

# Status Report on PM2.5 Monitoring

for



by

**STAPPA/ALAPCO**



Prepared for June 13, 2002  
Meeting in Washington D. C.

Updated August 1, 2002

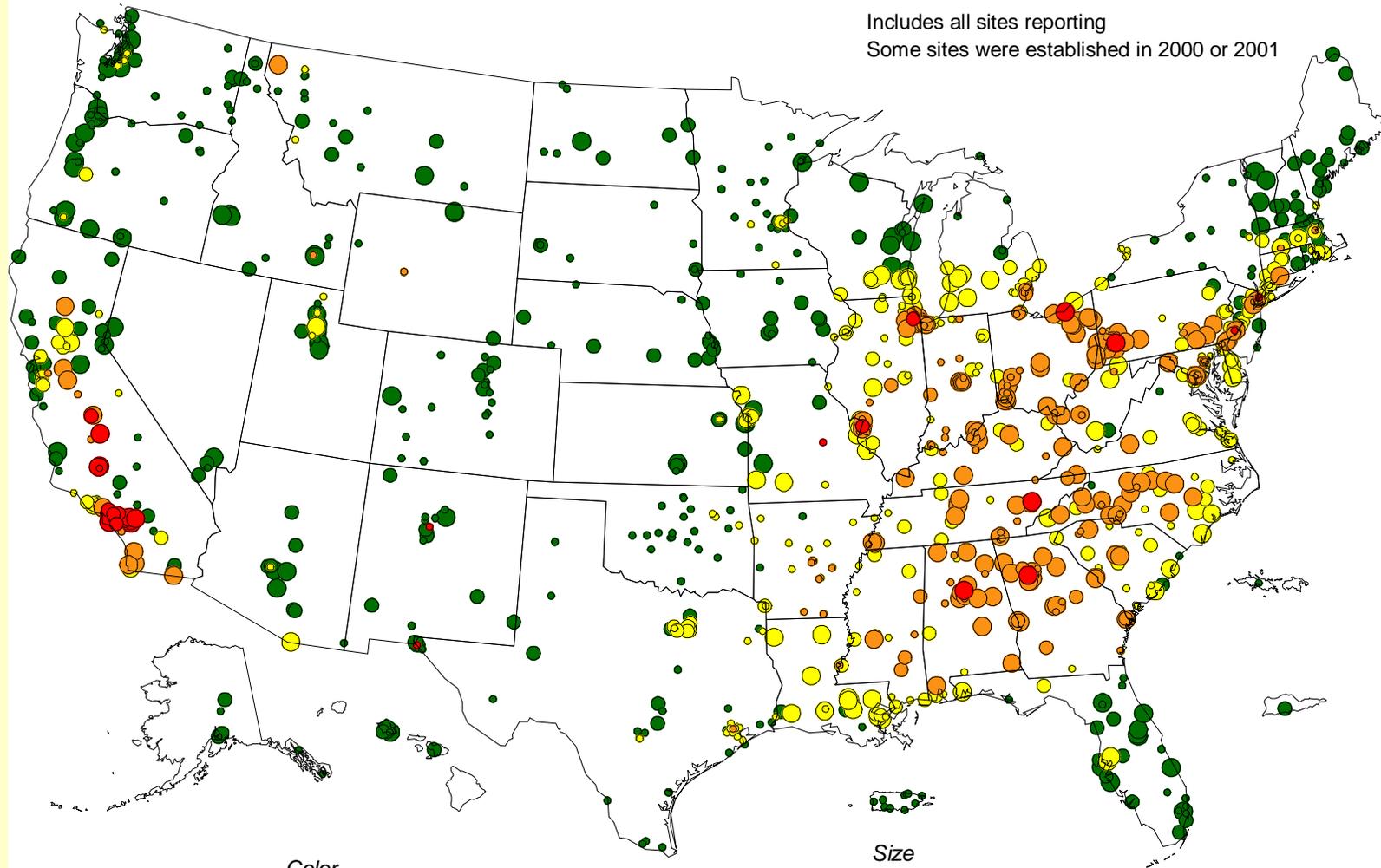
# DISCUSSION TOPICS

- **PM2.5 Air Quality Levels for 1999-2001** (EPA)
- **PM2.5 Monitoring Program** (STAPPA/ALAPCO)
  - Monitoring Mass PM2.5 Levels
  - Continuous Monitoring
  - Measuring Chemical Composition of PM2.5
- **Efforts To Implement PM2.5 Monitoring** (STAPPA/ALAPCO)
- **PM2.5 Data Completeness** (EPA)
  - Base Case Maps
  - Simulation of "Data substitution"
  - Other Analyses
- **Summary and Next Steps** (All)

# 1999-2001 3-Year Average Annual Mean PM<sub>2.5</sub>

Data from AQS 7/8/02. Sites that operated anytime 1999-2001 ( $n = 1202$ ).

Includes all sites reporting  
Some sites were established in 2000 or 2001



*Color*

●	$0 < \text{mean} \leq 12$
●	$12 < \text{mean} \leq 15$
●	$15 < \text{mean} \leq 20$
●	$20 < \text{mean}$

*Size*

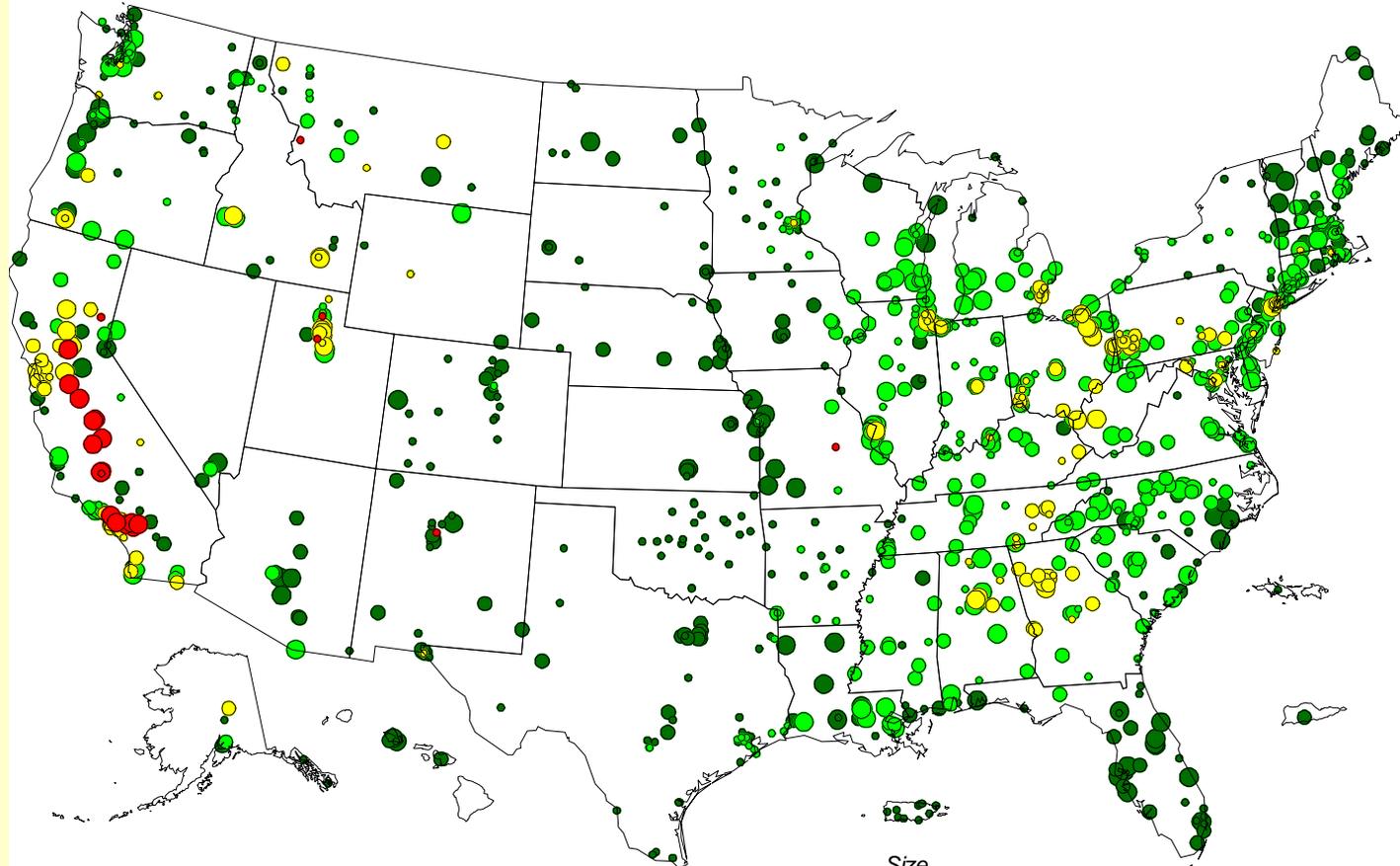
○	Meet NAAQS completeness criteria
○	12 quarters of data (but not complete)
○	Other incomplete sites

[No substitution]

# Sacramento Is The Area Exceeding Daily NAAQS And Not The Annual NAAQS

## 1999-2001 98th Percentile PM<sub>2.5</sub>

Data from AQS 7/8/02. Sites that operated anytime 1999-2001 (n = 1202).



Color

●	0 < 98th% <= 30
●	30 < 98th% <= 15
●	40 < 98th% <= 65
●	65 < 98th%

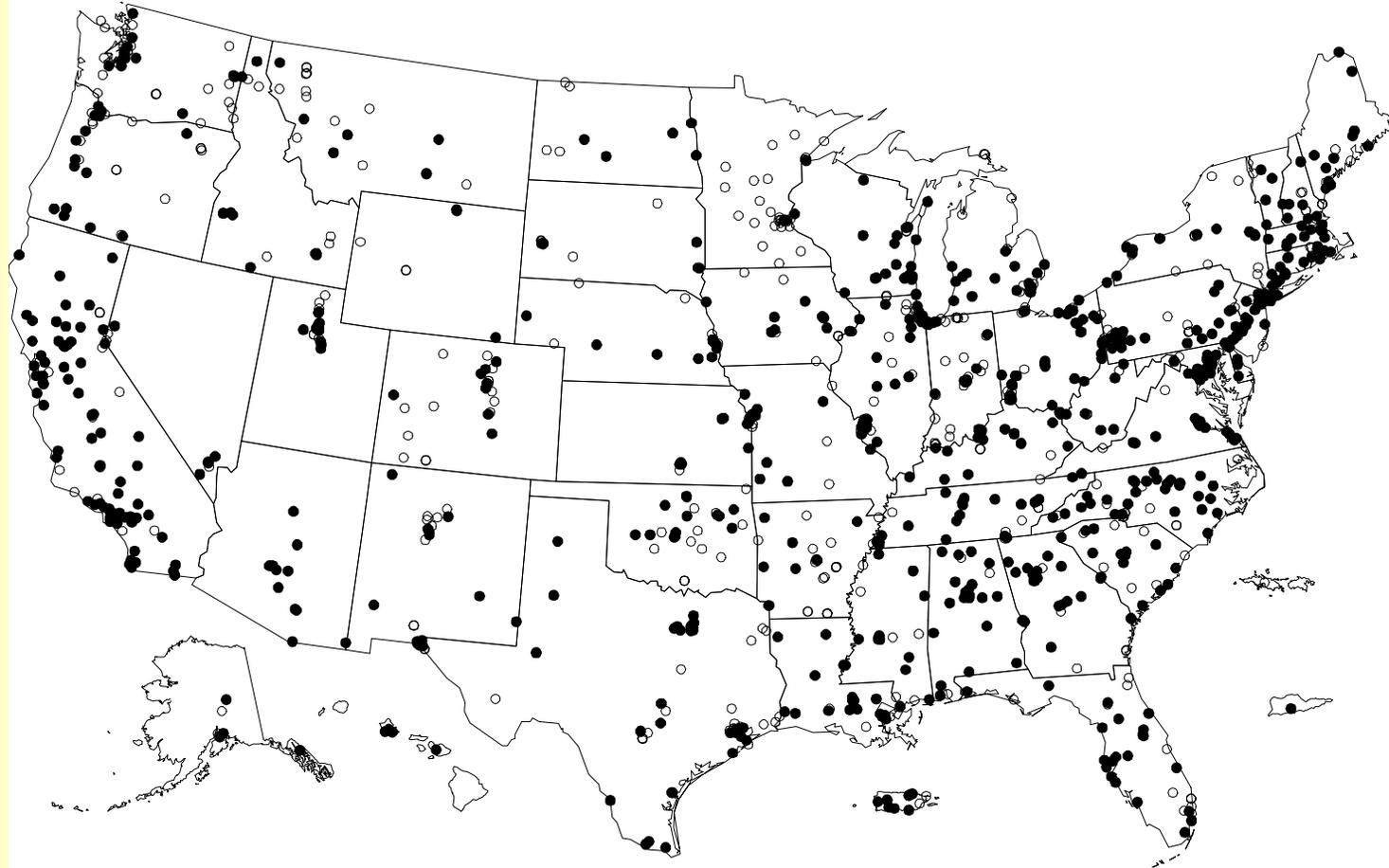
Size

○	Meet NAAQS completeness criteria
○	12 quarters of data (but not complete)
○	Other incomplete sites

[No substitution]

# Monitoring Sites For PM<sub>2.5</sub> Mass Have Been Installed Across US Since 1999

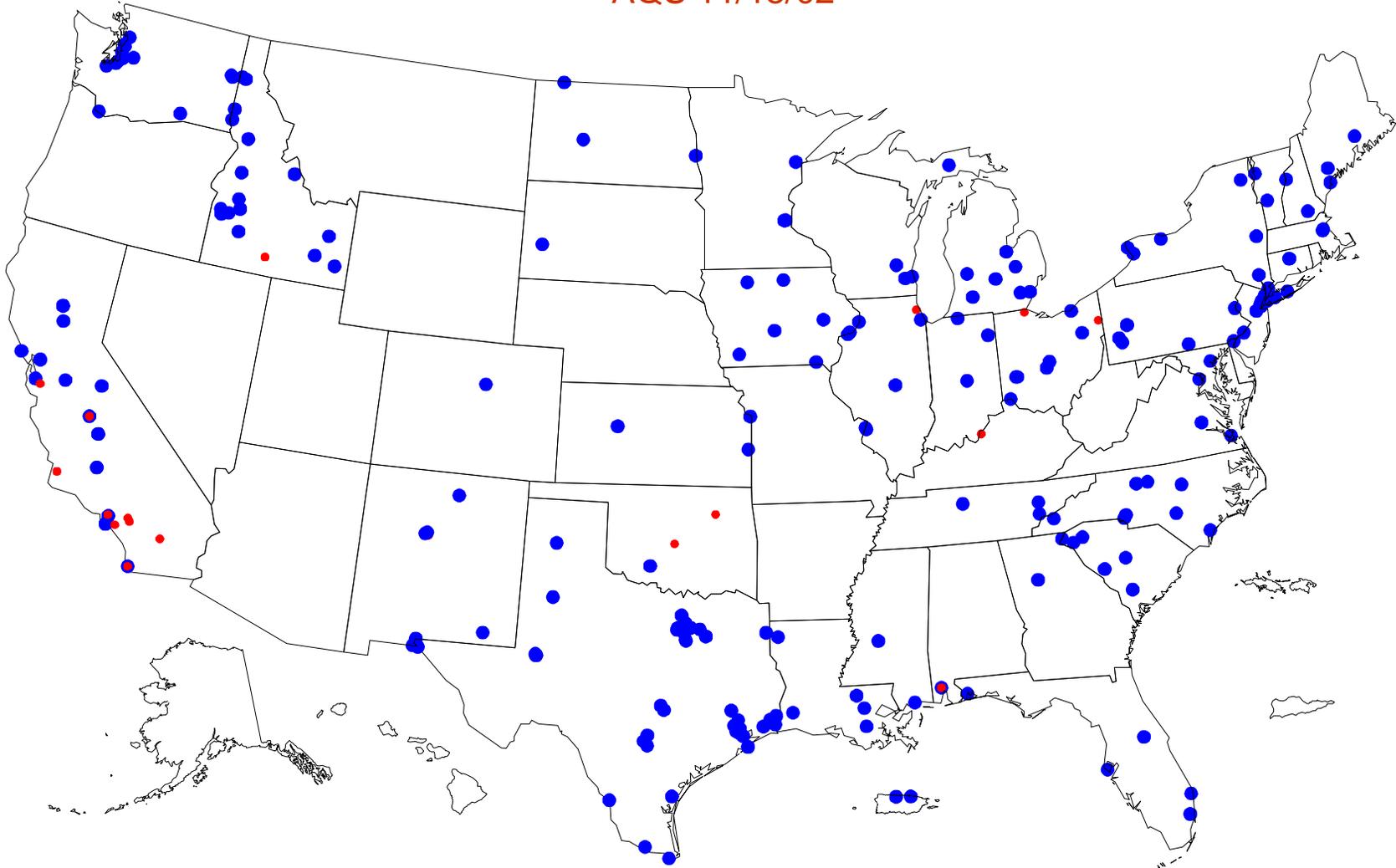
Data from AQS 7/8/02. Sites that operated anytime 1999-2001 ( $n = 1202$ ).



- Operated all 12 quarters [763]
- Incomplete; did not operate all 12 quarters [439]

# Active Continuous PM<sub>2.5</sub> Monitoring Sites

AQS 11/15/02



Data reported in AQS [238]

Registered in AQS but no data [19]

# Real-time PM products

- State and Local programs
  - Some supporting ALA Offices
- AirNow
  - PM Mapping Initiative
  - Data is being tested
  - Expect this online the Fall.

# Real-time PM supporting the Public

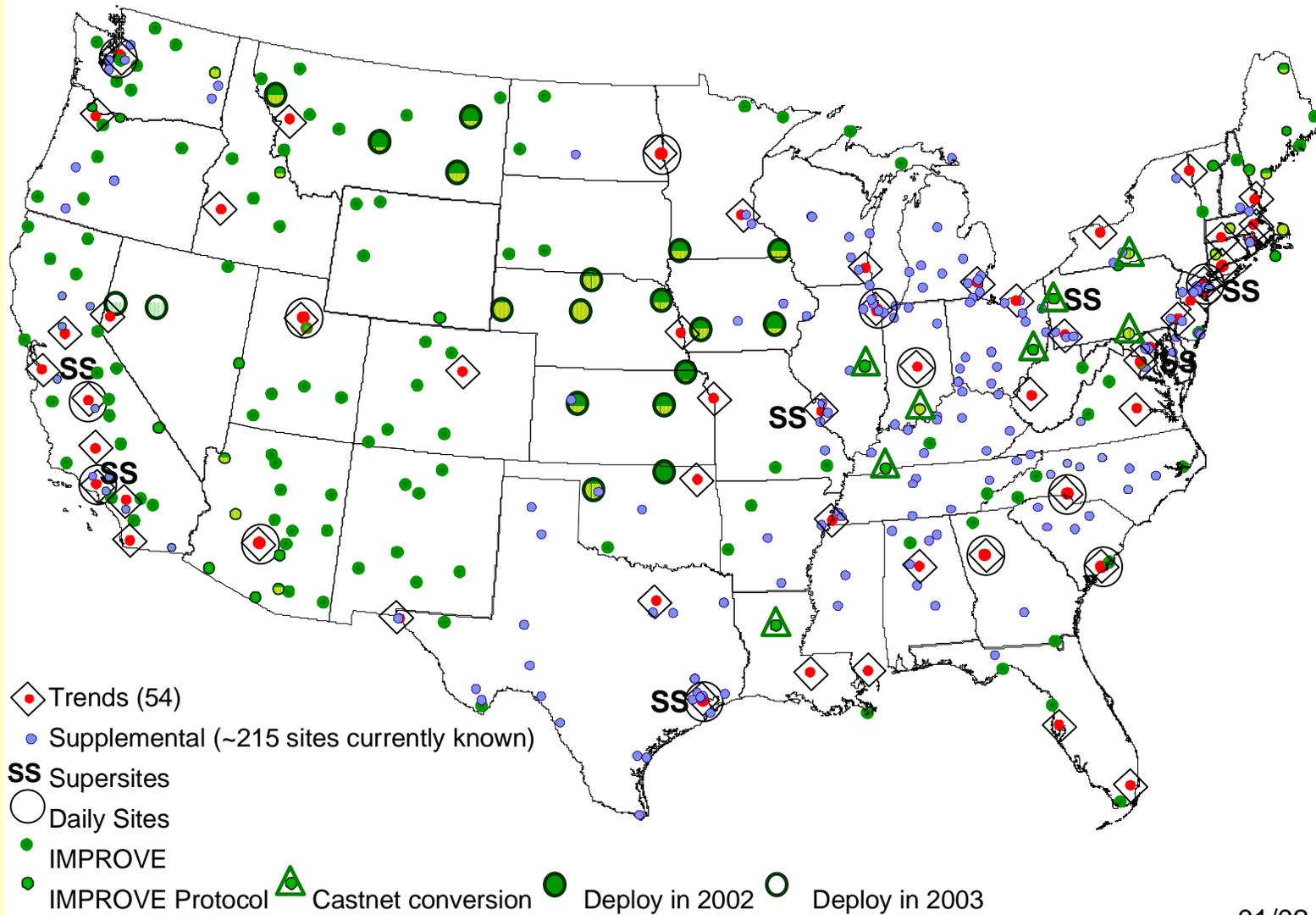
6/9/2002 6PM Pacific Time

Area	AQI	Descriptor				Pollutant
		G	M	USG	U	
EVERETT/MARYSVILLE	29	✓				Particulate
LYNNWOOD	27	✓				Particulate
LAKE FOREST PARK	29	✓				Particulate
BELLEVUE	29	✓				Particulate
SEATTLE	29	✓				Particulate
QUEEN ANNE	21	✓				Particulate
SOUTH PARK	31	✓				Particulate
KENT	31	✓				Particulate
TACOMA	37	✓				Particulate
SOUTH TACOMA	36	✓				Particulate
PUYALLUP	29	✓				Particulate
BREHERTON	26	✓				Particulate
SILVERDALE	30	✓				Particulate

Check marks  indicate applicable AQI descriptor at each monitoring area.  
 Descriptors: **G** = Good **M** = Moderate **USG** = Unhealthy for Sensitive Groups **U** = Unhealthy



# Current/Planned Urban & Rural PM<sub>2.5</sub> Speciation Networks



01/02

# Efforts to Ensure Quality of Data from PM2.5 Monitoring

- Early on ... new program complexities
  - Buying equipment
  - Equipment “start-up” – malfunction and filter issues
  - Overcoming roll out challenges
  - Site location and personnel issues
- EPA-State-local QA and reporting efforts
  - DQO developed and evaluated
  - PM2.5 Monitoring Performance Evaluation Program
  - AQS re-engineered and new data fields needed for PM2.5
- STAPPA/ALAPCO
  - Close liaison with S/L Agencies and EPA
  - Helping to find solutions
    - FRM issues
    - AIRS

# **Keys to Ongoing Success**

- **Refine networks for efficient operation**
- **Improvement as AQS matures**
- **Reinforce expectations for timely reporting**
- **Focus on new equipment issues**

# PM 2.5 Data Completeness Report Card

- **Improvements in collection and reporting**
  - **SAMWG and EPA Working Together**
  - **State and Local Agency efforts**
  - **Continuous PM network**
- **Noteworthy results in 2001**
  - **1103 station operated all 4 quarters**
  - **AQS issues being resolved**
  - **5 States below 75% completeness in 2001**
- **Continued focus is warranted**

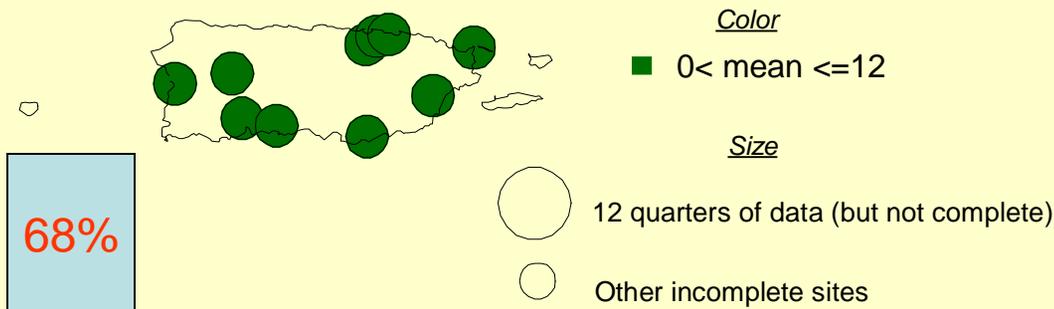
# Current 2001 reporting by EPA Region

• Region 1	82%	• Region 6	86%
• Region 2	78%	• Region 7	92%
• Region 3	89%	• Region 8	88%
• Region 4	89%	• Region 9	85%
• Region 5	89%	• Region 10	91%

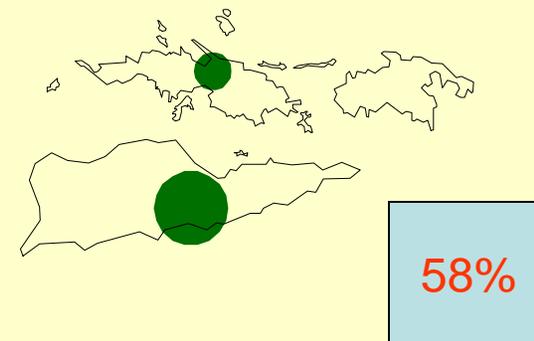
➤ **National Average of 87% - Shows significant increase from 2000**

# Some locations with incomplete data are not critical ...

## Puerto Rico



## Virgin Islands

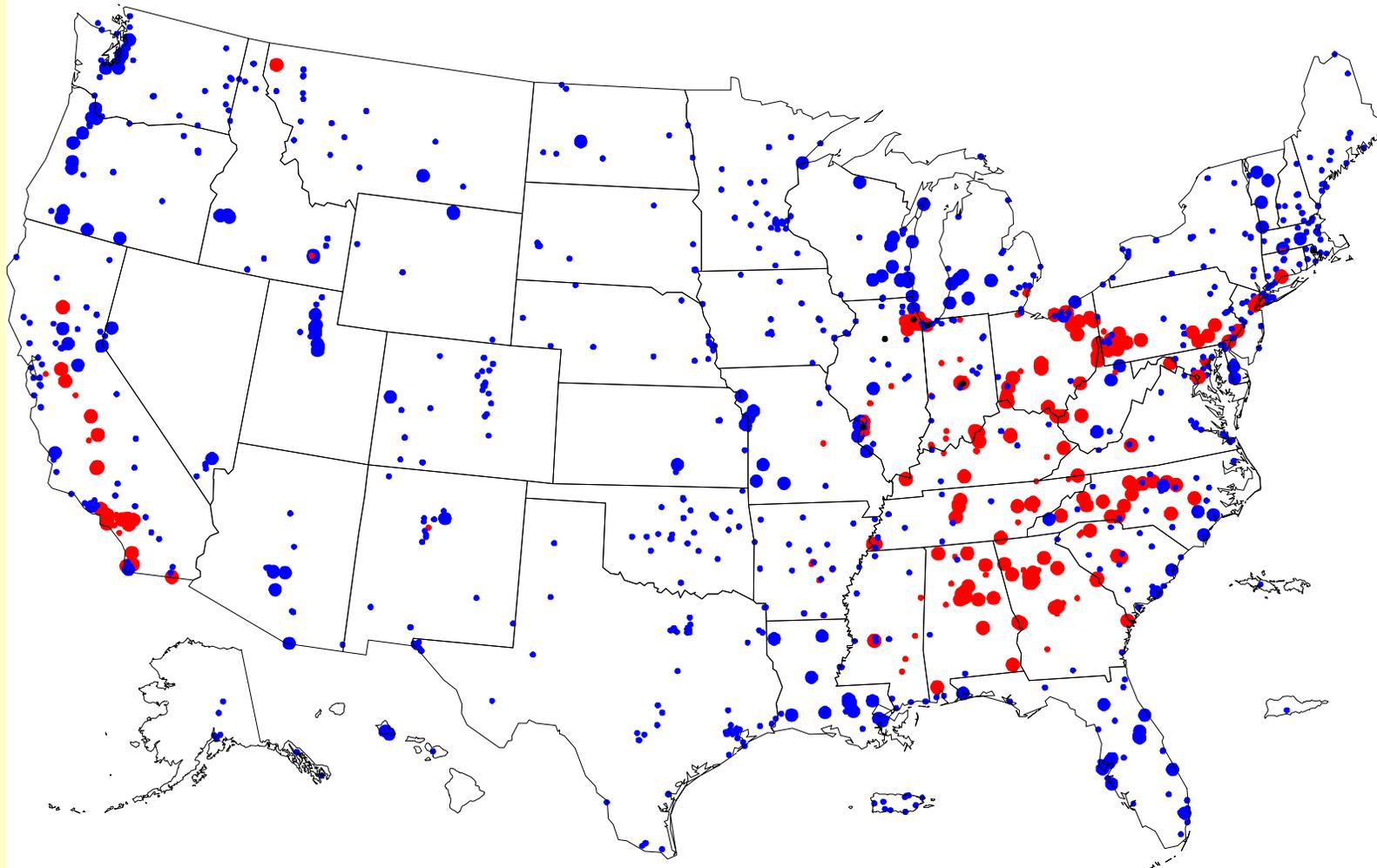


ST	COU	STATE	COUNTY	SITE	POC	Number of Q w/ Data	Number of Q w/ 11+	Number of Q 75%+	3-Yr Ann. DV
72	021	PR	BAYAMON	720210009	1	11	11	8	7.4
72	053	PR	FAJARDO	720530003	1	10	10	7	5.6
72	057	PR	GUAYAMA	720570008	1	11	11	6	7.6
72	059	PR	GUAYANILLA	720590016	1	11	11	7	7.6
72	061	PR	GUAYNABO	720610005	1	11	11	5	9.9
72	069	PR	HUMACAO	720690001	1	7	7	4	5.7
72	081	PR	LARES	720810001	1	11	10	6	6.1
72	097	PR	MAYAGUEZ	720970003	1	11	11	6	8.6
72	113	PR	PONCE	721130004	1	11	11	7	8.0
72	127	PR	SAN JUAN	721270003	1	11	10	8	10.0
78	001	VI	ST CROIX	780010012	1	12	1	1	8.3
78	005	VI	ST THOMAS	780050009	1	7	4	3	7.4

**Well below  
NAAQS!**

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

Data from AQS 7/8/02. Sites that operated anytime 1999-2001 ( $n = 1202$ ).



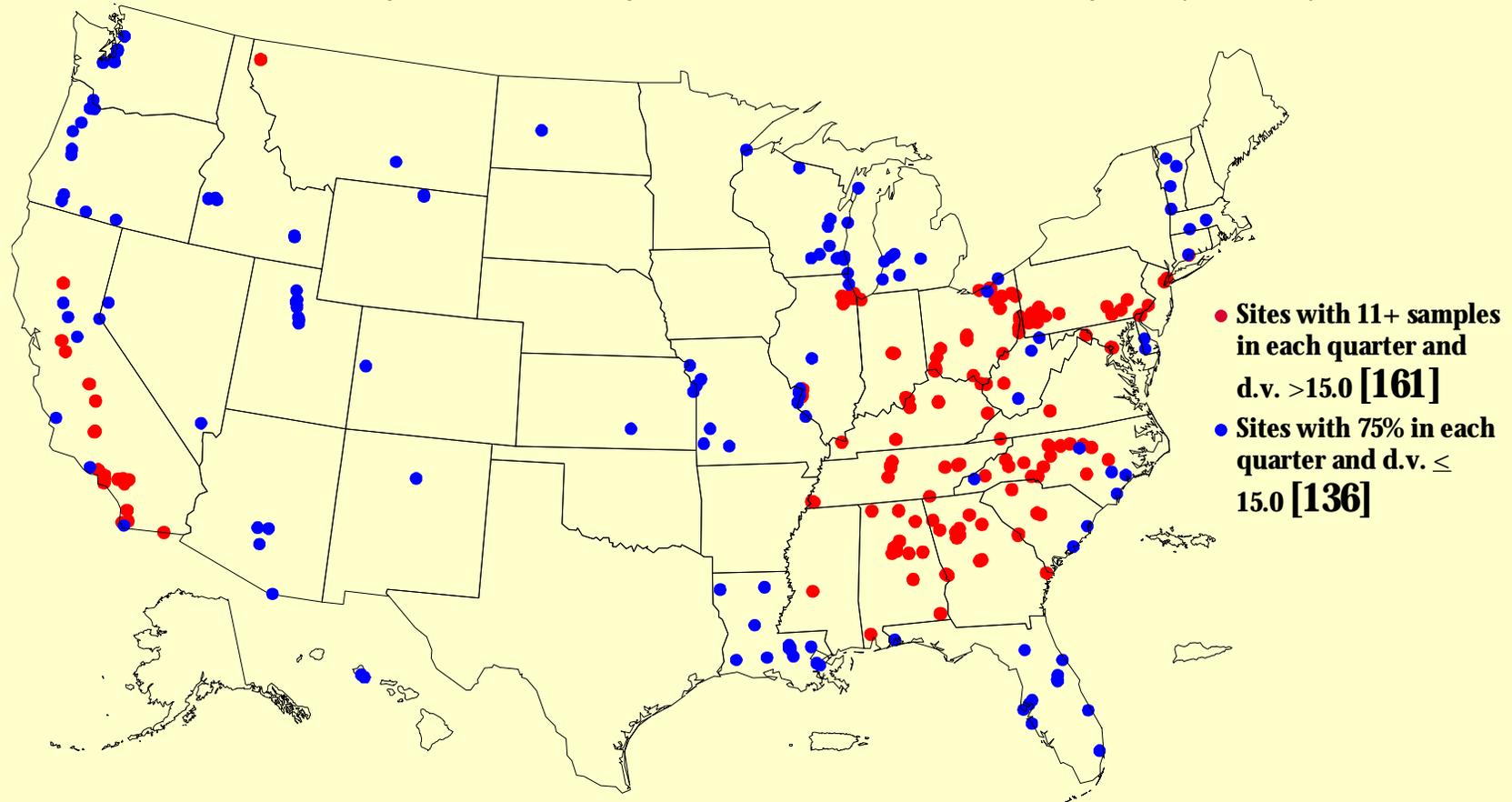
- Sites with 11+ samples in each quarter and d.v. > 15.0 [161]
- Sites with 75% in each quarter and d.v. ≤ 15.0 [136]
- Incomplete sites with d.v. > 15.0 [155]
- Incomplete sites with d.v. ≤ 15.0 [743]
- Sites not to be judged to annual standard [7]

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

(Data from AQS - 7/8/02)

Sites that operated all 12 quarters 1999-2001\* and complete (n = 297)

Based on preliminary data



*Base Case - Regulatory Data Completeness*

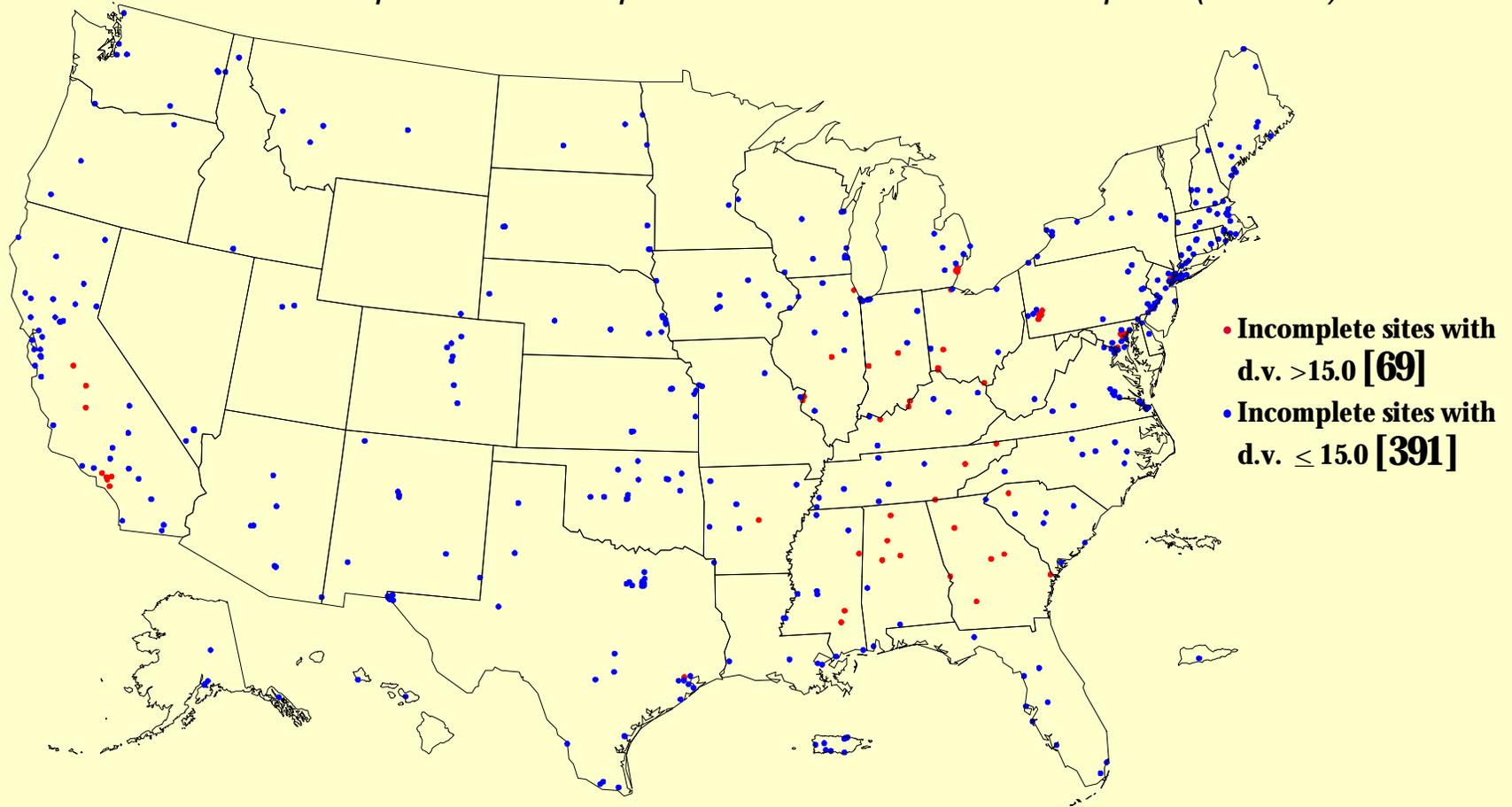
\* or can utilize substitution

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

(Data from AQS - 7/8/02)

*Sites that operated all 12 quarters 1999-2001 and incomplete (n = 460)*

Based on preliminary data

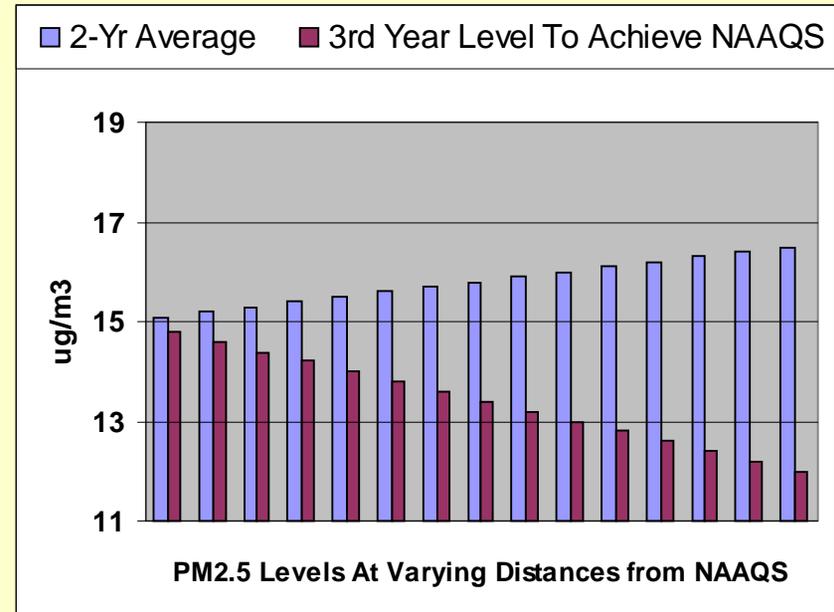
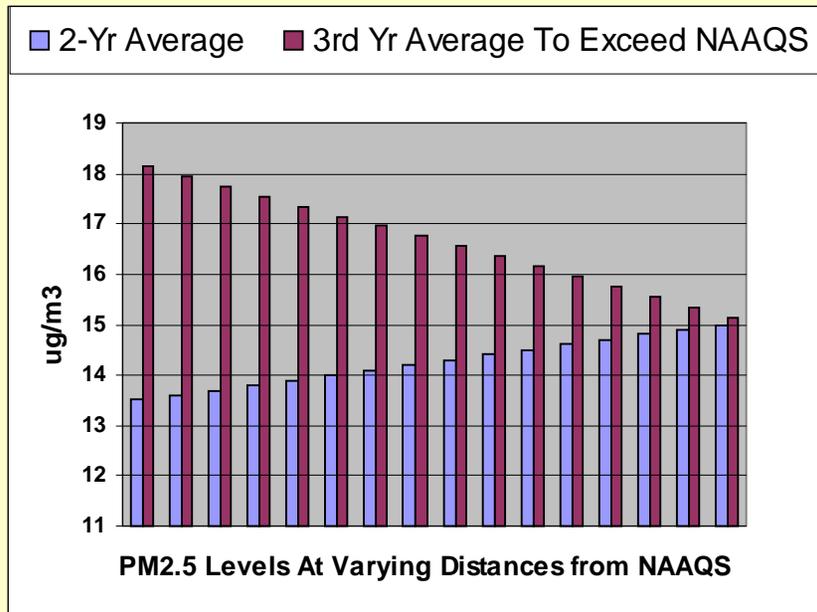


*Base Case - Regulatory Data Completeness*

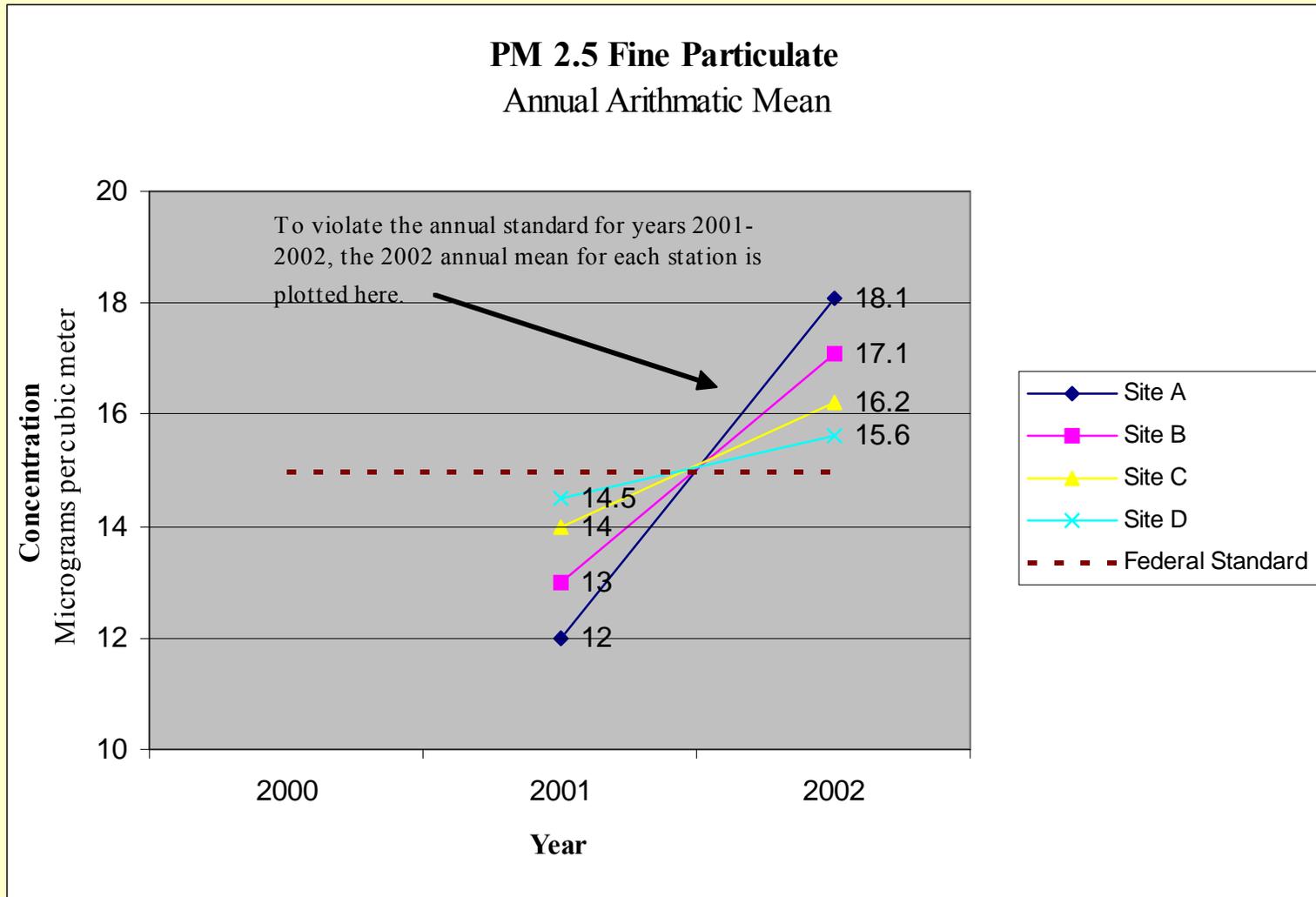
## NAAQS-How close is close?

- **PM 2.5 annual standard is controlling NAAQS.**
- **Annual Averages are relatively stable.**
  - Not susceptible to wide variability
  - Monitor's representative scale
- **Understanding the degree of change**
  - Levels needed to exceed or attain.

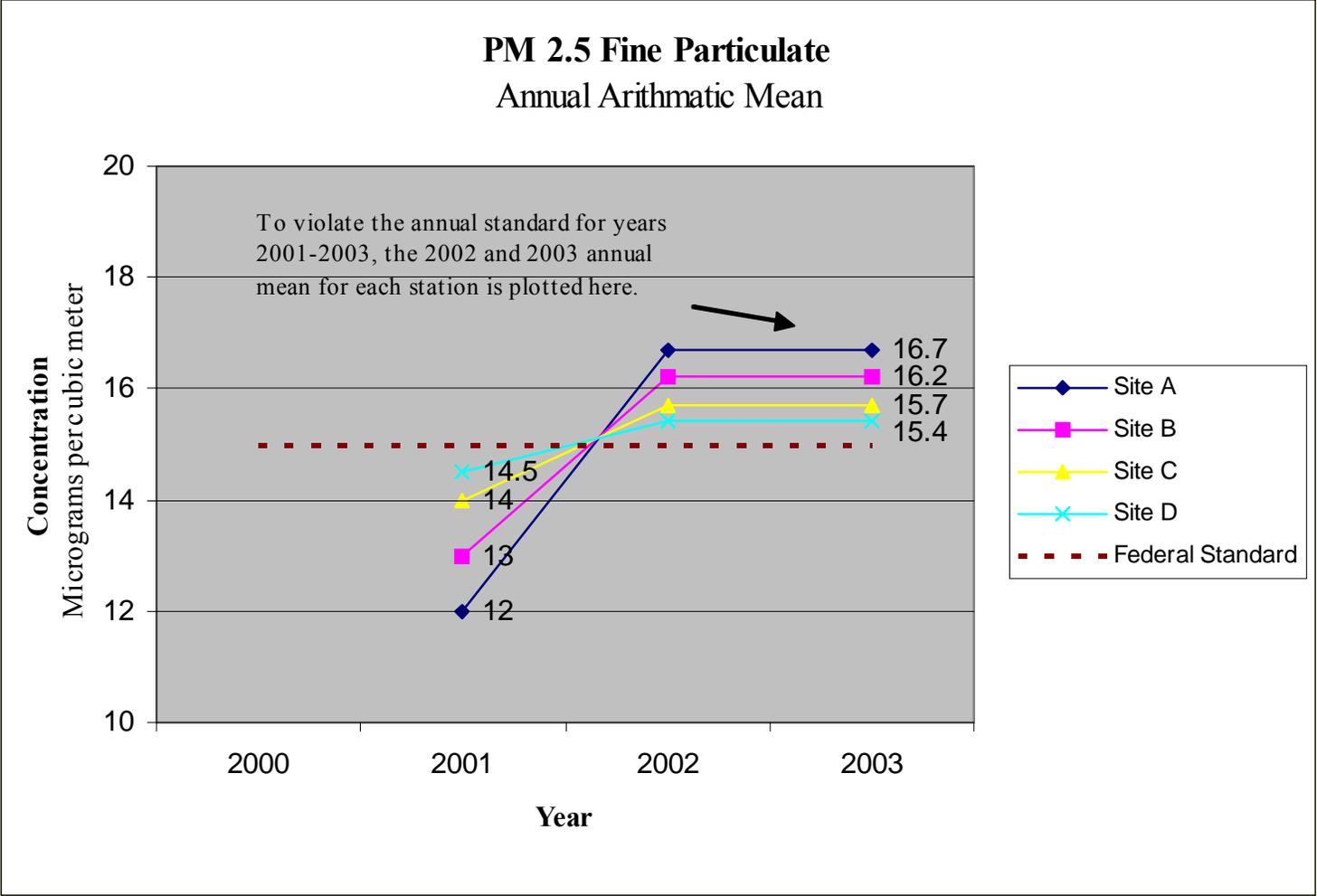
# As sites approach NAAQS, small changes can make a difference



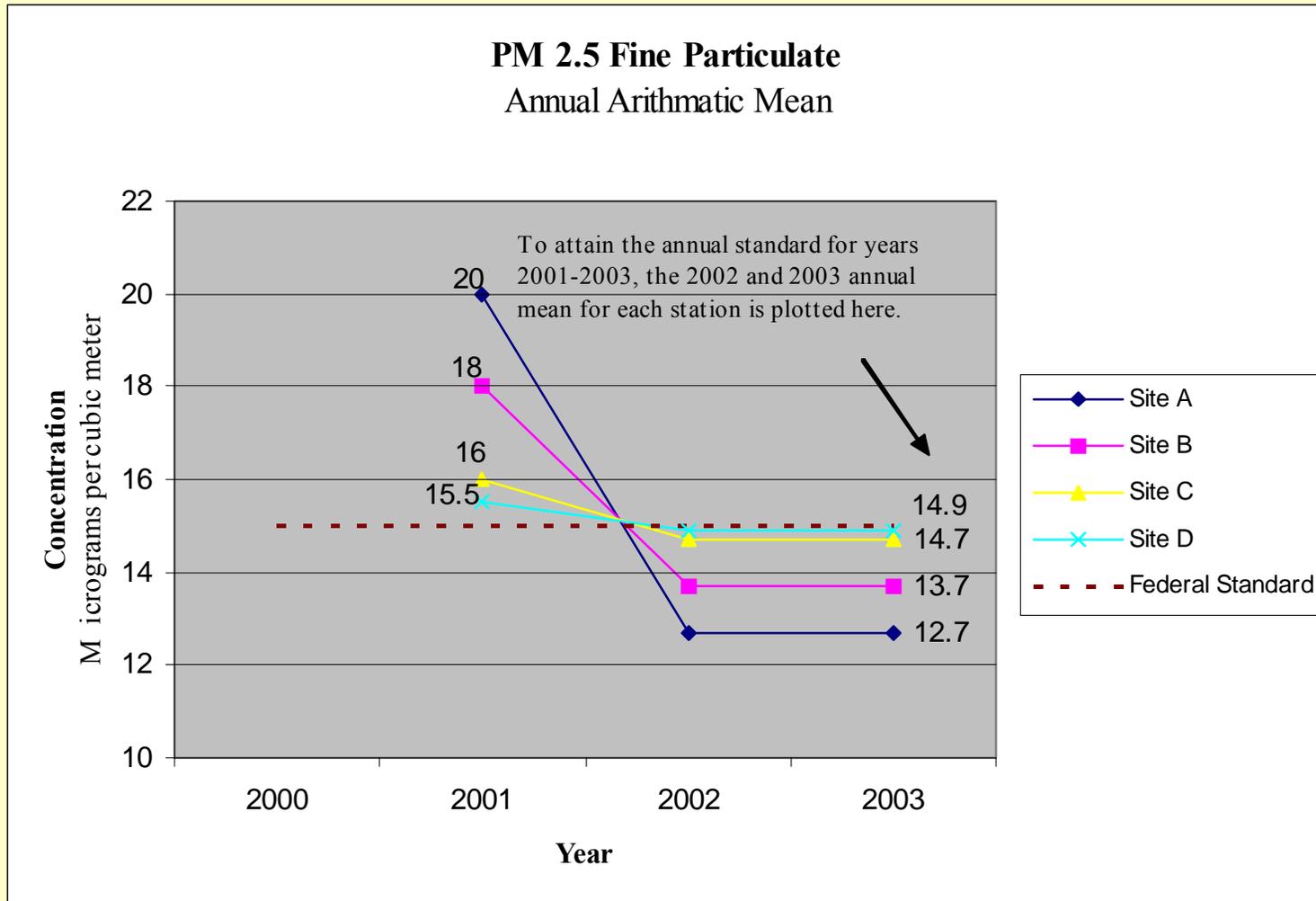
# Change Needed To Violate NAAQS- 1year



# Change Needed to Violate NAAQS- 3year

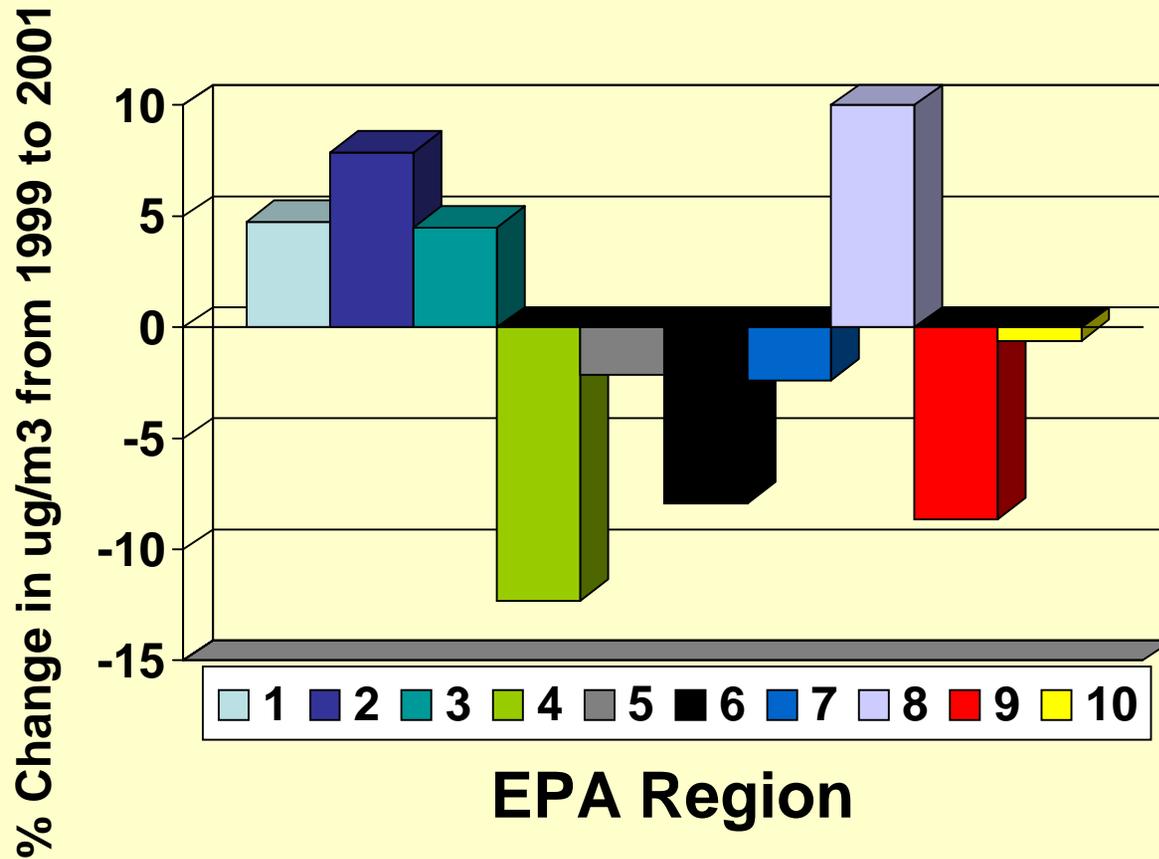


# Change Needed to Attain NAAQS - 3year



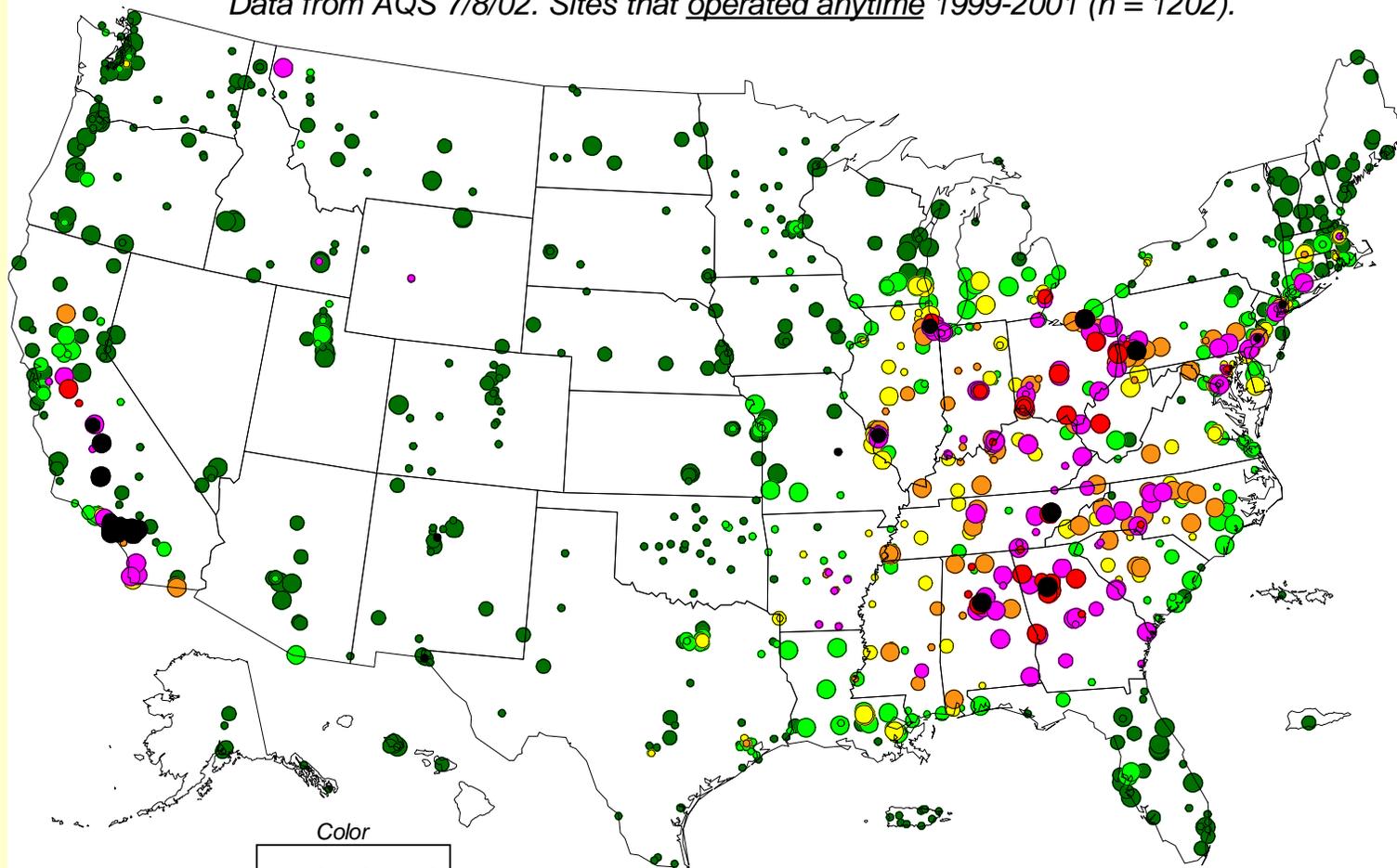
# PM2.5 Levels Have Been Changing Over 1999-2001

Data as of 7/8/02 from AQS with 11+ samples in 12 Quarters



# 1999-2001 Annual Mean PM<sub>2.5</sub>

Data from AQS 7/8/02. Sites that operated anytime 1999-2001 (n = 1202).



Color

■	0 - 12 ug/m <sup>3</sup>
■	12 - 14
■	14 - 15
■	15 - 16
■	16 - 18
■	18 - 20
■	20 +

Size

○	Meet NAAQS completeness criteria
○	12 quarters of data (but not complete)
○	Other incomplete sites

[No substitution]

So, What's being done to use the existing PM2.5 data ?

# How is the PM2.5 data used for program implementation ?

- Data substitution
  - Existing data substitution guidance
  - The “gray zone”
- Looking at different geographical boundaries

# Completeness Criteria for PM2.5 Annual Standard

- Designations / Design Values (d.v.'s) based on 3 years of data
- To show attainment (A), sites must have 75%+ data capture in each of the 12 quarters
- To show nonattainment (NA), sites must have at least 11 samples in each of the 12 quarters
- EPA Regional Administrators have the discretion to use less complete data

## Overview status of PM2.5 Monitoring Network

as of July 8, 2002

1202 sites operated some time during 1999-2001

763 Sites operated all 12 Quarters

## RA Discretion - Use of 'incomplete data' *Substitution Approaches*

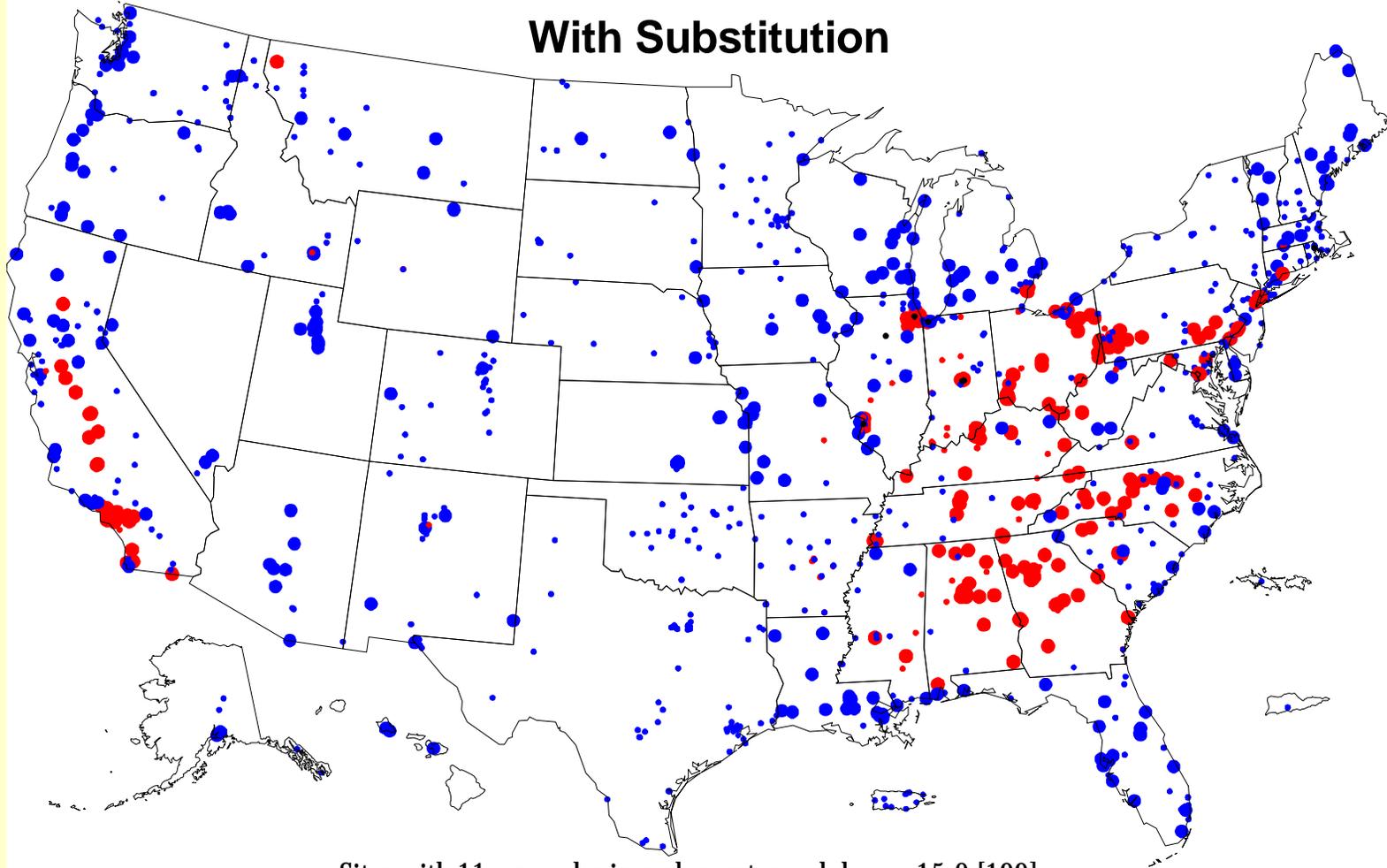
**CFR:** "Situations may arise in which there are compelling reasons to retain years containing quarters which do not meet the data completeness requirement of 75 percent or the minimum number of 11 samples. The use of less than complete data is subject to the approval of the appropriate Regional Administrator"

- ▶ Three methods, noted in the PM Data Handling Guideline, were utilized:
  - ▶ For Attainment:
    - ▶ If a monitors had at least 50% in each Q but not 75% in all, collocated PM10 were substituted for missing samples
    - ▶ If a monitors had at least 50% in each Q but not 75% in all, max quarterly values can be substituted for missing samples
  - ▶ For Nonattainment:
    - ▶ The 'historically lowest 24-hr concentration observed at the site' was substituted for missing samples (to bring the total number in incomplete quarters up to 11)

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

Data from AQS 7/8/02. Sites that operated anytime 1999-2001 ( $n = 1202$ ).

## With Substitution



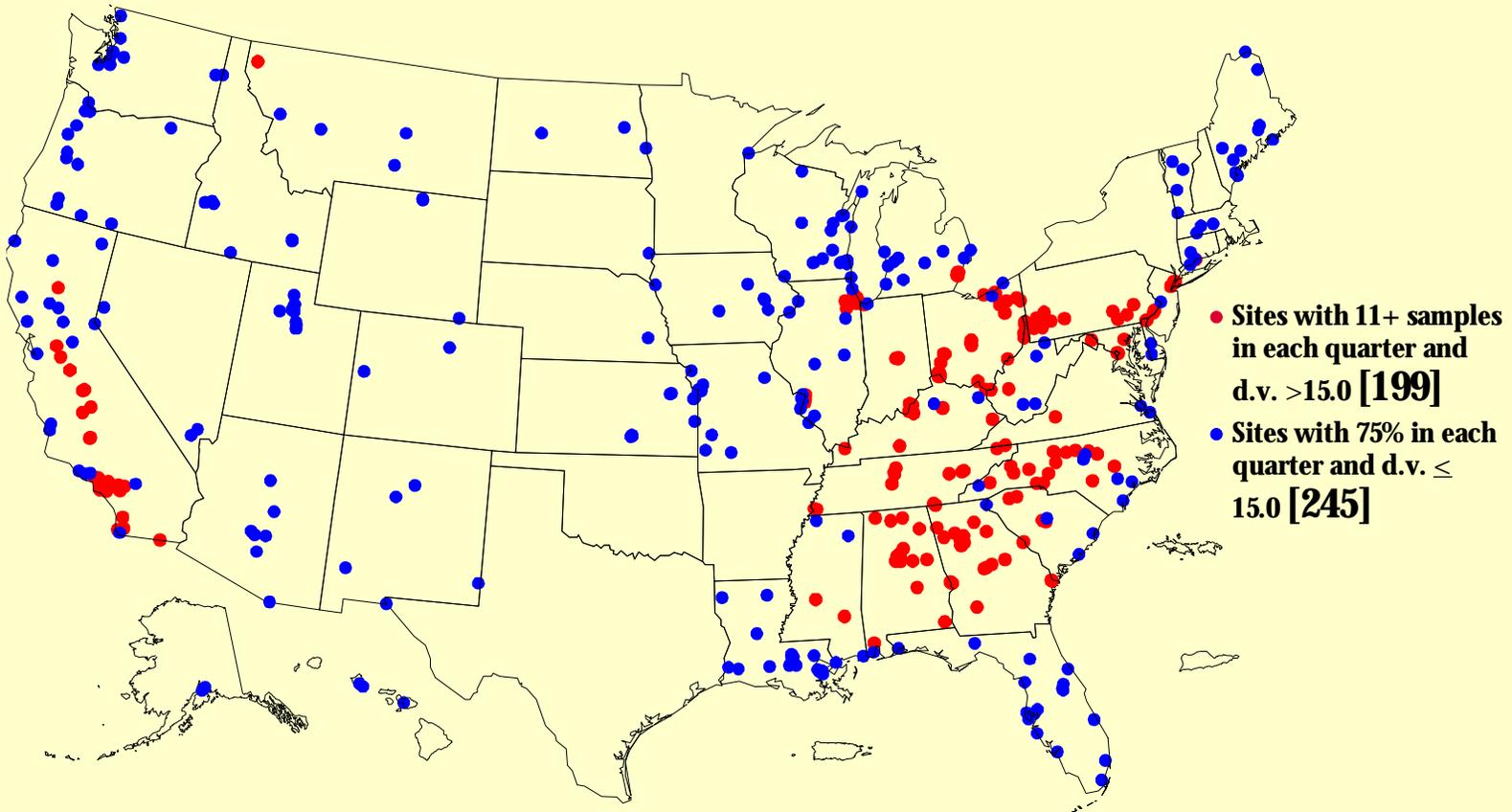
- Sites with 11+ samples in each quarter and d.v. > 15.0 [199]
- Sites with 75% in each quarter and d.v. ≤ 15.0 [245]
- Incomplete sites with d.v. > 15.0 [117]
- Incomplete sites with d.v. ≤ 15.0 [634]
- Sites not to be judged to annual standard [7]

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

(Data from AQS - 7/8/02)

Sites that operated all 12 quarters 1999-2001\* and complete (n = 444)

Based on preliminary data



## Regulatory Data Completeness - With Substitution

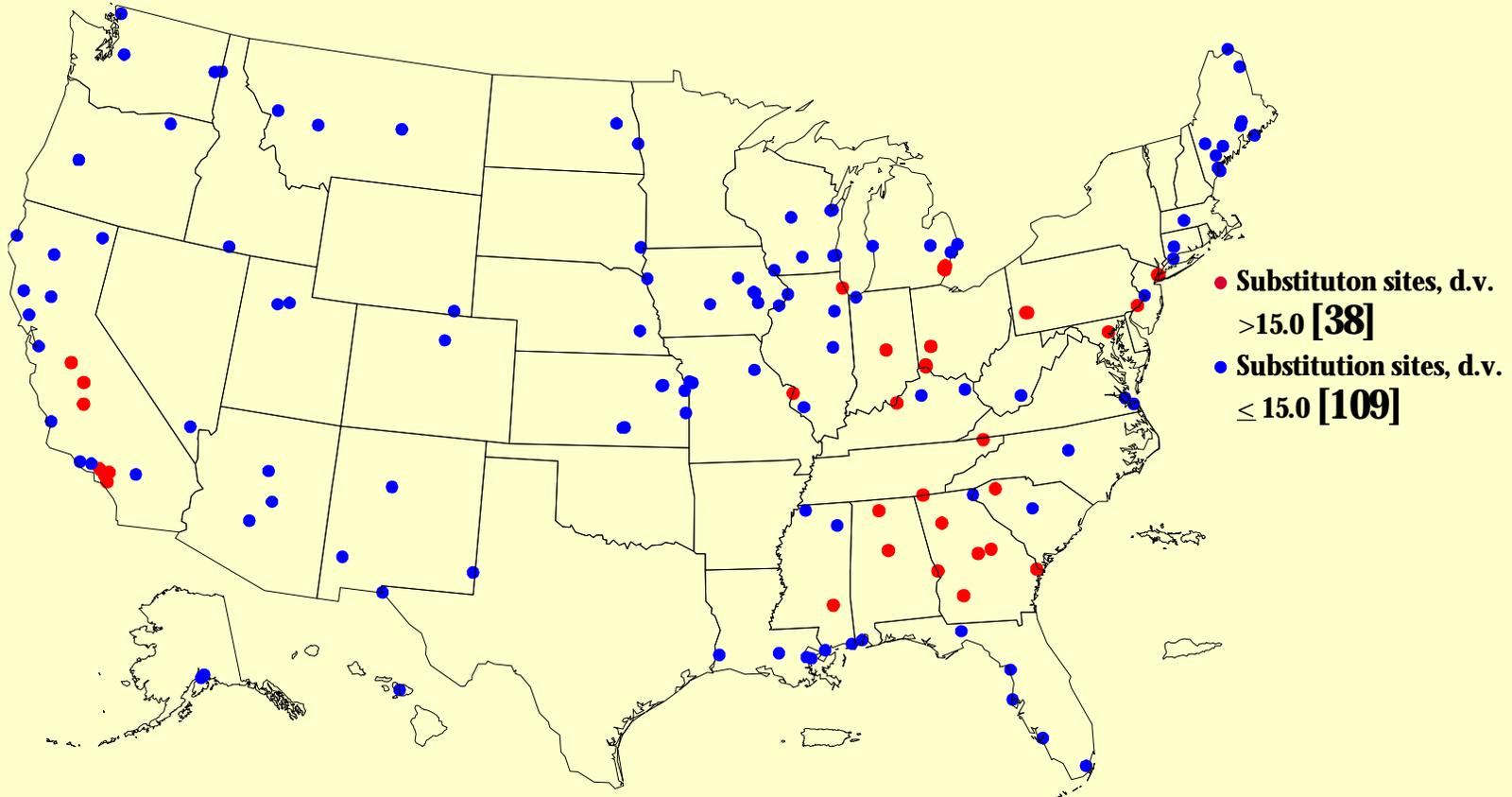
\* or can utilize substitution

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

(Data from AQS - 7/8/02)

Sites that can utilize 'data substitution' (n = 147)

Based on preliminary data



*Regulatory Data Completeness - Substitution Sites*

# Some other analyses

- Who's in the gray zone
- What happens if we look at ...
  - counties
  - MSA

NOTE: These are very preliminary looks at the data

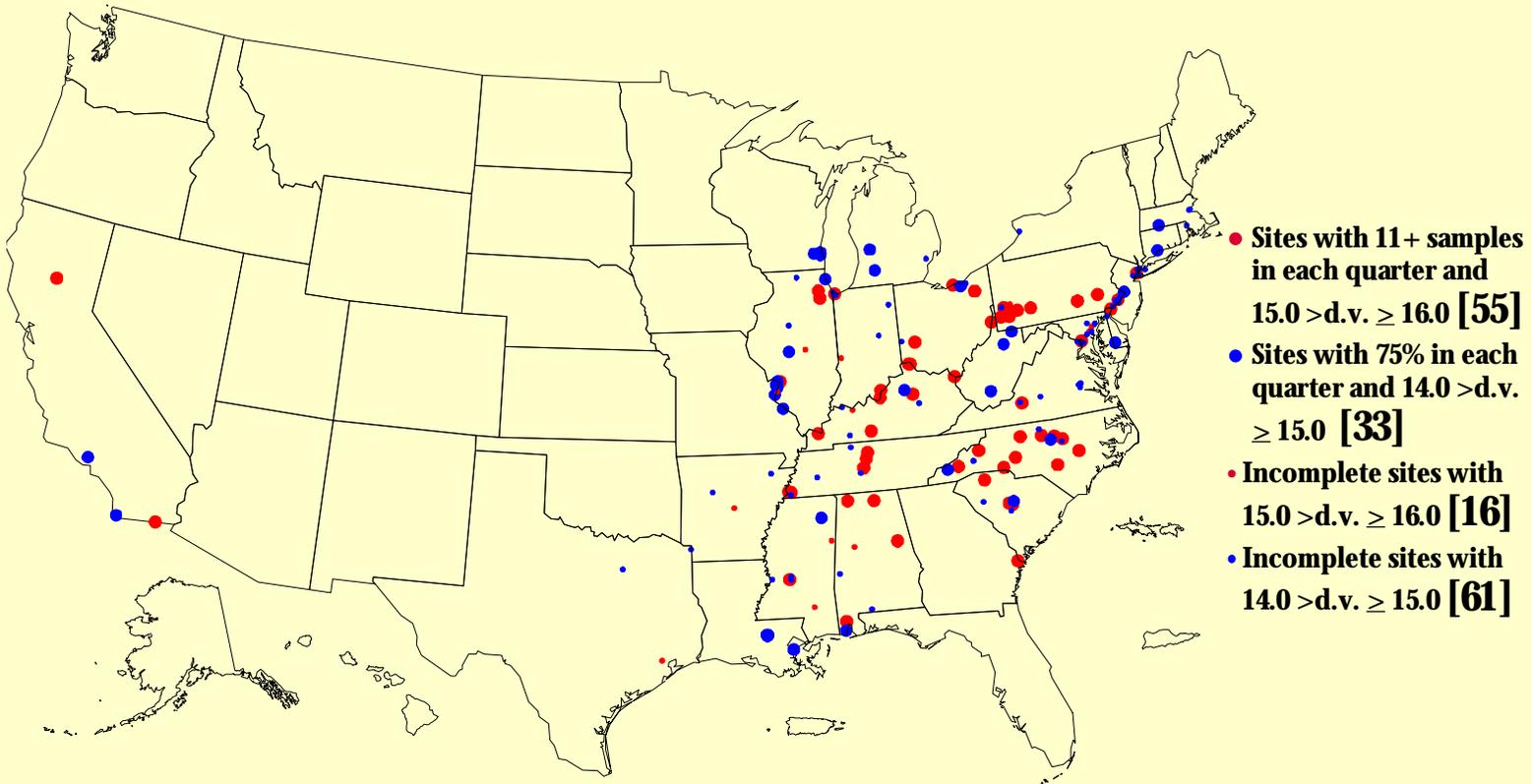
# How many monitors are within 1ug/m3 of NAAQS?

## 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

(Data from AQS - 7/8/02)

Sites that operated all 12 quarters 1999-2001\* and dv between 14.0 & 16.0 (n = 165)

Based on preliminary data

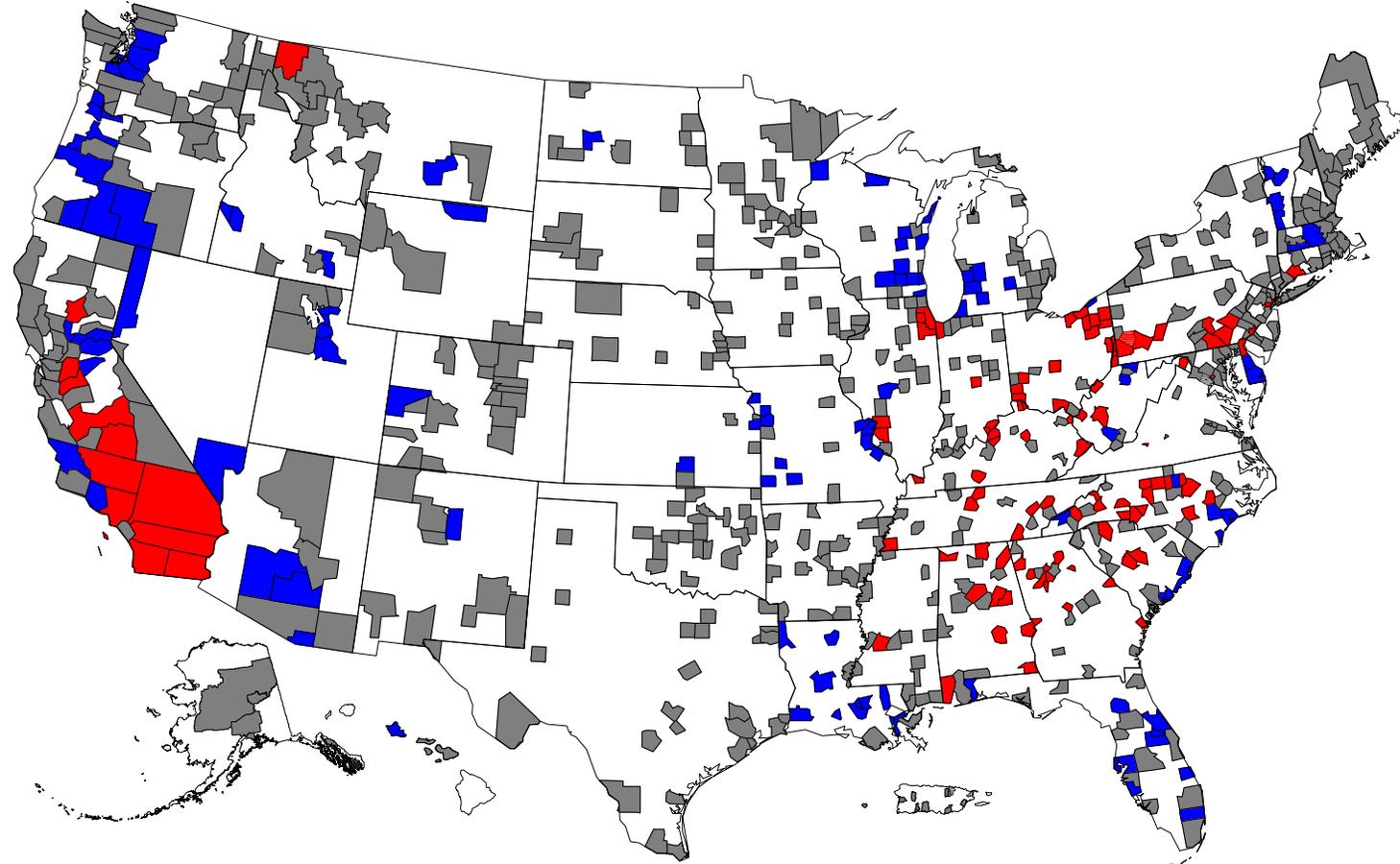


Regulatory Data Completeness - With Substitution

# Another way to look at the data

## 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

Data from AQS 7/8/02. Counties with sites that operated anytime 1999-2001 (1202 sites in 706 counties)



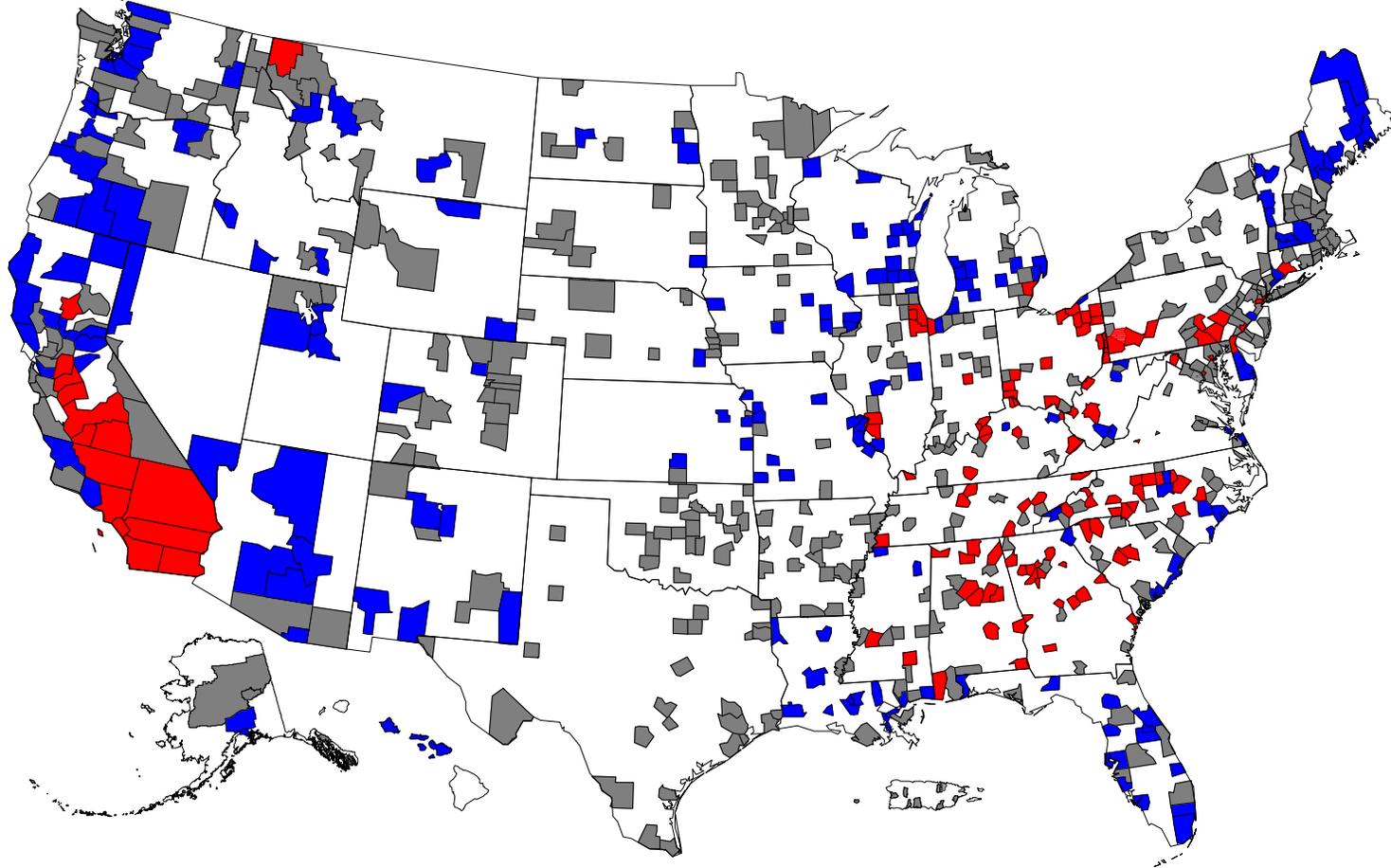
- Counties with at least 1 complete site w/ d.v. >15.0 [113]
- Counties with at least 1 complete site w/ d.v. ≤ 15.0 (and none above) [109]
- Counties without a complete /usable site [484]

**Base Case**

NOT INTENDED TO REPRESENT NON ATTAINMENT AREAS

# 1999-2001 Annual Standard Design Value PM<sub>2.5</sub>

Data from AQS 7/8/02. Counties with sites that operated anytime 1999-2001 (1202 sites in 706 counties)

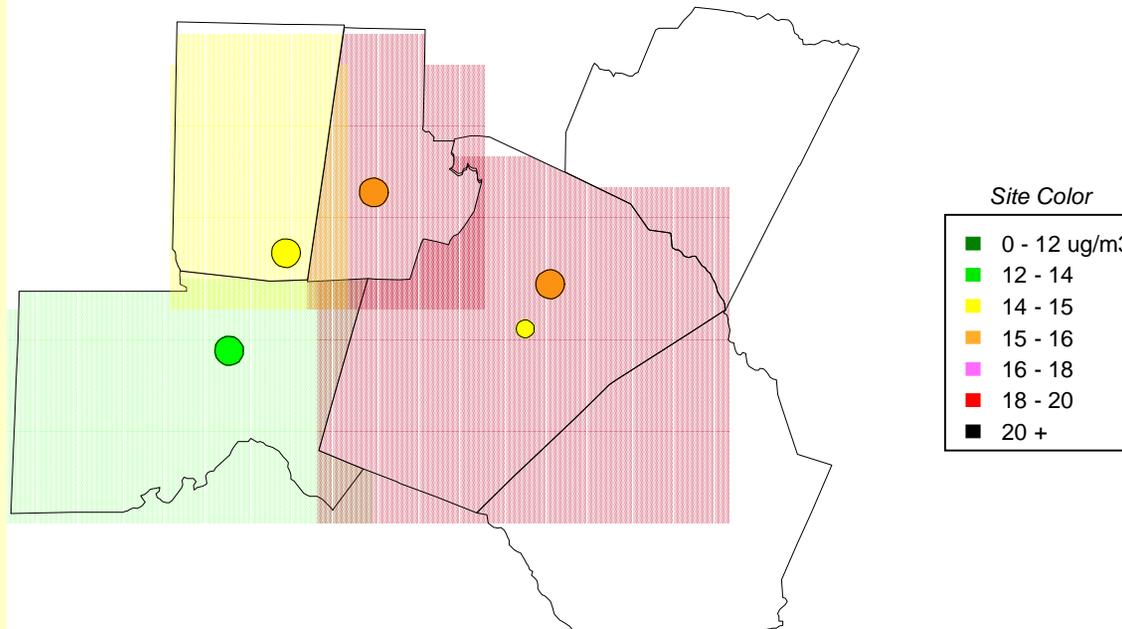


- Counties with at least 1 complete site w/ d.v. >15.0 [129]
- Counties with at least 1 complete site w/ d.v. ≤ 15.0 (and none above) [182]
- Counties without a complete /usable site [395]

**With Substitution**

## Yet, Another Way to Look at the Data: MSAs and Counties

### Raleigh-Durham-Chapel Hill MSA (NC)



- 4 sites meet completeness criteria (1 via substitution)
  - 2 of the 4 exceed the standard
    - Both in the range 15-16 (both 15.3)
  - 2 meet the standard
    - One in the yellow range of 12-14 (13.4)
    - One in the light green range of 14-15 (14.3)
- 1 site (small yellow) doesn't meet completeness and is  $\leq 15.0$ , but is in the same county as a complete site (which is  $>15.0$ )
- No monitors in 2 counties

# SUMMARY

- We have 3 years of data for many but not all relevant sites (certification due July 1)
- We are continuing to obtain and report data
- We are working to understand air quality and completeness of data

# NEXT STEPS

- Review of certified data by EPA, State, Local and Tribal agencies
- Share information with the public
- Initiate stakeholder discussions on designation process