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**Planning and Coordinating  
The  
Eastern Supersites Program  
July 2001 Intensive  
Monitoring Period  
(ESP01)**

**Paul Solomon & Phil Hopke**

## Develop a Regional Air Quality Database to Support:

### & **Data Analysis**

- Transport
- Boundary Conditions
- Understanding Better Aloft Chemistry and Dynamics

### ➤ **Regional and Sub-continental Scale Modeling**

### ➤ **Observationally Based Models**

### ➤ **Provide Outer Domain for Neighborhood Scale Modeling**

## **Studies Coordinating with ESP01 to Date (3-15-01)**

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### **Southeast US**

1. Houston Supersites
2. TVA PM2.5 Partnership
3. Fall Line Air Quality Study
4. Assessment of Spatial Aerosol Composition in Atlanta
5. SEARCH
6. ARIES
7. Brenton Air Quality Study (3 Radar Profilers + surface)
8. MMS Off Shore Study (2 Radar Profilers + Surface)
9. TNRCC

### **Studies in the Midwest**

#### DOE Studies in Western PA and the Upper Ohio River Valley

10. Upper Ohio River Valley Project [Lawrenceville (Urban), Holbrook (rural)]
11. Steubenville, OH (Urban) - Steubenville Comprehensive Air Monitoring Project
12. NETL (Suburban Pittsburgh, PA) - NETL Office of Science and Technology
13. North Birmingham, AL (Urban) - Southern Fine Particulate Monitoring Project.

#### Other Studies in the Midwest

14. Lake Michigan Air Directors (2 aircraft)
15. St. Louis Supersites
16. Pittsburgh Supersites

## ***Studies Coordinating with ESP01 to Date (3-15-01)***

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### Mid Atlantic:

- 17. 17. Baltimore Supersites
- 18. 11. NE-OPS ( Philadelphia with Aircraft and LIDAR)
- 19. 12. March-Atlantic -- Ft Mead

### Northeast:




- 20. 13. NY Supersites
- 21. 14. New Hampshire Study (4 sites)
- 22. 15. Boston PM Center
- 23. 16. Toronto, Canada and Southern Ontario
- 24. 17. NY PM Center (Thurston)

### National

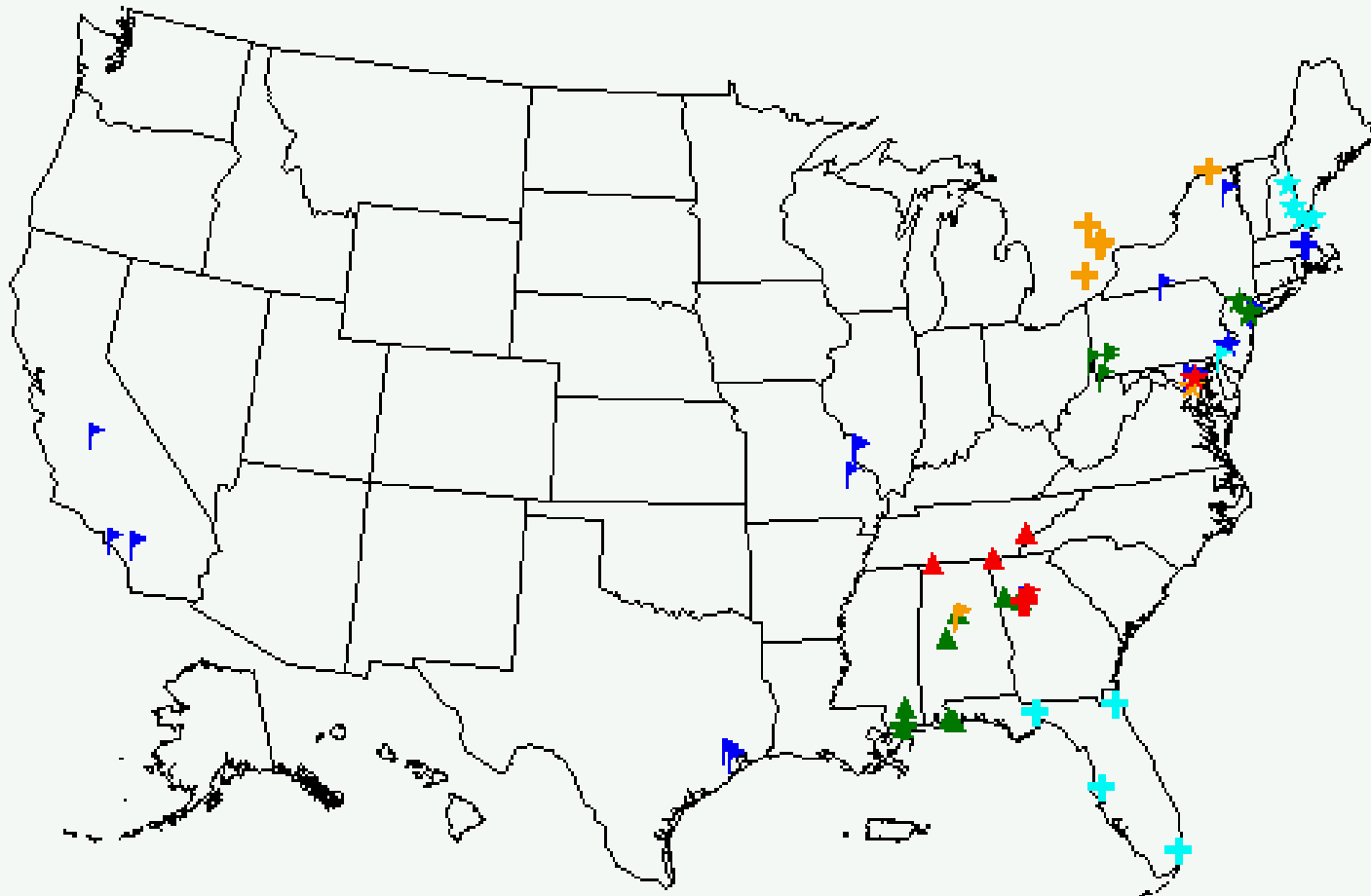
- 25. 19. NOAA - Demonstration Division Profiler Program
- 26. 20. EPA PM2.5 National FRM Network
- 27. 21. EPA PM2.5 National Chemical Speciation Network
- 28. 22. NPS/EPA PM2.5/PM10 IMPROVE Network
- 29. 23. EPA CASTNet Network
- 30. 24. EPA PAMS Network

# ESP01 Study Domain



-  Phase I
-  Phase II
-  Both Phases

## All ESP01 and Supersites Locations



## Gases

- & Ozone, CO, SO<sub>2</sub>, Nitrogen oxides, Nitric Acid, Ammonia, oxidants, NMHC, variety of VOC

## PM Sampling for Mass/Chemistry-Discrete

- & TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, PM<sub>10-2.5</sub> (Coarse Particles)
  - Y Mass, Ions, Elements, OC, EC, Absorption, Denuded Nitrate and OC
  - Y OC Speciation, Cytokine Endotoxins, Spores..., Bioaerosols
  - Y Particle Morphology, Air Toxins, Hg

\*Measured at least at one site

# Types Of Measurements\* (Cont)

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## Continuous PM

- & Mass (TEOM 30C, TEOM, BAM, CAMM, RAMS)
- & Nitrate (Flash, Denuder Diff)
- & Sulfate (Flash, Continuous Thermal {Allen})
- & OC/EC (R&P, ADI, METONE, Sunset)
- & Elements (SEAS, HFAS/GFAA)
- & Number Concentration (ultrafines, fines, coarse)

## Organic Gases (Integrated)

- & Toxic HC, Carbonyls, Light and Heavy VOC, Aldehydes
- & PM OC Speciation
- & Cont. Particle Bound PAH



# Types Of Measurements\* (Cont)

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## Visibility Related

- & Continuous Light Scattering
- & Continuous Absorption

## PM Size & Chemistry

- & Particle Size Distribution (ultra fine to PM10)
- & MOUDI – Mass & Chemistry
- & Organic Species by Size
- & **Single Particle MS**

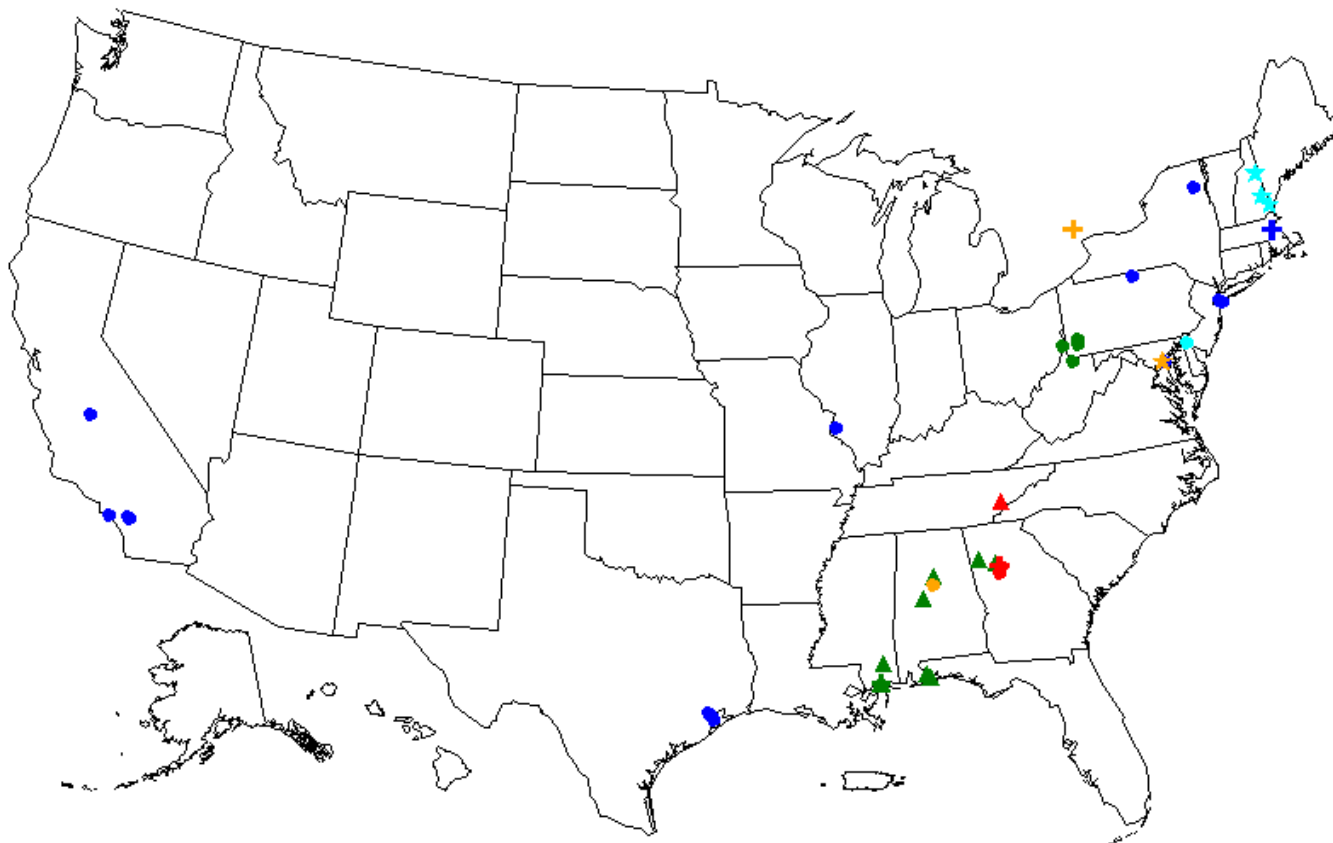
## Meteorology

- & Surface (T, WS, WD (scalar, vector), RH, SR...)
- & Aloft (WS, WD, Tv) NOAA Network of Radar Profilers & RASS + others

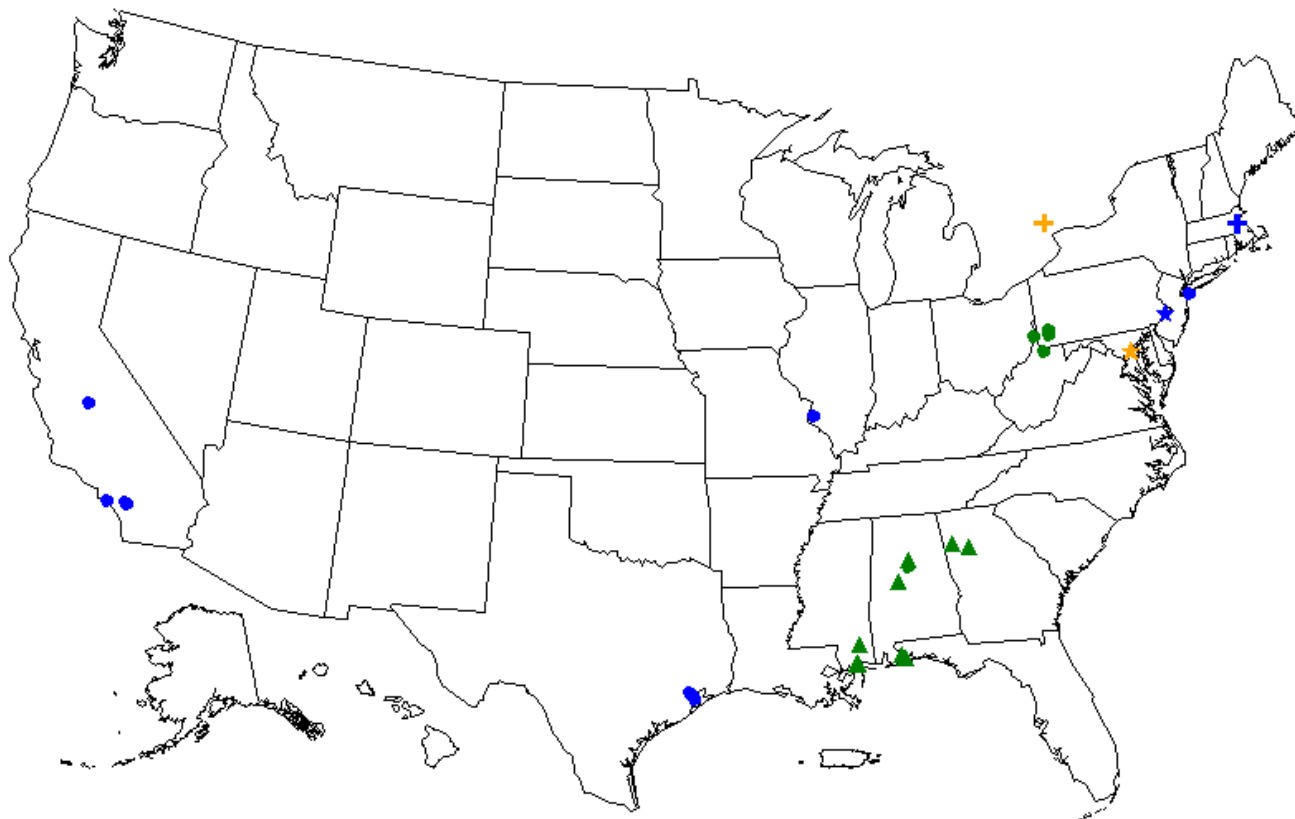
## Aircraft

- & Baseline: Ozone, Meteorology, PM Mass and Chemistry, Light Scattering by Neph or NOx

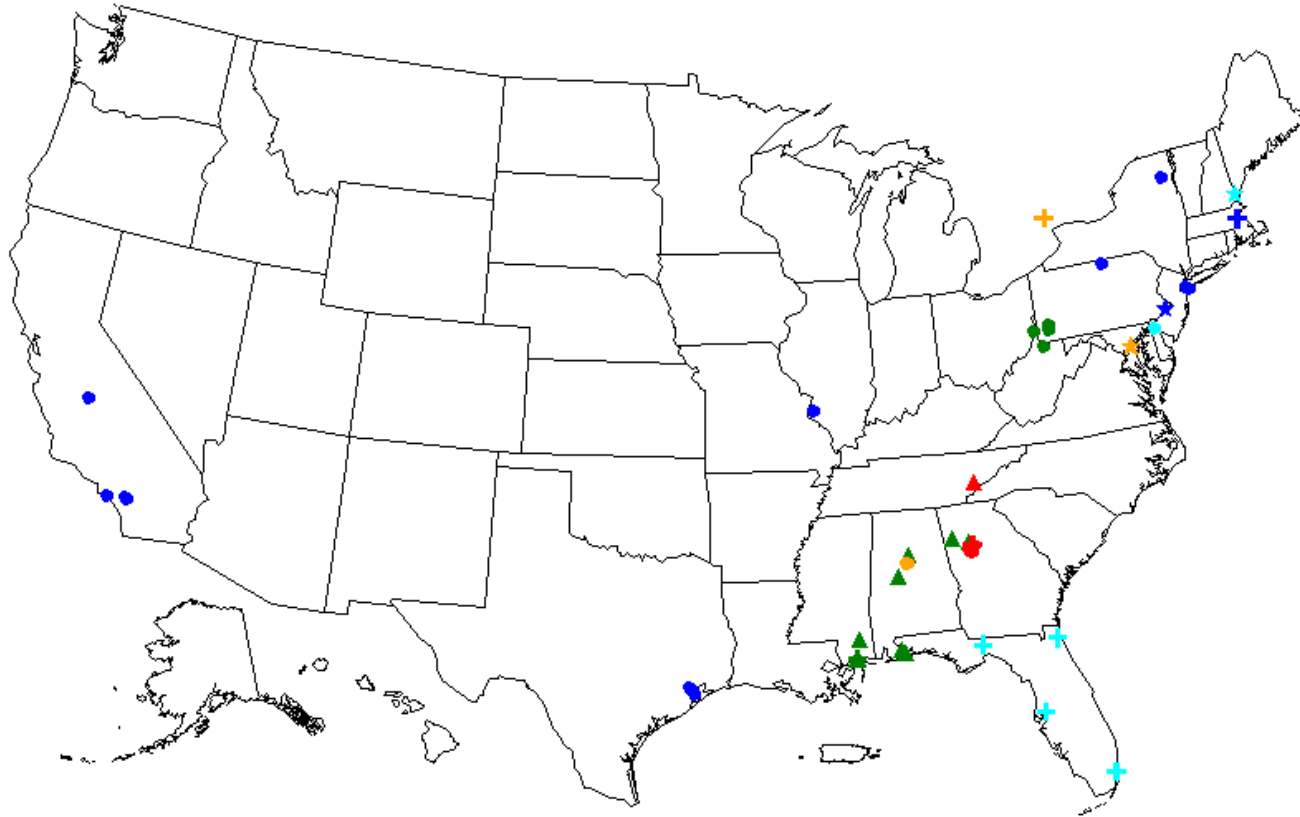
## Ozone Sites

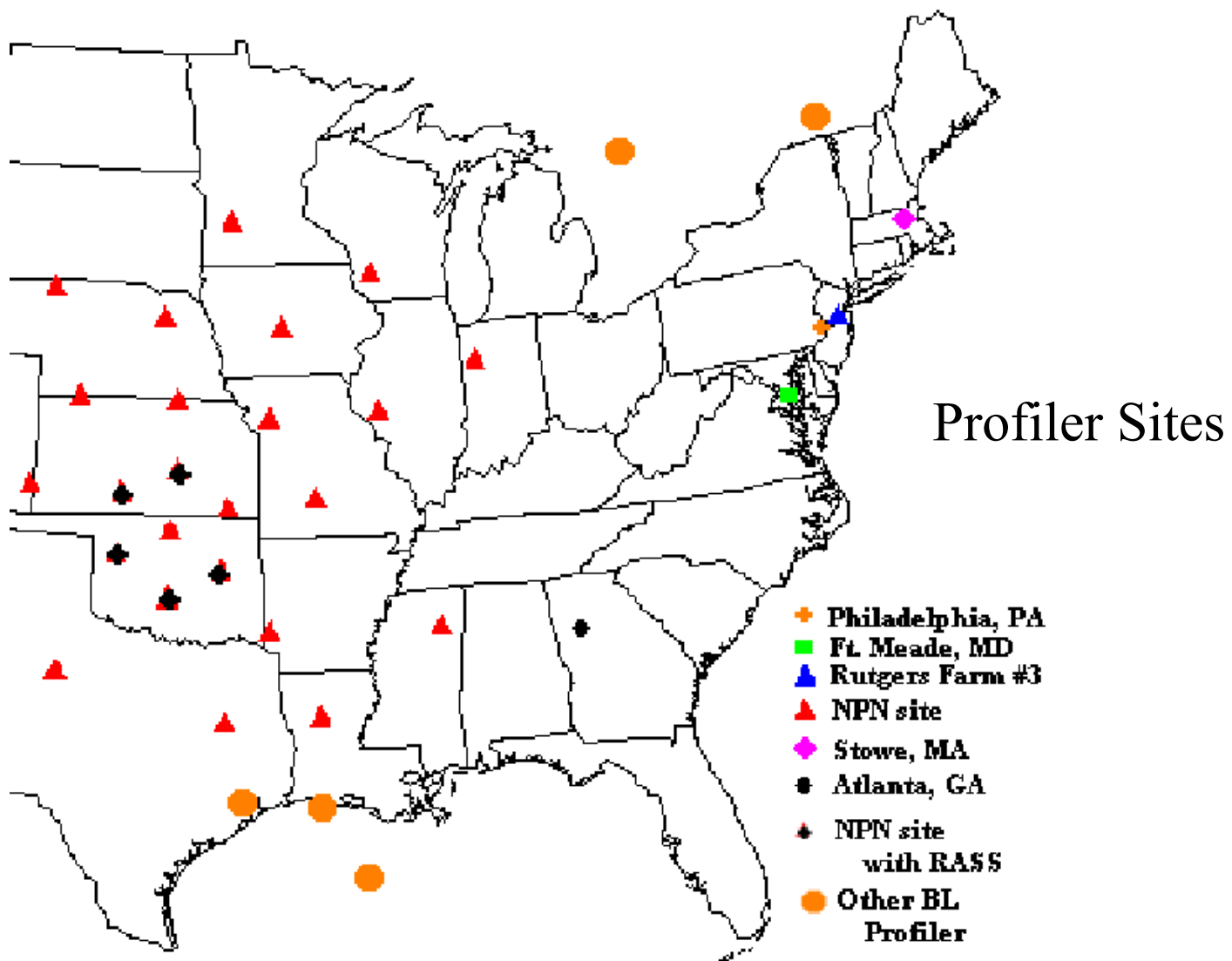


## Nitric Acid and/or Ammonia Sites

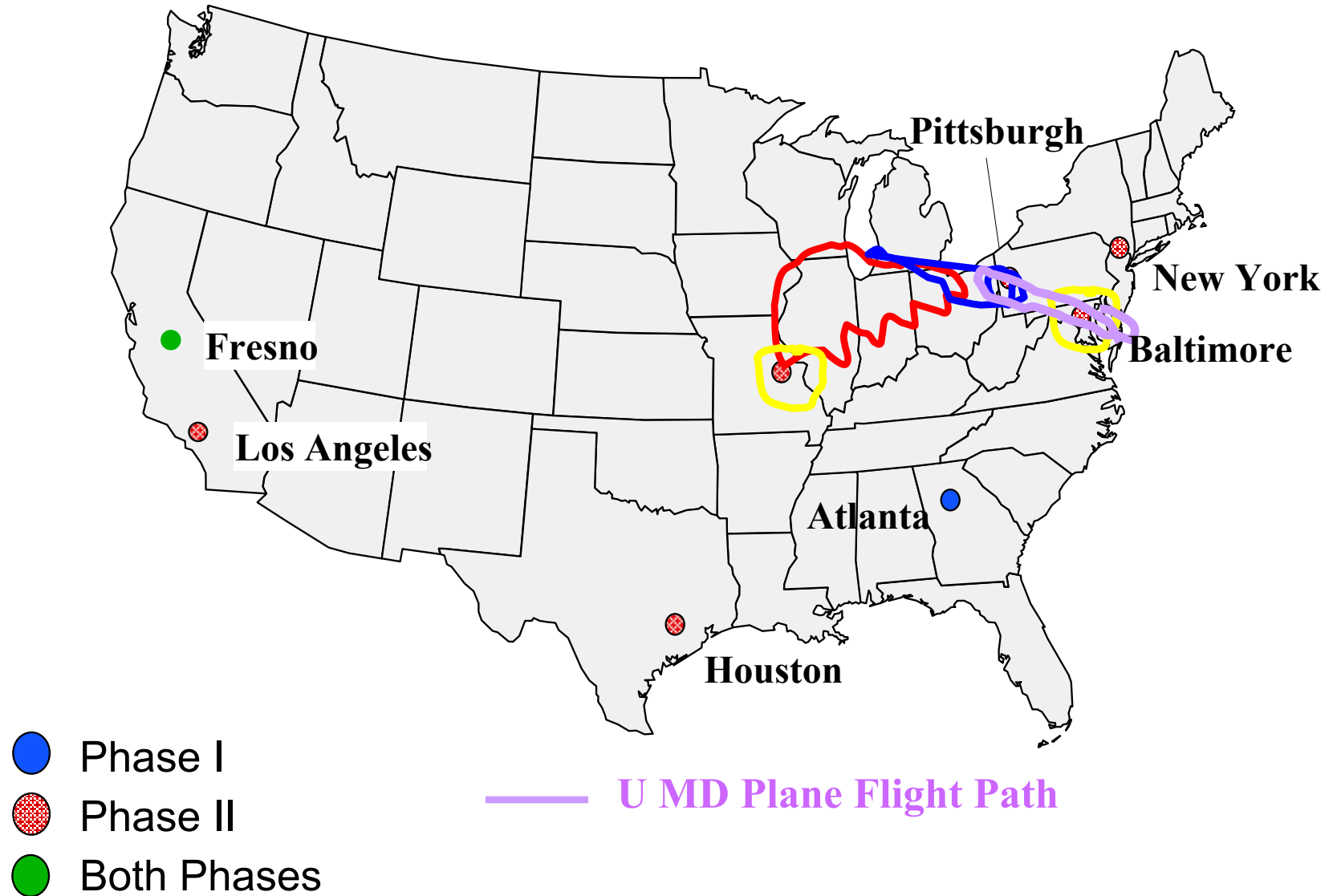


## PM2.5 Ion Sites





# Generalized Flight Plans: LADCO & U MD



## Sampling Period

& June 30 - July 29

## Start & Reporting Time – Surface Based

& 12:01 AM June 30

Y Local, EST

Y Reporting Data Hour (start hr)

& **Start & Reporting Time – Aircraft**

& **Episodes – Criteria Being Developed**

Y 4 Flight Plans Under Consideration

- Upper Ohio River Project (LADCO)
- St. Louis (LADCO)
- Pittsburgh (LADCO)
- Pittsburgh (Univ. Maryland)

# Common Measurements Among Sites



## Criteria for Determination

- & Common Among Supersites
- & Important for Modeling and Data Analysis

## Issue

- & Where Common Measurements Are Being Made How Far Should We Go to Have Common Protocols
  - Y What are the parameters of concern (inlets, filter temperature, indoor/outdoor, etc.)

## Gases

- & NO/NO<sub>x</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO, SO<sub>2</sub>, NMHC, HNO<sub>3</sub>\*, NH<sub>3</sub>\*

## Filter Based

*\* May require additional Supersites funding*

- & PM<sub>10</sub> Mass
- & PM<sub>2.5</sub> Mass & Composition (Major Components)

## Semi-Continuous

- & PM<sub>10</sub> Mass, PM<sub>2.5</sub> Mass, Nitrate, Sulfate, OC/EC, Ultrafine



## OC Gases and Particles

- & Light VOC, PM<sub>2.5</sub> OC Species, Light Scattering, Light Absorption

## PM Size and Chemistry

- & Mobility Particle Sizer (<10 nm – 500 nm)
- & Optical Particle Counter (0.2 – 20 μm)
- & Aerodynamic Particle Sizer (0.2 – 10 or 20 μm)
- & Single Particle MS

## Surface Meteorology

- & WD (scalar, vector), WS, T, RH, SR (may be at nearby sites)

## Common Protocols for Each Common Measurement on Previous Slides

**& Where Common Measurements Are Being Made How Far Should We Go to Have Common Protocols**

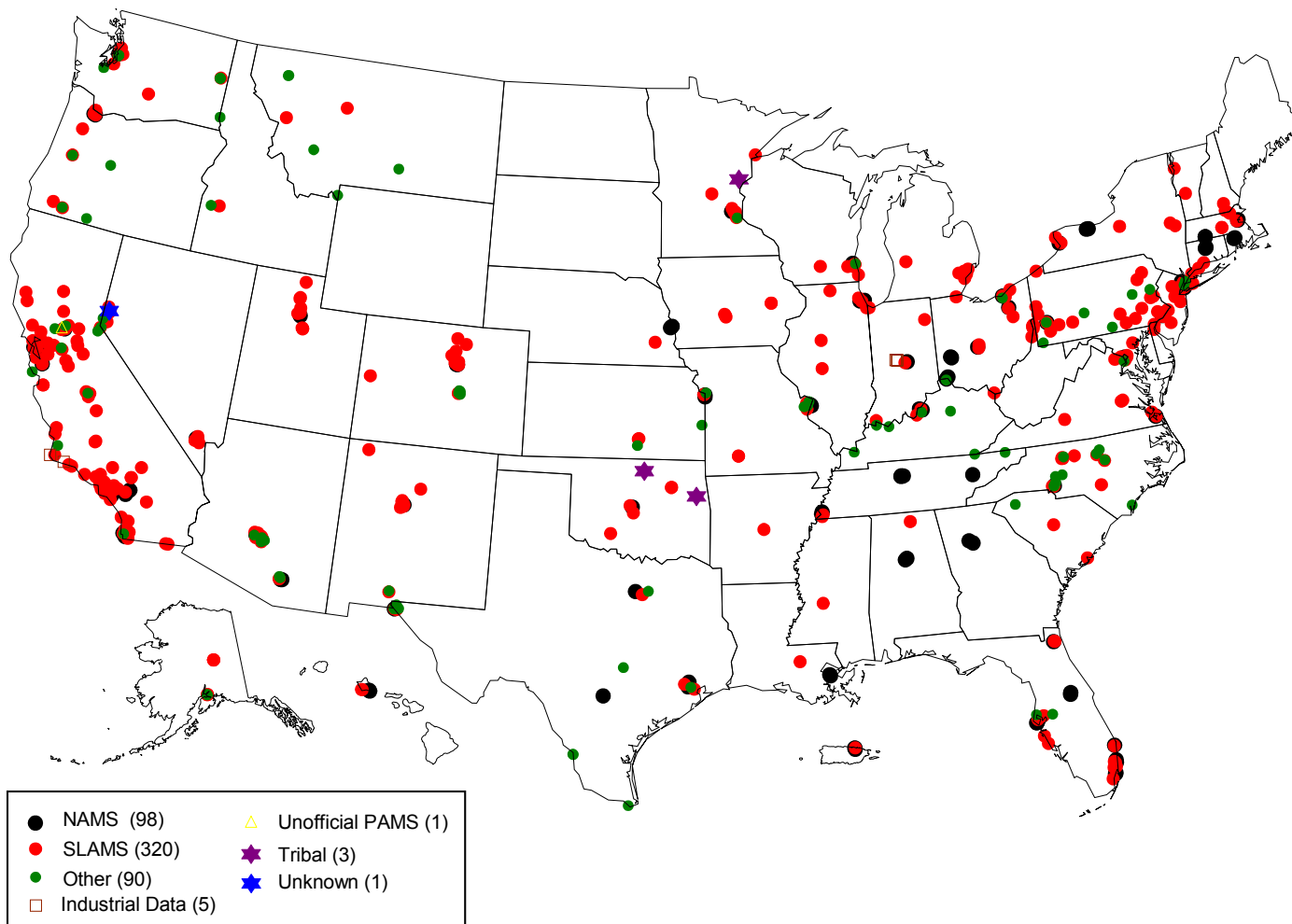
- Y** What are the parameters of concern
- Inlets
  - Filter type
  - Filter temperature
  - Sampler location -- indoor/outdoor
  - RH (particle distribution, number)
  - OC/EC TOR vs TOT
  - Other

## Progress to Date & Solutions & Discussion Period

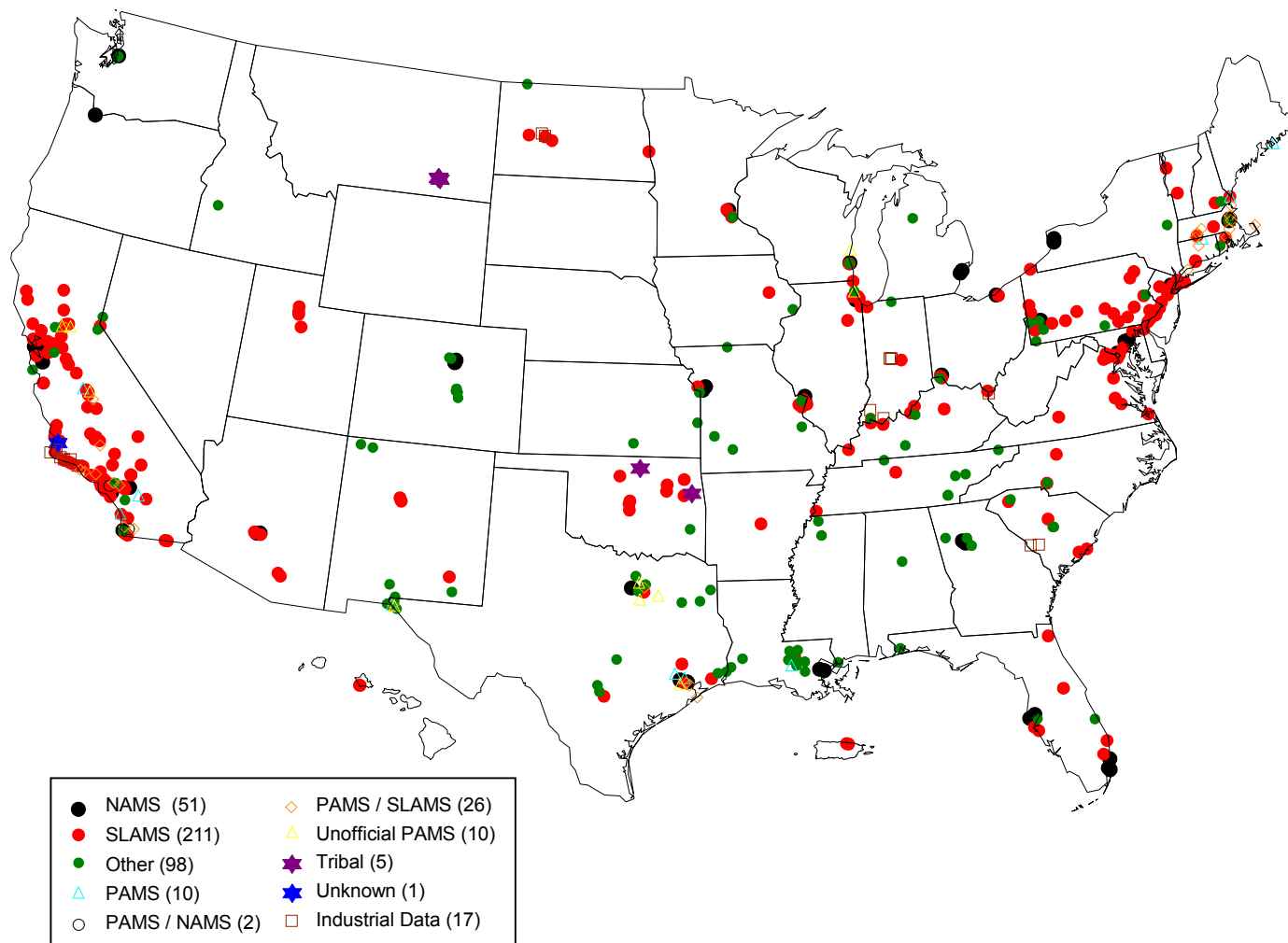
# Appendix

## Regulatory Maps

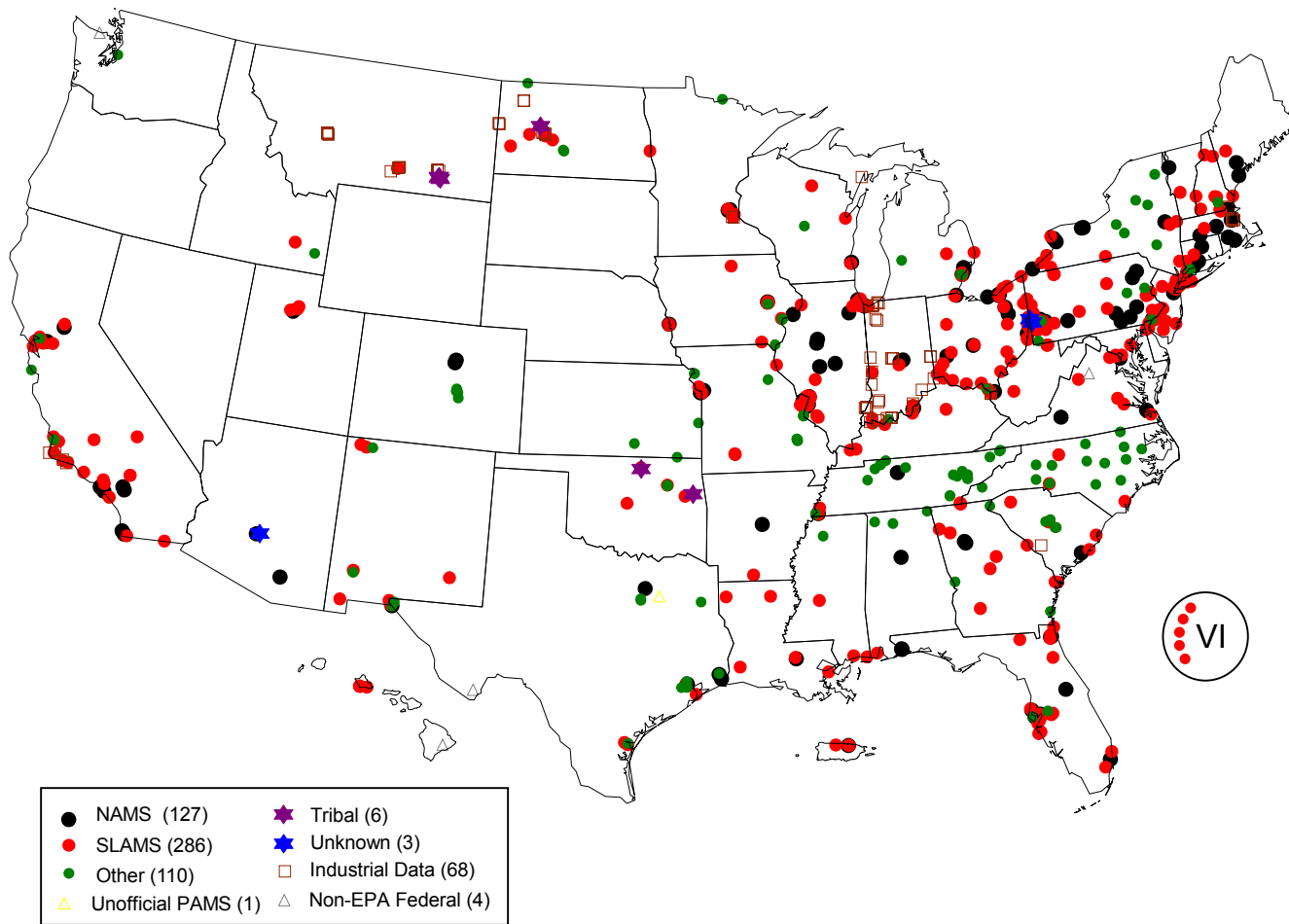
# CO Monitors



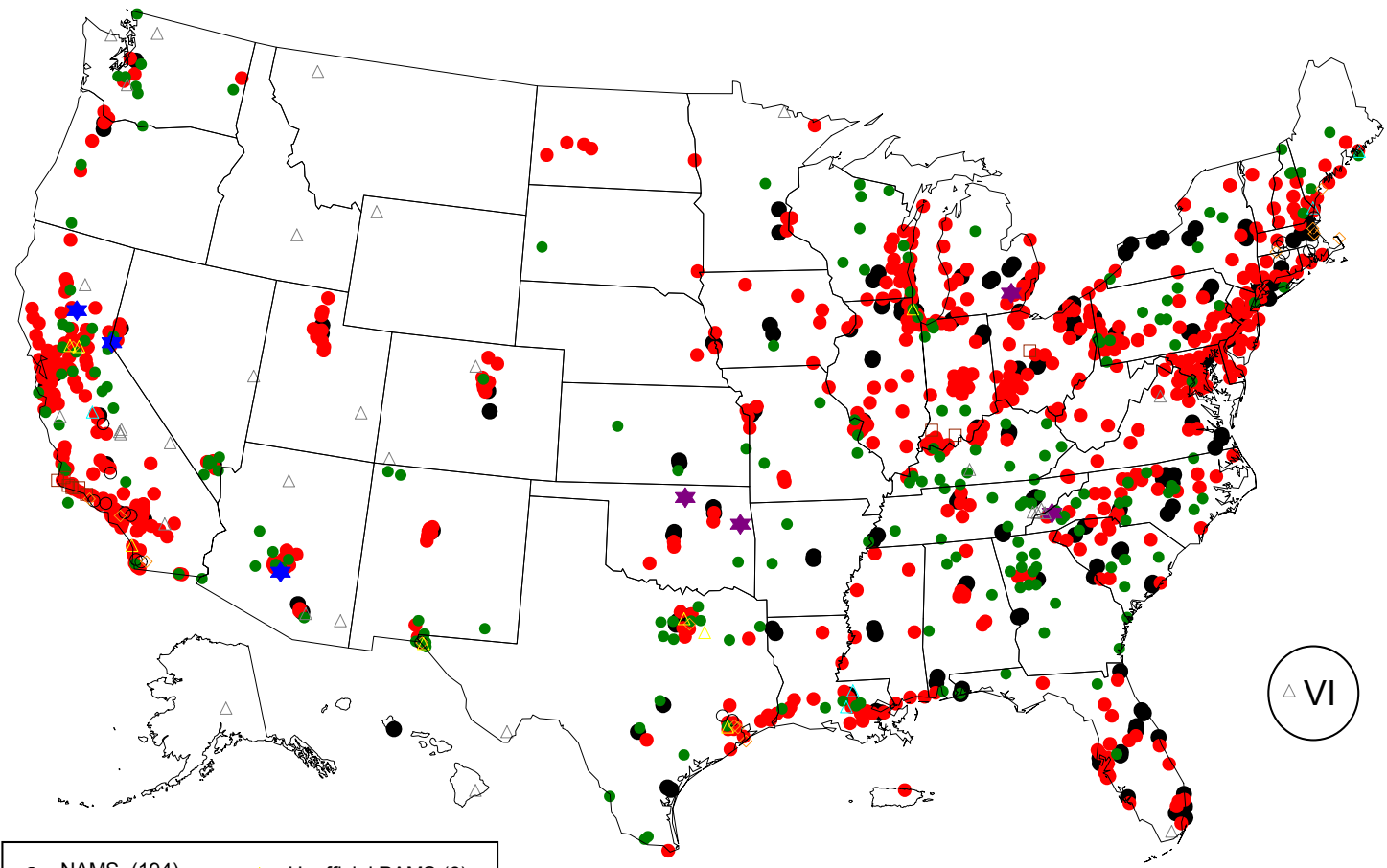
# NO<sub>2</sub> Monitors



# SO<sub>2</sub> Monitors



# O3 Monitors

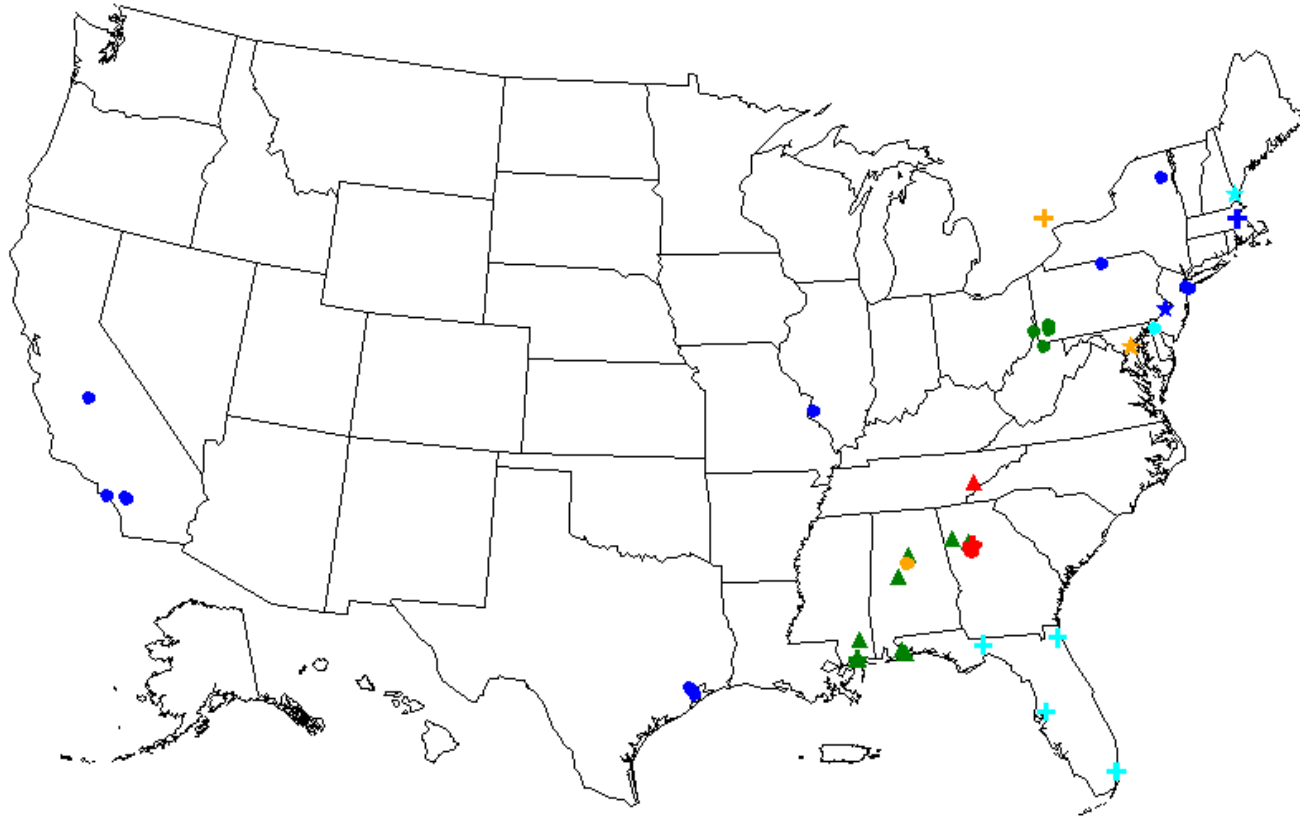


● NAMS (194)	△ Unofficial PAMS (8)
● SLAMS (616)	★ Tribal (4)
● Other (208)	★ Unknown (3)
△ PAMS (5)	□ Industrial Data (9)
○ PAMS / NAMS (19)	△ Non-EPA Federal (32)
◇ PAMS / SLAMS (14)	

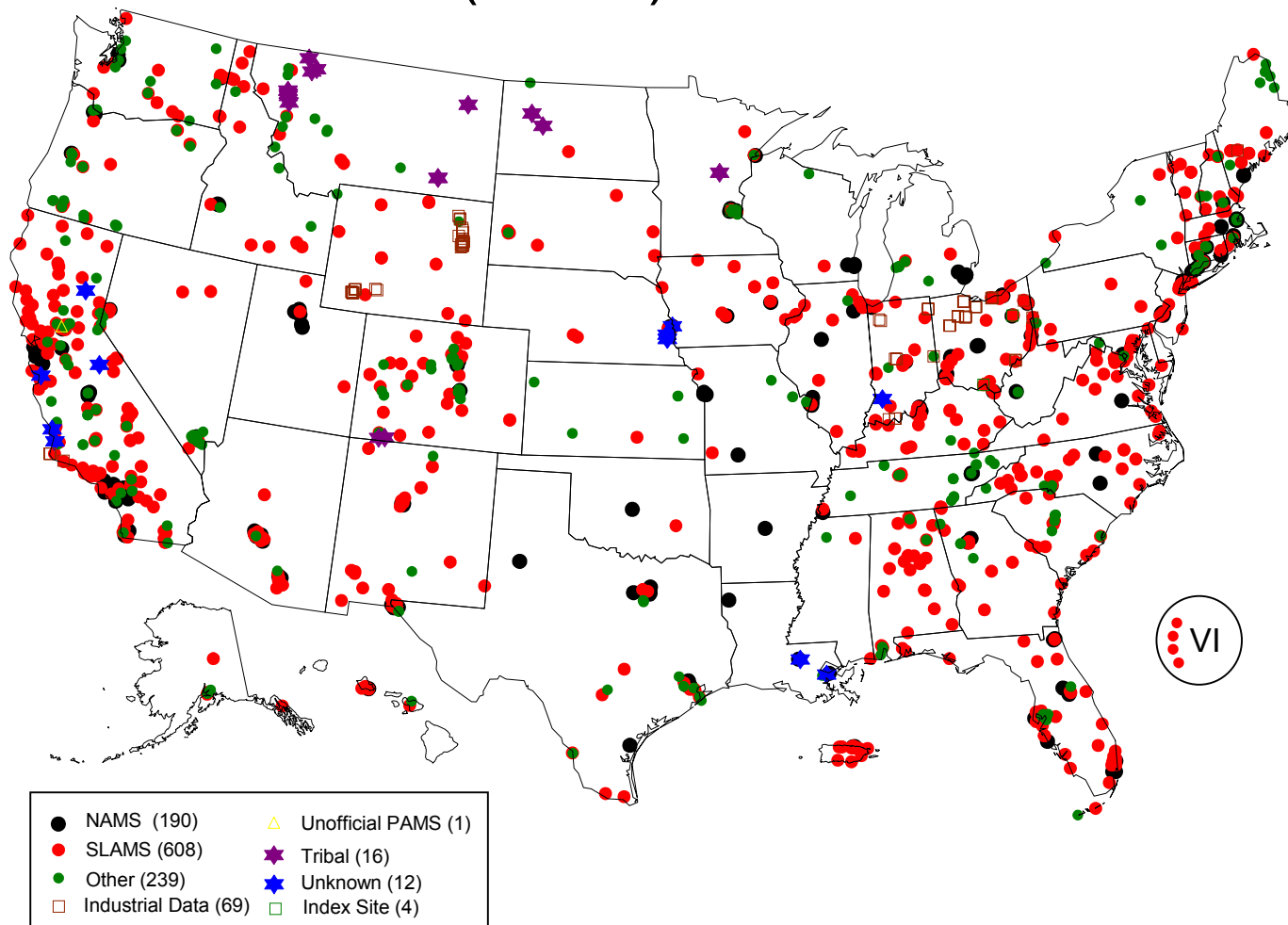
△ VI



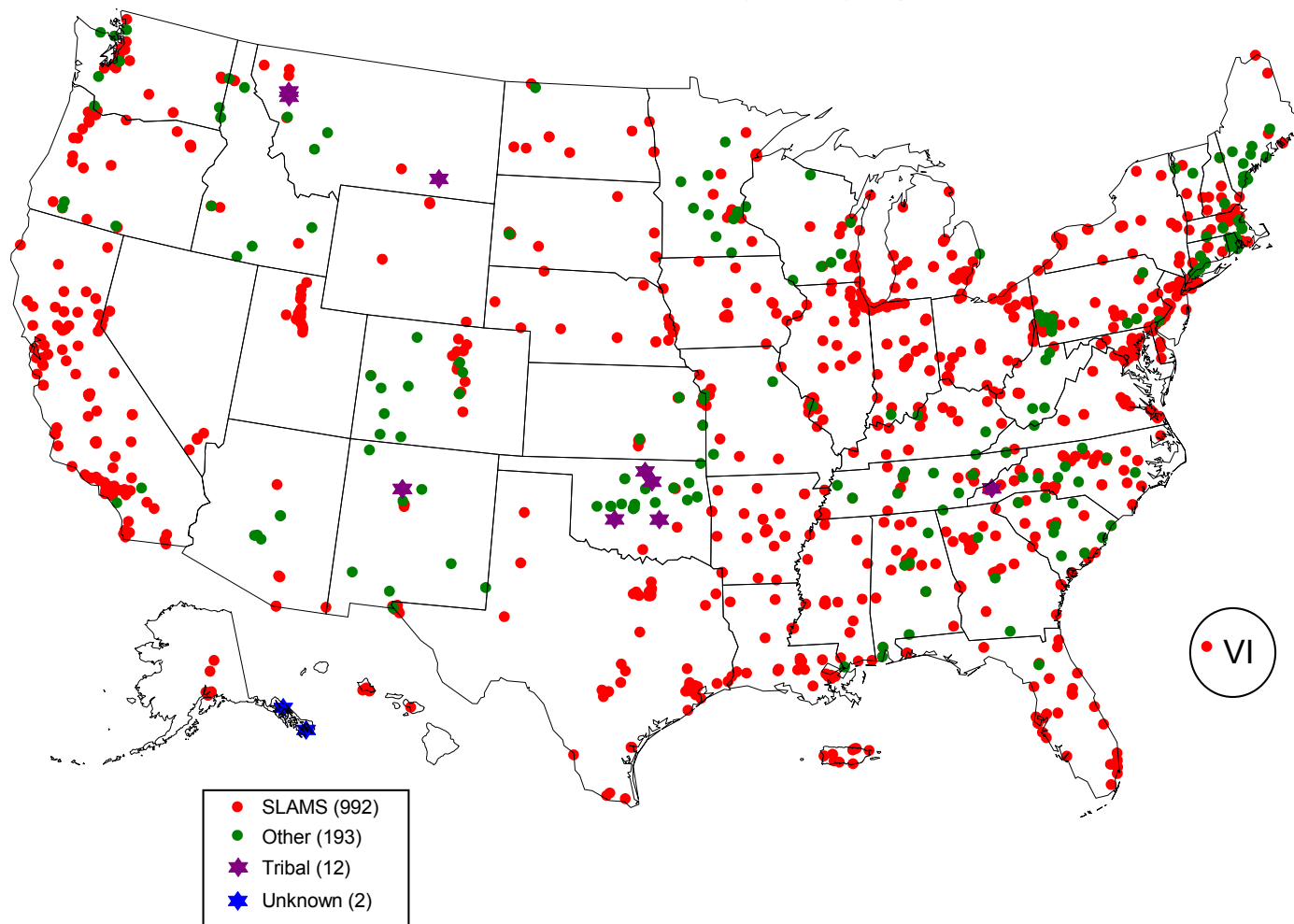
## PM2.5 Ion Sites



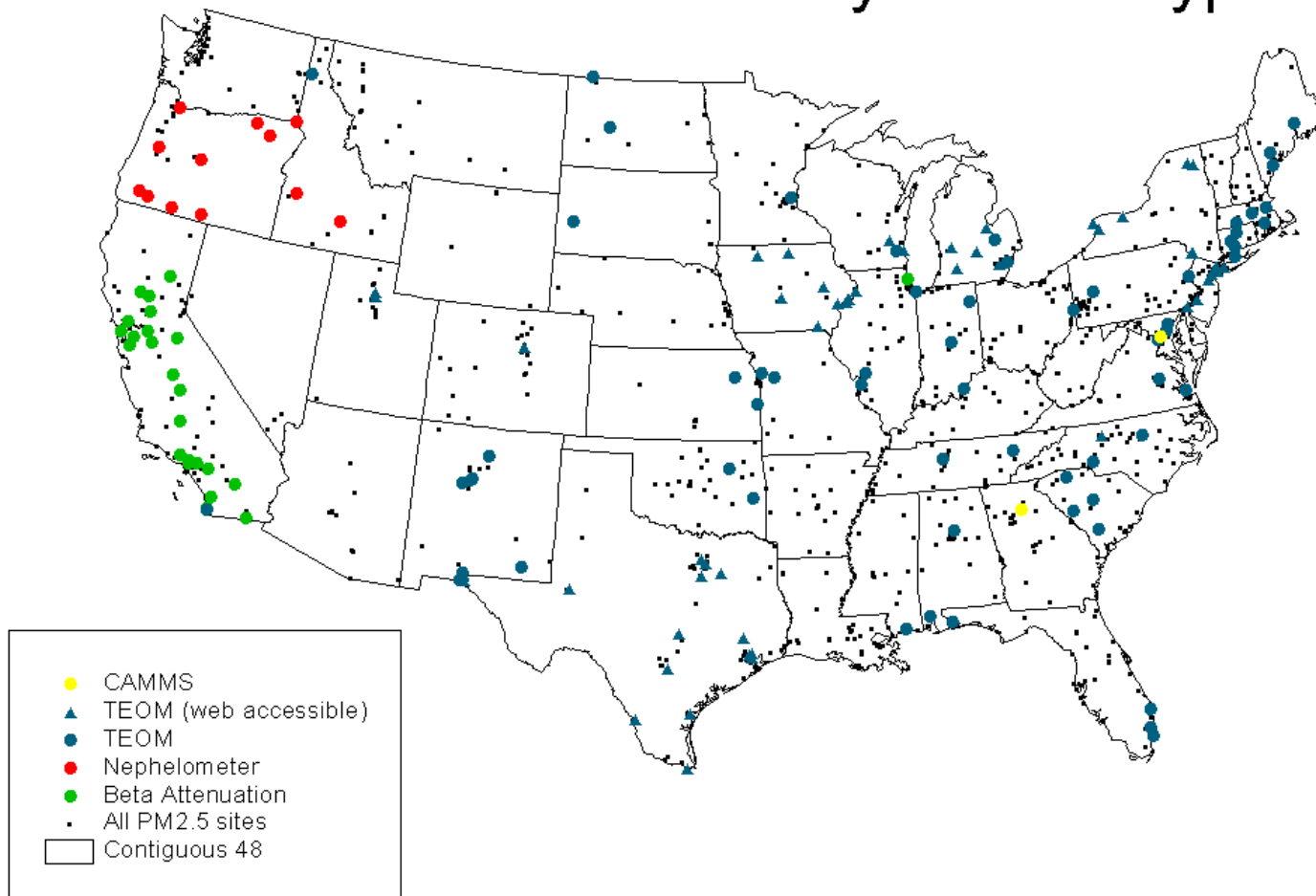
# PM<sub>10</sub> (81102) Monitors



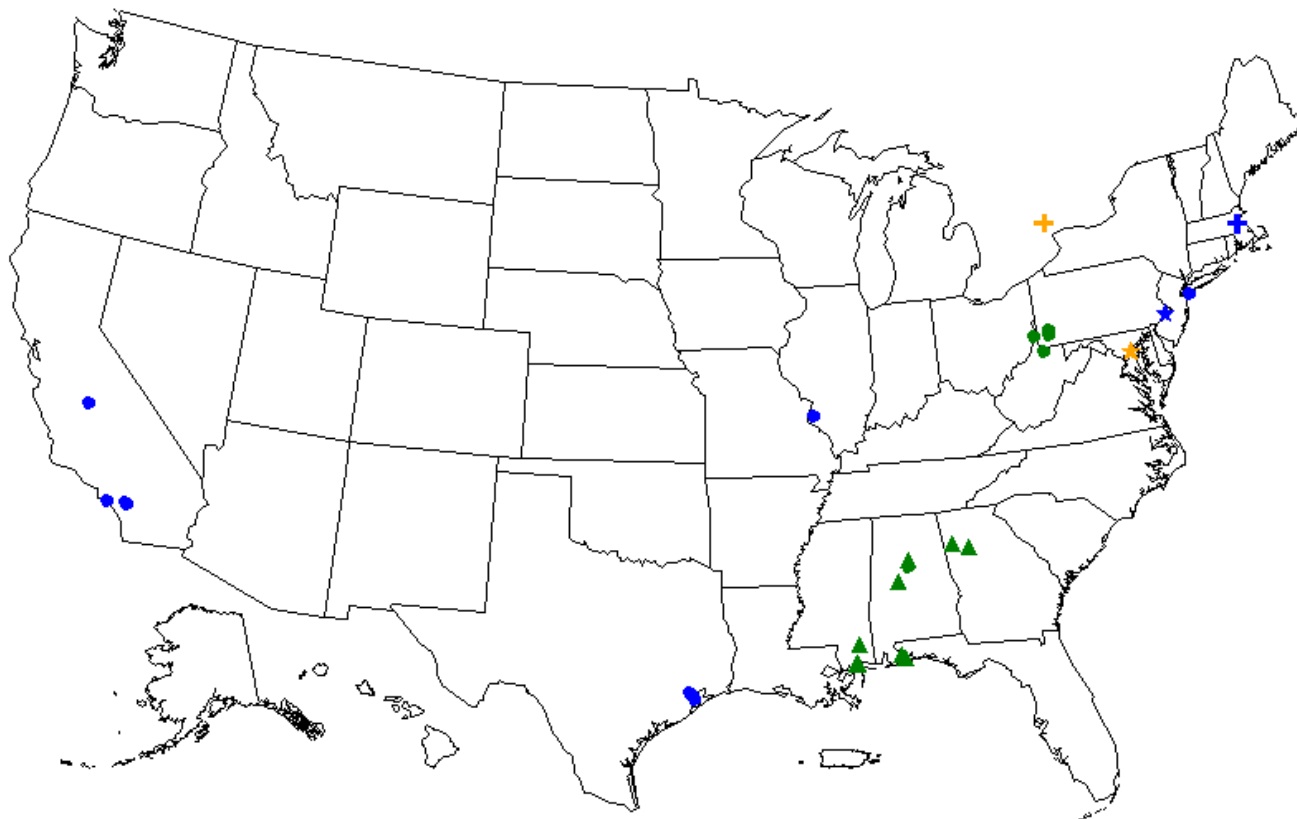
# PM<sub>2.5</sub> FRM Monitors



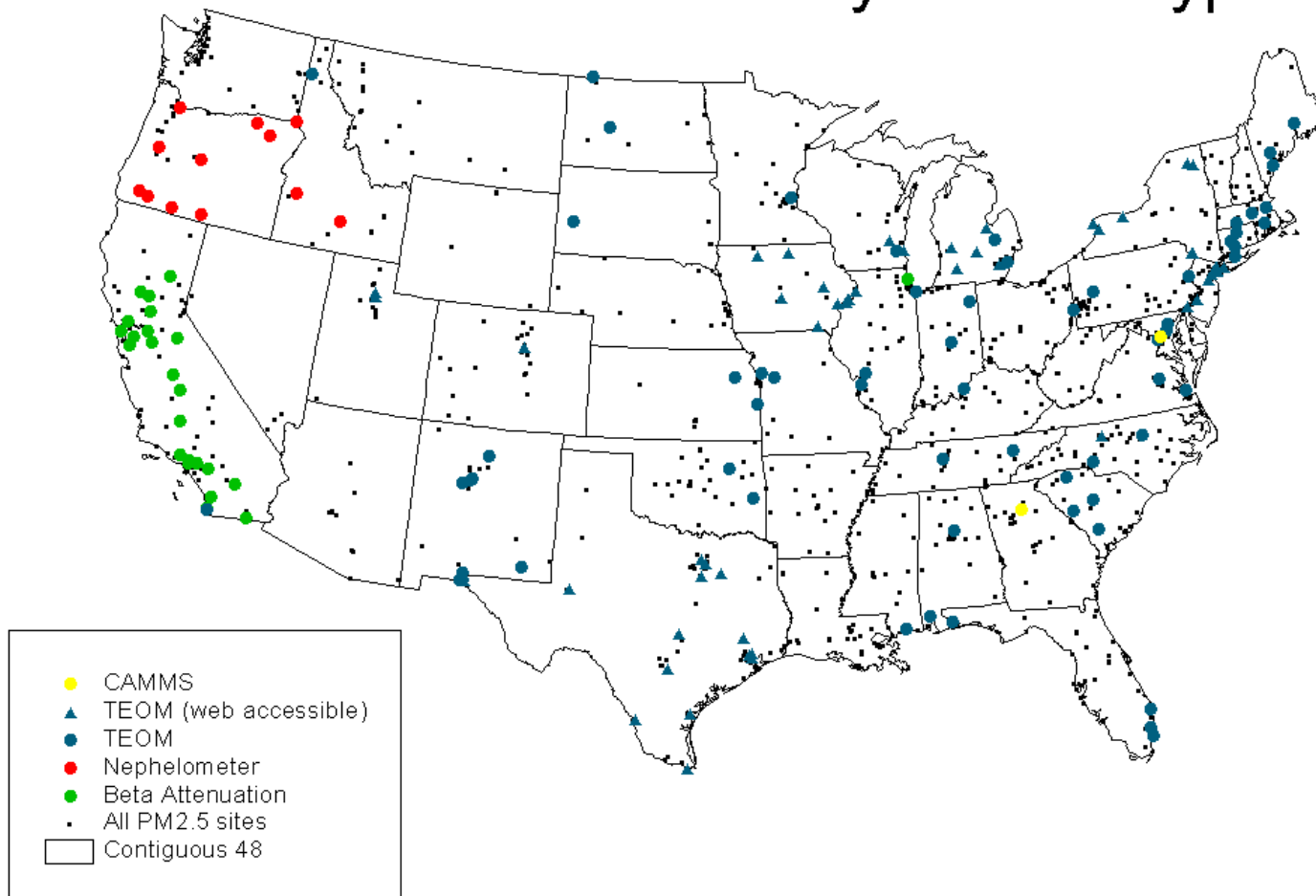
# All PM2.5 Monitoring Sites with continuous sites by monitor type



## Nitric Acid and/or Ammonia Sites



# All PM2.5 Monitoring Sites with continuous sites by monitor type



# Toxics Pilot Monitoring Sites

