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Andrew Carter*

ALCHEMICAL RULEMAKING AND IDEOLOGICAL FRAMING: LESSONS FROM THE 40-YEAR BATTLE TO REGULATE MERCURY EMISSIONS FROM ELECTRIC POWER PLANTS

ABSTRACT

*Environmental mercury has long been linked to adverse health impacts on human populations. Globally ubiquitous at ambient levels in air and water, it can reach potentially unsafe levels in fish as it biologically magnifies and accumulates through aquatic and marine food webs. Vulnerable communities, including many communities of color, are particularly at risk from fish-borne mercury. Despite the fact that coal-fired electric generating units have been recognized as major sources of environmental mercury since the 1970s, and that the Environmental Protection Agency discussed possible future regulations of mercury emissions from such plants in 1975, it was not until 2014 that the Obama administration promulgated the Mercury and Air Toxics Rule regulating such emissions – and not until 2016 that the rule appeared to be firmly in place after the Environmental Protection Agency’s revised findings promulgated in response to the Supreme Court’s remand in *Michigan v. EPA*.*

This article examines the more than forty-year-long debate over mercury emissions regulations from electric generating utilities, situating it in the context of both scientific uncertainty and the larger legal and ideological conflicts that have grown to define environmental policy discourse in the United States since the 1970s. It focuses on the discursive tactics – the ways actors interpret the meaning of both laws and science, and frame those meanings in ways that push regulatory actions in directions that those actors want them to go, even when they seem to conflict with the plain language of the Clean Air Act. While offering a historically comprehensive account, it pays special attention to contrasting the development of the Bush-era Clean Air Mercury

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Rule in 2005 with the far different Obama-era Mercury and Air Toxics Rule. The development of these two rules show how the same statutory language can lead to significantly different regulatory regimes depending on the ideological motivations of those in power, and environmental justice can frequently be abrogated in favor of commercial interests. Considering the Trump administration's call for significant rollbacks in environmental protection laws, this article may provide insight into what happens to environmental statutory interpretation and varying strategic interpretations of scientific uncertainty. Just as ancient alchemists saw mercury as an element of change and flux, ideological actors in the modern federal rulemaking process have seen the rules governing mercury emission as subject to its own transmutation, able to flow and transform into different manifestations as ideological actors gain control of the regulatory crucible.

INTRODUCTION

On June 13, 2016, the Supreme Court denied certiorari to industry petitioners seeking to invalidate the Environmental Protection Agency's (EPA's) rule regulating the emissions of mercury and other Hazardous Air Pollutants (HAPs) from coal- and oil-fired electric generating units (EGUs)¹ under Section 112 of the Clean Air Act (CAA).² That ruling appears—at least currently³—to signal the end of a forty-year debate over EPA regulation of EGU-sourced mercury, a conflict that intensified after a 2000 rule promulgated by the Clinton administration regulating EGU-sourced HAPs, and escalated over the next sixteen years as successive administrations attempted to implement mercury regulations that reflected dramatically different environmental ideologies.⁴ The latest ruling

1. *Michigan v. EPA*, 136 S. Ct. 2463 (2016) (mem). Industry petitioners sought to overturn the D.C. Circuit's decision in *White Stallion Energy Center, L.L.C. v. EPA*, where the court remanded the rule to EPA rather than vacate it. *White Stallion Energy Ctr., L.L.C. v. EPA*, No. 12-1100, 2015 WL 11051103, at *1 (D.C. Cir. Dec. 12, 2015) (per curiam), *cert. denied sub nom. Michigan v. EPA*, 136 S. Ct. 2463 (2016) (mem).

2. Clean Air Act § 112, 42 U.S.C. § 7412 (2012).

3. The recent election of Donald Trump, who has taken office with Republican majorities in both the House and Senate, and who has called for significant rollbacks in environmental protection laws, renders the issue slightly more uncertain than it appeared prior to November 8, 2016. As will be described in further detail in this article, the current regulations are currently codified, and any changes would have to be implemented through either a new rulemaking process or changes to the Clean Air Act itself. Should the mercury emissions limitations discussed become a target of new rulemaking, this article becomes not just a work of environmental legal history but a possible blueprint to how those attacks may be carried out.

4. As will be discussed in more detail below, the rulemaking history concerning EGU-sourced mercury and other HAPs is convoluted: EPA initially promulgated a rule regulating such emissions from EGUs in 2000 during the Clinton administration, attempted to reverse that decision in 2005 during the Bush administration, re-"confirmed" the 2000 rule in 2012 during the Obama administration after the D.C. Circuit Court invalidated the attempted 2005 revision, but then had to revise the original 2000 listing decision after the Supreme Court held it had impermissibly fail to account for costs. *Regulatory Finding on the Emissions of HAPs from EGUs*, 65 Fed. Reg. 79,825 (Dec. 20, 2000) [hereinafter 2000

comes almost a year after the Supreme Court invalidated the same rule on the grounds that it impermissibly failed to incorporate costs into the decision to regulate EGUs under Section 112, leading the D.C. Circuit Court to remand the Obama administration's attempt to put into effect stringent HAP emissions restrictions opposed by the EGU industry, in *Michigan v. EPA*.⁵

Until recently, the decades-long debate over whether EGU-sourced mercury should be regulated under the HAP provisions of the CAA has been consistently resolved in favor of the EGU industry and a "wait and see" approach that used scientific uncertainty as a rationale to avoid regulations the energy industry sees as financially undesirable, even as evidence has increasingly shown that environmental mercury may pose a risk to a significant number of Americans, particularly children and the unborn.⁶

Mercury is a toxic contaminant that has long been linked to adverse health impacts on humans and other organisms. Though found naturally, anthropogenic sources of mercury, particularly industrial emissions, have significantly increased environmental levels over the past two hundred years.⁷ While mercury is globally ubiquitous at ambient levels in air and water, it can reach potentially unsafe levels in fish as it magnifies and accumulates through aquatic and marine food webs, threatening the health of human populations that consume seafood in significant quantities.⁸ Over the past several decades, increased understanding of the mercury cycle and the potential health impacts of environmental mercury has led to legal and regulatory mechanisms both domestically and abroad intended to mitigate such health risks.⁹ However, such regulations are complicated not only by significant

Listing Rule]; Revision of December 2000 Regulatory Finding on the Emissions of HAPs From EGUs and the Removal of Coal- and Oil-Fired EGUs From the Section 112(c) List, 70 Fed. Reg. 15,994 (Mar. 29, 2005) [hereinafter 2005 Delisting Rule] (to be codified at 40 C.F.R. pts. 40, 63) ("We are taking this action because we now believe that the December 2000 finding lacked foundation and because recent information demonstrates that it is not appropriate or necessary to regulate [EGUs] under section 112."); Nat'l Emission Standards for HAPs From Coal- and Oil-Fired EGUs and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304, 9335 (Feb. 16, 2012) [hereinafter 2012 Mercury and Air Toxics Standards, or 2012 MATS Rule] (to be codified at 40 C.F.R. pts. 60, 63) ("New technical analyses conducted by EPA confirm that it remains appropriate and necessary to regulate HAP emissions from EGUs."); Supplemental Finding that it is Appropriate and Necessary to Regulate HAPs From Coal- and Oil-Fired EGUs, 81 Fed. Reg. 24,420 (Apr. 25, 2016) [hereinafter 2016 Supplemental Finding] (to be codified at 40 C.F.R. pt. 63); *Michigan v. EPA*, 135 S. Ct. 2699, 2712 (2015) (invalidating and reversing the 2012 MATS Rule); *New Jersey v. EPA*, 517 F.3d 574, 577–78 (D.C. Cir. 2008) (vacating the 2005 Delisting Rule). Principal proposed and final rules are discussed herein; as with many complex rulemaking processes, numerous minor technical corrections are published through the Federal Register, but are not referenced unless substantively relevant to the discussion at hand.

5. *Michigan*, 135 S. Ct. at 2712.

6. Research regarding adverse health effects of mercury is discussed in Section I.A below.

7. See generally E.G. Pacyna et al., *Global Emission of Mercury to the Atmosphere from Anthropogenic Sources in 2005 and Projections to 2020*, 44 ATMOSPHERIC ENV'T 2487 (2010).

8. For an explanation of bioaccumulation and biomagnification processes, see Richard L. Williamson et al., *Gathering Danger: The Urgent Need to Regulate Toxic Substances that can Bioaccumulate*, 20 ECOLOGY L.Q. 609–18 (1993).

9. A number of state and federal statutes and regulations regulate mercury from a variety of sources in products, food, and the environment, though a comprehensive discussion of such regulations

uncertainty in how mercury moves through the environment and to what extent it affects humans and other organisms once it has entered the body, but also by political and economic interests that impact the success and stringency of regulations.¹⁰

One of the most significant anthropogenic sources of environmental mercury is the EGU sector.¹¹ Despite growing scientific and public concerns in the 1960s and 1970s over anthropogenic mercury in the United States, and the enactment of the CAA, which allowed federal regulation of airborne toxics,¹² EPA has historically been largely unwilling to directly regulate EGU-sourced mercury. While EPA began regulating atmospheric mercury emissions under Section 112 from certain other sources as early as 1973, it did not attempt to regulate EGU-sourced mercury as a HAP until 2000, a decision which the second Bush

is beyond the scope of this article. The focus here is on EGU-sourced mercury emissions regulations under CAA because those emissions currently make up the largest single source of anthropogenic mercury emissions in the United States, and because the complex regulatory history concerning them offers a compelling case study in the evolution of, and difficulties inherent in, the U.S. system of federal environmental governance. Furthermore, the federal environmental regulatory scheme is enormously complex, and other environmental laws and regulations can, in theory, regulate EGU-sourced mercury indirectly; for example, the Clean Water Act (CWA) requires states to report waterbodies containing certain levels of pollutants, including both mercury generally and methylmercury specifically, that may have been deposited from EGU emissions. See Clean Water Act, 33 U.S.C. § 1313 (2012) (Water quality standards and implementation plan provision of CWA); EPA Water Quality Standards, 40 C.F.R. pt. 131 (2016). For a general overview of mercury regulation in the United States, see U.S. ENVTL. PROT. AGENCY, *Environmental Laws that Apply to Mercury*, <https://www.epa.gov/mercury/environmental-laws-apply-mercury> (last visited Sept. 9, 2017); and see Wendy Thomas, Note, *Through the Looking Glass: A Reflection on Current Mercury Regulation*, 29 COLUM. J. ENVTL. L. 145 (2004) (discussing Federal mercury regulations generally). Also beyond the scope of this article is an in-depth treatment of the Minamata Convention, a global treaty created in 2013 to regulate mercury releases to the environment and to which the United States is a party. Minamata Convention, Oct. 10, 2013, <https://treaties.un.org/doc/Treaties/2013/10/20131010%2011-16%20AM/CTC-XXVII-17.pdf>. While Article 8 of the Minamata Convention requires the U.S. to take steps to reduce EGU-sourced mercury emissions, it currently stands as a sole executive agreement entered into under the President's executive authority, meaning that as of now compliance with the Convention will be carried out through the CAA rulemaking discussed here. Such efforts could be abandoned by the new administration. For a discussion of legal issues relating to the domestic implementation of sole executive agreements, see Bradford R. Clark, *Domesticating Sole Executive Agreements*, 93 VA. L. REV. 1573 (2007).

10. For earlier accounts of EGU-sourced mercury regulation, see Lisa Heinzerling & Rena I. Steinzor, *A Perfect Storm: Mercury and the Bush Administration* (pt. 1), 34 ENVTL. L. REP. 10297 (2004) [hereinafter Heinzerling & Steinzor Part I]; Lisa Heinzerling & Rena I. Steinzor, *A Perfect Storm: Mercury and the Bush Administration* (pt. 2), 34 ENVTL. L. REP. 10485 (2004) [hereinafter Heinzerling & Steinzor Part II]; David Rugh, Note, *Clearer, But Still Toxic Skies: A Comparison of the Clear Skies Act, Congressional Bills, and the Proposed Rule to Control Mercury Emissions from Coal-Fired Power Plants*, 28 VT. L. REV. 201 (2004); James Ruhl, Note, *Quicksilver Alchemy: New England's Mercury Control Programs and the Clean Air Mercury Rule*, 32 VT. L. REV. 525 (2008); and Thomas, *supra* note 9.

11. The majority of EGU mercury emissions come from coal-fired electric utility generators, though oil-fired generators also emit mercury in smaller amounts. Gas-powered EGUs do not emit mercury in any significant amount; for the purposes of this article, and consistent with EPA's own definition, "EGUs" without any qualifier as to type refers to coal- and oil-fired utility units generating electricity for sale, typically found in electric utility installations.

12. Clean Air Act of 1970, Pub. L. 91-604, 77 Stat. 392 (1970) (codified as amended at 42 U.S.C. §§ 7401-7671q (2012)).

administration would attempt to retract, leading to lengthy court battles, a subsequent attempted re-implementation by the Obama administration in 2011, the *Michigan* decision and its aftermath.

The historic failure to regulate EGU-sourced mercury has not been driven by any single factor. Legitimate scientific uncertainty complicates the issue; while evaluation of the health or environmental risks of air pollutants generally is rife with uncertainty, mercury science particularly has suffered from significant knowledge gaps in how it moves and cycles through the environment, as well as how it impacts human populations.¹³ However, as will be argued below, scientific uncertainty has often been used as a discursive weapon to delay or weaken regulation, and many decisions in mercury regulation specifically can be credibly attributed to what environmental policy theorist Wendy Wagner defines as the “science charade”—or regulatory agencies’ use of putatively scientific rationales (in this case scientific uncertainty) to avoid accountability for underlying policy decisions.¹⁴

This “science charade” is driven largely by the powerful energy utility and coal lobbies, and pro-industry administrations generally hostile to environmental regulations. It is enabled by a successful multi-decadal push by anti-regulatory think tanks, lobbying groups, and advocacy organizations to not only normalize cost-benefit approaches to managing environmental health, but also do so in a way that maximizes industry costs and minimizes public benefits of potential regulatory approaches.¹⁵ These actors have crafted effective anti-regulatory, pro-capitalism “policy stories” that have significantly changed the regulatory landscape, particularly since the 1980s.¹⁶ When the more easily quantifiable costs of mercury

13. See, e.g., CHEMICALS BRANCH, UNITED NATIONS ENTL. PROGRAMME, GLOBAL MERCURY ASSESSMENT 2013, at 30 (2013) [hereinafter UNEP MERCURY REPORT], <http://wedocs.unep.org/handle/20.500.11822/7984> (Once at the UNEP Document Repository page, download a PDF version of the report from either of the provided “ENGLISH” or “Show full item record” links); Matthew O. Gribble et al., *Mercury, Selenium and Fish Oils in Marine Food Webs and Implications for Human Health*, J. MARINE BIOLOGY ASS’N U.K. 43, 46 (2015). See generally Mahamud Subir et al., *A Review of Uncertainties in Atmospheric Modeling of Mercury Chemistry I: Uncertainties in Existing Kinetic Parameters – Fundamental Limitations and the Importance of Heterogeneous Chemistry*, 45 ATMOSPHERIC ENV’T 5664 (2011).

14. Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1617 (1995).

15. See Thomas McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 51 (1998) (“[F]ree marketeers . . . tend to overestimate the costs and underestimate the benefits of social regulation in their calculations.”); Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health, Safety, and Environmental Regulation*, 80 TEX. L. REV. 1997, 1998 (2002) (“[A]gencies are heavily dependent upon the regulated entities for information about compliance costs. Knowing that the agencies are less likely to impose regulatory options with high price tags . . . regulatees have every incentive to err on the high side.”).

16. Sidney A. Shapiro, *Talking About Regulation: Political Discourse and Regulatory Gridlock*, 7 WAKE FOREST J.L. & POL’Y 1, 6, 20–23 (2017). There is a substantial body of work on the intersection of politics and science in environmental policy, and the dilemmas inherent in technical rulemaking, particularly in areas of scientific uncertainty. E.g., SHEILA JASANOFF, *THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS* (1990); JUDITH A. LAYZER, *OPEN FOR BUSINESS: CONSERVATIVES’ OPPOSITION TO ENVIRONMENTAL REGULATION* (2012); Daniel Sarewitz, *What is the “Rightful Place” of Science?*, in *THE RIGHTFUL PLACE OF SCIENCE: POLITICS* 91 (G. Pascal Zachary ed., 2013); Laurence H. Tribe, *Policy Science: Analysis or Ideology?*, 2 PHIL. & PUB. AFF. 66 (1972).

emissions control are measured against the far more uncertain risks of those emissions, it is easy for opponents to justify waiting for greater scientific certainty.¹⁷ Furthermore, and as will be shown below, anti-regulation policymakers and their allies in the public and private sphere have become especially skilled at minimizing, weakening, and delaying regulatory measures through indirect approaches that use a putatively pro-environmental narrative frame while implementing rules that favor industry. As will also be shown below, in addition to capitalizing on uncertainties and ambiguities in the science, such actors have also capitalized on ambiguities in how the law is worded – or by creating ambiguity when there seems to be little.

The criticism of letting anti-regulatory ideologies drive much of the rulemaking decisions discussed here is not (or at least not solely) because it tends to produce anti-environmental regulation, but because it leads to rulemaking decisions that conflict with the plain text of the law, and have so for decades. While this article does take a (mostly) implicit normative position in favor of environmental regulations more protective of humans and the environment, it also sets out to show that the historical decisions catalogued here are problematic from a democratic standpoint, independent of one's views on environmental regulations specifically. Congress decided to prioritize limiting HAPs with the CAA and its amendments, and gave EPA certain nondiscretionary duties to do so. When it comes to EGU-sourced mercury, however, EPA largely failed to execute the law as written.

This article traces how EGU-sourced mercury escaped regulation for so long under the CAA despite growing scientific and societal awareness of the dangers of environmental mercury, even as other anthropogenic sources of the element became more tightly regulated. While several articles have been published addressing specific regulatory debates in EGU-sourced mercury regulations,¹⁸ this article examines that regulatory history over the life of the CAA, situating it in the context of the larger ideological conflicts that grew to define the environmental policy discourse in the United States following the implementation of the federal environmental regulatory apparatus, and the various discursive strategies anti-regulatory actors have used to prevent the regulation of mercury emissions from EGUs.¹⁹

As political scientist and environmental policy analyst Judith Layzer has noted, “[a]n exclusive focus on overt policy debates and formal decisions can obscure ‘the subterranean political processes that shape ground-level policy effects,’ as well as the ways that powerful actors shape and restrict the political

17. See NAOMI ORESKES & ERIK M. CONWAY, *MERCHANTS OF DOUBT: HOW A HANDFUL OF SCIENTISTS OBSCURED THE TRUTH ON ISSUES FROM TOBACCO SMOKE TO GLOBAL WARMING* 76–77 (2010) (paraphrasing quote by former Council of Environmental Quality member J. Christopher Bernabo as “the degree of scientific certainty demanded is proportional to the cost of doing something about it”).

18. See articles cited *supra* note 10.

19. It takes, in other words, a diachronic approach. See Joseph Cooper & David W. Brady, *Toward a Diachronic Analysis of Congress*, 75 AM. POL. SCI. REV. 988, 988 (1981) (“[T]he concepts and measures required to provide an adequate basis [of current structures] need to be developed through diachronic, rather than merely static, analysis.”).

agenda, ensuring that some issues are never seriously considered.”²⁰ Using a similar critical lens, the analysis below examines regulatory debates over EGU-sourced mercury as “struggles to define problems and characterize solutions within a rhetorical and institutional context”²¹ This article explores the historical large-scale regulatory, ideological, and political narratives that have impacted mercury regulation decisions, with a particular focus on the discursive practices and tactics used in different policymaking processes to show how different actors have “define[d] problems and characterize[d] solutions” surrounding environmental mercury in a way that has served economic and ideological interests, but not necessarily public health. The analysis taken here seeks not simply to “tell[] a story” but to do so in a manner that will offer insight into how policy is developed and how such discursive strategies can push implementation of laws in directions unforeseen – and unwanted – by the lawmakers who created them.²²

Part I below consists of a brief technical background on the current state of the science of mercury, with a focus on scientific uncertainty in regards to its environmental cycling and its public health impacts that have impacted regulatory decisions, and current control options. Part II forms the largest and most central component of this article, examining the creation of the CAA and the history of mercury emissions regulation under it, focusing on the legislative and regulatory battles over EGU-sourced mercury, and how those battles fit into the larger policy debate about air toxics regulation over the past forty years. It divides this history of mercury emissions regulations into three different historical periods, representing: (1) the creation of the CAA until 1989; (2) the passage of the 1990 CAA Amendments until the 2000 Listing Decision; and (3) the period from the 2000 Listing Decision until the present, analyzing each period in the context of that larger narrative. Part III concludes by discussing the evolution of regulatory narratives over EGU-sourced mercury and the historic costs of this inaction in terms of human health, and offers suggestions to improve future legal and regulatory decisions about mercury specifically and other air toxics in general by more openly engaging with questions of value.

I. BACKGROUND

A. Environmental Mercury: Science and Uncertainty

Mercury is ubiquitous in the environment, where it is found in mostly trace amounts in air and water across the globe. Environmental mercury has both

20. LAYZER *supra* note 16, at 11 (quoting Jacob S. Hacker, *Privatizing Risk Without Privatizing the Welfare State: The Hidden Politics of Social Policy Retrenchment in the United States*, 98 AM. POL. SCI. REV. 243, 243 (2004)).

21. *Id.*

22. See KAREN T. LITFIN, OZONE DISCOURSES: SCIENCE AND POLITICS IN GLOBAL ENVIRONMENTAL COOPERATION 191 (Helen Milner & John Gerard Ruggie eds., 1994). As articulated by Professor Litfin, the value of a discursive approach to environmental policy analysis is that it can “offer important insights into the policy process in general and perhaps into future events. . . . It can alert the analyst to certain misconceptions that might arise, and it can also alert the practitioner to the importance of alternative discursive strategies.”

natural and anthropogenic sources; natural sources include volcanoes, weathering of mercury-containing rocks and soils, and wildfires, while anthropogenic sources include fossil fuel combustion, gold and other metal production, cement production, waste incineration, and various industrial processes.²³ Environmental mercury levels have increased steadily since the mid-19th century, almost certainly due to human activities,²⁴ though levels may be declining since the 1980s.²⁵ Organic mercury compounds pose the greatest health risk, particularly since they tend to be concentrated to unsafe levels up the food chain in marine and aquatic environments.

Coal combustion is the largest single source of anthropogenic mercury emissions to the atmosphere.²⁶ Coal-fired EGUs are significant emitters of mercury, though mercury content of coal varies depending on coal type and geographic origin.²⁷ One recent estimate of worldwide mercury emissions from stationary combustion (most of it coal combustion), places emissions at approximately 970 tpy, with 79 tons originating in North America.²⁸ In 1997, EPA estimated EGU-sourced mercury emissions in the United States at 47 tpy,²⁹ a number that was used as a baseline in EGU mercury emissions regulatory debates through about 2011, though subsequently other CAA regulations and state regulations were projected to reduce mercury emissions to an estimated 29 tpy in 2016.³⁰

23. Nicola Pirrone et al., *Global Mercury Emissions to the Atmosphere from Anthropogenic and Natural Sources*, 10 *ATMOSPHERIC CHEMISTRY & PHYSICS* 5951, 5952–53 (2010). See generally William H. Schroeder & John Munthe, *Atmospheric Mercury—An Overview*, 32 *ATMOSPHERIC ENV'T* 810 (1998) (providing an overview of all major aspects of mercury in the atmosphere).

24. See D. H. Landers et al., *Using Lake Sediment Mercury Flux Ratios to Evaluate the Regional and Continental Dimensions of Mercury Deposition in Arctic and Boreal Ecosystems*, 32 *ATMOSPHERIC ENV'T* 919, 919–20, 928 (1998).

25. UNEP MERCURY REPORT, *supra* note 13, at 16 tbl. Emissions to air. However, different methodological approaches to quantifying both anthropogenic and natural mercury emissions inventories over the years complicates determining long-term trends. See *id.* at 16.

26. Pacyna et al., *supra* note 7, at 2488 (“[C]oal burning is the largest anthropogenic source of mercury emission to the atmosphere.”). In terms of mercury emissions to all media, including land and water, artisanal gold mining is estimated to be a larger source, at approximately 1,102 tons per year (tpy), though only about 441 tpy is estimated to be emissions to the atmosphere. Pirrone et al., *supra* note 23, at 5956. For the sake of consistency, I have converted the metric tons used in this and certain other references to American short tons throughout this article.

27. The estimated worldwide average mercury content of coal is in the neighborhood of 100–400 parts per billion, though it can vary from 1 part per billion to 330 parts per million, or by a factor of 330,000. Parisa A. Ariya et al., *Mercury Physiochemical and Biogeochemical Transformation in the Atmosphere and at Atmospheric Interfaces: A Review and Future Directions*, 115 *CHEMICAL REVIEWS* 3760 (2015).

28. Pacyna et al., *supra* note 7, at 2493 tbl.3.

29. U.S. ENVTL. PROT. AGENCY, MERCURY STUDY REPORT TO CONGRESS (1997) [hereinafter 1997 EPA MERCURY REPORT], Vol. I, at 3-6 tbl.3-1 (combining mercury emission totals for Coal, Oil, and Natural gas combustion sources for the total mercury emissions produced by Utility boiler combustion sources) All volumes of the 1997 EPA Mercury Report can be found at <https://www.epa.gov/mercury/mercury-study-report-congress>.

30. U.S. ENVTL. PROT. AGENCY, EPA-452/R-11-009, REVISED TECHNICAL SUPPORT DOCUMENT: NATIONAL-SCALE ASSESSMENT OF MERCURY RISK TO POPULATIONS WITH HIGH CONSUMPTION OF SELF-CAUGHT FRESHWATER FISH 8 (2011) [hereinafter 2011 Technical Support Document or 2011

Toxicity and absorption of mercury depends on both the form of mercury as well as the route of exposure, but most forms are neurotoxic. Organomercury compounds like methylmercury, the kind most frequently found in fish, tend to be the most toxic.³¹ Prenatal exposure to organic mercury can interfere with brain development; high prenatal doses have been linked to severe intellectual disabilities, blindness, seizure disorders, and deafness. Even low doses may cause more subtle cognitive impairments, such as reduced motor function and lower IQ.³² Elemental mercury is less dangerous through ingestion or contact, but inhaling high levels of mercury vapors can lead to adverse health effects, including tremors and aggression.³³

Despite significant epidemiological research into the impact of consuming methylmercury-containing fish, the level at which methylmercury causes health impacts in human populations is still unknown. Numerous longitudinal studies have been carried out, with frustratingly varied results between populations, a fact which has been a common tactic to forestall regulation.³⁴

B. Mercury Emissions Control

Due to its low concentration and chemical characteristics, controlling mercury emissions from combustion sources like EGUs can be difficult.³⁵ EPA has identified four general control techniques: (1) pre-combustion pollution prevention measures (such as product substitution or process modification); (2) coal cleaning; (3) alternative approaches (e.g., emissions trading or use taxes); and (4) flue gas treatment technologies.³⁶ Because almost all coal contains mercury, and because

TSD], <https://www3.epa.gov/ttn/atw/utility/revise mercury tds.pdf> (“The [EPA’s] estimated Hg emissions from U.S. EGUs in 2016 . . . is 29 tons, after other CAA related regulations are fully implemented.). The 29 tons figure represents a baseline figure not reflecting any mercury-specific EGU pollution controls. *Id.*

31. For example, in one widely publicized incident, a chemist at Dartmouth accidentally spilled several drops of dimethylmercury, a particularly toxic form, on her latex-gloved hand and died from mercury poisoning within a year. David W. Nierenberg et al., *Delayed Cerebellar Disease and Death After Accidental Exposure to Dimethylmercury*, 338 NEW ENG. J. MED. 1672, 1672 (1998).

32. NAT’L RESEARCH COUNCIL, TOXICOLOGICAL EFFECTS OF METHYLMERCURY 17 (2000) [hereinafter 2000 NRC REPORT].

33. Thomas W. Clarkson et al., *The Toxicology of Mercury – Current Exposures and Clinical Manifestations*, 349 NEW ENG. J. MED. 1731, 1733 (2003).

34. A longitudinal study is one where measurements or observations are made of the same subject at different periods of time over a study.

35. GOV’T ACCOUNTABILITY OFFICE, GAO-10-47, CLEAN AIR ACT: MERCURY CONTROL TECHNOLOGIES AT COAL-FIRED POWER PLANTS HAVE ACHIEVED SUBSTANTIAL EMISSIONS REDUCTIONS 3 (2009) [hereinafter 2009 GAO REPORT], <http://www.gao.gov/new.items/d1047.pdf> (“Mercury is emitted in such low concentrations that its removal and measurement are particularly difficult, and it is emitted in several forms. . . .”). The 2009 GAO REPORT provides a nontechnical review of mercury emissions reduction technologies. More recently, UNEP has released a draft guidance document on mercury emissions controls. *See generally* UNITED NATIONS ENVTL. PROGRAMME, GUIDANCE ON BEST AVAILABLE TECHNIQUES AND BEST ENVIRONMENTAL PRACTICES TO CONTROL MERCURY EMISSIONS FROM COAL-FIRED POWER PLANTS AND COAL-FIRED INDUSTRIAL BOILERS (2015).

36. 1997 EPA MERCURY REPORT, *supra* note 29, Vol. VIII, at ES-8. Coal cleaning is the physical or chemical removal of impurities from coal such as sulfur (to which mercury is often bound). *Id.* at ES-9.

coal cleaning (removing mercury pre-combustion) has limited effectiveness,³⁷ technical approaches typically focus on developing flue gas treatment technologies to remove mercury from flue gas after combustion but before it leaves the smokestack.

The technical and economic feasibility of using specific mercury control technologies at a given EGU are dependent on the type of coal used, boiler design, and the types of pollution control technologies already in place, though the U.S. Government Accounting Office (GAO) has predicted that sorbent-injection systems will be able to substantially reduce mercury emissions at a relatively low cost for most plants.³⁸

C. Early Legal and Regulatory Approaches to Mercury Health Risks

While by the early 20th century numerous laws regulating mercury had been implemented at the state level, they focused solely on protecting the public from direct exposure to mercury products.³⁹ No such regulations existed at the federal level.⁴⁰ In the wake of the first Earth Day on April 22, 1970, and in response to a public that demanded concerted action by the federal government to mitigate pollution, the then-existing patchwork of state and federal approaches to pollution control was supplanted in large part with more comprehensive federal frameworks. The new federal laws would largely supplant rather than supplement traditional tort claims over environmental contaminants.⁴¹

Even before the creation of EPA and the environmental laws it would implement and enforce, mercury ranked highly as a contaminant of particular concern; members of the Senate held two days of hearings in the summer of 1970 on the threat environmental mercury posed to both humans and the environment.⁴²

Flue gas is the byproduct of combustion emitted to the atmosphere, which can be treated before it is released from the stack. *Id.* at ES-11 to ES-13.

37. *See id.* at 6-1 (“The available data on coal cleaning indicate that mercury reductions ranged from zero to 64 percent. The average reduction was 21 percent.”).

38. 2009 GAO REPORT, *supra* note 35, at 27.

39. *E.g.*, N.C. Revisal of 1908, ch. 95, § 4489 (1908) (“It shall be unlawful for any person to sell or deliver to any person . . . [t]he compounds and salts of . . . mercury,” except as provided by statute.); MINN. STAT. § 2337 (1905) (“No person, otherwise than on a physician’s written prescription, shall sell at retail . . . mercury . . . without affixing to the package or receptacle containing the same a label conspicuously bearing the word ‘Poison’”); Act of Apr. 1, 1912, ch. 351, § 1, 1912 N.J. Laws 603 (requiring every physician to report instances of occupationally related mercury poisoning to the state board of health).

40. The Pure Food and Drug Act of 1906 outlawed the sale of “adulterated” food in general, but mercury was not specifically listed as an adulterant in the statute or the implementing regulations of the time. Pure Food and Drug Act of 1906, Pub. L. No. 59–384, 34 Stat. 768, *repealed by* Act of June 25, 1938, ch. 675, § 902(a), 52 Stat. 1059 (codified as amended in scattered sections of 21 U.S.C.).

41. *See, e.g.*, *Am. Elec. Power Co., v. Connecticut*, 564 U.S. 410, 424 (2011) (“[T]he Clean Air Act and EPA actions it authorizes displace any federal common law right to seek abatement of carbon-dioxide emissions from fossil-fuel fired power plants.”); *Middlesex Cty. Sewerage Auth. v. Nat’l Sea Clammers Ass’n*, 453 U.S. 1, 11, 22 (1981) (holding that the Clean Water Act fully pre-empted federal common law of nuisance in terms of ocean pollution).

42. *Effects of Mercury on Man and the Environment: Hearing Before the Subcomm. on Energy, Nat. Res., and the Env’t of the S. Committee on Commerce*, 91st Cong. (1970).

Similarly, in the Council on Environmental Quality (CEQ) first annual report, the CEQ recognized toxic mercury pollution as “a serious national problem.”⁴³

II. MERCURY REGULATION UNDER CAA

Most of the contemporary debate and controversy over regulating mercury emissions has taken place in the context of the CAA, arguably the most important—and most fought-over—federal statute arising in that “golden age” of federal environmental law. The CAA and its implementing regulations promulgated by EPA have been the primary regulatory instruments through which the federal government (and by delegation, state governments) regulates atmospheric emissions of pollutants and potential pollutants from both stationary and mobile sources.

The CAA replaced earlier, more limited federal air pollution measures that had been created in the preceding decades in response to growing public concern over air quality. While some states had already taken steps to statutorily abate such pollutants,⁴⁴ these actions were hampered by air pollutants’ movement across state borders.⁴⁵ The Air Pollution Control Act of 1955 was the first federal regulation to address air pollution, providing funding for research and technical assistance; however, as its drafter reassured his colleagues, it was not intended to intrude on the states’ authority to control air pollution.⁴⁶ While the federal government’s advisory role was maintained in amendments to that act in 1960 and 1962, growing public (and legislative) support for federal intervention into pollution abatement led to the passage of the Air Quality Act of 1963, amended in 1967, which allowed the Department of Health, Education, and Welfare to set emissions criteria. However, the Department’s enforcement ability was limited to requesting the Department of Justice bring suit for pollution abatement, and even then could only request such a suit after a long series of administrative procedures had been followed.⁴⁷

43. COUNCIL ON ENVTL. QUALITY, ENVIRONMENTAL QUALITY: THE FIRST ANNUAL REPORT 52 (1970), <http://files.eric.ed.gov/fulltext/ED062109.pdf>; see also Addition to List of HAPs, 36 Fed. Reg. 5931 (Mar. 31, 1971). The CEQ was created by the National Environmental Policy Act of 1969, Pub. L. 91-190, § 202, 83 Stat. 854 (codified as amended at 42 U.S.C. § 4342 (2012)). The Council was created to, *inter alia*, advise the President on environmental matters, and assist him in preparing the required annual Environmental Quality Report Council, which was required by statute until 1997, when that requirement was removed pursuant to the Federal Reports Elimination and Sunset Act of 1995, Pub. L. No. 104-66, § 1091(b), 109 Stat. 707 (1995); see also 42 U.S.C. § 4344 (1970) (prior NEPA annual report requirement).

44. STANLEY E. DEGLER, STATE AIR POLLUTION CONTROL LAWS 1 (rev. ed. 1970) (“In 1970, all 50 states had laws to control air pollution.”). By 1963 only 14 states had air pollution control laws at a state-wide level, *id.* at 2, though after the passage of the CAA of 1967 this would grow to 46 by 1969. *Id.* at 1. However, not all states with authority to regulate air pollution used that authority. Only four states (Alabama, Maine, Nebraska, and South Dakota) had no statutory authority under state law to regulate air pollution, though they could do so under nuisance statutes. See *id.* at 1-32 (describing air pollution laws in all fifty states); see also Harold W. Kennedy & Andrew O. Porter, *Air Pollution: Its Control and Abatement*, 8 VAND. L. REV. 854 (1955).

45. See generally Edmund S. Muskie, *Role of the Federal Government in Air Pollution Control*, 10 ARIZ. L. REV. 17 (1969) (discussing the difficulties of establishing jurisdictional responsibility in the field of pollution control).

46. CHRISTOPHER J. BAILEY, CONGRESS AND AIR POLLUTION 94-96 (1998).

47. See 42 U.S.C. § 1857d(c)-(f) (1964).

Public concerns over pollutants during this time period tended to focus on more visible pollutants, with priority to chemical components or precursors of highly visible, predominately urban air pollution, particularly the ozone relating to photochemical smog, as well as particulates and sulfur dioxide (SO₂), a noxious, terrible-smelling compound known for causing lung irritation and illness.⁴⁸ However, through the 1970s, scientists, policymakers, and the general public had become more aware of invisible toxics, thanks in large part to Rachel Carson's seminal 1962 work, *Silent Spring*,⁴⁹ which likely helped drive creation of the HAP provisions of the CAA.

Dissatisfied with what was perceived as ineffective regulation under the earlier Clean Air Act of 1963 (and its 1967 amendments), and faced with growing clamor from the states for federal intervention, Congress essentially rewrote the air pollution regulatory scheme in 1970 with the CAA, implementing a comprehensive statute which, among other things, established procedures for EPA to set and enforce emissions standards and strengthened enforcement mechanisms. Regulation of mercury seems fairly straightforward—the dangers of environmental mercury were fairly well known then, and a Senate committee report during the drafting process expressly suggested mercury as a possible future regulated substance.⁵⁰ However, attempts to do so under the CAA have been piecemeal and, when it comes to EGU-sourced mercury, unsuccessful for most of the CAA's history. The CAA and its implementing regulations contain several different mechanisms for limiting air pollutants from both stationary and mobile sources, though only the stationary source provisions are of significant relevance to mercury regulations.⁵¹ An enormously complex statute, the CAA contains numerous provisions applying to different pollutants, areas, and sources; addressed below are the primary regulatory tools for governing general pollutants from stationary sources like EGUs.

48. See Bailey, *supra* note 46, at 129. See generally Matthias Dörries, *The Transmutation of Ozone in the Early 1970s*, in TOXIC AIRS: BODY, PLACE, PLANET IN HISTORICAL PERSPECTIVE (James Rodger Fleming & Ann Johnson eds., 2014) (exploring the debate over ozone from the 1950s, with a particular focus on the 1970s).

49. Though focused on pesticides, particularly DDT, the book held one reference to mercury, referring to it as a “poison” used in some crabgrass killers. RACHEL CARSON, *SILENT SPRING* 80 (Houghton Mifflin Co. 1994) (1962).

50. ENVTL. POLICY DIV, CONG. RESEARCH SERV. & LIBRARY OF CONG., S. COMM. ON PUB. WORKS, 2 LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1970, at 133 (1974) (“Examples of substances which the Administration informed the Senate were likely to be controlled under [section 112 include] mercury. . . .”).

51. Unless otherwise specified, the general provisions described here have been a part of the CAA from its passage in 1970 until the time of this writing, with cites to the statute based on the present U.S. Code. Mercury is not emitted from mobile sources in any significant quantities, so provisions of the CAA applying strictly to mobile sources are not discussed.

A. Pollutant Regulation Provisions of the CAA Applying to Stationary Sources

1. CAA Section 108: National Ambient Air Quality Standards

To control the ubiquitous, large-scale pollutants like ozone, SO₂ and nitrogen oxides (NO_x) which affect air quality over large areas, Congress enacted CAA Section 108,⁵² which requires the creation of state- or EPA-designated air quality regions and the designation of national ambient air quality standards (NAAQS) for pollutants, which “may reasonably be anticipated to endanger public health or welfare; [and] the presence of which in the ambient air results from numerous diverse mobile or stationary sources”⁵³ Such standards restrict the level of criteria pollutants permitted in the ambient air in a region, with states then directly regulating sources within their jurisdiction through State Implementation Plans (SIPs) tailored to meet those NAAQS requirements.⁵⁴ Failing to meet NAAQS deadlines, or submitting SIPs that do not meet EPA approval, may subject states to potential penalties.⁵⁵ While nothing in the CAA’s original text precluded mercury from being regulated as a criteria pollutant, regulation under Section 112 (discussed in Section IIA3 below) as a HAP shortly after passage barred mercury’s designation as a criteria pollutant, and the 1990 Amendments firmly established that mercury emissions, including EGU emissions, were to be regulated under Section 112.⁵⁶ Since the CAA’s passage, Section 108 has never been used or proposed as a direct mercury regulatory mechanism, though as discussed in Section

52. 42 U.S.C. § 7408 (2012). Both primary and secondary standards are set, with the primary standards designed to protect public health “allowing an adequate margin of safety,” and less stringent secondary standards aimed at protecting the “public welfare.” *Id.* § 7409. As currently codified, the distinction is not particularly important since air quality regions are considered non-attainment under CAA section 107(d) if they fail to meet either primary or secondary standards. *Id.* § 7407(d)(1)(A)(i).

53. 42 U.S.C. § 7408(a)(1)(A)–(B).

54. In 1971, EPA promulgated regulations designating six NAAQS criteria pollutants: SO₂, particulates, carbon monoxide, photochemical oxidants, hydrocarbons, and NO_x. 36 Fed. Reg. 8186 (Apr. 30, 1971) (codified at 40 C.F.R. §§ 50.4–50.11). In 1978, EPA designated lead as a criteria pollutant, 43 Fed. Reg. 46,246 (Oct. 5, 1978) (codified at 40 C.F.R. § 50.12), but has not designated any additional criteria pollutants since then.

55. 42 U.S.C. § 7413 (2012). The NAAQS deadlines have been extended repeatedly through the years, and with the 1990 Amendments “nonattainment areas” not meeting NAAQS requirements are classified into separate categories, with requirements and compliance deadlines differing depending on category. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, §§ 181–193, 104 Stat. 2399 (codified at 42 U.S.C. §§ 7511–7515 (2012)). The 1990 Amendments also added the requirement that in nonattainment areas even old sources must be required to use reasonably available control technology (“RACT”) to control criteria pollutant emissions. *Id.* § 182 (codified at 42 U.S.C. § 7511(a) (2012)).

56. A separate but related provision is CAA Part C, designated as Prevention of Significant Deterioration of Air Quality (“PSD”) which requires EPA and state governments to implement additional permitting requirements ensuring that air quality is not degraded in other areas that have attained NAAQS standards. 42 U.S.C. §§ 7470–7492. As originally implemented in the 1977 Amendments, PSD restrictions could be placed on non-criteria pollutants, including mercury. 42 U.S.C. §§ 7470–7491 (1988); *see also* Ala. Power Co. v. Costle, 636 F.2d 323, 361 n.90 (D.C. Cir. 1979) (noting in dicta that “the fact that emission of mercury is not [regulated under section 112 does not] mean[] that mercury is not a pollutant subject to regulation [under PSD].”). However, following the 1990 Amendments, section 112 HAPs are excluded from regulation under the PSD provisions. 42 U.S.C. § 7412(b)(6) (2012).

II(D)(2)(d) below, controls for some types of criteria pollutants can also reduce mercury emissions as a co-benefit.

2. CAA Section 111: New Source Pollution Standards

While Section 108 allows states some flexibility in the actual emissions standards set in SIPs so long as the region's ambient air quality goals can be met, Section 111 requires EPA to directly regulate emissions standards for new sources of pollutants "caus[ing], or contribut[ing] significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare."⁵⁷ A "new source" under the statute means one that is constructed or modified in a way that increases its emission of any air pollutant after EPA has set emissions standards.⁵⁸ Standards are based on the best emissions reduction system achievable, taking into account costs, and energy and non-air environmental impacts.⁵⁹ The section provides that the states may implement and enforce EPA's new source standards through SIPs, though Section 111(c)(2) allows EPA to directly enforce standards for those new sources.⁶⁰ The sole major attempt to regulate EGU-sourced mercury under Section 111 NSPS provisions was under the Bush-era EPA's Clear Skies Plan, discussed in more detail in Section D1 below.

Under the NSPS sections as originally enacted, EPA *could* also apply the new source emissions standards to already-existing sources, but only if those pollutants were not already regulated as criteria pollutants (under Section 108) or HAPs (under Section 112); this provision was intended primarily to serve as a "gap-filling" measure for "pollutants which cannot be controlled through the ambient air quality standards and which are not hazardous substances."⁶¹ Whether that provision survived the 1990 Amendments without substantive change is uncertain at the time of this writing. Due to a legislative error arising out of the 1990 Amendments and discussed in more detail in Section D1 below, Section 111(d) currently may preclude regulating those *sources* that are already regulated as HAP, even if the specific pollutant itself is not regulated.⁶²

57. 42 U.S.C. § 7411(b)(1)(A). "New sources" under Section 111 refers to stationary sources constructed or modified after standards of performance have been promulgated. *Id.* § 7411(a)(2).

58. *Id.* § 7411(a)(2)-(4).

59. *Id.* § 7411(a)(1)-(2).

60. *Id.* § 7411(c)(1).

61. Frank B. Cross, *Section 111(d) of the Clean Air Act: A New Approach to the Control of Airborne Carcinogens*, 13 B.C. ENVTL. AFF. L. REV. 215, 233 (1986) (quoting *A legislative History of the Clean Air Act Amendments of 1970*, 93rd Cong., 2d Sess. 377 (1970) 227 (statement of Sen. Muskie)).

62. The Senate and the House of Representatives passed different versions of section 111(d) in the Clean Air Act Amendments of 1990. The Senate version prevents EPA from regulating pollutants under section 111(d) that are also regulated under section 112, while the House version prevents EPA from regulating *sources* that are regulated under section 111(d). While the issue came up in *West Virginia v. EPA*, No. 15-1363 (D.C. Cir., Sept. 27, 2016) (en banc), regarding the Clean Power Plan, it has not yet been resolved. See Andrew Childers, *Clean Power Plan Scrutinized Through Lens of Supreme Court*, BLOOMBERG BNA: ENERGY & CLIMATE REP. (Sept. 27, 2016), <https://www.bna.com/clean-power-plan-n57982077646/>.

3. CAA Section 112: Hazardous Air Pollutants

Historically, however, the CAA sections most relevant to mercury regulation are the HAP provisions under Section 112.⁶³ This section mandates that EPA set emissions standards for HAPs that pose a “threat of adverse human health effects . . . or adverse environmental effects”⁶⁴ The statutory language is ambiguous as to whether a pollutant should be regulated as a NAAQS criteria pollutant or as a HAP, though throughout the lifetime of the CAA ubiquitous pollutants that are usually dangerous in large quantities have been defined as criteria pollutants.⁶⁵ Contaminants that are significantly more toxic in smaller amounts have been more often defined as HAPs.⁶⁶ As with NSPS, EPA sets specific national emissions standards itself rather than through individualized SIPs, though this does not preclude state-level emissions standards that are more restrictive,⁶⁷ and the states can and typically do handle permitting and enforcement regarding compliance with the HAP regulations.⁶⁸

The 1970 version of the original CAA required EPA to designate a substance as a HAP if it “may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.”⁶⁹ While as written it did not expressly permit EPA to limit HAP regulations by source, shortly after the statute’s creation, EPA interpreted it as doing so,⁷⁰ and in 1990, Congress codified this interpretation.⁷¹ Unlike with Section 111, all sources of emissions are

63. 42 U.S.C. § 7412.

64. *Id.* § 7412(b)(2).

65. See NAT’L RESEARCH COUNCIL, AIR QUALITY MANAGEMENT IN THE UNITED STATES 46–49 (2004).

66. See Williamson et al., *supra* note 8 at 705 (“Hazardous air pollution regulation focuses primarily on protecting individuals downwind of toxic releases from direct exposure.”); John D. Graham, *The Failure of Agency-Forcing: The Regulation of Airborne Carcinogens under Section 112 of the Clean Air Act*, 1985 DUKE L.J. 100, 108 (1985) (“The toxic air pollutants to be regulated under section 112 were supposed to be more dangerous . . . than the criteria pollutants.”).

67. 42 U.S.C. § 7412(d)(7).

68. The initial version of the CAA provided that “[i]f the Administrator finds the [submitted] State procedure is adequate, he shall delegate to such State any authority he has under this [Act] to implement and enforce such standards. . . .” 42 U.S.C. § 1857(c)(1) (1970) (current version at 42 U.S.C. § 7412(d)(1) (2012)). The CAA of 1990 reserved the right of the Federal government to delegate implementation and enforcement procedures to the states, but provided more detailed information on state responsibility, and provided for research and management assistance.

69. 42 U.S.C. § 1857c-7(a)(1) (1970) (amended 1977).

70. U.S. ENVTL. PROT. AGENCY, A COLLECTION OF LEGAL OPINIONS, Vol. I: DECEMBER 1970-DECEMBER, 1973, at 100 (1975) (“[W]e believe that §112 standards should be made applicable only to designated sources. Whenever it appears that additional sources may emit the pollutant in question in unsafe amounts, we will immediately investigate the situation and propose and promulgate regulations as necessary to protect the public health.”). EPA’s decision to list HAPs as limited to those from specific sources appears to have gone largely unchallenged, though the President’s Council on Environmental Quality originally took a different interpretation. See COUNCIL ON ENVTL. QUALITY, ENVIRONMENTAL QUALITY: THE SECOND ANNUAL REPORT 9 (1971), <http://files.eric.ed.gov/fulltext/ED055922.pdf> (“Asbestos, mercury, and beryllium have been designated as hazardous air pollutants for which Federal emissions standards, *applicable to all sources*, will be promulgated.”) (emphasis added).

71. Clean Air Act Amendments of 1990, Pub. L. 101-549, § 301, 104 Stat. 2531 (current version at 42 U.S.C. § 7412 (2012)).

regulated, whether old or new.⁷² When setting those limits EPA was required to, within 180 days, propose standards that were “at the level which in [EPA’s] judgment provides an ample margin of safety to protect the public health from such hazardous air pollutant,” with no allowances for cost.⁷³ Even when, as shown below, the 1990 amendments liberalized how emissions standards were determined, the focus of CAA Section 112 has remained on public health.

When first passed, Congress clearly intended the CAA to force aggressive EPA regulation of HAPs under CAA Section 112(a)(1).⁷⁴ The Nixon Administration was less enthusiastic, recommending unsuccessfully during Conference proceedings that the entirety of Section 112 be removed.⁷⁵ In practice, however, the first two decades of the CAA’s existence saw little action taken by EPA to designate and control substances as HAPs.

B. Regulating Mercury as a HAP: 1971-1989

1. Mercury Emissions and HAP Regulations in the CAA’s First Decade

Despite the nominal strength of the HAP provisions, their reliance on the initiative of the executive branch quickly proved a barrier to regulation. Shortly after the creation of both EPA and the CAA, the Nixon administration, worried particularly about the cost of CAA regulations, quickly put in institutional measures to limit EPA’s effective power by allowing the Office of Management and Budget (OMB) a significant oversight role.⁷⁶ Nixon’s willingness to limit EPA’s effectiveness so quickly after its creation was likely a result of personal frustration; after disappointing results from the 1970 Congressional elections, and resentful over a perceived lack of credit from environmentalists for what he accomplished, Nixon likely saw far less political gain to be had from siding with those environmentalists of whom he characterized in a meeting with auto industry executives as interested in “destroying the system.”⁷⁷ The CAA especially was “[c]onservative critics’ main target during the 1970s.”⁷⁸

72. 42 U.S.C. § 7412(a)(1) (1988).

73. *See id.* § 7412(b)(1)(B) (no mention of cost).

74. *Id.* § 7412(b)(1)(B); *see also* Graham, *supra* note 66, at 110, 131, 147–50.

75. Graham, *supra* note 66, at 106 & n.39.

76. Robert V. Percival, *Checks Without Balance: Executive Office Oversight of the Environmental Protection Agency*, 54 L. & CONTEMP. PROBS. 127, 132–33 (1991); *see* Robert F. Durant, WHEN GOVERNMENT REGULATES ITSELF: EPA, TVA, AND POLLUTION CONTROL IN THE 1970s 26–44 (1985).

77. RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 77 (2004); J. BROOKS FLIPPEN, NIXON AND THE ENVIRONMENT 142 (2000). For a more favorable view of Nixon’s environmental legacy, *see* Russell E. Train, *The Environmental Record of the Nixon Administration*, 26 PRESIDENTIAL STUD. Q. 185 (1996). The first EPA Administrator, William Ruckelshaus, would later state that Nixon was incurious about EPA and the issues it addressed, noting, “he [Nixon] never asked me about anything going on in EPA. Never.” Michael Gorn, *William D. Ruckelshaus: Oral History Interview*, EPA (Jan. 1993), <https://archive.epa.gov/epa/aboutepa/william-d-ruckelshaus-oral-history-interview.html>.

78. LAYZER, *supra* note 16, at 63.

Nevertheless, in 1971, EPA included mercury in its first proposed list of HAPs, but proposed standards only for chlor-alkali and ore processing facilities.⁷⁹ EPA failed to promulgate actual emissions standards within the statutory deadline following listing, finally doing so in 1973 after being sued by the Environmental Defense Fund (EDF).⁸⁰ EPA's final rule applied only to the proposed sources, and then only to prevent emissions of 1 ppm or over—in other words, levels that were considered high enough to be potentially dangerous outside any bioaccumulation process.⁸¹ In implementing this rule, EPA acknowledged that methylmercury was “by far the most hazardous mercury compound, particularly via the ingestion of fish,” but declined to regulate source mercury emissions based on whether they increased environmental mercury as a whole, offering as a rationale that “[c]urrent data on the environmental transport of mercury do not permit a clear assessment of the effect of mercury emissions into . . . aquatic and terrestrial environments.”⁸²

When the first HAP standards for mercury were promulgated there existed a large and proliferating body of research on bioaccumulation and biomagnification, health effects, and an understanding among the scientific and engineering community that EGUs emitted mercury in significant amounts.⁸³ However, the same time period also saw EGUs having difficulty meeting the electricity needs of the public, shortfalls that many at the time believed would be exacerbated by environmental regulations.⁸⁴ By the time the final rule was promulgated in April 1973, the economic outlook was grim, as the stock market had crashed a few months before, and an energy crisis was clearly on the horizon. When Gerald Ford succeeded Nixon in the wake of the Watergate scandal, the country was firmly in the grips of that crisis. While environmentalists had some hope that Ford would be friendly to environmental initiatives given his experience as a federal park ranger, he took little action on the environmental front either for or against regulation, ending with an “environmental slate” that was “clean, albeit empty.”⁸⁵

79. List of HAPs, 36 Fed. Reg. 5931 (Mar. 31, 1971) (listing mercury as HAP); Nat'l Emission Standards for HAPs, 36 Fed. Reg. 23,239 (Dec. 7, 1971) (to be codified at 40 C.F.R. pt. 61) (proposing emissions standards).

80. *Env'tl. Def. Fund v. Ruckelshaus*, 3 ENVTL. L. REP. 20,173 (D.D.C. 1973) (ordering EPA to promulgate emissions standards for asbestos, beryllium, and mercury, within sixty days from the entry of the court's order); 38 Fed. Reg. 8820, 8826 (Apr. 6, 1973).

81. 38 Fed. Reg. at 8824.

82. *Id.* at 8824–25.

83. VICTOR W. LAMBOU, U.S. ENVTL. PROTECTION AGENCY, REPORT ON THE PROBLEM OF MERCURY EMISSIONS INTO THE ENVIRONMENT OF THE UNITED STATES 14–19, 28 (1972), <https://nepis.epa.gov/Exe/ZyPDF.cgi/9101H8V5.PDF?Dockey=9101H8V5.PDF>. This EPA report was drafted for an international working group on mercury.

84. Philip M. Boffey, *Energy Crisis: Environmental Issue Exacerbates Power Supply Problem*, 168 SCI. 1554, 1556–57 (1970).

85. JACQUELINE VAUGHN SWITZER & GARY BRYNER, ENVIRONMENTAL POLITICS: DOMESTIC & GLOBAL DIMENSIONS 51 (Beth A. Gillett et al. eds., 2d ed. 1998). While in 1976, Ford did sign the Toxic Substances Control Act of 1976 (TSCA), Pub. L. 94-469, 90 Stat. 2003 (codified as amended at 15 U.S.C. §§ 2601–2629 (2012)) and the Resource Conservation and Recovery Act of 1976 (RCRA), Pub. L. 94-580, 90 Stat. 2795 (codified as amended at 42 U.S.C. § 6901–6992K (2012)), both passed with veto-proof majorities in the House and Senate.

In 1974, upon petition from the EDF, EPA proposed amending the HAP list to include among regulated sources of mercury incineration and drying of wastewater treatment plant sludges, limiting mercury emissions from those sources to 3,200 grams a day, which EPA calculated would ensure the same 1 ppm mercury limits on ambient air adjacent to the source.⁸⁶ Again, while recognizing the potential danger of bioconcentration of environmental mercury in fish, it still purported to find too much scientific uncertainty to take action on that issue: “The Agency has become increasingly concerned about the total environmental burden of mercury, however, and is initiating studies to determine how this aspect can most effectively be addressed under the provisions of the Clean Air Act and other authorities.”⁸⁷

On October 14, 1975, EPA published its final rule governing mercury emissions from wastewater treatment plant sludges.⁸⁸ It noted that during the comment period some participants had suggested other sources, including coal-fired EGUs, be included, but rejected such an approach, stating that none of those sources “emit mercury in such quantities that they are likely to cause the ambient mercury concentration to exceed one microgram per cubic meter.”⁸⁹ In 1987, EPA implemented a minor administrative rule to the mercury standards for chlor-alkali plants,⁹⁰ and again considered (or purported to consider) but rejected a commenter’s request that the agency re-evaluate the decision not to regulate EGU-sourced mercury emissions, as well as a separate request that EPA generally “take into account total human exposure to mercury, including deposited mercury in its more toxic methylated forms.”⁹¹ There would be no significant mercury emissions regulations until after the 1990 Amendments; EPA took little action during the Carter administration on regulating HAPs, a decision that disappointed environmentalists,⁹² though Carter did successfully see CAA renewed, and even strengthened in some places.⁹³ During the Carter administration, the National

86. Proposed Amendments to Nat’l Emission Standards for HAPs, 39 Fed. Reg. 38,064, 38,067 (Oct. 25, 1974) (to be codified at 40 C.F.R. pt. 61).

87. *Id.*

88. Amendments to Standards for Asbestos and Mercury, 40 Fed. Reg. 48,297–98 (Oct. 14, 1975) (to be codified at 40 C.F.R. pt. 61).

89. *Id.* at 48,298. However, EPA’s own 1972 report, which reviewed research on mercury emissions, does not paint a particularly disparate picture between the environmental effects of mercury emissions of EGUs and wastewater sludge incineration; see LAMBOU, *supra* note 83.

90. Nat’l Emissions Standards for HAPs; Review and Revision of the Standards for Mercury, 52 Fed. Reg. 8724–28 (Mar. 19, 1987).

91. *Id.* at 8725. While conceding that some coal sources had mercury levels of 8 ppm for subbituminous coal and 3.3 ppm for bituminous coal, and conceding also that under worst case scenarios a large coal-fired plant using 8 ppm coal would reach a ground concentration of 1.0 $\mu\text{g}/\text{m}^3$, the agency concluded that “typically, mercury emissions from coal-fired power plants are expected to be well below the ambient guideline level.” *Id.* EPA’s rationale seems somewhat inconsistent with the fact that EPA had been willing to regulate mercury emissions from sludge incineration even though it “estimate[d] that the largest mercury emissions from an existing sludge incinerator . . . is approximately one-sixth of the maximum allowable emission.” 40 Fed. Reg. at 48,298.

92. Graham, *supra* note 66, at 112.

93. *E.g.*, Clean Air Act Amendments of 1977, Pub. L. 95-95, § 106, 91 Stat. 685 (codified at 42 U.S.C. § 7409(d) (2012)); see also LAYZER, *supra* note 16, at 68 As noted above, the PSD provisions were implemented through the 1977 Amendment. See sources cited *supra* note 56.

Research Council released a comprehensive assessment of environmental mercury and its possible health impacts, warning that mercury emissions from EGUs were of “special concern,” since such emissions were “currently uncontrolled and the use of coal [was] expected to increase significantly.”⁹⁴

Despite EPA’s refusal to consider bioaccumulation and biomagnification processes when regulating mercury under CAA, during the 1970s both EPA and FDA did consider it in other contexts. In 1973, the FDA promulgated an action level of .5 ug/g of mercury (or .5 ppm) for seafood, allowing them to remove seafood meeting that action level from the market.⁹⁵ EPA’s own position on mercury-based pesticides and fungicides played out far differently than it did for EGU-sourced mercury. The Fungicide, Insecticide, Fungicide and Rodenticide Act of 1947 (FIFRA)⁹⁶ originally allowed the Department of Agriculture to suspend registrations of pesticides that posed an “imminent hazard” to the public, though the notoriously agribusiness-friendly department did not vigorously exercise that power.⁹⁷ When that suspension power was transferred to EPA,⁹⁸ the agency quickly took action to cancel the registration of mercury-containing pesticides and fungicides based substantially on their environmental and health impacts, primarily based on their tendency to bioaccumulate and biomagnify through food webs.⁹⁹

2. 1980-1989: The Anti-Regulation Backlash and the Reagan Revolution

Whatever the evolving scientific consensus stated, the 1980 election of the fiercely anti-regulation Ronald Reagan made serious oversight of EGU emissions by the executive branch extremely unlikely; the 1980s would see particularly bruising legislative fights over environmental protections, especially those regarding air pollution.¹⁰⁰ The seeds of the anti-regulatory backlash had been planted in the 1960s and 1970s through the development of a “conservative infrastructure” in the form of think tanks and lobbying organizations funded by industry and staffed by fiercely pro-business conservative intellectuals. In President Reagan, those organizations found a champion willing to fight enthusiastically and publicly against environmental protection measures.

94. NAT’L RESEARCH COUNCIL, AN ASSESSMENT OF MERCURY IN THE ENVIRONMENT 29 (1978).

95. See Kelly Joyce, *Is Tuna Safe? A Sociological Analysis of Federal Fish Advisories*, in MERCURY POLLUTION: A TRANSDISCIPLINARY TREATMENT 79 (Sharon L. Zuber & Michael C. Newman eds., 2011).

96. Fungicide, Insecticide, Fungicide and Rodenticide Act of 1947, ch. 125, 61 Stat. 163 (1947) (codified as amended at 7 U.S.C. §§ 136–136y (2012)).

97. 7 U.S.C. § 136d(b), (c) (2012).

98. Reorganization Plan No. 3 of 1970, § 2(a)(8)(i), 35 Fed. Reg. 15,623, (Oct. 6, 1970), *reprinted in* 84 Stat. 2086 (1970).

99. See Certain Products Containing Mercury: Cancellation of Registration, 37 Fed. Reg. 6419–20 (Mar. 29, 1972); see also Chapman Chemical Co., 1 E.A.D. 199, 214 (1976) (“[I]n the aquatic environment . . . highly toxic methyl mercury by natural biomethylation poses a significant risk to man and the environment. I am persuaded that registrants’ evidence in support of the opposite suggests a greater optimism than scientific caution. Based on the evidence as a whole, I cannot share that optimism.”).

100. See Graham, *supra* note 66, at 113–15.

Accordingly, while Nixon had sought political capital from a public display of environmental advocacy, Reagan in many ways did the opposite. He intentionally and publicly attacked environmental regulations as a pro-business regulatory reformer.¹⁰¹ Under his administration, EPA officials were heavily recruited from the private sector, including regulated industries, and selected for their “ideological purity” by the White House rather than screened by EPA’s professional personnel. Reagan’s choice for EPA Administrator, the notoriously anti-regulation Anne Gorsuch, slashed her own budget, relaxed environmental regulations, and reduced enforcement actions before being forced to resign.¹⁰²

Faced with significant public and congressional scrutiny over the state in which Gorsuch left EPA, the Reagan administration attempted to bolster its environmental credibility by re-appointing William Ruckelshaus, EPA’s first administrator, as Gorsuch’s successor. Ruckelshaus, a moderate Republican, was fairly well regarded in both political and environmental circles.¹⁰³ However, he was also highly concerned with the potential costs of environmental regulation in general, particularly regarding toxics. His second term as EPA administrator eventually received a mixed review from environmentalists and pro-regulation politicians, though he was considered by some to be the most environmentally-friendly EPA administrator possible under the Reagan administration.¹⁰⁴ On HAP regulation, he did little other than promise impending regulatory measures that in large part failed to materialize. In a statement given to the House Subcommittee on November 7, 1983, Ruckelshaus addressed the failure of EPA to regulate many proposed HAPs by blaming in large part the language of §112 itself:

In implementing the provisions of section 112, the EPA has had to make some uncomfortable compromises. We took it as given that Congress did not intend for us to virtually ban a number of major industrial chemicals. We have, therefore, made judgments about safety, about the appropriate balancing of risks and cost We believe that we are in accord with the real intent of

101. See LAYZER, *supra* note 16, at 9. See generally Michael E. Kraft & Norman J. Vig, *Environmental Policy in the Reagan Presidency*, 99 POL. SCI. Q. 415, 426–33 (1984) (discussing the Reagan administration’s environmental policy and regulation reform).

102. See Kraft & Vig, *supra* note 101, at 426–31. Gorsuch’s resignation was prompted by the increasingly public battles with Congress and negative press focused attention that focused not only on her extreme antipathy towards environmental regulations but also on charges of political favoritism and corruption JOEL A. MINTZ, ENFORCEMENT AT THE EPA 57–58 (1995).

103. Ruckelshaus’ reputation for integrity (Nixon referred to him as “Mr. Clean”) led to him being appointed acting director of the FBI, and then Deputy Attorney General, as the Watergate affair began to take its toll on the Nixon White House. See FRED EMERY, WATERGATE: THE CORRUPTION OF AMERICAN POLITICS AND THE FALL OF RICHARD NIXON 397–99 (1995).

104. See Philip Shabecoff, *E.P.A.: Apres Ruckelshaus le Deluge?*, NY TIMES (Dec. 3, 1984), <http://www.nytimes.com/1984/12/03/us/epa-apres-ruckelshaus-le-deluge.html> (“Without paradox, spokesmen for groups that had been his severest critics expressed dismay and anxiety over Mr. Ruckelshaus’s impending departure . . . he was the best Administrator they could hope for while Mr. Reagan was in the White House.”).

Congress and that the flexibility to balance risks and costs is an essential part of EPA's ability to carry out its mission.¹⁰⁵

Though Ruckelshaus argued EPA had been operating as it expected Congress wanted it to, Congress would later disagree.¹⁰⁶ Materials provided to Congress indicate that in the early 1980s at least some EPA employees intended to carry out health assessments of a number of potential HAPs from sources not already regulated, but at the same time the agency also appeared to intentionally put up procedural roadblocks to delay those assessments.¹⁰⁷ In 1983, the GAO investigated EPA's management of regulation under Section 112 in light of its failure to list additional HAPs, including thirty-seven priority pollutants already identified by EPA.¹⁰⁸ In its report, the GAO concluded that a number of institutional barriers prevented effective regulation under Section 112, including extensive internal reviews of health assessment documents, a lengthy Science Advisory Board review process, and EPA's insistence on collecting "economic and technological factors" impacting HAP regulation – which the GAO noted were improper under the statute in light of the fact that Section 112 did not provide for those kinds of analyses.¹⁰⁹

3. *Mercury and Toxics Regulations During the CAA's First Two Decades: Context and Conclusions*

While environmentalists hoped that CAA would significantly limit what industry could emit to the air, when it came to HAPs that optimism proved unwarranted through the CAA's first two decades. While restrictions on criteria pollutants proved somewhat effective, restrictions on HAPs were scant. Legitimate scientific uncertainty was certainly a factor in this inaction; the health and environmental effects of toxics, particularly those like mercury, which are naturally present in trace amounts and undergo complex transformations in both the environment and organisms, are difficult to detect. The inherent statutory requirements of CAA Section 112 also likely led in some cases to bureaucratic paralysis; as noted above, once a pollutant was listed as a HAP, EPA was required to propose emissions standards, and do so quickly. Furthermore, EPA had to provide an "ample margin of safety" to protect the "public health," without any consideration of cost or feasibility.¹¹⁰ For many candidate HAPs, that "ample margin of safety" would require an unrealistic zero emissions.¹¹¹ In other words,

105. *EPA's Air Pollution Control Program: Hearing Before the Subcomm. on Oversight and Investigations of the H. Comm. on Energy and Commerce*, 98th Cong. 17 (1983) [hereinafter November 1983 Hearings] (statement of William D. Ruckelshaus, Administrator, EPA).

106. See discussion *supra* Section II.C.1, at pp. 34–35.

107. See November 1983 Hearings, *supra* note 105, at 144–46 (Nov. 3, 1983 Memorandum).

108. See COMPTROLLER GEN., U.S. GOV'T ACCOUNTING OFFICE, GAO/RCED-83-199, DELAYS IN EPA'S REGULATIONS OF HAZARDOUS AIR POLLUTANTS (1983), <http://www.gao.gov/assets/150/140586.pdf>.

109. *Id.* at 21–23, 28–35, 43–44.

110. See 42 U.S.C. § 7412(b)(1)(B) (1988) (containing no mention of cost or feasibility).

111. See Health Risk and Economic Impact Assessments of Suspected Carcinogens, 41 Fed. Reg. 21,402 (May 25, 1976) ("Evidence has accumulated that indicates that the no-threshold concept can also be applicable to chemical carcinogens."); see also Graham, *supra* note 66, at 130–31.

once EPA listed a HAP, it was forced to create a rapid and potentially cost prohibitive regulatory scheme, with little flexibility to avoid potentially economically catastrophic consequences. Several commentators during that time period argued that it was this reason, rather than partisan affiliation or environmental ideology, that led to inaction.¹¹² Reducing EGU-sourced mercury in particular would also have been difficult during this time because stringent mercury reduction technologies were unavailable. While anti-regulation forces during this time period failed to substantially weaken CAA due to strong congressional and public resistance, the wide discretion the executive branch enjoyed in rulemaking and enforcement actions allowed EPA to delay regulations, and minimize the impact on industry of those that did get through.

C. The CAA Amendments of 1990 and their Aftermath: 1990-2000

1. Development of the 1990 Amendments

By the end of the 1980s, and despite EPA's earlier promises to Congress, EPA had still only listed eight HAPs under Section 112.¹¹³ In 1988, Congress was faced with a president who had indicated a greater willingness to accept environmental regulations.¹¹⁴ Distrustful of EPA in light of its actions during the Reagan administration, the more pro-environmentally-minded members of Congress began work on what would become the 1990 Clean Air Act

112. *E.g.*, Graham, *supra* note 66, at 116 (“The EPA’s failure to implement section 112 . . . is not simply a reflection of sinister political forces The persistence of implementation problems throughout the section’s history suggests that there may be fundamental statutory and administrative obstacles—in addition to technological and economic barriers—to expeditious control of airborne carcinogens.”); Cross, *supra* note 61, at 220 (“[G]iven the current state of scientific knowledge, there is no demonstrably safe level of human exposure to a carcinogen . . . such a total prohibition makes the agency avoid regulation.”); *Clean Air Act Amendments of 1983: Hearing on S. 768 Before S. Comm. on Env’t and Pub. Works*, 98th Cong. 9 (1984) (statement of Joseph A. Cannon, Assistant Administrator for Air and Radiation, U.S. EPA) (“The simple fact is, an automatic listing requirement might make us make decisions or might require us to make decisions that are not always in the best interest of the country.”); *Clean Air Act Amendments (Part 3): Hearings Before the Subcomm. on Health and the Env’t of the H. Comm. on Energy and Commerce*, 101st Cong. 475 (1989) (statement of Rick Abraham) (former EPA official characterized section 112 as an “example of the perfect being the enemy of the good . . . because of the burdens put on the Agency in trying to do something that isn’t doable, the process got paralyzed”).

113. See Henry A. Waxman, *An Overview of the Clean Air Act Amendments of 1990*, 21 ENVTL. L. 1721, 1774 (1991) (“EPA proved unwilling or unable to mount an effective regulatory program in its twenty-year effort to implement section 112.”); November 1983 Hearings, *supra* note 105, at 2 (“At this moment more than 25 substances are candidates for [HAP] listing at the EPA. Unfortunately, they have been candidates not for weeks or months, but for years. That is a sorry record.”); *Clean Air Act Amendments (Part 3): Hearing Before the Subcomm. on Health and the Env’t of the H. Comm. on Energy and Commerce*, *supra* note 112, at 295 (testimony of David D. Doniger, Senior Att’y, Natural Resources Defense Council) (“In nearly 19 years since the Clean Air Act of 1970 was enacted, EPA has done extraordinarily little to protect the American people and their environment from toxic air pollutants.”).

114. See Susan Page, *Bush Bucks Reagan Over Environment*, NEWSDAY, 17 May 1988, at 15 (discussing then Vice President George Bush’s call for greater environmental protections); Hugh McIntosh, *Catching Up on the Clean Air Act*, 101 ENVTL. HEALTH PERSP. 226, 228 (1993). Nixon had actually considered but rejected George H. W. Bush as the first EPA Administrator, believing his ties to the Texas oil industry would be a political liability. LAZARUS, *supra* note 77, at 76.

Amendments, which incorporated some of the elements of the earlier HAP-related bills but went much further.¹¹⁵

While earlier unsuccessful congressional bills had attempted to force EPA to take action on a number of potential HAPs, the 1990 Amendments went much further, listing 189 pollutants as HAPs and requiring EPA to either remove those pollutants from the list—if it could determine there was adequate data that showed no adverse health or environmental effects—or set emissions standards for each over a ten year period for “major sources” of those pollutants.¹¹⁶ The Amendments defined “major sources” to be those that release 10 tpy of any HAP or 25 tpy or more of any combination of HAPs.¹¹⁷

As an apparent concession to critics’ charge that the Section 112 rulemaking process could result in burdensome results with little flexibility, taking into account logistical and economic complications, the 1990 Amendments also fundamentally changed how HAP emissions standards were to be set. Dropping an absolute requirement that EPA set those standards that “provide[] an ample margin of safety to protect the public health,”¹¹⁸ the 1990 Amendments instead allowed emissions standards for both new and existing sources that reflected “the maximum degree of reduction in [HAP] emissions . . . taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements. . . .”¹¹⁹ The standards developed to implement this “maximum degree of reduction” for HAPs was characterized as the Maximum Achievable Control Technology, or MACT standards. For new sources, the minimum standard, or MACT floor, could not be less stringent than the “best controlled similar source.”¹²⁰ For existing sources, however, the MACT floor could be set at a less stringent standard – “the average emission limitation by the best performing 12% of the existing sources”¹²¹

115. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990). For a detailed account of the legislative history of the 1990 Clean Air Act Amendments by one of its architects, see Waxman, *supra* note 113.

116. 42 U.S.C. § 7412(b)(1)–(3), (e)(1) (2012). A subsequent Congressional joint resolution removed hydrogen sulfide from the list. Act of Dec. 4, 1991, Pub. L. No. 102-187, 105 Stat. 1285 (1991). Since the 1990 CAA Amendments were passed, EPA has only successfully removed three HAPs through the section 112(b)(3)(A) delisting process. Those HAPs are caprolactam, 40 C.F.R. § 63.60 (2016), methyl ethyl ketone, *id.* § 63.61, and ethylene glycol monobutyl ether, *id.* § 60.63.

117. 42 U.S.C. § 7412(a)(1).

118. *Id.* § 7412(b)(9).

119. *Id.* § 7412(d)(2).

120. *Id.* § 7412(d)(3). As with the NSPS provisions of section 111, a “new source” refers to a stationary source constructed or modified after emissions standards have been promulgated. *Id.* § 7412(a)(4).

121. *Id.* § 7412(d)(3)(A). As will be discussed later, EPA has a significant amount of leeway in deciding what makes up that 12% of best performing existing standards. The 1990 Amendments also require the administrator to review residual risks not addressed by MACT standards within 8 years of emissions standards promulgation, and if need be, institute more stringent controls. *Id.* § 7412(f)(2)(A).

2. EGU-Specific HAP Provisions of the 1990 Amendments

The new HAP provisions applied to all major sources except EGUs, where Congress implemented a “unique procedure.”¹²² The original Senate version of the bill sent to conference gave EPA five years after enactment to regulate mercury and particulate HAPs from sources that accounted for at least 90% of the aggregate emissions – which would by necessity include EGUs for mercury as well as other HAPs.¹²³ Even given a five year deadline, the proposed standards deadline for EGU-sourced mercury particularly faced significant resistance from industry and its allies in Congress, nominally due to both scientific and technical uncertainties though the increased costs of mercury controls was almost certainly the primary concern. Furthermore, members of Congress believed that separate acid rain provisions in the bill would also control EGU-sourced HAPs sufficiently to obviate the need for separate HAP standards.¹²⁴

During conference, therefore, language was added to the Section 112 amendments exempting EGUs from the same regulation schedule as other major sources of the 189 pollutants.¹²⁵ Instead, the 1990 Amendments required EPA to first carry out a study (“Utility Study”) to evaluate the risks from EGU-sourced HAPs, particularly mercury, before deciding whether it was “necessary and appropriate” to regulate EGUs under Section 112.¹²⁶ Additionally, Section 112(n) required two other reports to follow: (1) a National Institute of Environmental Health Sciences (NIEHS) report on the level at which mercury becomes dangerous, also due within three years; and (2) an EPA study of EGU-sourced mercury and its potential health impacts, due within four years; EPA study would come to play an outsized role in subsequent debates.¹²⁷ Once the Utility Study was issued, EPA was

122. *See* Michigan v. EPA, 135 S. Ct. 2699, 2705 (2015).

123. S. 1630, 101st Cong. § 112(c)(6), (e)(5)(D) (1990) (as engrossed in Senate).

124. Michigan, 135 S. Ct. at 2715 (Kagan, J., dissenting) (“Congress modified that regulatory scheme for power plants . . . because the 1990 amendments established a separate program to control . . . emissions contributing to acid rain, and many thought that just by complying with those requirements, plants might reduce their emissions of [HAPs] to acceptable levels.”). The costs of additional requirements on coal-fired power plants to address mercury pollution beyond what would be required for acid rain control was certainly a cause of concern. *See, e.g.*, ENVTL. & NAT. RES. POLICY DIV., LIBRARY OF CONGRESS, A LEGISLATIVE HISTORY OF THE CLEAN AIR ACT AMENDMENTS OF 1990, at 779 (1998) (Oct. 27, 1990 statement by Sen. Burdick, Chair of the Senate Environment and Public Works Committee during conference debate: “a full control program . . . to control mercury emissions from coal-fired power plants would double the cost of acid rain control with no expectation of perceptible improvement in public health. . . .”).

125. EGUs would otherwise automatically qualify as “major sources” due to the fact that they release—or have the potential to release—well in excess of the 25 tpy limits of section 112(a)(1), most of that in the form of hydrogen chloride. 42 U.S.C. § 7412(a)(1); U.S. ENVTL. PROT. AGENCY, STUDY OF HAZARDOUS AIR POLLUTANT EMISSIONS FROM ELECTRIC UTILITY STEAM GENERATING UNITS -- FINAL REPORT TO CONGRESS 3-18 to 3-19 (1998) [hereinafter 1998 UTILITY STUDY], <https://www3.epa.gov/ttn/atw/combust/utltox/eurtcl.pdf> (showing HAP emissions from a characteristic coal- and oil-fired EGUs).

126. 42 U.S.C. § 7412(n)(1)(A).

127. *Id.* § 7412(n)(1)(A)–(C). EPA was also tasked with a fourth study to be conducted in cooperation of the National Oceanic and Atmospheric Administration (“NOAA”) examining the contribution of atmospheric HAPs generally to pollution loading in the Great Lakes and coastal waters. *Id.* § 7412(m).

required to rely on it to determine whether it was “appropriate and necessary” to regulate EGU-sourced HAPs.¹²⁸

In 1992, during the time in which the statutorily required studies were in process, President Clinton had assumed office. Though a Democrat, his administration disappointed many environmentalists who felt he was too willing to compromise with regulated industries. Indeed, through most of his tenure EPA mercury and HAP reports went unreleased.¹²⁹

3. *EPA and NRC Mercury Reports: Conclusions and Controversies*

The NIEHS finished its study by 1995,¹³⁰ but EPA’s reports were delayed well past their deadlines, drawing congressional pressure. In May 1997, Sen. Patrick Leahy introduced a resolution on the Senate floor urging EPA to release the mercury report to Congress as required by the 1990 Amendments, though it later died in committee.¹³¹ However, pressure on EPA appeared to work and in December 1997, four years after the statutory deadline, EPA transmitted to Congress its CAA §112(n)(1)(B)-mandated report to Congress (“EPA Mercury Report”). That was followed up shortly after by the Utility Study in February of 1998.¹³²

The 1998 Utility Study identified 67 of the 188 HAPs designated by Congress in the 1990 Amendments as potentially emitted by EGUs.¹³³ Of those 67 HAPs, 14 were identified as “priority” HAPs due to their health impacts, including mercury.¹³⁴ While reportedly close to releasing the report that focused on EGU-sourced mercury and its health impacts in early 1995, that report languished at EPA

128. While the 1990 Amendments did not state the purpose of the NIEHS and EPA studies, the engrossed Senate bill had originally intended them to be filed on EPA rulemaking docket and used when setting post-listing emissions standards. S. 1630 § 112(e)(5).

129. See BENJAMIN KLINE, *FIRST ALONG THE RIVER: A BRIEF HISTORY OF THE U.S. ENVIRONMENTAL MOVEMENT* 126 (4th ed. 2011); GREEN TALK IN THE WHITE HOUSE 162–64 (Tarla Rai Peterson ed., 2004).

130. NIEHS STUDY, EPA-HQ-OAR-2009-3053 (1995). By the time the other reports were released, the NIEHS study had become somewhat dated and does not appear to play a significant role in the post-1999 EGU-sourced mercury debate; its results were effectively assimilated into or superseded by the later EPA and NAS reports. See 2012 MATS Rule, *supra* note 4, at 9370 (“The NIEHS completed the NIEHS Study in 1995 . . . Because NAS completed its study 5 years after the NIEHS Study, and considered additional information not earlier available to NIEHS, for purposes of this document we discuss the content of the NAS Study as opposed to the NIEHS Study.”). Indeed, the actual date of the NIEHS Study report is cited inconsistently—the 1997 MERCURY REPORT and the 1998 HAP Report both give the NIEHS Report an earlier 1993 publication date. 1997 MERCURY REPORT, Vol. VII, at 9-13. It is possible that there was a preliminary 1993 report created before the study as a whole ended, and which is cited in those works. I was unable to obtain a report based on the study; the docket number listed was identified in the regulations, but no document with that identification number listed in is available from the Federal government’s centralized rulemaking website, <http://regulations.gov> or EPA’s archived reports at the National Service Center for Environmental Publications (NSCEP). I sent a request to NIEHS for this report but received no response.

131. S. Con. Res. 28, 105th Cong. (1997) (“A concurrent resolution expressing the sense of Congress that the Administrator of the [EPA] should take immediate steps to abate emissions of mercury and release to Congress the study of mercury required under the Clean Air Act”).

132. See 1998 UTILITY STUDY, *supra* note 125.

133. *Id.* at ES-4.

134. *Id.* at ES-6.

in draft form until 1998, most likely due to pressure from not only the utility industry, but also from representatives of the seafood industry who were worried about public perception of mercury risks from fish.¹³⁵

What the 1997 EPA Mercury Report lacked in timeliness it made up for in scale; it consisted of eight volumes and included in-depth analyses of anthropogenic sourcing, fate and transport, human health and environmental exposure, and potential mercury control technologies with their attendant costs.¹³⁶ Reviewing the scientific literature, the report concluded that there was “a plausible link between mercury emissions from anthropogenic combustion and industrial sources and mercury concentrations in air, soil, water and sediments . . . and methylmercury concentrations in freshwater fish.”¹³⁷ The 1997 EPA Mercury Report also concluded that EGUs had surpassed municipal waste combustors and medical waste incinerators as the largest “identifiable” anthropogenic sources of mercury emissions to the atmosphere; it estimated EGU mercury emissions at approximately 52 tons in 1994-1995, accounting for 33% of total anthropogenic emissions.¹³⁸

Both proponents and opponents of EGU mercury regulations drew on the Report, with the former arguing it showed action was needed to protect the vulnerable populations identified, and the latter claiming it showed that for most Americans methylmercury in fish was not a significant threat.¹³⁹ In regards to the vulnerable populations identified in the Report, debates focused on both the limited and contradictory epidemiological data available, and the relative importance of EGU-sourced mercury as a contributor to methylmercury in fish.¹⁴⁰ Faced with the potential for imminent and costly mercury control standards, members of Congress successfully pushed to have the Report’s health assumptions scrutinized by the National Academy of Sciences (NAS), a tactic that had become a frequent means to

135. See Dieter Bradbury, *Congressional Delegation Slow to Respond to Mercury Threat Sen. Olympia Snowe Initially Urged the EPA to Withhold a Controversial Report That Could Result in Stricter Pollution Limits*, PORTLAND PRESS HERALD: THE MERCURY MENACE, Sept. 29, 1997, at A7 (discussing the reasons why EPA withheld the report).

136. See *id.* (mentioning EPA report suggested solutions for cutting mercury in the environment).

137. 1997 EPA MERCURY REPORT, *supra* note 29, Vol. I, at 3-20.

138. See 1997 EPA Mercury Report, *supra* note 29, Vol. II, at ES-4, ES-10, 4-2 tbl.4-2.

139. James Gerstenzang, *EPA Report Raises new Concerns About Mercury; Environment: Study Sees Greater Risk of Toxic Substance Entering the Atmosphere, Food Chain*, L.A. TIMES, DEC. 19, 1997, at 37 (claiming that mercury from EGUs is a greater hazard than previously believed); Jim Nichols, *EPA Calls for Mercury Watch Utilities, Miners Fear for Future of Coal-Fired Plants*, PLAIN DEALER, June 15, 1998, at 1B (stating that EPA’s position against mercury from coal-fired EGUs is shaky as EPA’s assumptions about the health risks of mercury “are based on extrapolation, not direct testing”).

140. E.g. *Regional Haze and Mercury Pollution: Hearing Before the Subcomm. on Clean Air, Wetlands, Private Property & Nuclear Safety of the S. Comm. on Env’t & Pub. Works*, 105th Cong. 30-32, 38 (1998) (statement of Gary Myers, Professor of Neurology and Pediatrics, Rochester, New York) (“The results of the Seychelles child development study so far . . . indicate no adverse developmental effects from prenatal methylmercury exposure in the range commonly achieved by consuming large amounts of fish.”); *id.* at 36 (statement of Leonard Levin, Program Manager, Air Toxics Health and Risk Assessment, Electric Power Research Institute) (“[Seychelles] findings, if they’re supported in later analyses, imply that a given mercury level in fish may be less of a threat to human health than formerly believed.”).

both delay environmental decisions as well as subject agency decisions to what some members of Congress perceived as a more scientifically conservative standard of review.¹⁴¹ The targets were the assumptions used by EPA as to what level of mercury level in fish constituted a health risk.¹⁴²

Congress therefore required EPA to contract with NAS to “perform a comprehensive review of mercury health research and prepare recommendations on the appropriate level for a mercury exposure reference dose [RfD].”¹⁴³ If the NAS referral had been a tactic to forestall or thwart mercury regulation, however, it was not particularly successful. In July 2000, the NAS’s National Research Council (NRC) released a report that drew on more recent data from the Seychelles, Faroe, and New Zealand studies, examined the existing body of toxicological and physiological information, and concluded EPA’s RfD was appropriate.¹⁴⁴ The 2000 NRC Report stated that based on the RfD, “over 60,000 newborns annually might be at risk for adverse neurodevelopmental effects from in utero exposure to [methylmercury].”¹⁴⁵ The results were stark; NRC concluded that mercury in fish “is likely to be sufficient to result in an increase in the number of children who have to struggle to keep up in school and who might require remedial classes or

141. JASANOFF, *supra* note 16, at 59 (“Risk-assessment guidelines . . . were generally characterized [by industry representatives] as science, suitable for resolution by accredited expert bodies like the National Academy of Sciences. Industrial groups were convinced that these technocratic organizations would reach conclusions that were scientifically more conservative. . . .”); Heinzerling & Steinzor Part I, *supra* note 10, at 10301 (“In the last few years, referral of regulatory controversies to NAS peer review panels has gone from being a useful tool in complex regulator decisionmaking to becoming a central tactic used to forestall or delay regulation of toxics.”); ORESKES & CONWAY, *supra* note 17, at 64 (“Most historians of science would say that the Academy has an intrinsic conservatism stemming from its dependence on the executive branch . . . Moreover, Academy reports are normally consensus reports . . . [t]he result is often a ‘least common denominator’ conclusion, with a text innocuous enough that everyone involved can agree.”).

142. In examining the potential health impacts of the organomercury forms accumulating in fish, the 1997 EPA MERCURY REPORT used an RfD, or “[a]n estimate . . . of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime,” of .1 µg/kg/day, or one ten millionth of a gram per day. 1997 EPA MERCURY REPORT, *supra* note 29, Vol. I, at 0-2, 3-27 (RfD based on studies of Iraqi grain poisoning victims). RfDs are determined through an oftentimes-complicated process: after a toxic hazard is identified, “dose-response” assessments using epidemiological and/or animal experiments identify the highest level of exposure for which no observed adverse effect is seen. This dose is then multiplied by an “uncertainty factor” to account for scientific uncertainty (and occasionally a “modifying factor” derived through the evaluators’ professional judgment) in order to create the RfD, which can then start as the base from which to evaluate the health impacts of the toxic chemical on human populations. The less data available, the higher the uncertainty factor is set and therefore the lower the RfD. Somewhat paradoxically, even where additional research shows a substance is more toxic than originally believed, the RfD might go down because there is less need of uncertainty levels. See generally Michael L. Dourson et al., *Uncertainties in the Reference Dose for Methylmercury*, 22 NEUROTOXICOLOGY 677 (2001).

143. H.R. REP. NO. 105-276, at 282 (1998).

144. See 2000 NRC REPORT, *supra* note 32, at 326–27. The NRC dose-response assessment resulted in a benchmark dose level of 12 ppm, as compared to EPA’s 11 ppm.

145. *Id.* at 325.

special education [T]he long-term goal needs to be a reduction in the concentrations of [methylmercury] in fish¹⁴⁶

4. *The 2000 Listing Rule: EPA Finally Regulates EGU-Sourced Mercury*

On December 20, 2000, faced with an incoming administration that was likely to be far less friendly to pollution control regulations, and armed with strong scientific support from the new NRC report, the promulgated the 2000 Listing Rule, holding that it was “appropriate and necessary” that EGUs be regulated under CAA Section 112(c).¹⁴⁷ Citing the 1998 Utility Study, the Rule discussed multiple HAPs of concern being emitted from EGUs, but relied principally on EGU-sourced mercury to justify its determination, noting “there is a plausible link between methylmercury concentrations in fish and mercury emissions from [EGUs].”¹⁴⁸ The 2000 listing rule did not impose specific regulatory requirements, stating that EPA would later subcategorize EGU source categories and set emissions “floors” for those categories for mercury and the other HAPs.¹⁴⁹

5. *Mercury Emissions Regulations in the 1990’s: Context and Conclusions*

While the 1990 Amendments dramatically reshaped air toxics regulations under CAA, EGU-sourced mercury and other HAPs escaped mandatory regulation pending further investigation. In 1992, a Democratic administration came to power, which many expected to be somewhat more amenable to regulation and more focused on the benefits of environmental regulations rather than simply the costs. However, President Clinton still employed a more pro-business, anti-regulatory-cost rhetoric than many Democrats preferred, and in 1994, a conservative Republican majority captured both houses of Congress, and made removing or weakening environmental protection laws and regulations one of their primary goals through both substantive statutory changes as well as significantly reducing EPA’s budget for enforcement of environmental laws, particularly of CAA and the Clean Water Act.¹⁵⁰ These political fights may have resulted in a level of caution at EPA that delayed release of the reports until late in President Clinton’s second

146. *Id.* at 9. So stark was the conclusion that even the power industry appeared to accept the panel’s conclusions, “shifting the debate over mercury regulation from if to how.” Andrew C. Revkin, *Milestone Report on Mercury Emissions*, N.Y. TIMES (July 12, 2000), <http://www.nytimes.com/2000/07/12/us/milestone-report-on-mercury-emissions.html>.

147. 2000 Listing Rule, *supra* note 4, at 79,826. EPA would later note that the HAP reductions expected from acid rain controls set forth in the 1990 Amendments—the putative reason why EGU-sourced contaminants were not designated HAPs at the time—had turned out lower than expected. *See Proposed Supplemental Finding That it is Appropriate and Necessary to Regulate HAPs From Coal- and Oil-Fired EGUs*, 80 Fed. Reg. 75,025, 75,036–37 (Dec. 1, 2015).

148. 2000 Listing Rule, *supra* note 4, at 79,830.

149. *Id.* An industry group quickly appealed the 2000 listing decision to the D.C. Circuit, but the case was dismissed on the grounds that HAP listings under 42 U.S.C. § 7412(e)(4) are not subject to review until emissions standards are set. *Util. Air Regulatory Grp. v. EPA*, No. 01-1074, 2001 WL 936363, (D.C. Cir. July 26, 2001) (per curiam).

150. *See LAZARUS, supra* note 77, at 125–40.

term, possibly aided by industry pressure, as might the agency's realization that at the time it would be difficult to institute stringent mercury pollution controls.¹⁵¹ Throughout the 1990s, the number of fish consumption advisories based on mercury levels increased, though for most of the decade regulations under CAA remained in stasis pending the outcome of the various statutorily-required reports on mercury and HAP. The 2000 Listing Rule, however, would lead to a far more active debate in the 2000s and beyond.

D. Regulatory Battles and Atmospheric Ideologies: 2001-Present

1. *The Anti-Regulatory Redux: George W. Bush's Pollution Policy*

Under CAA Section 112(c)(5), the 2000 Listing Rule required emissions standards for EGU-sourced mercury and other HAP be promulgated within two years. Shortly after the 2000 Listing Decision, however, George W. Bush was inaugurated. A former oil company executive (like his Vice-President, Dick Cheney), who ran on an explicitly anti-regulatory platform, his time in office saw attempted rollbacks of the fairly modest regulations issued by the Clinton-era EPA and significant efforts to substantially relax federal pollution control laws, particularly the CAA.¹⁵² The Bush administration had promised in its 2002 budget to “reform the current single-pollutant approach to regulating existing electric utility plants with a multi-pollutant approach, which would provide regulatory certainty to utilities, phase in reductions over a reasonable period, and make use of market-based incentives to further clean up the environment.”¹⁵³ EPA justified multi-pollutant approaches on the grounds that many pollutants had common emissions sources, control technologies, and interacted with each other in a way that impacted exposure pathways and risks.¹⁵⁴ A multi-pollutant approach was not a new one; that policy approach grew out of converging trends of technological advancements in emissions controls in the 1990s that could eliminate multiple contaminants, as well as growing scientific awareness that air pollutants interacted with each other in the atmosphere and human bodies in ways different than when by themselves.¹⁵⁵ While environmentalists initially considered President Bush's ascension to the presidency a potential environmental catastrophe in light of his anti-regulatory rhetoric, oil industry experience, and his pro-industry record as

151. See 1997 EPA MERCURY REPORT, *supra* note 29, Vol. VIII, at 6-2 (“Given the relative low maturity level of these technologies being tested, commercial deployment is still several years away.”).

152. See EMILY COUSINS ET AL., NAT. RES. DEF. COUNCIL, REWRITING THE RULES: THE BUSH ADMINISTRATION'S FIRST-TERM ENVIRONMENTAL RECORD (Special ed. 2005), <https://www.nrdc.org/sites/default/files/tr2005.pdf>.

153. PRESIDENT GEORGE W. BUSH, A BLUEPRINT FOR NEW BEGINNINGS: A RESPONSIBLE BUDGET FOR AMERICA'S PRIORITIES, 73–74 (2001), <https://www.gpo.gov/fdsys/pkg/BUDGET-2002-BLUEPRINT/pdf/BUDGET-2002-BLUEPRINT.pdf>.

154. See U.S. ENVTL. PROT. AGENCY, THE MULTI-POLLUTANT REPORT: TECHNICAL CONCEPTS AND EXAMPLES 1-1 to 1-2 (2008), https://archive.epa.gov/airquality/aqmp/web/pdf/20080702_multipoll.pdf.

155. See generally Suzanne Shelley & Charles B. Sedman, *Controlling Emissions from Fuel and Waste Combustion: Newer Methods Look to Remove Multiple Contaminants*, 106 CHEMICAL ENGINEERING 82 (1999).

Governor of Texas,¹⁵⁶ they did support a multi-pollutant approach in theory, particularly in light of EPA Administrator Christine Todd Whitman's public acknowledgment that global warming was occurring and suggestion that carbon dioxide regulation would be included as a co-regulated pollutant.¹⁵⁷

a. The Clear Skies Plan and Mercury

In February 2002, Bush released more details about his "multi-pollutant" approach with his "Clear Skies Initiative," an approach to EGU emissions which sought to replace traditional emissions standards approaches with a multiple-pollutant, cap-and-trade plan similar to the one that had been created to control acid rain in the early 1990s. As originally announced, the Initiative promised to reduce sulfur dioxide emissions by 73%, nitrogen oxide emissions by 67%, and mercury emissions by 69% by 2018.¹⁵⁸ Environmental groups criticized the Initiative,¹⁵⁹ believing the bill did not go nearly far enough in reducing EGU emissions of SO₂ and NO_x, and would be far less stringent than the 90% reduction in mercury emissions EPA had predicted under the post-2000 MACT standards. Introduced as identical bills in both the House and the Senate in July 2002, and reintroduced in substantively identical form in 2003 and 2005,¹⁶⁰ the Clear Skies Act was the cornerstone of the Bush administration's air pollution policy.

The Clear Skies Plan and its proposed implementing legislation caused a massive backlash from the environmental community, and were fiercely opposed by Democratic members of Congress from the beginning, never making it out of committee.¹⁶¹ Though Republicans attempted to keep different versions of the Clear Skies Act alive over the next few years, after March 2005, it was effectively dead as a legislative proposal.¹⁶² During the fight over the Clear Skies Plan, Democrats introduced competing multi-pollutant bills that would have led to more significant reductions in mercury emissions, though none were successful either.¹⁶³

156. See Jim Yardley, *On the Record: Governor Bush and the Environment; Bush Approach to Pollution: Preference for Self-Policing*, N.Y. TIMES (Nov. 9, 1999), <http://www.nytimes.com/1999/11/09/us/record-governor-bush-environment-bush-approach-pollution-preference-for-self.html>.

157. Eric Pianin, *EPA Mulls Limits for Power Plant Emissions; Environmentalists Laud White House Effort on Pollution*, WASH. POST, Feb. 28, 2001, at A13. Shortly after, Whitman would be informed by President Bush that he had changed his mind, and that he had made a mistake calling CO₂ a pollutant. John J. Fialka & Jeanne Cummings, *How the President Changed His Mind on Carbon Dioxide*, WALL ST. J., Mar. 15, 2001, at A20.

158. Press Release, *President Announces Clear Skies & Global Climate Change Initiatives*, THE WHITE HOUSE (Feb. 14, 2002, 2:05 PM), <http://georgewbush-whitehouse.archives.gov/news/releases/2002/02/20020214-5.html>.

159. See LAYZER, *supra* note 16, at 284.

160. Clear Skies Act of 2002, H.R. 5266, 107th Cong. (2002); Clear Skies Act of 2002, S. 2815, 107th Cong. (2002); Clear Skies Act of 2003, H.R. 999, 108th Cong. (2003); Clear Skies Act of 2003, S. 485, 108th Cong. (2003).

161. See Rugh, *supra* note 10.

162. See Mary Curtius & Tom Hamburger, *Bush's Clear Skies Act Stalls in the Senate*, L.A. TIMES (March 10, 2005), <http://articles.latimes.com/2005/mar/10/nation/na-skies10>.

163. In the Senate, Vermont's James Jeffords introduced the Clean Power Act, which sought to reduce EGU-sourced emissions of SO₂, NO_x, CO₂, and mercury through a new CAA provision. Clean Power Act of 2001, S. 556, 107th Cong. (2001); Clean Power Act of 2003, S. 366, 108th Cong. (2003). His colleague Sen. Carper would later introduce the Clean Air Planning Act, which offered a more

b. A Change in Strategy: Instituting a Cap-and-Trade Plan Through the Rulemaking Process¹⁶⁴

Through 2004, even while President Bush was trying to convince Congress to accept his Clear Skies alternative, EPA still appeared to be moving (if slowly and begrudgingly) towards finally releasing MACT standards under Section 112.¹⁶⁵ The agency had convened a working group which met fourteen times between March 2001 and March 2003 to discuss the proposed Section 112 rule,¹⁶⁶ and the members of the group were charged specifically to determine an appropriate MACT standard for mercury.¹⁶⁷ In December 2001, EPA had informed an industry group that the MACT standards under development could reduce EGU mercury emissions by 90% by 2008.¹⁶⁸

However, behind the scenes, Bush EPA appointees appeared to have been secretly working on a different objective.¹⁶⁹ While the MACT group was meeting to develop the MACT standards, political appointees at EPA's Office of Air and Radiation quietly worked to implement a version of the Clear Skies Act's failed cap-and-trade scheme for mercury through EPA rulemaking. On April 1, 2003, a planned fifteenth meeting for the MACT group was cancelled and never rescheduled,¹⁷⁰ though the head of EPA's Air and Radiation Office assured

stringent cap-and-trade program for mercury as well as SO₂, NO_x, and CO₂. Clean Air Planning Act of 2003, S. 843, 108th Cong. (2003); Clean Air Planning Act of 2007, S. 1177, 110th Cong. (2007). The Energy Information Agency conducted a comparative analysis of the three competing plans, finding reductions in all pollutants, particularly mercury, were highest under the Clean Power Plan and lowest under the Clear Skies Plan. See ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, SR/OIAF/2004-05, ANALYSIS OF S. 1844, THE CLEAR SKIES ACT OF 2003; S. 843, THE CLEAN AIR PLANNING ACT OF 2003; AND S. 366, THE CLEAN POWER ACT OF 2003 (2004).

164. For a comprehensive account of the circumstances that led up to the 2004 Proposed Rule, see Heinzerling & Steinzor Part I, *supra* note 10.

165. Heinzerling & Steinzor Part II, *supra* note 10, at 10488.

166. Proposed Nat'l Emission Standards for HAPs; and in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: EGUs, 69 Fed. Reg. 4652, 4656 (Jan. 30, 2004) (to be codified at C.F.R. pts. 60, 63) [hereinafter 2004 Proposed Clean Air Mercury Rule, or 2004 Proposed CAMR].

167. Heinzerling & Steinzor Part I, *supra* note 10, at 10306.

168. CLEAN AIR TASK FORCE & NAT. RES. DEF. COUNCIL, THE BUSH ADMINISTRATION'S PROPOSED AIR POLLUTION LEGISLATION: MORE MERCURY POLLUTION, HIGHER HEALTH RISKS, at *2, <http://www.savethecleanairact.org/pdf/FS-S-131-Mercury.pdf>.

169. The following year, the Natural Resources Defense Council would show that at an April 2001 meeting the Edison Electric Institute, an influential industry group, a lobbyist assured energy sector representatives that the Bush administration would use EPA rulemaking to institute both criteria and hazardous pollutant restrictions that "won't be . . . robust" with the "goal here . . . to gain a foothold, an irreversible foothold on the next generation of reasonable cost effective SO₂ and NO_x reduction, plus air toxics that we can all live with and that someone else can't undo." *The Clear Skies Act of 2005: Hearing Before the S. Comm. On Env't and Pub. Works*, 109th Cong. 254-57 (2005) (transcript of speech by Quinn Shea, Senior Director for Environmental Activities, Edison Electric Institute).

170. Heinzerling & Steinzor Part II, *supra* note 10, at 10489; Tom Hamburger & Alan C. Miller, *Mercury Emissions Rule Geared to Benefit Industry, Staffers Say*, L.A. TIMES (Mar. 16, 2004), <http://articles.latimes.com/2004/mar/16/nation/na-mercury16/3>; Eric Pianin, *EPA Led Mercury Policy Shift; Agency Scuttled Task Force That Advised Tough Approach*, WASH. POST, Dec. 30, 2003, at A17.

suspicious members of Congress that while EPA advocated passage of the Clear Skies Act, it still would provide a MACT standard.¹⁷¹

When EPA finally released its 2004 proposed “Clean Air Mercury Rule” (CAMR) to regulate EGU-sourced HAP, it did propose Section 112 MACT restrictions that EPA forecast would reduce mercury emissions by thirty-four tons in 2010 and thirty-one tons in 2020—standards far weaker than what the working group had anticipated.¹⁷² Because no existing EGUs had installed mercury-specific emissions reduction equipment, EPA had significant freedom in determining the MACT floors for both new and existing sources, and took advantage of it by subcategorizing EGUs by coal type, then using a combination of emissions tests, mercury composition of the coal used, and a statistical corrective that assumed each plant was emitting mercury at its peak level.¹⁷³ The proposed standards for new sources were based on the statutorily required “best-controlled similar source” which EPA determined were PM and flue gas control measures, with emissions standards calculated through a similar process as determined the MACT floor for existing units.¹⁷⁴

As surprising as the extremely weak MACT standards were to observers (including the MACT working group), even more surprising were the non-MACT-based cap-and-trade alternatives that EPA proposed. The first proposed cap-and-trade rule was based on a provision in Section 112(n)(1)(A) that required EPA to report “alternative control strategies for emissions” in the 1998 Utility Study. EPA had followed this requirement in the report, describing in detail a number of alternate control strategies, including technological controls like coal cleaning and gasification, as well as energy conservation and management practices, but did not include cap-and-trade as a control strategy for mercury.¹⁷⁵ In the 2004 proposed CAMR, EPA argued that this reporting obligation also gave it the authority to

171. *The Clear Skies Initiative: A Multipollutant Approach to the Clean Air Act: Hearing Before the Subcomm. on Energy and Air Quality of the H. Comm. on Energy and Commerce*, 108th Cong. 95 (2003). When asked about whether MACT mercury modeling had been done, the head of EPA’s Office of Air and Radiation hedged, stating “[w]e are doing all the analysis we need to do.”

172. 2004 Proposed CAMR, *supra* note 166, at 4706. The proposed rule only applied to EGUs of more than 25 megawatts generating capacity that provided electricity for sale. *Id.* at 4727. In addition to mercury, the Proposed CAMR also proposed regulating nickel emissions from oil-fired utilities, but none of the other HAPs discussed in the 2000 Listing Decision. *Id.* at 4689.

173. *Id.* at 4668–82. For a detailed critique of the means by which EPA calculated the MACT floor, see MICHAEL AUCOTT & LEO KORN, N.J. DEPT. OF ENVTL. PROT., EPA’S PROPOSED MACT FLOOR STANDARDS FOR MERCURY EMISSIONS FROM COAL-FIRED UTILITY UNITS (2004), <http://www.nj.gov/dep/dsr/mercury/mact.pdf>. Henry Waxman, one of the primary architects of the 1990 Amendments, had been concerned about the possible abuse of determining MACT standards by categories shortly after passage. See Waxman, *supra* note 112, at 1777. While Rep. Waxman notes that in §112(c)(1) Congress mandated that any such categories “be consistent with the list of source categories established pursuant to section [111], [the New Source], and part C, [prevention of significant deterioration provisions],” the actual language of the provision only requires EPA do this to “the extent practicable,” and explicitly states that “nothing in [the sentence cited by Rep. Waxman] limits the Administrator’s authority to establish subcategories under this section, as appropriate.” 42 U.S.C. § 7412(c)(1) (2012).

174. 2004 Proposed CAMR, *supra* note 166, at 4677–93.

175. See 1998 UTILITY STUDY, *supra* note 125, 13-1 to 13-47 (“Alternative Control Strategies for Hazardous Air Pollutant Emissions Reductions”).

implement one of the alternative control strategies, apparently including one that it never reported on in the Utility Study.¹⁷⁶

The proposed rule also offered a parallel cap-and-trade plan under Section 111(a)(1), a provision that, while not explicitly allowing such a program, does not explicitly foreclose on one.¹⁷⁷ However, before implementing such a cap-and-trade plan under Section 111, EPA would have to somehow delist mercury as a HAP, since pollutants cannot be regulated under both Section 111 and Section 112. Both the Section 111(d) and Section 112(n)(1)(A) cap-and-trade alternatives would cap mercury emissions at an undisclosed amount in 2010 determined by the co-benefits of SO₂ and NO_x reductions projected from another proposed rule published that day, the proposed Clean Air Interstate Rule.¹⁷⁸ The caps were based on the proposed Section 112 MACT floors, but the cap-and-trade system would allow not only banking of unused allowances, but provided a “safety valve” provision that capped allowance costs at \$2,187.50 per ounce, making it potentially less expensive for some EGUs to simply buy allowances instead of even attempting to limit emissions.¹⁷⁹ EPA followed the 2004 Proposed CAMR with a Notice of Data Availability (NODA), proposing a process for quantifying the mercury deposition and bioaccumulation impact of the proposed rule.

c. The Backlash Against the Proposed CAMR

While environmentalists have frequently invoked the accusation that industry is often allowed to write the regulations, for the 2004 Proposed CAMR this was not hyperbole; the proposed rule contained numerous legal arguments that mirrored almost exactly memoranda submitted by attorney lobbyists from the law firm at which both the head of EPA’s Office of Air and Radiation and his principle deputy had worked before joining EPA—who argued for a cap-and-trade system.¹⁸⁰

176. 2004 Proposed CAMR, *supra* note 166, at 4661–62 (“Because Congress directed EPA to develop control strategies that would be alternatives to the usual section 112(d) MACT standard, it is reasonable to conclude that Congress authorized EPA to implement such alternatives.”).

177. See 42 U.S.C. § 7411(a)(1) (“The term ‘standard of performance’ means . . . the application of the best system of emission reduction . . . (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements). . . .”).

178. 2004 Proposed CAMR, *supra* note 166, at 4698; Proposed Interstate Air Quality Rule (IAQR), 69 Fed. Reg. 4566 (Jan. 30, 2004). Unusually, the Proposed IAQR, a cap-and-trade plan for SO₂, NO_x, and ozone, had been accepted by both industry and environmental groups; however, it would be overturned in 2008 after a small group of utility companies challenged some of its provisions. *North Carolina v. EPA*, 531 F.3d 896, 901 (D.C. Cir. 2008) (per curiam).

179. 2004 Proposed CAMR., *supra* note 166, at 4704. While EPA control costs vary depending on factors such as coal and boiler type, costs for activated carbon injection, generally the most effective mercury control technology, could reach \$50,000 per pound, or \$3,125.00 an ounce. NE. STATES FOR COORDINATED AIR USE MGMT., TECHNOLOGIES FOR CONTROL AND MEASUREMENT OF MERCURY EMISSIONS FROM COAL-FIRED POWER PLANTS IN THE UNITED STATES, at xvi (2010), <http://www.4cleanair.org/Documents/July2010NESCAUMFinalReptHgControlandMeasurementTechsatUSPPs.pdf>.

179. See Proposed Nat’l Emission Standards for HAPs; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources, EGUs: Notice of Data Availability, 69 Fed. Reg. 69,864–78 (Dec. 1, 2004).

180. Eric Pianin, *Proposed Mercury Rules Bear Industry Mark*, WASH. POST (Jan. 31, 2004), https://www.washingtonpost.com/archive/politics/2004/01/31/proposed-mercury-rules-bear-industry-mark/028e1379-0026-4bcb-b7ce-192bbae7b4c6/?utm_term=.686a49ccc080 (“A side-by-side

The cap-and-trade plan and the circumstances surrounding its development evoked quick opposition from internal EPA staff, environmental groups, many states, scientific experts on the mercury issue, and members of Congress.¹⁸¹ MACT working group members and EPA staff reported that technical experts at the agency were cut out of the process.¹⁸² Members of the Senate Environment and Public Works Committee were suspicious of the process resulting in the 2004 Proposed CAMR, and requested analyses of the proposed rule from EPA's Office of the Inspector General (OIG), and from the Government Accountability Office (GAO), both of which released reports highly critical of the Proposed CAMR and the process by which it was created.¹⁸³

EPA OIG conducted an internal investigation and concluded that the proposed Section 112 MACT standards had been arrived at through a pretextual calculation; rather than determine the best controlled 12% of existing sources required by Section 112(d)(3), EPA senior management had simply instructed staff to take as a given that a MACT-based standard was to result in 2010 emissions of thirty-four tons, and then develop a MACT methodology that would result in that number.¹⁸⁴ They did this through modifying various assumptions, and modifying variables and re-running models until the latter projected the thirty-four ton number.¹⁸⁵

comparison of one of the three proposed rules and the memorandums prepared by Latham & Watkins . . . shows that at least a dozen paragraphs were lifted, sometimes verbatim, from the industry suggestions.”); Juliet Eilperin, *EPA Wording Found to Mirror Industry's*, WASH. POST (Sept. 22, 2004), <http://www.washingtonpost.com/wp-dyn/articles/A39749-2004Sep21.html>; Matt Fleischer-Black, *Mercury Man; Did the EPA's Jeffrey Holmstead Take a Cue from Latham Lobbyists?*, AM. LAW. (Aug. 1, 2005), <https://www.iatp.org/news/mercury-man-did-the-epas-jeffrey-holmstead-take-a-cue-from-latham-lobbyists>. Holmstead would later claim that he had been given the language from another agency with its origins unmarked. Fleischer-Black, *supra*. EPA formally responded to the criticism through the rulemaking docket, though very briefly. EMISSIONS STANDARDS DIV, U.S. ENVTL. PROT. AGENCY, OAR-2002-0056-6215, RESPONSE TO SIGNIFICANT PUBLIC COMMENTS ON THE PROPOSED CLEAN AIR MERCURY RULE 10-4 (2005), https://www3.epa.gov/ttn/atw/utility/sec_111_respcom_oar-2002-0056-6206.pdf (“EPA is aware of the concern expressed by the commenters and has responded to the Congressional inquiries. The material in question was provided to EPA through the Clean Air Act Advisory Committee working group process established under the Federal Advisory Committee Act (FACA) and, thus, we do not feel that its use was inappropriate.”).

181. See COMMENTS ON PROPOSED RULE AND SUPPLEMENTAL NOTICE: PROPOSED NAT'L EMISSION STANDARDS FOR HAPS; AND IN THE ALTERNATIVE, PROPOSED STANDARDS OF PERFORMANCE FOR NEW AND EXISTING STATIONARY SOURCES, OAR-2002-0056 (June 28, 2004) (comments of state attorney generals and environmental officials opposing cap-and-trade proposal), <http://www.4cleanair.org/Oldmembers/members/committee/airtoxics/stateAGsmercurycomments.pdf>; Jennifer 8. Lee, *White House Minimized the Risks of Mercury in Proposed Rules, Scientists Say*, N.Y. TIMES (Apr. 7, 2004), <http://www.nytimes.com/2004/04/07/us/white-house-minimized-the-risks-of-mercury-in-proposed-rules-scientists-say.html>.

182. Hamburger & Miller, *supra* note 170.

183. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-05-252, CLEAN AIR ACT: OBSERVATIONS ON EPA'S COST-BENEFIT ANALYSIS OF ITS MERCURY CONTROL OPTIONS (2005) [hereinafter 2005 GAO REPORT], <http://www.gao.gov/assets/250/245489.pdf>; OFFICE OF INSPECTOR GEN., U.S. ENVTL. PROT. AGENCY, 2005-P-00003, ADDITIONAL ANALYSES OF MERCURY EMISSIONS NEEDED BEFORE EPA FINALIZES RULES FOR COAL-FIRED ELECTRIC UTILITIES (2005) [hereinafter 2005 EPA OIG REPORT], <https://nepis.epa.gov/Exe/ZyPDF.cgi/91018FYT.PDF?Dockey=91018FYT.PDF>.

184. 2005 EPA OIG REPORT, *supra* note 184, at 13.

185. *Id.* at 13–15.

Furthermore, the OIG concluded that the true basis for the thirty-four tons – the co-benefits projected under the Clean Air Interstate Rule – did not comply with the MACT requirements of CAA. As to the cap-and-trade plan, the OIG criticized its lack of stringency and implicitly questioned the veracity of the drafters.¹⁸⁶ The OIG also found that staff had been pressured to base the benefits analysis of the proposed rule on the public comments solicited through the NODA (many of which came from utilities), rather than on the scientific literature.¹⁸⁷

Finally, the OIG noted that several documents it had requested had not been provided by EPA, including statistical analyses for MACT model runs, inter-agency communications, and information as to how the Latham & Watkins memoranda language got into the proposed rule.¹⁸⁸ In its response to the OIG’s draft report, EPA simply disputed several of the factual assertions—including that it had started with the thirty-four-ton emissions goal and manipulated MACT calculations to meet it—but did not address the report’s recommendations.¹⁸⁹

The GAO also investigated the 2004 Proposed Rule, specifically the cost-benefit analyses used to compare the proposed cap-and-trade plan with the MACT rule, and found such analyses significantly lacking. While EPA examined the costs of the MACT rule by itself, it analyzed both the costs and benefits of the cap-and-trade plan in the context of the CAIR rule, making comparison between the two impossible. Perhaps most critically—and inexplicably—EPA’s cost-benefit analysis of the two options failed to quantify the actual primary health benefits of mercury emissions reductions.¹⁹⁰ Instead, EPA calculated the secondary health benefits accruing from the reduction of fine particles, such as decreases in respiratory diseases and heart attacks.¹⁹¹ As did the OIG, the GAO also faulted EPA for its lack of transparency in developing the proposed rule.¹⁹²

d. The Clear Skies Act Reborn: Reversing the 2000 Listing Rule and Implementing Cap-and-Trade Under CAMR

Largely ignoring the criticism from congressional members, environmentalists, EPA’s own inspector general, and the GAO, EPA ultimately promulgated the Section 111(d)-based cap-and-trade plan in their final Clean Air Mercury Rule (“CAMR”),¹⁹³ followed by the 2005 Delisting Rule.¹⁹⁴ EPA characterized the new cap-and-trade plan as “the best method for encouraging the continued development of [emissions control] technologies.”¹⁹⁵ The 2010 cap

186. *See id.* at 15.

187. *Id.* at 33.

188. *Id.* at 9, 41.

189. *Id.* at 49.

190. 2005 GAO REPORT, *supra* note 184, at 12.

191. *Id.* at 12 & n.15.

192. *Id.* at 4.

193. Standards of Performance for New and Existing Stationary Sources: EGUs, 70 Fed. Reg. 28,606 (May 18, 2005) (to be codified at 40 C.F.R. pts. 60, 72, 75) [hereinafter 2005 CAMR].

194. 2005 Delisting Rule, *supra* note 4, at 15,994 (“We are taking this action because we now believe that the December 2000 finding lacked foundation and because recent information demonstrates that it is not appropriate or necessary to regulate [EGUs] under section 112.”).

195. 2005 CAMR, *supra* note 194, at 28,615.

under the 2005 CAMR was even higher than EPA OIG had anticipated, at thirty-eight tons, with a 15 tpy cap coming into effect in 2018.¹⁹⁶ According to EPA, the caps would reduce mercury emissions by “up to 70%,” significantly less than the 2000 Regulatory Finding proposed.¹⁹⁷ Direct health benefits of the mercury reductions from the 2005 CAMR were projected at a modest 0.2 to 3 million dollars a year by 2020.¹⁹⁸ As had been promised in the 2004 Proposed Rule, the final Phase I cap would not require additional mercury-specific mitigation technologies, as the 38 tpy figure was the estimated amount of mercury reduction as a co-benefit from already-existing SO₂ and NO_x rules.¹⁹⁹ As had been contemplated in the 2004 Proposed CAMR, EGUs would be able to bank allowances for future use, but the “safety valve” provision was removed.²⁰⁰ The cap-and-trade system would be implemented by the states pursuant to State Implementation Plans subject to review by EPA, with states failing to participate still required to reduce emissions below their cap.²⁰¹

Under the 2004 Proposed CAMR, the cap for the cap-and-trade plan would have been based on concurrently offered CAA Section 112 new source MACT standards, which would equal the “best controlled similar source.”²⁰² However, purportedly responding to commenters who argued that even that was too strict for Section 111 emissions standards—which require explicit consideration of cost—EPA revised the cap upwards.²⁰³ Those caps were not based on mercury-specific control technologies, but rather on controls that would be installed to control PM_{2.5} and SO₂, as EPA argued that stringent mercury-specific control technologies could not be installed and operated on a national scale by the 2018 final cap deadline.²⁰⁴ Even given those limitations the mercury emissions

196. *Id.* at 28,606; *see also* Jana B. Milford & Alison Pieniak, *After the Clean Air Mercury Rule: Prospects for Reducing Mercury Emissions from Coal-Fired Power Plants*, 43 ENVTL. SCI. TECH. 2669, 2669 (2009).

197. OFFICE OF AIR QUALITY PLANNING & STANDARDS, U.S. ENVTL. PROT. AGENCY, EPA-452/R-05-003, REGULATORY IMPACT ANALYSIS OF THE FINAL CLEAN AIR MERCURY RULE 3-3 (2005), <https://nepis.epa.gov/Exe/ZyPDF.cgi/91011BYT.PDF?Dockey=91011BYT.PDF>.

198. *See* 2005 CAMR, *supra* note 194, at 28,642, 28,643 tbl.3. These costs were based on “avoided IQ decrements in potentially prenatally exposed children . . . and the benefits of reducing directly emitted [particulate matter].” *Id.* at 28,641. Details about the modeling of these benefits were provided in the separate Regulatory Impact Assessment.

199. *Id.* at 28,617–18.

200. *Id.* at 28,629–30.

201. *Id.* at 28,607.

202. *Id.* at 28,615.

203. *Id.* Compare 2004 Proposed CAMR, *supra* note 166, at 4690, with 2005 CAMR, *supra* note 194, at 28,615. Depending on source subcategory, the final standards were less stringent by factors of approximately 2 to 5.

204. 2005 CAMR, *supra* note 194, at 28,615–16. While the 1997 EPA MERCURY REPORT had concluded that reliably controlling mercury emissions from coal-fired EGUs was “several years away,” 1997 EPA MERCURY REPORT, *supra* note 29, Vol. VIII, at 6-2, in the years since that report was published a joint DOE-industry pilot program had made significant gains by the time of the 2005 CAMR. *See generally* John H. Pavlish et al., *Status Review of Mercury Control Options for Coal-Fired Power Plants*, 82 FUEL PROCESSING TECH. 89 (2003).

released from the “best controlled similar sources” upon which the caps were based also assumed particularly high levels of mercury in source coal.²⁰⁵

Two weeks after publishing the 2005 CAMR, EPA issued the 2005 Delisting Rule removing EGU-sourced mercury as a Section 112 HAP.²⁰⁶ The conventional HAP delisting process under §112(c)(9) would have required EPA determine that no EGU—or EGU category—would release mercury emissions above a level adequate to protect public health and preclude adverse environmental effects.²⁰⁷ Even the Bush-era EPA seemed unwilling to make such a clearly implausible determination, so instead the 2005 Delisting Rule simply concluded that the delisting requirements of Section 112(c)(9) need not be met, that the “appropriate and necessary” standard gave EPA significant discretion in how to treat EGU-sourced HAP, and thus “nothing precludes [EPA] from revising [the] appropriate and necessary finding” based on initial error or new information.²⁰⁸ EPA’s position was that the 2000 Listing Decision was fundamentally unwarranted at the time it was made, and it offered a lengthy argument that EGU-sourced mercury did not pose a significant health hazard, particularly after the mercury reduction co-benefits of recent regulation were taken into account.²⁰⁹ Such marginal health benefits, argued the 2005 Delisting Rule, have been substantially outweighed by the costs of compliance were mercury to be regulated under Section 112.²¹⁰

205. See 2005 CAMR, *supra* note 194, at 28,615; see also JIM EDDINGER, COMBUSTION GROUP, ENVTL. PROT. AGENCY, MEMORANDUM ON STATISTICAL ANALYSIS OF MERCURY TEST DATA TO DETERMINE BDT FOR MERCURY EMISSIONS 3 (March 15, 2005), https://www3.epa.gov/ttn/atw/utility/nsps_doc_oar-2002-0056-6192.pdf (“Using the highest [mercury] fuel content ensures that the developed NSPS limit are achievable by a unit located anywhere in the United States.”).

206. Requests for reconsideration of both the 2005 Delisting Rule and CAMR were filed with EPA, but were denied in a subsequent rule that only made minor substantive changes to State mercury allocations and some of the section 111(d) new source standards. See Revision of December 2000 CAA Section 112(n) Finding Regarding EGUs; and Standards of Performance for New and Existing EGUs: Reconsideration, 71 Fed. Reg. 33,388, 33,389 (June 9, 2006) (to be codified at 40 C.F.R. pt. 60).

207. 42 U.S.C. § 7412(c)(9)(B)(ii) (2012).

208. 2005 Delisting Rule, *supra* note 4, at 16,002.

209. Those other rules included new NSPS standards for NO_x emitted from utility and industrial boilers, and the requirement that 22 states and the District of Columbia revise their state implementation plans to mitigate interstate transport of ozone. 2005 Delisting Rule, *supra* note 4, at 16,004. The argument that remaining mercury emissions after those rules would have minimal health impacts was supported by EPA deposition modeling described in the rule. *Id.* at 16,015–21. EPA based its conclusions on modeling runs using CMAQ, its general-purpose atmospheric processes model, when applied to mercury the CMAQ had at that point shown a tendency to predict smaller aqueous mercury concentrations than other mercury models commonly used by scientists and governmental agencies. See Alexey Ryaboshapko et al., *Comparison of Mercury Chemistry Models*, 36 ATMOSPHERIC ENV’T 3881, 3894–95 (2002). A 2005 peer review panel that evaluated the CMAQ model noted that the CMAQ results for the 2005 CAMR were not particularly robust. PRAVEEN AMAR ET AL., FINAL REPORT: SECOND PEER REVIEW OF THE CMAQ MODEL 13 (2005) https://www.epa.gov/sites/production/files/2017-05/documents/final_report_second_peer_review_of_the_cmaq_model_july_2005.pdf. Generally, the results of even good faith modeling can show dramatically different results based on model parameters and assumptions.

210. 2005 Delisting Rule, *supra* note 4, at 16,000–01, 16,021–22. EPA justified the decision through a number of assumptions, including that only freshwater fish should be analyzed, that only women of childbearing age are at risk, that research showing high levels of consumption by certain subpopulations should not be relied upon, and that only utility-attributable mercury should be measured. *Id.*

e. New Jersey v. EPA

EPA's new mercury strategy was met with intense criticism; members of Congress introduced joint resolutions to disapprove the rule under the Congressional Review Act, which if successful would have forced EPA to issue a MACT-based rule, though the resolution did not pass.²¹¹ Dissatisfied with the lack of stringency, many states later issued their own EGU-sourced mercury regulations that went well beyond the 2005 rule.²¹² Predictably, a number of environmental groups and states appealed the 2005 Rule to the D.C. Circuit Court.²¹³ On February 8, 2008, the D.C. Circuit vacated the 2005 Rule in *New Jersey v. EPA*, finding EPA's delisting decision violated the plain text and structure of Section 112 because EPA did not make the necessary findings required to delist HAP under Section 112(c)(9).²¹⁴ EPA raised different statutory construction and deference arguments but the Court rejected them, holding that Congress had intentionally removed significant discretion from the HAP listing process—and that included the EGU-sourced mercury process—precisely because it considered EPA too reluctant to list HAPs.²¹⁵

Because the court concluded that the 2005 Delisting Rule was invalid, EGU-sourced HAP including mercury remained regulated under Section 112, precluding them from regulation under Section 111 and resulting in the Court vacating both the 2005 Delisting Rule and the 2005 CAMR. The *New Jersey* decision came out shortly before President Bush was to leave office, and future EGU mercury emissions regulations would wait for his successor. One of the last actions the administration took on EGU-sourced mercury emissions was cancelling DOE field tests of mercury emissions reduction technology—once they started to show low-cost reduction of 90 percent or more of emissions was possible.²¹⁶ Bills

211. S.J. Res. 20, 109th Cong. (2005); *see also* Congressional Review Act, 5 U.S.C. §§ 801–808 (2012). Of course, overturning the 2005 Delisting Rule would have likely lead to further battles on the suitability of the MACT standards already developed by EPA. *See* JAMES E. MCCARTHY & RICHARD S. BETH, CONG. RESEARCH SERV., RS22207, CONGRESSIONAL REVIEW OF EPA'S MERCURY RULE 2 (2005), https://www.everycrsreport.com/files/20050725_RS22207_64e65541441ca2d9d4e1a075110d9d8ccad482f7.pdf.

212. JAMES E. MCCARTHY, CONG. RESEARCH SERV., RL33535, MERCURY EMISSIONS FROM ELECTRIC POWER PLANTS: STATES ARE SETTING STRICTER LIMITS 2 (2007), https://www.everycrsreport.com/files/20070222_RL33535_9490786af904352a3618fa139135a3471dab06fb.pdf. The Congressional Research Service would also analyze the 2005 CAMR rule and come to a similar conclusion as EPA and 2005 GAO reports. *See* DANA A. SHEA ET AL., CONG. RESEARCH SERV., RL32744, MERCURY EMISSIONS FROM ELECTRIC GENERATING UNITS: A REVIEW OF EPA ANALYSIS AND MACT DETERMINATION (2005), <https://file.wikileaks.org/file/crs/RL32744.pdf>.

213. *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008), *cert. dismissed*, 555 U.S. 1162 (2009), and *cert. denied sub nom.*, *Util. Air Regulatory Grp. v. New Jersey*, 555 U.S. 1169 (2009).

214. *Id.* at 583.

215. *Id.* at 582–83.

216. *See* 2009 GAO REPORT, *supra* note 35, at 6 (“[W]hile a number of short-term tests achieved mercury reductions in excess of 90 percent, the amount of sorbent injection that achieved the reductions was often decreased during long-term tests to determine the minimum cost of achieving, on average, 70 percent mercury reductions. Beginning in 2007—near the end of the research program—DOE field tests aimed to achieve reductions of 90 percent or greater mercury at low costs. However, DOE reported that federal funding for the DOE tests was eliminated before the final phase of planned tests was completed.”).

were again introduced in Congress to force EPA to implement strict EGU-sourced mercury emissions limits, though none passed.²¹⁷

2. 2008-2016: The Obama Administration and Air Pollution Control

President Obama's entry into the White House signaled a change in EPA's approach to pollution control, particularly regarding atmospheric pollution. His environmental record as a state legislator in Illinois and the U.S. Senate had been mixed;²¹⁸ however, in light of his pro-environmental campaign rhetoric, and the fact that his immediate predecessor compiled what had been widely considered one of the worst environmental records, if not the worst, in U.S. history, environmentalists were optimistic.²¹⁹ Immediately after taking office he quickly moved to halt the flurry of "midnight regulations" the Bush EPA had attempted to push through the regulatory process at the end of that administration, though with mixed success.²²⁰

217. *E.g.*, Mercury Emissions Control Act, S. 2643, 110th Cong. § 3 (2008) (requiring EPA to promulgate regulations that reduce mercury from new and existing EGUs by "not less than 90 percent"); Mercury Emissions Reduction Act, H.R. 1087, 110th Cong. § 2 (2007) (amending section 112 to require EPA to promulgate EGU-sourced emissions standards within one year); Healthy Air and Clean Water Act, H.R. 3989, 110th Cong. § 702 (2007) (setting mercury emissions limits for EGUs at .6 lbs per trillion Btu).

218. Ken Dilanian, *Obama's Record on Coal Support*, USA Today (July 18, 2008), https://usatoday30.usatoday.com/news/politics/election2008/2008-07-17-obama-coal_N.htm ("[A]s a state senator . . . he usually supported bills sought by coal interests, according to legislative records and interviews."); see LEAGUE OF CONSERVATION VOTERS, *National Environmental Scorecard: Senator Barack Obama*, <http://scorecard.lcv.org/moc/barack-obama> (last visited Nov. 8, 2017) (Awarding him a cumulative score of 72% on his "National Environmental Scorecard" during his Senate tenure; though they record him as voting against environmental protection only twice, he did miss numerous votes on environmental legislation, driving down his score.).

219. Suzanne Goldberg, *The Worst of Times: Bush's Environmental Legacy Examined*, THE GUARDIAN (Jan. 16, 2009), <https://www.theguardian.com/politics/2009/jan/16/greenpolitics-georgebush> (The spokesperson for the Sierra Club stated: "[The Bush administration] has undone decades if not a century of progress on the environment . . . "[His] administration has introduced this pervasive rot into the federal government which has undermined the rule of law, undermined science, [and] undermined basic competence. . . . We're excited just to push the reset button."); John Vidal, *Obama Victory Signals Rebirth of US Environmental Policy*, THE GUARDIAN (Nov. 5, 2008, 9:42 AM), <https://www.theguardian.com/environment/2008/nov/05/climatechange-carbonemissions> (President of Defenders of Wildlife Action Fund stated that "[f]or the first time in nearly a decade, we can look to the future with a sense of ope that the enormous environmental challenges we face will begin to be addressed. . . . It is difficult to describe the damage done by the Bush administration's misguided and destructive environmental policies."); see COUSINS ET AL., *supra* note 152, at iv ("Over the course of the first term, [the Bush] administration led the most thorough and destructive campaign against America's environmental safeguards in the past 40 years.").

220. Gale Lea Rubrecht, *President Obama Halts Midnight Regulations*, 24 NAT. RESOURCES & ENV'T 47, 47-49 (2009); see also Elizabeth Kolbert, *Midnight Hour*, NEW YORKER (Nov. 24, 2008), <https://www.newyorker.com/magazine/2008/11/24/midnight-hour>; R. Jeffrey Smith, *A Last Push to Deregulate*, WASH. POST (Oct. 31, 2008), <http://www.washingtonpost.com/wp-dyn/content/article/2008/10/30/AR2008103004749.html>; Bryan Walsh, *George W. Bush's Last Environmental Stand*, TIME (Nov. 5, 2008), <http://content.time.com/time/health/article/0,8599,1856829,00.html>. For a comprehensive listing of President Bush's attempted "midnight regulations," see Joaquin Sapien & Jesse Nankin, *Midnight Regulations*, PROPUBLICA (Nov. 18, 2008), <https://www.propublica.org/special/midnight-regulations>. The updates on the status of each are years out of date.

a. The Obama EPA's Mercury and Air Toxics Rule

President Obama had previously indicated his willingness to take action on mercury. While a Senator, he introduced two pieces of legislation aimed at reducing environmental mercury emissions,²²¹ and had been a co-sponsor of the unsuccessful resolution to nullify the 2005 Delisting Rule. Shortly after he won the 2008 presidential election, several non-profit groups brought suit in D.C. District Court to compel EPA to create EGU-sourced mercury MACT standards, and EPA entered into a consent decree requiring promulgation of MACT standards in 2011, with final regulations to follow in six months.²²²

The proposed regulations, published on May 3, 2011, would impose stringent controls on EGU-sourced HAP, including mercury, under Section 112.²²³ Under the proposed standards, mercury reductions would be reduced from a baseline projected 29 tpy to 6 tpy by 2015, with additional reductions in the other HAP identified in the Utility Study.²²⁴ The proposed rule drew significant attention; EPA received a record breaking more than 900,000 public comments, far more than any similar proposed regulation.²²⁵ Many, particularly from individual members of the public, strongly supported stringent regulation of EGU-sourced mercury, though the EGU industry and its allies protested EPA's scientific and legal rationales for both the "confirmation" of the 2000 Listing Rule and the proposed standards.²²⁶

On February 16, 2012, EPA issued the final 2012 MATS Rule, slightly modified from the proposed Rule but instituting similar emissions standards that would reduce EGU-sourced mercury emissions from a newly projected 27 tpy down to 7 tpy.²²⁷ In terms of mercury emissions standards, the 2012 MATS Rule used a more stringent analysis to determine the MACT floor than had the 2004

221. Missing Mercury in Manufacturing Monitoring and Mitigation Act, S. 3631, 109th Cong. (2006) (amending the Toxic Substances Control Act to phase out the use of mercury in chlorine and caustic soda manufacturing); Mercury Export Ban Act of 2008, S. 906, 110th Cong. (2007) (enacted) (amending the Toxic Substances Control Act to prohibit federal agencies from selling or conveying mercury, and to ban the export of mercury outside the United States). The first bill would die in Committee, though the second would be signed into law by President Bush.

222. *See* Am. Nurses Ass'n v. Jackson, No. 1:08-cv-02198, 2010 WL 1506913, at *1-2 (D.D.C. Apr. 15, 2010). State and industry actors sought to prevent the Consent Decree, but did not prevail. *See* Am. Nurses Ass'n, No. 1:08-cv-02198 (D.D.C. Oct. 24, 2011) (order denying motion to alter judgments). Further proceedings were mooted when EPA promulgated of emissions standards in December of 2011.

223. Nat'l Emission Standards for HAPs From Coal- and Oil-Fired EGUs, 76 Fed. Reg. 24,976 (proposed May 3, 2011) (to be codified at 40 C.F.R. pts 60, 63) [hereinafter 2011 Proposed Mercury and Air Toxics Standards or 2011 Proposed MATS Rule].

224. *Id.* at 25,073 tbl.21. The 2011 Proposed MATS was also projected to reduce hydrogen chloride by 68,000 tpy and through HAP control co-benefits, SO₂ by an additional 2.1 million tpy, NO_x by 100,000 tpy, PM_{2.5} by 83,200 tpy, and CO₂ by 24.2 million tpy. *Id.*

225. 2012 MATS Rule, *supra* note 4, at 9306.

226. EPA aggregated, summarized, and responded to many of these comments in the final rule. *See id.*

227. *Id.* at 9424 tbl.7. Projected emissions reductions had changed for other HAPs as well, as did projections of baseline HAP emissions absent the 2012 MATS Rule. *Compare id.*, with 2011 Proposed MATS, *supra* note 224, at 25,073 tbl.21.

Proposed CAMR or 2005 CAMR.²²⁸ While EPA conducted a thorough analysis of the costs of the 2012 MATS Rule, concluding that they were outweighed by the benefits, it also concluded that it did not need to account for costs before regulating EGU-sourced HAPs.²²⁹ Likely foreseeing legal and political pushback from the EGU industry, EPA also conducted extensive new modeling of mercury risk,²³⁰ and relied heavily on its independent Scientific Advisory Board (“SAB”) to review its methodologies and assumptions.²³¹ Significant changes were made to the scientific technical and evaluation, but even after the suggested modifications were made, the models still showed that, contrary to the conclusions reached by EPA when justifying the 2005 Delisting Rule, EGU-sourced mercury posed a discrete hazard to human health.²³² EPA used the same deposition model to support the listing decision in the 2012 MATS Rule as it had for the 2005 Delisting Rule, but incorporated more data and used different modeling assumptions and higher spatial resolution.²³³

b. Michigan v. EPA

The Final Rule was appealed in *White Stallion Energy Center, L.L.C. v. EPA*, this time by impacted companies, industry and labor groups, and states, while environmental groups, other industry groups and states intervened in support of the Rule.²³⁴ The central argument by petitioners was that EPA improperly decided that it was “necessary” and “appropriate” to list EGU-sourced mercury without considering the costs, as it was implausible that Congress would want no attention paid to cost considerations.²³⁵ The D.C. Circuit court rejected that argument, siding

228. For example, existing EGUs using bituminous coal—the most common type—would have had their emissions limited or capped to .021 lbs per gigawatt hour (“lb/GWh”) by the 2004 Proposed CAMR, but now were limited to .013 lb/GWh by the 2012 MATS Rule. *Compare* 2004 Proposed CAMR, *supra* note 166, at 4662 tbl.1, *and* 2005 CAMR, *supra* note 194, at 28,615, *with* 2012 MATS Rule, *supra* note 4, at 9367 tbl.3. The 2012 MATS Rule also included emissions standards for other HAPs, while the 2005 CAMR only regulated mercury and nickel. *Compare* 2012 MATS Rule, *supra* note 194, at 9367 tbl.3, *with* 2005 CAMR, *supra* note 194, at 28,615.

229. *See* 2012 MATS Rule, *supra* note 4, at 9425-32. Many of the stated benefits were based on co-benefit reductions of particulate matter. *Id.* at 9431 tbl.11, 9432.

230. *E.g.*, OFFICE OF AIR QUALITY PLANNING & STANDARDS, U.S. ENVTL. PROT. AGENCY, EPA-452/R-11-009, REVISED TECHNICAL SUPPORT DOCUMENT: NATIONAL-SCALE ASSESSMENT OF MERCURY RISK TO POPULATIONS WITH HIGH CONSUMPTION OF SELF-CAUGHT FRESHWATER FISH (2011) [hereinafter 2011 REVISED TECHNICAL SUPPORT DOCUMENT], <https://www3.epa.gov/ttn/atw/utility/revisedmercurytsd.pdf>; OFFICE OF AIR QUALITY PLANNING & STANDARDS, U.S. ENVTL. PROT. AGENCY, EPA-452/R-11-013, SUPPLEMENT TO THE NON-HG CASE STUDY CHRONIC INHALATION RISK ASSESSMENT IN SUPPORT OF THE APPROPRIATE AND NECESSARY ANALYSIS FINDING FOR COAL-AND OIL-FIRED ELECTRIC GENERATING UNITS (2011), <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100DFR6.PDF?Dockey=P100DFR6.PDF>.

231. 2012 MATS Rule, *supra* note 4, at 9312–18 (describing consultation with SAB).

232. Sensitivity analyses examine how changing model variables—in this case for example, only looking at high-mercury-deposition watersheds, or changing consumption patterns—altered the overall population risk values derived by the model, and found that such changes did not significantly reduce that risk. *See id.* at 9315–16.

233. *See* 2011 Revised Technical Support Document, *supra* note 231, at 48 (2011) (describing the differences between the modeling for the 2005 Delisting Rule and the 2012 MATS Rule).

234. 748 F.3d 1222 (D.C. Cir. 2014), *rev'd sub nom.* Michigan v. EPA, 135 S. Ct. 2699 (2015).

235. *Id.* at 1236.

with EPA and intervenors and holding that under the plain language of CAA Section 112(n)(1), EPA was ordered to list EGU-sourced mercury as a HAP if it “[found] such regulation appropriate and necessary after considering the results of the [EPA and NIEHS studies],”²³⁶ and thus the decision to list was therefore predicated solely on the determination of whether EGU-sourced mercury was a public health hazard. Any cost considerations would then be incorporated when actually setting MACT emissions limits.²³⁷ Industry and state actors opposing the rule appealed to the Supreme Court on the cost consideration issue under the MATS Rule.²³⁸

As the Supreme Court noted in *Whitman v. American Trucking Ass’ns*, it had previously “refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted.”²³⁹ On its face, the Court seemed to be addressing a similar situation when reviewing EPA’s “appropriate and necessary” determination: the CAA, particularly after the 1990 Amendments, explicitly requires EPA to consider costs before making regulation decisions in a number of provisions.²⁴⁰ In the amended Section 112 provisions at issue, Congress had not only failed to expressly require EPA to consider costs when making the “appropriate and necessary” determination, but had mandated that it only make such a determination after considering the results of the 1998 Utility Study, the statutory requirement of which was purely a public health analysis.²⁴¹

The legislative history of the 1990 Amendments to Section 112 also strongly suggested that Section 112’s sole focus on health survived the 1990 Amendments, with EPA being required to add a substance to the HAP list generally “upon a showing . . . that emissions . . . are known to cause or may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects.”²⁴² Indeed, the provision that excepted EGU-sourced HAP from automatic regulation was added in conference and then only because Congress seemed reluctant to regulate where the separate acid rain provisions of the 1990 Amendments might remedy the problem.²⁴³ For HAPs from all other major sources not likely to be impacted by the acid rain provisions, EPA was only to consider costs in the emissions standards stage of regulation, and even then the MACT floor

236. *Id.* at 1239 (emphasis omitted) (quoting 42 U.S.C. § 7412(n)(1)(A) (2012)).

237. *See id.* at 1238–41.

238. *Michigan v. EPA*, 135 S. Ct. 702 (2014) (mem) (granting petition for writ of certiorari limited to the question of “[w]hether the [EPA] unreasonably refused to consider cost in determining whether it is appropriate to regulate [HAPs] emitted by [EGUs].”).

239. *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 467 (2001) (citing *Union Elec. Co. v. EPA*, 427 U.S. 246, 257 & n.5 (1976)).

240. *See, e.g.*, 42 U.S.C. § 7411(a)(1) (2012) (requiring EPA to take into account “the cost of achieving such reduction” when setting standards of performance for new stationary sources); *id.* § 7545(k)(1)(A) (requiring EPA “tak[e] into consideration the cost of achieving such emissions reductions” when setting standards for reformulated gasoline”); *id.* § 7547(a)(3) (requiring emissions standards for nonroad engines and vehicles be “the greatest degree . . . achievable . . . giving appropriate consideration to the cost of applying such technology. . . .”).

241. *Id.* § 7412(n)(1)(A).

242. *Id.* § 7412(b)(3)(B).

243. *See supra* note 124 and accompanying text.

required a certain minimum emissions standards, notwithstanding the cost.²⁴⁴ Furthermore, giving the ambiguity of the “appropriate and necessary” determination, EPA would seem to have significant discretion under *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.* to determine just what that meant.²⁴⁵

However, rejecting the applicability of both *American Trucking Ass’n*s and *Chevron*, the Court ruled 5-4 in favor of petitioners, holding that it “strayed far beyond [*Chevron*’s] bounds” when it made its “appropriate and necessary” listing decision without paying attention to cost considerations.²⁴⁶ Arguing that such a “capacious[.]” phrase required that “all the relevant factors” be considered, the opinion reasoned that for its listing decision to be “appropriate,” at least some attention to cost must be paid; otherwise, the potential could arise that “billions in economic costs” might be incurred “in return for a few dollars in health or environmental benefits.”²⁴⁷ Conceding that other Section 112 listing decisions were based on the threat to human health or the environment, the *Michigan* majority characterized the EGU-specific “appropriate and necessary” section as Congress enacting different and “unique” requirements to be met before regulating EGU-sourced HAP.²⁴⁸ The four justices dissenting argued that EPA had, in fact, paid significant attention to costs throughout the entire process, and would do so again, faulting the majority for unduly focusing on the one initial stage of the regulatory decision where cost was not required under the statute.²⁴⁹

3. *The Trump Administration and the Future of the Mercury and Air Toxics Rule*

While many observers had assumed in the wake of the Supreme Court’s denial of a stay on the 2012 MATS Rule that the final rule would stand, Trump’s election and his appointment of Scott Pruitt—who had himself litigated against the 2012 MATS Rule as Attorney General of Oklahoma—has called that into question. A number of parties appealed the 2016 Supplemental Finding on various grounds, arguing *inter alia* that the cost analyses done by EPA did not comply with *Michigan* or CAA, and impermissibly counted the co-benefits of reducing non-HAP pollutants.²⁵⁰

Though Obama’s EPA had opposed the appeal along with a number of state and non-governmental organization intervenors, the Trump EPA would later

244. See 42 U.S.C. § 7412(d)(2)–(3).

245. 467 U.S. 837 (1984). *Chevron*, coincidentally, was addressing a similar issue; EPA’s discretionary authority to define a term under the CAA. *Id.* at 840.

246. *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015).

247. *Id.*

248. See *id.* at 2710.

249. *Id.* at 2718 (Kagan, J., dissenting).

250. Opening Brief of State and Industry Petitioners, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. Nov. 18, 2016), <http://blogs.edf.org/climate411/files/2016/11/Murray-Energy-v-EPA-Petitioners-combined-opening-brief-11-18-16.pdf>. Though petitioners attack the 2016 Supplemental Rule for a variety of alleged flaws, the central arguments are that EPA impermissibly: (1) failed to adequately compare costs and benefits, *id.* at 28–40; (2) considered the co-benefits of reducing non-HAP pollutants in the benefit-cost analysis it *did* do, *id.* at 41–55; and (3) did not consider alternative control strategies and all relevant costs, *id.* at 58–63.

move to continue the oral arguments on petitioners' motion, because "[i]n light of the recent change in Administration . . . the appropriate officials [need] adequate time to fully review the Supplemental Finding."²⁵¹ EPA further notes that those officials may "reconsider the rule or some part of it."²⁵² The D.C. Circuit Court of Appeals granted EPA's motion to continue, requiring the agency to report on the status of its review every 90 days, but not giving any specific deadline to complete that review.²⁵³ In the meantime, the 2012 MATS Rule seems to remain in place.

EPA left unclear how exactly it would "reconsider the rule or some part of it" in light of the requirements of section 112. Instead, EPA vaguely references "[a]gencies['] . . . inherent authority to reconsider past decisions and to revise, replace or repeal a decision to the extent permitted by law. . . ." ²⁵⁴ The primary difficulty in "reconsider[ing]" the rule, of course, is as the D.C. Circuit Court noted in *New Jersey v. EPA*, it is far more difficult for EPA to add a pollutant to the HAP list—CAA Section 112(b)(3)(C) forbids removing EGU-sourced mercury as a HAP absent a finding that "emissions, ambient concentrations, bioaccumulation or deposition of the substance may not reasonably be anticipated to cause any adverse effects to the human health or adverse environmental effects."²⁵⁵ In the case of mercury, this would be impossible—there is no dispute that bioaccumulation can cause adverse effects to human health and the environment.²⁵⁶ Still, as the 2005 Delisting Decision and 2005 CAMR demonstrated, even regulatory decisions that appear on their face to be invalid can delay stringent regulations for years while they work their way through the rulemaking and court systems.

Additionally, in terms of real-world effects, even were the 2016 Supplemental Finding to be successfully withdrawn (or, withdrawn for a number of years while the inevitable litigation worked its way through the court system), the vast majority of EGUs have already complied with the 2012 MATS Rule's emissions requirements or, in the case of older plants, have shut down. Furthermore, coal-fired EGUs are increasingly disadvantaged economically in

251. Respondent EPA's Motion to Continue Oral Argument at 1, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. May 18, 2017), https://www.edf.org/sites/default/files/content/mats_supp_finding_-_epa_motion_to_continue_oral_arg_-_4-18-17.pdf.

252. *Id.* at 5.

253. Order at 1, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. April 27, 2017). Both industry petitioners, and state and NGO intervenors opposed the continuation; the former largely because of the uncertainty involved to industry. *See* Industry Respondent-Intervenors' Opposition to Motion to Continue Oral Argument, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. April 24, 2017); Non-Governmental Organization Intervenors' Opposition to Motion to Continue Oral Argument, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. April 21, 2017); State and Local Government Respondent-Intervenors' Opposition to Motion to Continue Oral Argument, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. April 21, 2017). As of October 27, 2017, "EPA [was] continuing to review the Supplemental Finding to determine whether the rule should be maintained, modified, or otherwise reconsidered." EPA's Status Report, *Murray Energy Corp. v. EPA*, No. 16-1127 (D.C. Cir. Oct. 27, 2017).

254. Respondent EPA's Motion to Continue Oral Argument at 5, *Murray Energy Corp. v. EPA*, No. 16-1127 (April 18, 2017).

255. 42 U.S.C. § 7412(b)(3)(C) (2012).

256. Though EPA does not reference *New Jersey v. EPA* in its motion to continue, all the other parties note that under *New Jersey* EPA lacks the authority to simply withdraw the "Necessary and Appropriate" finding. *See* sources cited *supra* note 253.

comparison to natural gas and renewable energy. Removing the rule might, however, allow plants to save money by both allowing them to turn off control technologies as well as not be subject to reporting requirements or enforcement actions. In any event, the Trump EPA's position likely signals that the multi-decade EGU-sourced mercury emissions debates will in fact go on longer.

4. *The Evolving Mercury Emissions Discourse, 2000-2016: Context and Conclusions*

Discerning the *why* of the second Bush administration's attempt to head off stringent mercury regulations is not difficult; he, his vice-president, and many of his appointees were veterans of the energy industry who adhered to a fiercely anti-regulatory ideology that saw environmental regulations dangerous not just to the immediate economy but capitalism, and American economic pre-eminence itself. The specific *how*, though, requires a deeper inquiry. It is important to consider that, historically direct challenges to environmental regulations often faced congressional, public, and judicial resistance in a way that could be both politically damaging and result in legislative action that removed significant agency discretion over environmental policy domains. For example, the HAP provisions of the 1990 Amendments wherein anti-regulatory actors both inside and outside government relied increasingly on "low profile" challenges that attempted to reframe and redirect regulatory discourse in a way that sought to hide goals in arcane rulemaking processes and technical language.²⁵⁷ Indeed, this strategy switch can be prominently seen with the second Bush Administration's Clean Skies Plan; defeated in Congress and facing significant public backlash, its architects simply attempted to implement it under the CAA's rulemaking process.

Both procedural and technical discursive practices were leveraged to frame, analyze, and regulate mercury emissions in a way that would minimize industry burdens. On a procedural level President Bush's appointees shut out agency and independent scientists, incorporated industry-provided materials ranging from modeling results to actual industry-drafted language, and drafted both the rules and the technical documentation alleged to support them in lengthy and arcane language – the 2005 CAMR and 2005 Delisting Rule made up a combined and densely technical 135 pages of the Federal Register, while the Regulatory Impact Analysis document EPA produced to support those rules made up 570 pages. The architects of the 2005 CAMR complemented those tactics by framing their approach in a way that emphasized uncertainty and downplayed risks; for example, the 2005 CAMR attempted to undermine EPA's health assumptions as to the level at which mercury in fish is likely to cause adverse health effects by downplaying the reliability of the RfD.²⁵⁸ As presented to the public, the overall projected emissions of the Clear Skies Act generally were framed as beneficial to human health, though they only appeared so when compared to a mercury

257. See LAYZER, *supra* note 16 at 22; see also LAZARUS, *supra* note 77 at 106 ("[T]he ironic upshot of the Reagan attack on federal environmental law was most likely more, not less, demanding federal environmental legislation.").

258. 2005 CAMR, *supra* note 194, at 28,646 ("The RfD is an estimate (with uncertainty spanning several orders of magnitude) . . . [that] important[ly] . . . does not define a bright line, above which individuals are at risk of adverse effect.").

emissions baseline which involved no additional mercury emissions regulations whatsoever.²⁵⁹

Perhaps the most unusual aspect about the 2005 CAMR process was that even after many of these tactics were exposed not only by the OIG and GAO reports as well as by significant media coverage, and even after EPA's own employees warned that the CAMR was likely unlawful under CAA,²⁶⁰ the CAMR's architects simply proceeded to implement it. Considering the substantial public record of irregularities in the rulemaking process, as well as the almost legally indefensible 2005 Delisting Decision, it seems possible that they expected the 2005 CAMR to not survive judicial scrutiny. But even delay served the EGU industry sector, allowing them to put off significant costs and profit from highly-polluting EGUs that were operating well past their expected lifespan.²⁶¹

Why did the Bush administration face so little political or electoral fallout from its intense anti-environmental record?²⁶² Several explanations offer themselves. Increasing political polarization and partisan animosity is one; in 1970 environmental regulations were supported by large proportions of both the public and politicians; for example, CAA passed without a single nay vote in the Senate, and with a single representative voting against it in the House.²⁶³ However, the electoral politics have shown widening between those supporting environmental protection measures and those opposing them.²⁶⁴ Among the general public there is still significant support for environmental protection measures, but the past two decades have also seen significant political polarization generally; even if a conservative and/or Republican voter had supported stronger EGU-sourced

259. See U.S. ENVTL. PROT. AGENCY, PRESIDENT BUSH ANNOUNCES CLEAR SKIES & GLOBAL CLIMATE CHANGE INITIATIVES 1 (2003), https://archive.epa.gov/clearskies/web/pdf/clear_skies_factsheet.pdf.

260. Pianin, *supra* note 170.

261. See RACHEL CLEETUS, ET AL., UNION OF CONCERNED SCIENTISTS, RIPE FOR RETIREMENT: THE CASE FOR CLOSING AMERICA'S COSTLIEST COAL PLANTS 1 (2012), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/clean_energy/Ripe-for-Retirement-Full-Report.pdf ("[In 2012] more than three-quarters of U.S. coal-fired power plants have outlived their 30-year lifespan—with 17 percent being older than half a century."). Indeed, in response to the 2012 MATS Rule many of the oldest plants have closed rather than pay to install mercury control technology. See Owen Comstock, *Coal Made Up More Than 80% of Retired Electricity Generating Capacity in 2015*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (Mar. 8, 2016), <https://www.eia.gov/todayinenergy/detail.cfm?id=25272>.

262. While President Bush ended his presidency with historically low approval ratings, there is little to suggest they were driven by his environmental policies. See Paul Steinhauser, *Poll: Bush Most Unpopular in Modern History*, CNN: Politics (May 1, 2008, 2:30 PM), <http://politicalticker.blogs.cnn.com/2008/05/01/poll-bush-most-unpopular-in-modern-history>.

263. E. W. Kenworthy, *Tough New Clean-Air Bill Passed by Senate, 73 to 0*, N.Y. TIMES (Sept. 23, 1970), <http://www.nytimes.com/1970/09/23/archives/tough-new-cleanair-bill-passed-by-senate-73-to-0-a-tough-cleanair.html>.

264. See Riley E. Dunlap et al., *Politics and Environment in America: Partisan and Ideological Cleavages in Public Support for Environmentalism*, 10 ENVTL. POL. 23, 23–24 (2001). Dunlap and his co-authors chart a significant widening gap between Democratic and Republican lawmakers on environmental issues from 1973–2000, driven by movement on both sides—over time Democratic lawmakers increasingly voted for pro-environmental measures, while Republicans increasingly voted against those measures. *Id.* at 29. The gaps between both Democratic and Republican, and liberal and conservative, members of the public showed less of an overall trend, though self-identified Democrats and liberals consistently had more pro-environmental views than Republicans and conservatives. *Id.* at 31–32.

mercury emissions generally, they might be less likely to vote based on that single issue in light of general political self-identification.²⁶⁵

When the Obama administration took power, it brought its own discursive framing to bear. Representing a sharp break from the anti-regulatory ideology of his predecessor, President Obama pursued the most robust emissions control policy since the beginning of the CAA, attempting to place significant controls on not only mercury and other EGU-sourced HAP, but also greenhouse gas emissions through the rulemaking process with the Clean Power Plan. To head off potential attacks on the scientific conclusions reached by EPA in enacting the 2012 MATS Rule, the Obama-era EPA relied heavily on the SAB to vet its research, and addressed each of the recommendations and requests brought by the SAB in response.²⁶⁶ Where the Bush-era 2005 CAMR often read like a work of legal advocacy, the Obama-era 2012 MATS Rule more frequently read like a scientific article or report, with frequent references to articles in scientific journals that supported the point under discussion.²⁶⁷ Like the Bush-era EPA, EPA under Obama framed not only the legal and technical aspects of their program in a way that counseled taking its chosen policy approach, but also framed opposing viewpoints by summarizing and framing public comments opposing stringent mercury regulations in ways that made them seem less credible or as arguing for patently unlawful or unreasonable interpretations of CAA.²⁶⁸ Though it is early in the Trump administration, his EPA has already signaled a major rollback of environmental regulations.²⁶⁹ The fact that petitioners in *Murray Energy Corp. v. Env't Prot. Agency* have attacked, *inter alia*, the economic modeling assumptions underlying the 2016 Supplemental Finding—and the fact that current EPA Administrator Scott Pruitt represented one of the petitioners in the *Murray Energy Corp.* case—indicates that EPA's review may involve the same kind of approach to modeling assumptions used by the Bush-era EPA to justify the 2005 Delisting Rule and the 2005 CAMR.

265. Certainly EPA appointees who had masterminded the CAMR avoided any negative effects outside their personal reputations, particularly among environmentalists, as they successfully re-entered the EGU lobbying industry when their tenure at the EPA was over. At the time of this writing, former Air and Radiation head Jeffrey Holmstead is a partner at Bracewell & Giuliani, <https://www.bracewell.com/people/jeffrey-r-holmstead>. His deputy, William Wehrum, became head of Hunton & Williams' administrative law practice, before returning to EPA in 2017 to become head of the Air and Radiation office himself. See <https://www.law360.com/articles/983588/senate-confirms-hunton-s-wehrum-to-lead-epa-s-air-office>. There is little dispute that the United States electorate has become increasingly polarized in the past several years. See Shanto Iyengar & Sean J. Westwood, *Fear and Loathing Across Party Lines: New Evidence on Group Polarization*, 59 AM. J. POL. SCI. 690 (2015). While there has been little research done on the importance of environmental views on voting decisions, most of what has been done suggests it has little effect. See Deborah Lynn Guber, *Voting Preferences and the Environment in the American Electorate*, 14 SOC'Y & NAT. RESOURCES 455 (2001).

266. See 2012 MATS Rule, *supra* note 4, at 9313–19 (describing SAB criticisms and recommendations and EPA's response to them).

267. See, e.g., *id.* at 9352 nn.222–234 (citing numerous scientific articles in support of EPA's health study assumptions), 9354 nn.258–67 (same).

268. See *id.* at 9319–62.

269. See Michael Greshko et al., *A Running List of How Trump is Changing the Environment*, NAT'L GEOGRAPHIC (Aug. 23, 2017), <http://news.nationalgeographic.com/2017/03/how-trump-is-changing-science-environment/>.

III. CONCLUSION AND POLICY RECOMMENDATIONS

If the first (1970-1989) and second (1990-2000) eras of CAA-based mercury regulatory decisions were defined by inaction and delay, the third (2001-2017) has seen vigorous battles played out in Congress, EPA rulemaking process, and the federal courts over how to regulate EGU-sourced mercury. From the CAA's creation until the present, a surgent anti-regulatory movement has emerged and environmental issues have become increasingly polarized, with an executive branch frequently controlled by politicians either unable or unwilling to fully implement CAA provisions, particularly regarding HAP. As overt attempts to weaken or delay CAA provisions proved less effective, politicians and policymakers interested in reducing environmental regulatory burdens on business instead turned to lower-profile mechanisms to implement industry-friendly rules. No process shows this evolution in such sharp relief as President Bush's Clear Skies Plan and the controversial implementation of its mercury provisions as the 2005 CAMR. Framed as a means to reduce the dangers posed by, *inter alia*, EGU-sourced mercury, the 2005 CAMR created a regulatory mechanism that essentially placed no mercury reduction requirements on EGUs for several years.

The tactics used to delay actual mercury emissions reductions requirements included modifying scientific and technical assumptions to increase projected costs while reducing projected benefits, all within a rhetorical framing that strove to appear objective and "scientific." One particularly common strategy has been afforded by—and likely partially the cause of—an increase in the length of regulations. The 1973 rule regulating mercury emissions from chlor-alkali plants made up 31 pages, including pages discussing beryllium and asbestos, with most of the Rule setting forth technical and procedural processes to ensure compliance.²⁷⁰ The 2005 CAMR, on the other hand, was more than three times as long, and relied on even longer technical analyses filed separately on the docket.²⁷¹

While environmentalists ultimately appeared to have been victorious in the regulation of mercury emissions by EGUs, the recent announcement by the Trump EPA has cast the 2012 MATS Rule in doubt again. Furthermore, even if EPA decides not to withdraw or alter the rule,²⁷² the history of the rule's passage shows a costly victory. In the context of the 40-year history of Section 112, the EGU industry has been the real winner. While it has been the primary source of

270. See Nat'l Emission Standards for HAPs, 38 Fed. Reg. 8820, 8820–50 (Apr. 6, 1973) (to be codified at 40 C.F.R. pt. 61).

271. See 2005 CAMR, *supra* note 194, at 28,606–700. Of course, such attempts are also served by ever increasing "additional procedures, analytical requirements, and external review mechanisms" that have greatly contributed to the size of published regulations generally, and the time it takes to move from proposed to final rule. See Thomas O. Garity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385, 1386 (1992).

272. The public has historically been resistant to regulations weakening toxic standards. See JASANOFF, *supra* note 16 at 197–98 (discussing the controversy surrounding the regulation of formaldehyde in the late 70s and early 80s). For one recent example of public opposition to rollbacks on toxic substances, see Katharine Q. Seelye, *E.P.A. to Adopt Clinton Arsenic Standard*, NY TIMES (Nov. 1, 2001), <http://www.nytimes.com/2001/11/01/us/epa-to-adopt-clinton-arsenic-standard.html> ("The level of 10 parts per billion was proposed by the Clinton administration in January but blocked in March by the Bush Administration. Mr. Bush has since admitted that it was one of the worst moves of his young administration . . .").

mercury emissions since at least the 1990s, it has avoided mercury regulations through appeals to scientific uncertainty and purportedly unreasonably high costs of control, aided by a well-organized ideological movement against environmental regulations that has been highly effective not only in Republican administrations but also Democratic ones.²⁷³ As shown above, while anti-regulatory actors were unable to substantially weaken the CAA itself or delay stringent mercury regulations indefinitely, by prolonging the debate they were able to let EGUs reap those financial benefits for decades.

The health costs resulting from this inaction may be substantial. From 1993 until 2011, the percentage of total river miles and lake acres subject to chemical contamination advisories—with mercury being the most common contaminant—increased from less than 5% to over 35% for the former, and from less than 10% to over 40% for the latter.²⁷⁴ The comprehensive technical analysis produced by EPA for the 2012 MATS Rule, revised in response to peer-review by SAB, suggests that vulnerable groups especially may be exposed to dangerous levels purely due to EGU emissions alone, even at the decreased mercury levels then found in the environment.²⁷⁵ In the context of CAA's history, then, the delay in regulating EGU-sourced mercury may have negatively impacted generations of children, particularly in vulnerable communities where freshwater fish consumption may be particularly high.

Furthermore, at this point many EGUs have already installed control technologies (or in the case of older plants, closed down) in response to MATS or state-level restrictions, and thus have already complied with the 2012 MATS Rule. While it is likely too soon to determine whether the new mercury control measures are effective in reducing mercury in waterbodies from which fish are taken, initial data suggests that they may already be effective in reducing localized mercury pollution near EGUs that have installed control technologies.²⁷⁶ Furthermore, the costs of such controls have not proven especially excessive, and the sorbent injection controls themselves may be even more efficacious than previously thought by industry actors.²⁷⁷

What policy recommendations can be gleaned from the EGU-sourced mercury debate? For one thing, it provides an almost textbook example of the fundamental difficulties of the modern environmental regulatory apparatus; striking the appropriate balance between giving agencies like EPA sufficient discretion to regulate pollution in a flexible manner, but not giving them so much discretion that agency actors hostile to environmental regulation use that flexibility to weaken or

273. See LAYZER, *supra* note 16, at 66–82, 187–256.

274. U.S. ENVTL. PROT. AGENCY, EPA-820-F-13-058, 2011 NATIONAL LISTING OF FISH ADVISORIES 2 fig.1 (2013), <https://www.epa.gov/sites/production/files/2015-06/documents/technical-factsheet-2011.pdf>.

275. See 2011 TSD, *supra* note 30, at 110–11.

276. See Mark S. Castro & John Sherwell, *Effectiveness of Emissions Controls to Reduce the Atmospheric Concentrations of Mercury*, 49 ENVTL. SCI. & TECH. 14000, 14000–07 (2015).

277. 2009 GAO REPORT, *supra* note 35, at 14, 18 (“Overall . . . most plant managers said that the sorbent injection systems at their plants are more effective than they had originally expected.”).

delay regulations protective towards human health.²⁷⁸ But as the history described above demonstrates, even where EPA has not been given discretion, it will often take it – as in the case of the 2005 CAMR. The history of the EGU-sourced mercury debate also provides a clear example of the shift from overt challenge or resistance to CAA requirements to a more covert approach that uses a pro-environmental narrative framing and control of technical analyses to put into place regulations that benefit industry as much as possible.

What is the best way to regulate either EGU-sourced mercury or other toxics emissions in the future? In the case of mercury and a number of other pollutants, the current multi-pollutant approach seems more effective than a single-pollutant one, allowing multiple layers of pollution mitigation regulations that can reduce a potentially expansive array of pollutants.²⁷⁹ For mercury specifically, increased government funding for scientific research into areas that are still uncertain, particularly atmospheric cycling and population-level health effects, would help, as would implementing a more comprehensive national mercury deposition monitoring network.²⁸⁰

Dealing with the technical and scientific dimensions of air pollution control generally may end up being less difficult to resolve than clashes of ideology, considering that the scientific and technical consensus that mercury posed a danger to the American public, and that EGU emissions were the largest anthropogenic source in the United States.²⁸¹ How can environmental regulations be effectively implemented when EPA is controlled by those ideologically opposed to such regulations at a fundamental level, who have developed sophisticated procedural and discursive strategies they can leverage when they have political control of EPA? While environmental advocates have successfully headed off many such attacks in the courts and before legislative bodies, anti-regulatory interests often hold the advantage because they can frequently achieve their goal by simply delaying regulations as long as possible. And even though the regulatory debate over EGU-sourced HAP emissions has on more than one occasion seemed to have reached a denouement, changes in administration continuously place it back in question.

Perhaps future regulatory debates would be served best by a more explicit engagement in ideological disputes, moving away from a technical or scientific framing of uncertainty towards debates over values: in the face of uncertainty, how much risk is the public willing to suffer—and who should bear that burden of uncertainty? Although most of the public has been consistently pro-environmental regulation, they tend not to make voting choices based on environmental beliefs.²⁸²

278. See Williamson et al., *supra* note 8, at 645 (“The original authorizing statutes often provided little direction other than broad, sometimes vague, and occasionally contradictory goals.”).

279. Of course, as the history of the 2005 CAMR demonstrates, the multipollutant narrative can be framed to justify inaction.

280. See L. Zhang et al., *Assessment of Modeled Mercury Dry Deposition Over the Great Lakes Region*, 161 ENVTL. POLLUTION 272, 273 (2012) (“Major challenges in quantifying [mercury] dry deposition at regional scales include . . . insufficient spatial coverage of speciated-mercury measuring sites . . .”).

281. See generally 1998 UTILITY STUDY, *supra* note 125; 2000 NRC REPORT, *supra* note 32.

282. See *supra* note 265 and accompanying text.

The early 1970s, however, saw a massive public outcry that led to the CAA and other federal environmental statutes, so it is at least possible that this pro-environmental fervor could recur, or at least the public could move towards a point where politicians again feel the need to follow along, if only for their own political careers.²⁸³ However, the CAA generally may be a victim of its own success; despite the critique above in regards to EGU-sourced mercury regulations (or the lack thereof), in many other ways it has largely been successful, improving the air quality immensely over the past several decades, if not always to the extent hope for when it first went into effect.²⁸⁴ That success may help explain the lack of political consequences for politicians who take an environmentally anti-regulatory stance in the face of a public that overall tends to favor environmental regulations by large margins.²⁸⁵ Even when the public expressed support for strong mercury emission regulations as with the 2005 CAMR, the executive branch seemed disinclined to listen to them.²⁸⁶

Over the past decades, environmental policy analysts and other social scientists have worked on increasing public understanding of, and participation in, environmental policy decisions.²⁸⁷ Furthermore, the increasing risk of dire—and very visible—consequences of climate change may also help spur increased public interest in environmental laws and regulations, and if those consequences are as severe as many scientists project, such involvement will be critical. Increasing public interest in environmental protection could help push presidential administrations into taking environmental protection more seriously, and help fulfill the lofty goals of the environmental regulatory regime envisioned in the Earth Day era.

Ancient alchemists saw mercury as an element of change and flux; ideologically-charged actors in the modern federal rulemaking process have similarly seen the law regarding mercury subject to their own transmutation, able to be transformed into different manifestations as ideological actors gain control of the regulatory crucible. Allowing greater public involvement in that alchemy may ensure that what comes out of the crucible is consistent with what the public wants—and deserves.

283. See LAZARUS, *supra* note 77, at 75–77.

284. Concentrations of each NAAQS pollutant in the atmosphere of the United States has shown a steady downward trend over the past few decades, with particularly significant decreases in the smog precursors SO₂ and NO_x. U.S. ENVTL. PROT. AGENCY, *Progress Cleaning the Air and Improving People's Health*, <https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health> (last visited Nov. 12, 2017). Hazardous air pollutant emissions are somewhat harder to track due in part to their variability, though emissions for many (but not all) HAPs have been similarly reduced over time. See generally McCarthy et al., *Background Concentrations of 18 Air Toxics for North America*, 56 J. AIR & WASTE MGMT. ASS'N 3 (2006).

285. Polls show that roughly three-quarter of the public agrees that the country should “do whatever it takes to protect the environment.” Monica Anderson, *For Earth Day, Here's How Americans View Environmental Issues*, PEW RES. CTR. (Apr. 20, 2017), <http://www.pewresearch.org/fact-tank/2017/04/20/for-earth-day-heres-how-americans-view-environmental-issues/>.

286. See discussion *supra* Section II.D.1.

287. See, e.g., WILLIAM ASCHER ET AL., *KNOWLEDGE AND ENVIRONMENTAL POLICY: RE-IMAGINING THE BOUNDARIES OF SCIENCE AND POLITICS* (2010); David Guston, *Democratizing Science: Ends, Means, Outcomes*, in *THE RIGHTFUL PLACE OF SCIENCE: POLITICS* 39–47 (G. Pascal Zachary ed., 2013).