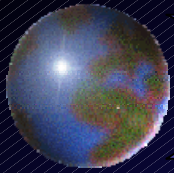


*Mercury and
Children's Health
Implications for Regulation of US
Power Plants*

Susan West Marmagas, MPH

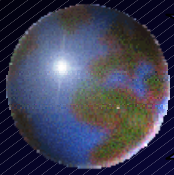
Director of Health Programs

Collaborative on Health & The Environment



Presentation Summary

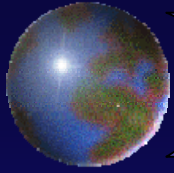
- Brief Public Health Overview on Mercury and Children's Health
- Findings of EPA's Children's Health Protection Advisory Committee
- Themes for State-specific Decisions on Mercury Regulations for Power Plants



Mercury: An Invisible Threat

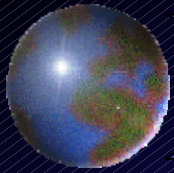


Photo credit: Don Breneman/USEPA GLNPO



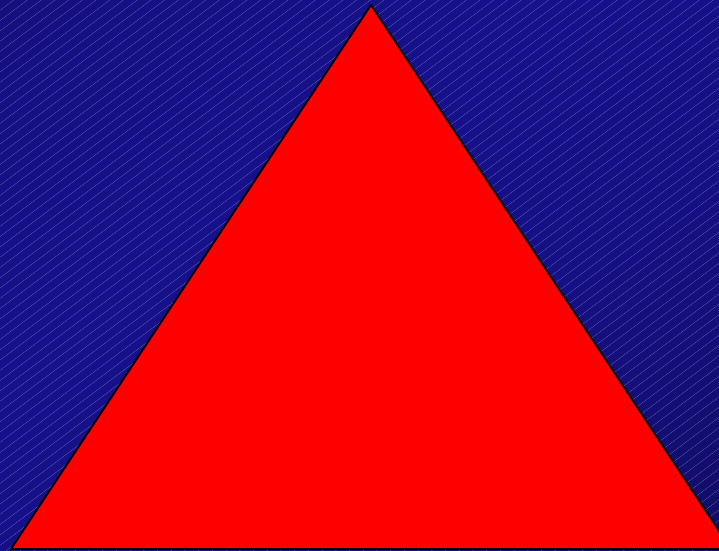
Five Unfortunate Properties of Mercury

- ⊕ Biomethylation
- ⊕ Bioaccumulation
- ⊕ Global Transport
- ⊕ Local Deposition
- ⊕ High Toxicity



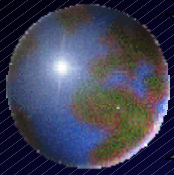
Toxic Triangle

TOXIC
AGENT

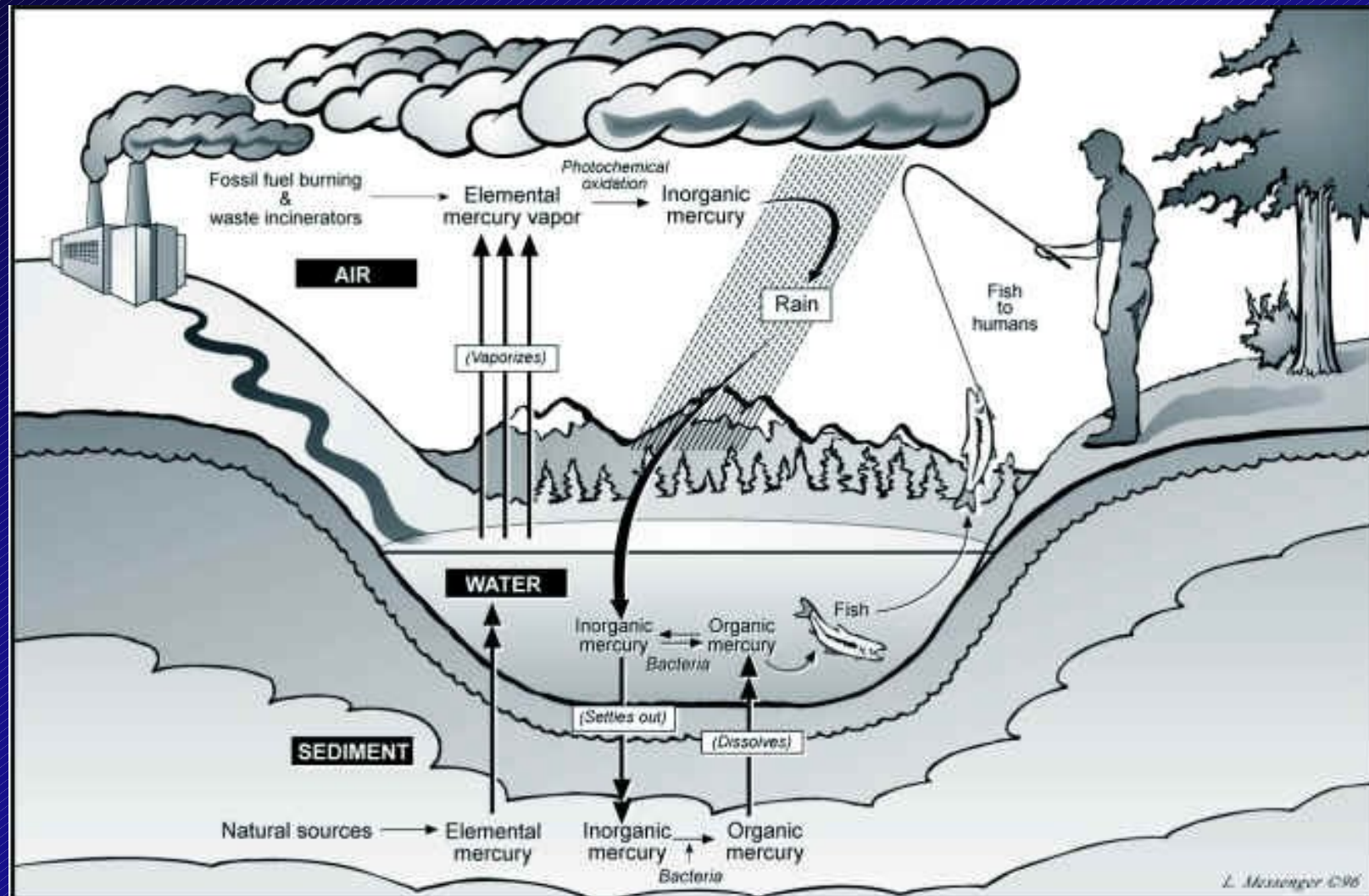


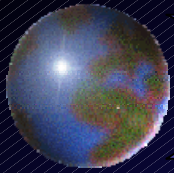
ENVIRONMENTAL
EXPOSURE

SUSCEPTIBLE
POPULATIONS



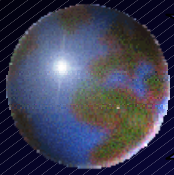
How Does Mercury Get Into Fish?





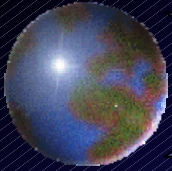
Movement of Methylmercury in human body

- Methylmercury is degraded slowly by the human body
- It crosses the placenta
- It crosses the blood brain barrier
- It is secreted in breast milk
- It disrupts biological processes critical for normal brain development



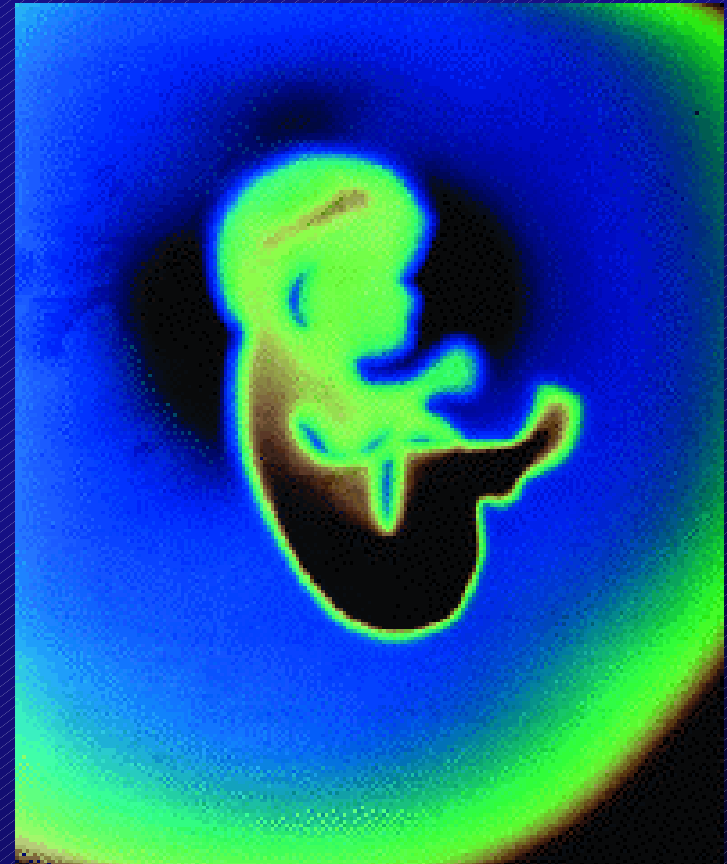
Vulnerable Populations

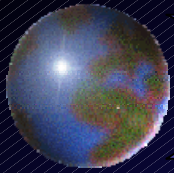




Most Vulnerable

- The Fetus
- Infants and Young Children





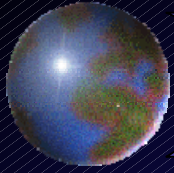
Developmental Neurotoxicity of Methylmercury

- Numerous studies demonstrate adverse effects
- Studies are, in general, consistent
- Good correlation between animal and human studies
- Effects are often delayed and are often **IRREVERSIBLE**



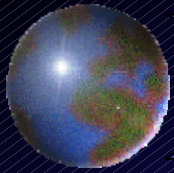
Effects in Children (low level exposures)

- **Delayed Developmental Milestones**
- **Attention Disorders**
- **Fine Motor Function**
- **Visual Spatial Abilities**
- **Memory**



Major Studies on Effects of Methylmercury Exposure

- 1950's – Neurological disorders in predatory birds
- 1960's – Neurological disorders in Japanese Fishermen – Minamata Bay
- 1971-72 – Bread contaminated by organic mercury causes severe neurotoxicity in Iraq
- 1980's – New Zealand – Developmental Neurotoxicity
- 1990's – Seychelle Islands – No Effect
- 1990's – Faroe Islands – Developmental Neurotoxicity

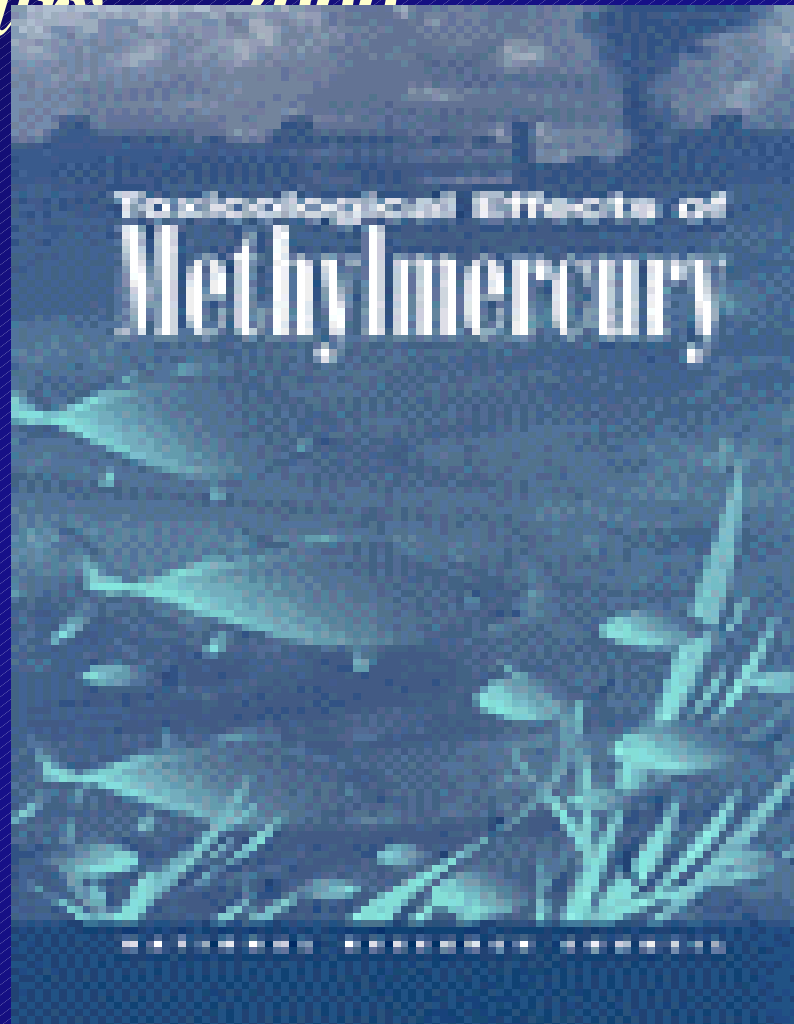


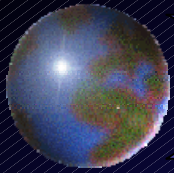
Methylmercury Studies have been RIGOROUSLY Reviewed

- EPA – Mercury Report to Congress, 1997
- ATSDR – Toxicological Profile for Mercury, 1999
- Scientific Issues Relevant to Assessment of Health Effects from Exposure to Methylmercury – 1998
 - White House Office of Science and Technology
 - National Institute of Environmental Health Sciences
- Toxicological Effects of Methylmercury, 2000
 - National Academy of Sciences



National Academy of Sciences
Committee on the Toxicological Effects of
Methylmercury 2000



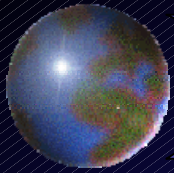


Blood Hg Women Age 16-49

National Environmental Exposure Study

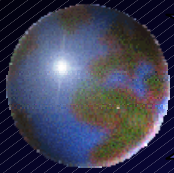
<http://www.cdc.gov/exposurereport>

- **Representative sample of the general US population**
 - 1709 women tested
- **6-8% of US women of childbearing age above recommended safety level (5.8)**
 - 3.5 MILLION women 20-44 years of age**
 - 630,000 newborns each year at risk (Mahaffey, 2004)**



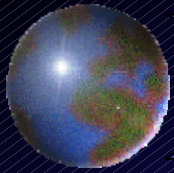
EPA Reversal on Mercury Emissions

- Clean Air Amendments 1990 --
 - Maximum Achievable Control Technology can reduce mercury emissions by as much as 90% by 2008.
- December 2003 Mercury Proposals
 - MACT Proposal
 - Cap and Trade
- Final Mercury Rule March 2005
 - 29% by 2010 and 69% by 2018.
 - Cap and trade approach



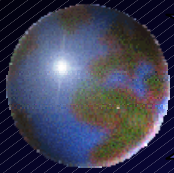
EPA's Children's Health Protection Advisory Committee

- As defined by EPA, the CHPAC is
 - “a body of researchers, academicians, health care providers, environmentalists, children’s advocates, professionals, government employees, and members of the public who advise EPA on regulations, research, and communications issues relevant to children.”
- The CHPAC is comprised of a broad swath of children’s health experts and all decisions are made by consensus.



Proposed EPA Rules - 2004

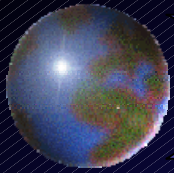
- Maximum Achievable Control Technology – 29% by 2010 (Co-benefit of the Interstate Air Quality Rule) **OR**
- Cap and Trade
 - ▣ Phase I – 30% by 2010
 - ▣ Phase II – 69% by 2018
- No specific consideration of children's exposures



January 2004 CHPAC Letter

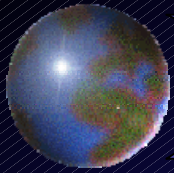
Findings/Recommendations:

- Proposal does not sufficiently protect our nation's children
- EPA needs to elevate consideration of child health impacts
- EPA should build on successes achieved in regulating mercury at 90% from medical and municipal waste incinerators
- EPA should move expeditiously to reduce mercury emissions from power plants
- EPA needs to address concerns about local hot spots
- CHPAC requests integrated analysis from agency on technology, costs, economic benefits and impacts on children



March 2004 Response from EPA

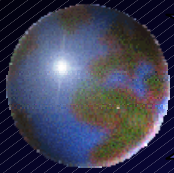
- Proposed multi-pollutant emissions reduction strategy is the most cost effective and environmentally beneficial
- Cap and trade programs in the past have not created local hot spots, and incentives have been created for utility sector to seek reductions in NOX and SOX which will lead to mercury reductions as well.
- Benefits of regulating multiple pollutants together (NOX, SOX, mercury and nickel)
- No comment about CHPAC request for more analysis



June 2004 CHPAC Letter

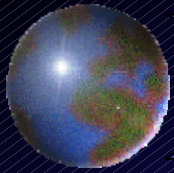
Given the extension of the rulemaking to March 2005, CHPAC reiterated its request for:

- Evaluation of health benefits for women of child bearing age and children;
- An integrated analysis of impacts, technologies, costs and economic benefits of both proposals;
- Further evaluation of hot spots under Cap and Trade
- Release of pending EPA's Mercury Action Plan



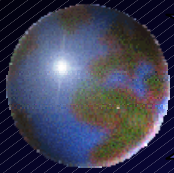
July 2004 Response from EPA

- EPA is considering conducting additional analysis, but will wait until public comments are reviewed to make decision about additional analysis;
- Will conduct “whatever analyses are necessary to ensure the right decision is made and we protect public health in the most effective way possible;”
- Hot spots were not created under the acid rain program. “We will give particularly careful consideration to this issue as we develop the final rule.”



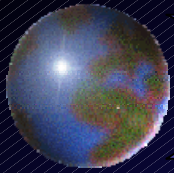
CHPAC Met with Experts at EPA and Externally

- To better understand the complexity of the issues, Work Group decided to hold conference calls with experts
- Presentations sought on the topics of:
 - Available technology
 - Cost-Benefit analysis
 - Local Deposition of Mercury – how significant is this issue (relevant to hot spots question)



CHPAC Consultations

- EPA Staff – Bob Wayland and Bill Maxwell, Office of Air and Radiation
- Available Technology
 - David Foerter and Michael Durham, Institute of Clean Air Companies
 - George Offen, Electric Power Research Institute
 - Praveen Amar, Northeast States for Coordinated Air Use Management



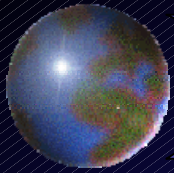
CHPAC Consultations

- Local Deposition

- Tom Atkeson, Florida Department of Environmental Protection

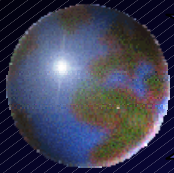
- Economic Feasibility -- Costs and Benefits

- Martha Keating, Clean Air Task Force



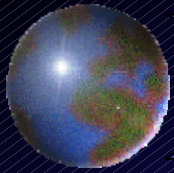
November 2004 CHPAC Letter

- Controls are available to reduce mercury emissions by up to 90% in a shorter time frame (a number of states are already implementing more stringent standards)
- A more stringent national standard could begin to address the concerns about regional, local and downwind mercury deposition
- Quicker and deeper reductions will provide important health benefits in a cost-effective manner – even EPA's initial health benefits analysis showed significant benefit to society



January 2005 CHPAC Letter

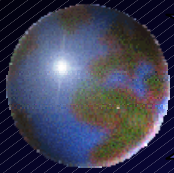
- Response to the Notice of Data Availability (released Dec 2004) and EPA request for public comment on components of a new health benefits analysis
- “CHPAC believes that documented scientific evidence on mercury transport, chemistry, deposition, bioaccumulation, consumption patterns, dose-response and local impacts makes a compelling case for EPA to develop a comprehensive health benefits analysis using existing health-conservative input parameters.”



Jan 2005 CHPAC Letter

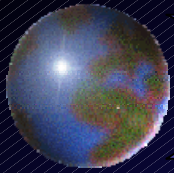
(Hot Spots)

- “ EPA's own models show that in the states with the highest mercury concentrations, more than 50% of the mercury deposited comes from local sources... as demonstrated in the Florida Everglades, reductions of ionic mercury emissions will show benefits at the local or regional scale within a relatively short period of time.”



Jan 2005 CHPAC Letter (US vs. Global Mercury)

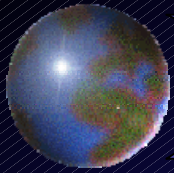
- “While the global contribution of mercury into the US environment is important, it is vital to recognize and address the significant contribution of the largest US source of mercury air emissions, namely coal-fired power plants, to mercury contamination at the local and regional scale in the US.”
- “We should show leadership in applying stringent mercury controls to our own coal-fired power plants and involve the U.S. in technology transfer to improve emissions in other parts of the world.”



Jan 05 CHPAC Letter

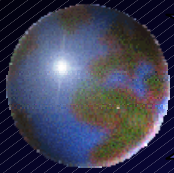
(American Competitiveness)

“We... urge you to recognize that protecting our children from neurodevelopmental damage is a cornerstone of maintaining America's competitiveness, and we request that this be reflected in the issuance of a final mercury standard. By implementing a more stringent and public health-protective standard at home, the US can lead the international community as a model and work to stimulate the necessary global mercury reductions from other industrialized nations.”



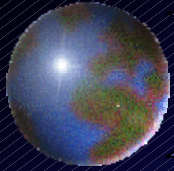
Result of CHPAC Input

- EPA's final health benefits analysis did not reflect input of the CHPAC
- Final rule not strengthened from the original EPA proposal
- CHPAC themes still relevant to state-specific efforts



Themes for State-Specific Decisions

- Mercury is a significant health threat to infants and children
- Children's health experts are calling for more stringent standards
- More stringent reductions on an earlier timetable are achievable
- Hot spots must be addressed and local/ regional mercury contamination warrants action
- Children's health is a part of American competitiveness



For More Information . . .

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Director of Health Programs

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