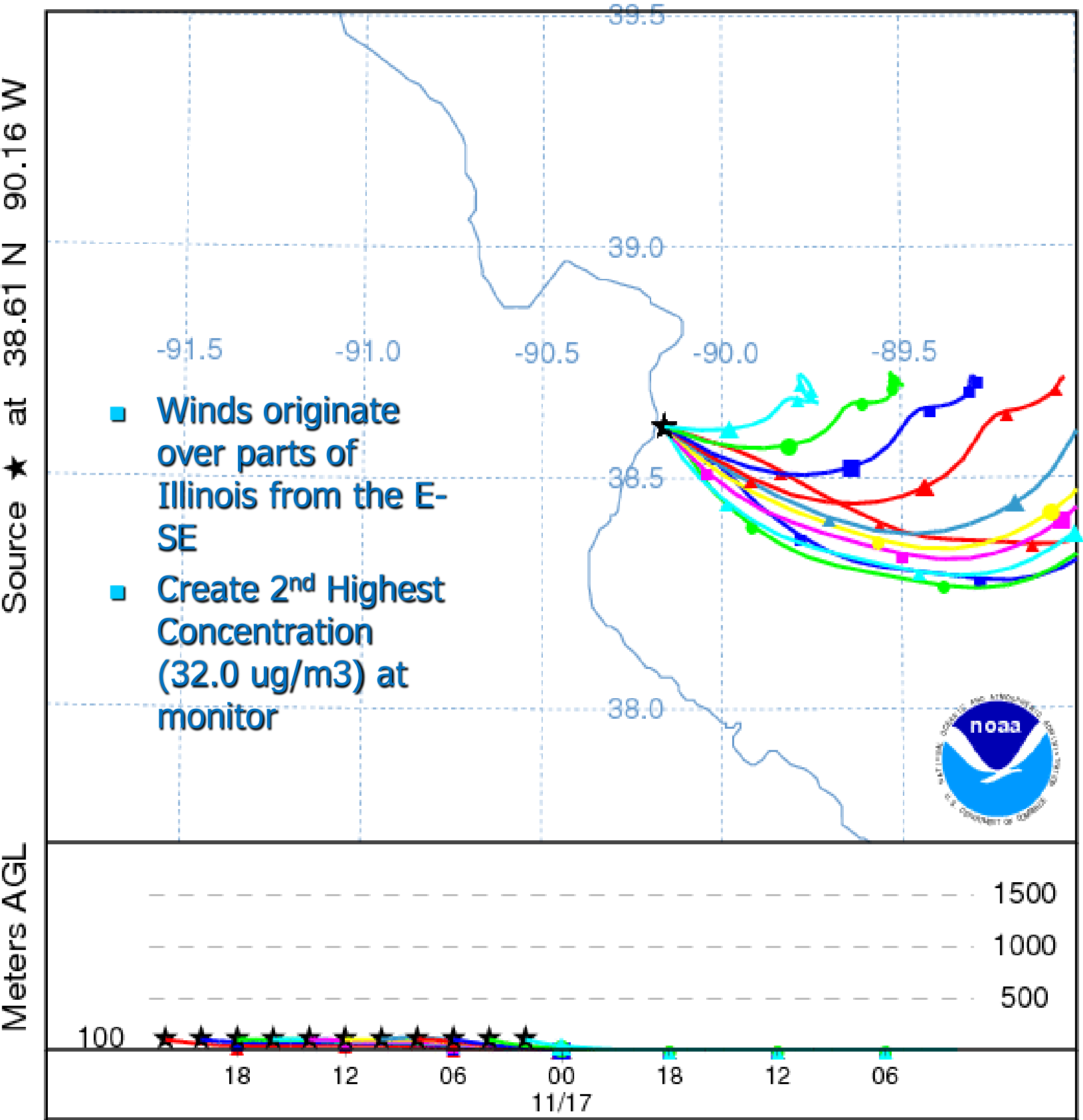
Meteorology

# HYSPLIT Trajectory Paths




- Transported Emissions contributing to PM2.5 concentrations from many wind directions
- 3-dimensional paths traveled by air parcels to the violating monitor
- Shows winds path on highest day in 3-year period (37.4 ug/m3) at monitor (S-SW)

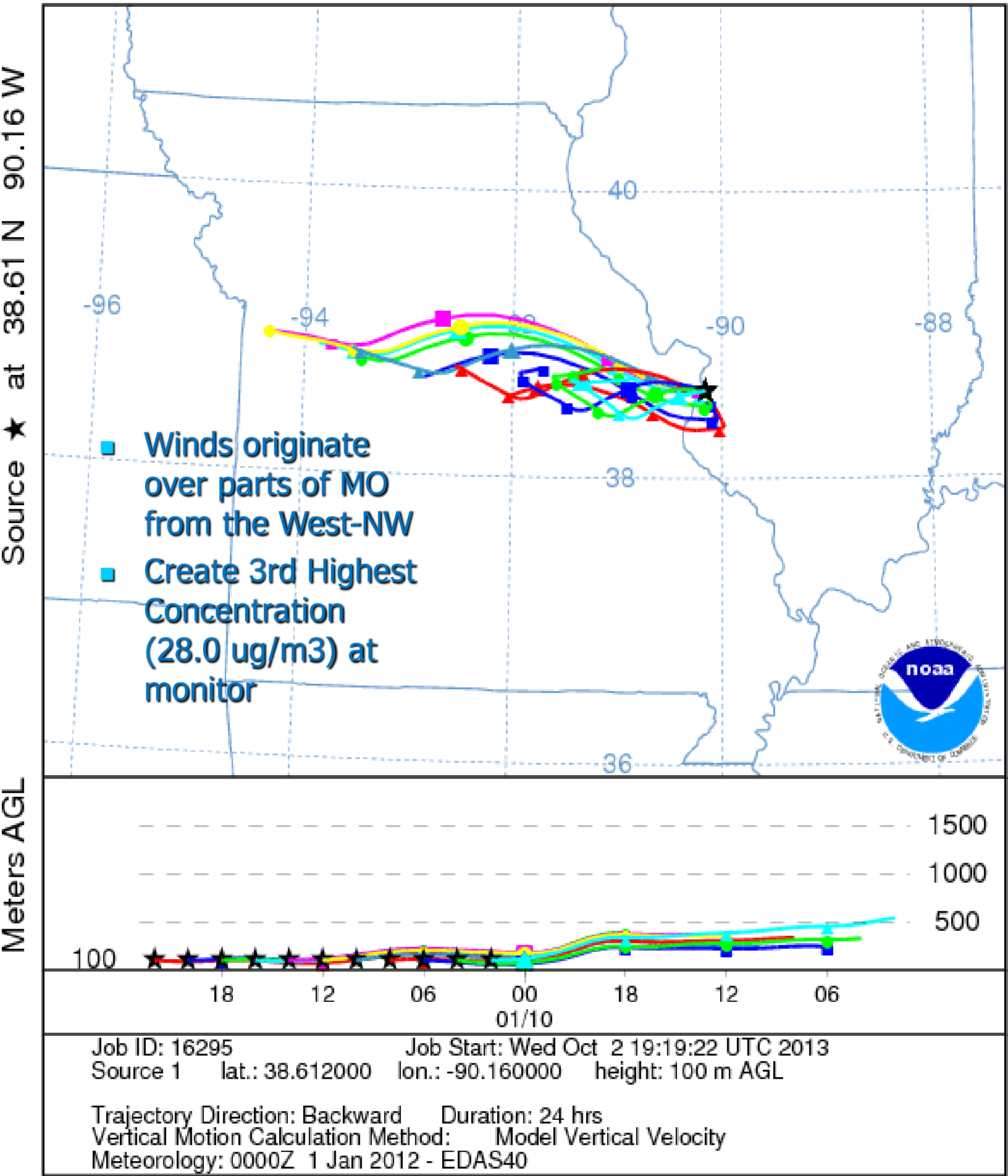
NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 17 Nov 12
EDAS Meteorological Data




Job ID: 16251 Job Start: Wed Oct 2 19:14:57 UTC 2013
Source 1 lat.: 38.612000 lon.: -90.160000 height: 100 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 16 Nov 2012 - EDAS40

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 10 Jan 12
EDAS Meteorological Data



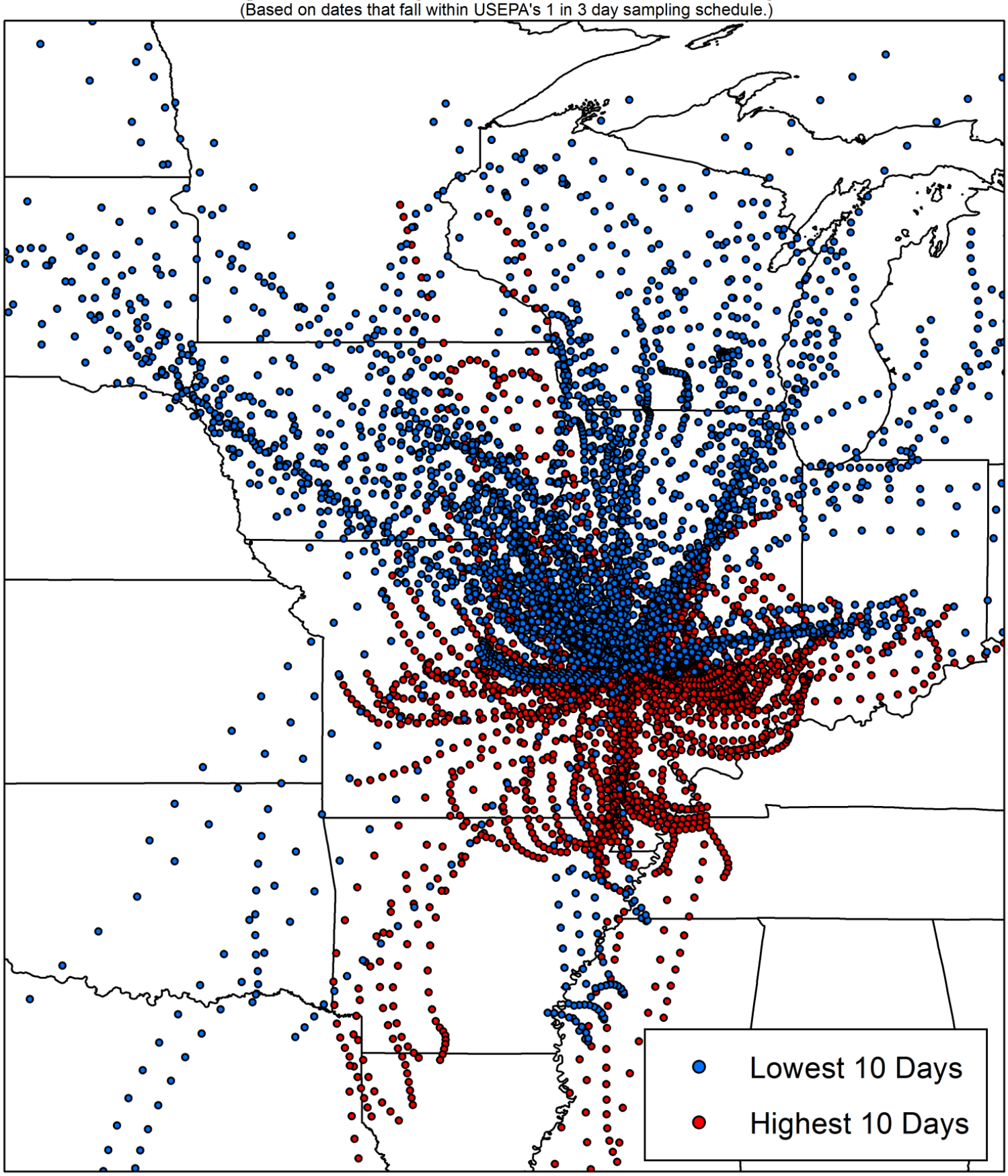

Job ID: 16295 Job Start: Wed Oct 2 19:19:22 UTC 2013
Source 1 lat.: 38.612000 lon.: -90.160000 height: 100 m AGL

Trajectory Direction: Backward Duration: 24 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 1 Jan 2012 - EDAS40

# Granite City-Fire Station #1
# 2010-2012 HYSPLIT Trajectory End Points

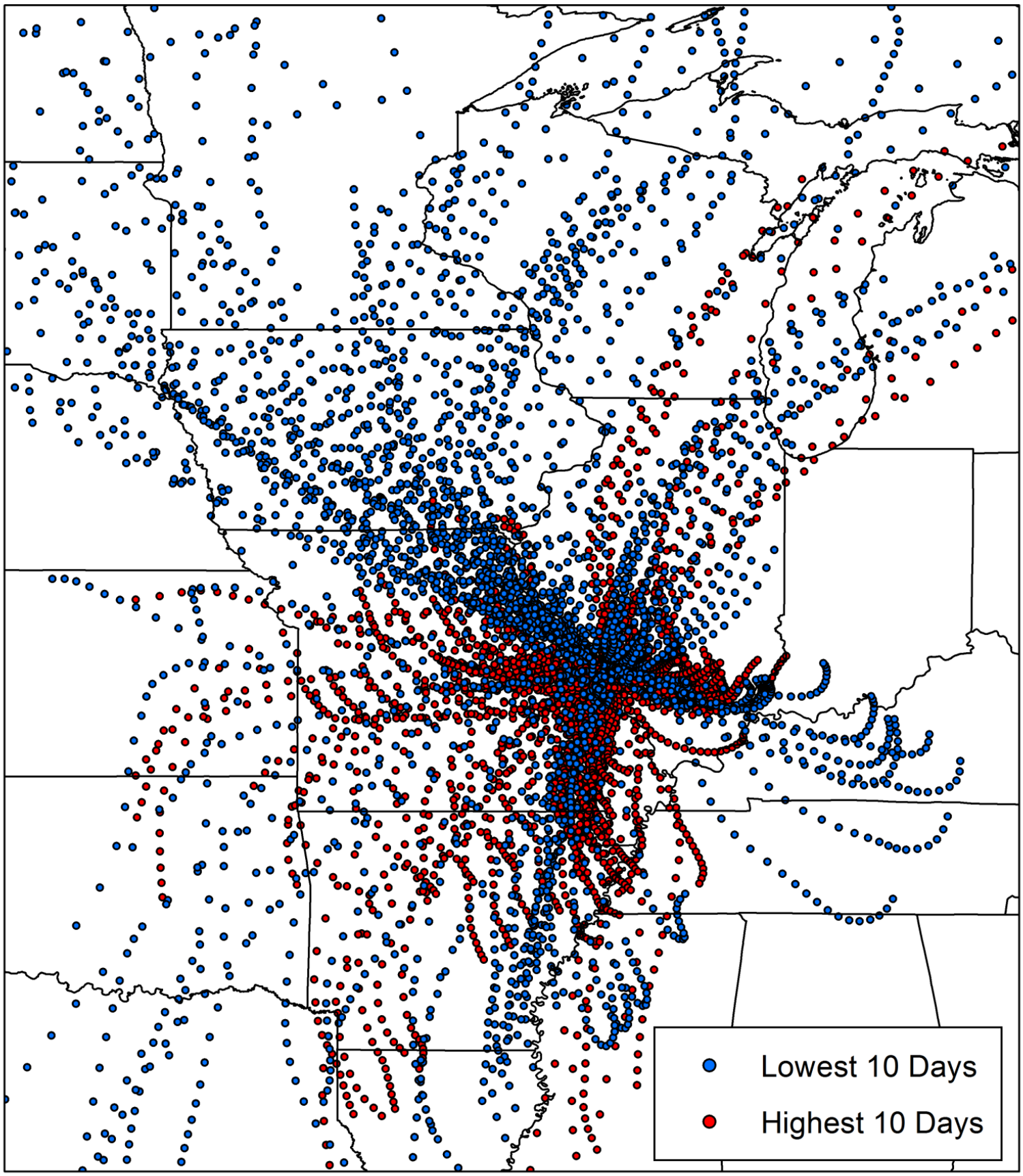
## Highest 10 Days versus Lowest 10 Days

(Based on dates that fall within USEPA's 1 in 3 day sampling schedule.)



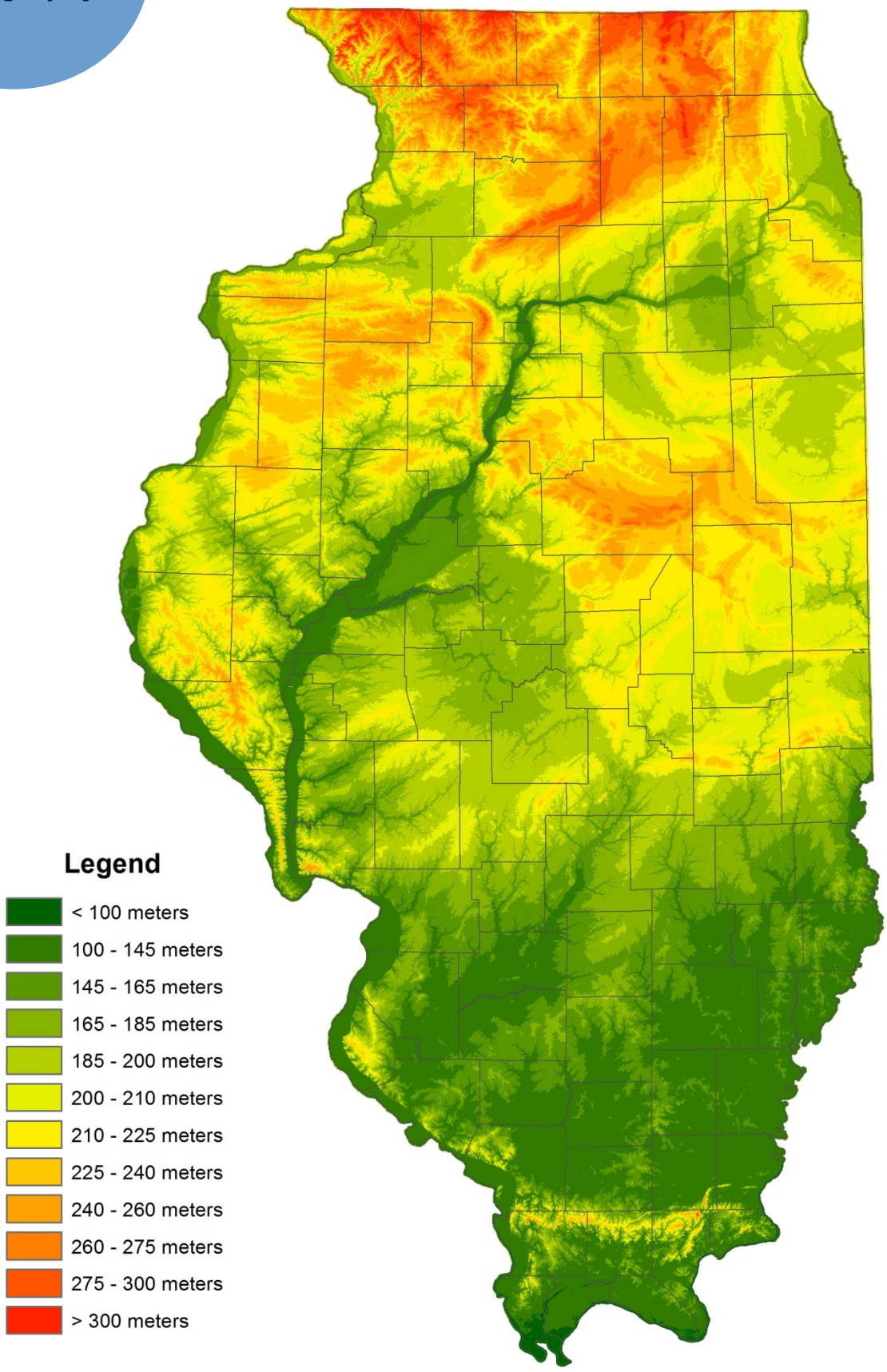
# East St. Louis
# 2010-2012 HYSPLIT Trajectory End Points

## Highest 10 Days versus Lowest 10 Days



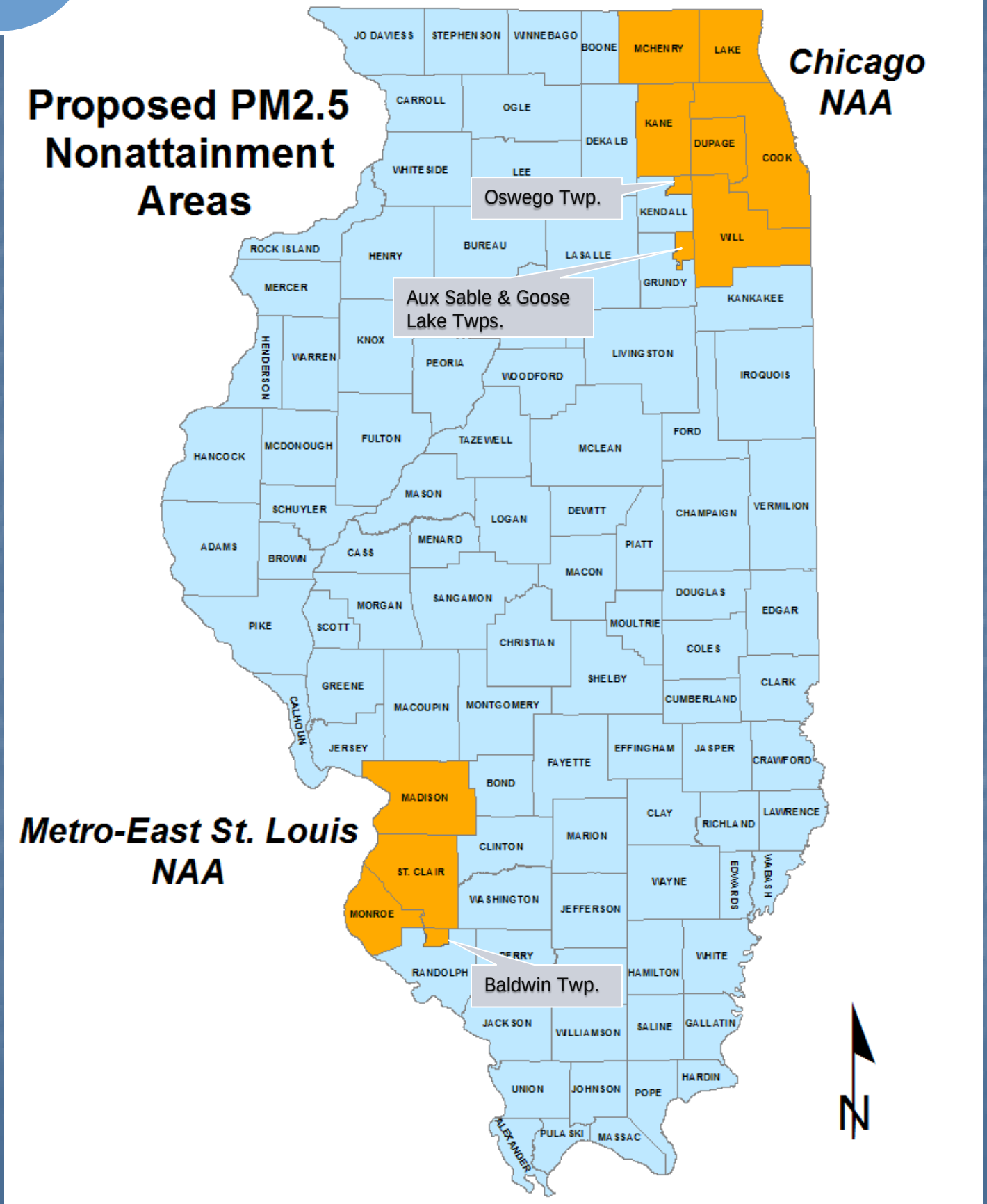
Geography / Topography

# Topography



Jurisdictional Boundaries

# Jurisdictional Boundaries



# IEPA Recommendation

- For Chicago, Illinois intends to propose the following counties/townships for the Annual PM2.5 NAA:

  Cook DuPage
  Kane Lake
  Will McHenry
  Kendall (Oswego)
  Grundy (Aux Sable & Goose Lake)

- For Metro-East, Illinois intends to propose the same Annual PM2.5 NAA boundary:

  Madison
  Monroe Randolph (Baldwin twp)
  St. Clair

- All Other Counties: Attainment/Unclassifiable