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**Testimony of E. Ramona Trovato**  
**U.S. Environmental Protection Agency**  
**to the**  
**Committee on Government Reform**  
**U.S. House of Representatives**

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**Introduction:**

Good Morning. I am Ramona Trovato, Director of the Office of Children's Health Protection in the U.S. Environmental Protection Agency and I want to thank you, Chairman Burton, Ranking Member Waxman, and members of the Committee, for inviting me to talk about mercury.

**What is EPA's Role?**

EPA has authority to address releases of mercury to the environment, including its presence in our air, water, and soil. EPA undertakes both regulatory and non-regulatory actions to reduce the release of mercury to the environment and thus, the human health consequences of mercury exposure. EPA does not have regulatory authority over vaccines, and Section 3(2)(B)(vi) of the Toxic Substances Control Act (15 U.S.C. 2602(2)(B)(vi)) specifically excludes drugs from the definition of "chemical substance."

**What is Mercury?**

Mercury is an element and, as such, it is neither created nor destroyed. The same amount of mercury has existed since the earth was formed. As a naturally occurring metal, mercury takes several forms: elemental, inorganic, and organic. Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts" which are usually white powders or crystals. Mercury also combines with carbon to form organic mercury compounds. Methylmercury is the form of organic mercury in the environment, while an ethylmercury salt (thimerosal) has been used as an additive to biologics and vaccines since the 1930's to combat bacterial contamination. The scientific community knows a lot about the human health and ecological effects of mercury and mercury exposure, and has agreed, in spite of remaining scientific uncertainties, that mercury, in certain forms and levels of exposure, is an important human health and environmental problem.

Mercury has long been known to have toxic effects on the nervous systems of humans and wildlife. Inorganic mercury enters the air from coal and waste combustion, industrial plants, and from mining ore, and is then transported through the air finally being deposited on land and in waters. As previously noted, mercury persists in the environment. In water, elemental

mercury may be biotransformed through the action of bacteria into methylmercury which is a more toxic and bioaccumulative form. Methylmercury can bioaccumulate in predatory fish and marine mammals to concentration levels that are hundreds of thousands of times higher than concentrations in surrounding waters. People who routinely consume large amounts of contaminated fish or consume fish with relatively high levels of methylmercury are at risk of adverse effects. Fetuses exposed to methylmercury through their mother's consumption of contaminated fish may be at risk of adverse effects because the developing nervous system is more vulnerable to mercury toxicity.

### **What are the Health Effects of Mercury?**

Methylmercury is toxic to adults, children, and the fetus. Both prenatal and postnatal exposures can adversely affect the nervous system. Among adults, methylmercury can produce neurological damage ranging from fatalities at high doses to effects including neurological damage only identifiable through specialized clinical testing (e.g., visual field evaluation, neuromotor dysfunction) at low doses.

Some recent large epidemiological studies of children have identified cognitive deficits as a result of *in utero* methylmercury exposure, including impairment in attention, language processing, and memory.

Fetal nervous system development is a particularly vulnerable period that may be adversely affected by methylmercury exposure. Many of the same biological events that occur in the fetal brain continue postnatally in children. Specifically, methylmercury impairs migration of neurons, synapse formation, and myelination, processes that occur both prenatally and postnatally. Susceptibility to the developing fetus has been demonstrated by the fact that in several mercury poisoning incidents worldwide, minimally affected mothers gave birth to severely affected infants. Thus, EPA concludes developing fetuses are more vulnerable to methylmercury toxicity than adults.

Delayed neurotoxicity from methylmercury exposure is also a concern. Data from both human and animal models reveal an interaction between earlier methylmercury exposure and impaired function during aging. For example, data from Japan (the site of severe poisoning episodes in the 1950s and 1960's in Minamata and Niigata), found that people with earlier methylmercury exposure experienced a greater likelihood of being unable to independently care for themselves including the ability to dress, bathe, and use the toilet independently. There is a plethora of potential effects ranging from intellectual deficits to sensory and motor impairment that may result from methylmercury exposure during different phases of life.

### **How are we Exposed to Mercury?**

Concentrations of mercury in air and water are usually low and of little direct health concern. Once mercury enters water, either directly or through air deposition, it may be converted to methylmercury and, as such, can bioaccumulate in fish and animal tissue. As a result of this bioaccumulation, the concentration of mercury in predators at the top of the food

web (for example, predatory fish and fish-eating birds and mammals) is a cause for both human health and ecological concern.

Human exposure to methylmercury occurs primarily through eating contaminated fish. The amount of mercury that people are exposed to depends on the species of fish consumed, the concentration of the methylemercury in the fish, and how much and how often they eat fish.

Seafood is an important part of a healthy, balanced diet for everyone. While most U.S. consumers need not be concerned about their exposure to methylmercury, some exposures may be of concern. Those who regularly and frequently consume large amounts of non-commercial fish -- either marine fish that typically have much higher levels of methylmercury than the rest of seafood, or freshwater fish that have been affected by mercury pollution -- may be more highly exposed. Certain populations, such as pregnant women and their fetuses, may be at risk, if they consume large amounts of contaminated fish, or fish with relatively high levels of methylmercury.

### **What are the Sources of Mercury?**

Global mercury emissions from all sources (natural and anthropogenic) are estimated to be about 5,000 to 5,500 tons per year (tpy). Of this total, approximately 1,000 tpy are estimated to be natural emissions, which result from the mobilization or release of geologically bound mercury by natural processes such as volcanos. Approximately 2,000 tpy are estimated to have originated from past anthropogenic activity, while current anthropogenic emissions account for the remaining 2000 tpy.

Mercury released to the environment via the atmosphere may be transported, then deposited onto soil and water. Such emissions can be anthropogenic, natural or re-emitted emissions. Table 1 presents annual U.S. emissions from the largest categories of anthropogenic sources.

**Table 1\*      Estimated Annual National Emissions of Mercury to the Air from the Largest Anthropogenic Sources; 1994 -1995**

<b>Source Category</b>	<b>Tons Per Year</b>	<b>Percent of Total</b>
Utility boilers-coal combustion	52	32.6
Municipal waste combustors	29	18.7
Medical waste incinerators	16	10.1
Chlorine production	7	4.5
Hazardous waste incineration	7	4.4
Portland cement, excluding hazardous waste-fired	5	3.1

\*1997 Mercury Study Report to Congress

The Agency does not have national estimates for mercury releases to water. However, water discharge permits generally require monitoring for mercury before discharge and we anticipate these releases to be low relative to air emissions.

While the Agency does not have comparable inventories at this time, there is enough information to say with confidence that emissions have decreased from some categories since 1990. Incineration emissions (especially from MWCs and MWIs) have decreased considerably because of reduced mercury content of batteries, pollution prevention activities, state regulations, and the early impacts of federal regulation (i.e., early compliance, and shutdown of marginal incinerators). Chlor-alkali emissions have also likely decreased because of the decrease in the number of operating facilities (from about 20 in 1990 to 12 in 2000) and the decrease in their mercury use. Utility emissions likely haven't changed much since the amount of coal burned has slightly increased; however, this increase has been partially offset by increased use of control technologies such as scrubbers.

### **What is EPA doing to Reduce Exposure to Mercury in the Environment?**

EPA is taking action to reduce mercury in the environment. These actions include issuing regulations for industries that significantly contribute to mercury releases. To date, EPA has issued standards that limit air emissions of mercury from municipal waste combustors, medical waste incinerators, and hazardous waste combustors. The Agency is developing regulations now for industrial, commercial, and institutional boilers; process heaters; industrial, commercial, and other non-hazardous solid waste combustors; gas turbines; and stationary internal combustion engines; and for chlor-alkali plants. By December 15 of this year, EPA intends to make a finding under the Clean Air Act as to whether it is appropriate and necessary to regulate mercury emissions from electric power plants.

EPA also supports the efforts of state and local governments to achieve mercury discharge reductions through outreach and technical assistance for mercury pretreatment programs at sewage treatment plants.

Releases of mercury compounds must be reported on the Toxics Release Inventory (TRI). Beginning with reports this year (2000), the threshold for TRI reporting of mercury releases has been lowered to capture releases from many more facilities.

EPA is encouraging voluntary efforts to control mercury releases with industry groups such as the American Hospital Association who have agreed to eliminate the use of mercury containing products at their facilities.

Federal, State and Tribal governments publish fish advisories to assure the public's right to know about whether and which fish are safe and in what amounts. To date, there are 1,931 fish consumption advisories in 40 states that have been issued, and ten states have issued statewide advisories for mercury in their lakes and/or rivers. In fact, almost 68% of all advisories issued in the United States are a result of mercury contamination.

The National Academy of Sciences (NAS) report released on July 11, 2000 regarding the toxicological effects of methylmercury reinforces the importance, especially for women who may become pregnant, of heeding consumption advisories for noncommercial fish. The NAS findings also reaffirm EPA's existing guidance to states on the appropriate levels to be used in developing consumption advisories as "scientifically justifiable." While the NAS indicated that the majority of the US population has low risk of adverse effects from current methylmercury exposures, they also indicated that individuals who often consume fish (a primary exposure pathway) with relatively high levels of methylmercury may experience methylmercury exposures close to those that have demonstrated observable adverse effects. They estimated that over 60,000 children are born each year at risk of adverse neurodevelopmental effects (i.e., overall cognitive ability, language development, spatial perceptual skills, and motor skills) due to in utero methylmercury exposure.

Since it was just released, EPA has not yet had an opportunity to review the NAS report and all of its recommendations.

### **Conclusion**

EPA will continue to take steps, both on its own and through partnerships with other federal agencies and the states, to further improve public health, especially for the most vulnerable segments of our population, by reducing releases of mercury in our environment.

Thank you for the opportunity to testify today.