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TESTIMONY

before

The Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
of the
U.S. House of Representatives

on the

U.S. Environmental Protection Agency's Proposed Revision of Mercury and Air Toxics Standards for Power Plants

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PHILIP J. LANDRIGAN, MD, MSc, FAAP

DIRECTOR, GLOBAL PUBLIC HEALTH PROGRAM
SCHILLER INSTITUTE FOR INTEGRATED SCIENCE AND SOCIETY
BOSTON COLLEGE

HIGGINS HALL, SUITE 648, 140 COMMONWEALTH AVE, CHESTNUT HILL, MA 02467
TEL: 617-552-8209 FAX: 617-552-2011 EMAIL: PHIL.LANDRIGAN@BC.EDU WWW.BC.EDU

Good Morning,

Madame Chair DeGette, Mr. Ranking Member Guthrie and Members of the Subcommittee on Oversight and Investigations. I thank you for having invited me to appear before you.

My name is Philip J. Landrigan. I am a pediatrician and public health physician. I serve currently as Director of the Program in Global Public Health and the Common Good and Director of the Global Observatory on Pollution and Health at Boston College. I am also a Professor of Biology at Boston College.

From 1985 to 2018, I was a member of the faculty of the Icahn School of Medicine at Mount Sinai in New York City. At Mount Sinai, I was Professor of Preventive Medicine and Pediatrics, Chairman of the Department of Preventive Medicine from 1990 to 2015, and Dean for Global Health from 2010 to 2018. A key responsibility of the Department of Preventive Medicine that I chaired at Mount Sinai is to direct a federally funded program that provides medical treatment and follow-up to over 20,000 of the police officers, firefighters, paramedics, construction workers, and other brave men and women who served as first responders after the attacks on the World Trade Center of September 11, 2001. I am now Professor Emeritus of Preventive Medicine and Pediatrics at Mount Sinai.

For more than four decades, beginning in the early 1970s during my service at the Centers for Disease Control and Prevention I have conducted research in pediatrics and public health, and I have published this research extensively in leading peer-reviewed journals including *The New England Journal of Medicine*, *The Lancet*, and *Environmental Health Perspectives*. My research has focused especially on understanding the impacts of environmental pollutants on children's health. In 2014, I co-edited the first ever *Textbook in Children's Environmental Health*, a volume of 700 pages and 60 chapters, authored by 85 scientists from five continents and published by Oxford University Press. From 2015-2016, I served as co-chair of the Global Committee on Public Health, a body of 51 scientists from countries around the world. Our report, published in *The Lancet* in 2018 found that pollution in all its forms kills 9 million people around the world each year and that air pollution is responsible for at least 6.5 million of these deaths.

I am an elected member of the U.S National Academy of Medicine. I am a Fellow of the American Academy of Pediatrics.

I am a veteran of the United States Public Health Service and of the Medical Corps of the United States Navy. I retired from the Navy in 2006 at the rank of Captain (O-6).

I submitted my full curriculum vitae to Subcommittee staff in preparation for this hearing.

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I appear here before you today to express my strong opposition to the U.S. Environmental Protection Agency's proposed revision of Mercury and Air Toxics Standards (MATS) for Power Plants. If they are implemented, these revised standards will cause disease, disability, shortened life expectancy and premature deaths in many thousands of Americans of all ages, and especially in children. If implemented, these revised standards will produce millions of dollars of economic loss in unnecessary health care costs and productivity losses. If implemented, these revised standards will undermine the security of the United States of America by reducing the health of our nation's citizens and the intellectual capacity of our children, who will be tomorrow's leaders.

Infants and children, including unborn children, are uniquely vulnerable to mercury and particulate air pollution.

All aspects of the environment have especially profound effects on children's health. Children are not little adults; they have more exposure to air pollution than adults because they breathe at a faster rate, have higher levels of physical activity, live closer to the ground and spend more time outdoors.[1] Children's developing organs - in particular the lungs and the brain – are exquisitely sensitive to environmental pollution. A child's lungs are formed before birth and they continue to grow throughout childhood until a child reaches adult height. Pollution exposure during lung formation can result in reduced lung growth. Thus, children who grow up in areas with higher air pollutant levels are likely to have lungs that are significantly smaller when they reach adulthood than children who grow up in less polluted environments.

Children's brains can be injured by small doses of toxic chemicals, like mercury, that appear not to harm adults. During the 9 months of pregnancy and throughout childhood, a child's brain is changing very rapidly, making new cells and establishing new connections between cells. It is this wondrously complex and highly choreographed development that makes a child's brain so powerful, but at the same time so susceptible to damage by toxic chemicals.

Mercury Pollution Harms Children's Health

Mercury occurs naturally in coal. When coal is burned, it releases mercury into the atmosphere. This mercury comes back down to the earth with the rain and snow. Some comes down close to the point of emission, and much of it travels long distance in the atmosphere and eventually enters rivers, lakes and the oceans. There, it is converted into a highly toxic chemical form, methylmercury and enters fish. Methylmercury bioaccumulates in the marine food chain, meaning that levels increase as mercury moves up the food chain and are highest in predatory fish at the top of the food chain such as tuna, swordfish, striped bass, and bluefish whose bodies contain the methylmercury that was present in the many smaller fish that they have eaten. Consumption of contaminated fish is the main route of human exposure to methylmercury. Methylmercury is a potent neurotoxicant that damages the brains of children, both during pregnancy when they are exposed to methylmercury as their mothers consume fish, and later, when they consume fish on their own.

Fetuses, infants, and children who are exposed to methylmercury face impaired neurological development and reduced cognitive abilities, memory, and language skills because of the toxic effects of methylmercury exposure on the developing human brain. These effects can range from mild ADHD and learning disabilities to very severe consequences, depending on the extent of exposure. Pediatricians counsel pregnant women to avoid eating large fish that contain high amounts of mercury, but physician guidance is not enough to protect children. It is the statutory responsibility of the EPA to keep harmful mercury out of the air in the first place so that children are not exposed to it. The Mercury and Air Toxics Standards (MATS) have been essential to that effort, and any weakening of the standards will put children at risk.

Particulate Air Pollution Harms Children's Health

Combustion of coal and oil in power plants releases large amounts of particulates – small airborne particles – into the atmosphere. Particulate air pollution, and especially pollution by fine airborne particulate matter of less than 2.5 microns in diameter, known as PM 2.5 pollution, is especially dangerous because fine particulates are small enough to enter deep into the lungs and even in some instances to enter the blood stream from where they can reach every organ of the human body and cause injury.

PM 2.5 air pollution has been shown through multiple clinical and epidemiological studies to cause disease, disability and death across the lifespan. In adults and children, PM 2.5 air pollution causes low birth weight and prematurity as well as pneumonia, bronchitis and asthma.[2] It also slows growth of the developing lungs.[3] In adults, it contributes to heart disease,[4] stroke, cancer, asthma, chronic obstructive pulmonary disease, diabetes, allergies, eczema, and skin aging[5]. There is growing evidence that air pollution contributes to dementia in older adults [6] and affects brain development in children.[7]

Air Pollution Standards in the United States are an EPA Success Story

The Clean Air Act was passed by the Congress in 1970 and was signed into law by President Richard M. Nixon. It has subsequently been amended and strengthened by both Republican and Democratic administrations. Throughout its nearly

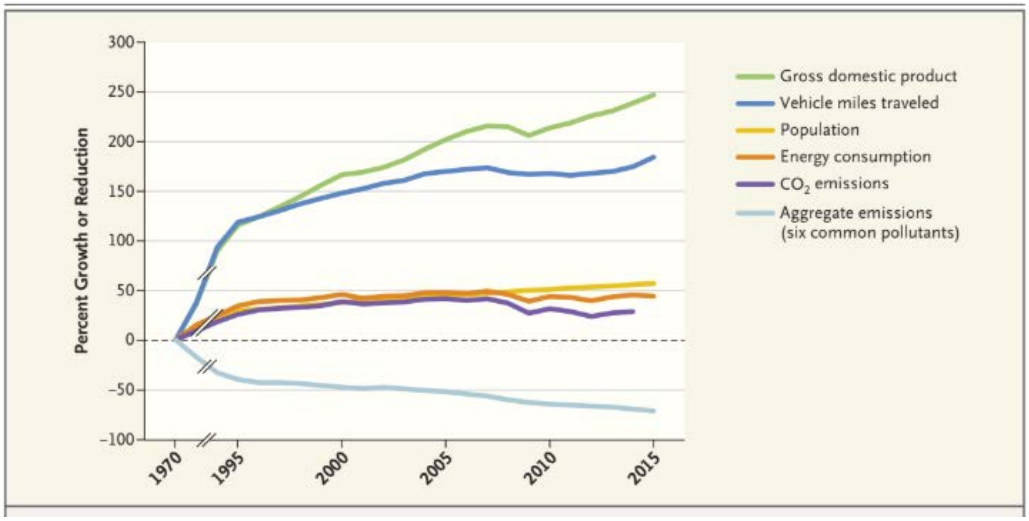
50 years of existence, the Clean Air Act has been guided by science. Permissible levels of pollutants in air have periodically been revised downward as new science has repeatedly shown that pollution levels previously considered to be "safe" were, in fact, not protective of human health and especially of children's health.

Since passage of the Clean Air Act in 1970, and despite an increase of more than 50% in the U.S. population, there has been a 70% reduction in emissions of criteria air pollutants (Fig. 1), and an increasing number of lives have been saved each year (160,000 in 2010).[8]

And contrary to the often-repeated claim that pollution prevention stifles economic growth, the GDP of the United States has increased by nearly 250% during these years in which our country was reducing air pollution by almost 70%. Substantial emission reductions have also been achieved for nearly 200 other hazardous air pollutants covered by the 1990 Clean Air Act Amendments.

Other evidence-based policy successes related to control of air pollution include a marked decrease in acid rain, with associated health benefits attributable to the associated decrease in fine particles, and reversal of the decline of the stratospheric ozone layer.[9]

Figure 1 Changes in Economic Indicators and Pollutant Emissions, 1970 2015.



Data are from the EPA (https://gispub.epa.gov/air/trendsreport/2016/).

The Mercury and Air Toxics Standards are an EPA Success Story

Prior to 2011, when EPA introduced MATS, only eleven states had implemented mercury emissions standards for power plants. Coal-fired power plants were the largest single source of unregulated mercury pollution in the United States.[10] Since its implementation, MATS has been an incredibly successful public health intervention for children. ***Mercury emissions from U.S. coal-fired power plants dropped by 89 percent in the 10-year period from 2007 to 2017 thanks to MATS.***[11]

The reduction of particulate matter and other hazardous air pollutants due to MATS has had tremendous health impacts, which were even greater than earlier estimates of the anticipated benefits. According to EPA estimates, MATS prevents up to 11,000 premature deaths, 130,000 asthma attacks, 4,700 heart attacks, 5,700 hospital and emergency room visits, and 3.2 million days when people must restrict their activities each year.[12] This enormous impact does not even include estimation of the health and economic benefits that will result from prevention of developmental complications caused by

air pollution that will affect children for the rest of their lives. MATS is one of the most important public health protections ever put in place by the EPA to reduce mercury exposure in children.

Weakening MATS will Cause Child Health Consequences

If the MATS air pollution standards are weakened, children will be exposed to increased levels of mercury PM 2.5 as well as to other dangerous air pollutants that have negative consequences for their growing bodies and minds. Other toxics that have been reduced under the MATS standards include carcinogens and volatile organic compounds that not only cause immediate harm, but also react to form dangerous ozone smog. Anything less than the full continued enforcement of these standards could result in increased emissions of deadly pollutants, and child health impacts that should have been prevented under these fully implemented safeguards.

Weakening MATS Will Increase Health Care Costs, Cause Productivity Losses and Damage the American Economy

The damages to human health caused by methylmercury and PM2.5 particulate pollutants are extremely costly. Disease and disability caused by these two forms of pollution increase health care costs, and many of these costs fall on state and federal budgets. These diseases and disabilities also cause productivity losses now and in the future through reducing children's intelligence, undermining health, and shortening the life span of economically productive adults.

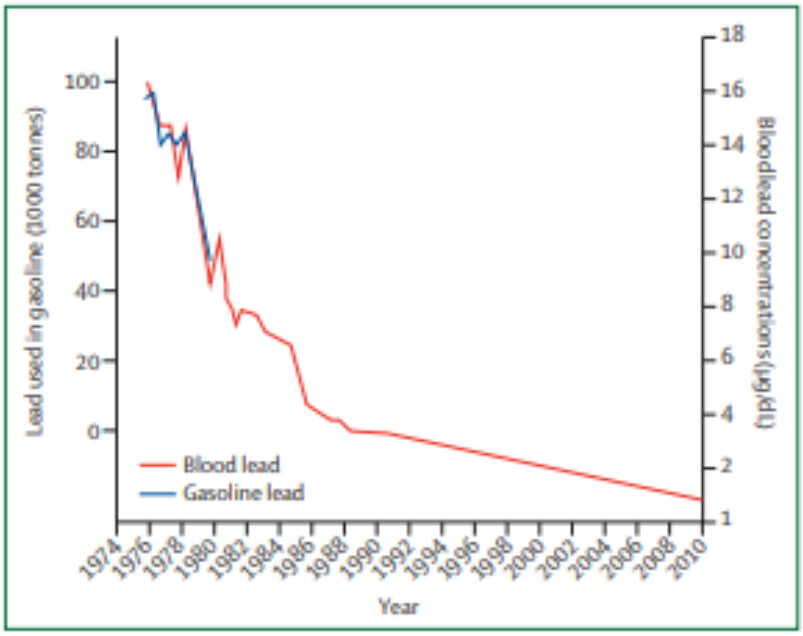
A 2011 analysis by my colleague Leonardo Trasande MD, estimated that methylmercury toxicity in American children costs this country an estimated $5.1 billion per year (range of estimates = $3.2 – 8.4 billion). Most of those costs are in the form of productivity losses in children whose intelligence and thus their creativity and economic productivity will be reduced across their entire lifetime by methylmercury exposure in early life. Of this total, $1.3 billion (range, $0.1-6.5 billion) each year is attributable to mercury emissions from American power plants.

This same analysis by Trasande found that illness in American children caused by particulate air pollution results in costs of $2.2 billion per year (range of estimates = $0.7 billion – 2.5 billion).

A further analysis of the economic benefits of controlling air pollution was produced by EPA itself. This study found that every dollar invested in control of ambient air pollution in the USA since 1970 has not only improved health,[13] but is also estimated to have yielded US$30 in economic benefits (95% CI $4–88), a return on investment of 30:1.[14]

Yet another example of the health and economic benefits of addressing air pollution is seen in the consequences of removing lead from gasoline in the USA. This intervention by EPA began in 1975 and, within a decade, had reduced the mean blood concentration of lead in the population by more than 90% (Fig. 2). Further benefits of this highly successful intervention were that it almost eliminated childhood lead poisoning, and increased the cognitive capacity of all American children born since 1980 by 2–5 IQ points.[15] This gain in intelligence has increased national economic productivity and will yield an economic benefit of US$200 billion (range $110 billion–300 billion) over the lifetimes of each annual class of children born since 1980,[16] an aggregate benefit to-date of over $6 trillion.[17,18]

Figure 2 Correlation between population mean blood concentration of lead and lead use in gasoline in the USA, 1974-1991



Taken from data that is publicly available from the Centers for Disease Control.

An important footnote to the story of removal of lead from gasoline is that in 1982 Anne Gorsuch, then EPA Administrator, proposed to put lead back in gasoline. That effort was rebuffed by a courageous Congress. [19]

Conclusion

Regulating hazardous air pollutant emissions from power plants is appropriate and necessary to protect the health of all Americans, and especially the health of America's children. The Mercury and Air Toxics Standards prevent brain injuries, protect children's lungs and save lives. Without strong protections in place, America's children will disproportionately bear the burden of disease caused by pollutants emitted by power plants. Moreover, protecting America's children against air pollution benefits the economy of our country and enhances the present and future security of the United States of America.

I urge the EPA to maintain these critical standards, and oppose any weakening of the MATS rule.

Thank you.

References

1.Landrigan PJ (Chair): Pesticides in the Diets of Infants and Children. Committee on Pesticides in the Diets of Infants and Children. Board on Agriculture, and Commission on Life Sciences. National Research Council. Washington: National Academy Press, 1993.

2. McConnell R, Berhane K, Gilliland F, Molitor J, Thomas D, Lurmann F, Avol E, Gauderman J, Peters J. Prospective study of air pollution and bronchitic symptoms in children with asthma. *Am J Respir Crit Care Med*. 2003; 168: 790–797. [PubMed: 12893648]

3. Gauderman WJ, Urman R, Avol E, et al. Association of improved air quality with lung development in children. *N Engl J Med* 2015; 372: 905–13

4. Hoek G, Krishnan RM, Beelen R, et al. Long-term air pollution exposure and cardio-respiratory mortality: a review. *Environmental Health* 2013 ;12(1):43. Available from: https://doi.org/10.1186/1476-069X-12-43

5. Krutmann J, Bouloc A, Sore G, Bernard BA, Passeron T. The skin aging exposome. *Journal of Dermatological Science* 2017; 85(3):152–61. Available from: http://www.sciencedirect.com/science/article/pii/S0923181116308167

6. Power MC, Adar SD, Yanosky JD, Weuve J. Exposure to air pollution as a potential contributor to cognitive function, cognitive decline, brain imaging, and dementia: A systematic review of epidemiologic research. *NeuroToxicology* 2016; 56:235–53. Available from: http://www.sciencedirect.com/science/article/pii/S0161813X1630105X

7. Suades-González E, Gascon M, Guxens M, Sunyer J. Air Pollution and Neuropsychological Development: A Review of the Latest Evidence. *Endocrinology* 2015; 156(10):3473-82. Available from: https://academic.oup.com/endo/article/156/10/3473/2422751

8. Progress cleaning the air and improving people's health. Washington, DC: Environmental Protection Agency, 2017 (https:/ / www.epa.gov/ clean-air-act-overview/ progress-cleaning-air-and -improving-peoples-health).

9. National Acid Precipitation Assessment Program report to Congress: an integrated assessment. Washington, DC: National Science and Technology Council, 2005.

10. According to a September 2017 story from the U.S. Energy Information Administration tracking the installation of mercury control technology on coal-fired power plants. This file shows that the compliance deadlines were extended to a few plants, but as of April 2017, all should have had controls in place. It includes a graph showing progress in the installation of controls and other details about the reduced mercury emissions. Coal plants installed mercury controls to meet compliance deadlines.

11. U.S. Environmental Protection Agency (EPA), 2019, Tri National Analysis. Mercury Air Releases Trend.

12. U.S. Environmental Protection Agency (EPA), 2011, Mercury and Air Toxics Standards: Healthier Americans.

13. Gauderman WJ, Urman R, Avol E, et al. Association of improved air quality with lung development in children. *N Engl J Med* 2015; 372: 905–13.

14. US Environmental Protection Agency: Office of Air and Radiation. The benefits and costs of the Clean Air Act from 1990 to 2020. April 2011. https://www.epa.gov/sites/production/files/2015-07/ documents/fullreport_rev_a.pdf (accessed March 30, 2017).

15, 16. Grosse SD, Matte TD, Schwartz J, Jackson RJ. Economic gains resulting from the reduction in children's exposure to lead in the United States. *Environ Health Perspect* 2002; 110: 563–69.

17. Pirkle JL, Kaufmann RB, Brody DJ, Hickman T, Gunter EW, Paschal DC. Exposure of the U.S. population to lead, 1991–1994. *Environ Health Perspect* 1998; 106: 745–50.

18. Annest JL, Pirkle JL, Makuc D, Neese JW, Bayse DD, Kovar MG. Chronological trend in blood lead levels between 1976 and 1980. *N Engl J Med* 1983; 308: 1373–77.

19. Shabecoff, Philip; EPA Chief Assailed on Lead Violation, *New York Times*, April 13, 1982.