

Before the United States Senate
Committee on Environment and Public Works

HEARING ON MERCURY LEGISLATION

Testimony of Vickie Patton
Deputy General Counsel
Environmental Defense Fund

May 13, 2008

Thank you very much Madam Chair and members of the Committee for the opportunity to testify about the *Mercury Emissions Control Act* (S. 2643).

My name is Vickie Patton. I am the Deputy General Counsel at Environmental Defense Fund, a national non-partisan science-based environmental organization, where I manage the national and regional air quality programs. I previously served as an attorney in the U.S. Environmental Protection Agency's Office of General Counsel under the George H.W. Bush and William Clinton administrations where I worked on a variety of Clean Air Act matters.

OVERVIEW

In 1990, the U.S. Congress charted the course for the nation in addressing the most deleterious airborne contaminants. The 1990 Clean Air Act Amendments, forged with strong bipartisan support and signed into law by Republican President George H.W. Bush, pointedly identified mercury as a harmful – indeed hazardous – air pollutant. The statute also singled out power plants, directing EPA to assess the health hazards due to mercury from power plants as a prelude to regulatory action.¹ Coal-fired power plants are the nation's largest source of human-caused mercury emissions.²

Nearly fifteen years later, EPA finalized a national policy for the mercury released by coal-fired power plants. In 2005, EPA announced a policy that recklessly misapplied an emissions trading system to mercury, a bioaccumulative neurotoxin.³ EPA's policy was constructed on an insecure

¹ EPA was instructed to “perform a study of the hazards to public health reasonably anticipated to occur as a result of emissions by electric utility steam generating units” of mercury and other hazardous air pollutants and to report the results of the study to Congress. See Clean Air Act §112(n)(1)(A), 42 U.S.C. §7412(n)(1)(A). EPA was commanded to regulate if appropriate and necessary considering the study of public health hazards. *Id.*

² Northeast States for Coordinated Air Use Management, *Mercury Emissions from Coal-Fired Power Plants: The Case for Regulatory Action*, available at: <http://www.nescaum.org/documents/rpt031104mercury.pdf> (2003); see also U.S. Environmental Protection Agency, *Mercury Study, Report to Congress*, Volume II: An Inventory of Anthropogenic Mercury Emissions in the United States, EPA-452/R-97-004 (Dec. 1997), available at: <http://www.epa.gov/mercury/report.htm>.

³ See 70 Fed. Reg. 15,994 (March 29, 2005) (“Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units from the Section 112(c) List”); 70 Fed.

foundation that EPA declined to buttress with the enduring pillars of science, technology and law.

EPA disbelieved the potential for mercury discharged by power plant smokestacks to contribute to serious impacts in surrounding communities and glossed over the pointed concerns about mercury hot spots raised by the Agency's own Inspector General.⁴ But landmark field studies have inextricably connected the mercury released from coal-fired power plants with deposition hot spots and with biological hot spots.

EPA was skeptical about the availability of advanced mercury control technology. But today engineering firms have contracted to install advanced mercury control systems at about 90 coal-fired power plants encompassing over 40,000 megawatts in electric generating capacity. The coal plants deploying advanced mercury removal systems combust the full range of coal types and operate in all parts of the nation.⁵

And EPA construed the law to remove coal plants from the carefully woven textual fabric designed to protect human health from each large source of hazardous air pollution. But in February the federal court of appeals in Washington, D.C. unanimously found that EPA stretched the law well beyond its elasticity in impermissibly substituting the Agency's desires with Congress' protective directives.⁶

Fortunately, our nation has a dynamic and resilient system of government. While EPA veered from science, technology and law, some states charted a sure and steady course. A number of states have crafted policies to secure considerable reductions at each power plant by establishing protective emissions standards based on advanced mercury removal technologies. These state programs provide a demonstrably firm and stable foundation for federal action.⁷

Today, we respectfully ask Congress to ensure EPA takes prompt corrective action that protects the entire nation from power plant mercury pollution. Forty-eight states have fish consumption advisories for mercury. An extensive and rigorous body of science documents the toxicological effects of mercury on human neurological development, particularly newborns and young children, and on the human cardiovascular system. Fortunately, clean air solutions are at hand. American innovation has once again prevailed over skepticism. Technologies to remove 90 percent or more of the mercury from coal-fired power plants are readily available and cost-effective.

Reg. 28,606 (May 18, 2005) ("Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units").

⁴ EPA Office of Inspector General, *Additional Analyses of Mercury Emissions Needed Before EPA Finalizes Rules for Coal-Fired Electric Utilities*, Report No. 2005-P-00003 (Feb. 3, 2005) ("the proposal does not adequately address the potential for hot spots").

⁵ Institute of Clean Air Companies, *Commercial Electric Utility Mercury Control Technology Bookings* (updated April 21, 2008), available at: http://www.icac.com/files/public/Commercial_Hg_Equipment_042108.pdf.

⁶ *New Jersey, et al. v. EPA*, No. 05-1097 & consolidated cases (D.C. Cir. decided Feb. 8, 2008).

⁷ See National Association of Clean Air Agencies, *State Mercury Programs for Utilities* (Dec. 4, 2007).

But nearly eighteen years after Congress chartered its course for the nation – national policy is far adrift from the science that compels action, from the clean air solutions widely available and from the plain text of the law that instructs each power plant to do its part in maximizing reductions of the most toxic contaminants. Today, we respectfully ask Congress to adopt the Mercury Emissions Control Act and to end the protracted delay in protecting the public’s health from hazardous air pollutants.

MERCURY IS A BIOACCUMULATIVE NEUROTOXIN THAT HARMS HUMAN HEALTH AND THE ENVIRONMENT

Mercury is a toxic heavy metal that contaminates water bodies across the nation, threatens the development of newborns and children, and contributes to the risk of heart disease.

Mercury vented into ambient air deposits from the atmosphere in precipitation or attached particles, and through runoff or deposition can end up in lakes, rivers and the ocean. Toxic methylmercury results from the transformation of mercury by microorganisms in the sediments of water bodies. The methylated mercury readily accumulates in the aquatic food chain with the concentrations increasing at each level in the food chain. According to EPA, the concentrations of mercury and other bioaccumulative contaminants in fish tissue far exceed the concentrations found in the waterbodies: “top predators in a food chain, such as largemouth bass or walleye, may have concentrations of bioaccumulative contaminants in their tissues a million times higher than the concentrations found in the waterbodies.”⁸

Forty-Eight States have Mercury Fish Consumption Advisories

Humans are exposed to methylmercury predominantly through the “[c]onsumption of contaminated fish.”⁹ As of 2006, forty-eight states have mercury fish consumption advisories. A total of 3,080 advisories for mercury have been issued at water bodies across the nation encompassing 14,177,175 lake acres and 882,963 river miles. Thirty-one states have issued statewide fish consumption advisories due to extensive mercury contamination in freshwater lakes or rivers, coastal waters, or marine fish: Alabama, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, New Hampshire, New Jersey, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Vermont, Washington, West Virginia, and Wisconsin.¹⁰

Mercury Threatens the Neurological Development of Newborns and Young Children

Each year approximately 630,000 newborns in the United States are exposed to mercury levels in

⁸ U.S. EPA, 2005/2006 National Listing of Fish Advisories, Fact Sheet, EPA-823-F-07-003 (July 2007).

⁹ Leonardo Trasande, Philip J. Landrigan, and Clyde Schechter, *Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain*, Environmental Health Perspectives, Vol. 113, No. 5 (May 2005).

¹⁰ *Id.*

blood above the levels designed to protect the developing nervous system.¹¹ The neurological effects of mercury include documented impairments “in ability to use language, to process information, and in visual/motor integration.”¹²

The developing brain of infants and young children is distinctly vulnerable to exposure of methylmercury:

The vulnerability of the developing brain to methyl mercury reflects the ability of lipophilic methyl mercury to cross the placenta and concentrate in the central nervous system (Campbell et al. 1992). Moreover, the blood-brain barrier is not fully developed until after the first year of life, and methyl mercury can cross this incomplete barrier (Rodier 1995).¹³

The National Academy of Sciences’ National Research Council found that the brain development of infants and young children is threatened by chronic, low-dose environmental exposures to methylmercury:

Chronic, low-dose prenatal MeHg exposure from maternal consumption of fish has been associated with more subtle end points of neurotoxicity in children. Those end points include poor performance on neurobehavioral tests, particularly on tests of attention, fine-motor function, language, visual-spatial abilities (e.g., drawing), and verbal memory.¹⁴

In children, low doses may produce deficits in vision and hearing, delayed walking and speech development, and other developmental delays.¹⁵

Methylmercury Exposure is Also Associated with Adult Heart Disease

The National Research Council assessment of the toxicological effects of methylmercury found evidence of “adverse effects on the developing and adult cardiovascular system (blood-pressure regulation, heart-rate variability, and heart disease)” including potential impacts below neurodevelopmental effects.¹⁶ The National Research Council’s analysis spurred scientific research to examine the potential for cardiovascular effects.

In 2005, an extensive review of studies examining cardiovascular health effects sharpened the focus on the potential connection between adult heart disease and methylmercury exposure. The review determined that the body of available epidemiological studies “suggest an association

¹¹ Kathryn Mahaffey, Ph.D., U.S. EPA, *Methylmercury: Epidemiology Update* (Fish Forum 2004).

¹² U.S. EPA, Methylmercury Exposure at www.epa.gov/mercury/exposure.htm.

¹³ Trasande, et al., *Public Health and Economic Consequences of Methyl Mercury Toxicity to the Developing Brain*, at p. 590.

¹⁴ National Academy of Sciences’ National Research Council, *Toxicological Effects of Methylmercury* (2000), p. 4.

¹⁵ Castoldi, Coccini, Ceccatelli, and Manzo, *Neurotoxicity and molecular effects of methylmercury*, *Brain Res. Bull.*, 55:197–203 (2001).

¹⁶ *Toxicological Effects of Methylmercury* at p. 4.

between MeHg exposure and heart disease, including (but possibly not limited to) AMI [acute myocardial infarction].”¹⁷

MERCURY FROM COAL PLANTS IS ASSOCIATED WITH DEPOSITION HOT SPOTS AND BIOLOGICAL HOT SPOTS

Mercury has a complex fate and transport with both local and far-reaching dimensions. EPA’s policy approach focused on the potential for long-range transport and deposition of mercury, glossing over the potential for local and regional hot spots. Two major field studies, reflecting volumes of data and analyses, have documented the potential for mercury to cause both deposition and biological hot spots.

Scientists at the University of Michigan and EPA conducted an extensive mercury monitoring and source apportionment study to evaluate the potential connection between local and regional coal plants and mercury deposited in the Ohio River Valley. The study was based on a two-year record of mercury deposition monitored in Steubenville, Ohio at the campus of Franciscan University. Seventeen coal plants are located within 100 kilometers of the monitoring site. The study found that local and regional coal plants were the dominant contributor to mercury wet deposition, responsible for an estimated 70% of the mercury deposited during precipitation events:

The results of the multivariate statistical analysis (~70% of the Hg in the wet deposition at Steubenville coal combustion sources), and meteorological analysis (highlighting the importance of local regional sources), consistently point toward the dominant influence by local and regional coal-burning sources.¹⁸

Another major field study examined the potential for biological mercury hot spots, defined as areas with “elevated concentrations of Hg in biota (e.g., fish, birds, mammals) that exceed established human or wildlife health criteria as determined by a statistically adequate sample size.”¹⁹ The study assessed over 7,000 observations of mercury concentrations for seven species including yellow perch and the common loon while also considering factors such as surface water chemistry and land cover.

The Merrimack River watershed was identified as a biological hot spot. Further investigation revealed both the potential for local emission sources to amplify the adverse biological effects of mercury at the hot spot and, conversely, the benefits of measures to reduce emissions from large local sources of mercury. Modeling analysis, for example, suggested “that emissions from coal-

¹⁷ Alan Stern, “A review of the studies of the cardiovascular health effects of methylmercury with consideration of their suitability for risk assessment,” *Environmental Research*, Vol. 98, Issue 1 (May 2005) ps. 133-142.

¹⁸ Gerald J. Keeler, Matthew S. Landis, Gary A. Norris, Emily M. Christianson, and J. Timothy Dvonch, *Sources of Mercury Wet Deposition in Eastern Ohio, USA*, *Environ. Sci. Technol.*, Article 10.1021/es060377q S0013-936X(06)00377-4 (published on web Sept. 8, 2006).

¹⁹ David C. Evers, Young-Ji Han, Charles T. Driscoll, Neil C. Kamman, M. Wing Goodale, Kathleen Fallon Lambert, Thomas M. Holsen, Celia Y. Chen, Thomas A. Clair, and Thomas Butler, *Biological Mercury Hotspots in the Northeastern United States and Southeastern Canada*, *BioScience*, Vol. 57, No. 1 (Jan. 2007) at 29-30.

fired power plants in the study region account for a large fraction of the total Hg deposited in the Merrimack River watershed hotspot.”²⁰ The data also showed biological exposure to mercury “can change rapidly in response to changes in atmospheric emissions and deposition from local and regional sources.”²¹ Protective emission limitations on the mercury from local incinerators substantially reduced overall mercury in the region. The field data revealed “consistency between the timing and magnitude of Hg emissions reductions and the declines in Hg concentrations in common loons, fish, and zooplankton.”²²

Measures to cut mercury in south Florida similarly revealed the close nexus between local sources of mercury and local impacts. Mercury emissions in south Florida were reduced by about 90 percent largely due to effective mercury emission limitations on incinerators. The mercury in the fish and wildlife of the Everglades, in turn, declined by about 75 percent.²³

In Massachusetts, a multi-year monitoring program found that mercury concentrations in yellow perch and largemouth bass declined substantially. The monitored changes were consistent with substantial reductions in mercury pollution from several local incinerators.²⁴

Field studies demonstrate that mercury emissions, deposition and bioaccumulative effects can have a cascade of local impacts. Conversely, empirical data show that measures to reduce nearby sources of mercury pollution can secure rapid, real-world results in cooling hot spots, and protecting human health and the environment.

EPA TRAMPLED SCIENCE AND LAW IN APPLYING AN EMISSIONS TRADING POLICY TO THE TOXIC MERCURY POLLUTION FROM POWER PLANTS

In 2005, EPA put in place a fundamentally misdirected trading system for the mercury from coal-fired power plants. Environmental Defense Fund has long been a proponent of properly designed emissions cap-and-trade policies. When properly applied and well-designed, such market-based measures can secure important and robust results through a flexible and highly cost-effective trading system.

But such policies must be properly applied. Mercury is toxic. The health effects of mercury can be potent, impairing brain development and contributing to heart disease. Mercury also bioaccumulates. Mercury pollution that deposits locally not only has the potential for hazardous local effects but its toxic properties can be magnified and amplified through bioaccumulation. Finally, extensive field studies have directly associated mercury from coal-fired power plants and other large industrial sources with surrounding hot spots.

²⁰ *Id.* at p. 41.

²¹ *Id.* at p. 38.

²² *Id.* at p. 39.

²³ Florida Dept. of Environmental Protection, *South Florida Mercury Science Program*, available at: <http://www.dep.state.fl.us/labs/mercury/index.htm>.

²⁴ Massachusetts Dept. of Environmental Protection, *Freshwater Fish in Mass. Lakes Show Reductions in Mercury*, available at: <http://www.mass.gov/dep/public/publications/mercury.htm>.

To effectuate its flawed cap-and-trade policy, EPA wrenched the regulation of mercury for coal plants out of the Clean Air Act's distinct protections for toxic contaminants and endeavored to shoehorn its policy into another Clean Air Act program. EPA's misguided and strained approach was unanimously rejected by the federal court of appeals in Washington, D.C.²⁵

EPA's application of a trading system to toxic mercury pollution has been opposed by some of the nation's leading medical and public health organizations. The American Public Health Association, the American Nurses Association and the American Academy of Pediatrics were compelled to take the unusual step of joining the lawsuits against EPA's action.²⁶ The American Medical Association adopted a resolution finding that EPA's rule "is inconsistent with the AMA's health-protective approach to air pollution."²⁷

STATE LEADERSHIP AND TECHNOLOGICAL INNOVATION PROVIDE THE FOUNDATION FOR PROTECTIVE NATIONAL STANDARDS

While EPA veered recklessly in addressing the mercury pollution from coal plants, many states took protective action. The National Association of Clean Air Agencies has compiled information on the status of state mercury pollution control programs.²⁸ The summary shows that a number of states have adopted programs that require substantial mercury reductions.

These more protective state policies have spurred deployment of advanced mercury control technology.²⁹ By contrast, during the course of its national rulemaking, EPA repeatedly rejected claims that advanced mercury control systems were available. While federal policy has floundered, state policy leadership to protect human health has propelled technological innovation.

CONCLUSION

Coal-fired power plants are the nation's single largest source of anthropogenic mercury. Today, nearly eighteen years since the passage of the 1990 Clean Air Act Amendments, EPA has failed to address mercury and other toxic air contaminants from coal plants. EPA's failure to craft a protective program based on science, technology and law has imposed a heavy burden on human health.

The National Research Council's assessment of the toxicological effects of methylmercury found that young children bear the highest health risks:

²⁵ *New Jersey, et al. v. EPA*, No. 05-1097 & consolidated cases (D.C. Cir. decided Feb. 8, 2008).

²⁶ Bridget M. Kuehn, *Medical Groups Sue EPA Over Mercury Rule*, *Journal of the American Medical Association* (July 27, 2005) at p. 415.

²⁷ American Medical Association, Report 1 of the Council on Science and Public Health (I-06), *Mercury Pollution* (Nov. 2006), available at: <http://www.ama-assn.org/ama/pub/category/17010.html#resolution>.

²⁸ National Association of Clean Air Agencies, *State Mercury Programs for Utilities* (Dec. 4, 2007), available at: <http://www.4cleanair.org/Documents/StateTable.pdf>.

²⁹ Institute of Clean Air Companies, *Commercial Electric Utility Mercury Control Technology Bookings* (updated April 21, 2008).

The population at highest risk is the children of women who consumed large amounts of fish and seafood during pregnancy. The committee concludes that the risk to that population is likely to be sufficient to result in an increase in the number of children who have to struggle to keep up in school and who might require remedial classes or special education.³⁰

We respectfully ask that Congress adopt the *Mercury Emissions Control Act* and end the delay in protecting our most vulnerable population from the hazardous airborne contaminants released by coal-fired power plants.

³⁰ National Academy of Sciences' National Research Council, *Toxicological Effects of Methylmercury* (2000), p. 9.