March 28, 2023

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Submitted via Regulations.gov

RE: Docket ID No. EPA–HQ– OAR–2015–0072, Reconsideration of the National Ambient Air Quality Standards for Particulate Matter

Comments of the Competitive Enterprise Institute (CEI)

Dear Dr. Perlmutt,

We appreciate the opportunity to submit this comment on the Environmental Protection Agency's (EPA) proposed rule entitled "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter."[1]

The EPA is not required to reconsider the particulate matter (PM) standards. After a thoughtful and extensive process, the agency finalized a new PM rule at the end of 2020 retaining the existing 2012 PM standards. Yet the EPA decided to jump the gun to initiate a reconsideration of the standards almost immediately after it finalized the 2020 rule.

These comments develop the following key points:

> 1) The EPA's proposed discretionary decision to reconsider the PM standards is premature. In addition, the proposal to reduce the primary annual fine particle ($PM_{2.5}$) standard does not properly consider the unnecessary harms that it will cause or the major flaws throughout the process.
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> 2) The EPA's judgment that $PM_{2.5}$ at concentrations below the current National Ambient Air Quality Standards (NAAQS) is based on a selective review of the epidemiological literature and is hard to reconcile with various real-world observations.

[1] Environmental Protection Agency, "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter, Proposed Rule," Proposed Rule, 88 Fed. Reg. 5558 (January 27, 2023) https://www.federalregister.gov/documents/2023/01/27/2023-00269/reconsideration-of-the-national-ambient-air-quality-standards-for-particulate-matter (accessed March 28, 2023).

3) The EPA's premature reconsideration and selective use of peer-reviewed studies reflect a more fundamental politicization of air pollution research—a condition attributable in part to the agency's outsized role as chief funder of air pollution studies.

We urge the EPA to withdraw the proposed rule and not change any of the existing standards, including lowering the primary annual $PM_{2.5}$ standard from 12.0 micrograms per cubic meter ($\mu g/m^3$) "to within the range of 9.0 to 10.0 $\mu g/m^3$ while taking comment on alternative annual standard levels down to 8.0 $\mu g/m^3$ and up to 11.0 $\mu g/m^3$."[2]

Part I: Regulatory Process Issues

Jumping the Gun: The EPA Should Learn from the Ozone Reconsideration Process

Whether the agency should reconsider the PM standards is a distinct question from how to set the standards. The former is a discretionary decision about whether the agency should be reconsidering the standards in the first place.[3]

Much can be learned from the EPA's decision to reconsider the 2008 ozone standards. Instead of following the five-year NAAQS review process established by Congress, the agency decided to propose a rule revising the ozone standards three years ahead of schedule.[4] In 2011, at the behest of President Barack Obama, OMB directed the EPA to withdraw what were going to be new and stricter ozone standards than the then-recently finalized 2008 standards, explaining:

> I have continued to underscore the importance of reducing regulatory burdens and regulatory uncertainty, particularly as our economy continues to recover. With that in mind, and after careful consideration, I have requested that Administrator Jackson withdraw the draft Ozone National Ambient Air Quality Standards at this time. Work is already underway to update a 2006 review of the science that will result in the reconsideration of the ozone standard in 2013. Ultimately, I did not support asking state and local governments to begin implementing a new standard that will soon be reconsidered.[5]

President Obama was correct in taking this action before the EPA published the final rule. At the time, OMB made it clear that the agency was making a discretionary decision, explaining, "finalizing a new standard now is not mandatory and could produce needless uncertainty."[6] This is true now regarding the proposed PM reconsideration. In addition, two important reasons

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[2] Ibid.
[3] See e.g. OMB Letter from Cass Sunstein to Administrator Jackson, September 2, 2011, https://www.reginfo.gov/public/return/EPA_Return_Letter_9-2-2011.pdf (accessed March 28, 2023).
[4] Environmental Protection Agency, "National Ambient Air Quality Standards for Ozone," Proposed Rule, 75 Fed. Reg. 2938 (January 9, 2010) https://www.regulations.gov/document/EPA-HQ-OAR-2005-0172-7239 (accessed March 28, 2023).
[5] "Statement by the President on the Ozone National Ambient Air Quality Standards," https://obamawhitehouse.archives.gov/the-press-office/2011/09/02/statement-president-ozone-national-ambient-air-quality-standards, September 2, 2011, (accessed March 28, 2023).
[6] OMB Letter, September 2, 2011.

President Obama identified for withdrawing the ozone rule also apply: economic and timing concerns.

Economic Concerns. President Obama emphasized the need "to minimize regulatory costs and burdens, particularly in this economically challenging time."[7] Given the current economic situation in the United States, with inflation devastating American families and the nation still recovering from the COVID-19 pandemic, the agency should withdraw the proposed rule. The 2022 inflation rate of eight percent was the highest experienced in the U.S. since 1981.[8]

Americans are taking a major financial hit meeting basic needs, such as fueling their cars and buying food. Regular retail gas prices during the week of March 20, 2023 were 20 percent higher than two years ago and 43 percent higher than the week after President Biden took office.[9] Food prices in February were 9.5 percent higher than a year earlier, and remain at 40-year highs.[10]

Timing Concerns. Noting that "Work had already begun on a new and forthcoming scientific review," OMB cautioned that "issuing a final ozone rule in late 2011 would be problematic in view of the fact that a new assessment, and potentially new standards, will be developed in the relatively near future."[11] Of necessity, the agency would chiefly rely on a review of the scientific literature as of 2006, rather than "the best available science," inconsistent with the express requirements of Executive Order 13563.[12]

Under the statutory five-year schedule, the EPA would finalize a new PM rule in 2025, and the agency could already be involved in a thoughtful review process in anticipation of 2025. Instead, the EPA decided to reconsider the 2020 final rule at the start of the Biden administration. Only one month after the EPA published its final PM rule in the *Federal Register* on December 18, 2020, President Joe Biden issued an executive order, which along with the accompanying fact sheet, directed the agency to review the 2020 PM rule. Just six months after publication of the 2020 final rule, the EPA announced its decision to reconsider the PM standards.[13]

Before the "ink could dry" on the 2020 PM rule, the EPA was already starting the process to undo the work that went into the rule. The EPA, as in 2011 regarding ozone, would be asking

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[7] "Statement by the President on the Ozone National Ambient Air Quality Standards."
[8] US Inflation Calculator, CoinNews Media Group Company, https://www.usinflationcalculator.com/inflation/historical-inflation-rates/ (accessed March 28, 2023).
[9] Calculations using data from Energy Information Administration, "Weekly U.S. Regular All Formulations Retail Gasoline Prices," https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=W (accessed March 28, 2023). The prices were $3.42 the week of March 20, 2023, $2.85 the week of March 15, 2021, and $2.39 the week of January 25, 2021 (the week after President Biden took office).
[10] Bureau of Labor Statistics, "Consumer Price Index Summary," https://www.bls.gov/news.release/cpi.nr0.htm (accessed March 28, 2023). See also Bureau of Labor Statistics, "Consumer Price Index Archived News Releases," https://www.bls.gov/bls/news-release/cpi.htm (accessed March 28, 2023).
[11] OMB Letter, September 2, 2011.
[12] Ibid.
[13] See e.g. "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule.

state and local governments to begin implementing a new standard even though the current standards are already required to be reviewed soon.

The NAAQS five-year process allows for the EPA to properly consider new evidence that has been produced over several years since the last review. The EPA through its proposed PM rule is simply re-reviewing the same science that was already available to the agency when it finalized the 2020 final rule. The only minor difference is the 2022 Integrated Scientific Assessment (ISA) supplement that the agency itself admits has a "narrow scope" and "does not encompass the full multidisciplinary evaluation presented within the 2019 ISA that would result in weight-of-evidence conclusions on causality."[14] The CASAC was so concerned with the limited scope that it stated "this limiting of scope applies only to this document and is not intended to establish a precedent for future ISAs."[15]

If the EPA simply waited as it should to review, and if appropriate, revise the PM standards, keeping with the five-year time period, then it could do so based on an ISA that includes a newer and more extensive assessment of the science. Instead, the EPA is rushing to revise the primary annual $PM_{2.5}$ standards based on the old 2019 ISA and a very limited supplemental document. As in 2011, the EPA would not be using the "best available science." An issue of such magnitude deserves far more careful and thorough attention than this unreasonable process.

The EPA Should Not Ignore the Already Low and Improving $PM_{2.5}$ Concentration Levels

The rapid rejection of the 2020 decision to retain the primary annual $PM_{2.5}$ standard without waiting until 2025 would lead one to believe that $PM_{2.5}$ concentration levels are extremely high and action must be taken immediately without waiting two years. PM data, including the EPA's own data, demonstrate the unreasonableness of such a belief and taking agency action in light of it.

Based on EPA data, between 2000-2021, the national average concentration levels for $PM_{2.5}$ declined by 37 percent.[16] Over the last five years of data, the national average concentration levels have been right around 8.0 µg/m³, well below the primary annual standard of 12.0 µg/m³. The national average concentration has not been above the current national standard since 2006.[17]

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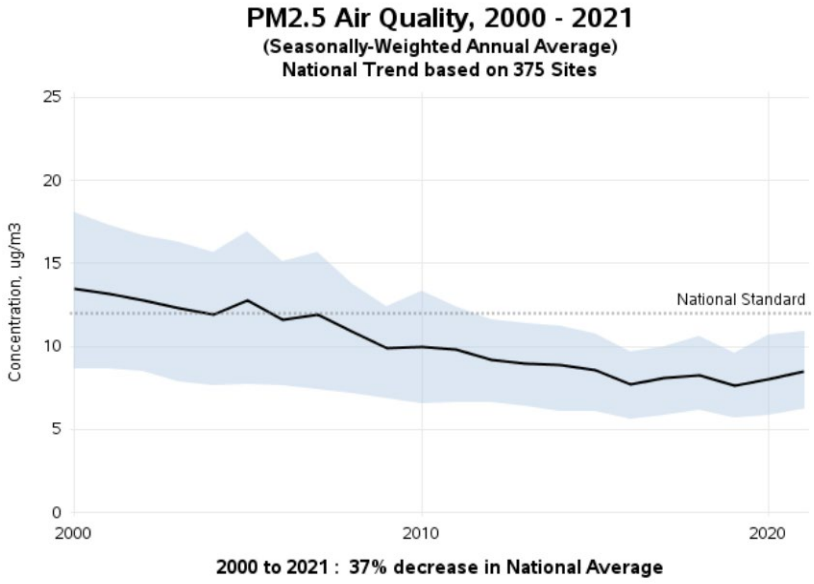
[14] Ibid at 5569.
[15] Ibid.
[16] Environmental Protection Agency, "Particulate Matter ($PM_{2.5}$) Trends," https://www.epa.gov/air-trends/particulate-matter-pm25-trends (accessed March 28, 2023).
[17] See "Particulate Matter ($PM_{2.5}$) Trends." While reductions in concentration levels have been continuous and most of the country is below the national standard, there were still 21 million people in nonattainment areas, according to a 2020 CRS report. "Ozone and Particulate Matter Air Standards: EPA Review," Congressional Research Service, updated December 23, 2020, https://sgp.fas.org/crs/misc/IF11288.pdf (accessed March 28, 2023). However, concentration levels in these areas will continue to improve and do not necessitate lowering the standards (lowering it further would not be needed to meet the existing standard, nor would it be needed to go below the standard). Not lowering a standard does not mean the end for reductions in concentration levels. For example, the 2006 PM review did not lower the primary annual standard. Yet the national average concentration level declined for the five years



The improvements exist across all regions of the country. Between 2000-2021, average concentration levels declined by 45 percent in the Ohio Valley, 32 percent in the Upper Midwest, 43 percent in the Northeast, 23 percent in the Northwest, 29 percent in the South, 45 percent in the Southeast, 13 percent in the Southwest, 28 percent in the West, and 16 percent in the Northern Rockies and Plains.[18]

Compared to other countries,[19] the United States is a leader when it comes to $PM_{2.5}$ concentration levels, and it is not even close. In 2020, the EPA explained, "the U.S. has some of the lowest fine particulate matter levels in the world—approximately five times below the global average, six times below Chinese levels, and 20 percent lower than France, Germany, and Great Britain."[20]

The EPA's rush to move forward with this reconsideration and to lower any of the PM standards is inconsistent with the reality of $PM_{2.5}$ concentrations in the country. The EPA has not made a case as to why waiting two years and going through a proper review process would be insufficient, and this reality regarding $PM_{2.5}$ concentrations makes the agency's actions even more unreasonable.

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from 2007 to 2011, from 11.9 µg/m³ to 9.8 µg/m³. See "Particulate Matter ($PM_{2.5}$) Trends." Further, states would establish standards that go below any national standard, if deemed necessary.

[18] "Particulate Matter ($PM_{2.5}$) Trends."

[19] See e.g. World Health Organization, "SDG Indicator 11.6.2 Concentrations of fine particulate matter ($PM_{2.5}$)," The Global Health Observatory, https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-(pm2-5) (accessed March 28, 2023).

[20] "EPA Finalizes NAAQS for Particulate Matter," Environmental Protection Agency press release, December 7, 2020, https://www.epa.gov/newsreleases/epa-finalizes-naaqs-particulate-matter (accessed March 28, 2023).

The Scientific Review Process During the Reconsideration Delegitimizes the Proposed Rule

There is a significant crisis when it comes to the use of science in rulemaking, from a lack of transparency to agencies only using science that supports a desired outcome. Policymakers have tried to address these problems for many years. For example, in 2009, President Obama issued a memorandum on scientific integrity, arguing that the public must be able to trust the science and the scientific process used by agencies.[21]

The current reconsideration process weakens public trust in the science and the scientific process. The EPA, at a minimum, appears to have selected scientists predisposed to supporting its desired policy outcomes. The agency then only used science that supports these outcomes while ignoring sound science that undermines them.

The Purge of the Clean Air Scientific Advisory Committee (CASAC). On March 31, 2021, EPA Administrator Michael Regan dismissed all of the advisers from CASAC, as well as another statutorily required panel, the Science Advisory Board (SAB).[22] Taking such unprecedented actions was initially being pushed[23] in 2020 by former EPA employees opposed to Trump administration policies.[24] John Graham, who had led the EPA's disbanded SAB, stated after this purge: "Now for the first time in the agency's 50-year history, we have an administrator interested in scientific advice only from those scientists he has personally appointed."[25]

The dismissals took place *before* the agency announced its decision to initiate the current reconsideration process in June 2021, setting the stage for a reconsideration with CASAC support.[26] In fact, that is precisely what happened. The EPA administrator's rationale to lower

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[21] President Barack Obama, Memorandum for the Heads of Executive Departments and Agencies, Scientific Integrity, March 9, 2009, https://obamawhitehouse.archives.gov/the-press-office/memorandum-heads-executive-departments-and-agencies-3-9-09 (accessed March 28, 2023).

[22] "Administrator Regan Directs EPA to Reset Critical Science-Focused Federal Advisory Committees," Environmental Protection Agency press release, March 31, 2021, https://www.epa.gov/newsreleases/administrator-regan-directs-epa-reset-critical-science-focused-federal-advisory (accessed March 28, 2023).

[23] "Resetting the Course of EPA: Restoring Science as the Backbone of EPA Decision-making," Environmental Protection Network, August, 2020, https://legacy-assets.eenews.net/open_files/assets/2021/03/26/document_gw_04.pdf (accessed March 28, 2023).

[24] Sean Reilly, "EPA science advisers could face ouster under 'reset,'" Greenwire, March 26, 2021, https://subscriber.politicopro.com/article/eenews/1063728617 (accessed March 28, 2023).

[25] Lisa Friedman, "The E.P.A. administration purges its scientific advisory boards, which included many Trump appointees." The New York Times, https://www.nytimes.com/2021/03/31/us/epa-advisory-boards-trump.html (accessed March 28, 2023).

[26] On June 17, 2021, the EPA announced the membership of the newly formed CASAC. It appears to have brought back two of the seven members who were serving at the time of dismissal. According to the EPA, the new members included two individuals selected by the Trump administration. Five of the previous members were not retained, including the Chair of CASAC. EPA Announces Selections of Charter Members to the Clean Air Scientific Advisory Committee, Environmental Protection Agency press release, June 17, 2021, https://www.epa.gov/newsreleases/epa-announces-selections-charter-members-clean-air-scientific-advisory-committee (accessed March 28, 2023). See also, the 2020 CASAC roster as listed in the advisory reports, Environmental Protection Agency, Clean Air Scientific Advisory Committee Advisory Reports, https://casac.epa.gov/ords/sab/f?p=113:12:1342972375271:::12 (accessed March 28, 2023).

the primary annual $PM_{2.5}$ standard was informed by "CASAC advice and recommendations, as reflected in discussions of the drafts of the ISA Supplement and PA [Policy Assessment] at public meetings and in the CASAC's letters to the Administrator."[27]

The proposal to lower the primary annual standard is inextricably bound with the EPA's indefensible and arbitrary decisions connected to CASAC. The proposal and the entire rule are arbitrary and capricious because the process informing them was arbitrary and capricious.

Part II. Scientific Issues

The agency is relying on the old 2019 ISA and the narrow 2022 ISA supplement with the backing of a reformulated and favorable CASAC, and still appears to generally agree with the assessment of the science made by the agency in the 2020 final rule. The only difference is related to the weight given to the epidemiological studies, which are extremely problematic.

The 2020 final PM Rule concluded that controlled human exposure studies and animal toxicology studies demonstrate the biological plausibility of $PM_{2.5}$ health risks at some levels of exposure, but do not provide evidence that the current annual standard of 12 $\mu g/m^3$ is insufficiently protective.[28] That is because, in general, clinical and toxicological studies examine the health of effects of $PM_{2.5}$ concentrations up to 80 times higher than the annual standard and substantially above daily peak exposures.

The proposal includes a few newer epidemiological studies but, overall, the difference between the 2020 final PM Rule and the proposed rule relates to the weight given to epidemiological studies.[29]

Experimental Studies. In the proposed rule, the EPA correctly observes that controlled human exposure and animal toxicology studies do not provide evidence that $PM_{2.5}$ poses significant mortality risks at today's historically low levels. Controlled human exposure experiments typically report indicators of cardiovascular function following 2-hour exposures to $PM_{2.5}$ concentrations at and above 120 $\mu g/m^3$ (and at and above 149 $\mu g/m^3$ for vascular impairment).[30] Animal toxicology studies generally examine the health effects of short-term exposures to $PM_{2.5}$ concentrations ranging from 100 to >1,000 $\mu g/m^3$ and long-term exposures to concentrations from 66 to >400 $\mu g/m^3$. Those exposures are too high to provide a basis for determining human health risks at concentrations of 12 $\mu g/m^3$ and lower.[31]

That experimental studies demonstrate only the biological plausibility of $PM_{2.5}$ as a health risk and do not validate $PM_{2.5}$ NAAQS determinations has been known for many years. In their comprehensive review of "inhalation studies using concentrated ambient particles, diesel engine

[27] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule at 5574.
[28] Environmental Protection Agency, "Review of the National Ambient Air Quality Standards for Particulate Matter," Final Rule, 85 Fed. Reg. 82684 (December 18, 2020) https://www.federalregister.gov/documents/2020/12/18/2020-27125/review-of-the-national-ambient-air-quality-standards-for-particulate-matter (accessed March 28, 2023).
[29] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule, at 5561.
[30] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule, at 5577.
[31] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule, at 5594.

exhaust particulate matter, and sulfate and nitrate salts," toxicologists Laura Green and Sarah Armstrong reported that "Toxicologic data on typical forms of pollution derived PM strongly suggest that current ambient concentrations in the U.S. are too small to cause significant disease or death."[32] That was in 2003, when $PM_{2.5}$ levels were considerably higher than today. Specifically, during 2004-2019, average annual $PM_{2.5}$ concentrations in the United States declined by 36 percent, according to EPA's 2020 Air Quality Trends report.[33]

Epidemiology. The EPA, however, contends that "the available scientific evidence and technical information indicate that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act."[34] That evidence and information comes entirely from certain epidemiological studies, also known as observational studies because the researchers observe rather than control or intervene in the processes or relationships being examined.[35]

Epidemiology applies statistics to health outcomes in a population. It looks for correlations between exposures and effects that may or may not have a causal basis. Associations are most likely to reflect causality when exposure to the pathogen of interest correlates with high rates of a rare disease.[36] Therein lies the problem. $PM_{2.5}$ is ubiquitous, meaning almost everyone is exposed to it almost all the time. Moreover, researchers look for associations between $PM_{2.5}$ exposures and total ("all cause") mortality—a condition that eventually befalls everyone—or between exposures and common causes of death, such as cardiovascular disease (CVD). The result is that correlations between $PM_{2.5}$ exposure and death are generally weak and so are the estimated relative risks.

As regulatory analyst Steve Milloy explains:

> Epidemiologic correlations are statistical associations often calculated as "relative risks" (RRs) or "odds ratios" (ORs)—terms that are interchangeable for the present discussion. An RR of 1.0 is a zero correlation, meaning no statistical relationship between the variables at issue, in this case $PM_{2.5}$ and death. The Six City and Pope study correlations are on the order of 1.1. Although their reported values are greater than 1.0, these RRs are so close to zero that they effectively amount to zero correlations. For example, in his famous 1965 address to the Royal Society, British epidemiologist Sir Austin Bradford Hill said that RRs on the order of 2.0 or less are unreliable and may very well be the result of poor data quality or chance.[37]

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[32] Laura C. Green and Sarah R. Armstrong, "Particulate matter in ambient air and mortality: toxicologic perspectives," Regulatory Toxicology and Pharmacology, Volume 38, Issue 3, December 2003, Pages 326-335, https://www.sciencedirect.com/science/article/pii/S0273230003000990 (accessed March 28, 2023).
[33] "Particulate Matter ($PM_{2.5}$) Trends."
[34] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule at 5560.
[35] S. Stanley Young and Jessie Q. Xia. 2013. Assessing Geographic Heterogeneity and Variable Importance in an Air Pollution Data Set.
[36] Steve Milloy, *Scare Pollution: Why and How to Fix the EPA* (USA, 2016), p. 6.
[37] Steve Milloy, *Will the Trump Fuel Economy Reform Program Create Deadly Air Pollution*, On Point No. 250, Competitive Enterprise Institute, October 17, 2018, https://cei.org/sites/default/files/Steve_Milloy_-_Will_CAFE_Reform_Proposal_Create_Deadly_Air_Pollution%20%281%29.pdf, (accessed March 28, 2023) citing Sir Austin Bradford Hill, "The Environment and Disease: Association or Causation," Proceedings of the Royal Society of Medicine, January 14, 1965,

As can be seen in Figure 3-5 from the EPA's 2022 Policy Assessment, CVD relative mortality risks from $PM_{2.5}$ exposures do not exceed 1.3. In addition, some studies are negative, meaning that $PM_{2.5}$ exposure is associated with a reduction in CVD mortality risk.[38]

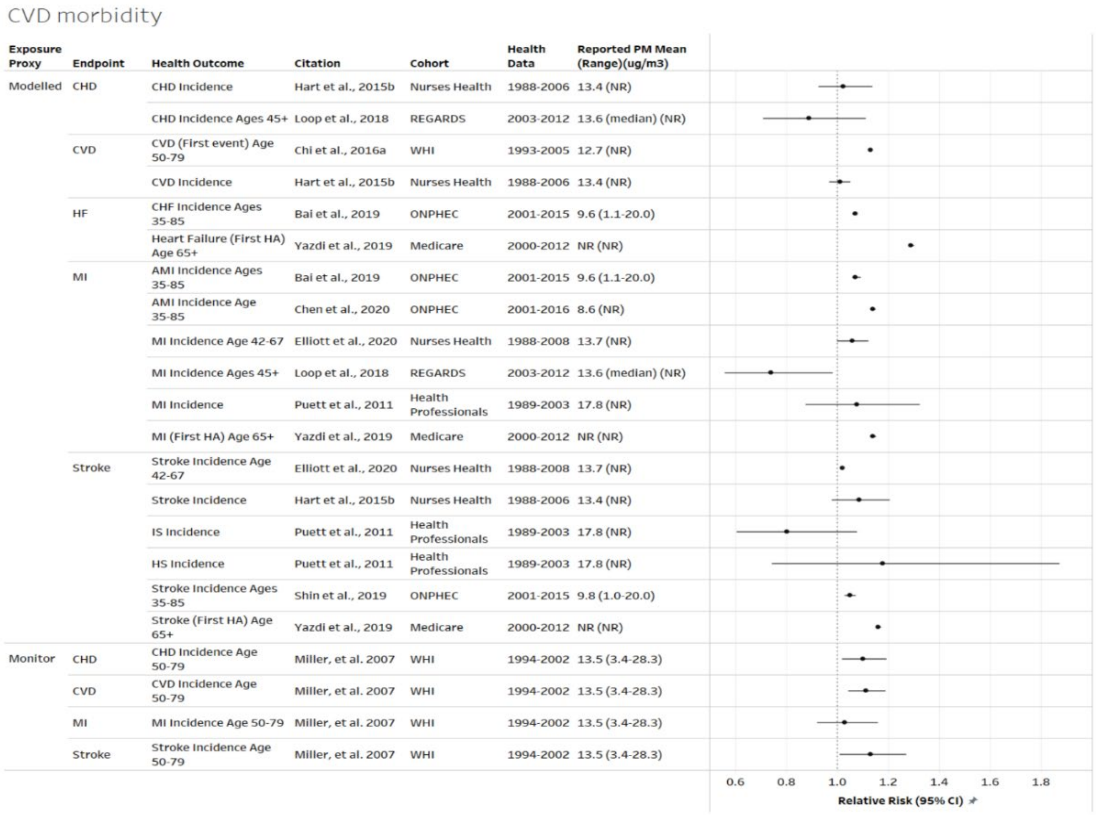

Figure 3-5. Epidemiologic studies examining associations between long-term $PM_{2.5}$ exposures and morbidity.

Orellano et al. (2020) provides a meta-analysis of the enormous literature on short-term pollution exposures and all-cause mortality.[39] The authors reviewed 1,632 studies and selected 196 for quantitative analysis. For $PM_{2.5}$ and all-cause mortality, the authors estimate a relative risk of 1.0065, with confidence limits of 1.0044 to 1.0086.

Statisticians S. Stanley Young and Warren Kindzierski comment: "Keep in mind that a risk ratio of 1.000 is considered no effect. So far as we know, 1.0065 is the smallest risk ratio claim for

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1898525/pdf/procrsmed00196-0010.pdf (accessed March 28, 2023).

[38] Environmental Protection Agency, "Policy Assessment for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," May 2022, https://www.epa.gov/system/files/documents/2022-05/Final%20Policy%20Assessment%20for%20the%20Reconsideration%20of%20the%20PM%20NAAQS_May2022_0.pdf (accessed March 28, 2023).

[39] Orellano et al. 2020. Short-term exposure to particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), and ozone (O_3) and all-cause and cause-specific mortality: Systematic review and meta-analysis. *International Environment* 142: 1-15, https://www.sciencedirect.com/science/article/pii/S0160412020318316 (accessed March 28, 2023).

$PM_{2.5}$ in the literature."[40] With a risk ratio that small, "any small bias in the selection of base papers to use in the meta-analysis might tilt the risk ratio," potentially producing a false positive.

Young and Kindzierski note that Orellano et al. (2020) does not include Young et al. (2017) and You et al. (2018a) among the 196 papers used to quantify relative risk. The first of those papers examine a large California $PM_{2.5}$/mortality data set comprising roughly 37,000 exposure days and 2 million death certificates over a 13-year period. The study is actually eight studies combined because the authors examine associations between $PM_{2.5}$ and mortality in eight separate air basins. They find no evidence of $PM_{2.5}$ associated mortality. You et al. (2018a) found "no statistically significant association between either ozone or PM2.5 and acute human mortality. In the absence of an association, causality is in question." Had Orellano et al. included those studies in their risk quantification, the relative risk might well have been indistinguishable from zero.

In any event, the exclusion of those papers from the risk quantification appears to show a bias in the selection of the base papers. The proposed rule appears to have a similar bias problem, which would make the rule arbitrary and capricious.

Depreciating Studies Finding No Association. The proposed rule spotlights epidemiological studies finding associations between $PM_{2.5}$ and mortality, especially associations below the current NAAQS. However, neither the proposal nor the 2022 Policy Assessment discusses studies finding no association, or none at levels below 12 $\mu g/m^3$. Several such studies are listed below.

1. Chay K, Dobkin C, Greenstone M. 2003. The Clean Air Act of 1970 and Adult Mortality. *Journal of Risk and Uncertainty*, 27(3): 279-300, https://epic.uchicago.edu/wp-content/uploads/2019/08/The-Clean-Air-Act-of-1970-and-Adult-Mortality.pdf.
2. Enstrom JE. 2005. Fine particulate air pollution and total mortality among elderly Californians, 1973–2002. *Inhalation Toxicology* 17:803–816, https://pubmed.ncbi.nlm.nih.gov/16282158/.
3. Enstrom JE. 2006. Response to "A Critique of 'Fine Particulate Air Pollution and Total Mortality Among Elderly Californians, 1973–2002'" By Bert Brunekreef, PhD. *Inhalation Toxicology* 18:509–514, https://www.tandfonline.com/doi/full/10.1080/08958370600596243.
4. Janes H, Dominici F, Zeger S. 2007. Trends in air pollution and mortality: An approach to the assessment of unmeasured confounding. *Epidemiology* 18:416–423, https://pubmed.ncbi.nlm.nih.gov/17568215/.
5. Berglind N, Ljungman P, Möller J, Hallqvist J, Nyberg N, Rosenqvist M, Pershagen G, Bellander T. 2010. Air Pollution Exposure—A Trigger for Myocardial Infarction? *Int. J. Environ. Res. Public Health* 7(4):1486-1499, https://pubmed.ncbi.nlm.nih.gov/20617041/.
6. Greven S, Dominici F, Zeger S. 2011. An approach to the estimation of chronic air pollution effects using spatio-temporal information. *Journal of the American Statistical Association* 106:396–406, https://pubmed.ncbi.nlm.nih.gov/28751799/.
7. Krstic G. 2012. A reanalysis of fine particulate matter air pollution versus life expectancy in the United States, *J Air Waste Manage Assoc*. 62:989–991, https://pubmed.ncbi.nlm.nih.gov/23019812/.

[40] S. Stanley Young and Warren Kindzierski, $PM_{2.5}$ and All Cause Mortality, https://arxiv.org/ftp/arxiv/papers/2011/2011.00353.pdf (accessed March 28, 2023).

8. Young SS, Xia JQ. 2013. Assessing geographic heterogeneity and variable importance in an air pollution data set. *Statistical Analysis and Data Mining* 6:375–386, https://cdn.cnsnews.com/documents/young080113.pdf.
9. Cox LA Jr, Popken DA, Ricci PF. 2013. Warmer is healthier: Effects on mortality rates of changes in average fine particulate matter ($PM_{2.5}$) concentrations and temperatures in 100 U.S. cities. *Regulatory Toxicology and Pharmacology*. 66:336–346, https://pubmed.ncbi.nlm.nih.gov/23707535/.
10. Young, S.S., Fogel, P., 2014. Air pollution and daily deaths in California, *Proceedings, 2014 Discovery Summit*, https://community.jmp.com/docs/DOC-6691/.
11. Cox LA Jr, Popken DA. 2015. Has Reducing Fine Particulate Matter and Ozone Caused Reduced Mortality Rates in the United States? *Annals of Epidemiology* 25(3):162-73, https://pubmed.ncbi.nlm.nih.gov/25571792/.
12. Wang X, Kindzierski W, Kaul P. 2015. Comparison of transient associations of air pollution and AMI hospitalization in two cities of Alberta, Canada, using a case-crossover design. *BMJ Open*. 5(11): e009169, https://pubmed.ncbi.nlm.nih.gov/26553835/.
13. Zu, K., Tao, G., Long, C., Goodman, J., Valberg, P., 2016. Long-range fine particulate matter from the 2002 Quebec forest fires and daily mortality in Greater Boston and New York City. *Air Qual. Atmos. Health* 9:213-221, https://pubmed.ncbi.nlm.nih.gov/27158279/.
14. Vanasse A, Talbot D, Chebana F, Bélanger D, Blais C, Gamache P, Giroux J-X, Dault R, Pierre Gosselin P. 2017. Effects of climate and fine particulate matter on hospitalizations and deaths for heart failure in elderly: A population-based cohort study. *Environment International* 106:257–266, https://espace.inrs.ca/id/eprint/5878/1/P003180.pdf.
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18. You C, Lin DJK, Young SS. 2018a. $PM_{2.5}$ and ozone, indicators of air quality, and acute deaths in California. *Regulatory Toxicology and Pharmacology*, 96: 190-196, https://www.sciencedirect.com/science/article/pii/S0273230018301430.
19. You C, Lin DJK, Young SS. 2018b. Time series smoother for effect detection. *PLoS ONE* 13 (4): e0195360, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5912770/pdf/pone.0195360.pdf.

The proposed rule could have reviewed one or more of the above studies in the interest of presenting a balanced assessment, but did not do so. The one partial exception is Greven et al. (2011). The EPA mentions the study's technique for reducing uncertainties related to potential confounders,[41] but not its conclusion:

> Results based on the global coefficient indicate a large increase in the national life expectancy for reductions in the yearly national average of $PM_{2.5}$. However, this coefficient based on national trends in $PM_{2.5}$ and mortality is likely to be confounded by other variables trending on the national level. Confounding of the local coefficient by unmeasured factors is less likely, although it cannot be ruled out. *Based on the local*

[41] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule at 5582.

> *coefficient alone, we are not able to demonstrate any change in life expectancy for a reduction in $PM_{2.5}$.*[42] (emphasis added)

This selection bias is a longstanding one. The studies listed above are also not included in the references for the 2020 final rule.

At a minimum, the proposal should have discussed Enstrom (2017) and Young et al. (2017). Enstrom's reanalysis of the American Cancer Society cohort study by Pope et al. (1995),[43] a foundational study for the EPA's regulation of $PM_{2.5}$, finds "No significant relationship between $PM_{2.5}$ and total mortality in the CPS II cohort . . . when the best available $PM_{2.5}$ data were used." Enstrom contends that Pope's finding of a "positive association" is due to "selective use" of both cohort and $PM_{2.5}$ data.[44]

The EPA's 2019 Integrated Science Assessment (ISA) discussed Enstrom (2017) but only to dismiss it in all of two sentences:

> A recent reanalysis of early…ACS [American Cancer Society] results observed a null association between county-level averages of $PM_{2.5}$ measured by the Inhalable Particle Network between 1979 and 1983 and deaths between 1982 and 1988 … Enstrom (2017)]. Inconsistencies in the results could be due to the use of 85 counties in the ACS analysis by Enstrom (2017) and 50 metropolitan statistical areas in the original ACS analysis (Pope et al., 1995).[45]

This "could be" explanation does not explain why Pope's conclusion should be favored over Enstrom's. If anything, Enstrom's inclusion of a larger number of counties weighs in its favor.

The ISA was similarly dismissive of Young et al. (2017):

> Additionally, in contrast to Ostro et al. (2006), a recent study by Young et al. (2017) did not provide any evidence of an association between short-term $PM_{2.5}$ exposure and mortality when examining eight air basins in California. The difference in results between these two studies could be attributed to: (1) the larger spatial domain over which exposure was assigned in Young et al. (2017), (i.e., an air basin [encompassing multiple counties]) compared with Ostro et al. (2006), (i.e., a single county); (2) the use of only the monitor with the highest concentration on each day to assign exposure (Young et al.,

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[42] Greven et al. (2006)

[43] C. Arden Pope III, Michael J. Thun , Mohan M. Namboodiri , Douglas W. Dockery , John S. Evans , Frank E. Speizer , and Clark W. Heath Jr. 1995. Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults American Journal of Respiratory and Critical Care Medicine, Vol. 151, Issue 3_pt_1, https://pubmed.ncbi.nlm.nih.gov/7881654/ (accessed March 28, 2023).

[44] James E. Enstrom, "Fine Particulate Matter and Total Mortality in Cancer Prevention Study Cohort Reanalysis," *Dose-Response: An International Journal*, January-March 2017:1-12, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5407529/pdf/10.1177_1559325817693345.pdf (accessed March 28, 2023).

[45] Environmental Protection Agency, "Final Integrated Assessment," December 2019, section 11, p. 67 (hereafter FISA 2019).

2017) versus the averaging of all monitors over the spatial domain examined (Ostro et al., 2006); and (3) the different statistical models used in the studies.[46]

Again, examining possible $PM_{2.5}$/mortality associations in a larger number of counties would appear to be a point in favor of Young et al. (2017). Note, too, that Young et al. (2017) examined 13 years of data (2000-2012) whereas Ostro et al. (2006) examined three years of data (1999-2002).[47]

To overlook or depreciate peer-reviewed assessments contrary to the agency's views "entirely fail[s] to consider an important aspect of the problem."[48] As the United States Supreme Court has explained, such a failure is normally a basis to conclude a rule is arbitrary and capricious.[49]

Note, too, that the EPA's overhasty decision to reconsider the 2020 final PM rule effectively excluded the agency's review of two significant studies published in January 2023. A new study by Louis Anthony Cox, Jr. concludes that "While there is strong evidence of an association between $PM_{2.5}$ and mortality risk, the causal nature of this association remains uncertain due to the possibility of omitted confounders."[50]

A new study by Robert Obenchain and S. Stanley Young suggests that the most dangerous fine particles are biogenic volatile organic compounds, namely, terpenes from grasses and trees. The authors conclude: "There appear to be only two realistic conclusions from the EPA data that we analyze here. Either biogenic volatile organic compounds are the real killers, or current EPA models for the chemical content of air pollution are misleadingly wrong."[51] The authors do not spell out the implication for regulatory policy, so we will. If the fine particles of chief concern are biogenic rather than anthropogenic, then further reductions in anthropogenic emissions would not significantly improve public health. Moreover, regulatory "solutions" are fundamentally misguided since trees and grasses are not potentially responsible parties under the Clean Air Act.

Lest there be any misunderstanding, we are not endorsing the Cox and Obenchain-Young studies. We are simply pointing out that they are among the negative or skeptical studies that the EPA would consider in a balanced and properly-timed assessment of the peer-reviewed literature.

Incongruous Facts. The problems with the agency's use of science in the proposed rule goes beyond the misuse of epidemiological studies. The EPA does not attempt to address

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[46] Environmental Protection Agency, FISA 2019, section 11, pp. 9-10.
[47] Ostro et al. 2006. Fine particulate air pollution and mortality in nine California counties: Results from CALFINE. *Environmental Health Perspectives*, 114(1): 29-33, https://pubmed.ncbi.nlm.nih.gov/16393654/ (accessed March 28, 2023).
[48] Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983), https://supreme.justia.com/cases/federal/us/463/29/ (accessed March 28, 2023).
[49] Ibid.
[50] Louis Anthony Cox, Jr. 2023. Causal reasoning about epidemiological associations in conversational AI. *Global Epidemiology,* 5: 1-6, https://www.sciencedirect.com/science/article/pii/S2590113323000056 (accessed March 28, 2023).
[51] Robert L. Obenchain and S. Stanley Young. 2023. EPA Particulate Matter Data - Analyses using Local Control Strategy, *North Carolina Journal of Mathematics and Statistics*, 9:1-12, https://libjournal.uncg.edu/ncjms/article/view/2299 (accessed March 28, 2023).

incongruous facts in the agency's conclusions regarding PM that raise serious doubts about the lethality of $PM_{2.5}$ at today's historically low levels. For example, "almost-never" smokers do not experience massive reductions in average life expectancy even though their lifetime exposure to $PM_{2.5}$ is ~50 times higher than that of nonsmokers. This is the type of fact that requires the agency to at least *attempt* to provide an explanation.

Young, Enstrom, and seven other experts comment on this deep and easily verified incongruity:

> It is implausible that a never-smoker's death could be caused by inhalation over an 80-year lifespan of about one teaspoon (~5 grams) of invisible fine particles as a result of daily exposure to 15 $\mu g/m^3$. This level of exposure is equivalent to smoking about 100 cigarettes over a lifetime or 0.004 cigarettes per day, which is the level often used to define a never-smoker. The notion that $PM_{2.5}$ causes premature death becomes even more implausible when one realizes that a person who smokes 0.2 cigarettes/day has a daily exposure of about 750 $\mu g/m^3$. If a 10 $\mu g/m^3$ increase in $PM_{2.5}$ actually caused a 0.61-year reduction in life expectancy, equivalent to the claim of Pope, then a 0.2 cigarettes/day smoker would experience about a 45-year reduction in life expectancy, assuming a linear relationship between changes in $PM_{2.5}$ and life expectancy. In actuality, never-smokers and smokers of 0.2 cigarettes/day do not experience any increase in total death rate or decrease in life expectancy, in spite of a 50-fold greater exposure to $PM_{2.5}$.[52]

A CEI policy paper by Steve Milloy finds support for that argument in a study on the health benefits of smoking cessation in the *New England Journal of Medicine*:

> What does the epidemiology of smoking tell us about long-term exposures to $PM_{2.5}$? Someone living to age 80 or so breathing average U.S. air will inhale an ounce or so in total of $PM_{2.5}$—an amount that can be visualized as two sugar packets' worth of $PM_{2.5}$. A recent study in the *New England Journal of Medicine* reported that people who stop smoking by age 35 have normal life expectancy, which translates to about 80 years for white women.[53] Assuming such an individual had smoked half a pack of cigarettes per day, she would have inhaled over four pounds of $PM_{2.5}$. What does it say about the lethality of $PM_{2.5}$ on a long-term basis if a non-smoker and smoker can have the same life expectancy despite the vast differences in $PM_{2.5}$ inhaled—a sugar packet versus more than a sugar bag's worth, respectively?[54]

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[52] http://www.scientificintegrityinstitute.org/Science100615.pdf

[53] Prabhat Jha et al, "21st-Century Hazards of Smoking and Benefits of Cessation in the United States," *New England Journal of Medicine*, Vol. 368, No. 4 (January 24, 2013), pp. 341-350, https://www.nejm.org/doi/full/10.1056/NEJMsa1211128 (accessed March 28, 2023).

[54] Steve Milloy, Will the Trump Fuel Economy Reform Proposal Create Deadly Air Pollution? On Point No. 250, Competitive Enterprise Institute, October 17, 2018, p. 7, https://cei.org/sites/default/files/Steve_Milloy_-_Will_CAFE_Reform_Proposal_Create_Deadly_Air_Pollution%20%281%29.pdf (accessed March 28, 2023).

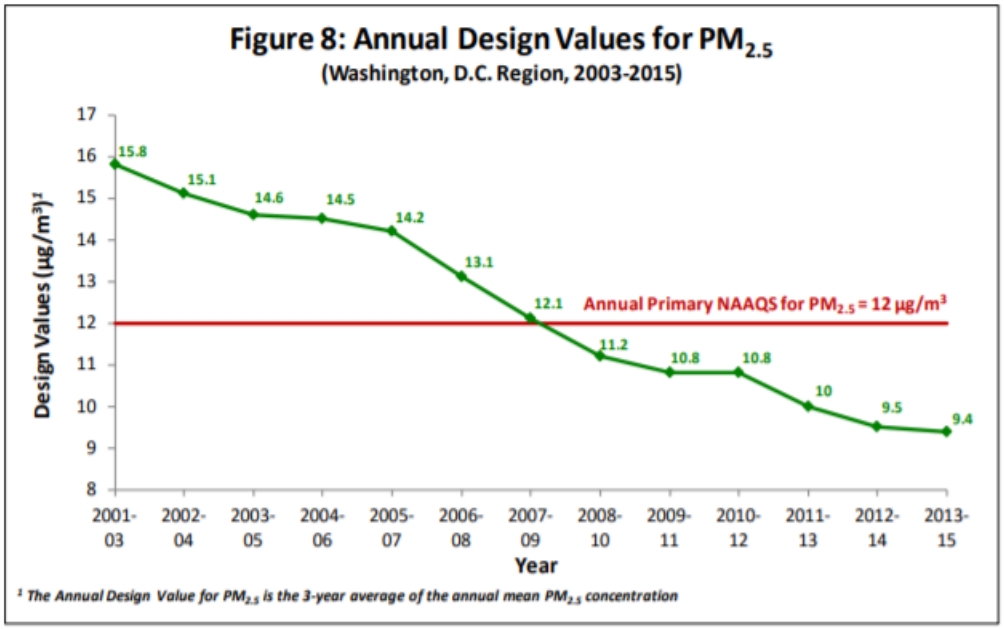
Milloy illustrates the foregoing with this photo:

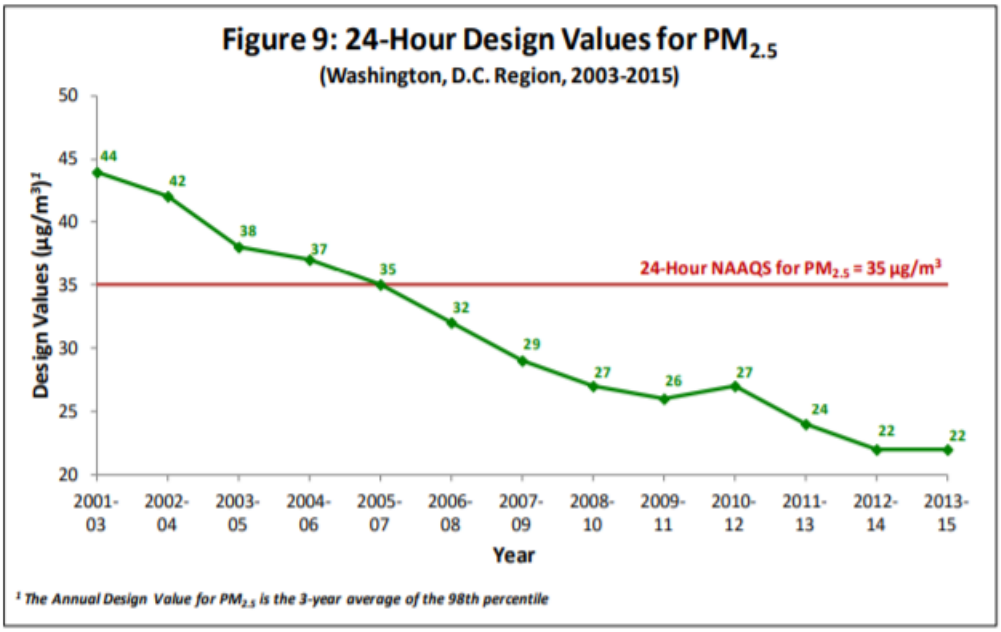
He concludes: "If one can inhale either a little or a lot of $PM_{2.5}$ over the course of a lifetime and expect to live the same length of time, then $PM_{2.5}$ does not kill on a long-term basis."[55]

Milloy points to another incongruity not easily understood based on mainstream $PM_{2.5}$ epidemiology: $PM_{2.5}$ levels in China's major urban centers are much higher than those in the United States, yet, as an example, life expectancy in Beijing is roughly equal to that of Arlington, County, Virginia.

For several years, $PM_{2.5}$ levels in the Washington, D.C. metropolitan area have been lower than the 2012 annual and 24-hour standards.[56]

[55] 2 Steve Milloy, "How does this photo debunk EPA's most important 'scientific' claim? JunkScience.Com, June 9, 2016, https://www.stevemilloy.com/?p=89746 (accessed March 28, 2023).
[56] Department of Environmental Programs, Metropolitan Washington Council of Governments, *Air Quality Trends, Metropolitan Washington D.C. Region, 1993-2016*.





The average life expectancy in the Washington metropolitan area is 78, or 0.6 years lower than the national average, a difference likely related to socioeconomic factors. Arlington County has an average life expectancy of 82.76 years, presumably due to higher-than-average levels of income, education, and access to high-quality medical care.[57]

[57] Dan Taylor, "D.C.: Here's How Long Your Life Expectancy Is," *Patch*, October 1, 2019, https://patch.com/district-columbia/washingtondc/dc-heres-how-long-your-life-expectancy (accessed March 28, 2023).

Beijing's $PM_{2.5}$ levels during June 28-29, 2020 ranged from 68 to 183 $\mu g/m^3$ and averaged 104 $\mu g/m^3$.[58] Beijing's average level was 42 $\mu g/m^3$—down from 85 $\mu g/m^3$ in 2014.[59] In short, although air quality is improving, the elderly in Beijing have been exposed to very high levels of $PM_{2.5}$ for many years. Yet, according to the government news agency, average life expectancy in Beijing is 82.2 years.[60]

To be sure, all health data emanating from China should be viewed with skepticism. On the other hand, we are unaware of any claims that Beijing life expectancy estimates are falsified or fudged. If people on average live about as long in Beijing as they do in Arlington County, it is hard to understand how U.S. $PM_{2.5}$ concentrations at today's historically-low levels can pose serious mortality risks to the American people. Further, China is just one example. Almost every country in the world has higher $PM_{2.5}$ concentrations than the United States, yet many countries especially in the developed world, do not have lower life expectancies than the U.S.

For example, according to the World Health Organization, in 2019, average U.S. $PM_{2.5}$ levels averaged 7.18 $\mu g/m^3$ compared to 10.73 $\mu g/m^3$ in Germany, 10.46 $\mu g/m^3$ in France, and 14.22 $\mu g/m^3$ in Italy.[61] Yet those countries have higher life expectancies than the United States. Average life expectancy at birth in the U.S. is 80.2 years compared to 81.7 years in Germany and 82.79 years in both France and Italy.[62] Obviously, such comparisons do not disprove $PM_{2.5}$ health effects because many socioeconomic factors influence all-cause mortality risk. Nonetheless, such comparisons suggest that $PM_{2.5}$ pollution is not one of America's leading problems or issues of concern.

III. The Bigger Picture: Incentives to Inflate $PM_{2.5}$ Risks

These comments have pointed to numerous actions by the agency that are unreasonable and, thus, arbitrary and capricious. This includes the premature reconsideration of the PM standards that would not utilize the best available science in setting the standards to the removal of CASAC members prior to the reconsideration.

In addition, these problematic actions exist in a broader regulatory environment that makes the proposed rule even more questionable. As mentioned earlier, President Obama in his 2009 memorandum on scientific integrity argued that the public must be able to trust the science and the scientific process used by agencies. The broader regulatory environment, such as how the agency uses PM research in rulemaking and the apparent political incentives, makes it difficult for the EPA to achieve this trust in connection to the proposed PM rulemaking.

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[58] Beijing Air Quality: Real Time Air Quality Index (AQI), accessed June 29, 2020 1:40 a.m. EST, https://aqicn.org/city/beijing/ (accessed March 28, 2023).
[59] Smart Air, Beijing $PM_{2.5}$ Air Quality Report – 2019 Statistics, https://smartairfilters.com/en/blog/beijing-air-pollution-2019-report-statistics/ (accessed March 28, 2023).
[60] Xinhaunet, "Beijing life expectancy hits 82.2 years," February 21, 2019, http://www.xinhuanet.com/english/2019-02/21/c_137840135.htm#:~:text=BEIJING%2C%20Feb.,municipal%20health%20commission%20on%20Thursday (accessed March 28, 2023).
[61] World Health Organization, https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-(pm2-5) (accessed March 28, 2023).
[62] CIA, *World Fact Book*, Life Expectancy at Birth, https://www.cia.gov/the-world-factbook/field/life-expectancy-at-birth/country-comparison (accessed March 28, 2023).

Co-Benefits. For years, the collateral benefits ("co-benefits") of $PM_{2.5}$ reductions have accounted for the vast majority of the quantified ("monetized") benefits of EPA air regulations. In a 2011 study, Anne Smith of NERA Economics Consulting found that of 26 non-PM air regulations promulgated by EPA since 1997, $PM_{2.5}$ co-benefits accounted for more than half the monetized benefits of 21 rules, and for >99 percent of the monetized benefits of 11 rules.[63]

Many EPA air regulations whose purpose is to address issues completely unrelated to PM are justified almost exclusively (and sometimes exclusively)[64] on the basis of the alleged co-benefits of reducing PM.[65] This abuse of co-benefits is problematic by itself. However, in view of the incentives discussed below, it is easy to see how inflated $PM_{2.5}$ mortality estimates would be very useful to those within the EPA seeking to promulgate and defend non-PM air regulations.

Both the perception that $PM_{2.5}$ kills at almost any level of exposure, and claims that collateral $PM_{2.5}$ reductions make costly regulations of other pollutants a bargain at any price, have political benefits for the EPA, which must compete with other agencies for congressional appropriations, fight for public support in the court of opinion, and rebut allegations by litigants that the agency's rules do not pass a benefit-cost test.

Research. Consequently, the EPA has political incentives to fund research based on the hypothesis that $PM_{2.5}$ endangers the American people and requires additional regulation to ensure their safety rather than fund research based on the contrary hypothesis. According to one estimate, as of 2019, the EPA has provided upwards of $180 million to individuals and organizations engaged in $PM_{2.5}$ epidemiology, whose findings and advocacy efforts broadly support new or more stringent EPA regulations.[66]

In his Farewell Address, President Dwight D. Eisenhower not only warned of a military industrial complex, but also the growing dependence of academic research on federal money, and the associated "danger that public policy could itself become the captive of a scientific-technological elite."[67]

Given the enormous economic, legal, and political stakes, it is utterly predictable not only that most EPA funding goes to researchers whose working hypothesis is that $PM_{2.5}$ kills at almost any

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[63] Anne E. Smith, *An Evaluation of the $PM_{2.5}$ Health Benefit Estimates in Regulatory Impact Analyses for Recent Air Rules*, Final Report Prepared for the Utility Air Regulatory Group, NERA Economic Consulting, December 2011, https://www.nera.com/content/dam/nera/publications/archive2/PUB_RIA_Critique_Final_Report_1211.pdf (accessed March 28, 2023).

[64] Ibid.

[65] The classic case is the Mercury Air Toxics Standards (MATS) Rule. The MATS Rule estimated that, in 2016 alone, industry would spend $9.6 billion to comply, yet the required reductions in hazardous air pollutants would provide only $4 million to $6 million in quantifiable health benefits. Costs would exceed benefits by 1,600 to 1 or even 2,400 to 1. The EPA estimated $PM_{2.5}$ co-benefits of $36 billion to $89 billion. Thus, the agency argued, the MATS Rule would generate $3 to $9 in health benefits for every dollar of cost. See 77 Fed. Reg. 9304 at 9306, https://www.govinfo.gov/content/pkg/FR-2012-02-16/pdf/2012-806.pdf.

[66] See Jason Johnston, "The EPA's Conflicted 'Science' on $PM_{2.5}$ Mortality," in Michaels and Keeley, eds., *Scientocracy: The Tangled Web of Public Science and Public Policy* (Washington, D.C.: Cato Institute, 2019), pp. 282-83.

[67] Dwight D. Eisenhower, Farewell Address, January 17, 1961, https://www.archives.gov/milestone-documents/president-dwight-d-eisenhowers-farewell-address (accessed March 28, 2023).

exposure level rather than those who question it, but also that universities preferentially hire and promote researchers who obtain EPA funding, and that the same researchers supply many of the editors and peer reviewers of academic journals.[68] The best-funded research centers will, in turn, attract the most students, whose careers will be influenced by the same incentives. In short, the massive direct and indirect influence of federal money ensures that, over time, the peer-reviewed literature will tilt towards alarm.

Perhaps nothing better illustrates the influence and harmful repercussions of political incentives on air pollution epidemiology than the attempt by EPA-supported researchers to attribute significant COVID-19 mortality to long-term $PM_{2.5}$ exposure.

In early April 2020, four researchers at the EPA-supported T.H. Chan School of Public Health published a study purporting to link long-term $PM_{2.5}$ exposures to COVID-19 deaths.[69] They did not wait for peer-review before releasing the study, which made a media splash. The study estimated that each 1 $\mu g/m^3$ increase in long-term $PM_{2.5}$ exposures accounts for 15 percent (later revised to 8 percent) of all U.S. COVID-19 deaths.[70] The researchers claimed they had controlled for all relevant confounders. However, they overlooked one of the most obvious: transit ridership. Daily commuting in crowded trains and buses can increase one's exposure to airborne viruses.

In June 2020, the National Bureau of Economic Research (NBER) published two studies identifying the confounding factor that had eluded the Harvard researchers.[71]

From the NBER study by MIT professors Christopher Knittel and Bora Ozaltun:

> A striking and robust relationship is found between death rates and public transit use.... This analysis suggests that once additional health and commute mode variables are included, the size of the pollution correlation falls away and statistical significance goes away, suggesting that the correlation between death rates and air pollution may be spurious.[72]

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[68] Johnson, op. cit., pp. 280-289.
[69] Xiao Wu, Rachel C. Nethery, M. Benjamin Sabath, Danielle Braun, and Francesca Dominici, Exposure to air pollution and COVID-19 mortality in the United States, April 5, 2020, https://pubmed.ncbi.nlm.nih.gov/32511651/ (accessed March 28, 2023).
[70] Dino Grandoni, "A Harvard study tying coronavirus death rates to pollution is causing an uproar in Washington," *Washington Post*, May 7, 2020, https://www.washingtonpost.com/news/powerpost/paloma/the-energy-202/2020/05/07/the-energy-202-a-harvard-study-tying-coronavirus-death-rates-to-pollution-is-causing-an-uproar-in-washington/5eb2eb6588e0fa42c41b3ba1/ (accessed March 28, 2023).
[71] Christopher R. Knittel and Bora Ozaltun, "What Does and Does Not Correlate with COVID-19 Death Rates," Working Paper 27391, National Bureau of Economic Research, June 2020, http://www.nber.org/papers/w27391(accessed March 28, 2023) ; John McLaren, "Racial Disparity in COVID-19 Deaths: Seeking Economic Roots in Census Data," Working Paper 27407, National Bureau of Economic Research, June 2020, http://www.nber.org/papers/w27407 (accessed March 28, 2023).
[72] Christopher R. Knittel and Bora Ozaltun, "What Does and Does Not Correlate with COVID-19 Death Rates."

From the NBER study by University of Virginia professor John McLaren:

> For African Americans and First Nations populations, the correlations [between race and COVID-19 deaths] are very robust. Surprisingly, for these two groups the racial disparity does not seem to be due to differences in income, poverty rates, education, occupational mix, or even access to healthcare insurance. A significant portion of the disparity can, however, be sourced to the use of public transit.[73]

The Harvard study—and its premature release—would appear to be responsive to the EPA's research interests. As the proposed rule notes, the ISA Supplement identifies the relationship between $PM_{2.5}$ exposures and COVID-19 infection and death as a "key scientific topic."[74] The EPA shows no signs of dropping that topic from its research portfolio, stating: "Taken together, while there is initial evidence of positive associations with SARS–CoV–2 infection and COVID–19 death, uncertainties remain due to methodological issues."[75]

To be clear, none of the foregoing implies the existence of any type of conspiracy. In the economic marketplace, a bewildering number of people and businesses across the globe must cooperate to produce a commodity as simple as a pencil.[76] Pencils are the not the result of central planning but of the decentralized decisions of myriad entities, coordinated by market signals and motivated by the associated incentives. Similarly, the political marketplace has its incentives and signals, well-documented in the political economy literature,[77] and the participants respond to them, typically producing parallel and mutually reinforcing efforts with minimal explicit coordination or direction.

Conclusion

The American people deserve and expect that the EPA will make any decisions regarding PM in an objective manner based on the best available science. Unfortunately, the EPA has not met these reasonable expectations and has proposed a rule that is arbitrary and capricious.

The agency should be using the time right now and over the next couple of years to gather and update the best available science so that in 2025, it can make the most informed decisions. Therefore, we urge the EPA to withdraw the proposed reconsideration and follow the five-year statutory schedule for PM. This will help ensure that when the agency does consider whether to revise the standards, its decisions will be better informed and have greater legitimacy.

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[73] John McLaren, "Racial Disparity in COVID-19 Deaths: Seeking Economic Roots in Census Data."
[74] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule.at 5568.
[75] "Reconsideration of the National Ambient Air Quality Standards for Particulate Matter," Proposed Rule at 5591.
[76] Leonard A. Read, *I, Pencil*, Foundation for Economic Education, 2015, https://fee.org/media/14940/read-i-pencil.pdf (accessed March 28, 2023).
[77] Jane S. Shaw, "Public Choice Theory," Library of Economics and Liberty, https://www.econlib.org/library/Enc1/PublicChoiceTheory.html (accessed March 28, 2023); Gordon Tullock, Gordon Brady, and Arthur Seldon, *Government Failure: A Primer in Public Choice* (Washington: Cato Institute, 2002).

Sincerely,

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