

Dr. Dave: My state (New Jersey) is suing the Environmental Protection Agency (EPA) for its new regulation regarding mercury emissions from power plants. What's the problem? I thought states had authority to limit mercury emissions?

A. First, as always, a little background. Mercury is a neurotoxin. Humans are exposed to it largely from eating fish and seafood.¹ The principal danger is to pregnant or childbearing age women, and children under 6.²

The EPA estimates some 8 percent of U.S. women of childbearing age (16 to 49) have concentrations of at least 5.8 ppb of mercury in their blood, the level at which EPA has identified risks to a fetus.³ EPA's guidelines are based on studies done in the Faroe Islands.⁴ Faroese children with high levels of exposure to mercury in the womb (10 to 20 ppm measured in the mother's hair) were found to have brain damage equivalent to a decline of five or six IQ points (comparable to a seven to eight month developmental delay at age 7), and a slight slowing of the brain's responses to signals.⁵

The typical American mother has about one-tenth the mercury found in mothers of the Faroe children studied. The U.S. Centers for Disease Control estimate that one in 12 U.S. babies (about 300,000 annually) are at risk of mercury-related brain damage.⁶

¹ Elemental mercury (e.g. mercury thermometers) and inorganic mercury can be poisonous to humans, but organic mercury is the most common form to which people are exposed. When mercury interacts with bacteria in water, methylmercury is formed. Methylmercury accumulates in fish, then accumulates in animals, including people, who eat fish. The human health risk comes from accumulation rather than a one-time exposure. The body processes mercury over about a year. So even if you go on a fishing trip and eat your catch every night, you may be fine if your total consumption averages out to about 6 ounces per week, per year.

² Consuming large amounts of mercury may be damaging to others, but EPA has not issued consumption guidelines.

³ EPA's current criterion for fish mercury is 0.3 ppm wet weight. The level of exposure to mercury that is expected to be without effect is 0.1 micrograms per kg of body weight per day. In addition to Clean Air Act regulations, mercury is also regulated under the Clean Water Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act.

⁴ The applicability of the Faroe Islands studies has been questioned because a similar study in the Seychelles showed no link between mercury exposure and neurological performance. Studies in New Zealand and Brazil have confirmed the link. See Center for the Evaluation of Risks to Human Reproduction, U.S. National Institute of Environmental Health Sciences, [Mercury](#), April 30, 2004.

⁵ Tests of the children at age 14 found the developmental damage continued. In the late-1980s, the Faroese government began advising women of childbearing age to stop eating whale (which has mercury levels 100 times higher than most fish, and was the primary source of mercury in the Faroese diet.) Faroese women today have one-tenth as much mercury in their systems as in 1986, when the first children in the study were born, putting them on a level with most Americans and Europeans.

⁶ A number of articles discussing the dangers of mercury compare the U.S. situation with that of Minamata in Japan. The situations are not comparable. Mercury levels in fish in Minamata were 30 times higher than those in the U.S. food supply. Mercury concentration levels in Minamata's residents were 45 to 350 times higher than the average U.S. level. For more information about Minamata, see Douglas Allchin, [The Poisoning of Minamata](#).

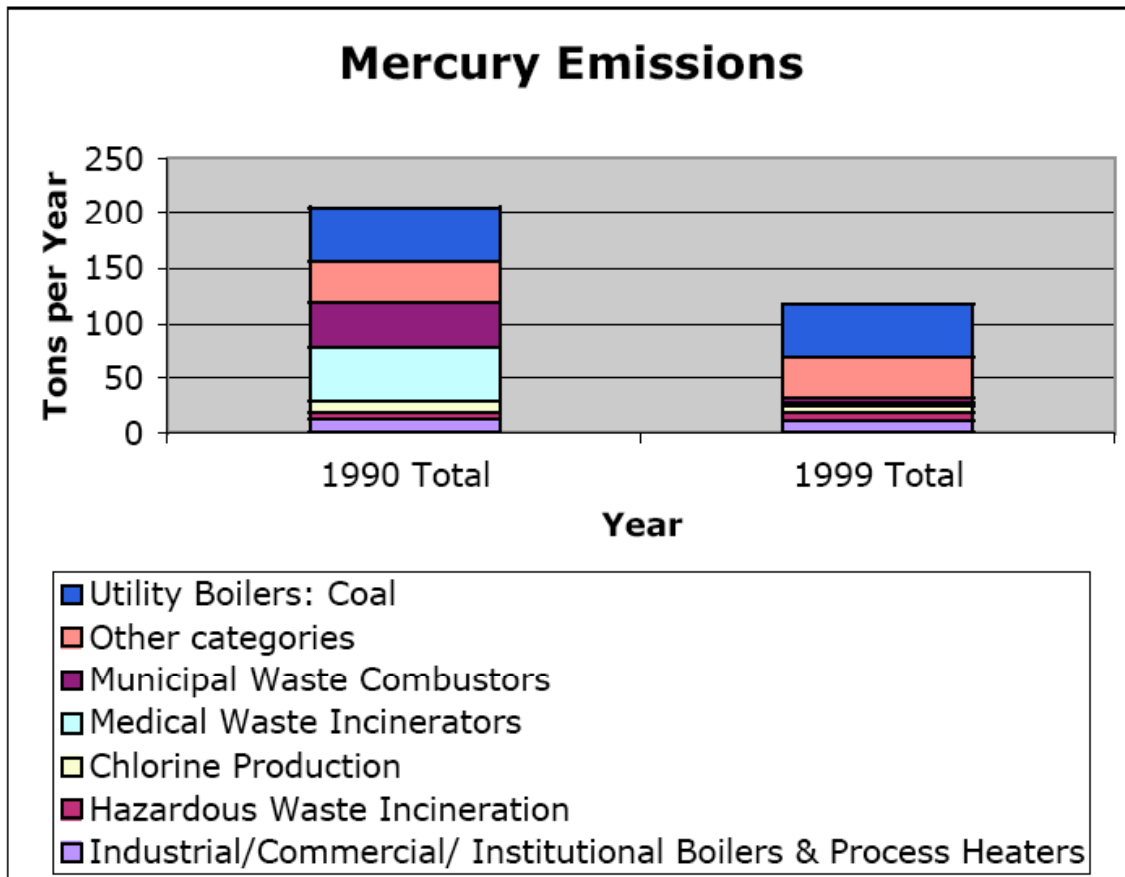
More recent findings from the Faroe Islands study discovered mild negative impacts on IQ from much lower mercury levels.⁷ The researchers modified their threshold for neurological damage to this new, lower level.⁸ About 630,000 children (one in six) are born each year to mothers with blood-mercury concentrations greater than this lower level of 1 ppb.

In the United States there are four major sources of mercury: hazardous waste incineration, medical waste incineration, municipal waste incineration, and coal fired boilers and power plants. Mercury may also leach into groundwater from the disposal of products containing mercury, such as thermometers, electrical switches, some types of batteries, and fluorescent lights.

The U.S. has substantially reduced mercury emissions, from 220 tons in 1990 to 115 tons in 1999. This was largely a result of restrictions on mercury emissions from waste incineration enacted by the EPA in the 1990s. Mercury emissions from this source alone dropped from 57 tons in 1990 to 6 tons in 2000. Medical waste emissions have been reduced by 95 percent from 1990 levels, from about 11.5 tons to about 2.5 tons annually.

⁷ Effects were noticed when concentrations were from 1 to 10 ppm in the mother's hair at pregnancy. The impact was a reduction of about 1.5 IQ points (comparable to a one to two month delay in vocabulary development) for each doubling of mercury.

⁸ See Drs. Richard Clapp and Philippe Grandjean, [Health Effects of Seafood Contamination With Methylmercury in the Faroes](#), Mississippi Alabama Sea Grant Consortium, Mercury Forum, May 21-22, 2002; and [Written Testimony of Philippe Grandjean](#) at the Mercury MACT Rule Hearing, Maine State House, Augusta, March 1, 2004.



Changes in Mercury Emissions by Source Categories. (Middleton, 2003)

Coal-fired power plants are the only major source for which emissions are not declining. As a result they comprise an ever-greater proportion of overall mercury emissions, rising from 20 percent in 1990 to over 40 percent today (48 tons).⁹

The current controversy

In the last few weeks of the Clinton Administration, the EPA declared mercury a hazardous air pollutant that should be regulated under the “maximum achievable control technology” (MACT) standard. In 2004, President Bush’s EPA overturned that decision. Instead the EPA issued regulations that require smaller emissions reductions over a longer period of time than would have been the case under the Clinton Administration’s ruling.

Eight states have filed a lawsuit against the EPA, charging that the failure to regulate power plant mercury emissions using maximum achievable control technology violates the Clean Air Act requirements for regulating hazardous air pollutants. The MACT

⁹ Under the Clinton administration, EPA tried to issue rules regulating mercury from coal fired power plants, but Congress slowed the process. For details see [Media Matters](#).

standard requires that all sources install technology equivalent to that used by the least-polluting 12 percent of the industry.

The Bush EPA Clean Air Mercury Rule establishes a 38-ton mercury emissions limit for coal-fired power plants in 2010, and a 15-ton limit by 2018. (The Energy Information Administration projects that, because of the structure of the cap and trade system, actual emissions will be 40 tons in 2010 and 29 tons in 2025.¹⁰) Virtually all of the mercury emission reductions by 2010 will be achieved as a byproduct of a new rule that requires coal-fired power plants to achieve a 60 percent reduction in nitrogen oxide emissions and a 70 percent reduction in sulfur oxides emissions by 2015.¹¹

Scrubbers used to reduce NO_x and SO_x emissions also reduce mercury emissions. On average, they capture about 40 percent of mercury emissions, but this varies with the type of coal burned and how the scrubbers are used.¹²

The Clean Air Interstate Rule (CAIR) mandates the NO_x and SO_x emissions reductions in 28 states and the District of Columbia.¹³ CAIR is the outcome of an extended dispute between New England and Midwestern states. New England argued that it was impossible for them to achieve federal air quality standards for ozone and fine particulate matter because emissions from Midwestern power plants are carried into the region by air currents.

Relatively few power plants have both NO_x and SO_x removal equipment. Under CAIR they will be required to have both. Scrubbers used to reduce NO_x and SO_x emissions also reduce mercury emissions. The best results come when they are used together – reducing mercury emissions by 80 percent or more in some trials. Some plants run their NO_x scrubbers only in the summer when ozone problems are worst. But as the cap on NO_x emissions drops under CAIR, plants will be required to run scrubbers year round.

CAIR is a cap-and-trade program. Power plants are issued permits for emissions, and as the cap on emissions is lowered, each plant gets permits for fewer units of emissions. They must either reduce their polluting emissions, or purchase permits from other plants that have surplus permits.

EPA does not pre-empt state authority

¹⁰ Energy Information Administration, [Analysis of Clear Skies, Clean Air Planning, and Power Act of 2003](#), May 2004.

¹¹ Nitrogen oxides contribute to ground-level ozone, or smog, and sulfur dioxide causes acid rain. Both contribute to fine particulate soot, which contributes to respiratory ailments.

¹² There is also a relationship between acid rain and the form of mercury that is toxic to humans, methyl mercury. The higher the acidity of water, the faster elemental mercury is converted into methyl mercury.

¹³ See [U.S. EPA, Clean Air Interstate Rule](#) for more information, including a map of affected states.

Both the mercury rule and CAIR allow states to make their own more stringent regulations. This is unusual; for most other emissions governed by the Clean Air Act, only California has the right to enact tougher regulations. Other states may then choose to adopt California's stiffer rules.

EPA's explanation of the mercury rule states: "The new mercury regulations allow states to adopt more rigorous standards. States are not required to adopt and implement the proposed emission trading rule, but they are required to be in compliance with their statewide Hg emission budget...States have the flexibility to meet these State budgets by participating in a trading program or establishing another methodology for Hg emissions reductions from coal-fired electric generating units, as discussed elsewhere in this action. States have the ability to require reductions beyond those required by the State budget."¹⁴

The "statewide Hg emission budget" is the cap on statewide mercury emissions set out in the mercury rule. Although power plants are being allowed to piggyback mercury reductions on NOx and SOx reductions, reductions in state-level mercury emissions are required by 2010. Individual power plants may purchase permits to emit more mercury (which would be a side-effect of increased operations or new construction), but overall each state must be in compliance with its budget. Pennsylvania, for example, must cut its statewide power plant emissions from nearly 5 tons per year recorded in 1999 to 1.78 tons by 2010. Ohio must cut emissions from 3.555 tons in 1999 to 2 tons in 2010.¹⁵

Several states have already enacted their own more stringent restrictions on power plant mercury emissions.¹⁶ In 2003, Connecticut passed a law that will cut the state's coal power plant emissions by up to 86 percent (See Democratic Energy – [Mercury Reductions from Coal Plants – CT.](#)) The same year, Wisconsin passed a bill requiring an 80 percent reduction by 2018. Massachusetts is requiring a 95 percent reduction from 2000 levels by 2012. In the weeks following the announcement of the federal rule, New Hampshire's Senate enacted a bill that requires the state's two coal-burning plants to achieve an 89 percent reduction in emissions by 2013 and stops them from achieving this by purchasing emission offset permits from out of state utilities.¹⁷

How large are out-of-state mercury emissions?

A number of critics of the EPA proposal argue that even if states reduce their in-state mercury emissions, they will still be subject to emissions coming from other states and therefore more rigorous EPA rules are needed. That is true in some places, but in many mercury "hot spots" (places with high levels of mercury accumulation) 50 to 80 percent

¹⁴ U.S. EPA, Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, Preamble, March 15, 2005.

¹⁵ U.S. EPA, Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, Preamble, page 90.

¹⁶ Wisconsin's law includes a provision that requires compliance with the federal mercury emissions law for power plants. The state will either have to water down their mercury standards to meet the federal standards,

¹⁷ U.S. EPA maintains a list of [mercury legislation and regulations enacted in the states.](#)

is generated locally. Of the states with the highest deposition, 9 received more than half the mercury from in-state sources; 14 of the 16 received more than 40 percent from in-state sources.¹⁸

Local emissions reductions can have a significant impact on local accumulations of mercury. Tighter regulations of medical and municipal waste incineration reduced Florida's total estimated local mercury emissions by 91 percent from 1991 to 2000. Concentrations of mercury in Florida's fish and wading birds decreased 60 to 75 percent from 1993 to 2000. "These data strongly suggest that local reductions of mercury yield reductions in mercury concentrations in local biota," concludes one study done for Environmental Defense.¹⁹

Findings from the Everglades might not be universally applicable because of its unique environment, but preliminary findings from the Wisconsin Department of Natural Resources confirm its results. An ongoing study has shown parallel decreases in mercury deposition, water concentration, and fish tissue concentrations between 1994 and 2000.²⁰ Recent experiments in Ontario show that mercury recently added to water converts to methylmercury much more quickly than mercury that has been in the sediment for years, indicating that cutting emissions could clean up lake waters relatively quickly.²¹

Global emissions also play a part local accumulation. Studies have found high concentrations of mercury in fish taken from lakes in remote areas with no direct discharges of mercury.²²

EPA estimates that of the 144 tons of mercury deposited²³ in the U.S. in 2001, about half came from sources outside the U.S. In 1997 EPA estimated that only 34 percent came from outside the U.S. Worldwide, emissions from Europe and North America decreased during the 1990s, while emissions from India and China increased by 27 percent and 55 percent, respectively.²⁴ Global human-caused emissions are about 2200 tons annually,²⁵ meaning U.S. emissions currently represent about 5 percent of global human-caused emissions.

¹⁸ Paulette Middleton, *Mercury – A Local Concern/An International Issue*, Panorama Pathways, Prepared for Environmental Defense, December 2003. A 2003 European study found that in Europe as well, local sources account for more than half the mercury deposited in countries like Germany, Poland, and Greece.

¹⁹ Science, January 2, 2004.

²⁰ Wisconsin DNR, Bureau of Air Management, [Wisconsin Regulations for Controlling Mercury Emissions from Electric Utilities](#), February 2005.

²¹ Science, January 2, 2004.

²² EPA 1997, Fitzgerald et al 1998.

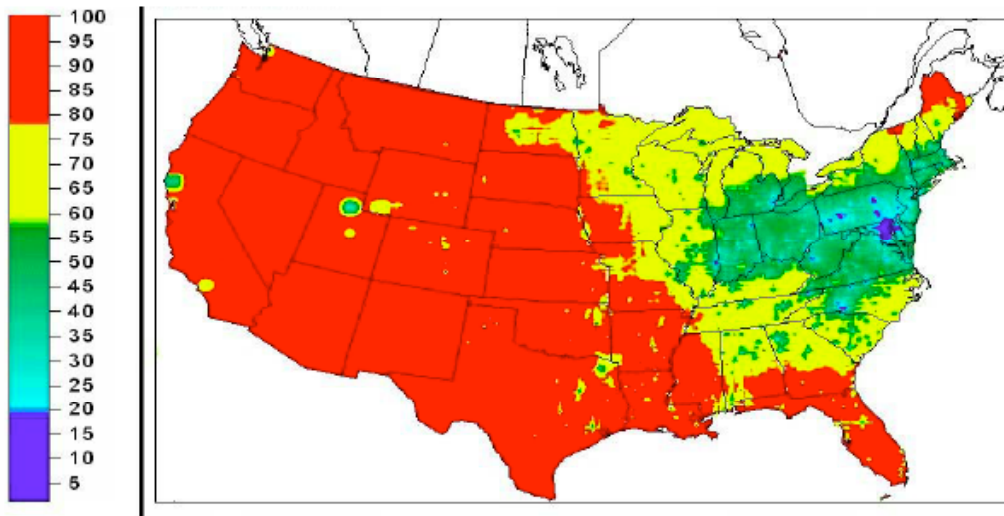
²³ Note that this figure is for depositions rather than emissions.

²⁴ Ibid.

²⁵ Christian Seigneur, *Review of Mercury Emissions*, Global Emissions Inventory Activity, May 25, 2003.

Percent of mercury deposition that originates outside of the U.S.

Source: EPRI



Electric Power Research Institute, referenced in National Rural Electric Cooperative Association, *Mercury Emissions Frequently Asked Questions*, July 2004.

“Given the current scientific understanding of the environmental fate and transport of mercury, it is difficult to quantify exactly how much of the methylmercury in fish consumed by the U.S. population in various parts of the country is the result of U.S. emissions relative to other sources,” writes Paulette Middleton, citing EPA and independent sources in a report prepared for Environmental Defense.²⁶

What is the cost of reducing mercury emissions?

Environmental groups maintain that EPA’s own studies indicate that installing Maximum Available Control Technology (MACT) would reduce mercury emissions from power plants by 90 percent, to about 5 tons annually. They believe this could be done within three years of the regulations taking effect. The National Wildlife Foundation has estimated that the cost to electricity customers would be \$1 to \$3 per household, per month.²⁷

A 1999 analysis by the EPA put the cost at 0.1 to 0.3 cents per kWh (70 cents to \$2.10 per household, per month) for MACT achieving a 70 percent reduction in emissions.²⁸ A January 2005 statement by the Electric Power Research Institute cites similar costs for

²⁶ Paulette Middleton, [Mercury – A Local Concern/An International Issue](#), Panorama Pathways, Prepared for Environmental Defense, December 2003.

²⁷ National Wildlife Federation, [Action Report, February/March 2005](#).

²⁸ U.S. EPA, *Analysis of Emissions Reduction Options for the Electric Power Industry*, April 1999. Figures in 1990 dollars.

the most common mercury-specific control under evaluation, but does not give a specific emissions reduction target.²⁹

In February 2005, the Wisconsin Department of Natural Resources estimated the state's law requiring an 80 percent reduction would cost \$70 per household, per year.³⁰

So what's the bottom line here? Lawsuits will not have a positive impact for many years. We should recall that the mercury rule issued this year is the result of Clean Air Act amendments of 1990. A Congressionally ordered study of the effects of mercury on human health was completed in 1998. The Clinton regulation was issued in December 2000. Even if the Bush administration had not reversed EPA's decision, the deadline for the final rule was not until December 2004. If a lawsuit is successful, the clock on rulemaking may well begin again.

Meanwhile, much can be done at the state level. States can enact their own caps on emissions, as Wisconsin and Connecticut have done. They can remedy other shortcomings of the federal law as well, such as the exemption for power plants with less than 25 MW generating capacity.

While a number of states are moving ahead, many more are not. Remarkably, about one-third of states have hamstrung their efforts by enacting laws that prohibit state regulatory agencies from enacting environmental regulations more stringent than those issued by the federal government.³¹ Some of these laws are very specific; for example, Wisconsin's rule for mercury power plant emissions requires the state to adjust its regulations to match the new federal regulation. Eight states (Maine, Florida, Pennsylvania, Wisconsin, Utah, Montana, Indiana, and Ohio) require an extensive review process for proposed state regulations that exceed federal ones.

Some states prohibit themselves from enacting any environmental laws that exceed federal regulations. States with this bizarre law include Pennsylvania, South Dakota, New Jersey, Ohio, and Tennessee.

Research for this answer was provided by Becca Vargo Daggett, Research Associate, New Rules Project.

²⁹ Electric Power Research Institute, *Frequently Asked Questions About Mercury*, January 2005.

³⁰ Wisconsin DNR, Bureau of Air Management, [Wisconsin Regulations for Controlling Mercury Emissions from Electric Utilities](#), February 2005. The estimate actually puts the cost at \$20 per household and \$100 million annually for the state's four major utilities. I have divided the \$100 million among Wisconsin's approximately 2 million households, on the assumption that the utilities will pass the cost along to consumers.

³¹ For more information about "no more stringent" laws, see the [State Environmental Resource Center](#), an excellent source of information that has been discontinued, sadly, for lack of funding.