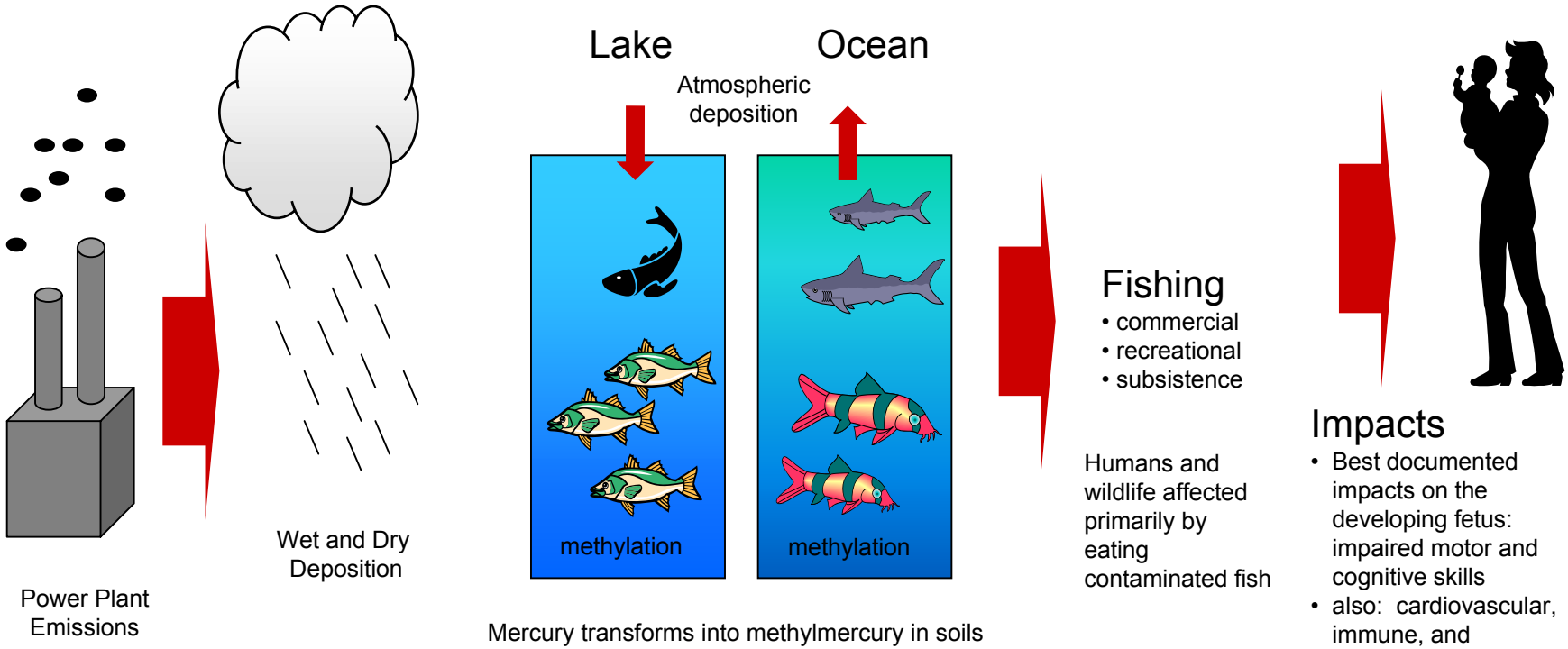
EPA's Action to Protect Human Health and the Environment from Power Plant Emissions of Mercury through the Clean Air Mercury Rule (CAMR)




Region III - Air Protection Division

Mercury Emissions from Power Plants Present a Substantial Threat to Human Health and the Environment

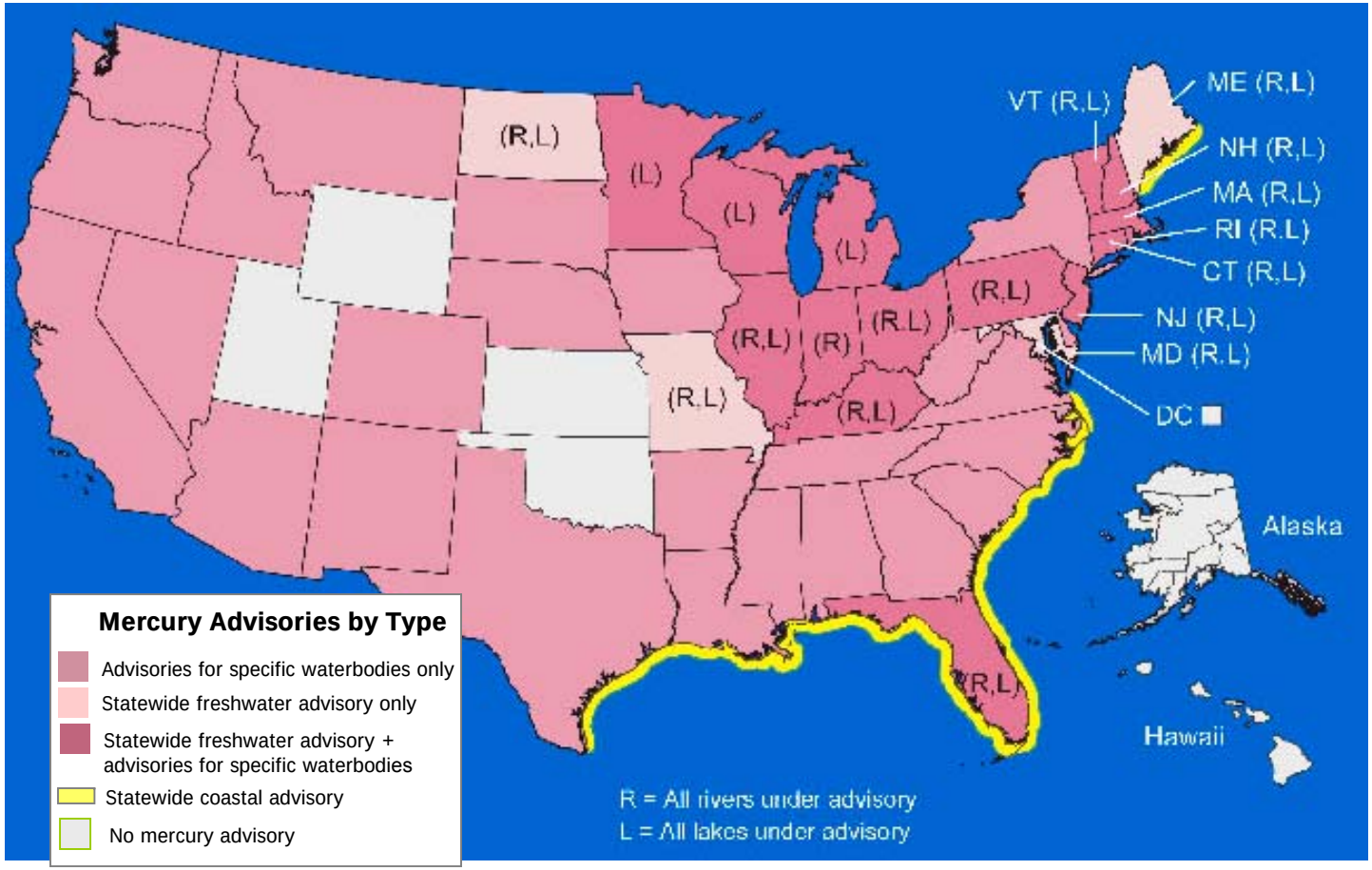


Emissions → **Atmospheric Transport and Deposition** → **Ecosystem Transport and Methylation** → **Human and Wildlife Exposure** → **Health Impacts**

Mercury Contamination in Fish

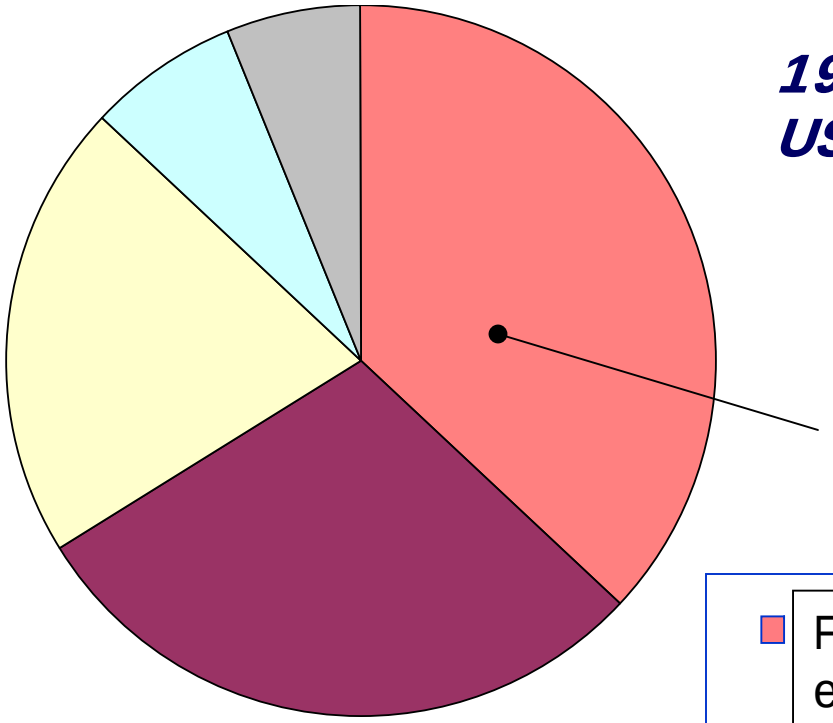
- **Currently 44 states have issue fish consumption advisories for some or all of their waters due to contamination from mercury.***

States with Fish Advisories Due to Mercury



*Note: For more information about the relationship between fish advisories and human exposure to mercury, see the EPA Report "America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illnesses" available at *http://yosemite.epa.gov/ochp/ochpweb.nsf/content/publications.htm*

Power Generation Is a Major Source of US Mercury Emissions



1999 Mercury Emissions from all US sources = 112 tons per year

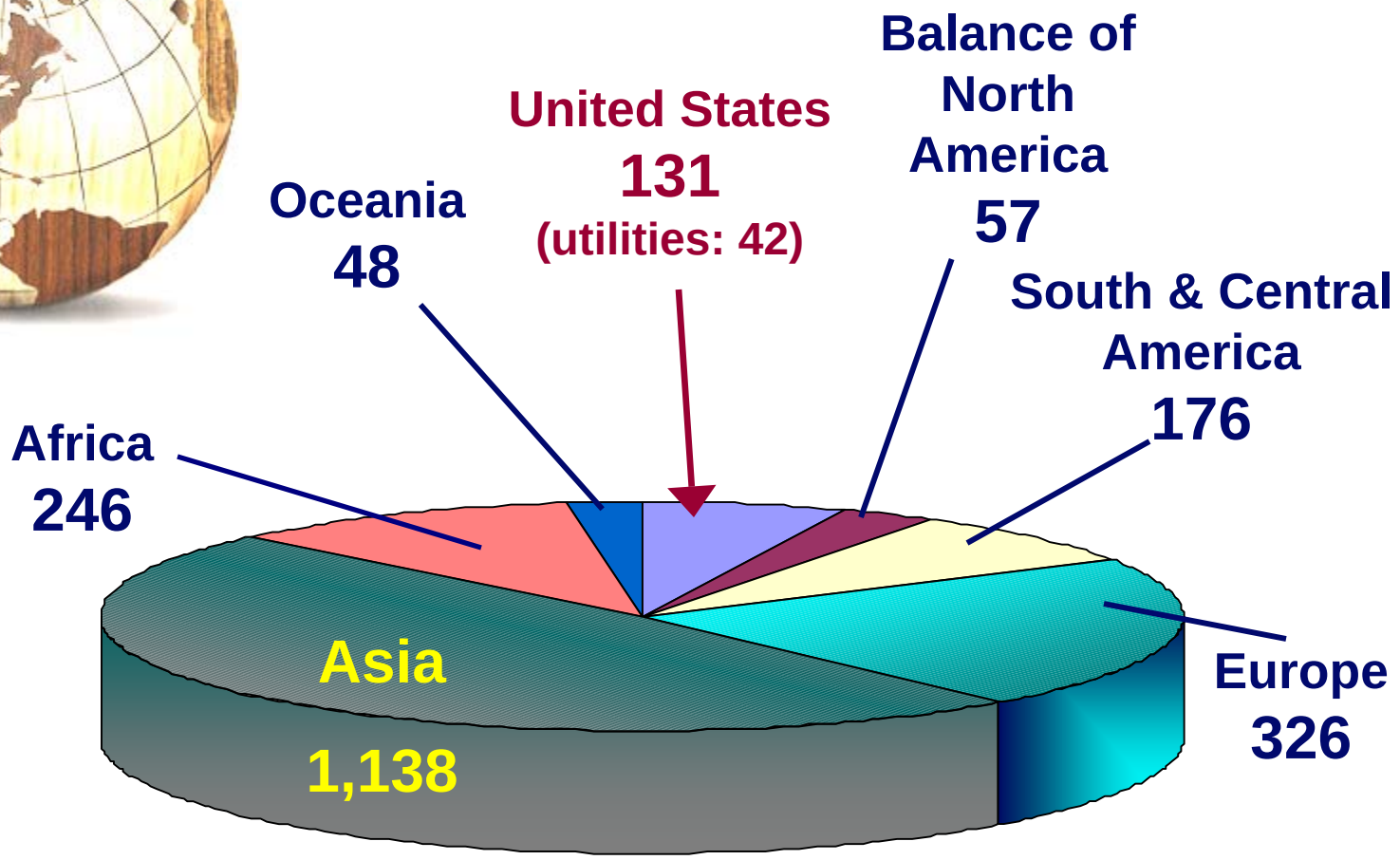
US Utilities (48 tons per year or40 %)

- Fuel Combustion-electric utilities
- Other stationary combustion *
- Industrial Processing
- Transportation
- Miscellaneous

* Other stationary combustion includes residential and commercial sources.

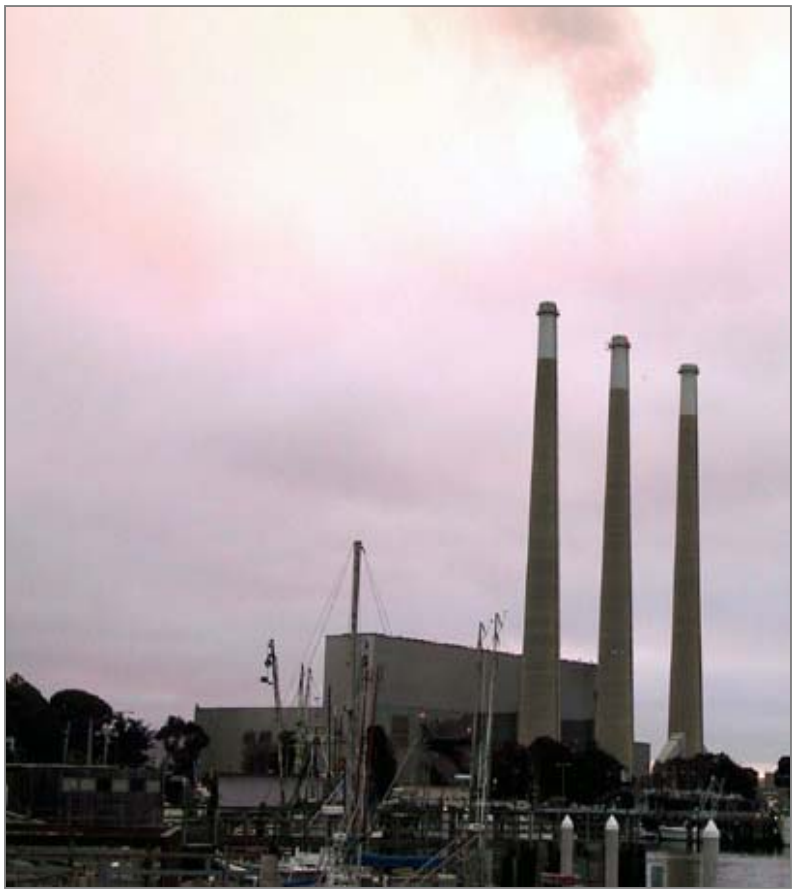
Mercury Global Emissions - Anthropogenic Emissions by Continent

Global total: 2,122 Mg/y



(Adapted from EPRI, 2004)

Overview: Requires New Coal Fired Power Plants to Meet New Source Performance Standard (NSPS) Emission Limits



- New coal-fired power plants ("new" means construction starting on or after Jan 30, 2004) will have to both comply with the NSPS and hold allowances as required by the national mercury emissions cap.
- NSPS limits are established on a unit by unit basis. Limits are based on type of coal burned.

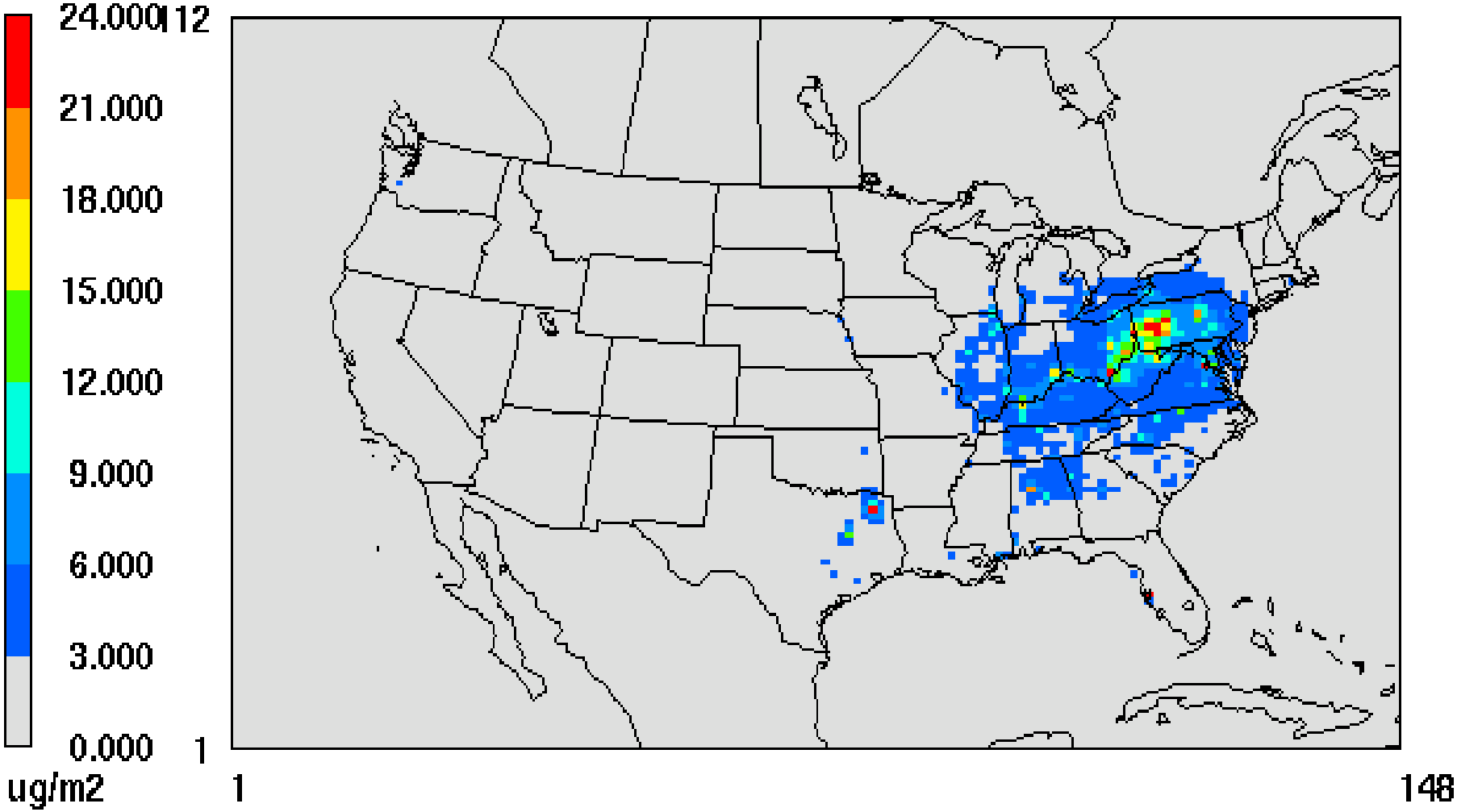
Overview: Requires Existing Power Plants To Reduce Their Emissions under an Emissions Cap and Trade Program

- Caps annual mercury emissions at 38 tons per year in 2010, and at 15 tons per year in 2018 and afterwards.
- States are granted a mercury emissions budget which they allocate to sources.
- States have flexibility in determining how to achieve reductions, including whether to allow trading.

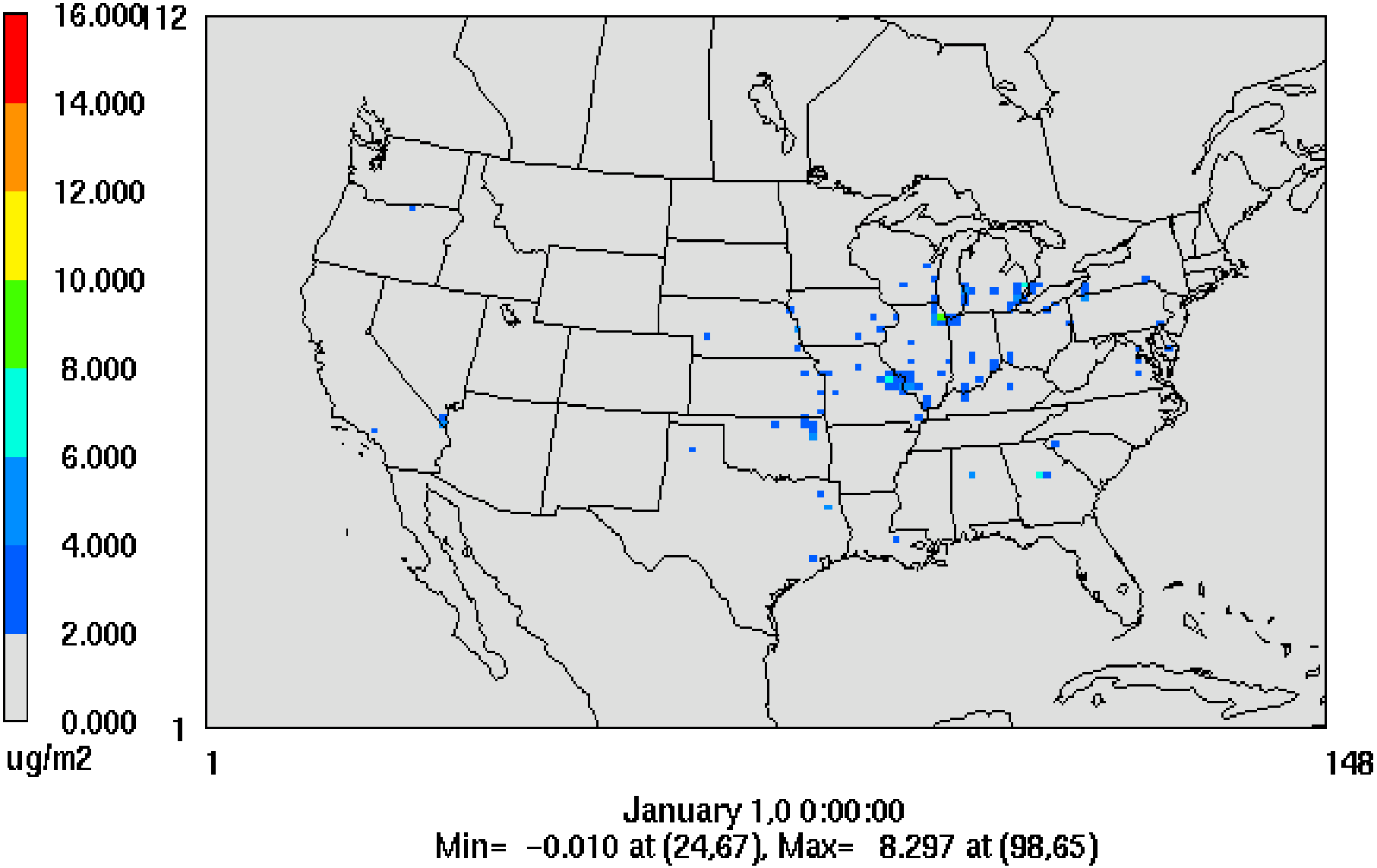
Expected Mercury Emissions Reductions From Utility Plants in Region III's States

State	1999 Hg (tons)	% of US Hg	Rank in US for Hg	2010 Hg Cap	2018 Hg Cap	Hg Δ 1999 - 2018
PA	4.979	10.4	2	1.78	0.702	- 85.9 %
VA	0.633	1.3	23	.592	0.234	- 63.0 %
WVA	2.466	5.1	5	1.394	0.55	- 77.7 %
MD	0.910	1.9	20	.49	0.193	- 78.8 %
DEL	0.104	0.2	38	.072	0.028	- 73.0 %
SUM	9.092	18.9		4.328	1.713	- 81.2 %

Total Annual Mercury Deposition from Power Plants: 2001



Total Annual Mercury Deposition from Power Plants after CAIR + CAMR: 2020



State Requirements under CAMR

- States must submit a plan under Clean Air Act section 111(d) that: 1) describes the State's mercury control strategy and 2) includes fully adopted State rules sufficient to meet the State's assigned mercury emissions budget. The rules must provide for compliance by 2010.

- States may choose to join the trading program by adopting or referencing the model trading rule (40 CFR part 60, subpart HHHH) in State regulations or by adopting regulations that mirror the necessary components of the model trading rule.

- States may choose to implement more stringent mercury emissions requirements.

State Mercury Emission Budgets

- State Hg budgets are binding if a State does not choose to participate in the EPA-run cap and trade program.
- Within the trading program, the Hg budgets represent the number of allowances that a State receives. Each State has discretion on how to allocate its budget among sources.
- In any particular year, sources in a State participating in the trading program may collectively emit more or less than the State budget, since they can buy, sell or bank allowances.
- States that do not have existing coal-fired power plants were allocated a State budget of zero tons. New units in these States would have to purchase allowances in order to comply.

Hg Model Trading Rule: Program Basics

- Applicability
  - Any coal-fired utility unit serving a generator larger than 25 MW that produces electricity for sale.
  - Any cogen unit serving a generator that supplies more than 1/3 of its potential electric output capacity and more than 25 MW electrical output to a utility power distribution system for sale (applied annually)
  - Trading program applicability is consistent with CAIR.
- Permits are administered through permitting vehicles established under title V of the CAA and 40 CFR part 70 or 71.

Hg Model Trading Rule: Program Basics

- A mercury allowance tracking system is established which is consistent with tracking systems developed for CAIR, and Acid Rain Program, and the NO_X SIP Call.
- Program audits will be conducted annually to allow states to track emissions and transaction activity in other states.
- Transfers can occur between accounts at any time of year except during EPA's reconciliation process.

Mercury Model Trading Rule: Necessary Common Components of State Rules

- State adoption of the model rule would ensure consistency in the following key operational elements of the program among participating states:
  - Allowance management
  - Banking
  - Emissions monitoring (according to 40 CFR Part 75) and reporting
  - Accountability for affected sources
  - Enforcement requirements
- State rule may deviate from the model rule only in the area of allowance allocation methodology.

Mercury Model Trading Rule: Allowance Allocations

- EPA recommends initial allowance allocations based on historic heat input data with adjustments for coal type.
- Initial allocation made for first five years of program. Afterwards, annual updating determines allocations for the year five years in advance.
- A new source set-aside is established for units that have entered service but have not yet been allocated allowances through the updating mechanism (5% for years 2010-2014; 3% thereafter).

Mercury Model Trading Rule: Banking of Allowances

- Banking with no restriction: sources can over-control for one or more seasons and withdraw from the bank in a later season.
- Encourages earlier or greater reductions than required, stimulates the market and encourages efficiency, and provides flexibility.
- However, use of banked allowances might cause state's trading program budget to be exceeded in a given year.

Mercury Model Trading Rule: Compliance and Penalties

- Assessed at the facility level.
- After December 31, sources have a window of time to obtain additional allowances if needed (60 days).
- Each compliance account must hold sufficient Hg allowances to cover the source's Hg emissions for the prior year's control period.
- If sufficient Hg allowances are not held, three Hg allowances for each ounce of excess emissions will be deducted from the source's compliance account for the following control period.
- Additional civil and criminal penalties possible.

CAMR Monitoring Requirements

- Most units required to install CEMs or sorbent traps
- Some low-emitting units ($\leq$ 29 lbs/yr) sources may use periodic testing under a third option
  - annual stack testing if Hg emissions are $\leq$ 9 lb/yr
  - semiannual testing if emissions are greater than 9 lb/yr, but $\leq$ 29 lb/yr
- Sources may also petition to use an alternative monitoring system, under Subpart E of Part 75
- Sources required to have monitors certified and to begin collecting data by January 1, 2009

CEMs

- Continuous Emissions Monitoring Systems
  - Measures “real-time” vapor phase Hg concentration in the stack
  - Similar to current systems in the Acid Rain & NO_x budget programs

Sorbent Traps

- Sorbent Traps
  - Continuously samples the stack gas---collects vapor phase Hg on sorbent media (e.g., activated carbon)
  - Accumulation of Hg over an extended period of time, e.g., a few days or weeks
  - Lab analysis of the tubes at end of period

CEMs and Sorbent Traps in Use or Being Demonstrated

- Mercury CEMs Installed for Compliance Monitoring
  - WE Energy – has installed mercury CEMs before and after baghouse
- Ongoing demonstration projects
  - North Carolina Power Plant Demonstration (ESP and low NOx burners) – testing 4 different CEM systems and sorbent trap
  - Kentucky Power Plant Demonstration (Wet Scrubber and SCR) – testing 6 different CEMs and sorbent trap
  - Many CEMS performing well.
  - Sorbent Traps performing well.

Summary

The Clean Air Mercury Rule will:

- Reduce power plant mercury emissions by about 70%, from an estimated 48 tons per year (TPY) to 38 TPY in 2010 and 15 TPY in 2018.
- Achieve these reductions in power plant mercury emissions cost effectively through a “cap and trade” approach.