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Via Electronic Mail

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Re: Supplemental Comments on "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review," RIN: 2060-AV12, Doc. ID No. EPA–HQ–OAR–2018–0794

Dear Director Sasser and Mr. Hutson:

Thank you to you and your Environmental Protection Agency ("EPA") colleagues for meeting on June 9, 2021 with representatives of the Attorney General's Offices of Massachusetts, California, and New York, along with our public health and environmental organization partners, to discuss EPA's review of the final action entitled "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review," 85 Fed. Reg. 31,286 (May 22, 2020) ("Revised Finding"). We appreciated the opportunity to discuss the significant and continuing public health, environmental, and economic benefits of the national hazardous air pollutant emissions limitations for power plants, commonly known as the Mercury and Air Toxics Standards or "MATS Rule," 77 Fed. Reg. 9304 (Feb. 16, 2012), and the urgent need for EPA to reverse its unlawful Revised Finding.[1]

As we mentioned at our meeting, compliance with the MATS Rule has generated enormous reductions in hazardous air pollutant emissions that are vital to protecting public health and the environment and leveling the regulatory playing field across the country. Power-plant mercury emissions, for instance, declined eighty-six percent between 2006 and 2017, mainly as a result of the MATS Rule and other emissions-control policies. 84 Fed. Reg. 2670, 2689 tbl.4 (Feb. 7, 2019).

As we discussed, a wide array of studies and data published since the MATS Rule was promulgated demonstrate that the Rule's environmental, health, and economic benefits are substantially greater than initially anticipated, and that the costs of the MATS Rule are lower than originally estimated. These data confirm that the MATS Rule's benefits far exceed its costs. For your reference and consideration, below please find a compilation of notable post-2011 sources that are relevant to assessing the benefits and costs of the MATS Rule, including sources regarding: fisheries and aquatic systems, human health and welfare, and compliance costs.

POST-2011 SOURCES RELEVANT TO THE BENEFITS AND COSTS OF THE MATS RULE FOR EPA'S CONSIDERATION

Fisheries and Aquatic Systems

Robert E. Unsworth et al., Industrial Economics, Inc., *The Economic Benefits of the Mercury and Air Toxics Standards (MATS) Rule to the Commercial and Recreational Fishery Sectors of Northeast and Midwest States* (2019), Doc. ID No. EPA–HQ–OAR–2018–0794–1175 Att. 2.

> Concluding that the MATS Rule has reduced mercury loadings to aquatic ecosystems and reduced mercury levels in recreationally caught and commercially harvested fish. "Given the importance of recreational fishing and the commercial fishing and processing sectors to the economies of the Northeast and Midwest, even modest changes in recreator and consumer behavior in response to reductions in mercury concentrations from the MATS Rule are likely to result in substantial benefits to the economies and residents of these states and the Nation as a whole. . . . [I]t is reasonable to conclude that the Rule may generate recreational and commercial fishing benefits in excess of $1 billion *annually*." Finding also that "[t]here are

[1] *See* Comments of the Attorneys General of Massachusetts, et al. on EPA's Proposed "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review," 84 Fed. Reg. 2670 (Feb. 7, 2019) (Apr. 17, 2019), Doc. ID No. EPA–HQ–OAR–2018–0794–1175 (arguing that EPA's action to revise its prior finding that regulation of power-plant hazardous air pollutants is "appropriate and necessary" is unlawful and *ultra vires*).

widely accepted methods that EPA could have used to monetize the benefits of reduced mercury concentrations in recreationally caught and commercially harvested fish. These benefits would include both regional economic performance (including jobs and expenditures) as well as social welfare benefits."

Elsie M. Sunderland, Miling Li, & Kurt Bullard, *Decadal Changes in the Edible Supply of Seafood and Methylmercury Exposure in the United States*, 126(1) Envtl. Health Perspectives 017006-1 (2018), https://ehp.niehs.nih.gov/doi/pdf/10.1289/EHP2644.

Estimating the geographic origins of seafood consumed in the United States and how shifts in edible supply impacted methylmercury exposures. Finding that "[c]oastal ecosystems account for 37% of U.S. population-wide MeHg intake and can be expected to respond to domestic efforts to curb mercury pollution."

Christopher R. DeSorbo et al. *Mercury Concentrations in Bald Eagles Across an Impacted Watershed in Maine, USA*, 627 Sci. of the Total Env't 1515 (2018), https://www.ncbi.nlm.nih.gov/pubmed/30857113.

Finding that bald eagles in interior Maine and in the Catskill Park region of southeastern New York State are commonly exposed to mercury, primarily from atmospheric deposition, at concentrations associated with neurological and reproductive impacts in birds.

Cheng-Shiuan Lee et al., *Declining Mercury Concentrations in Bluefin Tuna Reflect Reduced Emissions to the North Atlantic Ocean*, 50(23) Sci. & Tech. 12,825 (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5161346/.

Finding that mercury concentrations in bluefin tuna from the Northwest Atlantic "declined significantly" at a rate of 19% from 2004 to 2012. The decrease paralleled declining mercury emissions in North America and reductions in North Atlantic atmospheric mercury concentrations, demonstrating connection between efforts to reduce mercury emissions and meaningfully lower mercury concentrations in commercially important fish.

Ford A. Cross et al., *Decadal Declines of Mercury in Adult Bluefish (1972-2011) from the Mid-Atlantic Coast of the U.S.A.*, 49 Envtl. Sci. Tech. 9064 (2015), https://pubmed.ncbi.nlm.nih.gov/26148053/.

Measuring concentrations of total mercury in adult bluefish collected in 2011 off North Carolina and comparing those measurements with similar measurements made in 1972. Finding that mercury levels decreased by 43% between 1972 and 2011, similar to the estimated reductions of mercury observed in atmospheric deposition and aquatic ecosystems over that time. Also citing additional studies conducted between 1973 and 2007 that confirm a correlation between lower mercury levels in bluefish and decreasing U.S. mercury air emissions, and concluding that reduced mercury emissions have likely resulted in reduced human mercury exposures.

Ryan F. Lepak et al., *Use of Stable Isotope Signatures to Determine Mercury Sources in the Great Lakes*, 2(12) Envtl. Sci. & Tech. Letters 335 (2015), https://pubs.acs.org/doi/abs/10.1021/acs.estlett.5b00277.

Identifying three primary sources of mercury in Great Lakes sediment: atmospheric, industrial, and watershed-derived. Findings suggest "that atmospheric sources, rather than contaminated historical sediments, may be an important source of bioaccumulative Hg in Great Lakes fish."

Michael S. Hutcheson et al., *Temporal and Spatial Trends in Freshwater Fish Tissue Mercury Concentrations Associated with Mercury Emissions Reductions*, 48 Envtl. Sci. Tech. 2193 (2014), https://www.ncbi.nlm.nih.gov/pubmed/24494622.[2]

Analyzing mercury concentrations monitored from 1999 to 2011 in largemouth bass and yellow perch in 23 lakes in Massachusetts during a significant period of reductions in local and regional mercury emissions. Finding that average tissue mercury concentration in largemouth bass decreased 44% in most lakes in a regional mercury "hotspot" area, and average tissue mercury concentration in yellow perch in all sampled lakes in the same area decreased 43%. During a similar time period, mercury emissions from major point sources decreased 98% in the hotspot area, and 93% in the rest of the state, demonstrating a correlation between emissions reductions and decreased mercury concentrations in aquatic species.

Paul E. Drevnick et al., *Spatial and Temporal Patterns of Mercury Accumulation in Lacustrine Sediments across the Laurentian Great Lakes Region*, 161 Envtl. Pollution 252 (2012), https://surface.syr.edu/cie/6/.[3]

Analyzing core sediment samples from the Great Lakes and nearby lakes to assess historical and recent changes in mercury deposition. Finding that sedimentary mercury is declining in the region and that "atmospheric Hg deposition appears uniform across the Great Lakes airshed," which "suggests that local and regional sources of atmospheric Hg emissions are important sources of Hg deposition compared to global sources" and "that regional and local controls on atmospheric emissions have been effective in decreasing the delivery of Hg to lakes."

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[2] Exhibit 7, Appendix to Comments of Environmental, Public Health, and Civil Rights Organizations on the Proposed National Emissions Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review, 84 Fed. Reg. 2670 (Feb. 7, 2019) (Apr. 17, 2019) (hereinafter "Comments of Environmental, Public Health, and Civil Rights Organizations"), Doc. ID No. EPA–HQ–OAR–2018–0794–1267.

[3] Exhibit 8, Appendix to Comments of Environmental, Public Health, and Civil Rights Organizations, Doc. ID No. EPA–HQ–OAR–2018–0794–1267.

David C. Depew et al., ***Toxicity of Dietary Methylmercury to Fish: Derivation of Ecologically Meaningful Threshold Concentrations*****, 31(7) Envtl. Toxicology & Chemistry 1536 (2012), https://deepblue.lib.umich.edu/bitstream/handle/2027.42/92130/1859_ftp.pdf?sequence=2&isAllowed=y.**

Finding adverse effects on the reproductive and behavioral health of wild fish populations at low levels of environmental methylmercury exposure.

David C. Depew et al., ***Derivation of Screening Benchmarks for Dietary Methylmercury Exposure for the Common Loon (*****Gavia Immer*****): Rationale for Use in Ecological Risk Assessment*****, 31(10) Envtl. Toxicology & Chemistry 2399 (2012), https://deepblue.lib.umich.edu/bitstream/handle/2027.42/93756/1971_ftp.pdf?sequence=1&isAllowed=y.**

Surveying literature and summarizing effects of dietary methylmercury on the common loon.

Human Health and Welfare Benefits

David G. Streets et al., ***Global and Regional Trends in Mercury Emissions and Concentrations, 2010-2015*****, 201 Atmospheric Env't 417 (2019), http://bgc.seas.harvard.edu/assets/ae-paper.pdf.**

Analyzing global and regional trends in mercury concentrations in the period 2010 to 2015. Finding that U.S. emissions declined during this period.

Vivian E. Thomson, Kelsey Huelsman, & Dominique Ong, ***Coal-fired power plant regulatory rollback in the United States: Implications for local and regional public health*****, 123 Energy Pol'y 558 (2018), https://www.sciencedirect.com/science/article/pii/S030142151830627X.**

Analyzing which U.S. regions benefited from air quality improvements due to the MATS Rule and transport rule by modeling estimated differences between the impacts of pre-regulatory emissions and current emissions on fine particulate matter ($PM_{2.5}$) concentrations and on public health. Finding that annual average $PM_{2.5}$ concentrations are lower by 1–5 μg/m3, and 17,176–39,291 premature mortalities are avoided for each year of lower emissions.

Xue Feng Hu, Kavita Singh, & Hing Man Chan, ***Mercury Exposure, Blood Pressure, and Hypertension: A Systematic Review and Dose-Response Meta-analysis*****, 126(7) Envtl. Health Perspectives 076002 (2018), https://ehp.niehs.nih.gov/doi/10.1289/EHP2863.**

Reviewing 29 studies, covering more than 55,000 participants from 17 countries, and finding a significant positive association between mercury and hypertension and between mercury and blood pressure. Noting that "MeHg is generally considered to be the most toxic form [of mercury] and a dose-response relationship has been proposed between MeHg and cardiovascular outcomes."

Noah Kittner et al., *Trace Metal Content of Coal Exacerbates Air-Pollution-Related Health Risks: The Case of Lignite Coal in Kosovo*, 52(4) Environ. Sci. & Technol. 2359 (2018), https://pubmed.ncbi.nlm.nih.gov/29301089/.

Finding significant trace metal content in lignite coal from Obilic, Kosovo.

Giuseppe Genchi et al., *Mercury Exposure and Heart Diseases*, 14(1) Int'l J. Envtl. Research & Pub. Health 1 (2017), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5295325/pdf/ijerph-14-00074.pdf.[4]

Finding that high levels of methylmercury exposure in adults have been associated with adverse cardiovascular effects, including increased risk of fatal heart attacks.

Philippe Grandjean & Martine Bellanger, *Calculation of the disease burden associated with environmental chemical exposures: application of toxicological information in health economic estimation*, 16(123) Envtl. Health 1 (2017), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5715994/pdf/12940_2017_Article_340.pdf.[5]

Estimating the societal costs of the cognitive deficits associated with methylmercury exposure in the United States amount to approximately $4.8 billion annually.

Ki-Hyun Kim et al., *A Review on the Distribution of Hg in the Environment and Its Human Health Impacts*, J. Hazardous Materials 306 (2016), https://www.ncbi.nlm.nih.gov/pubmed/26826963.

Reviewing the route of mercury exposure to humans, its health impacts, and the associated risk assessment based on recent studies.

Vincent Nedellec & Ari Rabl, *Costs of Health Damage from Atmospheric Emissions of Toxic Metals: Part 2—Analysis for Mercury and Lead*, Risk Analysis 1 (2016), https://pubmed.ncbi.nlm.nih.gov/26992113/.

Estimating the damage cost associated with one kilogram of emitted mercury pollution, with 91% of the cost due to mortality from heart disease and the rest from IQ loss.

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[4] Exhibit 16, Appendix to Comments of Environmental, Public Health, and Civil Rights Organizations, Doc. ID No. EPA–HQ–OAR–2018–0794–1267.

[5] Exhibit 3, Appendix to Comments of Environmental, Public Health, and Civil Rights Organizations, Doc. ID No. EPA–HQ–OAR–2018–0794–1267.

Elsie M. Sunderland et al., *Benefits of Regulating Hazardous Air Pollutants from Coal and Oil-Fired Utilities in the United States*, 50 Envtl. Sci. & Tech. 2117 (2016), https://pubs.acs.org/doi/pdf/10.1021/acs.est.6b00239.

Concluding that the monetized benefits in EPA's 2011 Regulatory Impact Analysis for the MATS Rule underestimated power plants' contribution to local mercury deposition as well as the benefits associated with reductions of power-plant emissions. Concluding also that "as-yet-unquantified benefits to human health and wildlife from reductions in EGU mercury emissions are substantial."

Amanda Giang & Noelle E. Selin, *Benefits of mercury controls for the United States*, 113(2) Proceedings of the Nat'l Acad. of Sci. 286 (2016), https://www.pnas.org/content/pnas/113/2/286.full.pdf.[6]

Projecting that the total economy-wide benefits associated with the continued implementation of the MATS Rule through 2050 would amount to at least $43 billion based on reductions in mercury emissions alone. Providing a dose-response function quantifying the effect of methylmercury exposure on heart attacks.

Yanxu Zhang et al., *Observed Decrease in Atmospheric Mercury Explained by Global Decline in Anthropogenic Emissions*, 113(3) Proceedings of the Nat'l Acad. of Sci. 526 (2016), https://www.pnas.org/content/113/3/526.

Showing that spatial and temporal trends in atmospheric mercury concentrations and deposition are influenced by local and regional actions. "This implies that prior policy assessments underestimated the regional benefits of declines in mercury emissions from coal-fired utilities."

Aisha S. Dickerson et al., *Autism Spectrum Disorder Prevalence and Associations with Air Concentrations of Lead, Mercury, and Arsenic*, 188(7) Envtl. Monitoring & Assessment 407 (2016), https://www.ncbi.nlm.nih.gov/pubmed/27301968.

Examining associations between autism spectrum disorder prevalence and ambient concentrations of arsenic, lead, and mercury, and finding that tracts in the highest quartile of lead and mercury air concentrations had significantly higher autism prevalence than tracts in the lowest quartile for each of these pollutants, once the researchers adjusted for confounding factors.

[6] Exhibit 2, Appendix to Comments of Environmental, Public Health, and Civil Rights Organizations, Doc. ID No. EPA–HQ–OAR–2018–0794–1267.

T.I. Fortoul et al., "Health Effects of Metals in Particulate Matter," in *Current Air Quality Issues* (Farhad Nejadkoorki ed. 2015), https://www.intechopen.com/chapters/48145.

Describing the health impacts, and mechanisms underlying the health impacts, of toxic metals in particulate matter.

Ahmed Zaky et al., *Chlorine Inhalation-induced Myocardial Depression and Failure*, 3(6) Physiol. Rep. 1 (2015), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4510636/.

Observing cardiac pathology in rats exposed to chlorine gas.

Sara T.C. Orenstein et al., *Prenatal Organochlorine and Methylmercury Exposure and Memory and Learning in School-Age Children in Communities Near the New Bedford Harbor Superfund Site, Massachusetts*, 122(11) Envtl. Health Perspectives 1253 (2014), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4216164/.

Finding that increases in maternal hair concentrations of mercury were associated with decreases in childhood memory and learning, particularly visual memory.

Lisa M. Sweeney et al., Naval Medical Research Unit Dayton, *Acute Lethality of Inhaled Hydrogen Cyanide in the Laboratory Rat: Impact of Concentration x Time Profile and Evaluation of the Predictivity of "Toxic Load" Models*, Rep. No. NAMRU-D-13-35 (2013), https://apps.dtic.mil/sti/pdfs/ADA579551.pdf.

Reporting acute effects of exposure to hydrogen cyanide in animals.

K. He et al., *Mercury Exposure in Young Adulthood and Incidence of Diabetes Later in Life: The CARDIA Trace Element Study*, 36(6) Diabetes Care 1584 (2013), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3661833/pdf/1584.pdf.

Finding that toenail mercury levels are associated with incidence of diabetes in a dose-response manner among American young adults.

Martine Bellanger et al., *Economic Benefits of Methylmercury Exposure Control in Europe: Monetary Value of Neurotoxicity Prevention*, 12(3) Envtl. Health 1 (2013), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3599906/.

Documenting neurodevelopmental impacts of methylmercury at exposure levels below EPA's reference dose.

Sofia Jonasson, Bo Koch, & Anders Bucht, *Inhalation of Chlorine Causes Long-standing Lung Inflammation and Airway Hyperresponsiveness in a Murine Model of Chemical-Induced Lung Injury*, 303 Toxicology 34 (2013), https://pubmed.ncbi.nlm.nih.gov/23146759/.

Exposing mice to chlorine one time and finding an acute response that subsided after 48 hours and a sustained airway hyperresponsiveness for at least 28 days.

Philippe Grandjean et al., *Calculation of Mercury's Effects on Neurodevelopment*, 120(12) Envtl. Health Persp. A452 (2012), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3548290/pdf/ehp.1206033.pdf.

Suggesting an updated dose-response relationship for prenatal methylmercury, with a lower threshold Hg level corresponding to 50% of the previous reference dose.

Compliance Costs

James E. Staudt, *Andover Technology Partners, Update of the Cost of Compliance with MATS – Ongoing Cost of Controls* 7, 8 tbl.8 (2019), Doc. ID No. EPA–HQ–OAR–2018–0794–1175 Att. 3.

Finding that annual incremental operating costs associated with the MATS Rule are approximately $203 million.

Declaration of James E. Staudt, attached to Comments of Calpine Corp. et al. on EPA's Proposed Supplemental Finding (Dec. 1, 2015), Doc. ID No. EPA–HQ–OAR–2009–0234–20549.

Finding that EPA's projection of compliance costs in 2015, $9.6 billion, was nearly five times higher than the actual estimated cost of approximately $2 billion incurred through 2016.

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Please do not hesitate to reach out to us should you have any questions about this information or like to discuss further. Our contact information is below. Thank you again for your time and consideration.

Respectfully Submitted,

FOR THE COMMONWEALTH OF MASSACHUSETTS

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