What's New in the Monitoring World

Current Schedule for Ongoing NAAQS Reviews

MILESTONE	POLLUTANT						
	Lead	NO_2 Primary	SO_2 Primary	Ozone Reconsideration	CO	PM	NO_2/SO_2 Secondary
NPR	New schedule being developed	Jun 26, 2009	Nov 16, 2009	Jan 6, 2010	Oct 28, 2010	Nov 2010	July 12, 2011
NFR	Oct 15, 2008	Jan 22, 2010	Jun 2, 2010	Aug 31, 2010	May 13, 2011	July 2011	Mar 20, 2012

NOTE:

Underlined dates indicate court-ordered or settlement agreement deadlines

Next Ozone Review: Proposal in May 2013 and Final in Feb 2014

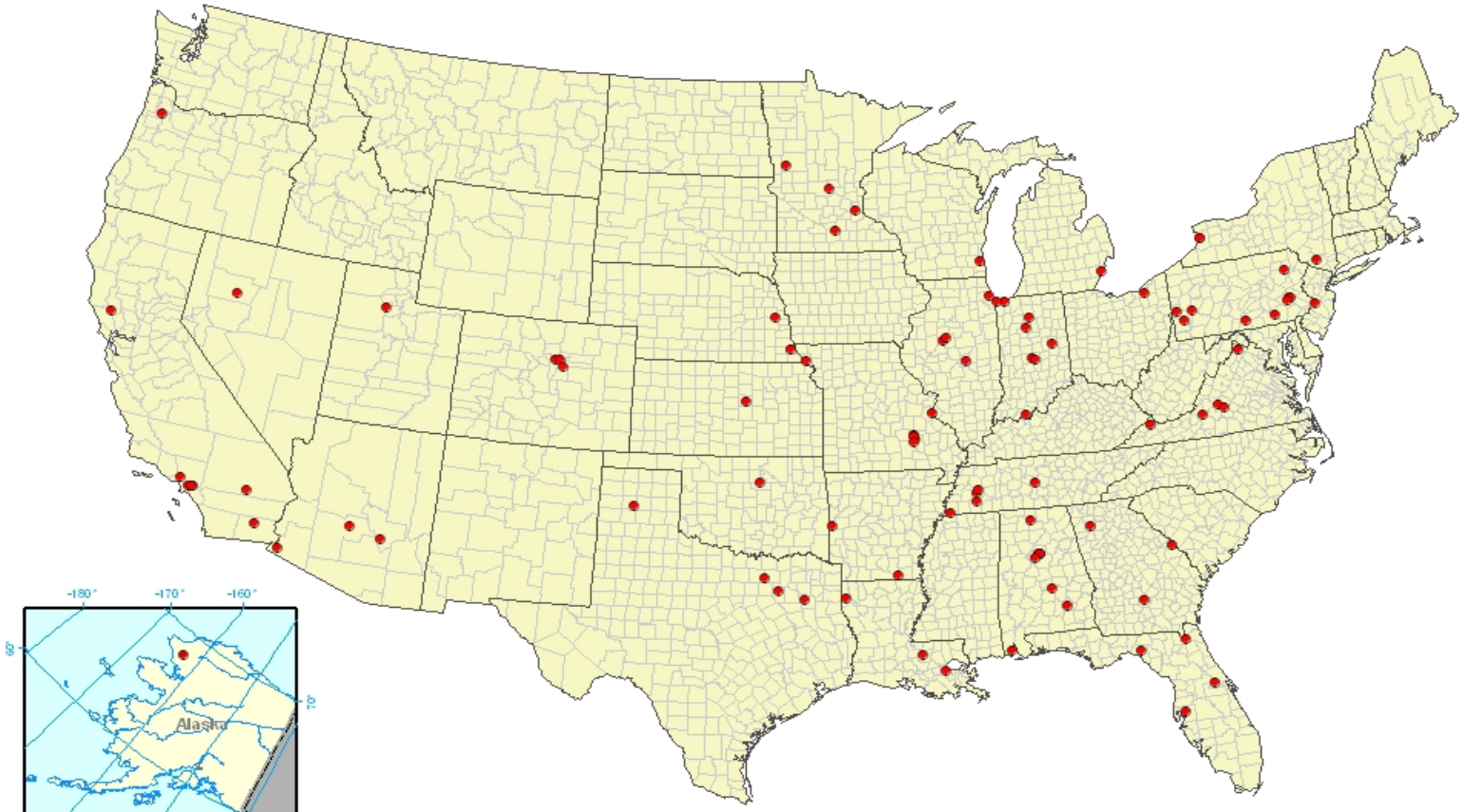
Lead (Pb)

Updating the Lead Monitoring Network
2008 Revisions

- New source-oriented lead monitors at sources ≥ 1.0 TPY emissions
  - Final rule identified 135 facilities identified in 2002 NEI as >= 1.0 tpy.
  - 100 sources required monitoring following review of emissions and waivers (based on survey of Regional offices)
  - Vast majority of sites are believed to have met January 1, 2010 deadline for sampling
    - **New sites need to be registered in AQS and have 1st quarter 2010 data reported by June 30, 2010**
- Operation of a (non-source) lead monitor in every urban area with a population of 500,000 or more, by January 1, 2011

Locations of lead sources of 1.0 TPY or greater

(unless waiver granted)



Data Source: 2005 National Emissions Inventory (updated as of 10/19/09)

EPA Reconsidering Portions of Lead Monitoring Requirements

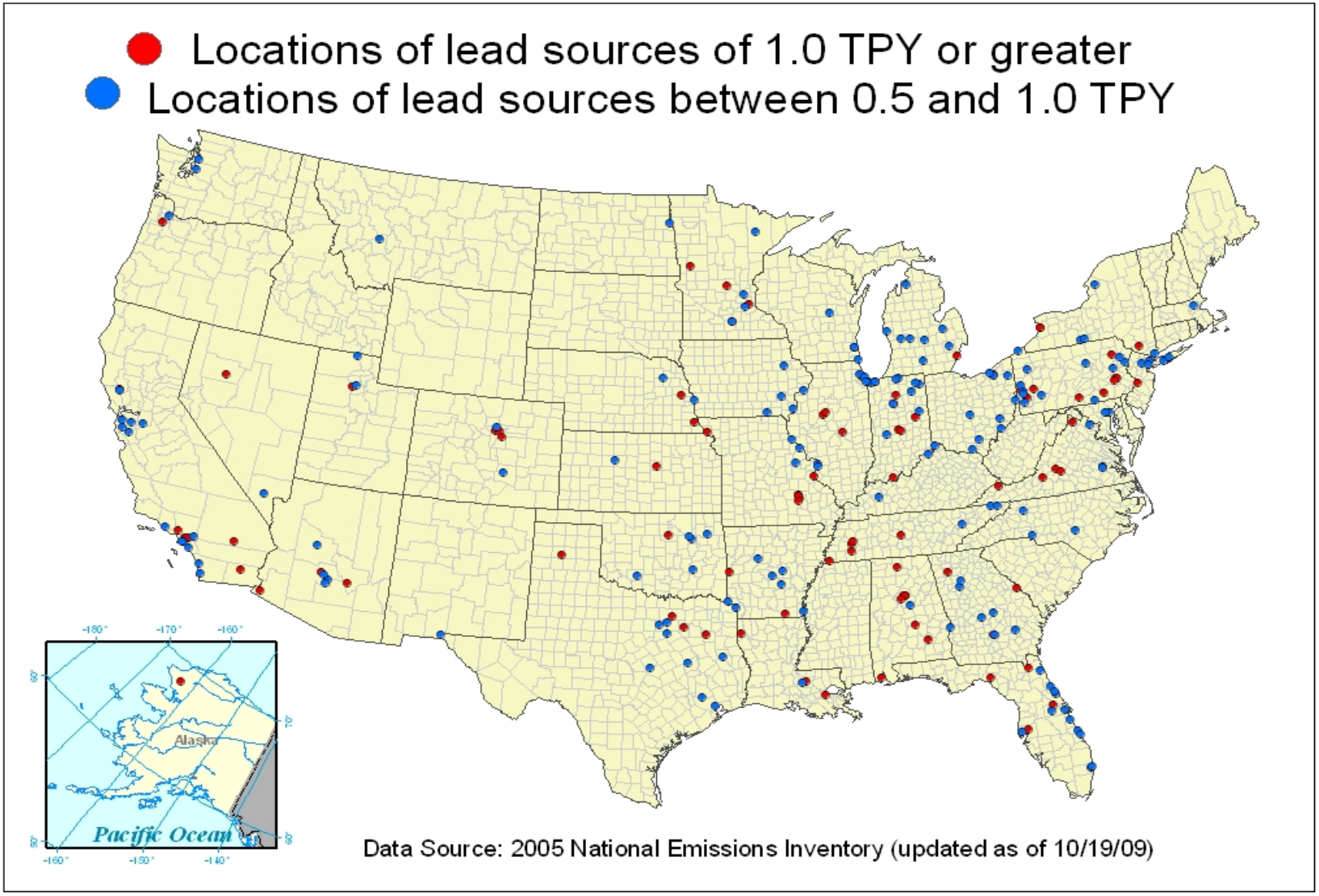
- In January 2009, EPA received a petition to reconsider the lead monitoring requirements from the Missouri Coalition for the Environment Foundation, Natural Resources Defense Council, the Coalition to End Childhood Lead Poisoning, and Physicians for Social Responsibility
- On July 22, 2009, EPA granted the petition for reconsideration to:
  - Reconsider the emissions threshold (currently 1 tpy) for source-oriented monitoring requirements and determine whether it should be lowered, as requested by Petitioners.
  - Reconsider related issues as appropriate, including the requirements for non-source oriented monitoring.
- EPA published proposed revisions to monitoring requirements on December 30, 2009 (74 FR 69050).

Summary of Proposed Revisions

- Source-oriented monitoring
  - Proposed to lower emission threshold from 1.0 tpy to 0.50 tpy
  - Requested comment on thresholds greater than 0.50 tpy
  - All sources treated in same manner (e.g., airports)
- Non-source-oriented monitoring
  - Proposed to revoke existing requirement for non-source monitoring in each CBSA of 500,000 or more population
  - Proposed to require Pb monitoring at all NCore stations [~80 monitors]
    - Many NCore sites will have low-volume PM_{10} samplers to meet $PM_{10-2.5}$ requirement
    - Requested comment on “urban-only” requirement for NCore (defined as populations greater than 500,000) [~50 monitors]
    - Proposed to revoke existing requirement for NCore Pb monitoring – each NCore site in most populated MSA/CSA per EPA Region

Impacts of Proposed Requirements on Network Size

	Existing Requirements	Proposed Requirements
Source-Oriented	100	272 (+172)
Non-Source-Oriented	101	80+ (-21)
Total	201	352 (+151)


Locations of lead sources of 1.0 TPY or greater
Locations of lead sources between 0.5 and 1.0 TPY
Alaska
Pacific Ocean
Data Source: 2005 National Emissions Inventory (updated as of 10/19/09)

Summary of Comments

- Comment period closed February 16, 2010
- Over 600 comments received
- Strong support to move to new threshold of 0.50 tpy
- Concerns raised over the need for monitoring at airports
- Strong support for monitoring Pb at NCore sites
  - Concerns raised over the need for Pb monitoring at rural NCore sites
- Support for staggering deployment of new monitors over two years

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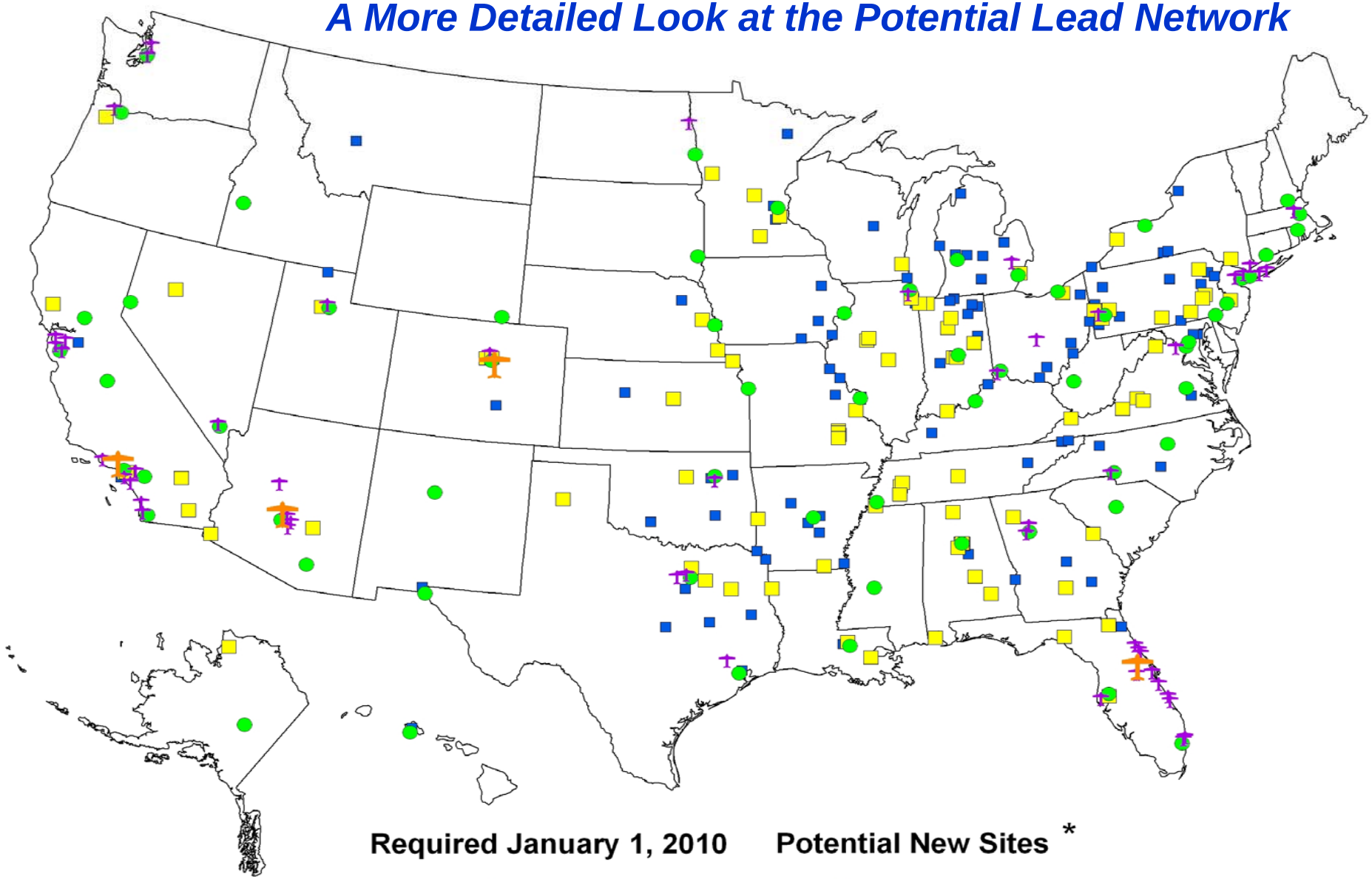
- EPA also dealing with some monitoring implementation issues:
  - new Pb methods for TSP and PM_{10}
  - Precision and bias assessments through QA requirements

Issues Currently Under Consideration for Pb Monitoring Final Rule

- The level of the (lower) emissions threshold for source monitoring
- How to treat airports in the context of source monitoring requirements
  - Special monitoring study under consideration
- Non-source monitoring requirements - all NCore or urban-only NCore
- Addressing Appendix A language issue with regard to collocation (Pb-PM_{10} problem)
- Deployment timeline (one or two years)
  - Likely initial deadline for new source monitors will be January 1, 2012 based on projected final rule effective 12/1/2010.
  - Considering moving NCore Pb monitoring deadline to 2012 (deadline remains at January 1, 2011 for other parameters except $PM_{10-2.5}$ speciation)

A More Detailed Look at the Potential Lead Network



* Based on 2005 National Emission Inventory estimates as of October 2009.

Nitrogen Dioxide (NO_2)

NO_2 NAAQS

- On January 22, 2010 EPA strengthened the primary national ambient air quality standard (NAAQS) for nitrogen dioxide (NO_2) to increase protection of public health by:
  - adding a ***1-hour*** NO_2 standard at 100 parts per billion (ppb); and
  - retaining the ***annual*** average NO_2 standard at a level of 53 ppb

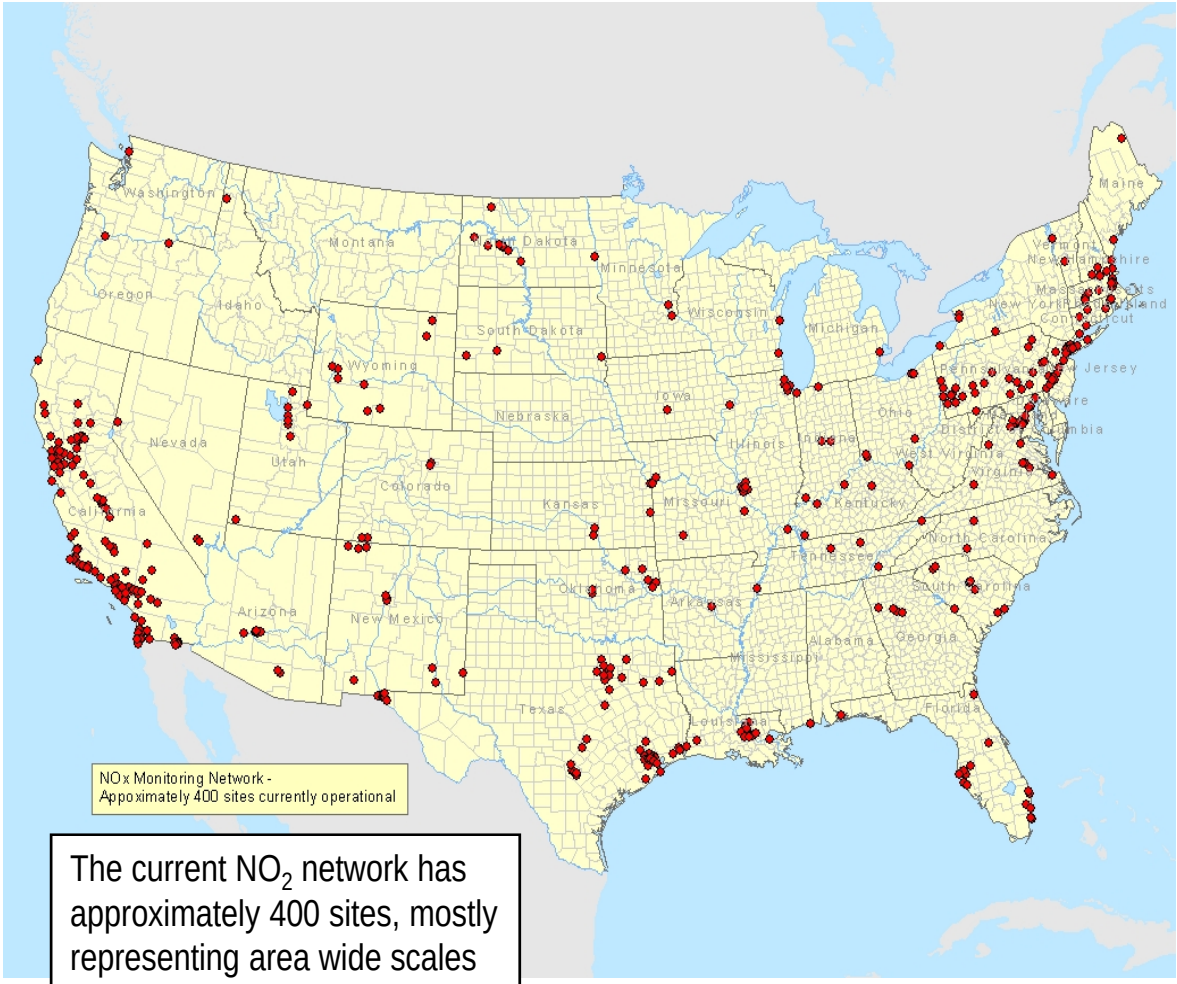
- Revised NO_2 standard reflects the maximum allowable NO_2 concentrations anywhere in an area.
  - In many locations, these maximum concentrations are likely to occur around roads
  - Some monitors will be located to focus on vulnerable and susceptible groups

Under a separate review, EPA is considering the need for changes to the secondary NO_2 standard

- For more information go to http://www.epa.gov/air/nitrogenoxides

Current NO_2 Monitoring Network

- The current network was implemented to support an annual standard
- The existing sites are satisfying multiple objectives including:
  - NAAQS compliance
  - assessment of ozone formation and transport
  - health study support
  - Prevention of Significant Deterioration (PSD)

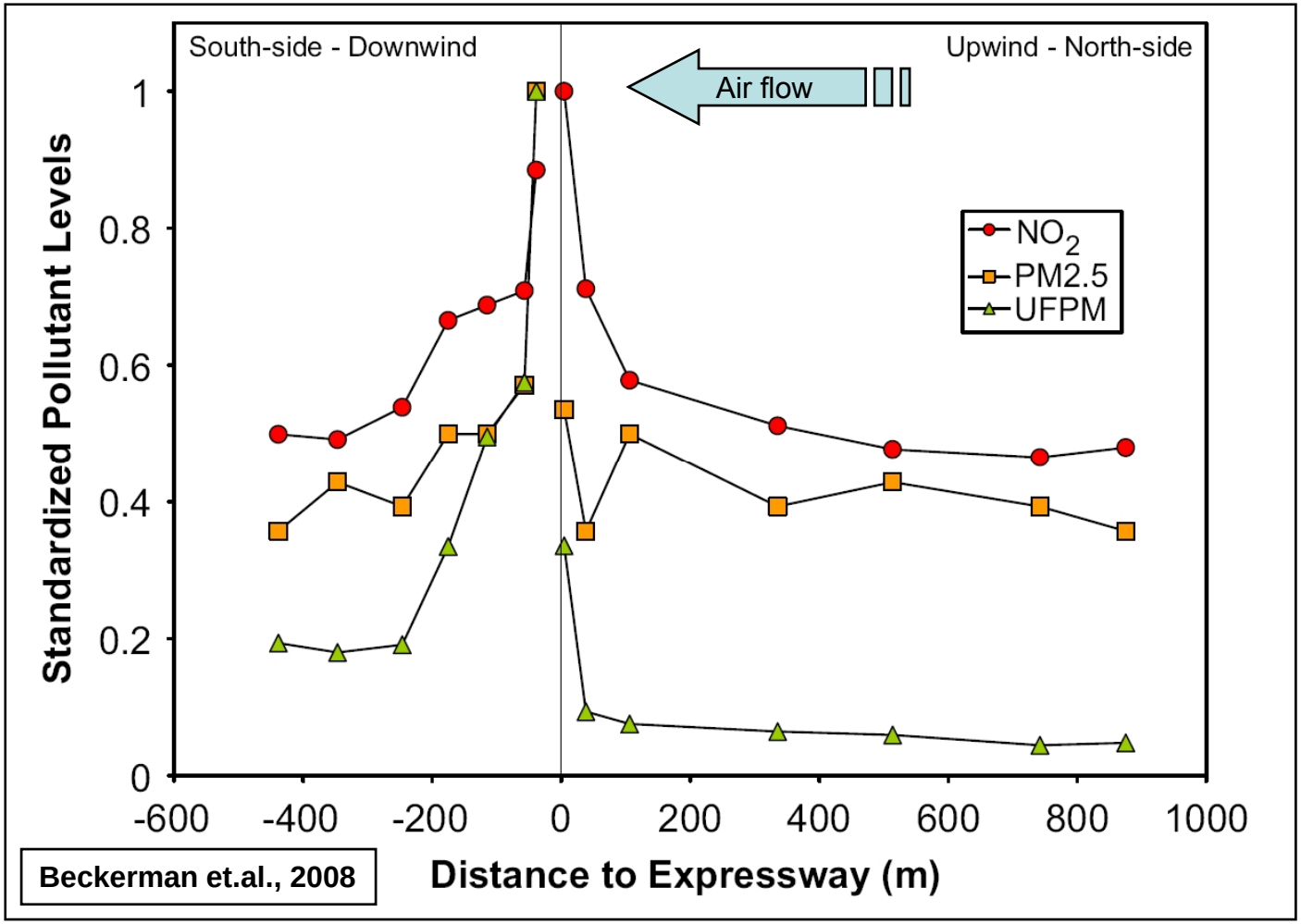


The current NO_2 network has approximately 400 sites, mostly representing area wide scales (neighborhood or larger scales)

Why worry about near-road exposure?

Tens of millions of people live near major roads – their exposure is higher than areas away from roads

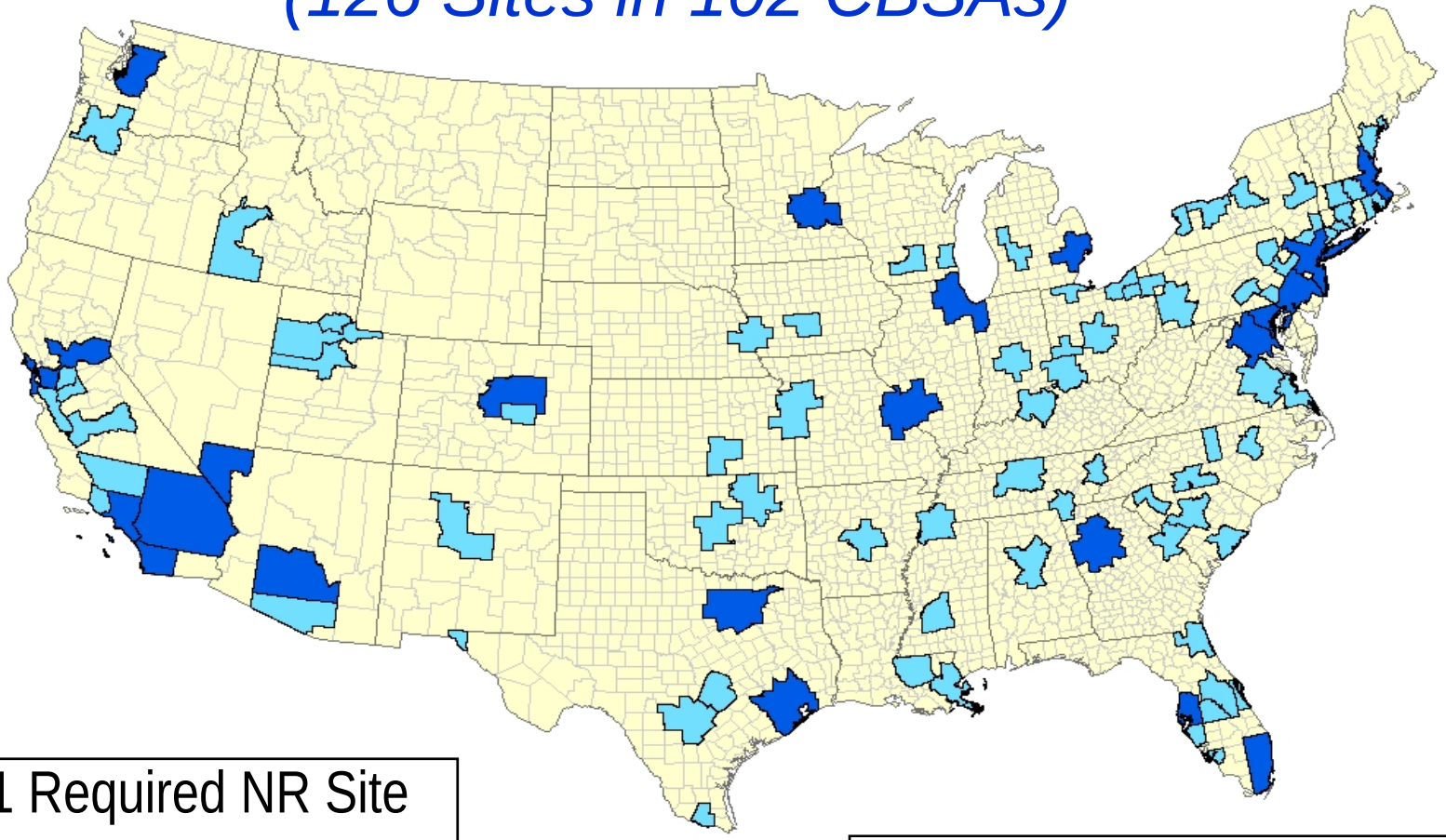
Multiple articles have reviewed NO_2 behavior in the near road, suggesting general ranges of influence



What's Key in the Final NO_2 Monitoring Requirements

- Near-road Monitors (126 in 102 CBSAs):
  - One NR monitor in any CBSA with 500,000 or more people (102)
  - A second NR monitor in any CBSA with 2,500,000 or more people OR any CBSA with one or more road segments with 250,000 AADT (24)
  - Rank candidate sites by AADT and **consider fleet mix, roadway design, congestion patterns, terrain, and meteorology** in determining locations of expected maximum NO_2 concentrations
  - Sites within 50 meters from edge of traffic lane of selected major roads
- Area-wide (53 in 53 CBSAs)
  - One monitor in any CBSA with 1,000,000 or more people (53)
  - These are sited at highest/max concentrations occurring at the neighborhood or larger spatial scale in a CBSA
- Regional Administrator recommended (40)
    - Focused on susceptible and vulnerable populations
- Extended lead-time before new monitors are required to be operational (due to deployment complexity) - Deadline for operation is January 1, 2013
- Development of near-road siting guidance and pilot monitoring program during next 18 months in partnership with NACAA/States and CASAC
  - Currently planning a CASAC/AAMMS meeting in August/September 2010 to kick-off process
  - Also waiting for a decision on potential FY2010 funding for the NO_2 pilot effort

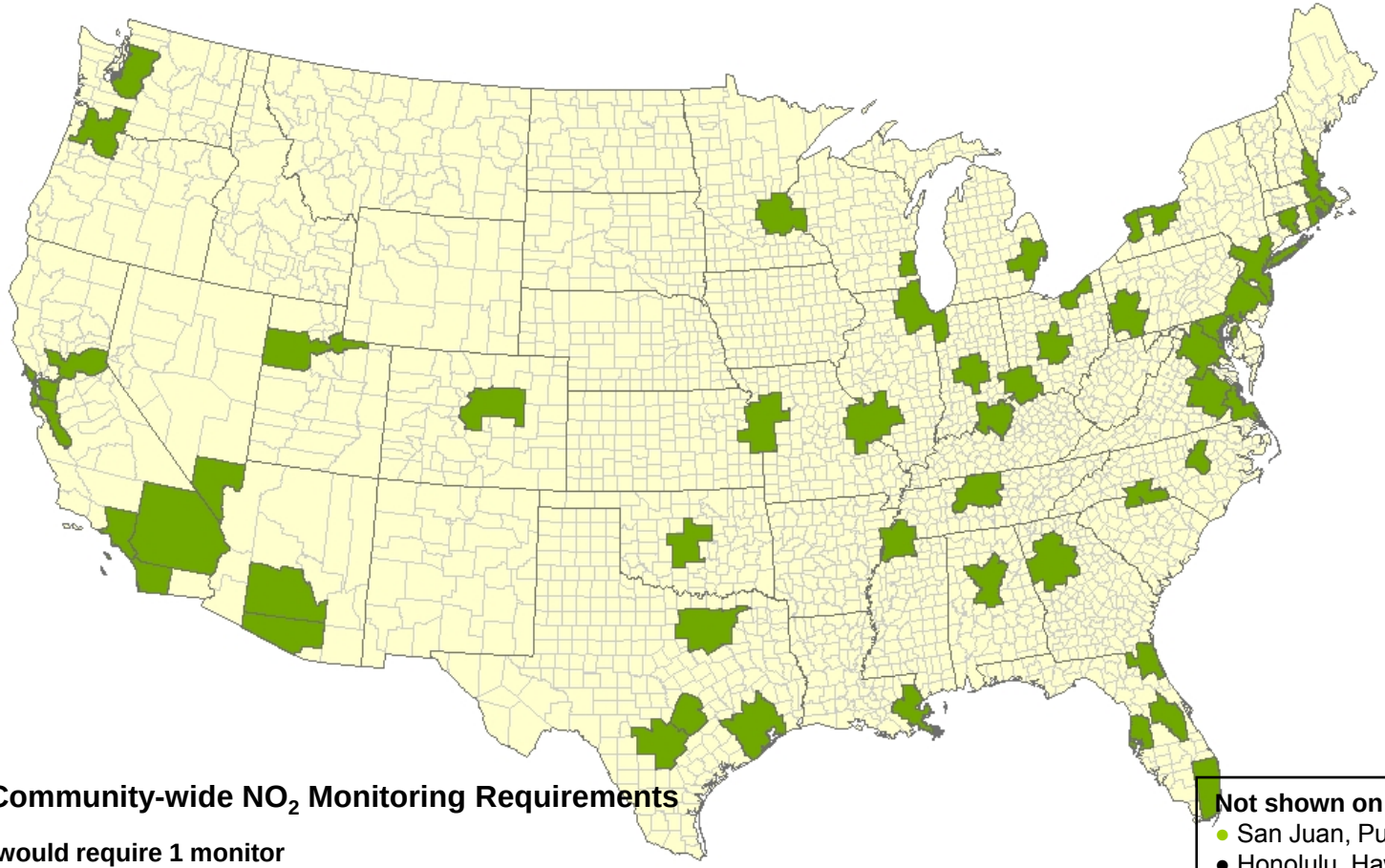
CBSAs with Required Near-road NO_2 Sites (126 Sites in 102 CBSAs)



= 1 Required NR Site
= 2 Required NR Sites

Note: San Juan has 2 required NR sites
Honolulu has 1 required NR site

Community-Wide NO_2 Monitors Are Required in 53 Urban Areas



Minimum Community-wide NO_2 Monitoring Requirements

◆ **53 areas would require 1 monitor**
(≥ 1 million population)

Not shown on map
- San Juan, Puerto Rico
- Honolulu, Hawaii

NO_2 NAAQS Implementation Schedule

Milestone	Date
State Designation Recommendations to EPA	**January 2011**: One year following promulgation (Based on existing network data)
Designations	**January 2012**: EPA designates all/most areas as "unclassifiable" (because near road monitors not in place)
New NO_2 Monitoring Network	**January 1, 2013**: All monitors operating
Next NO_2 NAAQS Review Completed	**January 2015**: Anticipated time frame
Nonattainment Re-Designations (discretionary)	**January 2016/2017** (depending on date that sites become operational)
Attainment Date	**January 2021/2022** (5 years after date of nonattainment designations)

Ozone (O_3)

Proposed Revisions to Ozone Standards

- EPA proposed to strengthen the level of the 8-hour primary ozone standard to a level within the range of 0.060-0.070 parts per million (ppm).
- EPA proposed a cumulative, seasonal secondary standard at a level in the range of 7-15 ppm-hours.
  - This cumulative standard would add weighted hourly ozone concentrations across all days in a three-month period.

Implementation Considerations for Proposed Ozone Standards

- **Designations**
  - EPA proposed an accelerated schedule for designating areas for the primary ozone standard.
  - EPA is taking comment on whether to designate areas for a seasonal secondary standard on an accelerated schedule or a 2-year schedule.
  - EPA is reviewing existing designations guidance and will be communicating with States and Tribes if additional guidance is needed.
- **Previous Ozone Standards**
  - The 2008 8-hour ozone NAAQS and the 1997 8-hour ozone NAAQS remain in place.
  - Implementation for the 2008 8-hour ozone NAAQS is delayed during the reconsideration.
    - EPA has extended the deadline for area designations for the 2008 ozone standards by one year (until 2011).
    - Any new ozone standards would replace the 2008 ozone standards. Implementation requirements for the 2008 ozone standards, including designations, would no longer apply.
  - The 1997 NAAQS remain in effect and implementation of that standard should continue.

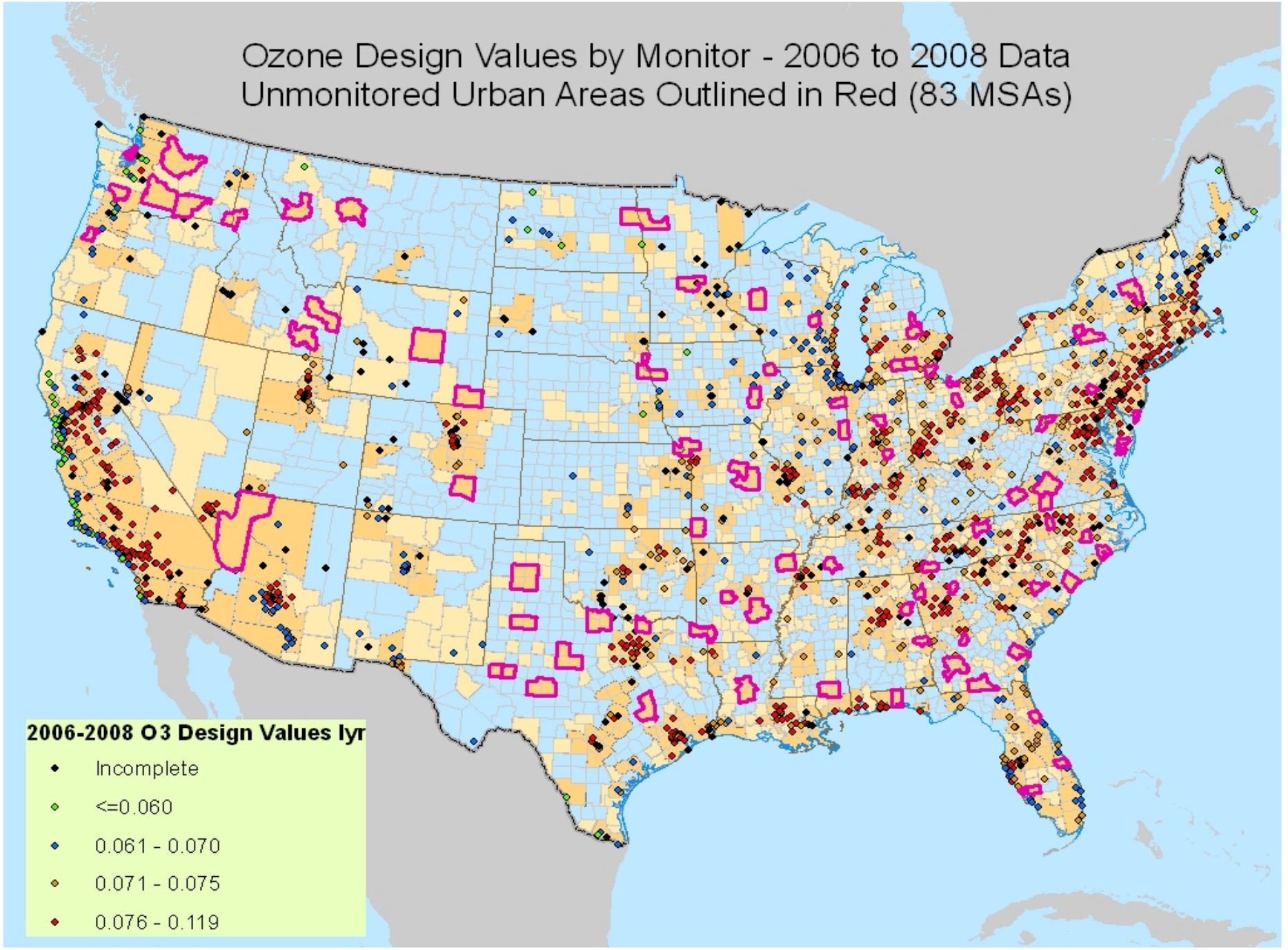
Proposed Accelerated Implementation Timeline

Milestone	Date
Signature—Final Rule	August 31, 2010
State Designation Recommendations to EPA	January 2011
Final Designations	Effective no later than August 2011
Attainment Demonstration SIPs Due	December 2013
Attainment Dates	2014-2031 (depends on severity of problem)

- EPA is planning to propose an implementation rule in spring 2010 and issue a final rule as quickly as possible after the final ozone NAAQS.

Status of Ozone Monitoring Rule & Revisions

- Ozone monitoring proposal published July 16, 2009
- Comments received from DOI, 17 states, multi-state organizations (NACAA, MARC, WESTAR), tribes, citizens. Broadly summarized as follows:
  - Supportive of additional monitors in urban areas
  - Mixed support for additional non-urban monitors. Additional specificity in siting requirements and overall flexibility requested
  - Significant concerns with proposed extension of ozone monitoring seasons (technical basis for decisions, logistical difficulties in operating monitors, confusion in key CBSAs that adjoin multiple states)
  - Serious concerns about availability of adequate STAG funding for equipment purchase and additional operation/maintenance costs, states want monitor deployment staggered over two years
- Monitoring comments received from the NAAQS proposal will help inform ozone monitoring final rule
- Proposed schedule for completion of monitoring final rule
  - Submit NFR to OMB (July 2010)
  - Rule signature projected – November 2010
- <u>Potential</u> timeline for implementation of new requirements
  - Revised ozone seasons effective in 2012
  - Additional ozone monitors staggered in 2013 and 2014


Ozone Design Values by Monitor - 2006 to 2008 Data
Unmonitored Urban Areas Outlined in Red (83 MSAs)
2006-2008 O3 Design Values lyr
Incomplete
<=0.060
0.061 - 0.070
0.071 - 0.075
0.076 - 0.119

Sulfur Dioxide (SO_2)

Overview

- On June 2, 2010 EPA strengthened the primary National Ambient Air Quality Standards (NAAQS) for sulfur dioxide (SO_2) to improve public health protection

- Specifically, EPA replaced the existing annual and 24-hour primary SO_2 standards with a new 1-hour SO_2 standard set at 75 parts per billion (ppb) to better protect public health by reducing people's exposure to high short-term (5-minutes to 24 hours) concentrations of SO_2

- This final standard is consistent with the recommendations of the Clean Air Scientific Advisory Committee (CASAC)

- This final rule does not cover the secondary SO_2 standard, which EPA is reviewing separately as part of a joint review of the welfare effects associated with deposition of SO_2 and NO_2 (to be completed in 2012)

Overview (cont.)

- EPA is revising the ambient air monitoring requirements for SO_2. States must make necessary adjustments to their monitoring network to meet the new requirements by January 1, 2013.
- EPA is also describing our planned hybrid approach for implementing the new 1-hour SO_2 standard. The approach would rely on air dispersion modeling of SO_2 sources and ambient monitoring to determine compliance with the new standard.
- This final rule also changes the Air Quality Index to include the revised SO_2 standard.
- For more information, http://www.epa.gov/air/sulfurdioxide/

Hybrid Monitoring/Modeling Approach to Assess Compliance with the New Standard

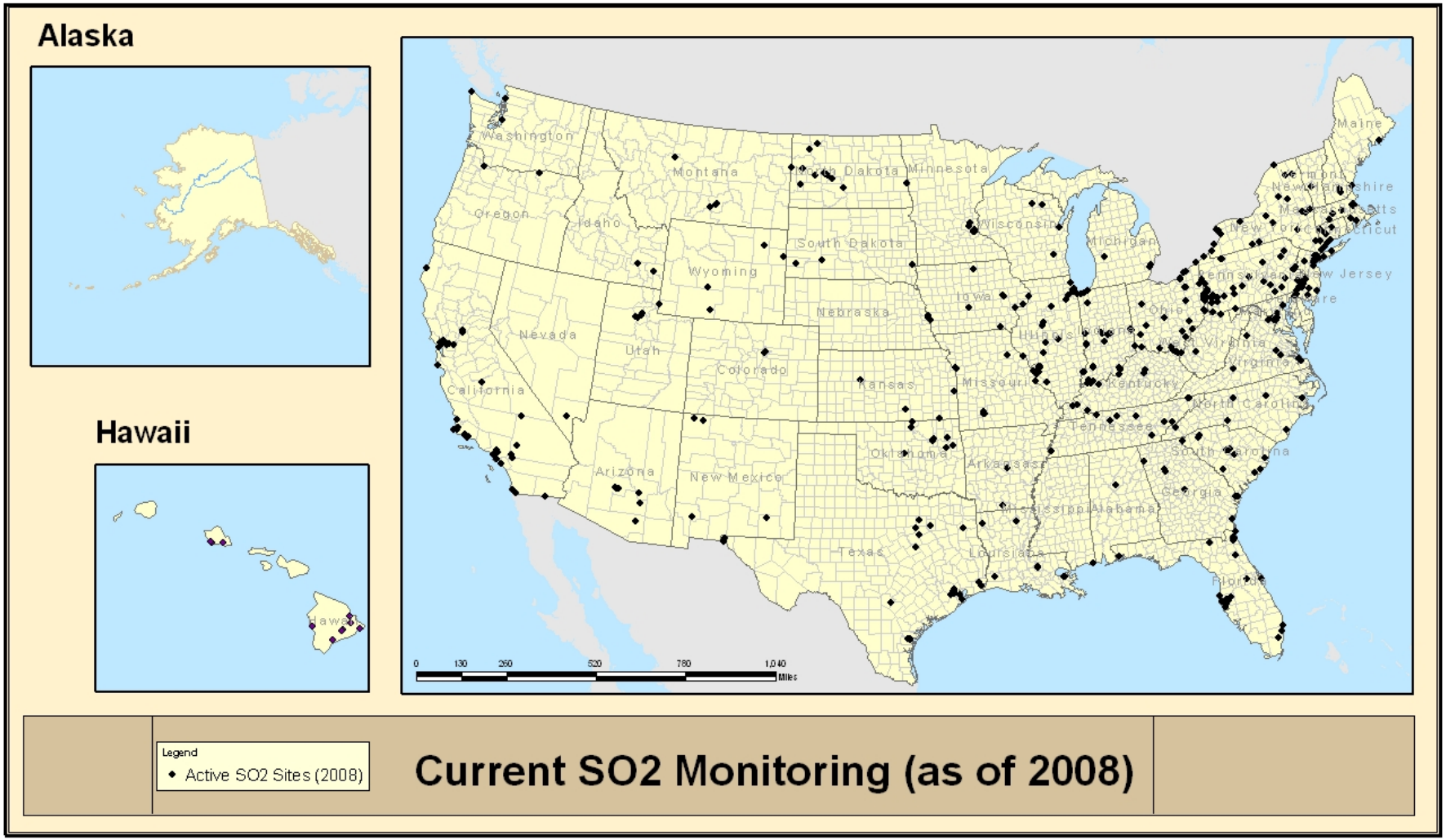
- EPA plans to use a combination of monitoring and modeling to assess compliance with the 1-hour standard
  - More technically appropriate and efficient to model medium to larger sources and to rely on monitoring for groups of smaller sources and sources not as conducive to modeling.
- Basis for revising monitoring-focused proposal to hybrid approach that includes modeling:
  - Address comments that increasing monitoring was insufficient and too burdensome, and
  - Consistent with historic approach to SO_2 compliance that used both monitoring and modeling to make determinations.

Hybrid Monitoring/Modeling Approach to Assess Compliance with the New Standard (cont.)

- For sources or groups of sources that have the potential to cause or contribute to a violation of the standard, EPA anticipates using refined source-oriented dispersion modeling to:
  - identify violations, and
  - determine compliance.
- EPA plans to develop modeling and implementation guidance for the states addressing a variety of issues including how to:
  - Appropriately compare the model results to the new SO_2 standard, and
  - Identify and appropriately assess the air quality impacts of smaller SO_2 sources that may potentially cause or contribute to a violation of the new SO_2 standard.
- EPA will provide an opportunity for public comment on the guidance before issuing it in final form.

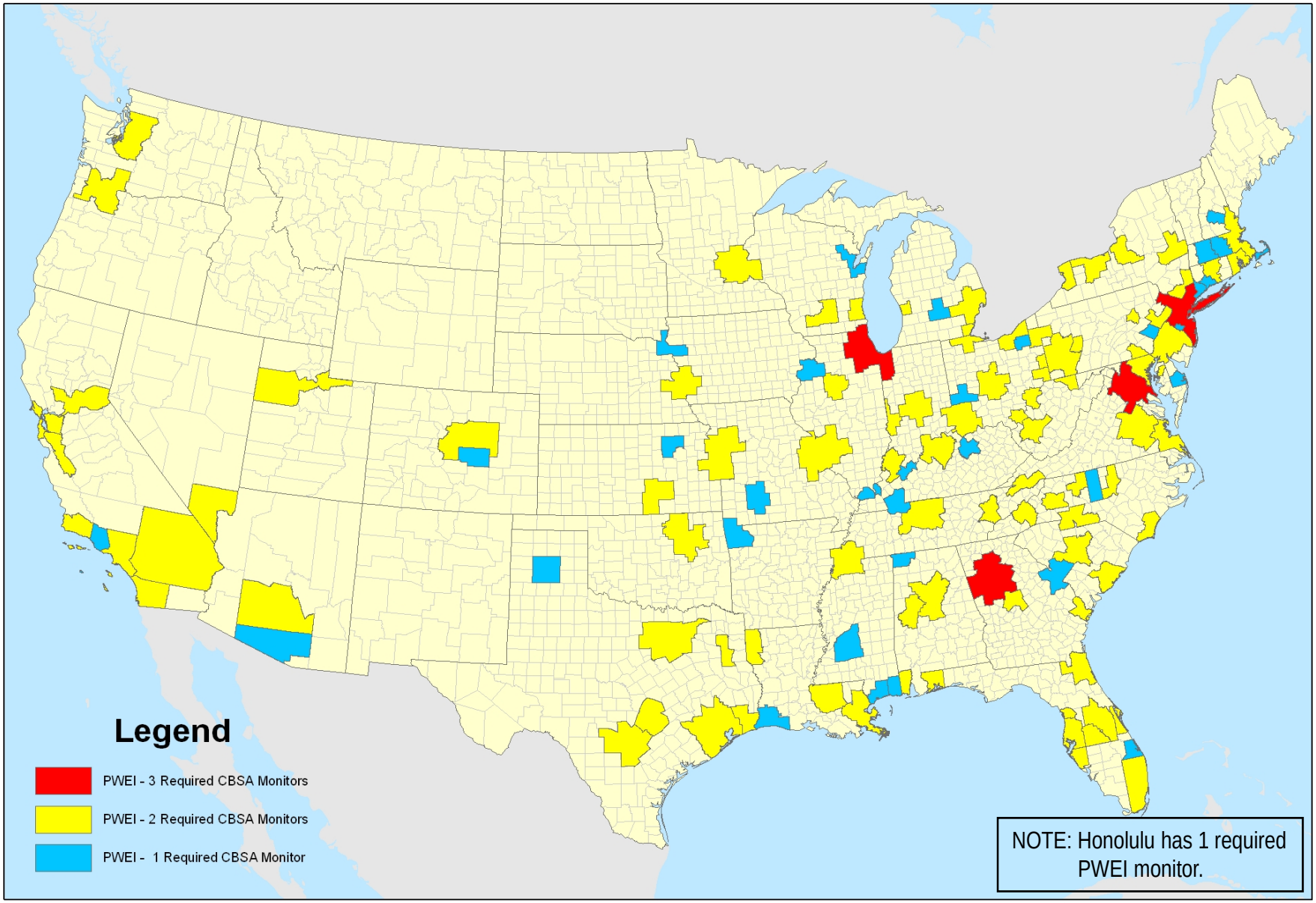
Final SO_2 Monitoring Network Requirements

- EPA is setting specific minimum requirements for where states must place SO_2 monitors.
- At least 163 SO_2 monitoring sites nationwide are required by this rulemaking.
- The final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index for the area . The final rule requires:
  - 3 monitors in CBSAs with index values of 1,000,000 or more;
  - 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
  - 1 monitor in CBSAs with index values greater than 5,000.
- All required SO_2 monitors must be operational by January 1, 2013.
- EPA Regional Administrators have the authority to require additional monitoring in certain circumstances.



Current SO_2 network is not primarily configured to monitor locations of expected maximum short-term concentrations. Only ~1/3 of the 488 SO_2 monitors operating in 2008 were source-oriented or at high concentration sites

Proposed SO2 Network Design - Prong 1 (PWEI Triggered)



Final SO_2 Data Reporting Requirements

- EPA also finalized changes to data reporting requirements. State and local agencies are required to report two data values for every hour of monitoring conducted:
  - The 1-hour average SO_2 concentration; and
  - The maximum 5-minute block average SO_2 concentration for each hour.
    - Optional (but encouraged) is to report all the 5-minute averages in the hour

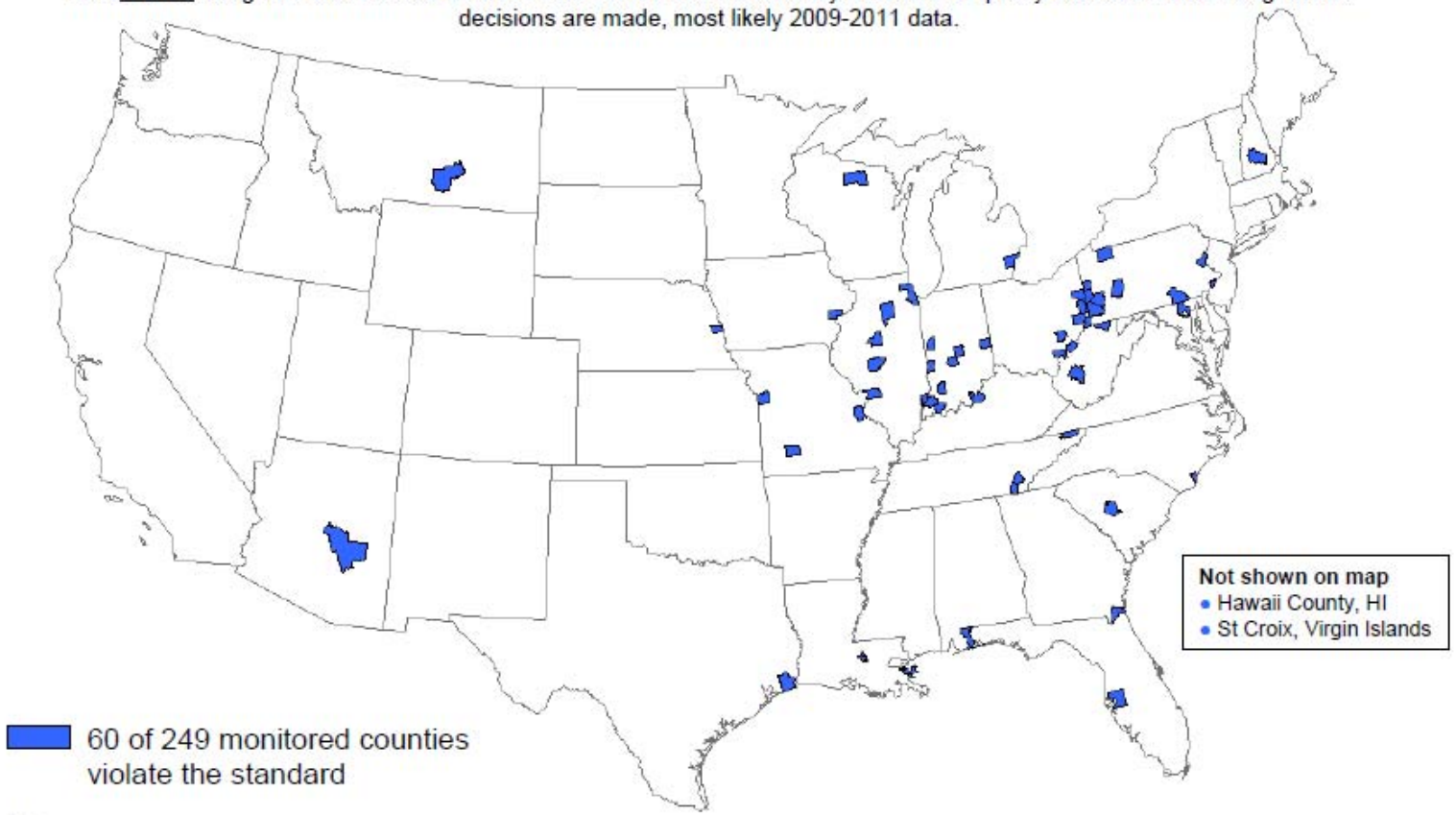
Designations & Potential Hybrid Monitoring/Modeling Approach

- Initial designations in 2012 will be based on data from existing monitors and, where provided by states, appropriate modeling.
- EPA's planned designation approach is:
  - Any area that has monitoring data (or refined modeling results) showing a violation would be designated "nonattainment".
  - Any area that has both monitoring and refined modeling results showing no violations would be designated "attainment".
  - All other areas would initially be designated "unclassifiable".
  - County would be the presumptive nonattainment boundary unless state demonstrates otherwise in recommendations to EPA.

Counties With Monitors Currently Violating the Revised Primary 1-Hour Sulfur Dioxide (SO2) Standard of 75 ppb

(Based on 2007 – 2009 Air Quality Data)

EPA will not designate areas based on these data but will use the currently available air quality data at the time designations decisions are made, most likely 2009-2011 data.



Notes:

1. Data are shown for monitors that met the following criteria: 75% of the day has valid hourly values,75% of the days in a quarter are valid, and all 4 quarters for each of the three years are valid as well as other applicable data handling conventions included in 40CFR50 Appendix T.

Deadline	Milestone
June 2010	EPA sets new primary SO_2 standard
June 2011	States submit designation recommendations, based on available monitoring data and any modeling they choose to perform in advance of submitting their state implementation plans
June 2012	EPA issues initial designations: ➢ "nonattainment" = monitored **or** modeled violations ➢ "attainment" = monitored **and** modeled evidence of no violations ➢ "unclassifiable" = all other areas
January 2013	New monitoring network operational
June 2013	State plans for basic requirements to implement the revised standards (including appropriate state regulations to carry out monitoring etc.) due to EPA Attainment and unclassifiable area state implementation plans, modeling attainment of the new standard by August 2017, due to EPA.
February 2014	Nonattainment area plans due to EPA
August 2017	All areas attain the standard

NOx/SOx Secondary Standard: Monitoring Implications

$$AAPI = g(\cdot) - \frac{1}{Q} L(NHx) - \frac{1}{Q}\left[V_{NOy} \cdot NOy + V_{SOx} \cdot SOx\right]$$

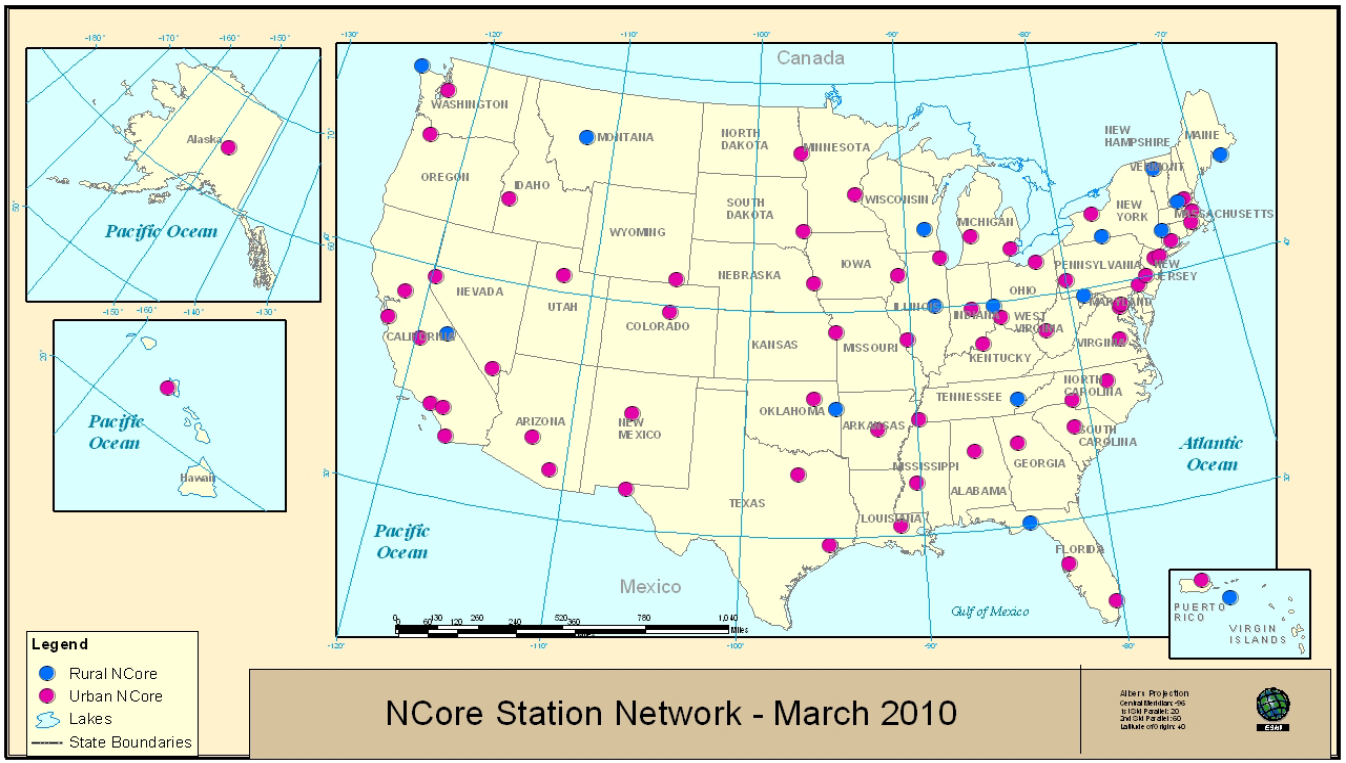
AAPI = Atmospheric acidification potential index

- Ambient observations of sulfur dioxide, particulate sulfate and NOy will be required to assess compliance. Note that SOx is the sum of SO_2 and SO_4.
- Implies FRM/FEM status will be required for sulfate and NOy. EPA considering alternate scenarios for standardization of methods
- Network design discussions to be addressed in second draft of the PAD (July – September 2010)
  - Leaning toward "representative" area wide monitoring
- Desire for reduced nitrogen (ammonia and ammonium ion) observations, but they would not be reference level.
  - Relying on modeled estimates of reduced nitrogen deposition
- Proposal on NAAQS and monitoring due July 2011

PM NAAQS – Secondary standard monitoring issues

- As part of its PM NAAQS review, EPA is considering a secondary standard to protect against visibility based welfare effects that is different from the primary standard.
- Light extinction (i.e. fractional loss of light per unit distance caused by scattering and absorption by particles and gases) is more closely tied visibility effects than PM mass concentration.
  - PM light extinction (component of light extinction caused by PM) is the largest contributor to light extinction during hazy conditions and it is directly measurable
- EPA is considering several approaches for implementing a possible PM secondary NAAQS
  - Light extinction monitoring (direct measurement)
  - Use of continuous $PM_{2.5}$ mass (direct measurement)
  - Continuous $PM_{2.5}$ mass with algorithm involving other factors such as RH and speciation data to estimate light extinction
- Choosing direct measurement of light extinction would require the establishment of a specific FRM, specifications and procedures for approval of a FRM and candidates FEMs, and network design and probe siting criteria
  - February 2010 CASAC AAMMS very helpful in framing challenges with respect to methods and availability of associated technology
  - http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/72b081422dc87002852576a900517480!OpenDocument&Date=2010-03-26

National Core (NCore) Network



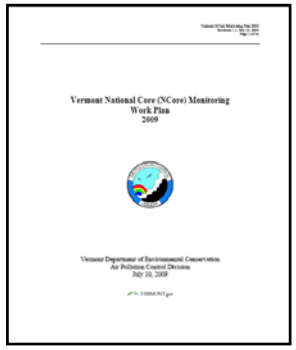
Implementation

- Most monitoring stations are operational for several measurements, others coming on-line this year.
- Plans received last year with almost all approvals completed.
- Stations to be fully operational by - January 1, 2011

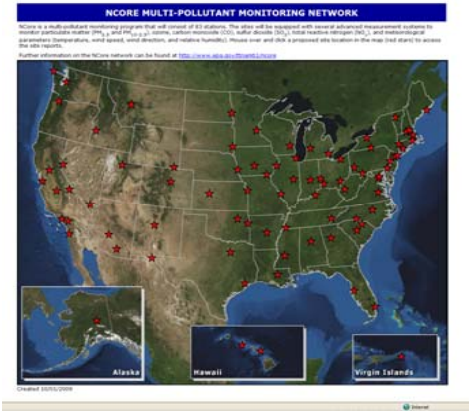
Network Size - 80 proposed stations

- urban (about 63 sites)
- rural (about 17 sites)
- May achieve additional rural coverage with National Parks and CASTNET

Tools used for NCore Approval Review


Vermont National Core (NCore) Monitoring
Work Plan
2009

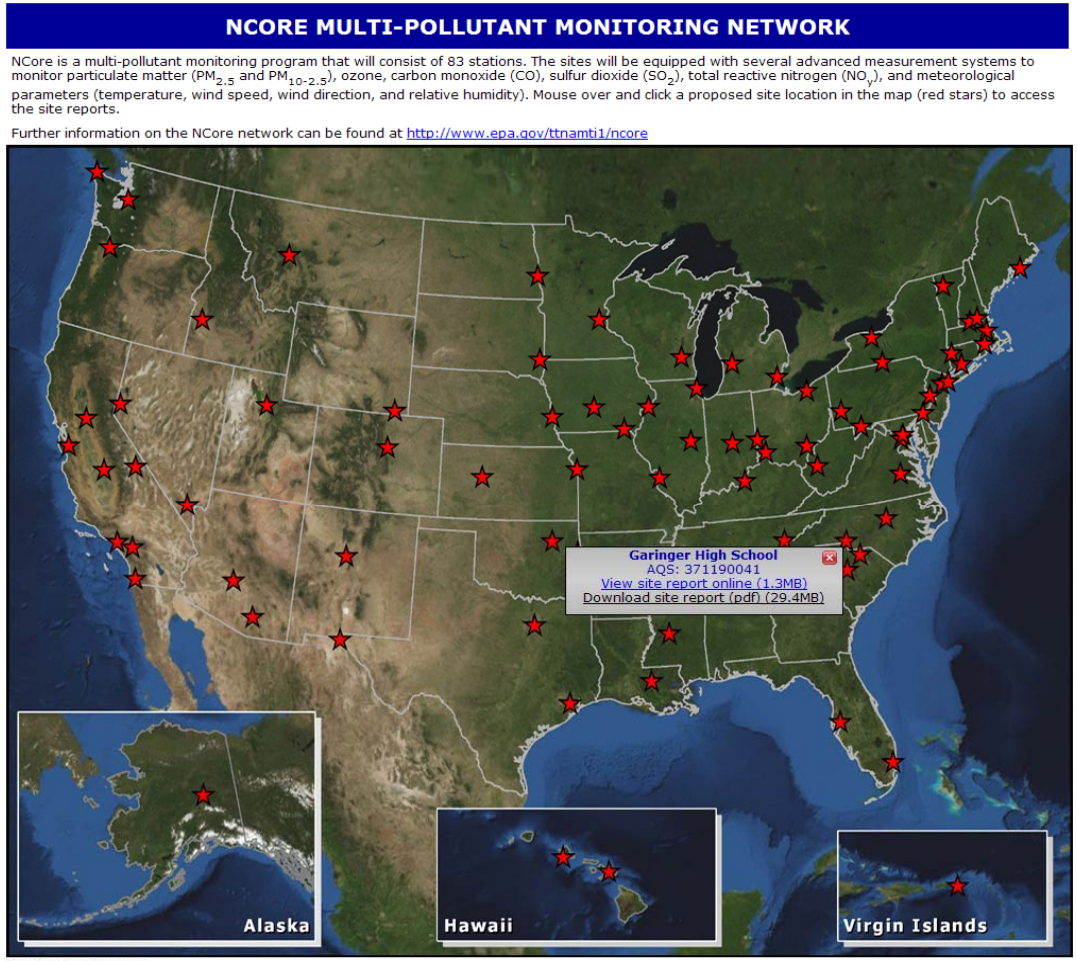
- ✓ Annual Monitoring Plan submitted by each monitoring agency
- ✓ Regional Recommendations
- ✓ NCore Site Characterization Reports from Sonoma Technology Inc.
  - http://ncore.sonomatechdata.com/#map
- ✓ AirExplorer/Google Earth kml files of $PM_{2.5}$ mass, CSN, and ozone monitoring stations
  - http://www.epa.gov/airexplorer/



Map Monitoring Sites
Explore monitoring locations with Google Earth. Download annual and daily data.

NCore Site Characterization Reports

- Google Earth Site views
- Local topography
- Land cover
- Population densities
- Traffic volumes
- Emissions data
- Pollution trajectories
- Wind roses
- Fuel use
- Climate summaries



Aerial Site Views

Image from Google Earth

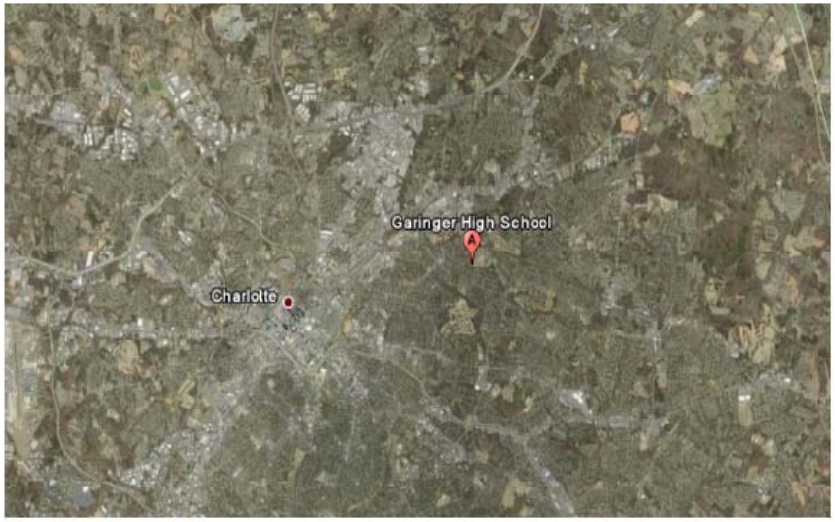
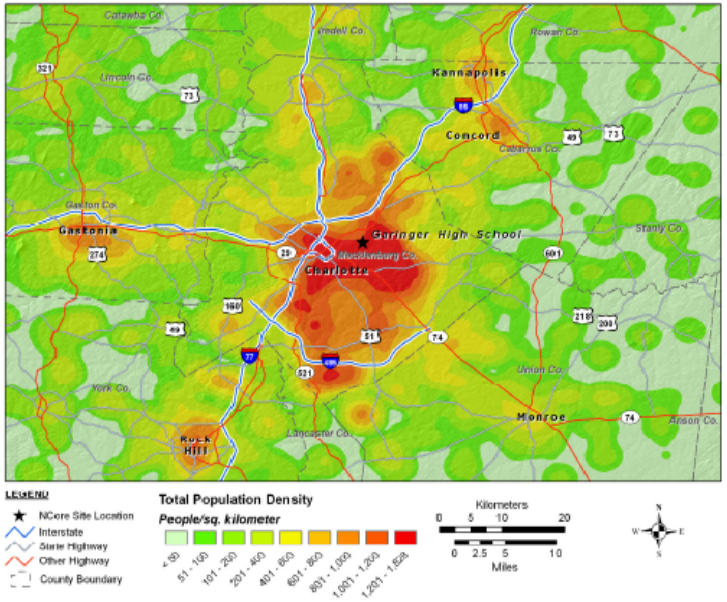
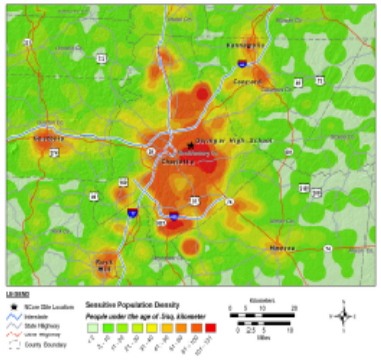


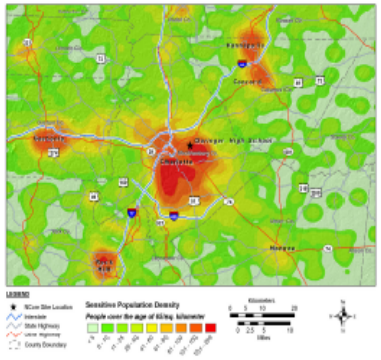
Image from Google Earth

Population Density

Population data were collected at the block-group level from the 2007 Census population projection estimates. Population density was mapped for the following population/socioeconomic parameters: total population and sensitive population (under the age of 5 and over the age of 65).

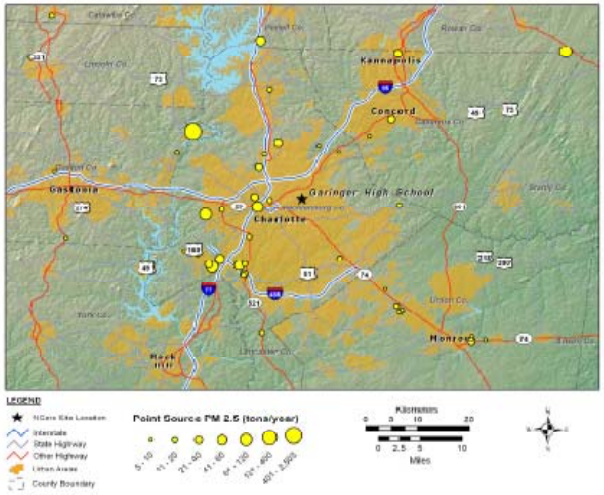


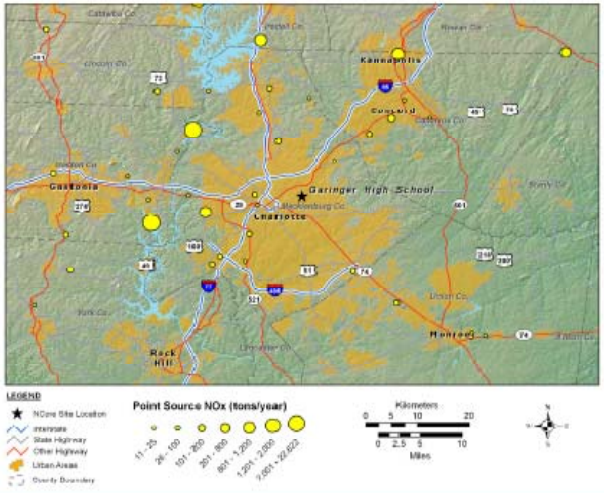




Facility Emissions

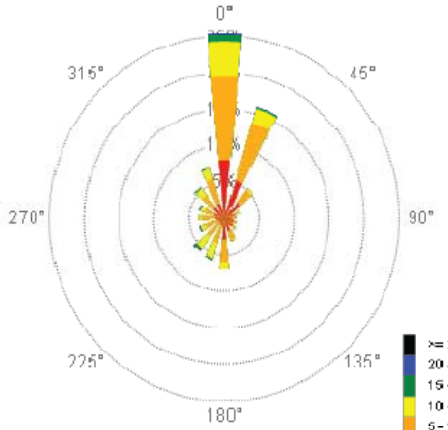
Major point source emissions data for VOCs, $PM_{2.5}$, NO_x, and SO_2 were collected from EPA's Air Quality System (AQS). Point source locations were mapped in graduated symbols depicting the 2005 annual emissions estimates. More information on facility emissions can be found at http://www.epa.gov/air/emissions/where.htm.



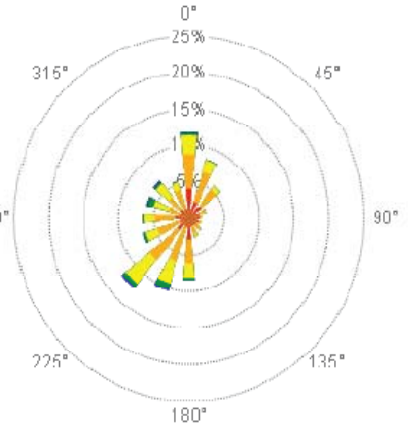


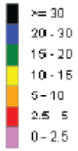
Wind Patterns

FALL
September, October, and November, 2005-2007



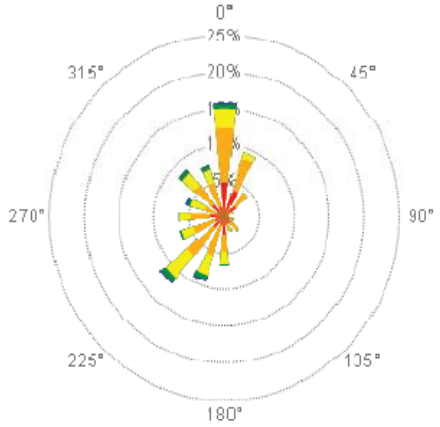
SPRING
March, April, and May, 2005-2007



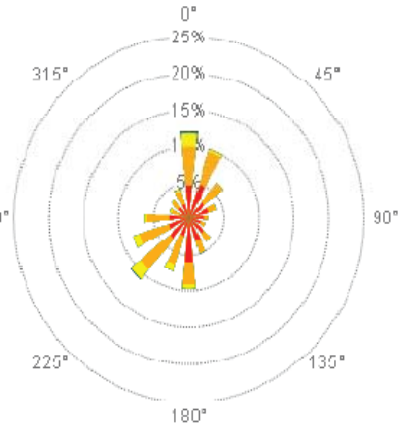


Wind Rose Legend
Wind Speed Units: miles per hour

WINTER
December, January, and February, 2005-2007



SUMMER
June, July, and August, 2005-2007



NCore Leveraging

- NCore Stations leveraged with other networks
  - 9 rural sites are IMPROVE sites (may increase)
  - 16 sites are National Air Toxics Trends Stations (NATTS)
  - 11 sites are PAMS sites
  - 4 sites are CASTNET
- 71 sites are either Chemical Speciation Network STN or Supplemental Speciation sites