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Tuesday, April 17, 2012

Testimony of
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On behalf of the
American Academy of Pediatrics

**Senate Environment and Public Works Subcommittee on Clean Air and
Nuclear Safety hearing:**

“Review of Mercury Pollution’s Impacts to Public Health and the
Environment”

Good morning. I appreciate this opportunity to testify today before the Committee on Environment and Public Works Subcommittee on Clean Air and Nuclear Safety regarding the child health impacts of mercury pollution in our environment. My name is Jerome A. Paulson, MD, FAAP, and I am proud to represent the American Academy of Pediatrics (AAP), a non-profit professional organization of more than 60,000 primary care pediatricians, pediatric medical sub-specialists, and pediatric surgical specialists dedicated to the health, safety, and well-being of infants, children, adolescents, and young adults. I am the chair of the AAP’s Council on Environmental Health, and I direct the Mid-Atlantic Center for Children’s Health & the Environment, one of 10 Pediatric Environmental Health Specialty Units (PEHSU), in the United States. I am also Professor of Pediatrics at the George Washington University School of Medicine and Health Sciences and Medical Director for National and Global Affairs of the Child Health Advocacy Institute at Children’s National Medical Center in Washington, D.C.

It has been more than 40 years since the Congress first passed the Clean Air Act, which gave the Environmental Protection Agency (EPA) the authority to regulate air pollution. More than 20 years ago, a bipartisan Congress passed the Clean Air Act Amendments of 1990, which granted the EPA new authority and responsibility to improve air quality and mandated the agency reduce mercury and other toxic emissions from our nation’s power plants. Since these laws were enacted, we have learned much about the relationship between air pollution and health through thousands of epidemiologic and controlled studies.^{1,2} Therefore, the Academy was incredibly pleased that the EPA has finally taken these steps to improve children’s health in the new Mercury and Air Toxics Standards (MATS). This new rule will lead to cleaner air for infants, children, families and communities across the United States.

The Clean Air Act has made incredible improvements in the environment, in the health of infants and children, and in the quality of life for all Americans. However, the impacts of the Clean Air Act have not been universally felt. In the last 40 years, we have learned that serious health effects of air pollutants are experienced at levels much lower than previously considered “safe” levels of exposure, particularly for vulnerable populations such as infants, children, the elderly, and individuals with respiratory diseases. In addition, air quality in many areas of the United States has improved, but in some areas it has actually decreased, and millions of Americans still live in areas where monitored air fails to meet EPA standards for at least one of six criteria pollutants. Further action and continued attention are necessary to protect the public’s health against air pollution.

Children Are Disproportionately Impacted By Air Pollution

All aspects of the environment have especially profound effects on children’s health. Children are disproportionately vulnerable to all environmental exposures: they breathe faster than adults, spend more time outside, and have proportionately greater skin surface exposed to the environment. A given dose of a pollutant will have a greater impact on a

child than on an adult not only due to their smaller size, but because of the nature of their growing bodies and minds. At sensitive points in child development, environmental exposures can have especially harmful effects.

Infants and children are among the most susceptible to the adverse effects of air pollution and are far more vulnerable compared to adults for a number of health and developmental reasons. Ambient air pollution has been associated with several adverse birth outcomes. Air pollution has been linked to sudden infant death syndrome and mortality due to respiratory disease in normal birth weight infants,³ with one study demonstrating that nearly one-quarter of deaths were attributable to elevated particulate matter.⁴ Children are also more impacted by air pollution due to their extensive lung growth and development after birth. Eighty percent of alveoli (the part of the lungs where oxygen is absorbed and carbon dioxide is released from the blood) are formed post-natally, and the developing lung is highly susceptible to damage from environmental toxicant exposure during the early post-neonatal period.^{5, 6, 7} Changes in the lungs continue through adolescence as respiratory cells actively proliferate and differentiate during this period of growth and development, creating increased susceptibility to the harmful effects of air pollution’s chemicals and particulates.

Children are exposed to more air pollutants compared with adults because of their higher minute ventilation (the amount of air breathed in or out of the lungs per minute), higher levels of physical activity, and because they spend more time outdoors.^{8, 9, 10} Children in communities with higher levels of urban air pollution and children who spend more time outdoors are likely to have decreased lung function and growth. This means that their lung size and function are stunted for the rest of their lives. This may make them more vulnerable to lung diseases that manifest themselves in adulthood such as chronic obstructive pulmonary disease (sometimes referred to as COPD or emphysema).^{11, 12} The impacts of air pollution have demonstrated health consequences that impose increased health costs across the lifespan.

Mercury Pollution Harms Children’s Health

Coal-fired power plants are the largest human-caused source of mercury emissions in the United States. Power plants that burn fossil fuels release mercury into the air, which then deposits in water. Bacteria in lake, stream, and ocean sediments then convert elemental mercury to organic mercury compounds (methylmercury), which then accumulates in fish moving from low concentrations in smaller fish to higher concentrations in larger fish, and are eventually consumed by humans. Although a person can be exposed to mercury through breathing contaminated air or through skin contact, the most common route of exposure to methylmercury for children over age one year is eating contaminated food, especially large predator fish. The methylmercury content of fish varies by species, size of fish, and harvest location. Large predator fish, such as mackerel king, shark, swordfish and tilefish, have the highest levels of methylmercury, compared to other commonly consumed

seafood. According to the FDA’s monitoring of hundreds of samples of commercial fish and shellfish, tilefish from the Gulf of Mexico have a mean mercury content of 1.5 (µg)/gram (g), swordfish and shark have a mean of about 1 µg/g, and mackerel king contains about .7 µg/g. These levels are high enough for the FDA to warn women and children against consuming these types of fish.

The health impact of mercury is one of the most extensively researched environmental health issues of our time. There is comprehensive scientific research on mercury pollution and its impacts on child health, and the findings over the past four decades have consistently proven that reducing exposure to methylmercury in the environment and mercury pollution in the air improves public health outcomes.

Methylmercury is toxic to the developing brain of the fetus and young child. The damage it causes to an individual’s health and development is permanent and irreversible. The developing fetus and young children are disproportionately affected by methylmercury exposure, because many aspects of development, particularly brain maturation, can be disturbed by the presence of methylmercury. In the developing brain, methylmercury is toxic to the cerebral and cerebellar cortex, causing localized death of nerve cells and destruction of other cells in the brain. Methylmercury interferes with neuronal migration and the organization of brain cells, and layering of the cortical neurons. In utero exposure to low levels of mercury has been associated with subtle effects on memory, attention, and language.

Methylmercury can also damage the kidneys, liver, brain, and nervous system, even in adults. A recent study has also found that methylmercury exposure may lessen the cardiovascular benefits of regular fish consumption. Pregnant women who consume contaminated fish transmit methylmercury to their developing fetuses, and infants can ingest methylmercury in breast milk. There is no evidence demonstrating a “safe” level of mercury exposure, or a blood mercury concentration below which adverse effects on cognition are not seen. Minimizing mercury exposure is essential to optimal child health.

In the last 50 years, there have been two instances of high level methylmercury exposure that have helped researchers understand the impacts of methylmercury on infants and children. First, in Minamata Bay, Japan in the 1950s, a factory discharged large quantities of a mercury catalyst into the bay. As a result, there were 41 deaths and at least 30 cases of profound brain injury in infants born to mothers who ingested contaminated fish during pregnancy.¹³ In the 1970s, grains accidentally treated with a mercury fungicide were eaten by people in Iraq during a famine, resulting in mercury poisoning in hundreds of people.¹⁴ In both the Minamata Bay disaster and the Iraq epidemic, mothers who were asymptomatic or showed mild toxic effects later gave birth to severely affected infants. Typically, infants appeared normal at birth, but went on to develop serious problems such as blindness, deafness, and seizures.¹⁵

In order to better understand the neurotoxic effects of low level methylmercury exposure on the developing fetus and young child, investigators have conducted a number of long-term epidemiological studies in areas around the world among populations that consume fish as significant portions of their diets. In order to assess different studies’ findings, the White House convened a workshop and Congress directed the National Research Council to carry out a study of methylmercury toxicity to provide recommendations on exposure limits in 1998. In 2000, the National Research Council published the study, “*Toxicological Effects of Methylmercury*,” which determined that methylmercury exposure is toxic to the developing brain. The study assessed findings from large-scale epidemiological studies in Finland, Seychelles, New Zealand and other populations to determine a reference value for methylmercury exposure and to assess the health effects of methylmercury exposure, especially neurotoxicity. The report stated that there is a large body of scientific evidence showing adverse neurodevelopmental effects of methylmercury exposure, including well-designed epidemiological studies, and therefore exposure must be minimized and avoided.

Health Care Costs of Mercury Pollution

As a pediatrician, I know that preventive health care is a fundamental investment in the health of all children and preventive health care at a young age can have lifelong impacts. Healthy children are far more likely to grow up into healthy adults. Conversely, children who experience poor health are more likely to suffer from ill health in adulthood. Inadequate attention to preventive health care mortgages the future health and welfare not only of children, but of society itself. Research across a broad range of interventions has shown that preventive health and wellness for children consistently produces a high return on investment. Preventing mercury exposure in children is an extremely effective and economical intervention for promoting lifelong health and reducing long term health costs.

Recent studies have attempted to quantify the health impacts of mercury pollution and the adverse neurodevelopmental effects of methylmercury exposure, especially loss of intelligence. One study assessed the impact on children’s health of industrial mercury emissions and found that between about 300,000 and 600,000 Americans are born each year with cord blood mercury levels above 5.8 micrograms/liter,¹⁶ a level associated with small but significant losses of IQ. The study estimated that these children experience mercury-related losses of cognitive function ranging from .2 to five IQ points.¹⁷ This decrement in IQ is permanent and irreversible.

The study then determined that the resulting loss of intelligence causes diminished economic productivity that persists over the children’s entire lifetime, in an aggregate economic cost in each annual birth cohort of \$8.7 billion.¹⁸ Of this total, approximately \$1.3 billion each year is attributable to mercury emissions from American power plants. In addition, the lifetime excess cost to treat an individual with an intellectual disability is estimated between \$240,000 and \$1.2 million.^{19, 20} Therefore, according to these studies,

the cost to care for individuals experiencing intellectual disabilities as a result of mercury pollution from American coal-fired power plants is \$2 billion every year.²¹ The loss of intelligence resulting from methylmercury consumption and mercury pollution exacts a significant cost on American society and threatens the economic health and security of the United States.

Mercury and Air Toxics Standards

The Academy was extremely pleased with the EPA’s recent efforts to regulate mercury and other toxic gases from coal- and oil-fueled power plants in the new Mercury and Air Toxics Standards (MATS) regulation. These standards are long overdue and will slash emissions of mercury, arsenic, nickel, acid gases and other dangerous pollutants by relying on widely available, proven pollution controls that are already in use at more than half of the nation’s coal-fired power plants. Until now, there have been no national standards that require power plants to limit their emissions of toxic air pollutants, including mercury, despite the overwhelming public health need for such reductions and readily available control technologies.

The EPA estimates that MATS will save approximately 11,000 lives, will prevent 130,000 asthma attacks, 6,300 cases of acute bronchitis, 5,000 heart attacks, 6,000 hospital visits, 540,000 missed days of work or school, and 3.2 million restricted activity days each year. MATS is a commonsense regulation that allows power plants adequate time to adopt the new technologies while also improving people’s health. The EPA estimates the value of the air quality improvements for the public’s health total up to \$90 billion each year. Therefore, for every one dollar spent to reduce pollution from power plants, the American public will see up to nine dollars in health benefits.

We recognize that the new rule will undoubtedly cost money, but not acting would be even more costly—not only in terms of jobs, health care costs, and education, but in human suffering and quality of life. By choosing to invest in preventing mercury exposure, the EPA has demonstrated that their priority is the health of our country and the AAP supports the agency in moving forward with this life-saving regulation.

AAP Recommendations

The AAP recommends in the strongest terms possible that the Clean Air Act should not be weakened in any way that decreases the protection of children’s health. In particular, it is absolutely crucial to the health of our nation’s children that the EPA is allowed to move forward with the MATS regulation and reduce mercury and other toxic emissions from coal- and oil-fueled power plants as scheduled. In contrast to the costs of controlling pollution, which are one-time or short-term expenditures, the costs to treat a child with a developmental disability resulting from mercury exposure recur in every year of that child’s life and in each birth cohort until mercury emissions are reduced. The Academy

encourages Congress to allow the EPA to move forward with this regulation and not impede its progress to improve our nation’s health.

It is also important to note that mercury pollution does not occur alone or in isolation from other toxic emissions. Air pollutants occur in mixtures with different concentrations in different geographic areas throughout the United States. These pollutants interact with each other in the environment in different and sometimes exacerbating ways, and it is less clear how pollutants interact once they enter the human body. In order to promote optimal infant and child health and development, the Academy encourages Congress and the Administration to continue to reduce all air pollutants and address them as a whole, rather than take a piecemeal approach in regulating these serious environmental and health hazards. Further, air quality standards should be drafted or revised to ensure that the most vulnerable groups are protected. Potential effects of air pollution on the fetus, infant, and child should be evaluated and all standards should include a margin of safety for protection of children.

If we fail to protect children against air pollution, we accept the cost of living with and treating preventable birth defects, chronic diseases, and disability among our nation’s infants and children. If we fail to protect children against air pollution, we also accept the cost of permanently diminished health and productivity in adults.

In conclusion, the American Academy of Pediatrics commends you, Chairman Carper and Ranking Member Barrasso, for holding this hearing today. We look forward to working with you to continue to improve air quality and children’s health throughout the country. I appreciate this opportunity to testify, and I will be pleased to answer any questions you may have.

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