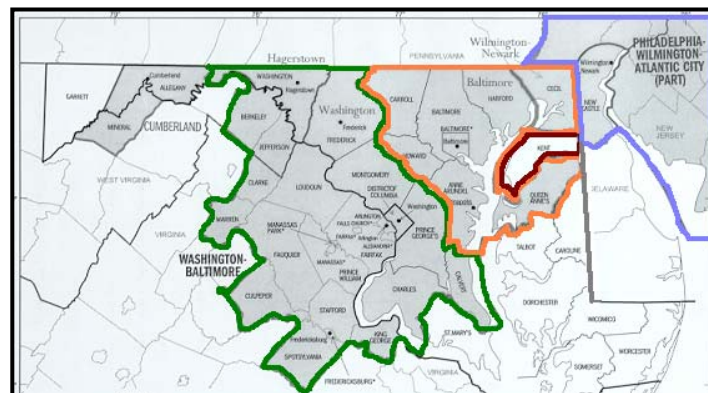
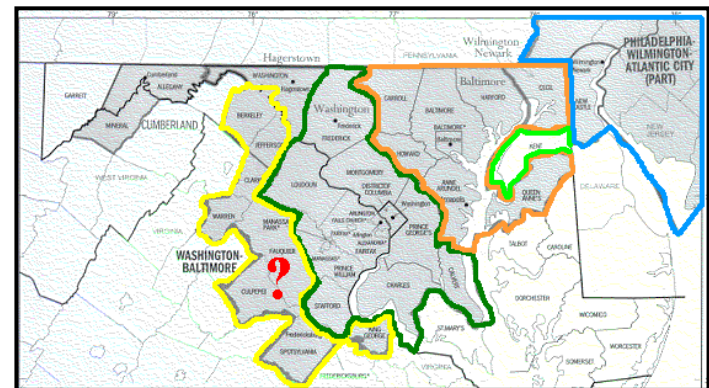
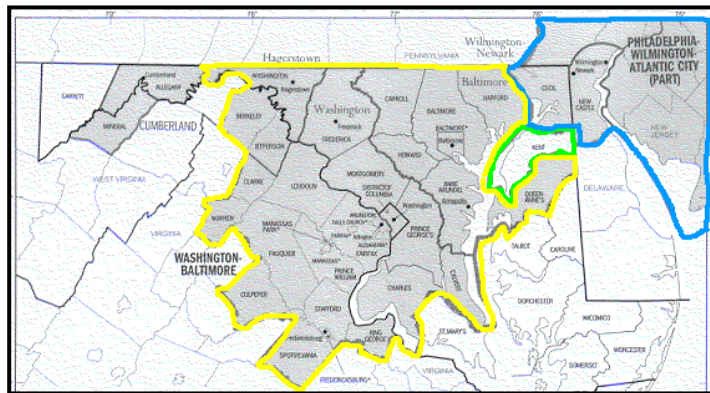
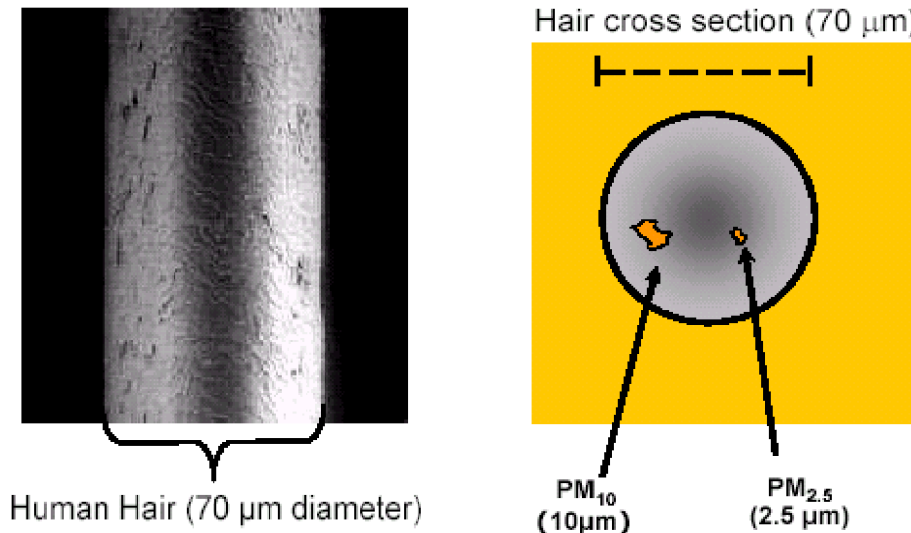


Background and Options for Establishing PM_{2.5} Nonattainment Boundaries



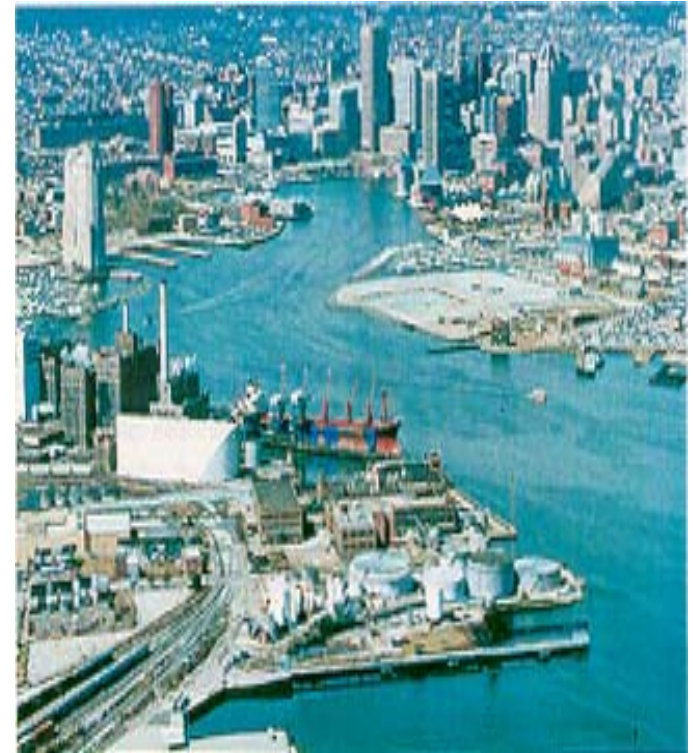
Topics Covered

- What is PM_{2.5}?
- Background on standard
- MDE's Recommendation
- EPA's Response to MDE's Recommendation
- What do we want to do next?



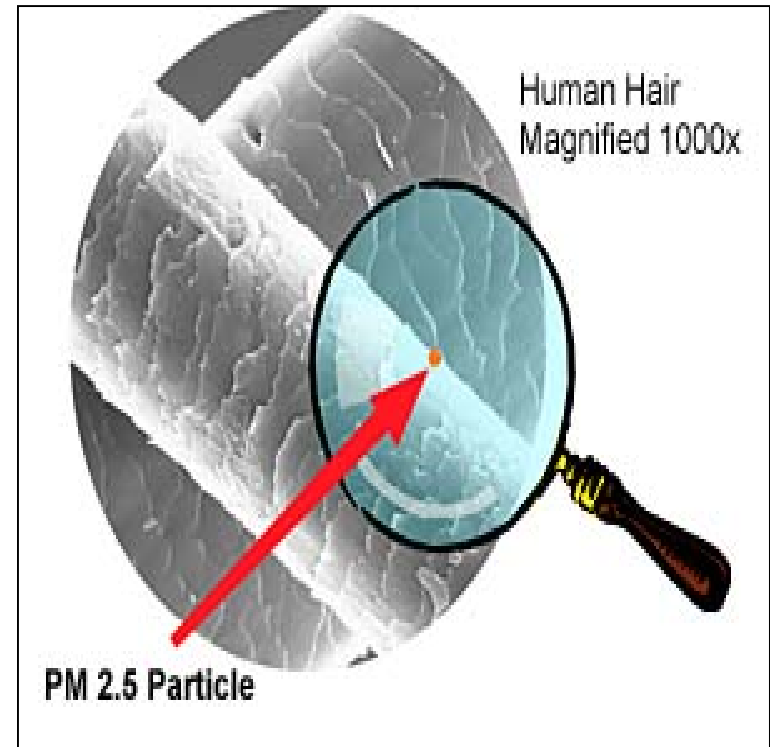
During the Presentation --- Please Think About Next Steps

- Any comments? – are you okay with EPA's recommendations?
- Should all of the counties be nonattainment?
- Is your preference for smaller or larger areas...?
- Additional meetings...what would you like to do?



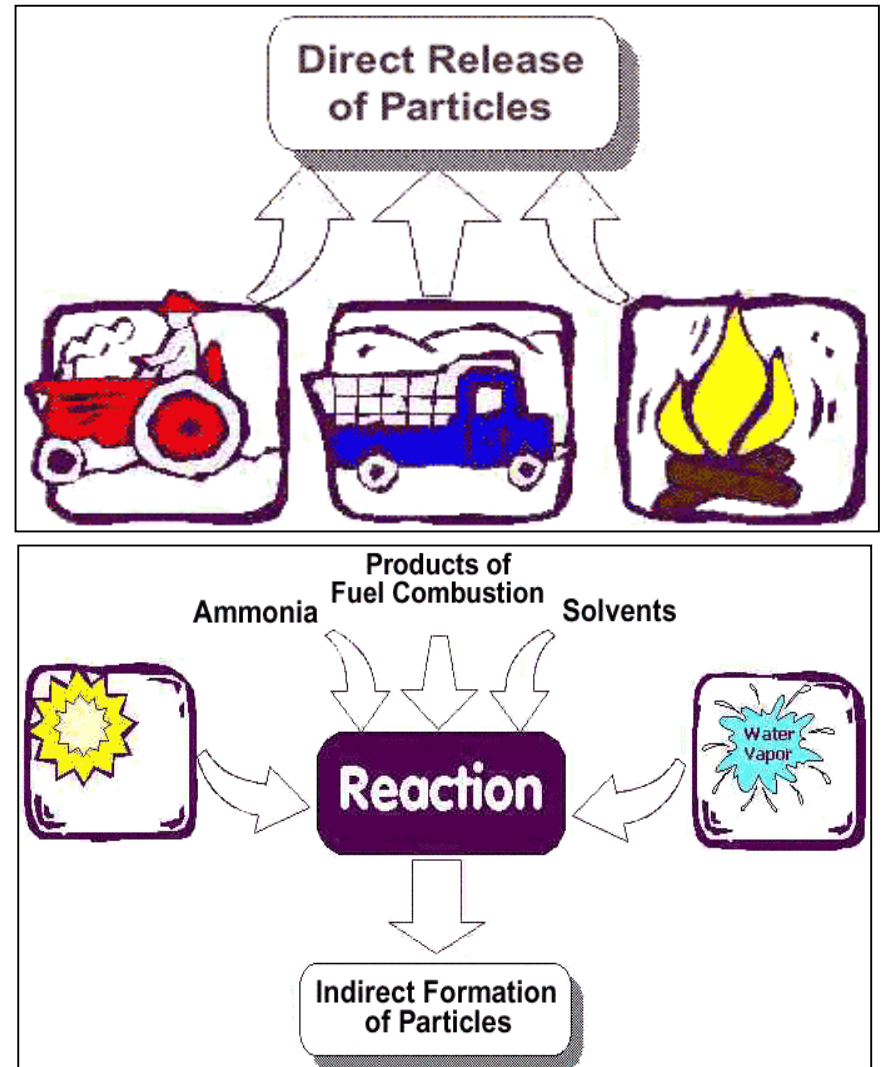
What is Fine Particulate Matter?

- Particulate matter, or PM, is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets.
- These small particles can be suspended in the air for long periods of time.
- Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope.



Types of Fine Particulate Matter

- Primary Particles
 - These particles are emitted directly from air pollution sources such as power plants, factories, automobile exhaust, construction sites, unpaved roads, wood burning
- Secondary Particles
 - Formed in the atmosphere indirectly when gases from burning fuels react with sunlight and water vapor and are chemically transformed into particles



Health Effects From Particulate Matter

- Many scientific studies have linked breathing PM to a series of significant health problems, including:
 - aggravated asthma
 - increases in respiratory symptoms like coughing and difficult or painful breathing
 - chronic bronchitis
 - decreased lung function
 - premature death



Other Effects From Particles

- Visibility Impairment
 - PM is the major cause of reduced visibility (haze) in parts of the United States, including many of our national parks.
- Aesthetic Damage
 - Soot, a type of PM, stains and damages stone and other materials, including objects such as monuments and statues.
- Plant Damage
 - PM can form a film on plant leaves interfering with photosynthesis and plant growth



Background - The Fine Particulate Matter Standard

- In 1997, EPA adopted new air quality standards for fine particulate matter
 - Annual Standard: 15 micrograms per cubic meter, averaged over 3 years (quarters averaged annually)
 - 24 Hour Standard: 65 micrograms per cubic meter, 98th percentile averaged over 3 years
- Since 1997, there has been a series of law suits on various aspects of the new standards

Background - The Fine Particulate Matter Standard

- **Basic Guidance on how the PM_{2.5} standard is to be implemented is yet to be released.....it is very very late**
 - Makes the designation process difficult (how is this impacting stakeholders/counties? – we don't know)
 - EPA is currently conducting numerous processes this way and the states are commenting negatively on the lack of process



EPA Guidance – What We Think It Will Say

- EPA will implement the PM_{2.5} standard under a part of the CAA called “Subpart 1”
- Early reductions strongly encouraged, with some incentive as all post 2002 reductions can be “credited” in later plans
- Looks like State Implementation Plans (SIPs) will be due in February 2008
- CAA Assumption: attainment date = 2010
- Attainment date extensions are possible



EPA Guidance – What We Think It Will Say

- No classifications or mandatory control requirements (subpart 1)
- Attainment plans will be based on modeling
- Reasonable Further Progress annual incremental reductions in emissions will ensure timely attainment targets
- Regional reductions from upwind areas will be critical

Source: EPA



Regional Control Programs to Reduce PM Transport

- New mobile source standards
- 1995 to 2004 power plant controls
- New power plant controls
 - Clear Skies Plus
 - EPA Transport Rule (CAIR)



(CNN)



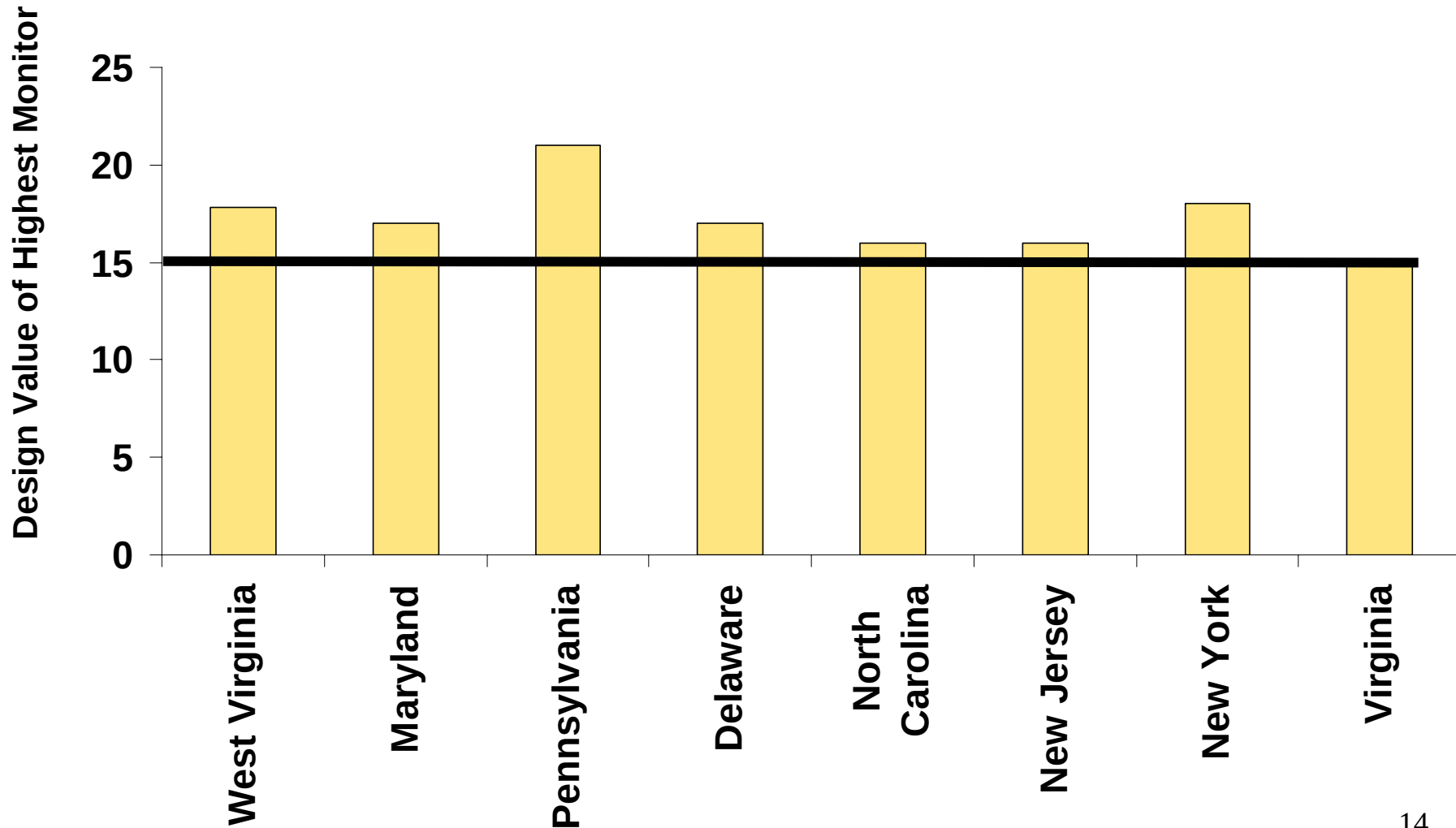


What are our Nonattainment Boundaries based on?

- Monitoring data
- Emissions and air quality data (our region and adjacent areas)
- Location of emission sources (where is it coming from? – a closer look at the inventory)
- Jurisdictional boundaries (our existing NAAs)
- Population density and degree of urbanization including commercial development
- Traffic and commuting patterns
- Growth
- Level of control of emission sources
- Regional emission reductions
- Meteorology (weather/transport patterns)
- Geography/topography



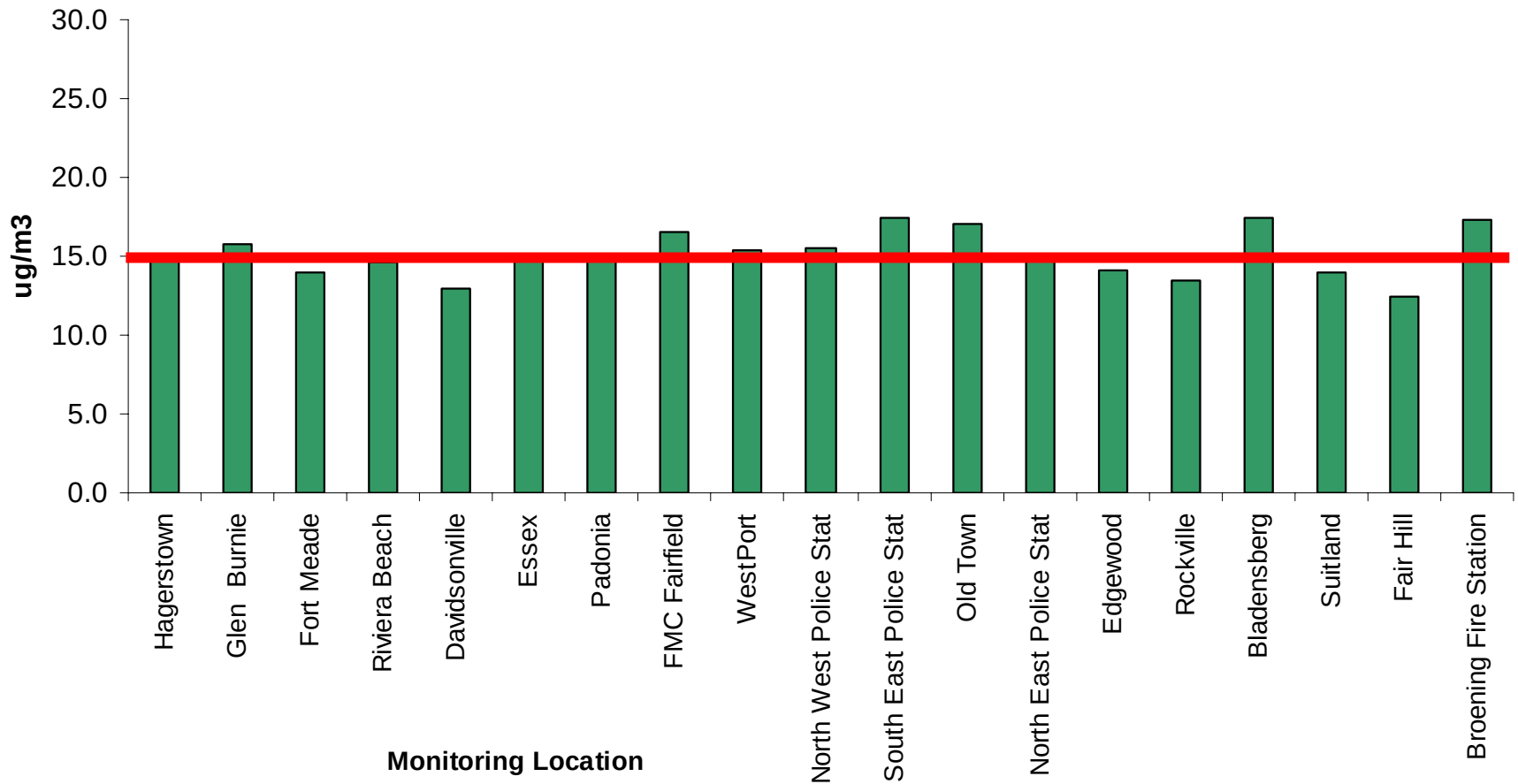
Fine Particulate Data (2000-2002)



Source: EPA

PM2.5 Annual Design Values (2000-2002)

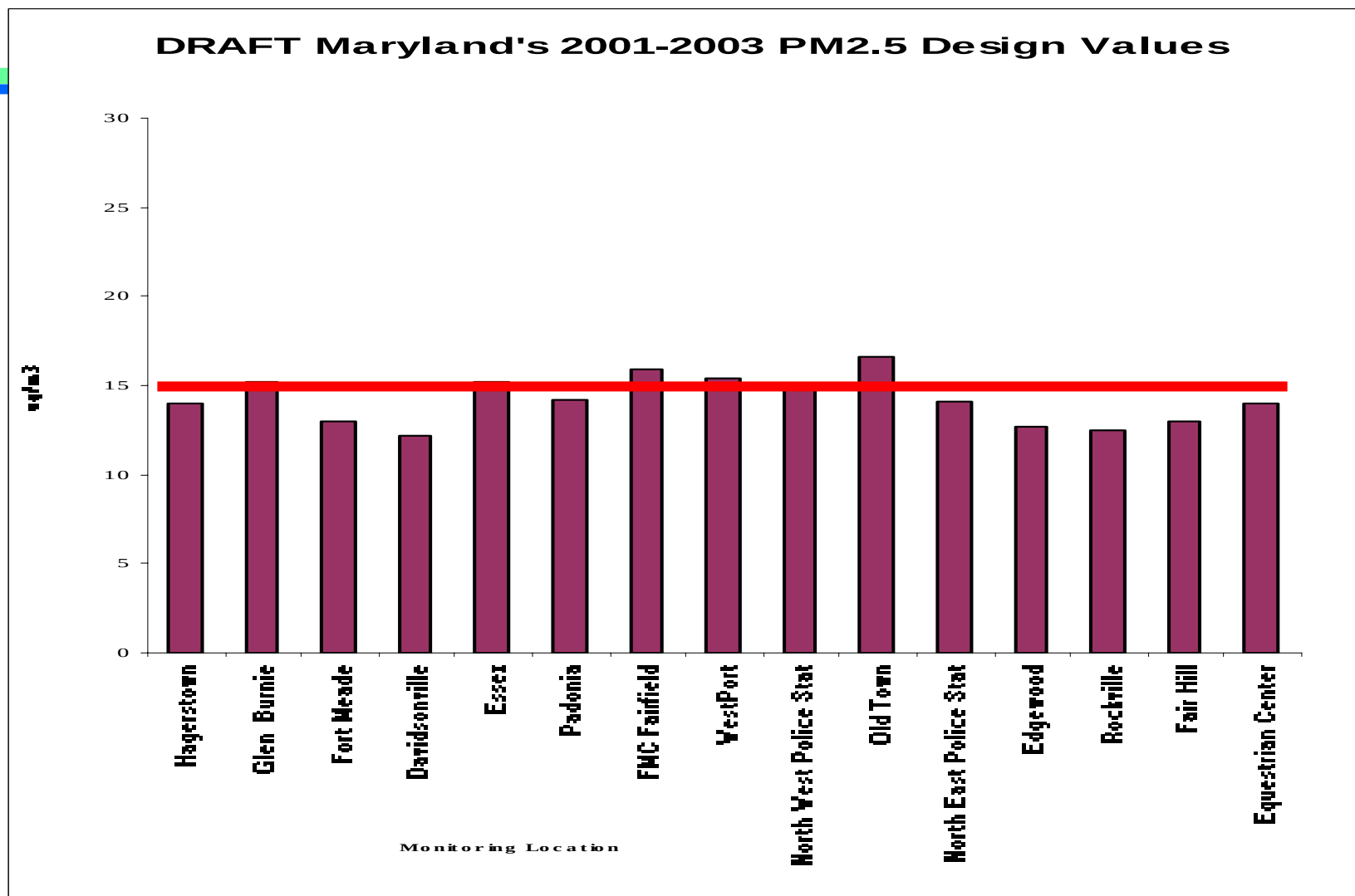
Maryland's 2000-2002 PM2.5 Design Values



Note: almost all of our monitors are very close to the standard¹⁵



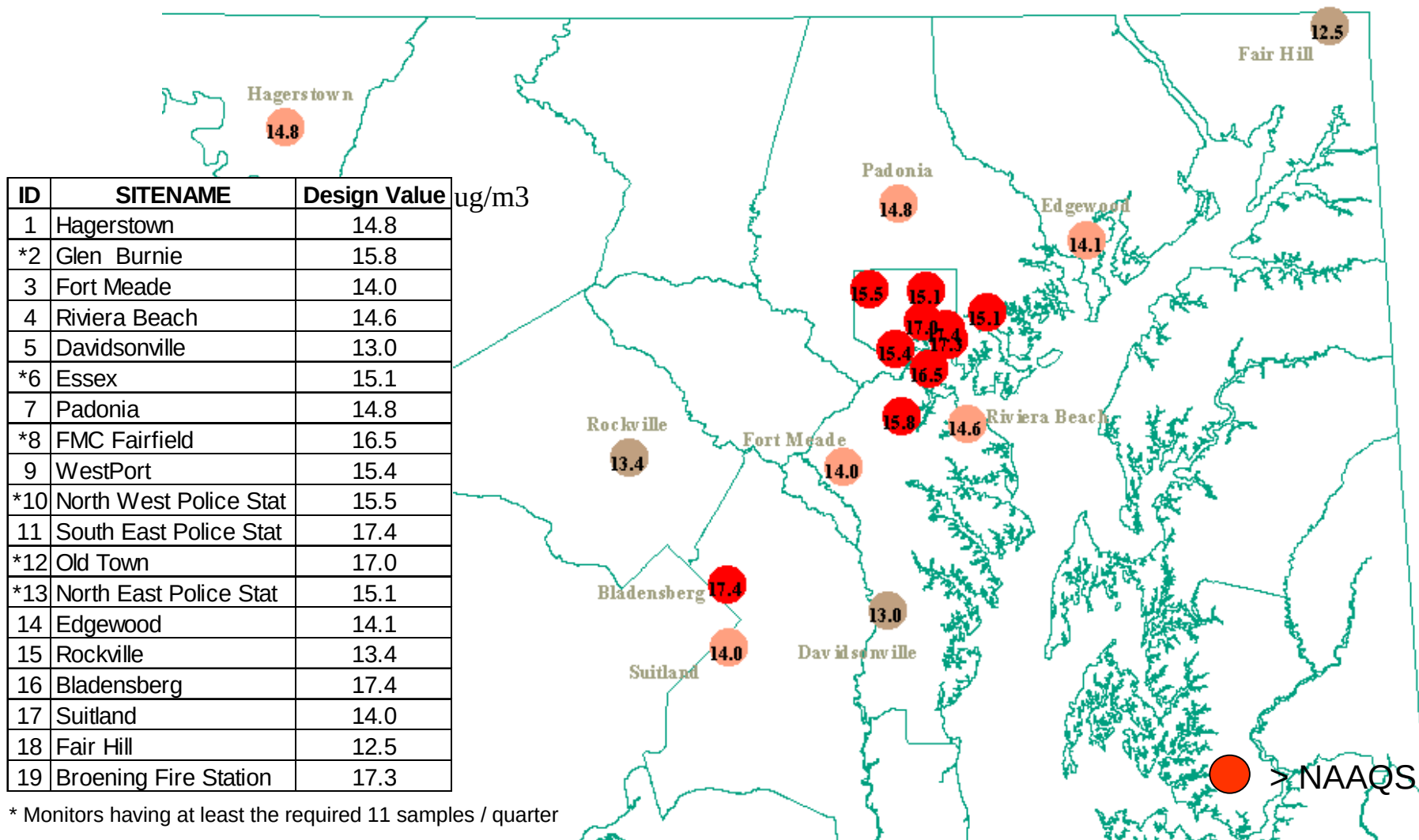
DRAFT PM2.5 Annual Design Values (2001-2003)



Note: almost all of our monitors are very close to the standard¹⁶

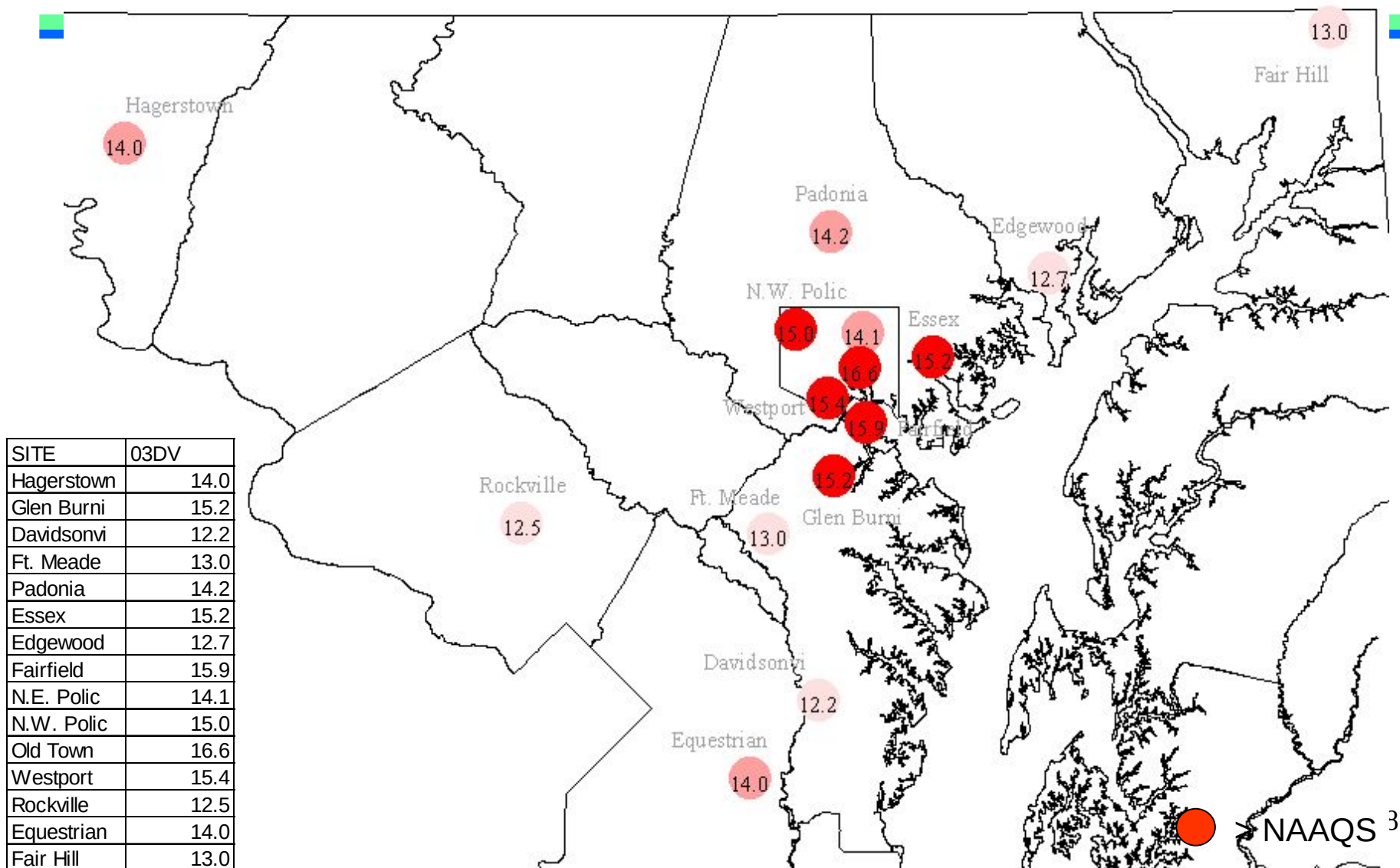


PM2.5 Annual Design Values (2000-2002)





DRAFT PM2.5 Annual Design Values (2001-2003)



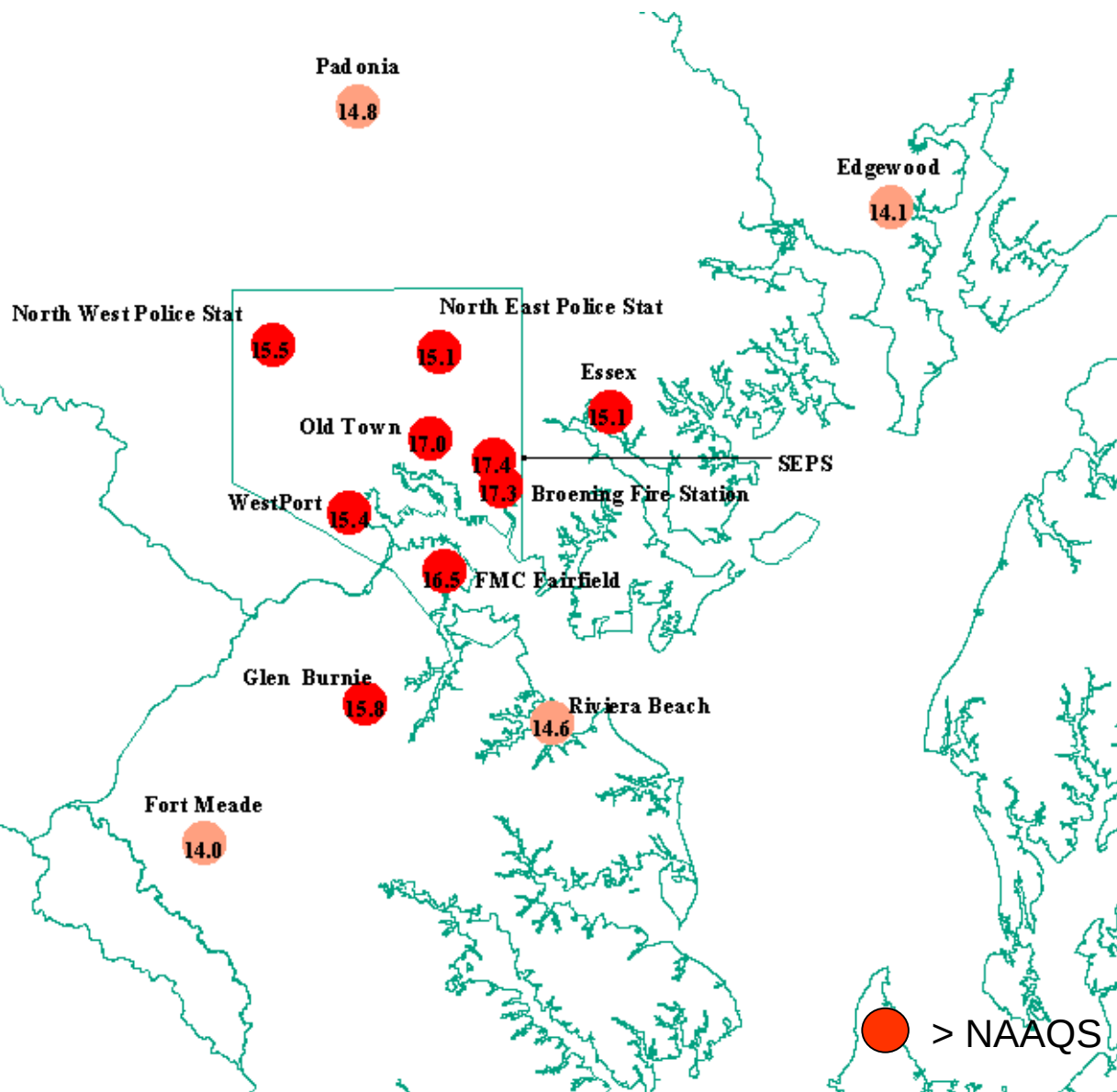


PM2.5 Annual Design Values (2000-2002)

ID	SITENAME	Design Value
1	Hagerstown	14.8
*2	Glen Burnie	15.8
3	Fort Meade	14.0
4	Riviera Beach	14.6
5	Davidsonville	13.0
*6	Essex	15.1
7	Padonia	14.8
*8	FMC Fairfield	16.5
9	WestPort	15.4
*10	North West Police Stat	15.5
11	South East Police Stat	17.4
*12	Old Town	17.0
*13	North East Police Stat	15.1
14	Edgewood	14.1
15	Rockville	13.4
16	Bladensburg	17.4
17	Suitland	14.0
18	Fair Hill	12.5
19	Broening Fire Station	17.3

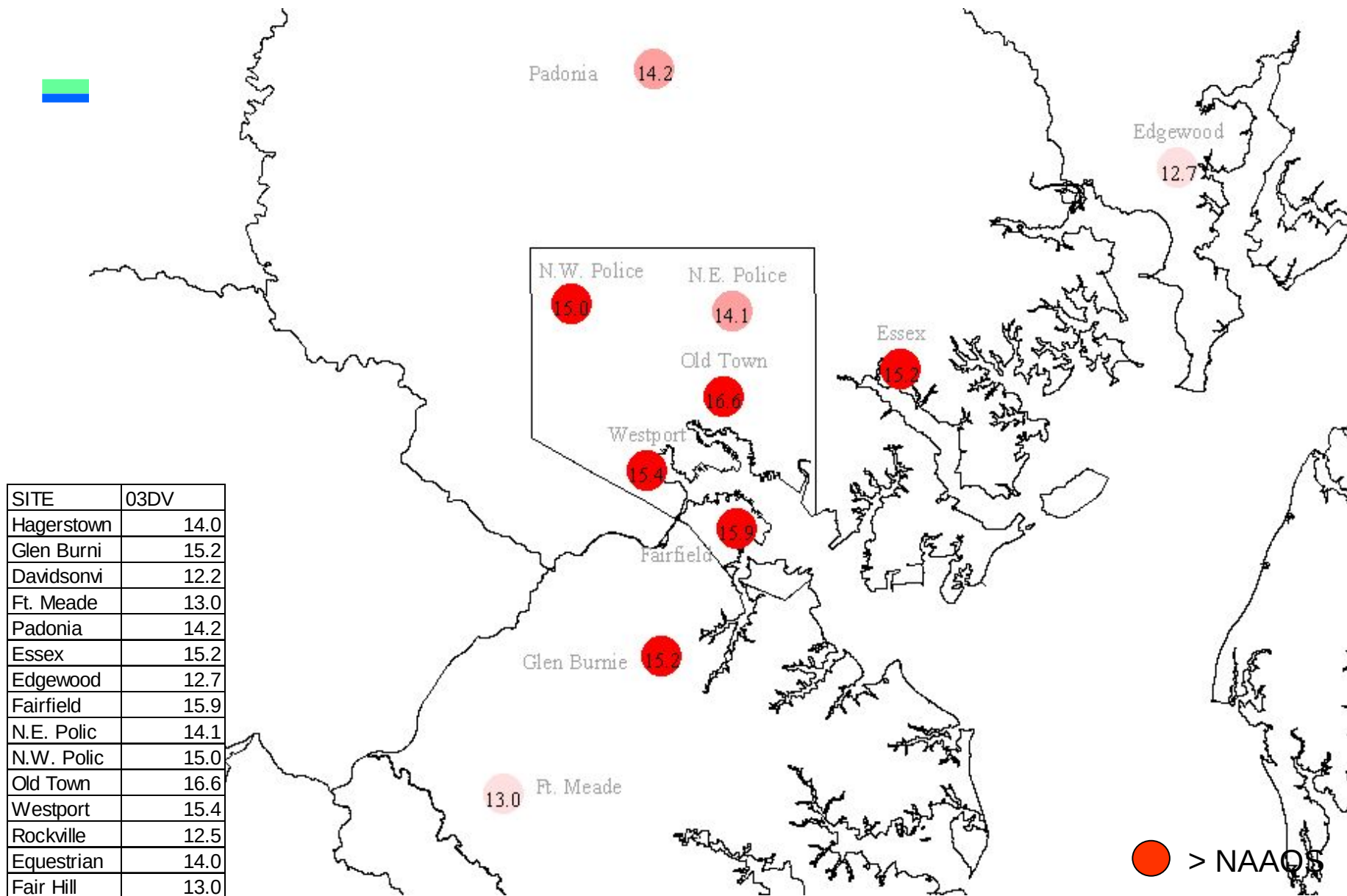
* Monitors having at least the required 11 samples / quarter

Rockville
13.4

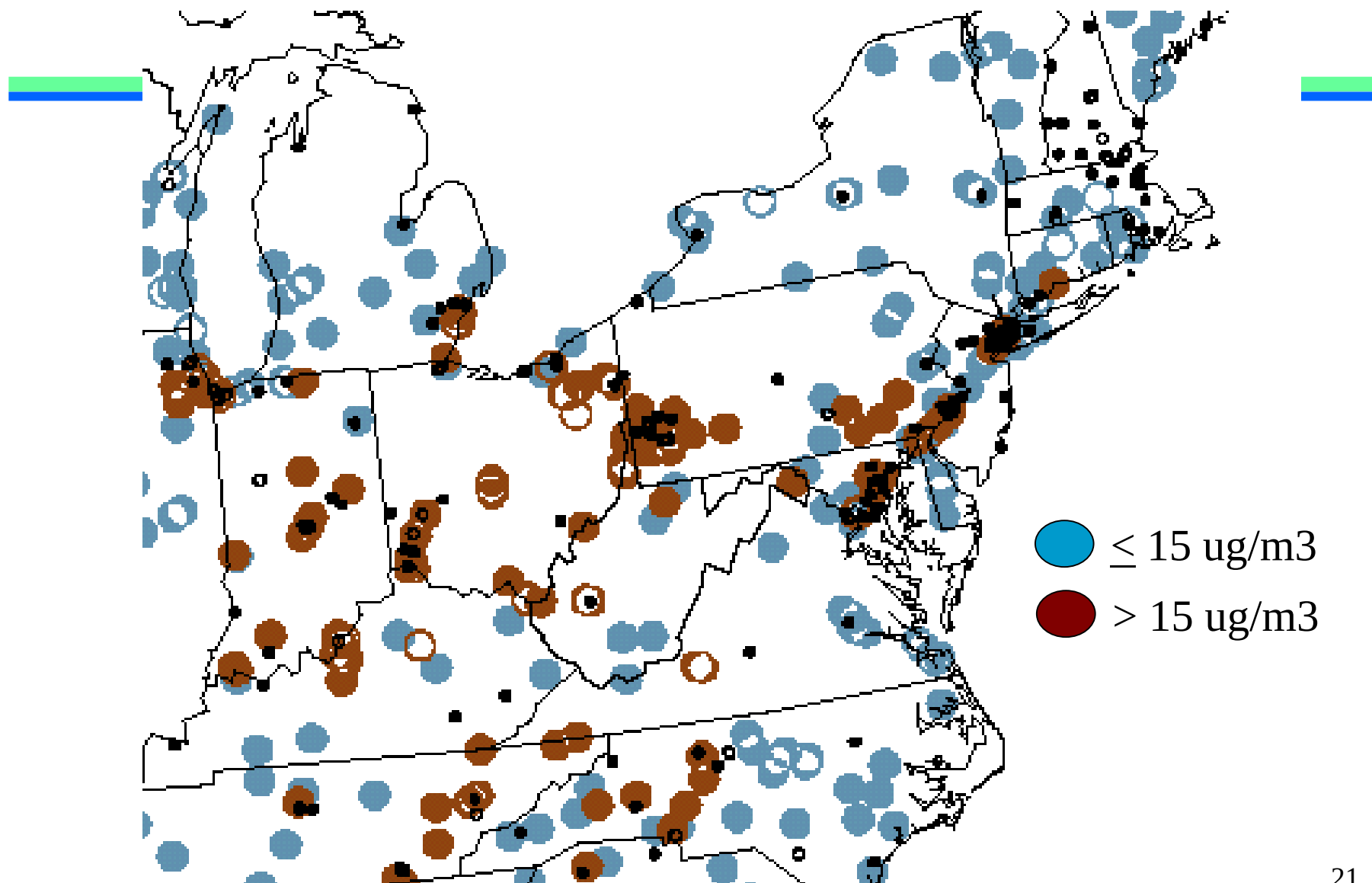




DRAFT PM_{2.5} Annual Design Values (2001-2003)



What do 2002 PM_{2.5} Design Values in the Region look like?



Source: USEPA



Some Background on PM2.5 Inventories

- MDE has just started this work – most of our inventory work focuses on ozone precursors
- The inventory data we have on PM2.5 is “work on progress”meaning nothing is final
- Important Note: this is our first look at the primary inventory – secondary emissions are modeled (much different from ozone)

**There are two kinds
of PM2.5 emissions**

•Primary Particles

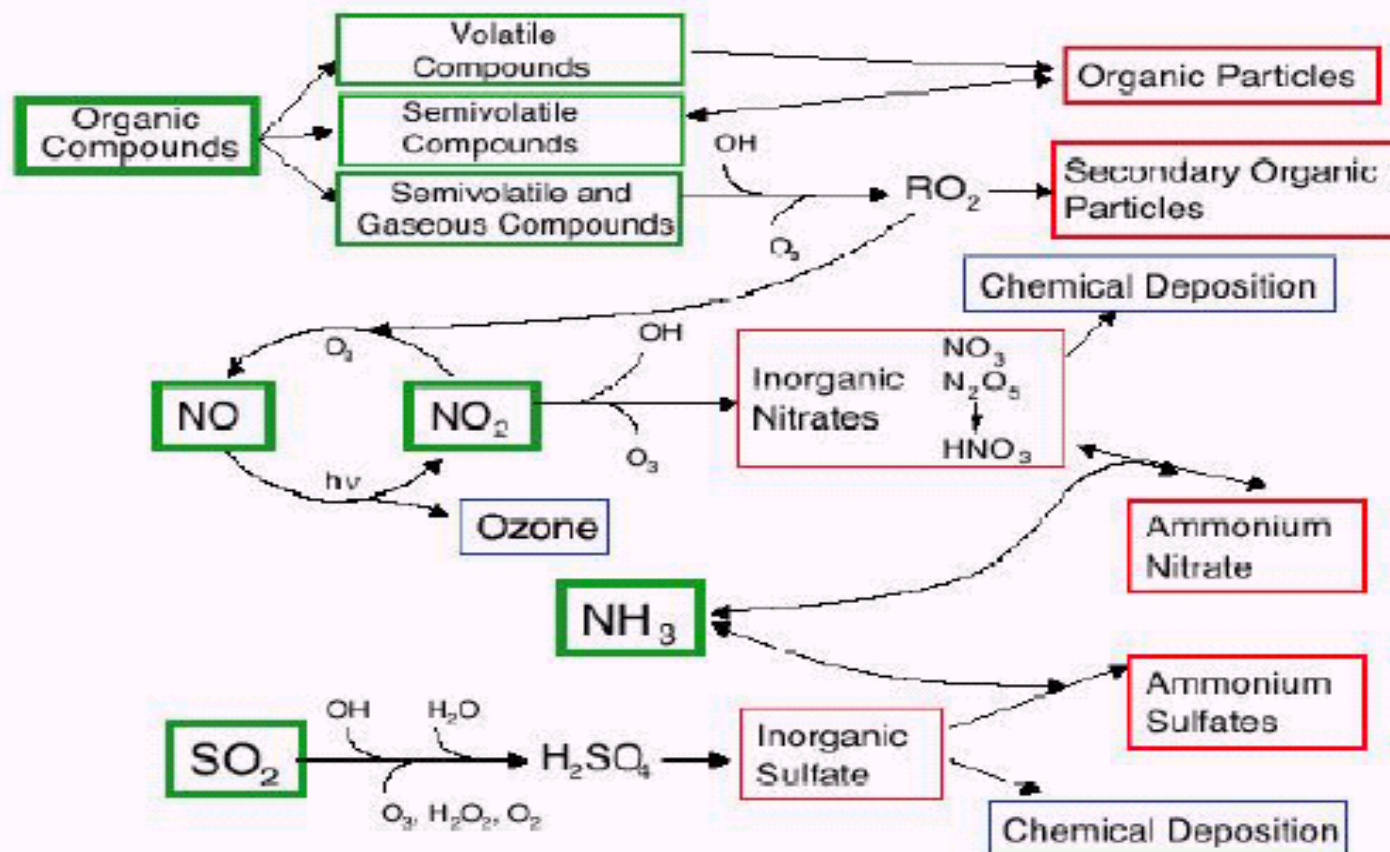
–These particles are emitted directly from air pollution sources such as power plants, factories, automobile exhaust, construction sites, unpaved roads, wood burning

•Secondary Particles

–Formed in the atmosphere indirectly when gases from burning fuels react with sunlight and water vapor and are chemically transformed into particles (nitrates, sulfates, ammonium)

Why is this so different from ozone?

ATMOSPHERIC AEROSOL PROCESSES



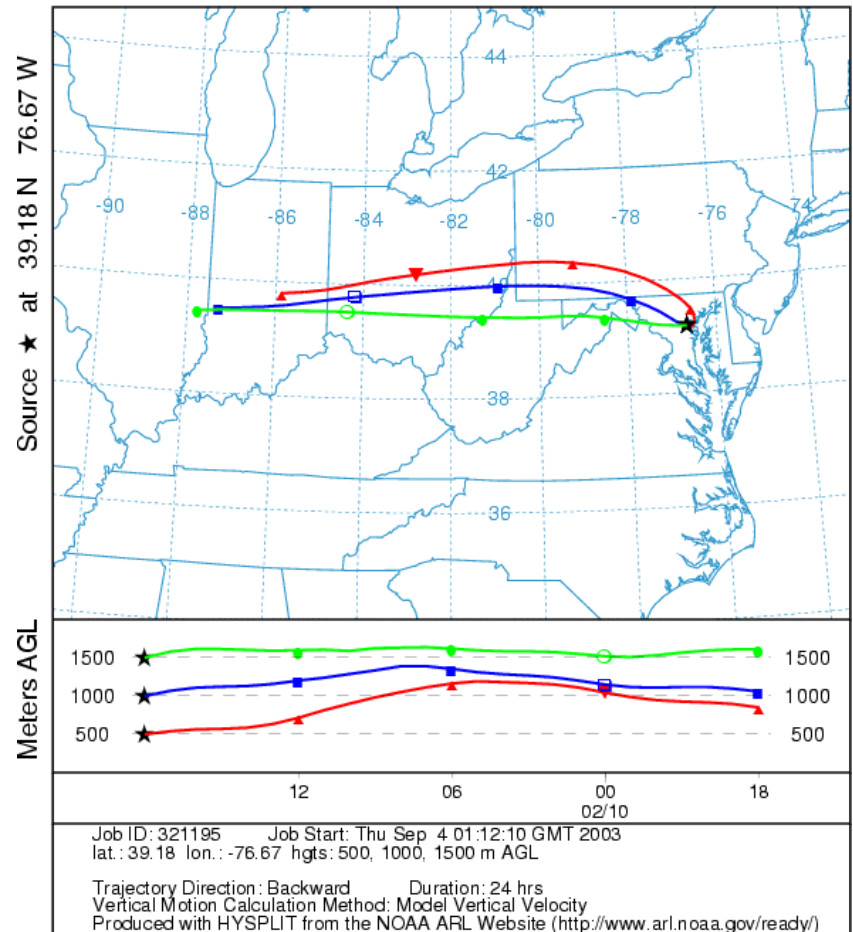
FOR REFERENCE PURPOSES

Source: EPA

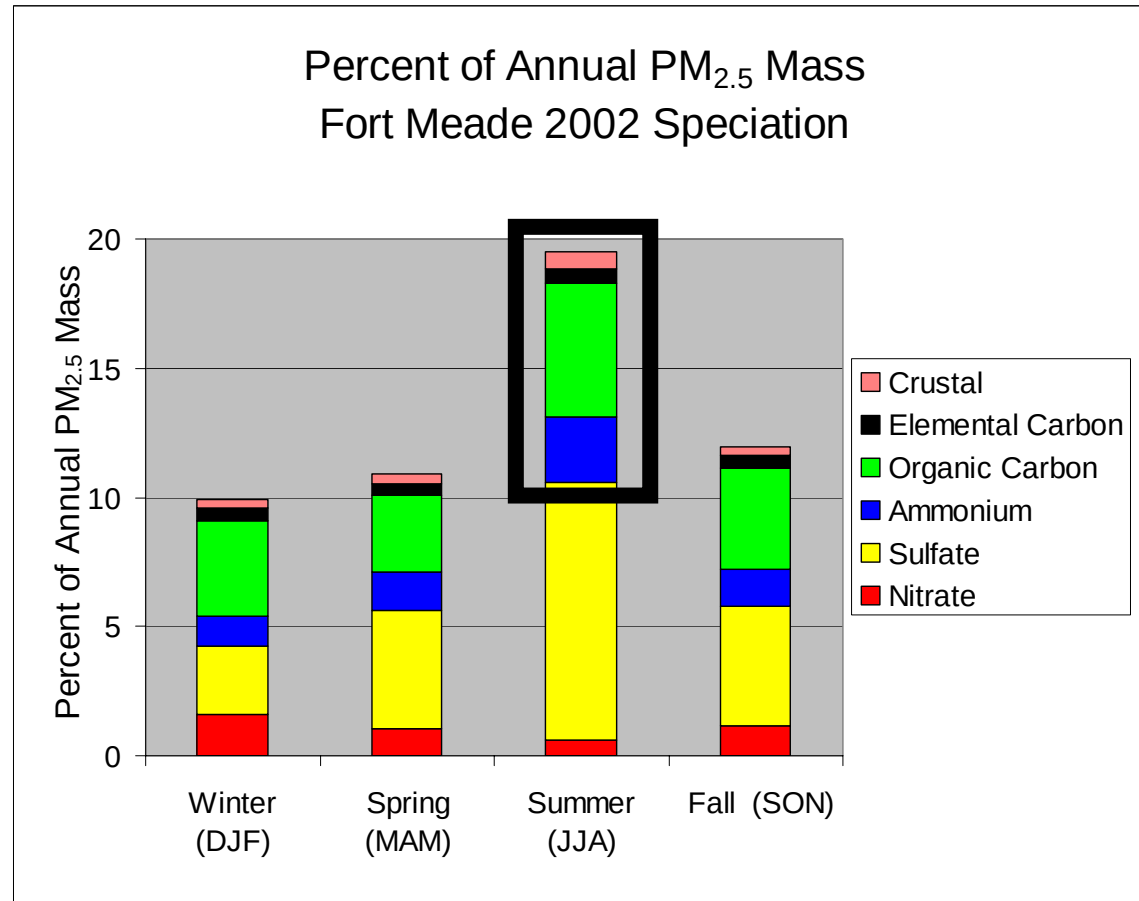
Regional or Local Problem?

- The fine particulate problem in the East is primarily a regional problem
- Regional sources include power plants, mobile sources and others
- Local sources include traffic, direct emitting sources like cement plants, fugitive dust, fires, lots more
- How much is being transported to MD?
 - Reasonable guess at this time is that Maryland's PM fine problem is 50-70% regional

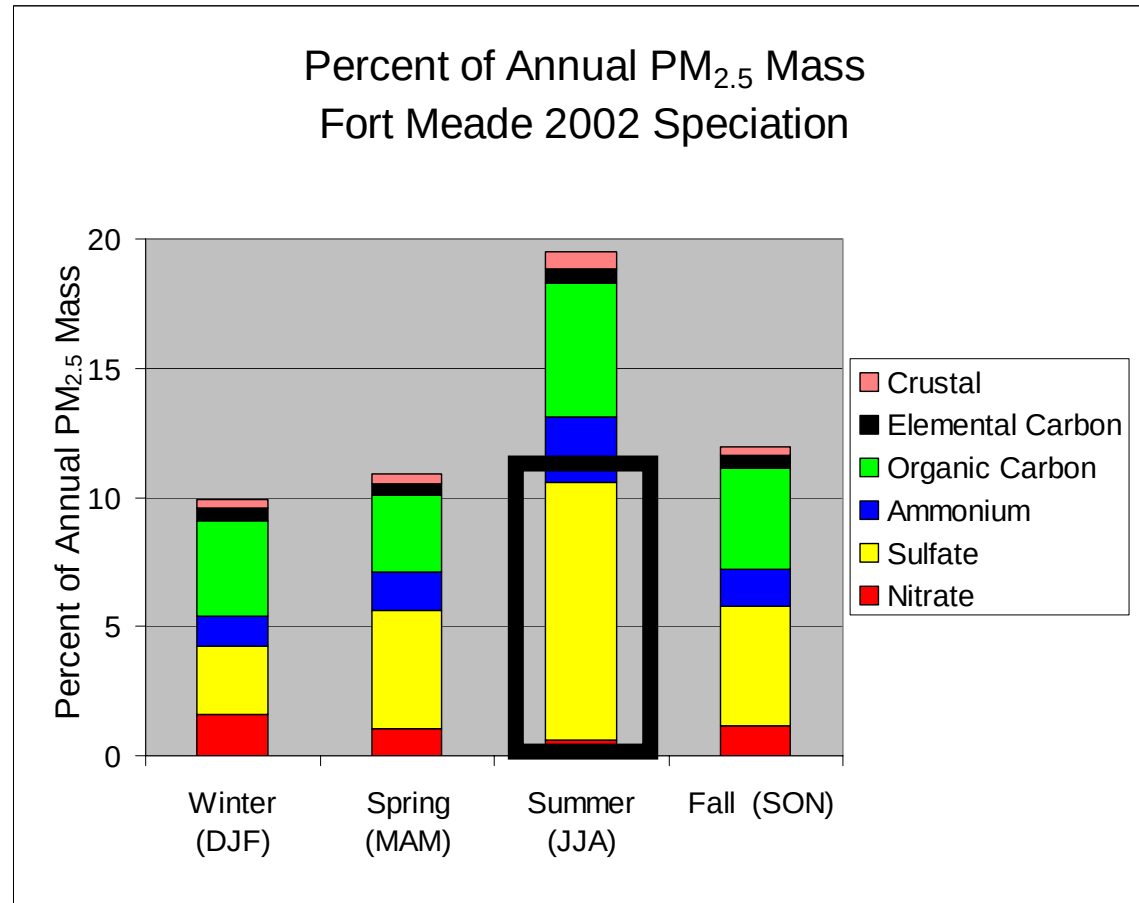
Backward trajectories ending at 18 UTC 10 Feb 00
EDAS Meteorological Data



Primary Particles – our Local Concern



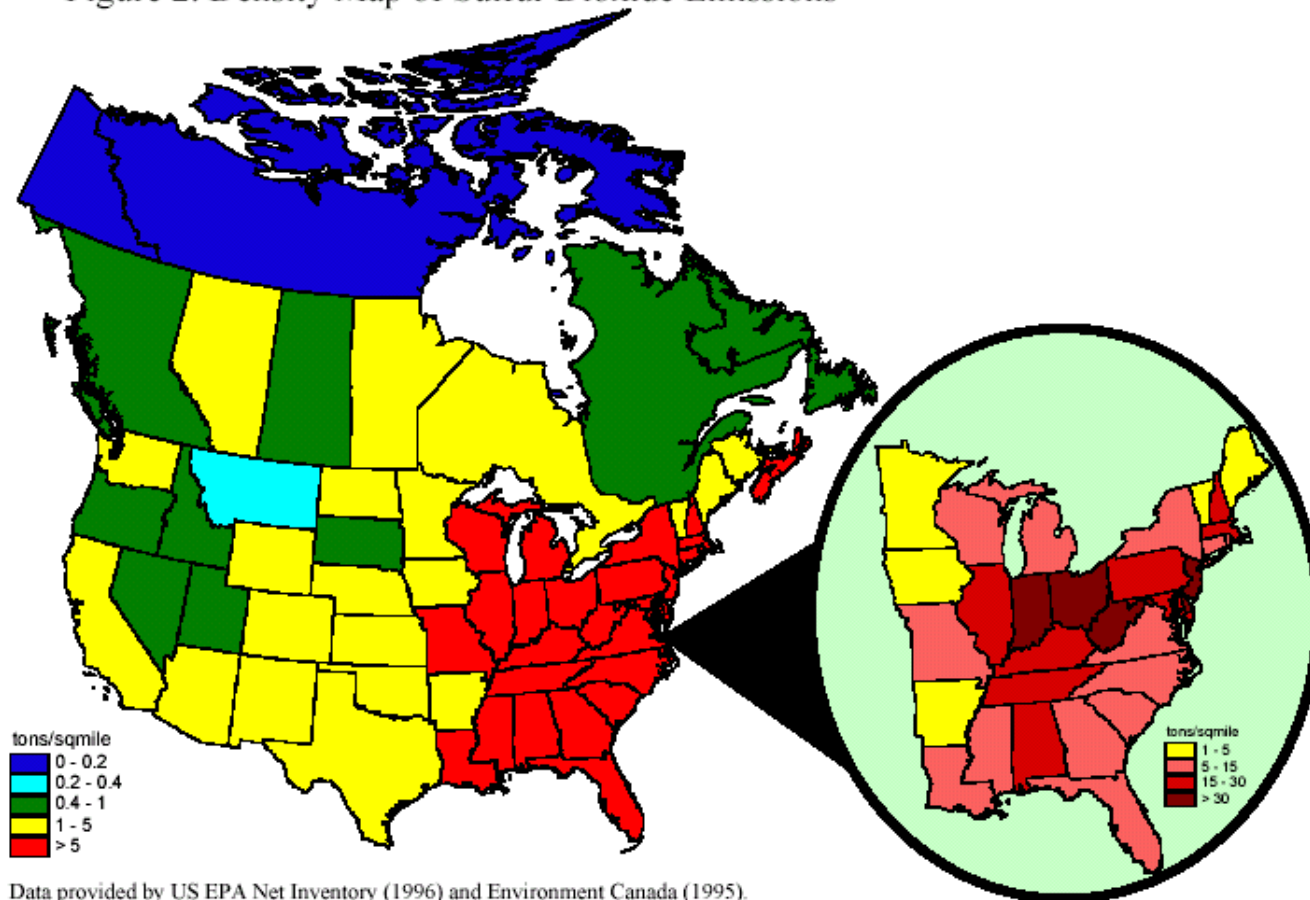
Secondary Particles – our Regional Concern



Secondary Particles – A Regional Problem

Source: MARAMA

Figure 2. Density Map of Sulfur Dioxide Emissions



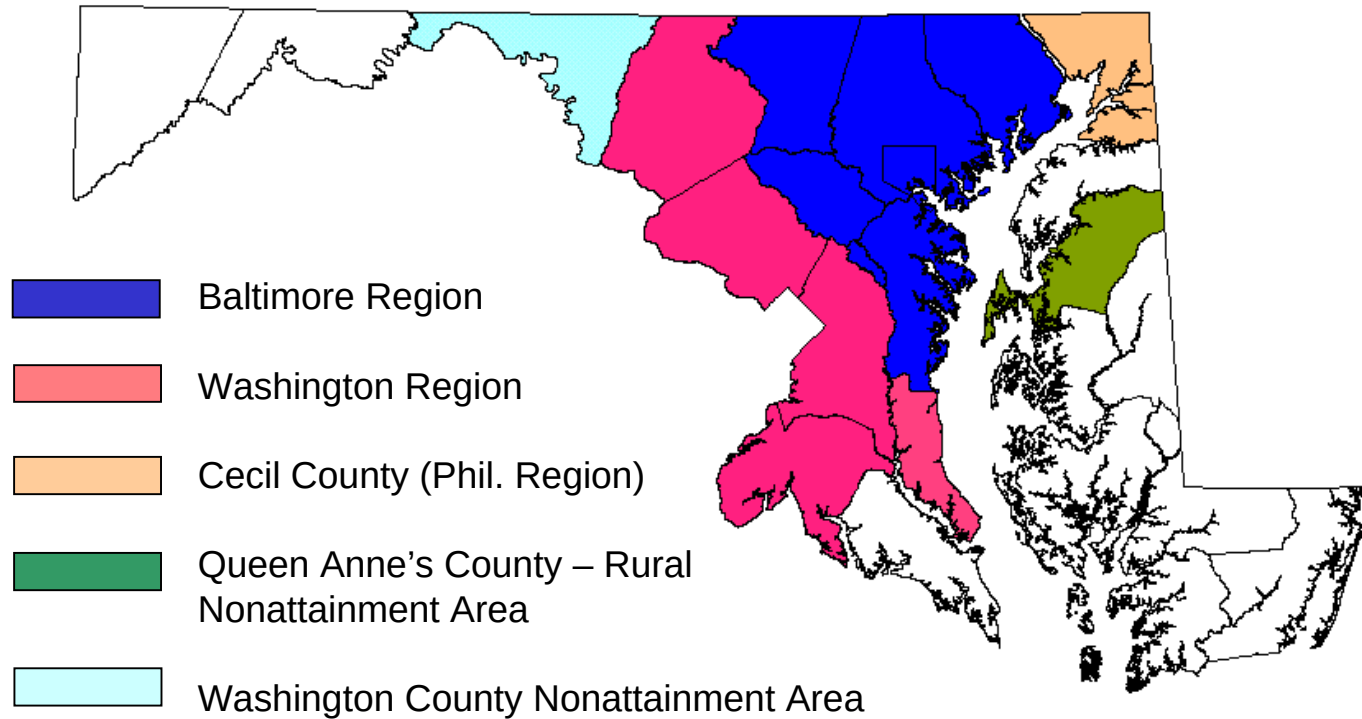
Data provided by US EPA Net Inventory (1996) and Environment Canada (1995).

Maryland's Recommendation

We Sent Two Options:

1. One that is generally consistent with EPA guidance
2. One that is innovative
 - acceptable to both the business community and local governments
 - may be misinterpreted by the environmental community
 - not consistent with EPA guidance
 - one that promotes regionalism

Maryland's Recommendation (Option 1)





Pros and Cons of Option 1

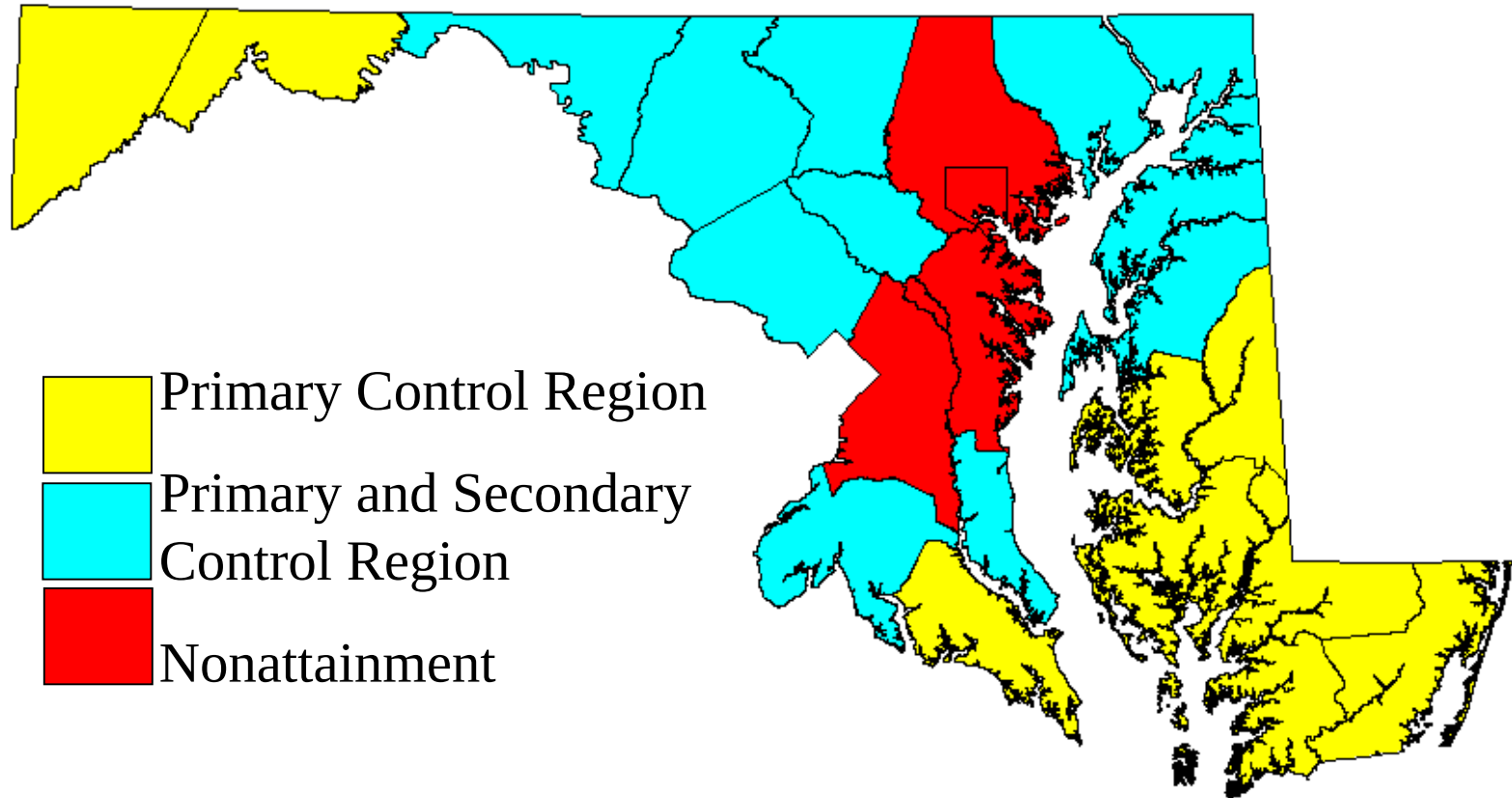
- Pros
 - Minimizes disruption of current air quality planning and conformity processes
 - Very consistent with EPA guidance (MSA concept)
- Cons
 - Does not make upwind areas responsible for contribution to downwind problems
 - May include some counties that could be attainment
 - Not consistent with scientific understanding



Option 2: Small Nonattainment Area – Larger Control Region

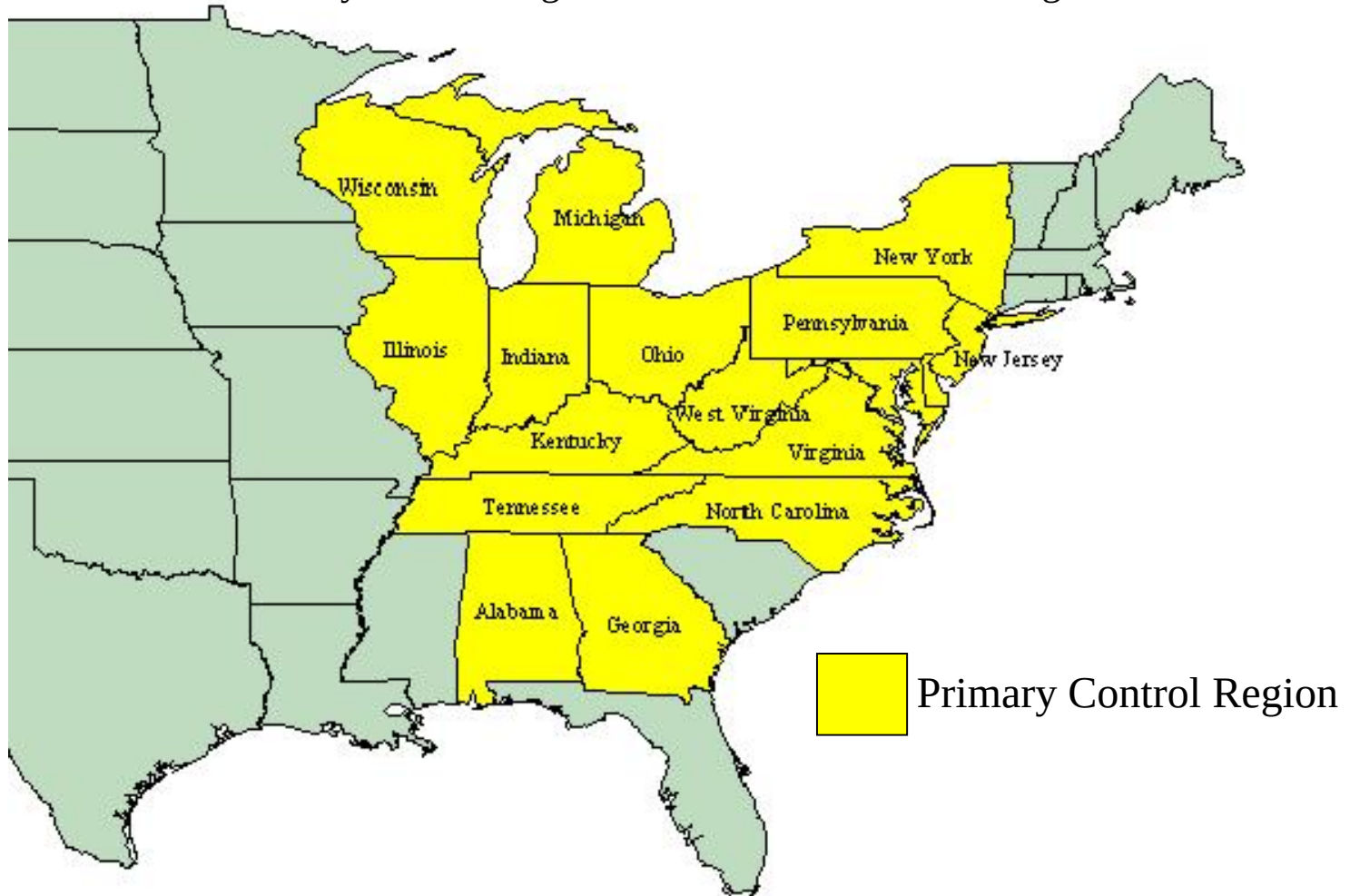
- MD would like to recommend new nonattainment classifications called “primary and secondary control regions”
- Primary Control Regions are any region that contributes significantly to PM_{2.5} nonattainment in any other state (as identified by EPA)
- Secondary Control Regions are counties located in a Metropolitan Statistical Area not identified as nonattainment
- Nonattainment designation only given to the counties that have monitors violating the standard

Maryland's Recommendation (Option 2)



Maryland's Recommendation (Option 2)

Primary Control Regions for the Baltimore/ Washington Areas





Pro's and Con's of Option 2

Pro's

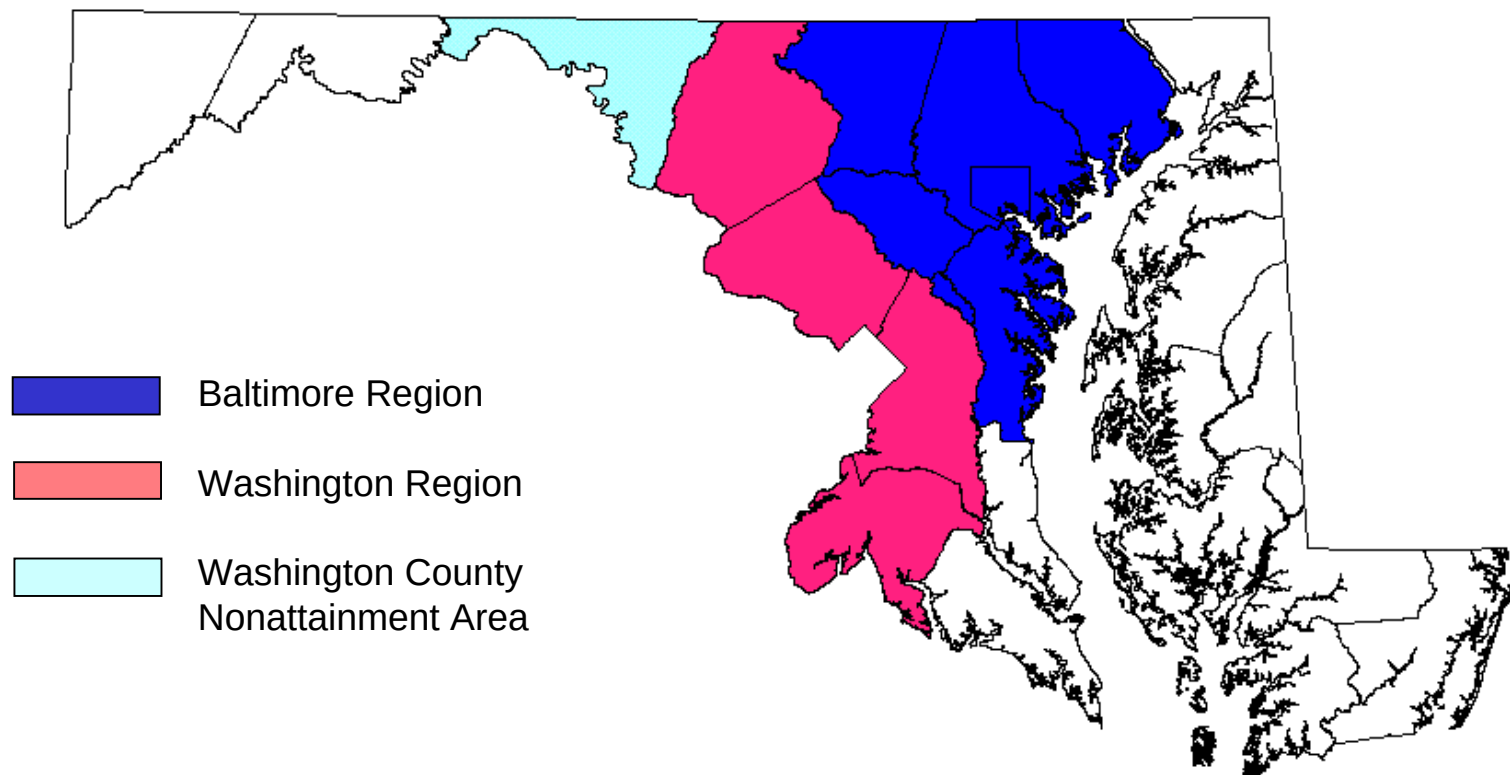
- Smaller nonattainment areas – individual areas were spared the stigma of having such large nonattainment areas
- Likely acceptable to both the local governments and the business community
- Keeps regional control programs in place
- Maintains the current SIP planning structure
- Would allow for regional transportation conformity process (as current)

Con's

- Not an accepted nonattainment designation (legal?)
- Environmental organizations may not agree (typically they desire larger “nonattainment” areas)



EPA June 29, 2004 Response/ Recommended Nonattainment Areas



Also.....DC Region includes Washington
DC and nine VA Cities and Counties

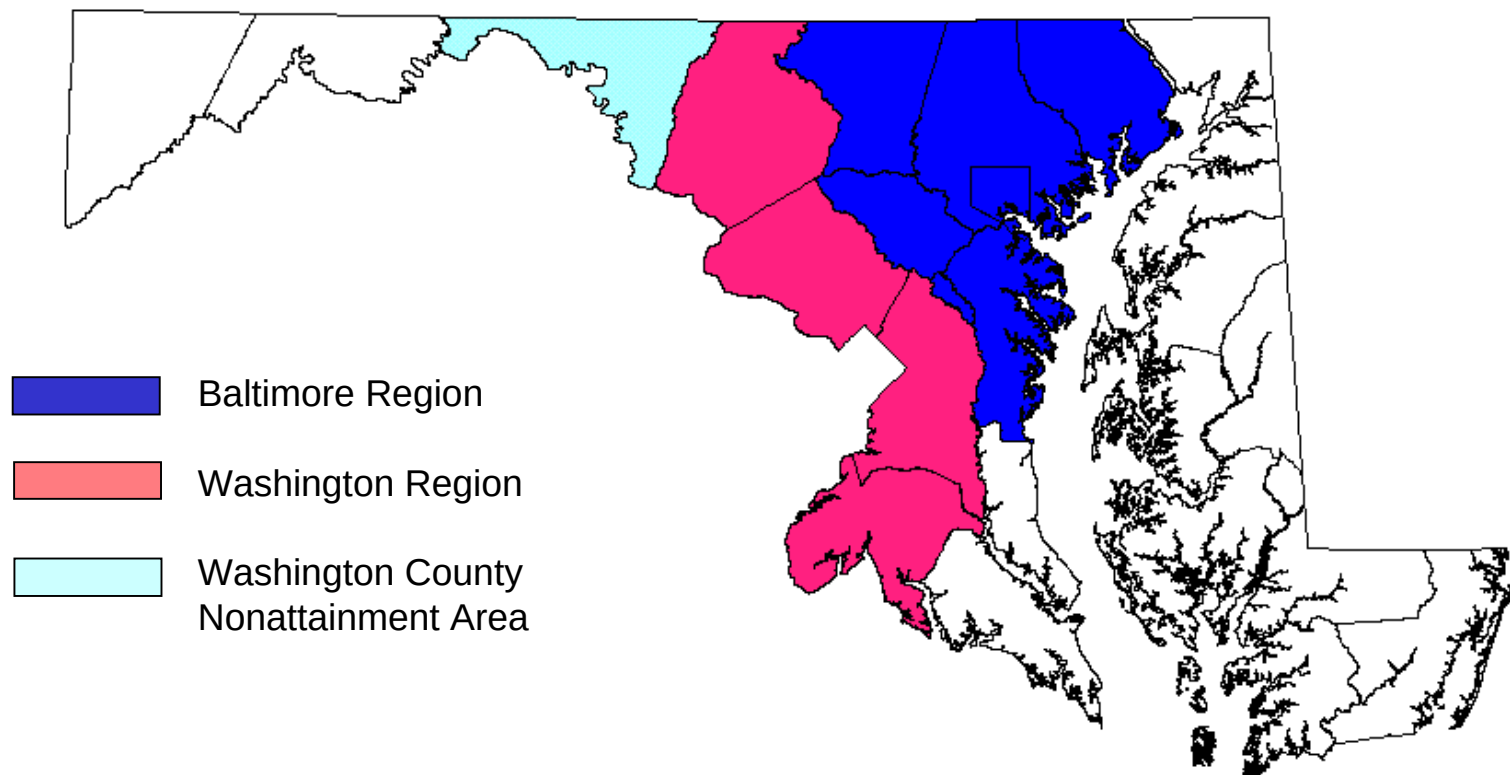


EPA June 29, 2004 Response/ Recommended Nonattainment Areas

- Established fine particle nonattainment areas slightly smaller than the 8-hour ozone boundaries
- EPA intends to designate the following counties as nonattainment (in addition to the 4 counties MD Recommended):
 - Carroll; Harford and Howard as part of the Baltimore MSA (Part of Washington-Baltimore CMSA)
 - Charles, Frederick, and Montgomery- part of the Washington DC. MSA(Part of the Washington-Baltimore CMSA)
 - Washington- part of the Hagerstown-Martinsburg 2003 CBSA



EPA June 29, 2004 Response/ Recommended Nonattainment Areas



Also.....DC Region includes Washington
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The “Bubble” Counties

Washington

Howard

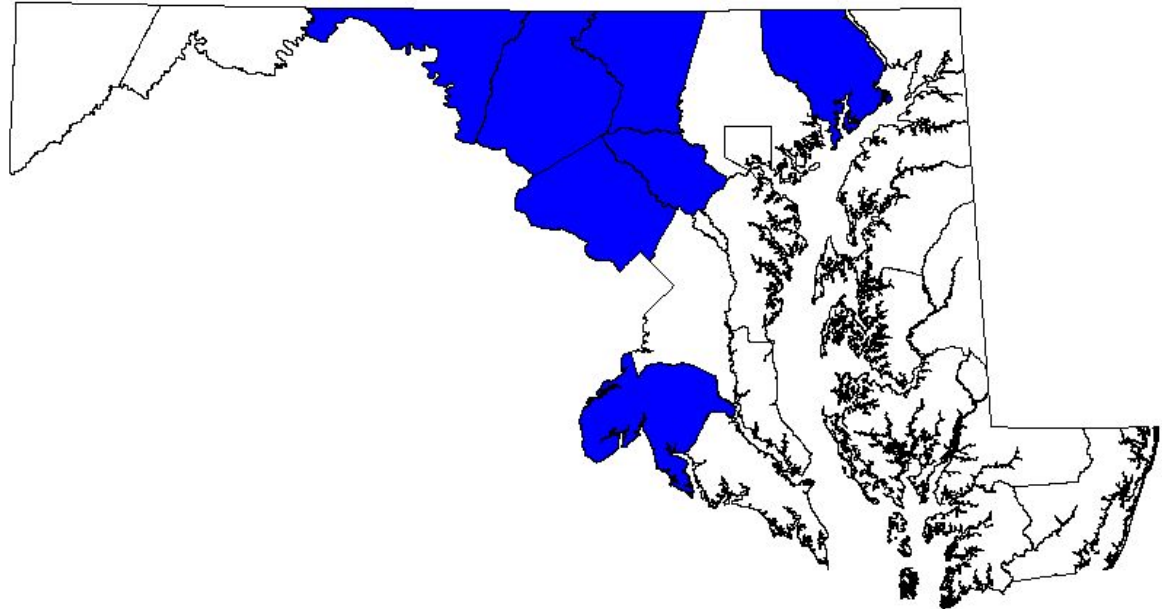
Harford

Carroll

Frederick

Montgomery

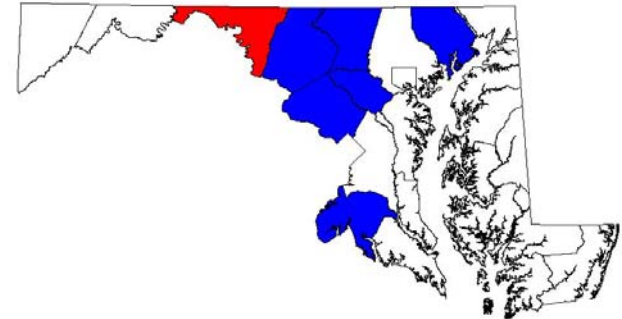
Charles



.....lets look at a few counties a little more closely.....

Washington County

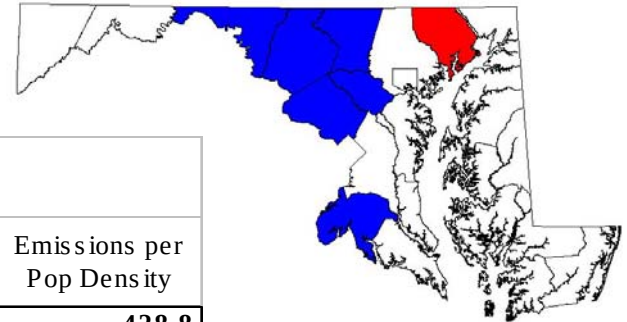
- Relatively low population growth
- Relatively low emissions
- Connected to CBSA
- EAC for Ozone – discontinuity issue



EPA Reg	ST	COU		
			Emissions Totals	Emissions per Pop Density
3	MD	Charles	120,061	428.8
3	MD	Montgomery	119,592	65.0
3	MD	Howard	24,907	24.1
3	MD	Washington	31,728	108.3
3	MD	Carroll	28,353	80.1
3	MD	Frederick	38,708	122.9
3	MD	Harford	23,198	44.8

Harford County

- Relatively low emissions score in EPA analysis (much lower than our recommended NAA counties)



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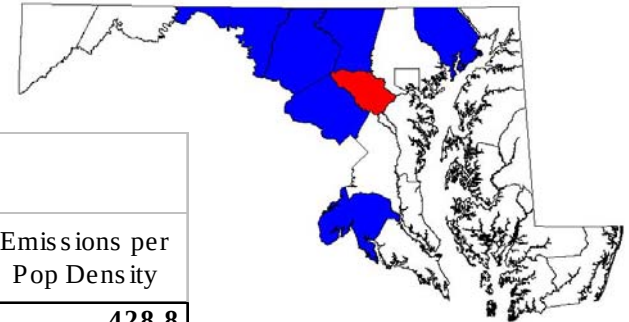
SUMMARY OF FACTOR 1: EMISSIONS BALTIMORE, MD MSA

** Counties Listed by Percent Contribution to area**

EPA Reg	ST	COUNTY	Total Emissions, 2001 (tons)							Weighted Emissions
			PM	SO2	NOX	VOC	Amm	Carbon	Crustal	
3	MD	Baltimore	8,510	42,719	43,464	26,217	1,607	3,370	3,935	34.6
3	MD	Anne Arundel	5,572	71,439	36,715	18,182	962	2,228	2,715	27.1
3	MD	Baltimore (City)	2,446	10,686	34,810	21,256	1,581	1,473	726	14.2
3	MD	Carroll	2,563	3,266	12,165	6,312	1,776	754	1,517	7.3
3	MD	Harford	1,517	1,946	8,662	8,606	1,008	754	705	7.2
3	MD	Howard	1,179	2,702	9,987	9,467	435	776	361	7.0
3	MD	Queen Annes	879	428	2,149	2,636	1,128	289	572	2.7

Howard County

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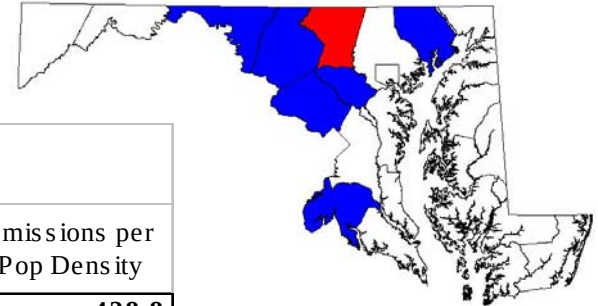
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EPA Final Proposal of Nonattainment Boundaries

- EPA Final Action and Effective Dates
 - EPA is required to provide 120 day notice to states before final designations
 - June 29, 2004, initiated the 120 day period used to reconcile differences
 - September 1, 2004 - deadline for Maryland to submit comments and/ or additional information to EPA
 - November 2004- EPA publishes designations as final action