



# **Proposed Rulemaking: Mercury Emission Reduction Requirements for Electric Generating Units**

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**Department of Environmental Protection  
Commonwealth of Pennsylvania**



# What is Mercury?

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- Naturally occurring element
- Enters the atmosphere through
  - natural events – 1,000 tons per year
  - human activities, such as industrial processes – 4,000 tons per year
- Persistent, bioaccumulative, and toxic



# Types of Mercury

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- Elemental ( $\text{Hg}^0$ ) – residence time in the atmosphere up to 1 year and can be transported over long distances.
- Inorganic ( $\text{Hg}^{++}$ ) – residence time in the atmosphere a few days and deposited near the source.
- Organic (methylmercury) – formed by biological processes after Hg precipitates from air to water.



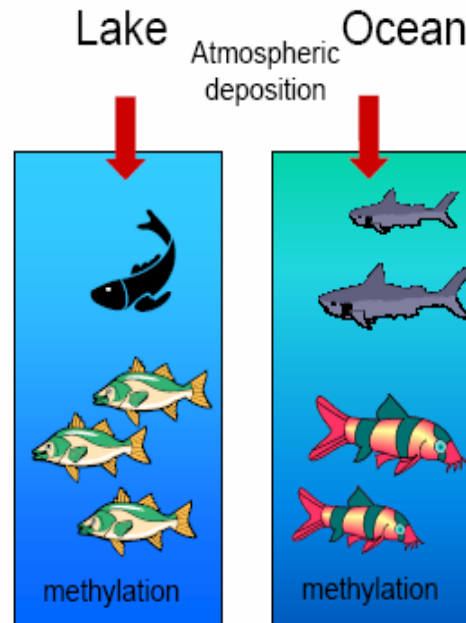
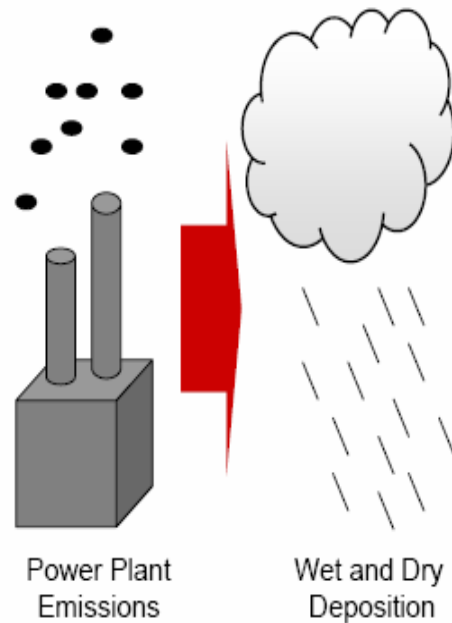
# Health Effects

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- Low dose prenatal methylmercury exposure associated with poor performance on neurobehavioral tests in young children.
- About 480,000 children born in U.S. could have neurological problems because of prenatal methylmercury exposure.
- Methylmercury is also known to be toxic to adults causing permanent damage to the brain and kidneys.



# Mercury Emissions from Power Plants Cause Human Exposure to Mercury



Mercury transforms into methylmercury in soils and water, then can bioaccumulate in fish

Fishing

- commercial
- recreational
- subsistence

Humans and wildlife affected primarily by eating contaminated fish



## Impacts

- Best documented impacts on the developing fetus: impaired motor and cognitive skills
- also: cardiovascular, immune, and reproductive system impacts

Emissions Reductions

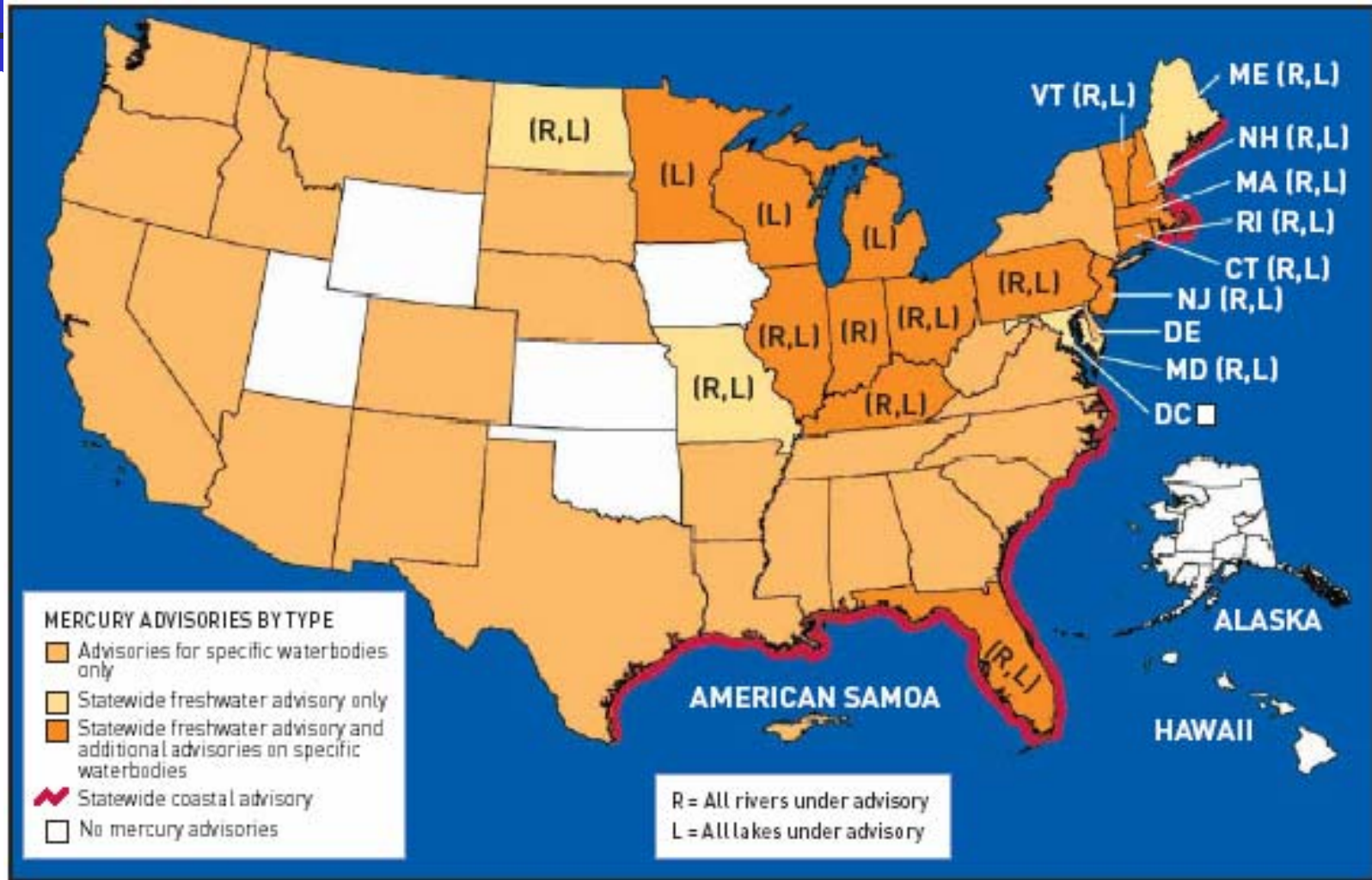
Reduce Atmospheric Transport and Deposition

Reduce Ecosystem Transport and Methylation

Reduce Human and Wildlife Exposure

Reduce Health Impacts

# Fish Advisories Across Nation





# Fish Advisories in PA

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- In Pennsylvania, there are fish advisories for 77 water bodies specific to mercury. These specific advisories are based on the actual mercury content measured in the fish caught in these water bodies.
- Mercury cuts into enjoyment of the outdoors --- an important subject to the 1.8 million anglers who fish in Pennsylvania and add \$1.6 billion to the economy annually.



# EPA's Clean Air Mercury Rule (70 FR 28606)

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- EPA's Clean Air Mercury Rule (CAMR) for new and used existing coal-fired electric generating units took effect on July 18, 2005.
- EPA's CAMR calls for the owners or operators of coal-fired utilities to reduce mercury emissions by 70 percent by 2018, but allows banking and trading.
  - Claims an 86% reduction in mercury emissions by 2018 in PA, again with trading.





# DEP Concerns w/ EPA's Clean Air Mercury Rule, Part I

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- Mercury is a potent neurotoxin with significant adverse environmental and health impacts because of its accumulation in the food chain.
- EPA's final mercury rule does not require the "control technology" approach contemplated under the hazardous air pollutant provisions of Section 112 of the CAA. With trading, "hot spots" around sources may occur.



# DEP Concerns w/ EPA's Clean Air Mercury Rule, Part II

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- Claims of an 86% reduction mercury emissions in PA are overstated. (EPA has been clear that because of banking and trading, mercury reductions will be much smaller and come much later than projected.)
- CAMR disadvantages bituminous, anthracite coals by requiring little or no control of mercury emissions from lignite and sub-bituminous coals.
  - Established the most stringent requirements for new coal refuse burning units.



## Mercury Emissions from Electric Generating Units (EGUs) in PA

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- Approximately 20,000 megawatts of capacity from 78 EGUs at 36 power plants in PA.
- EGUs in PA accounted for:
  - 77% of the more than 5 tons of mercury emitted to the atmosphere from PA sources in 2003.
  - 78.5% of the 4.23 tons of mercury emitted to the atmosphere from PA sources in 2004.
- Based on 2004 Toxic Release Inventory, mercury emissions reported from PA sources were second only to emissions reported from sources in Texas.



# General Principles Related to Draft Mercury Rule Concepts

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- Disallow trading of mercury emission allowances.
- Achieve greater reductions in mercury than EPA's Clean Air Mercury Rule (CAMR).
- Maximize mercury reduction co-benefits from other SO<sub>2</sub> and NO<sub>x</sub> controls in EPA's Clean Air Interstate Rule (CAIR).
- Discourage fuel-switching from bituminous coal.
- Avoid adverse impacts on capacity and reliability of power generation.



# PA's State-Specific Proposal

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- Achieves at least an 80% mercury emissions reduction by January 1, 2010, and at least a 90% reduction by January 1, 2015
  - These emission reductions are nearly 40 percent greater and achieved in less time than under the federal rule.
- Requires all facilities to meet a mercury emissions cap and prohibits system-wide and interstate mercury emissions trading that may create toxic "hot spots."



# PA's State-Specific Proposal

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- Applies to any coal-fired EGU with nameplate capacity of 25 MW or more.
- Enables utilities to meet the state-specific standards without forcing them to use technology beyond controls used to meet other new federal air quality requirements.
  - Mercury-specific controls are not mandated.
- Preserves market share for bituminous coal by presuming compliance for EGUs that burn 100 percent bituminous with advanced air control technologies.



# Emission Standards for Existing EGUs, Phase 1

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- Phase 1: Starting January 1, 2010
  - Pulverized Coal (PC) -fired
    - Output-based standard of 0.024 lb/ gigawatt-hour (GWh) or
    - 80% control efficiency.
  - Circulating Fluidized Bed (CFB)
    - Output-based standard of 0.0058 lb/GWh or
    - 95% control efficiency.



# Emission Standards for Existing EGUs, Phase 2

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- Phase 2: Starting January 1, 2015
  - PC-fired –
    - Output-based standard of 0.012 lb/GWh or
    - 90% control efficiency.
  - CFB –
    - Output-based standard of 0.0058 lb/GWh or
    - 95% control efficiency.





# Emission Standards for New EGUs

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- PC-fired –
  - Output-based standard of 0.011 lb/gigawatt-hour (GWh) or
  - 90% control efficiency.
- CFB –
  - Coal – 0.011 lb/GWh or 90% control efficiency.
  - Waste Coal – Federal NSPS standard (currently 0.0016 lb/GWh ).
- IGCC –
  - Output-based standard of 0.0048 lb/GWh or
  - 95% control efficiency.



# Annual Mercury Emission Limit

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- Provides regulatory assurance that Pennsylvania will meet mercury budgets established by CAMR.
- Establishes annual emission limit, in ounces, for each EGU.
- Establishes identical CFB unit annual emission limits for Phase 1 and Phase 2.



# Emission Standard Requirements for Electric Generating Units

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- Applies on a unit-by-unit basis.
- Allows emissions averaging among the units at a facility.
- Provides for an alternative emission standard/compliance schedule.
- Provides a compliance presumption
  - Phase 1 – Cold-side ESP and wet FGD where EGU is 100% bituminous coal-fired.
  - Phase 2 – Cold-side ESP, wet FGD and SCR where EGU is 100% bituminous coal-fired.



# Annual Emission Limit Compliance Components

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- Allocates non-tradable allowances based on CAMR allocation methodology utilizing the three highest heat input years from 2000-2004.
- Establishes a set-aside for new EGUs
  - Phase 1 - 5% of budget
  - Phase 2 - 3% of budget
- Establishes the same CFB allocation for both phases.
- Allows the owner/operator of an EGU to petition the Department for supplemental nontradable annual allowances.
- Establishes an order of preference for supplemental allowances.



# Additional Requirements

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- Monitoring Requirements
  - Similar to CAMR
- Testing Requirements
  - Similar to CAMR
- Recordkeeping and Reporting Requirements
  - Similar to CAMR



# Environmental Quality Board (EQB)

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- EQB approved the proposal at its May 17, 2006 meeting.
- Three public hearings will be held.
- Notice to be published in the Pennsylvania Bulletin on June 24, 2006
- The comment period closes on August 26, 2006



# EQB Public Hearing Schedule

July 25, 2006 1:00 p.m.	DEP Southwest Regional Office Waterfront A & B Conference Room 400 Waterfront Drive Pittsburgh, PA 15222
July 26, 2006 1:00 p.m.	DEP Rachel Carson State Office Building Room 105 400 Market Street Harrisburg, PA 17105
July 27, 2006 1:00 p.m.	DEP Southeast Regional Office Delaware Room 2 East Main Street Norristown, PA 19401



# Tentative Mercury Rule Timeline

June 2006	Begin public notice period on proposed rulemaking including three public hearings
September 2006	Meet with Air Quality Technical Advisory Committee/Citizens Advisory Council/Mercury Workgroup
September/October 2006	EQB considers final-form mercury regulation
October/November 2006	Regulatory Review Act Procedures
November 17, 2006	Publish final mercury rulemaking and submit State Plan to EPA Region III