HOW NOT TO DESIGN EXPERT BUREAUCRACY: LESSONS FROM ADMINISTRATIVE LAW*

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Can we trust our agency experts to provide reliable scientific knowledge to inform policy? This question has worried academics, policymakers, and the general public for decades. Now, in the wake of expert agency debacles during COVID, the advent of a new presidential administration, and a Supreme Court intent on reshaping the structure of administrative law, these concerns are escalating.

This Article offers one answer to this question by examining the architecture of administrative law itself, and the findings are not comforting. Under the law as currently designed, political officials within U.S. agencies and the White House—regardless of the president in power—can generally exert unrestricted control over the scientific staff at all stages of their work while also protecting these political interventions from public disclosure as deliberative process. And, while administrative law assumes that vigorous engagement by affected stakeholders will ensure the resultant work is at least not "arbitrary" in health and environmental regulation, the notice-and-comment processes are typically monopolized by the same corporate interests that enlisted the political officials in the first place. At the same time, the staff's anticipation of the resultant one-sided litigation only serves to introduce more biasing pressures on the objectivity of the work. And, if that were not enough, the deployment of elaborate external peer review processes, which are viewed as providing the last word on the quality of agency science, are entrusted not to disinterested scientists but to political officials. These officials enjoy ultimate control over the selection of scientists as peer reviewers and implementation of the review process, again in ways that remain largely undisclosed and often undocumented. As a result of this overarching legal design, even the most committed scientific staff find themselves

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impeded and sometimes blocked from producing work that has integrity, both with regard to scientific factfinding and to the identification of residual uncertainties. Indeed, it is not hyperbole to suggest that if one wants to know how NOT to design an expert bureaucracy, they should look to U.S. administrative law.

In designing a legal process to govern agency expertise, we can do better. To that end, the Article closes with a reform proposal that encourages agency experts to demonstrate why their work can be trusted, a step that is not only omitted from current institutional design but is generally precluded as a legal matter. Rather than impose this demonstration as a mandatory requirement, the proposal recommends offering incentives for agencies to voluntarily document the reliability of their scientific analyses. In return, agencies would receive increased judicial deference. Ideally, this framework would also include a safe harbor provision that grants complete deference to fact finding that meets the highest standards of scientific integrity.

INTRODUCTION

One of federal agencies' essential functions is the capacity "to find facts"—a role that some Supreme Court justices have suggested may be their only legitimate one.[1] Yet this core function is now under direct assault.[2] Within months of taking office for the second time, Trump and his administration gutted public health and environmental agencies—slashing staff,[3] scrubbing

1. Skeptics of the administrative state, such as Justices Gorsuch and Thomas, concede the existence of bureaucracy is at least justified with respect to its expert analyses. *See, e.g.*, Gundy v. United States, 139 S. Ct. 2116, 2145 (2019) (Gorsuch, J., dissenting) (describing agencies' continued utility to Congress in their capacities as fact finders and expert recommenders); Dep't of Transp. v. Ass'n of Am. R.Rs., 575 U.S. 43, 78–97 (2015) (Thomas, J., concurring in the judgment) (emphasizing that agencies' constitutional responsibilities are to make "factual determination[s]" rather than broad policy).

2. *See, e.g.*, Jeff Tollefson, Dan Garisot & Heidi Ledford, *Will US Science Survive Trump 2.0?*, NATURE (Apr. 29, 2025), https://www.nature.com/articles/d41586-025-01295-6 [https://perma.cc/K7ZZ-8V5N (dark archive)] (detailing how the Trump administration has fired thousands of scientists and cut funding for research); Leah Douglas, Marisa Taylor & Julie Steenhuysen, *Trump Begins Mass Layoffs at FDA, CDC, Other US Health Agencies*, REUTERS (Apr. 1, 2025, at 17:44 ET), https://www.reuters.com/business/healthcare-pharmaceuticals/trump-administration-begins-mass-layoffs-health-agencies-sources-say-2025-04-01/ [https://perma.cc/UKA9-U3NQ (staff-uploaded archive)] ("'The FDA as we've known it is finished, with most of the leaders with institutional knowledge and a deep understanding of product development and safety no longer employed,' former [FDA] Commissioner Robert Califf wrote in a LinkedIn post.").

3. *See* Carla K. Johnson, *Mass Layoffs Are Underway at the Nation's Public Health Agencies*, AP NEWS (Apr. 1, 2025, at 19:05 ET), https://apnews.com/article/health-human-services-layoffs-restructuring-rfk-jr-ec4d7731695e4204970c7eab953b2289 [https://perma.cc/QN3L-JECW (staff-uploaded archive)] (reporting layoffs for researchers, scientists, doctors, and support staff and leaders from HHS); Jeffrey Kluger, *The True Cost of Trump's Cuts to NOAA and NASA*, TIME (Mar. 13, 2025, 14:40 ET), https://time.com/7267889/climate-cost-of-trump-staff-cuts-noaa-nasa/ [https://perma.cc/KA36-DK2B] (describing massive cuts to NOAA and NASA's climate research employees); Douglas et al., *supra* note 2. Scientists are particularly targeted in public health and environmental agencies like the CDC, EPA, FDA, HHS, NIH, NOAA, and USDA where these gutting activities are most concentrated; *see*, *e.g.*, Will Stone & Pien Huang, *Health Agencies Lose Staff Members in Key Areas as Trump Firings Set In*, NPR (Feb. 17, 2025, at 20:18 ET), https://www.npr.org/sections/shots-health-news/2025/02/17/nx-s1-5300052/federal-employees-layoffs-cdc-nih-fda [https://perma.cc/7VT2-L9EJ] (describing termination of CDC, FDA, and NIH employees, which were lower than initially expected, but still amounted to thousands of workers); Lisa Friedman & Maxine Joselow, *E.P.A. Says It Will Eliminate Its Scientific Research Arm*, N.Y. TIMES (July 18, 2025), https://www.nytimes.com/2025/07/18/climate/epa-firings-scientific-research.html [https://perma.cc/W99W-EX5F (staff-uploaded, dark archive)] (EPA announces the elimination of its Office of Research and Development and its plans to "begin firing hundreds of chemists, biologists, toxicologists and other scientists").

public databases,[4] revoking grants,[5] and installing industry allies in senior management.[6] Because agency factfinding depends on professional staff, resources, and access to information,[7] these moves are draining the "lifeblood" from the modern administrative state.[8]

Trump's systematic dismantling of expert agencies is unprecedented in scale, but the administrative foundation was already fragile. The federal government's handling of expert advice during the COVID-19 pandemic

4. *See*, *e.g.*, Karen Zraick, *Farmers Sue over Deletion of Climate Data from Government Websites*, N.Y. TIMES (Feb. 24, 2025), https://www.nytimes.com/2025/02/24/climate/agriculture-farmer-website-data-lawsuit.html [https://perma.cc/762H-GRYL (staff-uploaded, dark archive)] (reporting on a lawsuit filed by farmers after USDA removed all references to climate change, including data sets and interactive tools, from its website in late January); Will Stone & Selena Simmons-Duffin, *Trump Administration Purges Websites Across Federal Health Agencies*, NPR (Jan. 31, 2025, at 16:50 ET), https://www.npr.org/sections/shots-health-news/2025/01/31/nx-s1-5282274/trump-administration-purges-health-websites [https://perma.cc/HX3X-NDXK] (reporting the removal of webpages from CDC and HHS websites that targeted adolescent health, HIV, and LGBTQ+ resources).

5. *See*, *e.g.*, Katrina Miller & Carl Zimmer, *National Science Foundation Terminates Hundreds of Active Research Awards*, N.Y. TIMES (Apr. 25, 2025), https://www.nytimes.com/2025/04/22/science/trump-national-science-foundationgrants.html?smid=nytcore-ios-share&referringSource=articleShare [https://perma.cc/GXV9-64PU (staff-uploaded, dark archive)] (explaining that the Department of Government Efficiency froze all new research grants and the National Science Foundation canceled grants funding ongoing research); Irena Hwang, Jon Huang, Emily Anthes, Blacki Migliozzi & Benjamin Mueller, *The Disappearing Funds for Chronic Health*, N.Y. TIMES (June 4, 2025), https://www.nytimes.com/interactive/2025/06/04/health/trump-cuts-nih-grants-research.html [https://perma.cc/G6ZG-6BXF (staff-uploaded, dark archive)] (tracing approximately 2500 NIH grants that have been terminated or delayed); Daniel Cusick, Chelsea Harvey & Scott Waldman, *White House Outlines Plan to Gut NOAA, Smother Climate Research*, POLITICO (Apr. 11, 2025, at 14:08 ET), https://www.politico.com/news/2025/04/11/white-house-plan-guts-noaa-climate-research-00286408 [https://perma.cc/5ND2-5GUZ (staff-uploaded archive)] (outlining budget proposal to abolish NOAA's primary research office and cut NOAA's budget by thirty-eight percent).

6. *See, e.g.*, Rachel Frazin, *Trump Packs EPA with Chemical, Oil Industry Alumni*, HILL (Jan. 27, 2025, at 16:29 ET), https://thehill.com/policy/energy-environment/5109157-trump-epa-appointments-chemical-oil-industry-ties/ [https://perma.cc/8GZ2-L3TN (staff-uploaded archive)] (listing various appointees to Trump's EPA, many of whom used to work for large industry lobbying groups or in industry itself); Sharon Lerner, *Trump's EPA Plans to Stop Collecting Greenhouse Gas Emissions Data from Most Polluters*, PROPUBLICA (Apr. 10, 2025, at 13:15 ET), https://www.propublica.org/article/trump-epa-greenhouse-gas-reporting-climate-crisis [https://perma.cc/26RB-AJ54] (discussing political appointees in EPA who previously were lobbyists for the ACC and Duke Energy, as well as holding other jobs in the industries regulated by EPA).

7. *See* William Brangham & Jackson Hudgins, *Scientists Sound Alarm on Trump Administration's Dismantling of Research Funding*, PBS NEWS (Mar. 31, 2025, at 18:35 ET), https://www.pbs.org/newshour/show/scientists-sound-alarm-on-trump-administrations-dismantling-of-research-funding [https://perma.cc/DKH8-7RKX] (transcribing interview broadcast with professor from Virginia Commonwealth University School of Medicine discussing concerns about the future of American science); Melissa Finucane, *Eliminating US Science Advisory Committees Will Harm the Public and Open the Door to Special Interests*, BULL. OF ATOMIC SCIENTISTS (May 12, 2025), https://thebulletin.org/2025/05/eliminating-us-science-advisory-committees-will-harm-the-public-and-open-the-door-to-special-interests/ [https://perma.cc/8MBM-L7QR] (explaining how elimination of science advisory committees will make it harder for agencies to regulate and make time-sensitive decisions); Tollefson et al., *supra* note 2.

8. Burlington Truck Lines, Inc. v. United States, 371 U.S. 156, 167 (1962).

became a flashpoint that badly damaged public confidence—not only in agencies, but in the institution of science itself.[9] Long before the pandemic, however, recurring scandals had cast doubt on the credibility of agency expertise.[10] Journalists documented repeated White House interference in the details of agency analyses;[11] courts invalidated agency decisions, because their science was found arbitrary or unsound;[12] and think tanks across the political spectrum identified failures of scientific integrity within agencies.[13]

The result is an expert bureaucracy now in shambles and a track record that makes clear that simply rehiring staff and restoring grants will not be enough. Administrative scholars must instead confront a deeper question: whether the very architecture of the expert bureaucracy needs to change.[14] Most of the problems that have emerged reflect not the failings of individual scientists[15] but the systematic shortcomings of institutional design. The challenge, then, is to treat concerns about the reliability of agency expertise as justified and ask what reforms are required to rebuild it for the future.

To explore this possibility, I conduct a long-overdue structural assessment of how well the institutional design of our scientific bureaucracy works in the important subset of agency actions involving environmental and health protection.[16] As a nation, we have set ambitious, bipartisan goals for this expert

9. *See infra* Section III.D.

10. *See, e.g.*, *infra* note 160 and accompanying text.

11. *See, e.g.*, *infra* Sections III.A.5, III.C.3.

12. *See infra* Sections III.A.5, III.B.2.c.

13. *See infra* Section IV.A.

14. This study focuses solely on scientific (not the larger expert) staff engaged in public health and environmental protection and then zooms out to look at the overarching legal design established to govern scientific bureaucracy. Other complementary studies of the expert bureaucracy are much broader and examine agency expertise more generally, sweeping in all types of expertise well beyond the natural sciences. *See, e.g.*, WILLIAM D. ARAIZA, REBUILDING EXPERTISE: CREATING EFFECTIVE AND TRUSTWORTHY REGULATION IN AN AGE OF DOUBT 6 (2022) (defining expertise to include not only the natural sciences but "technology, economics, social sciences, and statistics"); ELIZABETH FISHER & SIDNEY A. SHAPIRO, ADMINISTRATIVE COMPETENCE: REIMAGINING ADMINISTRATIVE LAW 18 (2020) (arguing for "thick" conception of expertise that goes beyond the narrow characterization of agency expertise as simply referring to "economists, scientists, accountants, and so forth"). But as a result, these other studies are narrower in the scope of their institutional assessments since they do not trace out critical features of the policy design governing agency science, such as formalized peer review, the role of affected groups in influencing staff scientific analyses, and the relationship between deliberative process protections and scientific norms of transparency, to name a few.

15. *See infra* note 64–65 and accompanying text.

16. This focus is justified not only given the second Trump administration's current assault on this particular slice of the scientific bureaucracy, but in light of the heightened attention the scientific expertise of the public health and scientific agencies have received over the last three-plus decades. *See, e.g.*, Brad Plumer & Coral Davenport, *Science Under Attack: How Trump Is Sidelining Researchers and Their Work*, N.Y. TIMES (Dec. 28, 2019), https://www.nytimes.com/2019/12/28/climate/trump-administration-war-on-science.html [https://perma.cc/2ZDD-AXV2 (staff-uploaded, dark archive)];

advice—that it have "integrity" in keeping with scientific and professional standards.[17] How effectively does our institutional design guard against the manipulation and biasing of scientific records used in policymaking and ensure that agency experts can provide trustworthy advice?

The findings are not comforting. This architectural assessment reveals that the oversight processes, management structures, and judicial review we have designed for the expert bureaucracy often impedes—and at times forecloses—the ability of staff scientists to explain how their work comports with the scientific conventions that safeguard integrity.[18] For example, scientific conventions for integrity expect scientists to be disinterested and independent or, at the least, disclose sources of conflicts and influence. By contrast, in the administrative process, political officials control all aspects of the agencies' scientific work and regularly exert that control without any disclosures detailing the nature of their influence.[19] In theory, this is not a fatal problem since vigorous oversight provided by stakeholders through notice and comment is supposed to catch and correct lapses in the agency's scientific record. However, in practice, this oversight is conducted not by disinterested experts but by ends-oriented parties. And, to add insult to injury, stakeholder oversight of agency science, for health and environmental regulations at least,[20] comes almost exclusively from a single perspective: regulated industry.[21] An additional check intended to ensure the integrity of agency science—the empaneling of outside experts to peer review agency science—also backfires, because in administrative process, the control of this expert peer review rests with . . . who else, but

see also infra Section IV.A (listing numerous reforms proposed for strengthening the integrity of agency science).

17. *See infra* notes 70–75 and accompanying text.

18. Under some presidential administrations, internal norms and informal rules within the agencies and executive branch (e.g., scientific integrity guidelines) provide valuable reinforcement and benchmarks for encouraging reliable scientific analyses. These informal structures partly make up for gaps in the legal processes themselves. *Cf.* Gillian E. Metzer & Kevin Stack, *Internal Administrative Law*, 115 MICH. L. REV. 1239, 1244 (2017) (discussing internal laws within agencies). But even the best of these written guidelines still falls significantly short of neutralizing key features of existing legal structures that serve to undermine these very same goals. *See, e.g.*, *infra* notes 318–26 and accompanying text. Moreover, some presidential administrations, like the second Trump administration, are revoking these same scientific integrity rules and openly violating longstanding public administration norms by, for example, firing staff scientists in part because they follow professional standards. *See, e.g.*, Phie Jacobs, *Trump Administration Quashes NIH Scientific Integrity Policy*, SCIENCE (Apr. 3, 2025, at 12:30 ET), https://www.science.org/content/article/trump-administration-quashes-nih-scientific-integrity-policy [https://perma.cc/69NS-MXFC], In these settings, the existing legal architecture not only fails to impede but actively facilitates the ability of the chief executive to further compromise the integrity of the agency's scientific work in myriad ways. *See infra* Sections III.A.3, III.C.2.

19. *See infra* Section III.A.

20. Imbalanced participation has also been identified in other areas of regulation. *See, e.g.*, Kimberly D. Krawiec, *Don't "Screw Joe the Plummer": The Sausage-Making of Financial Reform*, 55 ARIZ. L. REV. 53, 73 (2013) (finding imbalanced participation on Volcker Rule in financial regulation).

21. *See infra* Section III.B.1.

political appointees. At various points throughout the last five decades, appointees have stealthily, and sometimes openly, manipulated peer review boards to align scientific factfinding with their ideological objectives.[22] Until we establish an institutional foundation rooted in the core principles of scientific disclosure and transparency, the expert agencies cannot withstand the pressures they face.

But the situation is worse: By black-boxing how the agency arrives at its scientific findings and who contributes to their technical analyses, administrative process not only bypasses the basic norms of science but runs headlong against them. Agency experts can resist political intrusions into their work, for example, but they do so knowing they may lose their jobs.[23] They may resist unrelenting attacks from stakeholders' experts, but agency legal counsel can still reverse course by insisting on carefully concealed, scientific compromises to minimize litigation risks.[24] If and when agency scientists actually persevere and produce trustworthy scientific analyses, they may ironically be blocked from advertising the extent to which their underlying analyses are disinterested and free from bias by the deliberative process privilege.[25] Hence, even when the professionalism of civil servants triumphs over this poorly constructed legal architecture, outsiders are generally kept in the dark about which agency products resulted from proper scientific processes and which did not.

Stalwart defenders of the administrative state may try to minimize the significance of these structural failings. Perhaps the role of agency experts in finding facts is relatively insignificant in relation to the larger policy-driven nature of the decisions? But in reality, many if not most of the environmental and public health agencies depend on staff analyses to address fundamental fact-intensive questions that constrain and guide the alternatives and policy considerations that follow.[26] Or perhaps, these defenders might assume,

22. *See infra* Section III.C.

23. *See, e.g.*, Robin Bravender, *Climate Experts Say Trump's Interior Department Is Sidelining Scientists*, AZ MIRROR (July 29, 2019, at 9:15 ET), https://azmirror.com/2019/07/29/climate-experts-say-trumps-interior-department-is-sidelining-scientists/ [https://perma.cc/RRU8-22WP (staff-uploaded archive)] (discussing House hearing convening various agency scientists being retaliated against for their environmental research under the first Trump administration).

24. *See infra* note 204.

25. *See, e.g.*, *infra* Section III.A.3.

26. For just a few of the many mandates that depend on agency scientific expertise, see, for example, 33 U.S.C. § 1317(a)(l) (part of the Clean Water Act), requiring that decisions about which toxic pollutants are subject to effluent standards "shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms and the nature and extent of the toxic pollutant on such organisms," and 42 U.S.C. § 7422(a) (part of the Clean Air Act), requiring air pollutants that "may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness" are listed as criteria air

executive interference in agency science is the only problem and simply needs to be reined in. But even if that view had widespread, bipartisan support (which it clearly does not), the analysis here shows that significant problems also arise from the unconditional trusting of agency experts in a legal system rife with other significant sources of biasing pressure, some of which are the result of our misguided legal-design choices that relieve staff scientists from documenting the integrity of their work.

Readers ultimately can judge for themselves whether the problems with the existing institutional structure are consequential enough to warrant attention. But one significant flaw cannot be wished away: despite the centrality of transparency to both administrative law and scientific integrity, agency experts in our current legal structure are neither expected nor generally able to document whether or why their scientific work can be trusted. Instead, the U.S. administrative process is essentially the antithesis of what scientists would design to ensure that agency scientific advice is reliable in ways that meet professional standards.

The next few years will be difficult for our expert bureaucracy, not only because the capacity of the expert bureaucracy is being undermined, but because the Trump administration is ceding control to the same group of sophisticated stakeholders that have been steadily undermining the integrity of the expert bureaucracy over the last five decades.[27] But even though the second Trump

pollutants, § 7408(a)(1), or as hazardous air pollutants, § 7412(b)(1). In some cases, Congress goes further and requires, by statute, that the agency not only use reliable science, but ensure it is the "best available" science. *See, e.g.*, 15 U.S.C. § 2643(d)(7) (the Toxic Substances Control Act); 16 U.S.C. §§ 1533(b)(1)(A), 1536(c)(1), 1537a(c)(2) (the Endangered Species Act); 42 U.S.C. § 300g-l(b)(3)(A)(i) (the Safe Drinking Water Act).

27. Responding to both real and fictional worries about expert overreach and politicization, the accreting processes governing scientific advice over the last eighty years have been driven largely by influential stakeholders who seek greater control over fact-finding processes. The absence of a coherent blueprint for the expert bureaucracy, coupled with a muddling through approach endemic to administrative law, only serves to enhance the influence of the well-funded stakeholders in steering the legal design of expert processes over time. *See, e.g.*, *infra* Sections III.A.4, III.B.1, III.C.2.b. *See generally* Marc Galanter, *Why the Haves Come Out Ahead: Speculations on the Limits of Legal Change*, 9 LAW & SOC'Y REV. 95 (1974) (modeling how "repeat players" have sufficient resources and long-term interests to shape the development of law). President Trump's executive order directing agencies to use "Gold Standard" science and revoking the Biden scientific integrity framework is poised to amplify the influence of regulated industry over the scientific record. *See* Exec. Order No. 14303, 90 Fed. Reg. 22601 (May 29, 2025) [hereinafter Gold Standard Executive Order]. President Biden's framework provided agency staff with processes for reporting political interference and misconduct and benchmarked "scientific integrity" against scientific practices. *See* NAT'L SCI. & TECH. COUNCIL, EXEC. OFF. OF THE PRESIDENT, A FRAMEWORK FOR FEDERAL SCIENTIFIC INTEGRITY POLICY AND PRACTICE (2023). In its place, the new Executive Order delegates all decisions about what the scientific integrity standards are and how they are applied to political officials, thus providing appointees and their delegates with unilateral control over the scientific factfinding without the risk of misconduct charges. *See, e.g.*, David Michaels & Wendy Wagner, *Fool's Gold*, 388 SCIENCE 1245, 1245 (2025).

administration is taking radical steps to further compromise the integrity of agency science, its actions must not distract us from the underlying problem—namely, that the architectural design in administrative law has been flawed from the start. The fundamental misalignment between legal design and scientific norms in our design of the expert bureaucracy has steadily eroded the integrity of bureaucratic science over the last seventy years. This architecture explains how both presidents and agency career staff sometimes produce untrustworthy expert advice in ways that largely fly under the radar.[28] Indeed, it is not hyperbole to suggest that if one wants to know how NOT to design an expert bureaucracy, they should look to U.S. administrative law.

While the account presented in this Article is grim, once identified and held up to the light, significant progress can be made with modest adjustments.[29] Specifically, to ensure that regulatory policymaking is informed by reliable scientific analysis, institutional processes must be redesigned so that agencies are both permitted and expected to disclose how their analyses were conducted and who contributed to them.[30] Crucially, the standards of integrity that guide these disclosures must also be grounded in norms established by the scientific community—not shaped by political actors.[31] Agency scientists should not have the final say on how science informs policy decisions, but it is the scientific community that must define the standards by which the credibility and trustworthiness of that science are judged.

This Article assesses the capacity of our legal architecture to deliver trustworthy expert advice in four parts. Part I provides an orientation to the current administrative process governing scientific expertise. Part II continues this backgrounding work by providing an orientation to the challenges arising in science-intensive policymaking and summarizes the conventional thinking about how best to walk the tightrope between the dueling goals of producing both scientifically reliable and democratically accountable expert advice. Part III then applies these goals as benchmarks to assess the institutional design of the administrative state as embellished over time and reveals numerous shortfalls. Part IV suggests a possible path forward that better aligns the design

28. *See* STEPHEN MACEDO & FRANCES LEE, IN COVID'S WAKE: HOW OUR POLITICS FAILED US 269 (2025) (underscoring the importance of "checking" agency scientific advice through not only peer review but also a second layer of review by other disciplinary experts).

29. *See infra* Part IV.

30. By referencing "agency analysis," this Article includes not only basic research but the synthesis and weighting of multiple studies into a scientific analysis that informs policy. This synthesis and weighting is the more common type of scientific work prepared by expert agencies. *See generally* WENDY WAGNER, SCIENCE IN REGULATION: A STUDY OF AGENCY DECISIONMAKING APPROACHES 29–75 (2013) [hereinafter WAGNER, SCIENCE IN REGULATION], https://www.acus.gov/sites/default/files/documents/Science%20in%20Regulation_Final%20Report_2_18_13_0.pdf [https://perma.cc/345Z-CSE3] (discussing the incorporation of science into specific regulatory programs).

31. *See infra* text accompanying notes 322–25.

of administrative process with our goal of producing expert scientific advice that can be trusted.

I. ADMINISTRATIVE LAW'S APPROACH FOR ENSURING SCIENCE INTEGRITY

The early architects of the administrative state were convinced that agency experts were crucial to forging national regulation, but they were wary of the democratic implications of entrusting technocrats with policy-related responsibilities. To alleviate their worries, they dedicated considerable effort towards designing institutional processes to oversee the agencies' expert advice. The first major effort was the passage of the Administrative Procedure Act of 1946 ("APA"),[32] a foundational statute that has since been embellished by dozens of additional requirements and processes intended to keep agency experts accountable.[33] This Section surveys these legal developments over time.

Before the passage of the APA, agency expertise in the United States was effectively unconstrained. Technocrats during the first half of the twentieth century often developed regulatory policies with little public oversight and enjoyed "an exceptional amount of independence and flexibility" as a legal matter, operating with few legal checks.[34] During this time, Congress "identified social problems [only] at the most general level. It was then the job of experts to discern the best way to solve a particular problem and implement the appropriate policy . . . with minimal judicial interference."[35]

By the end of the New Deal, however, faith in expert administration had plummeted, even among its liberal protagonists.[36] In part, this was the result of widespread disillusionment with the quality of the work of the technical agencies, particularly during World War II.[37] But there was also a growing realization that the work performed by bureaucratic experts was laden with value choices, and yet there were insufficient mechanisms to ensure democratic

32. Administrative Procedure Act ("APA"), ch. 324, 60 Stat. 237 (1946) (codified as amended at 5 U.S.C. §§ 551, 553–59, 701–06).

33. 5 U.S.C. §§ 551–559.

34. Reuel E. Schiller, *Reining in the Administrative State: World War II and the Decline of Expert Administration*, *in* TOTAL WAR AND THE LAW: THE AMERICAN HOME FRONT IN WORLD WAR II 185, 186 (Daniel R. Ernst & Victor Jew eds., 2002) [hereinafter Schiller, *Administrative State*].

35. Reuel E. Schiller, *The Era of Deference: Courts, Expertise, and the Emergence of New Deal Administrative Law*, 106 MICH. L. REV. 399, 406 (2007).

36. *See, e.g.*, LOUIS L. JAFFE, JUDICIAL CONTROL OF ADMINISTRATIVE ACTION 576–85 (1965) [hereinafter JAFFE, JUDICIAL CONTROL] (discussing decline of public faith in agency expertise after New Deal); Daniel J. Gifford, *The New Deal Regulatory Model: A History of Criticisms and Refinements*, 68 MINN. L. REV. 299, 309–19 (1983).

37. *See, e.g.*, Schiller, *Administrative State*, *supra* note 34, at 201 ("Too often [during World War II,] American wartime agencies had the appearance of incompetent bullies, captured by special interests, acting with an autocratic disregard of due process.").

accountability.[38] Even New Dealers, such as Professor Louis Jaffe, conceded that there were no "value-free concepts" or independent "systems of expert justice" within expert bureaucracies.[39] These reservations animated how legal architects, like Jaffe, imagined a new legal structure that would provide the needed public oversight.[40]

The APA was thus crafted in part to address the effectively unregulated world of agency expertise in place prior to its passage, and APA drafters looked to bottom-up stakeholder engagement to do most of the work.[41] Associate Supreme Court Justice Felix Frankfurter, for example, insisted that a democratic model of expert public administration required, among other things, "easy access to public scrutiny, and a constant play of alert public criticism, especially by an informed and spirited bar."[42] The drafters also appreciated the need for a record of decision and procedural mechanisms to allow stakeholders to "constantly check[] the skill and integrity" of the relevant expert.[43]

The resulting design of administrative process, which carries over to today, therefore enlists public oversight to ensure agencies provide scientific advice that is both reliable and publicly accountable.[44] Under the APA, agencies are required to provide "notice and comment" on rule proposals so that all affected parties can offer comments and critiques.[45] Additionally, to ensure that agencies take this stakeholder input seriously, these same commenters can then challenge agency decisions in court.[46]

At least some judges accepted their new oversight role with enthusiasm, despite the fact that it involved scrutinizing all aspects of the agencies' decisions, including the advice of scientific experts. In a dissent written after

38. *See, e.g.*, FISHER & SHAPIRO, *supra* note 14, at 151–53 (tracing history); Schiller, *Administrative State*, *supra* note 34, at 194.

39. *See* Louis L. Jaffe, *The Illusion of the Ideal Administration*, 86 HARV. L. REV. 1183, 1187 (1973); *see also* MORTON J. HORWITZ, THE TRANSFORMATION OF AMERICAN LAW, 1780–1860, at 239–40 (Stanley N. Katz ed., 1977).

40. *See* JAFFE, JUDICIAL CONTROL, *supra* note 36, at 323 (observing that despite "magnificent accomplishments of the New Deal," too much unchecked faith in these systems can lead to "the most monstrous expressions of administrative power").

41. Indeed, even in the Congressional hearings for the APA, references to the failures of the wartime agencies provided both momentum and direction for the course of the reforms to come. *See, e.g.*, Schiller, *Administrative State*, *supra* note 34, at 198.

42. FELIX FRANKFURTER, THE PUBLIC AND ITS GOVERNMENT 159 (1930).

43. FISHER & SHAPIRO, *supra* note 14, at 173 (quoting the Attorney General Final Report and tracing this history in more detail).

44. *See, e.g.*, Sheila Jasanoff, *Quality Control and Peer Review in Advisory Science*, *in* THE POLITICS OF SCIENTIFIC ADVICE: INSTITUTIONAL DESIGN FOR QUALITY ASSURANCE 30, 32–33 (Justus Lentsch & Peter Weingart eds., 2011); SHEILA JASANOFF, THE FIFTH BRANCH: SCIENCE ADVISERS AS POLICYMAKERS 32–34 (1990) [hereinafter JASANOFF, THE FIFTH BRANCH] (discussing these "two moves"—consistency with scientific norms and public oversight of expert translations, both of which are essential to policy-relevant science).

45. 5 U.S.C. § 553(c).

46. *Id.* § 706(2)(A).

the APA was passed in 1950, for example, Justice Douglas warned that "[u]nless we make the requirements for administrative action strict and demanding, *expertise*, the strength of modern government, can become a monster which rules with no practical limits on its discretion."[47]

The logic of the APA model seems impeccable. Enlisting critical scrutiny from all affected parties allows skeptics to examine the agencies' expert judgments as well as its policies. To ensure these concerns are taken seriously, courts then—as mandated by the APA—review stakeholder challenges and require agencies to supply reasons for decisions that litigants allege to be arbitrary.[48]

Since its passage in 1946, the APA's basic model of relying on stakeholder (and judicial) oversight to hold agency experts accountable has been gradually embellished and expanded.[49] The first set of adjustments arose from decades of judicial interpretations as the courts crafted subdoctrines to govern, among other things, agency expertise.[50] Perhaps equally important, by reviewing all aspects of the agencies' work, including the reliability of the agencies' "fact-finding," the courts (in theory) not only discourage agency experts from cutting scientific corners, but also scrutinize their assumptions and methods.[51]

The rise of the unitary executive in the administrative state provides a second, albeit more controversial, addition to the legal mechanisms for overseeing bureaucratic discretion, including agency expertise.[52] Since the President presides over the work of executive agencies, he is a natural locus for coordinating their activities and ensuring the quality and appropriateness of the values incorporated into their decision-making.[53] Yet, over the past fifty years,

47. New York v. United States, 342 U.S. 882, 884 (1951).

48. *See infra* text accompanying notes 207–08.

49. *See, e.g.*, FISHER & SHAPIRO, *supra* note 14, at 181–213 (tracing these developments in detail that proceduralized and constrained agencies increasingly over time); Lars Noah, *Doubts About Direct Final Rulemaking*, 51 ADMIN. L. REV. 401, 404–05 (1999) (discussing origins of subsequent analytical requirements).

50. *See, e.g.*, Lars Noah, *Scientific "Republicanism": Expert Peer Review and the Quest for Regulatory Deliberation*, 49 EMORY L.J. 1033, 1040 (2000) ("[C]ourts became more demanding in their review of agency action during the 1960s and 1970s."). For concrete examples that impact bureaucratic science, see *infra* Section III.B.2.

51. *See, e.g.*, Elizabeth Fisher, Pasky Pascual & Wendy Wagner, *Rethinking Judicial Review of Expert Agencies*, 93 TEX. L. REV. 1681, 1715–21 (2015) (describing this relationship between agencies and courts as a kind of partnership in which the courts' scrutiny of the agency's expert work serves to strengthen the agency's internal processes and reasoning).

52. *See generally* Elena Kagan, *Presidential Administration*, 114 HARV. L. REV. 2245 (2001) (examining a significant change in the relationship between the President and the administrative state).

53. *See, e.g.*, Cass R. Sunstein, *The Office of Information and Regulatory Affairs: Myths and Realities*, 126 HARV. L. REV. 1838, 1874 (2013) (discussing importance of the Office of Information and Regulatory Affairs ("OIRA") as a tool for coordinating agencies through presidential executive power). During the APA drafting, Felix Frankfurter in fact conceded that even with public oversight applied to agency activities, the "final determinations of large policy must be made by the direct representatives of the public and not by the experts." FRANKFURTER, *supra* note 42, at 160.

the role of the President has expanded from overseeing the agencies' policy judgments to directly overseeing the quality of much of the agencies' scientific work.[54] Although the motivations for this scientific oversight are mixed, presidential oversight of expert advice is now an established feature of the administrative state.[55] Indeed, the Supreme Court has implied that this executive oversight of agency discretion is not merely legally appropriate, but might be constitutionally necessary.[56]

A third and more episodic, but nonetheless important source of external oversight over agency expertise is the deployment of a "Fifth Branch," consisting of external science advisory boards that peer review the work of agency experts.[57] Some of this external expert review is required by Congress in the authorizing statutes, some is recommended by the White House executive offices, and some is the result of formal and informal agency initiatives and guidance.[58] Even more than judicial and presidential oversight, this infusion of expert peer review into administrative process is explicitly designed, at least in theory, to enhance the reliability of agencies' expert advice.[59]

The structured methods of oversight that have been added to administrative law since 1946 are reinforced by a looser web of interactions arising from the agencies' contingent "place" in our constitutional system.[60] Members of Congress and congressional committees engage with and even attempt to influence agency expert processes.[61] Likewise, state and local governments often take an active role in shaping federal agencies' understanding of and approach to science-intensive decisions.[62] And interested

54. *See infra* Sections III.A, III.C.

55. *See, e.g.*, ARAIZA, *supra* note 14, at 61–62 (making this point and citing *Free Enterprise Fund* and *Kisor*).

56. *See, e.g.*, *id*. at 61 (detailing the Roberts Court's "skepticism about congressional attempts to immunize agency officials from direct presidential control").

57. *See generally* JASANOFF, THE FIFTH BRANCH, *supra* note 44 (detailing the "Fifth Branch" and the modern scientific advisory process).

58. *See infra* Section III.C.

59. *See infra* text accompanying notes 233–236.

60. *See* Peter L. Strauss, *The Place of Agencies in Government: Separation of Powers and the Fourth Branch*, 84 COLUM. L. REV. 573, 578–80 (1984) (noting incongruity of administrative agency function and "rigid separation-of-powers compartmentalization of governmental functions"). And it is through multiple interactions with a large range of different participants that agency staff are introduced to additional scientific information, offer diverse interpretations of the data, and explore the potential political ramifications of those varied interpretations. *See, e.g.*, Anya Bernstein & Cristina Rodriguez, *The Accountable Bureaucrat*, 132 YALE L.J. 1600, 1606 (2023) (tracing this web that lends accountability to work of unelected bureaucrats).

61. *See, e.g.*, Bernstein & Rodriguez, *supra* note 60, at 1621 (describing Congress' influence on the White House's choices during rulemakings); *see also infra* text accompanying note 314.

62. *See generally* Miriam Seifter, *States, Agencies, and Legitimacy*, 67 VAND. L. REV. 443 (2014) (recognizing state interests in the administrative process and discussing how states endeavor to safeguard those interests).

parties often intersect with all of these other government actors as well as with the agencies themselves.[63]

And, if the multiple sources of pluralistic oversight were not enough to ensure the rigor and accountability of bureaucratic expertise, there are additional sources of comfort arising from the civil service model of government itself. A growing literature in public administration and political science reveals how agency bureaucrats are generally motivated to do work of high quality, thereby adhering to the agencies' public-serving mission as well as their own professional standards.[64] The staff's professionalism thus provides reinforcing reasons for expecting expert agencies to provide scientific advice that tracks the basic norms for integrity embraced by the scientific community itself.[65]

II. CHALLENGES ARISING IN BUREAUCRATIC SCIENCE

Despite this elaborate administrative architecture, however, we know that designing an expert bureaucracy[66] that produces both scientifically reliable and democratically responsive analyses is not easy.[67] First and perhaps most critically, because of the inherent uncertainties in the applied sciences, scientific

63. *See generally* LEE DRUTMAN, THE BUSINESS OF AMERICA IS LOBBYING: HOW CORPORATIONS BECAME POLITICIZED AND POLITICS BECAME MORE CORPORATE 8 (2015) (discussing organizational lobbying over time and the relationships between corporations and the political environment); *infra* text accompanying notes 170–71.

64. *See generally* FISHER & SHAPIRO, *supra* note 14, at chs. 2–3 (making this case and discussing accountability checks on agency experts occurring inside the agencies); Bernstein & Rodriguez, *supra* note 60.

65. *See, e.g.*, FISHER & SHAPIRO, *supra* note 14, at 91–93 (referencing literature making this point); MARISSA MARTINO GOLDEN, WHAT MOTIVATES BUREAUCRATS? POLITICS AND ADMINISTRATION DURING THE REAGAN YEARS 150, 155, 166–67 (2000); JOHN BREHM & SCOTT GATES, WORKING, SHIRKING, AND SABOTAGE: BUREAUCRATIC RESPONSE TO A DEMOCRATIC PUBLIC 196–99, 202 (1999).

66. Despite the expansiveness of agency expertise, this Article deploys a relatively narrow conception of "expert" in examining the "expert bureaucracy." Agency experts for purposes of this Article are professionals trained in the natural or physical sciences, often with an advanced degree. The role of social scientists and other experts in agency decisions is important to protective regulation as well, and the challenges associated with this expertise, at least facially, overlaps significantly with the challenges analyzed here. *See, e.g.*, Kate M. Conlow, *Financial Conflicts of Interest and Academic Economists in Law and Policymaking*, 56 ARIZ. ST. L.J. 621, 631 (2024) (exploring how underlying conflicts of interest of economists engaged in agency decision-making can bias their work). Nevertheless, these broader types of expertise are bracketed in this investigation to gain greater analytical purchase on the more prominent role that "scientific" evidence plays in the contemporary struggles over agency expertise. Both historical and current characterizations of administrative failure (and success) tend to target agency expertise in the "hard" sciences, see *infra* Sections III.A, III.B, IV.A, further justifying a singular focus on the trustworthiness of this slice of scientific expert advice. Hence, the conception of agency expertise used in this Article is considerably narrower than in other treatments. *See, e.g.*, *supra* note 16 and accompanying text.

67. *See, e.g.*, Wendy E. Wagner, *No One Solution to the "New Demarcation Problem"?: A View from the Trenches*, 92 STUD. HIST. & PHIL. SCI. 177, 177 (2022) [hereinafter Wagner, *No One Solution*] (elaborating on these two challenges with citations).

advice is often shaped by unacknowledged value-laden choices, such as whether to adopt conservative assumptions that err on the side of health protection or to take a more risk-neutral approach when synthesizing the relevant research.[68] Thus, it is vital to ensure that scientists carefully identify these uncertainties for the public and policymakers. However, even when the values embedded in scientific analyses are identified, decision makers must also determine whether the expert analyses are reliable by scientific standards. Expert technical work that is not reliable is generally more of a liability than an asset.

In developing a legal process to produce both democratically responsible and scientifically reliable fact finding, these dual features of science policy not only compete for time and attention but are partly in conflict with one another.[69] This Part describes these challenges and extracts what appears to be an emerging consensus on how best to address them.

A. *Scientific Reliability and Bureaucratic Science*

To be of value to policymaking, agency scientific advice must be trustworthy.[70] In the administrative state, professional norms and scientific standards have long served as the litmus test for meeting this goal.[71] In laws, executive orders, and a variety of other agency and executive directives, administrative law embraces the end goal that agencies deliver scientific advice that is reliable and has scientific integrity.[72] In some cases, these directives go

68. *See generally* Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1622–27 (1995) [hereinafter Wagner, *The Science Charade*] (providing examples of these value-laden choices in the context of making "inference" judgments in risk assessments). Policymakers thus confront the epistemic and often complex question of "where the science leaves off and the policymaking begins," an inquiry that is necessary to ensure that the scientists are not given too much discretion to decide controversial policy questions. *See generally* Heather Douglas, *Inserting the Public into Science*, *in* DEMOCRATIZATION OF EXPERTISE? EXPLORING NOVEL FORMS OF SCIENTIFIC ADVICE IN POLITICAL DECISION-MAKING 153 (Sabine Maasen & Peter Weingart eds., 2005) (discussing the need for public involvement in scientific policy making); Sheila Jasanoff, *Quality Control and Peer Review in Advisory Science*, *in* THE POLITICS OF SCIENTIFIC ADVICE: INSTITUTIONAL DESIGN FOR QUALITY ASSURANCE 19 (Justus Lentsch & Peter Weingart eds., 2011) (arguing for the reconception of quality control in policy-relevant science).

69. *See, e.g.*, Wagner, *No One Solution*, *supra* note 67, at 181–82 (describing how these two concerns seem mutually exclusive).

70. Otherwise, agency experts will miss critical opportunities to protect the public or advance the economy and lose precious time and resources on misguided policies.

71. *See, e.g.*, ARAIZA, *supra* note 14, at 127 (underscoring the foundational role that professional norms should play in ensuring the integrity of agency scientific work); FISHER & SHAPIRO, *supra* note 14, at 85–93 (discussing the vital role that formal and informal norms play in providing accountability for expert decisions in administrative law).

72. Legislation is sometimes quite specific in requiring that the agency scientific analyses meet basic scientific standards of reliability, and in some cases demand that the science meet the highest scientific standards. *See, e.g.*, 15 U.S.C. § 2643(d)(7) (requiring the agency to use the "best available science" in the Toxic Substances Act); 16 U.S.C. §§ 1533(b), 1536(c), 1537a(c) (same in Endangered

further and explicitly reference adherence to the standards of the scientific community,[73] but even when they are silent, the scientists' own tests for reliability appear to be the implicit and seemingly inevitable touchstone.[74] Perhaps even more noteworthy, the expectation that agency science meets scientific norms has been adopted by both sides of the aisle. Partisan disagreements generally do not arise with regard to the appropriateness of the end goal of scientific reliability, but rather as to whether agency work ultimately meets these scientific standards.[75]

Precisely because the agencies' scientific work provides the facts that make up the foundation for high-stakes policy decisions, those facts are often subject

Species Act); 42 U.S.C. § 300g-l(b)(3)(A) (same in Safe Drinking Water Act); *Id.* § 4332(2)(D) (requiring agencies to "ensure the professional integrity, including scientific integrity, of the discussion and analysis in an environmental document" in NEPA compliance).

Executive branch directives on ensuring the reliability of agency science, while episodic, reference scientific standards or identify scientific integrity more generally as the lodestar for agency science-intensive work. *See, e.g.*, Memorandum of March 9, 2009, Scientific Integrity, Memorandum for the Heads of Executive Departments and Agencies, 74 Fed. Reg. 10671 (Mar. 11, 2009) ("To the extent permitted by law, there should be transparency in the preparation, identification, and use of scientific and technological information in policymaking."); Memorandum from John P. Holdren on Sci. Integrity to Heads of Exec. Dep'ts and Agencies (Dec. 17, 2010), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf [https://perma.cc/U3VN-6GHR] (directing the agencies to "communicate scientific and technological findings by including a clear explication of underlying assumptions; accurate contextualization of uncertainties; and a description of the probabilities associated with both optimistic and pessimistic case projections."). Even presidents, like George W. Bush, who were notorious for interfering with the agencies' scientific work, see, e.g., *infra* note 159 and text accompanying note 160, defaulted to scientific norms as the ultimate benchmark for ensuring the reliability of agency scientific analyses when doing so advanced their ends-oriented goals. *See, e.g.*, *infra* notes 182–84 and 278–81 and accompanying text (discussing George W. Bush administration OIRA guidance that purported to enhance the scientific integrity of agencies' scientific analyses). EPA Administrator Scott Pruitt's political interferences in EPA staff analyses under the first Trump administration similarly referenced "sound science" as the end-goal for the intervention. *See, e.g.*, Eric Lipton, *E.P.A. Chief, Rejecting Agency's Science, Chooses Not To Ban Insecticide*, N.Y. TIMES (Mar. 29, 2017), https://www.nytimes.com/2017/03/29/us/politics/epa-insecticide-chlorpyrifos.html [https://perma.cc/ZPG8-B9ZK (staff-uploaded, dark archive)]; Press Release, Environmental Protection Agency, Adm'r Pruitt Issues Directive to Ensure Independence, Geographic Diversity & Integrity in EPA Science Committees (Oct. 31, 2017), https://www.epa.gov/archive/epa/newsreleases/administrator-pruitt-issues-directive-ensure-independence-geographic-diversity.html [https://perma.cc/79C3-D7G6].

73. *See, e.g.*, SCI. INTEGRITY FRAMEWORK INTERAGENCY WORKING GRP. OF THE NAT'L SCI. AND TECH. COUNCIL, A FRAMEWORK FOR FEDERAL SCIENTIFIC INTEGRITY POLICY AND PRACTICE 27 (2023), https://www.transportation.gov/sites/dot.gov/files/2024-10/01-2023-Framework-for-Federal-Scientific-Integrity-Policy-and-Practice.pdf [https://perma.cc/ZKX2-BNW3] [hereinafter 2023 FRAMEWORK] (defining "scientific integrity" as "the adherence to professional practices, ethical behavior, and the principles of honesty and objectivity").

74. *See infra* note 86 (discussing National Academy of Sciences as adjudicator); *see infra* note 89.

75. *See infra* Section IV.A (referencing the flurry of legal activity regarding improving the reliability of agency science from all corners of the political spectrum all of which aspire to the same end-goal of ensuring that science is reliable, often by reference to undefined scientific standards).

to intense pressure in ways that can compromise their reliability.[76] Interested parties both outside and within the agency can engage vigorously in the science-intensive stages of the decision making, sometimes in ways intended to bias the scientific analyses.[77] Numerous books and articles trace how regulated industries in particular have devised devious ways to make scientific research appear credible while stealthily violating core principles of scientific integrity.[78] Interested parties, for example, may sponsor ends-oriented research under contract and then use this research to cast doubt on unwelcome findings done by academic scientists.[79] They may also commission scientists, again under contract, to nitpick and discredit respected research (and researchers) in the hope of undermining the perceived reliability.[80] Affected groups even find ways to manipulate peer review processes by cherry picking like-minded scientists to skew reviews, while carefully concealing these moves to make the resultant peer reviews appear scientifically credible.[81]

At the end of the day, however, it is the agency experts who are expected to track down these clandestine efforts to bias research, prioritize studies based

76. "Fact" is a word that does not equate to scientific findings for all the reasons discussed *infra* plus many more. However, it is the term used in law, including by the courts to describe the artificial line between "fact" and "policy." *See infra* note 151.

77. In environmental and public health law, this pressure begins the moment it becomes clear that a man-made activity—such as the discharge of a pollutant or changes in land use—poses potential adverse effects on the public. Polluters and manufacturers, in particular, take great interest in the relevant environmental and health research since the findings might affect not only their profit margins, but whether they can continue to operate at all. *See, e.g.*, Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 685, 703 (2010) (describing concerns that regulation can create job loss and can put firms into bankruptcy).

78. *See, e.g.*, Tess Legg, Jenny Hatchard & Anna B. Gilmore, *The Science for Profit Model—How and Why Corporations Influence Science and the Use of Science in Policy and Practice*, at 7–9, *in* 16 PLOS ONE art. e0253272 (June 23, 2021), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0253272#:~:text=The%20model%20shows%20that%20the,aspects%20of%20industry%2Dunfavourable%20science [https://perma.cc/D2EY-926Z] (tracing out the various strategies documented in literature for manipulating science used for policy); Bennett Holman & Kevin C. Elliott, *The Promise and Perils of Industry-Funded Science*, at 3–6, *in* 13 PHILOSOPHY COMPASS art. e12544 (2018), https://compass.onlinelibrary.wiley.com/doi/10.1111/phc3.12544 [https://perma.cc/ZP2U-KHKQ (staff-uploaded, dark archive)].

79. Known by the scientific community as the "funding effect," researchers find a statistically significant correlation between research sponsored by industry and outcomes that favor the sponsor. *See, e.g.*, Justin E. Bekelman, Yan Li & Cary P. Gross, *Scope and Impact of Financial Conflicts of Interest in Biomedical Research*, 289 JAMA 454, 463 (2003); THOMAS MCGARITY & WENDY WAGNER, BENDING SCIENCE 5 (2008) [hereinafter MCGARITY & WAGNER, BENDING SCIENCE] (documenting these and other legally-condoned paths for manipulating science in ends-oriented ways); *see also* Legg et al., *supra* note 78, at 7–9 tbl. 1 (listing techniques and examples in table form).

80. *See, e.g.*, MCGARITY & WAGNER, BENDING SCIENCE, *supra* note 79, at ch. 6 (detailing the ways special interests have devised to legally "attack" reliable science to undermine its credibility).

81. *See, e.g.*, *id*. at ch. 8 (discussing multiple techniques used to manipulate peer review to make unreliable research appear trustworthy).

on their strengths and limitations,[82] and ultimately produce an analysis that meets scientific standards.[83] The agency experts must do this, moreover, despite the fact that their own analyses (and sometimes professional reputations) can be subject to attacks by affected groups.[84] Indeed, empirical evidence reveals that agency experts working on protective rulemakings are regularly exposed to unrelenting pressures to undermine the reliability of their technical work, akin to the "machine-gun" effect on agency staff that Landis observed from industry back in 1960.[85]

Not surprisingly, given the high-stakes environment within which the agency scientific experts work, there are endless disagreements about whether agency expert advice can be trusted. To resolve these disputes, the National Academy of Sciences is sometimes summoned—at great expense and time—to serve as arbiter.[86] But more often the battles about the reliability of agency expert advice proceed in a more inchoate fashion. It is not unusual for opponents of the expert agencies' findings to introduce scientific-sounding arguments—some of which are overtly misleading—to support their ends-oriented positions.[87] Despite the frequency and intensity of these disagreements, precise guidance on how to draw the line between reliable and unreliable expert advice is effectively absent.[88] It is left to courts, political officials, and the general public to decide for themselves when and whether to trust agency expert advice.

82. *See, e.g.*, Tracey J. Woodruff, Patrice Sutton & The Navigation Guide Work Group, *An Evidence-Based Medicine Methodology To Bridge the Gap Between Clinical and Environmental Health Sciences*, 30 HEALTH AFFS. 931, 934–35 (2011) (describing various features that can be included in this weighting step).

83. *See, e.g.*, WAGNER, SCIENCE IN REGULATION, *supra* note 30, at 29–75 (describing how this staff scientific synthesis process works in select regulatory programs).

84. *See infra* Section III.B.2(c) (discussing these attacks from the courts' perspective when enlisted to resolve the disputes on the merits).

85. *See* JAMES M. LANDIS, REPORT ON REGULATORY AGENCIES TO THE PRESIDENT-ELECT 71 (1960); *infra* notes 189, 192, 194–95.

86. *See, e.g.*, Ian Fein, *Reassessing the Role of the National Research Council: Peer Review, Political Tool, or Science Court*, 99 CALIF. L. REV. 465, 523–24 (2011) (discussing the role of the National Research Council of the National Academies of Sciences, Engineering, and Medicine in mediating disputes regarding the reliability of scientific evidence for policy); David Policansky, *Science and Decision Making for Water Resources*, 8 ECOLOGICAL APPLICATIONS 610, 610 (1998) ("[NRC] is often called on by the U.S. Congress or executive-branch agencies to help resolve controversies about natural resources . . ."). The fact that the Academies is relied upon (and paid) to adjudicate the reliability of agencies' scientific analyses further underscores the use of scientific standards as the ultimate lodestar for assessing the reliability of scientific information used to inform policy.

87. *See, e.g.*, *infra* notes 311–15 and accompanying text (discussing some of these misleading moves at a legislative and executive level).

88. *See, e.g.*, *infra* Section III.B.3 (describing the absence of internal agency guidance or even written methods for integrating scientific conventions into the structures and processes agencies typically use to synthesize scientific evidence).

Fortunately, however, the scientific community, which has long wrestled with these same issues, has settled upon several foundational features that inform their assessment of the reliability of research. Indeed, because publication in a peer-reviewed journal is considered the *sine qua non* of reliable scientific analysis,[89] top scientific journal editors are particularly motivated to filter out unreliable research.[90] By applying specific criteria to screen submissions for bias and manipulation, the top biomedical journals uphold scientific norms that ensure reliable research.[91] These pre-publication requirements, consistent with basic scientific norms, assess research reliability by focusing on the *processes* by which research was created.[92] Biases in submitted research are flagged primarily by methodically tracing the pedigree of the research process rather than comparing the results or outcomes to a potentially fraught sense of established truth.[93]

Applying, albeit loosely, these conventional scientific criteria for reliability into administrative process provides a much-needed benchmark for evaluating the merits of the many battles of the experts, and for assessing the scientific integrity of regulatory processes more generally.[94] Of course, relying

89. *See, e.g.*, Kelley D. Mayden, *Peer Review: Publication's Gold Standard*, 3 J. ADVANCED PRAC. ONCOLOGY 117, 118 (2012) (discussing continued acknowledgement of peer reviewed publication as the gold standard in science, despite many limitations and imperfections inherent in the peer review process). Indeed, given the importance of publishing in a peer-reviewed journal for scientific reliability, economic actors often dedicate considerable resources to getting their sponsored work accepted for publication. MCGARITY & WAGNER, BENDING SCIENCE, *supra* note 79, at 3–4.

90. *See* Donald Kennedy, *Responding to Fraud*, 314 SCIENCE 1353, 1353 (2006) (describing how falsified science reports had to be retracted after being published in *Science*).

91. *See generally Roles and Responsibilities of Authors, Contributors, Reviewers, Editors, Publishers, and Owners*, ICMJE, https://www.icmje.org/recommendations/browse/roles-and-responsibilities/ [https://perma.cc/3BKG-XBWS] (defining roles of authors and contributors, including requiring disclosure of conflicts of interest and their responsibilities in submission and peer review process).

92. Science is, after all, assessed not on whether the substantive results are in line with expectations but on processes researchers followed to ensure trustworthiness. *See* NAOMI ORESKES, WHY TRUST SCIENCE? 57 (Stephen Macedo ed., 2019); Marcus R. Munafò, Brian A. Nosek, Dorothy V. M. Bishop, Katherine S. Button, Christopher D. Chambers, Nathalie Percie du Sert, Uri Simonsohn, Eric-Jan Wagenmakers, Jennifer J. Ware & John P. A. Ioannidis, *A Manifesto for Reproducible Science*, at 1–3, *in* 1 NATURE HUM. BEHAV. art. 0021 (Jan. 10, 2017), https://www.nature.com/articles/s41562-016-0021 [https://perma.cc/C9PZ-2C2Q] (arguing for greater adoption of key process measures to ensure scientific robustness).

93. Thus, rather than examine the "fit" of the results against past research, editors and scientific readers double-down on ensuring the most sacred conventions of the scientific process have been followed, particularly rigorous and diverse peer review. *See* ORESKES, *supra* note 92, at 58 (discussing these process standards). Ultimately, if the research is particularly impactful, other researchers will endeavor to replicate and expand the methods and findings. *Id.* (observing this "continued process of evaluation" as critical to science).

94. Each of these criteria, in fact, surface in various federal laws, guidelines, and directives, particularly the insistence on "transparency" and "peer review" as the reason for adoption or as guidance when making rules. *See, e.g.*, Safe Drinking Water Act, Pub. L. No. 93-523, § 2, 88 Stat. 1660, 1663 (1974) (codified as amended at 42 U.S.C. § 300g-1(b)) (referencing the use of "peer review" in the

on the journal criteria to assess scientific reliability does not equate to the expectation that the agencies' work must meet publication-level requirements. Publication in science takes years and considerable money, and hence establishing such a high standard for agency science would be both unrealistic and unnecessary.[95] Instead, the basic scientific criteria used by journal editors can inform the general parameters for evaluating the reliability of agency science. The closer the expert processes underlying an analysis align with these scientific standards, the greater the reliability of the expert advice. Conceiving of a reliability assessment that embodies general process-standards—rather than a substantive checklist of mandatory requirements—also provides much-needed flexibility for assessing the trustworthiness of agency science across widely varying regulatory settings. Deviations from the criteria are not necessarily disqualifying; deviations instead provide red flags of potential bias that inform how best to use that scientific work when making policy.

There are at least three mandatory process features that the top journal editors impose on prospective actors that inform, in part, their ultimate assessment of the reliability of the research.[96] The first convention seeks some

studies used and in the ultimate risk assessments produced by the agency); Memorandum of March 9, 2009, *supra* note 72 (referencing the import of "transparency"); Toxic Substances Control Act, Pub. L. No. 114-182, § 6, 130 Stat. 448, 462–63 (2016) (codified at 15 U.S.C. § 2605(b)(2)(E)) (prescribing use of either the Framework for Metals Risk Assessment of the Office of the Science Advisor from 2007, a peer-reviewed study, or other similarly peer-reviewed document for determinations of risk evaluation of metals); NSTC, PROTECTING THE INTEGRITY OF GOVERNMENT SCIENCE 20–21, [hereinafter 2022 REPORT], https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/01/01-22-Protecting_the_Integrity_of_Government_Science.pdf [https://perma.cc/ED5K-MTRC (staff-uploaded archive)] (outlining practices to increase transparency and highlighting transparency as a marker of scientific integrity); Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, § 110, 100 Stat. 1613, 1641–42 (codified at 42 U.S.C. § 9604(i)(13)) (providing that all studies under this subsection shall be subject to peer review by panels of three to seven "disinterested scientific experts"); HHS, THE SCIENTIFIC INTEGRITY POLICY OF THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES 2, https://www.hhs.gov/sites/default/files/hhs-scientific-integrity-policy.pdf [https://perma.cc/F9HM-SHAU (staff-uploaded archive)] (listing core values in HHS research which include transparency and objectivity); *infra* note 279 and accompanying text (discussing OIRA's peer review directive).

95. *See generally The Chemical Safety Improvement Act: Hearing on S. 1009 Before H. Subcomm. on Env't and the Econ. & H. Comm. on Energy and Com.*, 113th Cong. 105–24 (2013) (testimony of Wendy Wagner, Professor, Univ. of Texas Sch. of L.), https://www.congress.gov/113/chrg/CHRG-113hhrg87628/CHRG-113hhrg87628.pdf [https://perma.cc/9VEF-GR5A (staff-uploaded archive)] (making the case that these criteria should never be used as rigid pre-clearance rules since the agency would never be able to make progress on protective regulation).

96. *See generally Roles and Responsibilities of Authors, Contributors, Reviewers, Editors, Publishers, and Owners*, *supra* note 91. National Academy reports reinforce the importance of these general criteria—as well as many others—in a number of reports covering such diverse topics as forensic science, the regulatory use of models, and research integrity. NAT'L ACAD. OF SCIS., INTEGRITY IN SCIENTIFIC RESEARCH: CREATING AN ENVIRONMENT THAT PROMOTES RESPONSIBLE CONDUCT 34–35 (2002) (listing practices that enhance scientific integrity in research); NAT'L ACAD. OF SCIS., MODELS IN ENVIRONMENTAL REGULATORY DECISION MAKING 109–12 (2007) (discussing transparency in development and use of models).

assurance of the researcher's independence and objectivity in framing the hypotheses, designing the methods, and reporting and analyzing the findings by requiring, at a minimum, a detailed conflict of interest disclosure.[97] The second convention insists on critical scrutiny from diverse, disinterested experts; a vigorous process of peer review weighs heavily into journal editors' determination of research worthy of publication.[98] The third convention that governs all journal submission requirements is a commitment to full transparency on all features of the scientific work, including how it was produced.[99] Statements of uncertainties are particularly vital in light of the incomplete state of most policy-relevant science.[100] Journal editors appreciate

97. More specifically, to expose ways that the authors' independence might have been compromised, scientific journal editors require authors to identify key financial sources of potential influence using mandatory conflict of interest disclosure forms. *See, e.g.*, *Disclosure of Interest*, ICMJE, https://www.icmje.org/disclosure-of-interest/ [https://perma.cc/6SN3-3RBR (staff-uploaded archive)]. Scientific journals vary considerably, however, in how they implement and enforce conflict disclosures and authorship requirements. *See, e.g.*, Kathleen Ruff, *Scientific Journals and Conflict of Interest Disclosure: What Progress Has Been Made?*, at 2–6, *in* 14 ENV'T HEALTH, art. 45 (2015); *see also Cochrane Database of Systematic Reviews: Editorial Policies*, COCHRANE LIBR., https://www.cochranelibrary.com/cdsr/editorial-policies#coi [https://perma.cc/8CV6-T7FF] ("Authors without financial conflicts of interest must make up at least two-thirds of the author team."). Like all screening tools, moreover, conflict disclosures have multiple limitations. *See generally* Holman & Elliott, *supra* note 78 (describing advantages and disadvantages of disclosing private funding in science).

98. Philosophers and historians of science seem to agree that one of the most crucial ingredients for rigorous scientific work is critical scrutiny from diverse peers. *See, e.g.*, HELEN E. LONGINO, SCIENCE AS SOCIAL KNOWLEDGE: VALUES AND OBJECTIVITY IN SCIENTIFIC INQUIRY 80 (1990) (underscoring the role of critical and diverse scrutiny in science); HARRY COLLINS & ROBERT EVANS, WHY DEMOCRACIES NEED SCIENCE 49–50 (2017) (citing the importance of the normative goal of organized skepticism to the integrity of science); ORESKES, *supra* note 92, at 49–68 (discussing these internal checks as critical ingredients for trustworthy science).

However, actual implementation of peer review is fraught with numerous challenges that continually plague journal editors. *See* Mayden, *supra* note 89, at 117–18, 121 (outlining major limitations of peer review and yet concluding it is nevertheless still the "gold standard" for scientific reliability). For example, even in its most demanding incarnation, peer review is subject to human error. The selection and number of reviewers, the limited time and energy reviewers have to scrutinize work, and the reviewers' own idiosyncratic biases can also work to compromise their assessments of scientific reliability during peer review. *See, e.g.*, Jonathan P. Tennant & Tony Ross-Hellauer, *The Limitations to Our Understanding of Peer Review*, 5 RES. INTEGR. PEER REV. 6, 3–12 (2020).

99. *See, e.g.*, Kevin C. Elliott, *A Taxonomy of Transparency in Science*, 52 CANADIAN J. PHIL. 342, 343–49 (2022) (discussing the important role transparency plays in science and providing taxonomy of various types of transparency). Accordingly, journal editors and peer reviewers expect methods, assumptions, and sources of bias in a study to be spelled out clearly so that other scientists can both replicate the work and evaluate its quality. *See Recommendations*, ICMJE 3–4, 8, 11, 17, https://www.icmje.org/recommendations/ [https://perma.cc/Y9VU-4M9F (staff-uploaded archive)] (emphasizing the critical role of transparency in disclosures, of data, of methods, or revisions and various other features of the study).

100. *See* Elliott, *supra* note 99, at 343–45 (discussing value-laden nature of science and observing that "[o]ne of the common suggestions for responding to this difficulty is to promote transparency about the value judgments that influence scientific research"); *see also* NAT'L RSCH. COUNCIL,

that these standards strive—but do not always succeed—in ensuring reliable results. Nevertheless, the standards set by the leading scientific journals provide the best framework the scientific community has come up with thus far.[101]

If scientific analyses prepared by an agency scientist do not provide any information on these three criteria, then it is difficult to assess its reliability. Subjecting scientific analyses to these standards does not mean the final advice is value-free, of course. Nonetheless, employing them helps ensure that agency work does not fall outside of the shared norms of scientific inquiry. In this Article, then, as long as the goal for agency science is that the expert advice has "integrity" in line with scientific norms, these three criteria provide a good head start on explicating what the reliability of agency science means and how to assess it.[102]

B. *Embedded Values in Expert Knowledge*

Yet simply ensuring the science is reliable by these three scientific standards is not enough. An additional challenge arises from the fact that science itself is not value-free. This creates several overlapping complications for agency expertise.

First, in regulatory settings, agency scientists are inevitably asked to synthesize a diverse range of studies from the scientific literature to address a larger policy question that goes well beyond the parameters of the available research.[103] Even the most fact-intensive questions, such as the concentration at

SCIENCE AND JUDGMENT IN RISK ASSESSMENT 185 (1994) (recommending that EPA should "make uncertainties explicit and present them as accurately and fully as is feasible").

101. *See, e.g.*, *Defining the Role of Authors and Contributors*, ICMJE, https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html [https://perma.cc/U9ET-L398 (staff-uploaded archive)] (discussing how authorship makes published work accountable). Of course, superb peer review by no means guarantees that research yields the "truth." *See* HENRY H. BAUER, SCIENTIFIC LITERACY AND THE MYTH OF THE SCIENTIFIC METHOD 48 (1992) (citing John Ziman who estimates that ninety percent of the primary literature in physics is wrong); ORESKES, *supra* note 92, at ch. 2 (exploring illustrative case studies). Nevertheless, scholars writing on the history and philosophy of science and technology studies reaffirm the theoretical importance of these same normative aspirations on the practice of science. *See, e.g.*, LONGINO, *supra* note 98, at 80 (underscoring role of critical and diverse scrutiny in science).

102. More specifically, the criteria for assessing the scientific reliability of agency expert work used here provides basic information about: 1) who the scientific staff authors were and the extent of independence from significant sources of influence; 2) whether the analyses were submitted to diverse and critical peer scrutiny and what that review revealed; and 3) whether critical features and assumptions in the analysis were explained in transparent ways.

103. Statutory mandates provide guardrails on how scientists should think about their technical assignments but leave open multiple value-laden questions about how to synthesize that research. For example, Congress directs the EPA to restrict chemicals that "[present] an unreasonable risk of injury to health or the environment." 15 U.S.C. § 2605(a). This type of mandate requires fundamental policy judgments about how to define "unreasonable risk" as well as how to synthesize existing evidence on a chemical's hazardous propensities.

which a particular substance appears to cause a particular type of cancer in a species of mouse, involve value judgments embedded in locating and weighing the relevant research bearing on a policy question.[104] The staff scientists' analyses thus necessarily demand subjective judgments at numerous points during the course of their work.[105]

Fortunately, various reports and guidelines have been crafted over the past five decades to remind agency scientists to carefully respect the many "inference options" and value judgments needed to bridge disparate areas of research.[106] Indeed, a lack of candor about these necessary assumptions and inferences violates basic principles of scientific transparency itself.[107] The use of conflict disclosure requirements and vigorous peer review are also intended, in part, to help authors delineate more clearly where the science leaves off and the value choices begin.[108] But peer review will also call out authors for overstating the implications of their findings and failing to carefully explicate the gaps and limitations of their analyses.

However, as discussed, even vigorous adherence to explicating uncertainties ultimately takes us only partway toward ensuring the public accountability of expert advice, since the scientists' own consensual judgments are themselves necessarily value-laden.[109] Science is, after all, conducted by humans who have their own biases and values that cannot be entirely removed from their work. As a result, some scientists' shared values may be different from those of the general public.[110]

104. *See* Wagner, *The Science Charade*, *supra* note 68, at 1622–27 (identifying some of the numerous policy judgments including: the proper dose-response curve, how or whether to extrapolate from mouse to man, how to determine mean exposure risks in the population).

105. *See* Robert T. Lackey, *Science, Scientists, and Policy Advocacy*, 21 CONSERVATION BIOLOGY 12, 16 (2007) (arguing that scientists should be careful to avoid advocating for positions and should present scientific evidence as objectively as possible).

106. *See, e.g.*, NRC, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 28–33 (1983) (providing a nonexhaustive list of dozens of value-driven assumptions that need to be made for standard risk assessment).

107. *See* Elliott, *supra* note 99, at 343–45 (discussing the vital role that transparency plays in drawing out scientists' embedded values, as well as exploring some of the downsides and limitations to this kind of transparency).

108. *Recommendations*, *supra* note 99, at 3–4 ("An author's complete disclosure [of conflicts] demonstrates a commitment to transparency and helps to maintain trust in the scientific process."). A similar push for heightened transparency to assess improper influences on jurists is occurring in legal circles. *See, e.g.*, Andrew Chung & John Kruzel, *Under Fire, US Supreme Court Unveils Ethics Code for Justices*, REUTERS (Nov. 14, 2023, at 0:56 ET), https://www.reuters.com/legal/us-supreme-court-announces-formal-ethics-code-justices-2023-11-13/ [https://perma.cc/6Y3W-4QKD].

109. Sheila Jasanoff, *Serviceable Truths: Science for Action in Law and Policy*, 93 TEX. L. REV. 1723, 1748 (2015); *see* MACEDO & LEE, *supra* note 28, at 265–67 (discussing this problem in the agency expert advice during COVID).

110. *See* Elliott, *supra* note 99, at 344–45 (discussing this problem and citing discussions in philosophical literature).

This socially constructed feature of science initially appears to present a no-win choice between either scientific integrity using scientists' standards or democratic accountability. Yet in the abstract, the policymaking process is already primed to protect against insulated expert judgment through multiple layers of review. Peer review by disciplinary experts encourages authors to rigorously identify uncertainties, but this scientific vetting is ideally then followed by scrutiny from other experts, policymakers, and members of the public attuned to uncovering embedded assumptions and values that may be widely accepted within a scientific specialty yet diverge from broader societal preferences.[111] Importantly, these interrogations may also reveal that, in at least some cases, the values of scientific communities do not materially differ from those of the general public,[112] particularly as the scientific workforce grows more diverse.[113] Thus, while the potential for value misalignment between science and the public must remain a central consideration in science-informed policymaking, such discrepancies can generally be managed through robust, multi-level processes of critical "checking" and "balancing."[114]

C. *Putting It All Together*

Although these two goals—ensuring scientific integrity and delineating the hidden role of values—seem irreconcilable at first blush, trial and error over the last fifty years have yielded established methods for advancing both democratic and scientific accountability in policymaking.[115]

First, when scientists produce analyses in response to policy-framed questions, the scientists should be expected to provide full transparency regarding how their work aligns with scientific process standards. For literature

111. *See* MACEDO & LEE, *supra* note 28, at 271–73, 294–95 (advocating for precisely this kind of layered review that includes nonexperts to catch "noble lies" and ensure that experts "stay in their lane").

112. *See, e.g.*, NRC, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 183–91 (2009) (describing critiques by a broad scientific panel on the reliability of forensic science, which was largely insulated as a subspecialty).

113. *See* Alan L. Porter & Ismael Rafols, *Is Science Becoming More Interdisciplinary? Measuring and Mapping Six Research Fields Over Time*, 81 SCIENTOMETRICS 719, 741 (2009) (discussing how science is becoming more interdisciplinary over time, although also noting that this move is proceeding slowly and incrementally).

114. *See* MACEDO & LEE, *supra* note 28, at 296–99 (advocating for this "checking" and "balancing" of expert judgments); ORESKES, *supra* note 92, at 68 (concluding that overall justification for trust in science rests on "the processes of scientific investigation, . . . and the collective critical evaluation of knowledge claims").

115. *See, e.g.*, JASANOFF, THE FIFTH BRANCH, *supra* note 44, at 250 ("Repeated rounds of analysis and review may be required before an agency reaches a conclusion that is acceptable at once to science and to the lay interests concerned with regulation."); Sidney Shapiro, Elizabeth Fisher & Wendy Wagner, *The Enlightenment of Administrative Law: Looking Inside the Agency for Legitimacy*, 47 WAKE FOREST L. REV. 463, 498–99 (2012) (describing the iterative and discursive nature of the NAAQS process).

searches and analyses to inform pressing policy questions, for example, agency scientists should not only provide their ultimate findings but explain their process of analysis against scientific standards governing conflict disclosures, peer review, and transparency. In this way, the public has a basis for determining whether the expert scientific work can be trusted.[116]

Second, a science-intensive regulatory process must remain vigilant about identifying potential divergences between the scientific community and the public as they relate to value-laden regulatory questions. The National Academy of Sciences ("NAS") in particular has been emphatic about the importance of this essential line-drawing step, but the expert missteps during the COVID crisis underscore the need to ensure expert judgments are subject to multiple levels of vetting.[117] Ultimately, the public and policymakers, rather than experts, must take responsibility for framing and formulating the questions to be asked of science.[118] Once scientists present their analyses—documenting the integrity of their methods and clearly accounting for significant uncertainties and assumptions—it falls to the public and policymakers to decide how the scientific record should inform policy choices and future research priorities. This means not only assessing the limits of the evidence but also judging its relevance to the challenges at hand.[119]

III. CRITIQUE

From a high altitude, the analyses in Parts I and II offer reason for optimism: the dense web of pluralistic interactions embedded in the design of the administrative process appears well equipped to promote public accountability in agency expert decision-making. Whether the discretion

116. *See id.* at 494–99 (describing how the NAAQS process is designed to draw out process transparently in stepwise fashion).

117. *See, e.g.*, NAT'L RSCH. COUNCIL, REVIEW OF THE ENVIRONMENTAL PROTECTION AGENCY'S DRAFT IRIS ASSESSMENT OF FORMALDEHYDE 151–66 (2011); NAT'L RSCH. COUNCIL, SCIENCE AND JUDGEMENT IN RISK ASSESSMENT, *supra* note 100, at 7, 85–90; NAT'L RSCH. COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS 33–37 (1983); MACEDO & LEE, *supra* note 28, at 264–67, 270–71 (discussing the absence of this checking of expert advice during COVID).

118. For example, an assignment to design protective rules could be framed to scientists as follows: "identify the most scientifically credible level at which a pollutant causes human health harm from the literature." In setting ambient air quality standards (a process called "NAAQS"), in fact, the EPA separates this first step—formulating the questions to be asked of scientists—and engages all interested parties with notice and comment. Shapiro et al., *supra* note 115, at 493–94.

119. Again, in the NAAQS process, the role of the policymaker is delineated carefully and iteratively, but the ultimate decision of how to proceed in light of the scientific "facts" rests with the policymaker. *Id.* at 494–501.

involves scientific judgment or the selection of values to fill evidentiary gaps, the process includes multiple layers of oversight.[120]

Yet the track record of the expert bureaucracy's performance over the last four decades exposes numerous disappointments in meeting the dual goals of democratically and scientifically accountable expert advice. Indeed, both those concerned about the deep state[121] and those concerned about executive overreach have reason to be very dissatisfied with the status quo. Moreover, efforts to pacify one set of critics—for instance, those urging a more restrained chief executive—must still contend with the equally pressing concern that experts themselves may be offering biased and unaccountable advice.

How does the current design of administrative governance navigate the tension between scientific integrity and democratic accountability, and in what ways does it fall short? Given the limited empirical understanding of the internal workings of expert decision-making, one of the most effective ways to illuminate this black-boxed process is through a structural audit of the legal requirements that shape agencies' day-to-day operations.[122] This Part offers such an analysis. It proceeds in three sections and adopts an architectural perspective, tracing how existing legal frameworks support—or fail to support—the trustworthiness of agency science.

This critical review reveals that, rather than enabling our agency experts to bring their best work to the table, cumulative legal rules and directives often yield the opposite outcome. While the casualties for bureaucratic science vary according to the vigor with which the chief executive approaches scientific integrity, even the most scientifically committed president and their staff have failed to overcome the major legal obstacles that impede agencies from providing the nation with rigorous and trustworthy expertise.

120. *See* Bernstein & Rodriguez, *supra* note 60, at 1639–40 (discussing how the structure of administrative process, and the interconnected web of interactions and activities that result, create an environment that encourages and nurtures accountability by career staff).

121. *See generally* JASON CHAFFETZ, THE DEEP STATE: HOW AN ARMY OF BUREAUCRATS PROTECTED BARACK OBAMA AND IS WORKING TO DESTROY THE TRUMP AGENDA (2018) (tracing the alleged unaccountability of bureaucracy).

122. In assuming that legal requirements will affect agency behavior, the analysis presents what is (hopefully) a worst-case view of agency reality. We know that agency professionals will sometimes risk their reputation and future employment by remaining steadfast to their professional values. *See* Bernstein & Rodriguez, *supra* note 60, at 1630–33, 1631 n.107, 1651 n.184 (suggesting that professional staff's normative commitments to agency's mission and their own professional standards provide ballast that—in most cases—keeps resulting deliberations more balanced and accountable). The analysis largely brackets these offsetting (and generally undocumented) practices by staff scientists occurring in individual cases since the focus here is instead on whether we—as legal architects—have designed the best (or even a habitable) legal environment to allow staff professionals to bring their best work to the table.

A. *Presidential Leadership in Ensuring the Scientific Integrity of Agency Expert Work*

In theory, the president is perfectly situated to implement a full-throttled commitment to basic scientific norms in bureaucratic decision-making. Although normatively contested, the unitary executive model positions the White House as the command center for most agency activities, drawing its justification from the premise that agencies must be directly accountable to the electorate.[123]

Overseeing the work of agencies is challenging,[124] but there are many ways that the unitary executive could take charge and address systemic threats to the scientific integrity of agency expert advice. For example, the President could issue executive branch directives that, among other things, require staff to document the formative stages of their analyses in ways that align with best practices in science. This top-down supervision could also be used to identify and correct errors that arise from one-sided stakeholder participation. So far, so good.

Unfortunately, in practice, the executive branch's oversight of bureaucratic science tends to undermine the integrity and accountability of the agencies' scientific work. The analysis here begins with a brief overview of how executive control is intended to work and then proceeds to identify two central flaws in the design that not only fail to capitalize on the executive's unique opportunity to shore up expertise but actually widen the integrity gap. Making matters worse, the beneficiaries of this politicized science are not randomly distributed across all affected groups, but tip in favor of regulated industry.

1. Executive Control of Agency Science: The Legal Design and Promise

In the United States, administrative agencies engaged in health and environmental protection are under the ultimate control of the president, who in turn selects thousands of political appointees to run the agencies' day-to-day

123. Steven G. Calabresi, *Some Normative Arguments for the Unitary Executive*, 48 ARK. L. REV. 23, 67 (1995) (setting out various advantages of unitary executive).

124. *See, e.g.*, Cynthia R. Farina, *False Comfort and Impossible Promises: Uncertainty, Information Overload, and the Unitary Executive*, 12 U. PA. J. CONST. L. 357, 360 (2010) (criticizing many generalizations regarding a president's ability to advance electoral preferences by overseeing individual agency actions as unrealistic).

operations.[125] Over the last forty-plus years, presidential control over this bureaucracy has not only thrived but also expanded.[126]

The most direct means of presidential control over the "deep state" is accomplished by the appointment of multiple layers of political management, the number of which has increased more than tenfold since the 1960s.[127] Through these critical appointments, the President can set policy goals for the agency upfront and hand-select persons loyal to the President's mission to implement them.[128]

Political appointees can only oversee so much science-intensive work directly, however. To exert more systematic control, presidents also issue executive orders and directives to keep agencies in line with the presidential mission.[129] Presidents also impose added discipline by engaging White House

125. *See, e.g.*, *Transition Overview*, CTR. FOR PRESIDENTIAL TRANSITION, https://presidentialtransition.org/transition-resources/presidential-transition-guide/transition-overview/ [https://perma.cc/3Q2C-CE55] (referencing about 4,000 political appointees running agencies of which about 1,200 require Senate confirmation).

126. *See* Kathryn A. Watts, *Controlling Presidential Control*, 114 MICH. L. REV. 683, 706–26 (2016) (giving examples of presidential control over aspects of agency expertise); Shannon Roesler, *Agency Reasons at the Intersection of Expertise and Presidential Preferences*, 71 ADMIN. L. REV. 491, 503 (2019) (same). The Roberts Supreme Court has further reinforced the unitary executive's powers, speaking "explicitly about the importance—indeed, the constitutional imperative—of significant presidential authority over administrative agencies." ARAIZA, *supra* note 14, at 61.

127. *See id.* at 113 ("While President Kennedy had 286 politically appointed slots to fill within the bureaucracy, forty years later President George W. Bush had 3,361.").

128. *See also* Allison M. Whelan, *Executive Capture of Agency Decisionmaking*, 75 VAND. L. REV. 1787, 1810 (2022) (describing some of president's controls using appointees). *See generally* DAVID E. LEWIS, THE POLITICS OF PRESIDENTIAL APPOINTMENTS: POLITICAL CONTROL AND BUREAUCRATIC PERFORMANCE (2008) (providing comprehensive examination of presidents' use of appointments to gain political control over bureaucracy). After an appointment is approved, the President continues to enjoy ways to ensure his appointees do not disappoint, including removing them without cause. *See* Robert V. Percival, *Who's in Charge? Does the President Have Directive Authority over Agency Regulatory Decisions?*, 79 FORDHAM L. REV. 2487, 2490 (2011) (discussing this power for EPA appointees).

129. Over the last twenty-five years, for example, OIRA has issued at least four separate directives intended to systematize agency processes governing scientific peer review, risk assessment, data transparency, and data corrections. *See, e.g.*, *Final Information Quality Bulletin for Peer Review*, 70 Fed. Reg. 2664 (Jan. 14, 2005); Office of Mgmt. & Budget, Exec. Off. of the President, *M–07–24: Memorandum For the Heads of Executive Departments and Agencies* (Sep. 19, 2007), https://georgewbush-whitehouse.archives.gov/omb/memoranda/fy2007/m07-24.pdf [https://perma.cc/79DG-E366 (staff-uploaded archive)]; Office of Mgmt. & Budget, Exec. Off. of the President, *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies* (Jan. 3, 2002), https://obamawhitehouse.archives.gov/omb/fedreg_reproducible/ [https://perma.cc/M52F-2S7G]; Office of Mgmt. & Budget, Exec. Off. of the President, *Improving Implementation of the Information Quality Act: Frequently Asked Questions*, https://bidenwhitehouse.archives.gov/wp-content/uploads/2023/12/FAQs-Implemention-of-the-Information-Quality-Act-final.pdf [https://perma.cc/YNF9-J2Y9]. The Office of Science and Technology Policy ("OSTP") has also issued reports and guidelines elaborating on presidential executive orders. *See, e.g.*, Memorandum from John P. Holdren, Dir., Off. of Sci. & Tech. Pol'y, on Scientific Integrity, to Heads of Exec. Dep'ts & Agencies (Dec. 17, 2010), http://www.whitehouse.gov/sites/default/files/microsites/ostp/scientific-integrity-memo-12172010.pdf [https://perma.cc/D6WK-HBWC (staff-uploaded archive)].

offices, most notably the Office of Information and Regulatory Affairs ("OIRA"), to override problematic agency choices through a formal clearance process for significant rules.[130]

While this centralized executive control presents challenges for the scientific integrity of agency expertise, it is important to appreciate several of its virtues. As discussed in the previous Part, virtually all technical analyses arising within the regulatory state involve embedded value choices that can be cumulatively significant. The role of political and publicly accountable management in engaging with these decisions is therefore vital.[131] Additionally, since a federal agency should speak with one voice to gain public trust, it would be treacherous to allow individual staff to operate with too much independence.[132] Executive control over bureaucratic processes also provides enhanced accountability across agencies through improved coordination and streamlining.[133] Finally, in cases in which the public seems eager for trustworthy bureaucratic science, the chief executive is well-situated to reinvigorate and enhance agency expert processes and combat capture of agencies by regulated parties.[134]

2. Executive Control Over Agency Science: The Perils

Despite the *valuable* contributions the President can make to enhancing the integrity of agency science, that same executive control can be used just as effectively to manipulate and corrupt the agencies' expert work. In the current institutional design, political appointees and White House offices generally enjoy effectively unrestricted access to and control over agency scientific staff at all stages of their work.[135] When scientific findings get in the way of political

130. *See* Exec. Order No. 12,866, § 4, 3 C.F.R. 643–44 (1994), *reprinted in* 5 U.S.C. § 601 (1994).

131. *See generally* Harold H. Bruff, *Presidential Power Meets Bureaucratic Expertise*, 12 U. PA. J. CONST. L. 461 (2010) (arguing policy decisions in regulations should be made in part by political officers).

132. Incomplete technical information could surface in the public sphere before it has been adequately vetted, while rogue agency staff could confuse and terrify the public. *See generally* Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1601 (2008) (identifying some of the dangers of providing staff with too much authority).

133. *See generally* Sunstein, *supra* note 53 (highlighting virtues of OIRA oversight, particularly its coordination within government).

134. *See, e.g.*, Strauss, *supra* note 60, at 662–66 (1984) (arguing the President can provide unique balance and uniformity to agency outcomes).

135. *See* ARAIZA, *supra* note 14, at 39 ("The unitary executive theory is potentially far-reaching; taken to its extreme, it would allow presidential control of every decision made by every administrative agency."); Heidi Kitrosser, *Scientific Integrity: The Perils and Promise of White House Administration*, 79 FORDHAM L. REV. 2395, 2411 (2011) (making similar argument). President Biden attempted to discourage some of this political control by instituting procedures for staff to report and discipline scientific misconduct by appointees and their delegates, but President Trump revoked Biden's scientific integrity framework and removed all guardrails on the potential for political control of the scientific record. *See supra* note 18 and accompanying text.

goals, presidential control allows the chief executive (and his officials) to intervene and redirect scientific understandings to better align with their preferences. As Professor Araiza concludes, "[T]he aggressive presidential control of the bureaucracy . . . clearly tilts the regulatory balance in favor of politics and away from bureaucratic expertise."[136]

At a general level, political control of agency work presents a pervasive, running conflict of interest. From their key positions at the head of the agency, political appointees and their delegates have repeated opportunities to bias the scientific record to ensure that the facts do not get in the way of the President's priorities.[137] Political management, for example, may begin with an end goal for the expert work and then work closely with expert staff to design models, datasets, and analyses that yield the needed findings.[138] If the staff isn't cooperative, management may simply edit the key assumptions and numbers in staff reports before the reports are made public.[139] And, when scientific findings cannot be easily manipulated, management may bury the expert reports

136. ARAIZA, *supra* note 14, at 58.

137. Indeed, some Presidents have adjusted the agency's organizational chart to ensure that political appointees exert even more control over staff scientists' work. *See* Thomas O. McGarity & Wendy E. Wagner, *Deregulation Using Stealth "Science" Strategies*, 68 DUKE L.J. 1719, 1752–56 (2019) [hereinafter McGarity & Wagner, *Deregulation*] (describing numerous tactics); *see also* THE HERITAGE FOUNDATION, MANDATE FOR LEADERSHIP: THE CONSERVATIVE PROMISE 435–40 (Paul Dans & Steven Groves eds., 2023) [hereinafter PROJECT 2025], https://www.documentcloud.org/documents/24088042-project-2025s-mandate-for-leadership-the-conservative-promise/ [https://perma.cc/GL8Q-HXQK (staff-uploaded archive)]) (proposing changes to enable political appointees to have greater direct oversight over the EPA's Office of Research and Development).

138. One of the best-documented examples of direct executive control over staff scientific analyses occurred during the George W. Bush administration when then-Deputy Secretary of the Interior, Julie MacDonald, interfered with the actual field work of staff assigned to research key species proposed for classification as endangered. *See* OFF. OF INSPECTOR GEN., U.S. DEP'T OF THE INTERIOR, THE ENDANGERED SPECIES ACT AND THE CONFLICT BETWEEN SCIENCE AND POLICY 1–2 (2008) (discussing Deputy Secretary MacDonald's abuse of authority in making endangered species decisions). *See generally* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1728–33 (providing numerous examples).

139. *See* HEIDI KITROSSER, RECLAIMING ACCOUNTABILITY: TRANSPARENCY, EXECUTIVE POWER, AND THE U.S. CONSTITUTION 184 (2015) ("The president or his White House proxies can apply behind-the-scenes pressure not only as to final rulemaking determinations but as to the content of underlying factual findings and records."); *see also* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1740–42 (describing incidents of executive branch editing staff scientific reports); *infra* note 343 and accompanying text (proffering a relatively straightforward reform to rectify this problematic feature of administrative process).

altogether[140] while downsizing the scientific staff to reduce the number of science-policy conflicts in the future.[141]

Political officials have only so much time and energy to micromanage staff analyses in individual agency decisions, so presidents and their appointees also issue systematic directives crafted to bias the fact-finding process to align with the president's preferred ends, such as Pruitt's "transparency rule" or OIRA's "risk assessment guidance" discussed *infra*.[142] These internal operating procedures are publicly visible, and hence, there is a greater chance of public blowback, but these risks have not stopped political officials from issuing them in administrations that do not embrace scientific integrity as a presidential priority.[143]

These and related mechanisms of political control over science are so well-known within the executive branch that President Biden's task force on scientific integrity developed a descriptive taxonomy of "ways in which scientific integrity . . . can be violated," the majority of which involve some form of political interference (see Table 1 below).[144]

140. Under the first Trump administration, upper-level officials at the Department of Agriculture and the U.S. Geological Survey in October 2017 prohibited scientists from those agencies from making presentations at a conference concerning the role that climate change plays in causing conditions conducive to the spread of wildfires. *See* Brittany Patterson, *Govt. Scientist Blocked from Talking About Climate and Fire*, POLITICO: E&E NEWS (Oct. 31, 2017, at 08:14 ET), https://www.eenews.net/articles/govt-scientist-blocked-from-talking-about-climate-and-fire/ [https://perma.cc/V5X5-BPW9]; *see also* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1725–28 (describing incidents of censoring scientists by executive branch over time). Top-down control can also be accomplished by assigning particularly delicate technical projects to staff who are faithful to an administration's policy goals or pressuring or bullying scientists directly to produce more politically-palatable scientific analysis. *See* Sharon Lerner, *EPA Scientists Said They Were Pressured to Downplay Harms From Chemicals. A Watchdog Found They Were Retaliated Against*, PROPUBLICA: LABOR (Sep. 18, 2024, at 13:35 ET), https://www.propublica.org/article/epa-scientists-faced-retaliation-after-finding-harm-from-chemicals [https://perma.cc/6VK3-GEU5].

Additionally, comprehensive preclearance procedures in agencies can be implemented to put agency staff on notice that all of their work must pass through internal review, often repeatedly, before that work can be shared with the public. *See* KITROSSER, *supra* note 139, at 180–83 ("Administrations frequently assert a right to prohibit agency employees from speaking directly to the Congress, the press, or the public without first clearing their commentary with the OMB or another White House designated office.").

141. *See* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1748–52 (describing incidents of downsizing); PROJECT 2025, *supra* note 137, at 421–22 (proposing downsizing for agencies like the EPA during the second Trump administration).

142. McGarity & Wagner, *Deregulation*, *supra* note 137, at 1767–69. *See infra* notes 177–84, 278–84 and accompanying text.

143. *See* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1767–68.

144. SCI. INTEGRITY FAST-TRACK ACTION COMM., NAT'L SCI. AND TECH. COUNCIL, PROTECTING THE INTEGRITY OF GOVERNMENT SCIENCE 49 (2022) [hereinafter 2022 REPORT], https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/01/01-22-Protecting_the_Integrity_of_Government_Science.pdf [https://perma.cc/AT49-A54W].

Table 1: Violations of Scientific Integrity Policies

Type of Violation	Description
Research Misconduct	*In proposing, performing, or reviewing research or in reporting research results:* • Fabrication: Making up data or results and recording or reporting them. • Falsification: Manipulating research materials, equipment or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. • Plagiarism: Appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
Flawed Scientific Practice	• Use of improper or inappropriate methods or processes in conducting research. • Lack of adherence to practices for research quality, such as laboratory facility accreditation, quality assurance systems, and methods validation.
Flawed Review	• Undue influence or inadequate technical or peer review, including errors introduced within the review or clearance process, limiting scope of a review or peer review charge. • Untenable timelines for review that result in flawed or incomplete reviews. • Changing membership or structure of Federal Advisory Committees in ways that compromise their independence or eliminate needed expertise. • Failing to respond to reviewers' comments and/or selecting specific reviewers to influence the outcome of a review. • Denying scientists the opportunity to review descriptions of their scientific work included in other documentation, e.g., decision documents, policy reports.

Undermining the Scientific Workforce	• Selection or appointment of scientific staff based on non-science qualifications (e.g., to influence science in order to affect a particular policy outcome, reduce the overall quality of research findings, or diminish the public view and understanding of the science). • Undermining the expertise of Federal scientists by re-assignment to other duties or denying career advancement.
Suppression, Delay, or Censorship	• Preventing or delaying the release of a scientific product without scientific justification. • Failure to allow the inclusion of research, analysis, or technological information that well-established practices would consider necessary for decision-making.
Mischaracterization of Science	• Downplaying or exaggerating results. • Exaggerating uncertainty and/or not including or misrepresenting assumptions.
Manipulation of Science	• Altering, distorting, or changing science or scientific documents or documents derived from them without scientific justification.

3. Executive Control Over Agency Science: The Deep Secrets

Political influence on staff scientific work does not automatically undermine the reliability of the agencies' fact finding; in science, research may still be publishable so long as conflicts of interest are fully disclosed.[145] The heightened transparency puts readers on notice of potential sources of bias, which they can then factor into their assessment of the reliability of the work. As applied to the administrative state and in keeping with scientific best practices, then, as long as agency scientists disclose significant sources of political control or other biasing influences, the scientific integrity of their work might be salvageable.

But, alas, administrative process thwarts this goal as well since the transparency necessary to ensure scientific integrity is legally out of reach of scientific staff. Instead, the President and his delegates determine whether and

145. Top journal editors, for example, generally publish sponsored research provided authors disclose the nature of their conflicts and acknowledge the sponsor's role in that research. *See supra* note 97 and accompanying text.

how much of the internal executive sources of influence will be shared with the public. Although government records are subject to the Freedom of Information Act ("FOIA"),[146] there is an exception for materials related to deliberative process that allows political officials to keep information that is both pre-decisional and deliberative from public disclosure.[147] The exemption is intended to preserve the quality of agency decisions by "encourage[ing] open, frank discussions on matters of policy," "protect[ing] against premature disclosure of proposed policies before they are finally adopted," and "protect[ing] against public confusion that might result from disclosure of reasons and rationale that were not, in fact, ultimately the grounds for an agency's action."[148] A document subject to this classification must still be logged and briefly summarized in response to a FOIA request, but the executive still enjoys broad discretion regarding whether or how to classify it.[149] Hence, "it is often difficult or impossible for parties challenging an agency decision, and even for reviewing courts, to determine whether an agency has left important information regarding internal deliberations out of an administrative record."[150]

Given the focus of this FOIA privilege on "deliberative" documents, one might question whether an agency's underlying scientific analyses are included in this privilege since the nature of such analyses would seem to preclude agency staff from internally negotiating them. Yet despite past precedent that exempted "fact" and "science" from the privilege,[151] the courts have generally

146. Freedom of Information Act, Pub. L. No. 89-487, 80 Stat. 250 (1966) (codified at 5 U.S.C. § 1002).

147. *See* 5 U.S.C. § 552(b)(5) (2012) (allowing an agency to withhold from FOIA "inter-agency or intra-agency memorandums or letters which would not be available by law to a party other than an agency in litigation with the agency"). Congress did amend this exception to FOIA in 2016 to require that government also demonstrate that it "reasonably foresees that disclosure would harm an interest protected by an exemption." FOIA Improvement Act of 2016, Pub. L. No. 114-185, § 2(1)(D), 130 Stat. 538, 539 (codified as amended at 5 U.S.C. § 552(a)(8)(A)(i)(I)). But at least to date, the government's use of exemption 5 has not changed and, if anything, has trended upwards. The government also seen continued success in challenging the sufficiency of its demonstration of reasonable harm after the 2016 amendment. *See generally* Grant Shellhouse, Shellhouse_DPP Use Mini-Memo, at 1–5, https://utexas.box.com/s/rgbaif6b3zzwly2k4ncplwu9rikawerw [https://perma.cc/PHZ8-ECUF (staff-uploaded archive)] (UT Box) (on file with the North Carolina Law Review and author) (providing mini-investigation into government's use of the exemption since the amendment).

148. *See, e.g.*, Jud. Watch, Inc. v. Dep't of Army, 435 F.Supp.2d 81, 87–88 (D.D.C. 2006).

149. *See* Daniel J. Rohlf, *Avoiding the 'Bare Record': Safeguarding Meaningful Judicial Review of Federal Agency Actions*, 35 OHIO N.U. L. REV. 575, 604–05 (2009) (discussing multiple sources of leniency with respect to logging documents in the Vaughn Index). Even with considerable discretion afforded the executive in providing this document tracking, there is also evidence of blatant noncompliance. *Id.* at 607–08.

150. *Id.* at 604; *see also* KITROSSER, *supra* note 139, at 2.

151. As a historical matter, courts initially rejected executive claims that compiling the "factual" record was deliberative in nature. *See* EPA v. Mink, 410 U.S. 73, 89 (1973) (summarizing courts' long acceptance of fact-policy distinction for deliberative process claims). This early treatment of the

held over the last four decades that agency scientific analyses can be withheld as deliberative process.[152]

The resulting capacious executive privileges offer agency management almost unlimited opportunity to control the scientific record without leaving any fingerprints.[153] The most obvious path to influence is through verbal conversations, which need not be logged at all. But stamping "draft" on internal emails, records of conversations, and interim reports also allows management

scientific record as set apart from political deliberations also resonates with the views of most commentators. *See, e.g.*, Kagan, *supra* note 52, at 2356–57; Robert V. Percival, *Presidential Management of the Administrative State: The Not-So-Unitary Executive*, 51 DUKE L.J. 963, 966 (2001) (arguing that staff "who possess expertise in the regulatory matters entrusted to them" should be protected from interference); Whelan, *supra* note 128, at 1814 ("[E]ven if presidents possess the authority to influence, or even control, agency policymaking, such authority should not extend to scientific decision-making.").

However, over the fifteen years that followed, courts increasingly focused on the *role* documents played in deliberative processes, rather than the *content* of the documents. *See, e.g.*, Montrose Chem. Corp. v. Train, 491 F.2d 63, 67–68, 71 (D.C. Cir. 1974) ("When a summary of factual material on the public record is prepared by the staff of an agency administrator, for his use in making a complex decision, such a summary is part of the deliberative process, and is exempt from disclosure."). By the mid-to-late-1980's, courts considered even purely factual material eligible for the deliberative process privilege. For instance, in *National Wildlife Federation v. U.S. Forest Service*, 861 F.2d 1114 (9th Cir. 1988), the Ninth Circuit rejected the argument that "factual matters [should] be withheld only when their disclosure would reveal the substance of pre-decisional policy discussions." *Id.* at 1117–18. Instead, it adopted a "process-oriented" or "functional" test; rather than merely focusing on the material in the document itself, the court held that the "better analytical tool" was to

> focus on whether the document in question is a part of the deliberative process. . . . Hence, even if the content of a document is factual, if disclosure of the document would expose "the decision-making process itself" to public scrutiny by revealing the agency's "evaluation and analysis of the multitudinous facts," the document would nonetheless be exempt from disclosure.

Id. at 1118–19 (quoting *Montrose*, 491 F.2d at 68, 71).

152. *See, e.g.*, U.S. Fish & Wildlife Service v. Sierra Club, Inc., 141 S. Ct. 777, 788 (2021) (holding that Fish and Wildlife Service's draft biological opinion was shielded by deliberative process purely because it was marked "draft"); Lead Indus. Ass'n v. Occupational Safety & Health Admin., 610 F.2d 70, 83–85 (2d Cir. 1979) (holding that disclosure of factual segments of scientific analyses would reveal the deliberative process); Goodrich Corp. v. EPA, 593 F. Supp. 2d 184, 189 (D.D.C. 2009) (protecting EPA's model to analyze groundwater flow in a specific area because it was in draft form and the "selection and calibration of data is part of the deliberative process"); *see also* Gbemende E. Johnson, *Adjudicating Executive Privilege*, 53 LAW & SOC'Y REV. 823, 823 (2019) (finding high level of deference by district court judges to agency claims of deliberative process). Through this judicial deference, courts are effectively shifting power to the executive branch since the deliberative process privilege "lessen[s]—if not wholly abolish[es]" the courts' ability to preside over arbitrary and capricious challenges to agency rulemakings. Michael Ray Harris, *Standing in the Way of Judicial Review: Assertion of the Deliberative Process Privilege in APA Cases*, 53 ST. LOUIS U. L.J. 349, 408 (2009).

153. Of course, a conscientious President might instruct staff to ensure full transparency of scientific factfinding, but in doing so, he would relinquish valuable opportunities to control the scientific record with few corresponding benefits. There are few reputational gains to not taking political backdoors if the public remains largely unaware of the unlimited backdoors available to control the fact finding. Further, the record-keeping inherent in a heightened transparency scheme may impose additional administrative costs.

to withhold embarrassing documents, since the stamps signal that the information is pre-decisional in nature.[154] Given this ability to stealthily control the scientific record, it is perhaps not surprising that the executive branch has become more secretive in its operations over time.[155]

When it comes to ensuring the scientific integrity of agency expert work, the implications of this flawed institutional design are profound.[156] Although there are notable exceptions, many agencies do not afford expert staff an independent role in decision-making—for example, by allowing them to synthesize the scientific record in a separate, publicly available report.[157] Consequently, staff experts' analyses are frequently black-boxed and susceptible to political manipulation in order to align with preferred policy outcomes. Outsiders have no way to trace the role that politics played in the underlying analyses, even when the results are presented as primarily scientific.[158] Under such an institutional design, unless the staff has the courage to blow the whistle on executive interventions, patently unreliable scientific work becomes indistinguishable from work produced under exemplary scientific conditions. Indeed, in the few cases where the courts have gotten wind of political

154. *See* Rohlf, *supra* note 149, at 614, 617 (discussing use of this strategy); *see also* Lahr v. Nat'l Transp. Safety Bd., 569 F.3d 964, 979–84 (9th Cir. 2009) (emphasizing in the deliberative process privilege analysis of each document that the agency marked it as "draft"); *U.S. Fish & Wildlife Service*, 141 S. Ct. at 788 (holding that the privilege applied because the document was marked "draft," even though it revealed no other internal agency discussions); Alameda v. United States Dep't of Educ., No. 20-5087, 2020 WL 6038697, at *1 (D.C. Cir. Aug. 18, 2020) (per curiam) (holding that "drafts and corresponding emails were part of a deliberative process"); ViroPharma Inc. v. Dep't of Health & Hum. Servs., 839 F. Supp. 2d 184, 193 (D.D.C. 2012) ("[F]actual material need not be segregated from draft documents because the choice to include or remove such material in each draft reflects the agency's deliberative process.").

155. *See* KITROSSER, *supra* note 139, at 3 (introducing her book-length exploration of executive secrecy); *see also* Harris, *supra* note 152, at 393, 395 (observing a "marked rise in the use of the deliberative process privilege in APA cases" after 2000 and further noting that withheld information sometimes pertains to technical and scientific reports prepared by agency).

156. The fact that political officials *can*—in theory—interfere secretly with the career scientists' research and analyses but nevertheless suppress key information regarding that interference taints the reliability of all of the agencies' scientific work. *See* Whelan, *supra* note 128, at 1793 (arguing that "executive interference in agency scientific decision-making represents a uniquely problematic issue, particularly when it occurs covertly").

157. *See, e.g.*, WAGNER, SCIENCE IN REGULATION, *supra* note 30, at 61–63, 116–119 (describing some of these varied agency practices that provide limited independence and transparency for staff scientific assessments).

158. *See, e.g.*, U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-440, CHEMICAL ASSESSMENTS: LOW PRODUCTIVITY AND NEW INTERAGENCY REVIEW PROCESS LIMIT THE USEFULNESS AND CREDIBILITY OF EPA'S INTEGRATED RISK INFORMATION SYSTEM 57 (2008) (describing OIRA's significant role in influencing EPA's IRIS standards and guiding peer review). *See generally* WAGNER, SCIENCE IN REGULATION, *supra* note 30 (discussing how deliberative process privilege was used liberally by OIRA to conceal its role in influencing science-intensive rules). The only speedbump is that the executive must show that the conversations are both pre-decisional and deliberative in nature. *See U.S. Fish & Wildlife Service*, 141 S. Ct. at 785 (discussing the two-pronged test, in which prongs can overlap).

incursions into fact finding as a result of whistleblowing, their judgments come down hard on the agencies.[159]

4. The Primary Beneficiaries of this Executive Control Over Agency Science: Regulated Industry

We might presume in the abstract that those benefitting from executive control over the scientific factfinding used to develop protective regulations are randomly distributed across all affected groups. But, at least in protective rules, executive interference in fact finding appears to benefit predominantly, if not exclusively, regulated industry. Industry's high stake in the decisions, coupled with its greater resources, position industry to dominate most executive channels of control. Indeed, each of the presidents who have been most aggressive in deploying executive authority over agency science was committed to an anti-regulatory agenda.[160]

159. For example, when presented with agency staff notes revealing a political official had directed agency scientists "to find an analysis that works" to support the de-listing of an endangered species, the district court reversed and re-listed the species, reporting that, based on this evidence, it had "no confidence in the objectivity of the agency's decision making process." Ctr. for Biological Diversity v. Kempthorne, No. CV 07-0038-PHX-MHM, 2008 WL 659822, at *12 (D. Ariz. March 6, 2008); Benten v. Kessler, 799 F. Supp. 281, 286 (E.D.N.Y. 1992) (concluding the mifepristone ban by Bush administration was "based not from any bonafide concern for the safety of users of the drug, but on political considerations having no place in FDA decisions on health and safety"); Rohlf, *supra* note 149, at 579 n.17 (citing examples of court decisions that turned on evidence of political manipulation of regulatory science at the Fish and Wildlife Service).

Other courts appear to be influenced by the evidence of political interference but do not mention it explicitly. For example, in *Mississippi v. EPA*, the appellant produced evidence that the White House actually selected the final number for an air standard, and agency experts were directed to work backwards with their scientific analyses to justify it. 744 F.3d 1334 (D.C. Cir. 2013). The court struck down the rule because the agency had not provided sufficient substantive scientific reasons in support of its decision, but the court did not reference the evidence of political interference in its opinion. *Id.* at 1362.

160. Most notably, Presidents Reagan, George W. Bush, and Trump proceeded with an anti-regulatory agenda and were also notorious for the level of control over agency decision-making. *See generally, e.g.*, JONATHAN LASH, A SEASON OF SPOILS: THE REAGAN ADMINISTRATION'S ATTACK ON THE ENVIRONMENT (1984) (discussing Reagan's control over science-intensive decisions); MAJORITY STAFF OF THE SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT, 111TH CONG., NIPPING IRIS IN THE BUD: SUPPRESSION OF ENVIRONMENTAL SCIENCE BY THE BUSH ADMINISTRATION'S OFFICE OF MANAGEMENT AND BUDGET (2009) (describing George W. Bush's OIRA's effort to undermine the EPA's initiative to establish its Integrated Risk Information System database); SETH SHULMAN, UNDERMINING SCIENCE: SUPPRESSION AND DISTORTION IN THE BUSH ADMINISTRATION (2007) (documenting scientific integrity abuses during President George W. Bush's administration); CHRIS MOONEY, THE REPUBLICAN WAR ON SCIENCE (2005) (detailing scientific integrity abuses in Republican administrations); THOMAS O. MCGARITY, DEMOLITION AGENDA: HOW TRUMP TRIED TO DISMANTLE AMERICAN GOVERNMENT, AND WHAT BIDEN NEEDS TO DO TO SAVE IT (2022) (discussing scientific integrity abuses under President Trump's first term).

Empirical research confirms the disproportionate advantages industry enjoys as a result of the executive's control over agency science,[161] and these industry advantages occur across both Democratic and Republican administrations.[162] Studies of stakeholder communications with the White House's OIRA, for example, consistently find that industry participants significantly outnumber public interest groups.[163] And, in the most comprehensive study of OIRA influence to date, Professors Haeder and Yackee found that industry's more vigorous engagement paid off. When industry lobbied OIRA on issues that were unopposed by nonprofits, OIRA made significant changes to the rules; yet the same beneficial outcome was not true when public interest groups lobbied OIRA unopposed.[164] Additionally, we know from OIRA's own limited documentation (required by executive order)[165]

161. In the Brennan Report's sixty examples of political interference with science (which are not limited to OIRA), ninety-three percent were undertaken to advance industry's interests, including several interventions occurring during President Obama's administration. RUDY MEHRBANI, MARTHA KINSELLA & WENDY WEISER, BRENNAN CTR. FOR JUSTICE, 2 PROPOSALS FOR REFORM app. at 29–31 (2019) (tallying up occurrences by President); *see also* Whelan, *supra* note 128, at 1795 (observing that in the FDA's scientific decision processes, secretive interventions to benefit industry occurred in both Republican and Democratic administrations).

162. *See* Simon Haeder & Susan Webb Yackee, *Influence and the Administrative Process: Lobbying the U.S. President's Office of Management and Budget*, 109 AM. POL. SCI. REV. 507, 518 (2015) (finding that with respect to OIRA's role, "business interests may hold influence across both Republican and Democratic administrators"). *See generally* Steven J. Balla, Jennifer M. Deets & Forrest Maltzman, *Outside Communications and the OIRA Review of Agency Regulations*, 63 ADMIN. L. REV. 149 (2011) (finding OIRA's activities with stakeholders were frequent and occurred across Democratic and Republican administrations).

163. *See* Lisa S. Bressman & Michael P. Vandenbergh, *Inside the Administrative State: A Critical Look at the Practice of Presidential Control*, 105 MICH. L. REV. 47, 87 (2006) (noting that seventy-two percent of employees reported OIRA made changes favor industry); Steven Croley, *White House Review of Agency Rulemaking: An Empirical Investigation*, 70 U. CHI. L. REV. 821, 853, 871 (2003) (finding that fifty-six percent of meetings OIRA conducted to discuss rulemakings were exclusively with industry, as compared with the ten percent held exclusively with public interest groups); U.S. GOV'T ACCOUNTABILITY OFF., GAO-03-929, RULEMAKING: OMB'S ROLE IN REVIEWS OF AGENCIES' DRAFT RULES AND THE TRANSPARENCY OF THOSE REVIEWS 11 (2003) (finding about two-thirds of the rules that OIRA "significantly affected" and for which comments were available reinforced industry views).

164. *See* Haeder & Yackee, *supra* note 162, at 518 (describing changes made in favor of industry as "noteworthy and important"). The researchers also found that across administrations, changes in rules during OIRA review increased following the meetings with all groups but particularly with industry. *Id.* at 516.

165. *See* Exec. Order No. 12,866, § 6(a)(3)(E), 58 Fed. Reg. 51735, 51741–42 (Oct. 4, 1993) (requiring suggestions made by OIRA be identified and communications between OIRA and agencies be transparent); Nina A. Mendelson, *Disclosing "Political" Oversight of Agency Decision Making*, 108 MICH. L. REV. 1127, 1149–51, 1157 (2010) ("Despite the directives and the executive order disclosure requirements . . . public information about the content of executive supervision of an agency decision itself . . . is surprisingly rare.").

that some of the changes initiated by OIRA do not simply concern differing policy judgments, but reach deep into the scientific record.[166]

5. Evidence on the Ground that Presidential Control Undermines the Integrity of the Agency's Scientific Work

Despite a less-than-ideal institutional design, there are still important reasons to remain optimistic that executive interference in agency expert analyses is rare in practice. After all, the time and attention political officials have to influence staff scientific decision-making directly is limited,[167] and many staff scientists will resist such interventions.[168] There are also significant political costs to being caught manipulating the scientific record, even for presidents who campaign on platforms that disparage agency expertise and the "deep state."[169]

Nevertheless, a substantial body of evidence documents numerous instances in which political officials and their delegates have been interfering in agency experts' work since at least the early 1980's.[170] Myriad books, policy papers, and articles are in fact loaded with examples of how political officials—either operating from the White House or serving as political appointees within an agency—have compromised scientific analyses of regulatory agencies over

166. *See, e.g.*, NIPPING IRIS IN THE BUD, *supra* note 160, at 5 (documenting OIRA's intervention into health standards set by EPA); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-42, CHEMICAL ASSESSMENTS: CHALLENGES REMAIN WITH EPA'S INTEGRATED RISK INFORMATION SYSTEM app. III, at 34–40 (2011) (using a chemical-by-chemical basis to show the influential role of agencies like OMB and DOD on EPA's assessments, which are mediated through OIRA); Wendy E. Wagner, *A Place for Agency Expertise: Reconciling Agency Expertise with Presidential Power*, 115 COLUM. L. REV. 2019, 2036–45 (2015) [hereinafter Wagner, *A Place for Agency Expertise*] (documenting evidence of OIRA engaging in scientific details of agency rules).

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

168. *See* Bernstein & Rodríguez, *supra* note 60 (documenting accountable instincts of career staff); *see also* FISHER & SHAPIRO, *supra* note 14 (describing the "institutional expertise of public administration" as "contribut[ing] to agency accountability.").

169. Trump's first effort at getting re-elected in 2021 may have been hampered by visible political interventions into the FDA's vaccine approvals as well as other science-intensive issues surrounding COVID research. *See* E. Donald Elliott, *Lessons for the Law from COVID-19: Alternative Histories to Define the Roles of Politics and Expertise in the Administrative State* 5–9 (Ctr. for the Study of the Admin. State, Working Paper No. 21-50, 2022), https://administrativestate.gmu.edu/wp-content/uploads/2022/08/Lessons-Learned-Elliott-FINAL.pdf [https://perma.cc/79CH-DX4U] (documenting commenters who believe that Trump's response to COVID, including his contentious relationship with science and experts, was one of primary reasons he lost the election in 2022).

170. *See, e.g.*, LASH, *supra* note 160, at 130–31 (documenting President Reagan's "study-rather-than-act" move); *infra* note 272 (discussing President Reagan's effort to stack science advisors consistent with his political ideology). However, there are also claims in the literature that political interference by the executive branch is "increasing" over time. *See, e.g.*, BRENNAN CENTER, *supra* note 161, at 5, 7–12; Whelan, *supra* note 128, at 1815.

time.[171] A policy report by the Brennan Center, for example, offers an appendix of sixty documented examples (most of which were revealed by whistleblowers) of political interventions into the scientific record,[172] while the Union of Concerned Scientists identified "206 attacks on science [occurring under the Trump administration] . . . a total far exceeding those documented during the administrations of George W. Bush (98) and Barack Obama (19)."[173] Indeed, President Biden's government-wide task force identified its most pressing priority as putting measures that "prevent and address political interference in the conduct, management, communication, or use of science" at the "forefront of agency practices."[174]

Many accounts of political officials interceding in the scientific record occur within a single rule or agency decision by bullying or controlling the work as it is done, editing it after it is complete, or censoring the work and, if necessary, terminating or relocating the staff.[175] Over the last few decades, this executive influence over the scientific record has grown bolder, with some Presidents issuing government-wide guidelines and even requirements for how scientific staff must conduct their technical analyses.[176] One of the most visible examples of this was the Trump EPA's "transparency rule," which excluded any relevant scientific information (including some historical research) from consideration in an agency's scientific analysis if the underlying data was not

171. *See generally* ARAIZA, *supra* note 14, at chs. 5, 6 (discussing political control over science in detail); Whelan, *supra* note 128 (providing numerous accounts of presidential meddling in the science at FDA); McGarity & Wagner, *Deregulation*, *supra* note 137 (providing numerous accounts of presidential interventions into agency protective rules occurring across administrations); BRENNAN CENTER, *supra* note 161 (collecting occurrences of presidential interferences with scientific analysis); UNION OF CONCERNED SCIENTISTS, SCIENTIFIC INTEGRITY IN POLICYMAKING: AN INVESTIGATION INTO THE BUSH ADMINISTRATION'S MISUSE OF SCIENCE (2004) (detailing the Bush administration's suppression and distortion of the scientific analyses of federal agencies). *See also supra* note 160.

172. BRENNAN CENTER, *supra* note 161, at 41 n.29; *see also id*. at 3–4, 7–8.

173. Anita Desikan, *An Equity and Environmental Justice Assessment of Anti-Science Actions During the Trump Administration*, 44 J. PUB. HEALTH POL'Y 147, 152 (2023); *see also* Anita Desikan, *UCS Attacks on Science*, HARVARD DATAVERSE (Dec. 20, 2023), https://doi.org/10.7910/DVN/IFVLOW [https://perma.cc/6H5X-NW2A] (providing an Excel file, with links, of 325 total "attacks" on science occurring since 2001).

174. *See* 2023 FRAMEWORK, *supra* note 73, at 4.

175. *See, e.g.*, Doremus, *supra* note 132, at 1603–13; McGarity & Wagner, *Deregulation*, *supra* note 137, at 1724–69 (providing numerous examples of efforts by Presidents to manipulate the science to advance deregulation); Whelan, *supra* note 128, at 1816–51 (discussing executive interference in FDA decision making). Other inventions occur during OIRA review or in some cases through more ad hoc White House channels of influence. *See* Wagner, *A Place for Agency Expertise*, *supra* note 166, at 2036–45.

176. *See, e.g.*, *supra* note 27 and accompanying text (discussing the Biden and Trump directives on scientific integrity).

publicly available.[177] The rule, drafted by political officials and industry consultants rather than scientists, diverged substantially from mainstream scientific conventions[178] and attracted vigorous opposition from the scientific community.[179]

Likewise, President George W. Bush's OIRA issued several agency-wide, science-specific guidelines.[180] Among them was an OIRA initiative mandating centralized, government-wide guidance for all science-intensive agency risk assessments.[181] Scientific commenters were quick to point out that the proposed procedures would have the unambiguous effect of systematically biasing and delaying protective risk assessments in ways that benefitted industry.[182] Indeed, when asked to review the proposed guidance, the National Academy of Sciences committee gave it a grade of "F," identifying scientific problems with nearly every OIRA requirement.[183] Despite bad publicity, the Bush administration proceeded with a modified final version of the guidance.[184]

177. EPA, Strengthening Transparency in Regulatory Science, 83 Fed. Reg. 18,768, 18,773 (Apr. 30, 2018) (to be codified at 40 C.F.R. pt. 30) (emphasis omitted). The rule was promulgated as final, despite vigorous opposition, but was ultimately vacated in a court challenge. *See, e.g.*, Env't Def. Fund v. U.S. Env't Prot. Agency, 2021 WL 402824, at *1 (D. Mont. Feb. 1, 2021) (granting motion to vacate because rule exceeded the EPA's ability to create rules under its housekeeping authority). The rule may re-emerge through Trump's Executive Order that delegates the authority to determine what "gold standards" of science mean for agency decision making. *See* Gold Standard Executive Order, *supra* note 27, at 22602. In keeping with this latest Executive Order, the EPA Administrator might, for example, issue an agency-wide directive stating that, to be considered "replicable" and "transparent" under Trump's "gold standard science," only studies with publicly available data sets may be used by agency staff in synthesizing the literature. This requirement would then apply regardless of when the study was published or whether data access is actually relevant to assessing the study's reliability.

178. Records reveal that neither mainstream scientific nor technical organizations were consulted in developing this policy. *See* Sean Reilly, *GOP Lawmakers, Industry Had EPA's Ear on Advisory Panels*, POLITICO (May 24, 2018), https://www.eenews.net/articles/gop-lawmakers-industry-had-epas-ear-on-advisory-panels/ [https://perma.cc/4LR3-6AF3]. A court order disclosing the underlying documents used to prepare the directive reveals that the policy was heavily influenced instead by Republican politicians working with representatives of various industries. *Id.*

179. *See* 2023 FRAMEWORK, *supra* note 73, at 4.

180. *See, e.g.*, Sidney A. Shapiro, *OMB and the Politicization of Risk Assessment*, 37 ENV'T. L. 1083, 1092 (2007).

181. *Id.*

182. *See, e.g.*, *id.* at 1094–95 (making this point and then identifying some more significant problems including: OIRA's failure to establish why and whether added procedures were necessary; exemption of industry risk assessments; and recommending risk communication methods that were simplistic and ultimately misleading).

183. *Id.* at 1085, 1106 (summarizing the NAS review of guidance and observing that the NAS committee listed "each OMB requirement in the proposed Bulletin line by line" and had "an objection or problem with nearly every line").

184. *See* Memorandum from Susan E. Dudley, Adm'r, Off. of Info. & Regul. Affs., Off. of Mgmt. & Budget & Sharon L. Hays, Assoc. Dir. & Deputy Dir. for Sci., Off. of Sci. & Tech. Pol'y., to Heads of Exec. Dep'ts. & Agencies, at 2 (Sep. 19, 2007), https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/memoranda/2007/m07-24.pdf [http://perma.cc/2P5Z-4H5R].

B. *Bottom-up Scrutiny of Agency Expertise by Stakeholders*

While the potential for executive control of the scientific record is concerning, administrative law has in place a potent antidote: bottom-up stakeholder oversight through the APA notice-and-comment process. As noted in Part I, the APA effectively guarantees stakeholders the opportunity to scrutinize the agency's scientific work and have those technical critiques reviewed by the courts. Thus, when the President compromises the fact-finding record in ways that are inconsistent with scientific norms, vigilant stakeholders, in theory, stand at the ready to call out the problems and insist that they be corrected.[185]

A long-held assumption within administrative law is that stakeholder oversight will help keep agency experts in line.[186] As EPA Administrator Ruckelshaus observed, "A system of opportunity for citizen participation in federal environmental decisions is providing de facto what has been termed 'the most advanced Environmental Ombudsman system in the world,'" equipped to facilitate "creative citizen involvement" to check agency excesses.[187] Indeed, much of the literature examining the limitations of the APA's notice-and-comment process worries not that participants will miss important errors, but that stakeholders will overwhelm agencies with technically directed criticisms that impede their progress.[188]

1. Strike 1: Imbalanced Participation

Yet when put into practice, at least for protective rules, this oversight has one particularly fatal problem when it comes to ensuring the integrity of the agency's scientific fact finding: stakeholder participation overwhelmingly involves only one set of interests—those of industry.[189] Although all stakeholders are guaranteed the opportunity to scrutinize the agencies'

185. *See supra* note 159 and accompanying text.

186. *See supra* notes 41–43 and accompanying text; *cf*. FISHER & SHAPIRO, *supra* note 14, at 273 (expressing optimism from NAAQS cases that agencies and courts can establish constructive "partnership" to improve quality of agency's expert competence).

187. William D. Ruckelshaus, *The Citizen and the Environmental Regulatory Process*, 47 IND. L.J. 636, 642–43 (1972).

188. Thomas O. McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385, 1397 (1992) (discussing the resulting ossification of rulemaking). *See generally* Wendy Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321 (2010) [hereinafter Wagner, *Administrative Law, Filter Failure*] (tracing various ways that stakeholders can inundate and overwhelm rulemaking process).

189. *See* Wendy Wagner, William West, Thomas McGarity & Lisa Peters, *Deliberative Rulemaking: An Empirical Study of Participation in Three Agency Programs*, 73 ADMIN. L. REV. 609, 617 n.32 (2021) [hereinafter Wagner et al., *Deliberative Rulemaking*] (citing numerous empirical studies reaching this finding). More diverse engagement may occur in natural resource litigation, but there does not appear to be studies on the composition of the various participants in these programs.

rulemaking decisions, including the quality of their fact-finding efforts,[190] locating unreliable scientific work within a larger rulemaking record demands considerable time and sophistication.[191] As a result, for rules that protect the general public, only those most directly affected by the standards—regulated industry—generally have the resources and motivation to participate.[192]

Empirical work bears out the prediction. Numerous studies find that regulated industry is the only group engaged in the rulemaking process in about half of the agencies' rules.[193] In the other half, industry significantly outnumbers those representing the general public, often by more than tenfold.[194] Even when nonprofits do engage, they generally dedicate their limited resources to raising legal arguments rather than critiquing the agencies' scientific fact finding.[195] The resulting imbalance in stakeholder oversight means that the external critical review agency staff receive is neither diverse nor disinterested—per scientific standards—but intensely ends-oriented.

Yet, despite the obvious dangers of a participatory process designed on a pay-to-play model, the administrative process appears wholly unconcerned by the possibility that stakeholder imbalances could adversely impact the quality of the agencies' expertise. Indeed, rather than take preventive measures, like subsidizing public interest groups or appointing technical advocates to ensure more diverse scrutiny of agency science,[196] administrative law does the opposite, making it clear that, as a legal matter, the only criticisms that count are those

190. *See* 5 U.S.C. § 553(b)–(c).

191. If there is no evidence of how the agency came up with a particular result (e.g., no transparency of process), then outside parties must generally either replicate the entire analysis or else empanel their own group of diverse, neutral experts to peer review the work. *See* Wagner, *Administrative Law, Filter Failure*, *supra* note 188, at 1385–86 (discussing challenges for public interest groups in commenting on technical rules).

192. William T. Gormley, Jr., *Regulatory Issue Networks in a Federal System*, 18 POLITY 595, 606–07 (1986) (modeling effects of imbalanced participation on policymaking when high stakes, well-funded groups head off against diffuse publics).

193. Wagner et al., *Deliberative Rulemaking*, *supra* note 189, at 668.

194. *See, e.g.*, Christopher H. Schroeder & Robert L. Glicksman, *Chevron, State Farm, and EPA in the Courts of Appeals During the 1990s*, 31 ENV'T L. REP. 10371, 10392 (2001) (finding that, "[d]uring the 1990s, litigants with pro-industrial or pro-development agendas were responsible for initiating 79% of the challenges to the validity of EPA's scientific determinations, which was up from 70% in the 1980s."); Wagner et al., *Deliberative Rulemaking*, *supra* note 189, at 617–18 n.32, 630 (finding industry engagement in toxic chemical test rules exceeded public interest engagement by factor of more than 13:1, with over eighty-nine percent of the comments submitted by industry and less than five percent of comments contributed by public interest groups).

195. *See, e.g.*, Wendy Wagner, *Revisiting the Impact of Judicial Review on Agency Rulemaking: An Empirical Investigation*, 53 WM. & MARY L. REV. 1717, 1746 (2012) (nonprofit litigator concedes limited resources lead to triaging litigation priorities).

196. These supplemental mechanisms are used in some other rulemaking settings to ensure more comprehensive and inclusive participation by affected groups, however. *See, e.g.*, Brian D. Feinstein, *Identity-Conscious Administrative Law: Lessons from Financial Regulators*, 90 GEO. WASH. L. REV. 1 (2022) (identifying innovative measures in place within financial regulation for ensuring more diverse participation in agency decision-making).

lodged by active participants.[197] Engaging diverse critical perspectives—a foundational feature of science—is not required and thus irrelevant to the design of the APA.

2. Strike 2: Judicial Review Compounds the Adverse Effects of Imbalanced Oversight

Notwithstanding the problematic design of the notice-and-comment process, participatory imbalances could, in theory, be addressed by the courts. Agency expertise that violates basic tenets of scientific integrity would seem to be presumptively arbitrary under Section 706 and ripe for challenge. And in presiding over these challenges, we might expect the courts to look suspiciously upon the quality of science in rulemaking records that involve only industry participation. We might even expect courts to encourage public interest groups to intervene in these proceedings.

However, the courts do none of this. Instead, they remain wholly oblivious to how the one-sided review of the notice-and-comment process threatens to undermine the integrity of the agency's scientific processes. Indeed, their own doctrinal refinements discussed below only compound the problems. The lesson for agency staff from the courts' cumulative case law (discussed below) is that agency staff should not only focus their limited bandwidth on responding to industry critiques ex post but also are well-advised to develop analytical processes ex ante to anticipate industry's interpretation of the evidence.

a. Foreclosing Diverse Oversight: The Exhaustion Doctrine

Even if the only comments relating to an agency's scientific record are lodged by well-financed stakeholders, we might expect courts to allow opposing, thinly financed groups to intervene to minimize the risks that unbalanced participation compromises the reliability of the scientific record.

But under the courts' exhaustion of administrative remedies doctrine,[198] if a party does not lodge a comment on the precise matter in contention with specificity, then their concerns are barred in litigation.[199] Even if a final rule

197. *See* discussion *infra* Section II.B.2.a.

198. *See generally* McKart v. United States, 395 U.S. 185 (1969) (setting out reasons for exhausting remedies first within agency before raising issue with court). The recent decision in *Ohio v. EPA*, 144 S Ct. 2040 (2024), will likely exacerbate the biasing effects of imbalanced participation in agency rulemakings due to increased judicial scrutiny of the agencies' responses to individual, critical comments. *See, e.g.*, Karen M. Tani, *Foreword: Curation, Narration, Erasure: Power and Possibility at the U.S. Supreme Court*, 138 HARV. L. REV. 1, 74 (2024) ("[*Ohio* and similar cases] will divert the attention of administrators and courts toward the concerns of the propertied and powerful, while also potentially diminishing agencies' willingness to make robust and creative uses of their power.").

199. *See, e.g.*, Marcia R. Gelpe, *Exhaustion of Administrative Remedies: Lessons from Environmental Cases*, 53 GEO. WASH. L. REV. 1, 10–11 (1985) (outlining the rationale behind the exhaustion requirement).

reveals dramatic biases in fact finding, the resulting "arbitrary" rule is not judicially reviewable unless a stakeholder filed comments during the notice-and-comment period identifying that defect.[200] After the comment period closes, all other claims are deemed "waived."[201]

Beyond this catch-22 for thinly financed stakeholders, who must anticipate industry's technical comments and lodge targeted counter-responses during the comment period, the exhaustion doctrine also encourages agencies to capitulate to industries' scientific critiques to limit the risks of judicial review.[202] By the close of the comment period, the agency knows where its scientific vulnerabilities lie and, as a legal matter, is well-advised to focus all of its expert efforts on those contested facts, regardless of whether they are raised by an unrepresentative, ends-oriented group of stakeholders.[203] In some cases, agency experts may be advised by legal staff to accept dubious scientific arguments raised by industry representatives simply to placate industry and ensure the rule is promulgated expeditiously.[204]

b. Encouraging Negotiation of the Scientific Record with Industry: The Logical Outgrowth Doctrine

Because we hold expert agencies to professional standards, we might hope their scientific staff will anticipate the biasing effects of notice-and-comment and produce exemplary analyses ex ante, before the onslaught of industry comments. While this professional dedication will not avoid all scientific compromises before the rule is final, it should create a robust record that provides fewer opportunities for credible scientific disagreements.

But court-created doctrines interpreting the APA once again push professional staff to skirt scientific integrity norms. Specifically, the logical outgrowth doctrine requires that any significant changes to the rule that were not anticipated when the rule was first proposed must go through a second,

200. *See, e.g.*, Gabriel H. Markoff, *The Invisible Barrier: Issue Exhaustion as a Threat to Pluralism in Administrative Rulemaking*, 90 TEX. L. REV. 1065, 1084–85 (2012) (discussing this requirement).

201. Wendy Wagner, Katherine Barnes & Lisa Peters, *Rulemaking in the Shade: An Empirical Study of EPA's Air Toxic Emission Standards*, 63 ADMIN. L. REV. 99, 116–18 (2011) [hereinafter Wagner et al., *Rulemaking*].

202. Empirical research reveals that in these one-sided participatory environments, roughly one out of every two industry comments filed during the notice and comment period in ninety air toxic standards led to a change that weakened the rule, and no changes were made that strengthened the rules. *See* Wagner et al., *Rulemaking*, *supra* note 201, at 119, 130–32.

203. The resultant focus may come at the expense of shoring up the integrity of agencies' scientific analyses more generally, particularly with respect to features of that analysis that do not concern industry.

204. "According to EPA technical staff, the Office of General Counsel often rewrites regulations, notices, and proposals in anticipation that a lawsuit is imminent. Lawyers have the last word in most EPA actions . . ." Rosemary O'Leary, *The Impact of Federal Court Decisions on the Policies and Administration of the U.S. Environmental Protection Agency*, 41 ADMIN. L. REV. 549, 566 (1989).

time-consuming round of notice-and-comment.[205] To avoid having a rule caught up in a never-ending loop of notice-and-comment, some agencies (such as the EPA) have learned that the safest course is to reach some consensus with the most litigious opponents before the proposed rule is even published.[206] Making matters worse, since industry typically enjoys superior access to information about the potential hazards of the products and pollutants it creates, agency staff find collaboration with industry is often essential.[207] Industry is not only the primary source of critical scrutiny but is also in possession of key information the agency needs to develop a bulletproof rule.[208]

By creating incentives to compromise with industry at the formative stages of agency analysis, the logical outgrowth doctrine introduces still more risks that the staff's scientific work will be biased. And, in practice, empirical research reveals that industry does enjoy substantial influence in the development of at least some protective rules before the proposed rules are published. Indeed, these early technical deliberations tend to be completely dominated by regulated industry, often at the invitation of the agency.[209] Yet despite the seemingly obvious dangers of compromising the integrity of agency fact finding early, agency management, including by the President, actively encourage these negotiations.[210] And because they occur outside of the notice-and-comment

205. *See, e.g.*, Shell Oil Co. v. EPA, 950 F.2d 741, 747, 750–51 (D.C. Cir. 1991) (holding that the agency failed to provide meaningful notice-and-comment opportunities on issues in a final rulemaking because issues were first raised by commenters during notice-and-comment process).

206. *See, e.g.*, Jim Rossi & Kevin M. Stack, *Representative Rulemaking*, 109 IOWA L. REV. 1, 23–24 (2023) (elaborating on literature identifying the influential nature of stakeholder engagement during the pre-notice of proposed rulemaking ("NPRM") stages).

207. *See, e.g.*, Cary Coglianese, Richard Zeckhauser & Edward Parson, *Seeking Truth for Power: Informational Strategy and Regulatory Policymaking*, 89 MINN. L. REV. 277, 281–88 (2004) (outlining "regulators" informational dependence on those they regulate).

208. *Id.* at 310–11; *see also* Andrea Bear Field & Kathy E.B. Robb, *EPA Rulemakings: Views from Inside and Outside*, 5 NAT. RES. & ENV'T., Summer 1990, at 9, 10 (1990) (quoting industry counsel who observed that "[t]he arguments that stand the greatest chance of being listened to by the Agency are those that address technical aspects of a proposed rule rather than the legal basis of that rule").

209. Wagner et al., *Rulemaking*, *supra* note 201, at 124–28; *see also* Wagner et al., *Deliberative Rulemaking*, *supra* note 189, at 631 (noting that less than four percent of pre-NPRM participants in EPA TSCA test rules were public interest); William F. West, *Inside the Black Box: The Development of Proposed Rules and the Limits of Procedural Controls*, 41 ADMIN. & SOC'Y 576, 588–90 (2009) ("Most participation in proposal development occurs at [an agency's] specific invitation.").

210. *See, e.g.*, Memorandum from William D. Ruckelshaus, Adm'r, Env't Prot. Agency, to All EPA Emps., at 1 (May 13, 1983), https://www.regulationwriters.com/downloads/EPA-Fishbowl-Memo-05-19-1983-Ruckelshaus.pdf [https://perma.cc/H86N-52W9] (encouraging pre-proposed rule communications with affected parties); *see also* Exec. Order No. 12866 § 6(a)(1), 58 Fed. Reg. 51735, 51740 (Sep. 30, 1993) (encouraging pre-NPRM negotiations). Note, however, that the EPA appears to be on the permissive end of the scale in terms of encouraging stakeholder engagement pre-NPRM. *See, e.g.*, ESA L. SFERRA-BONISTALLI, EX PARTE COMMUNICATIONS IN INFORMATION RULEMAKING: A REPORT FOR ACUS 41–51 (2014).

process, the APA does not require the interactions to be documented or even recorded, leaving the biasing effects largely hidden from view.[211]

c. Focusing Agencies on Contested Facts Rather than Building Trustworthy Processes: Hard Look and Deferential Review

These doctrinal issues notwithstanding, at the end of the day, courts still stand at the ready to strike down agency fact finding that is "arbitrary."[212] By demanding reasons for contested scientific analyses, the courts challenge agencies to demonstrate that their scientific work is reliable.[213]

But in carrying out this important oversight work, the courts ultimately selected the wrong path for judicial review.[214] Rather than examining whether the agency's processes for generating contested facts are trustworthy (as journal editors do), judges instead focus like a laser on the substance of the dispute and try to decide for themselves whether the agency got the science right.[215] A judge

211. *See* Home Box Office, Inc. v. FCC, 567 F.2d 9, 57 (D.C. Cir. 1977) ("[C]ommunications which are received prior to issuance of a formal notice of rulemaking do not, in general, have to be put in a public file."); Kathryn E. Kovacs, *Rules about Rulemaking and the Rise of the Unitary Executive*, 70 ADMIN. L. REV. 515, 534 (2018) (noting that in the APA, there is no requirement to record the agency's decision process or communications with stakeholders outside of proposed rule stage). While at the EPA, there is at least a written policy that staff should log pre-NPRM communications into the rulemaking record, it is not clear whether it is enforced internally.

212. 5 U.S.C. § 706(2)(A).

213. Although "[n]owhere in the APA is there any requirement" that agencies must present supporting evidence and explain the connection to its policies, courts uniformly require these reasons. Christopher Walker & Scott MacGuiden, *Interpreting the Administrative Procedure Act: A Literature Review*, 98 NOTRE DAME L. REV. 1963, 1970 (2023). *See generally* JERRY L. MASHAW, REASONED ADMINISTRATION AND DEMOCRATIC LEGITIMACY: HOW ADMINISTRATIVE LAW SUPPORTS DEMOCRATIC GOVERNMENT (2018) (discussing vital role of reason-giving in judicial review); EDWARD STIGLITZ, THE REASONING STATE (2022) (same).

214. Creative case selection by public interest lawyers could surface opportunities for courts to review the integrity of the agency's scientific processes without triggering *Vt. Yankee Nuclear Power Corp. v. Nat. Res. Def. Council Inc.*, 435 U.S. 519 (1978), which held that appellate courts cannot impose additional procedural restrictions on agencies outside of the APA. *Id.* at 558. Indeed, litigants have already succeeded in arguing that executive interference caused an agency's facts to be "arbitrary." *See, e.g.*, Benten v. Kessler, 799 F. Supp. 281, 290 (E.D.N.Y. 1992).

215. Because judges are generalists that lack the scientific skills to review such material, Judge Bazelon believed the best way for courts to address technical challenges was by examining the agency's scientific process. Ronald J. Krotoszynski, Jr., *"History Belongs to the Winners": The Bazelon-Leventhal Debate and the Continuing Relevance of the Process/Substance Dichotomy in Judicial Review of Agency Action*, 58 ADMIN. L. REV. 995, 1000 (2006). However, Judge Bazelon "did not always specify the particular additional procedures that an agency must use on remand," creating "serious confusion" at times for agencies as to which additional procedures they must adopt. *Id.* at 1001–02. Ultimately, Bazelon's preferred process-based approach lost at the Supreme Court, in part because of the perception that it would impose further, mandatory procedures on courts beyond the requirements of the APA. *See id.* at 996–98; *see also* Reuel E. Schiller, *Rulemaking's Promise: Administrative Law and Legal Culture in the 1960s and 1970s*, 53 ADMIN. L. REV. 1139, 1177–78 (2001) (discussing the commotion that Judge Bazelon's approach created in the courts and how "Vermont Yankee ended the debate in the D.C.

might disagree with an agency, for example, on whether the findings from a large rat toxicity test were sufficiently robust to use as a basis for promulgating a protective rule.[216] Not only are judges prone to error when presiding over complex expert battles,[217] but they also forgo a valuable opportunity to incentivize agencies to follow scientific standards.

Although suboptimal, the courts' approach to reviewing challenges to agency fact finding is not always counterproductive. When a broad range of stakeholders are actively engaged in a rulemaking, the agency will strive to ensure that its analyses can withstand criticism from all affected parties. Abiding by the highest standards of scientific integrity helps make the scientific record effectively unassailable. Indeed, in these balanced settings, the courts' oversight has been credited as actually enhancing the integrity of the agency's scientific expertise.[218]

But agency staff know that in most protective regulatory programs, participation by stakeholders is not balanced, and scrutiny of the scientific record will most likely come from industry. Process integrity is effectively irrelevant to courts, so agencies focus their limited resources instead on anticipating and defending against technical critiques mounted by regulated industry. This defensive posture is particularly advantageous for surviving "hard look" (rather than deferential) review, since judges taking a hard look expect agencies to defend every contested fact with extensive support.[219]

Even with deferential review of the technical record, agencies find themselves better off operating defensively and collaborating with industry

Circuit over the propriety of second guessing agency procedural choices"). Courts now review contested science through Leventhal's model, which says the APA "requires reviewing courts to consider the merits of an agency's action." Krotoszynski, *supra*, at 1002.

216. *See, e.g.*, Gulf S. Insulation v. United States Consumer Prod. Safety Comm'n, 701 F.2d 1137, 1146 (5th Cir. 1983) (holding the Consumer Product Safety Commission's ("CPSC") insulation foam ban to be arbitrary based in part on CPSC's reliance on a "single" rat study involving a large "margin of error" since it exposed only 240 rats to the toxicant, a defect further "exacerbated" by fact that "average level of formaldehyde exposure . . . was 14.3 ppm, [and] the rats in fact were exposed regularly to much higher doses. . . . of between 17 and 20 ppm").

217. *See* Edward K. Cheng, *The Consensus Rule: A New Approach to Scientific Evidence*, 75 VAND. L. REV. 407, 410–16, 434 (2022) (proposing greater deference to the scientific community in assessing the reliability of scientific evidence due, in part, to the lack of scientific competency of judges; "expert competency requires years of immersive experience, and no amount of primers, short courses, or presentations will close the gap").

218. *See generally* Fisher et al., *supra* note 51 (tracing how judicial review ultimately improved the quality of the EPA's scientific analysis in NAAQS rules, which is unique program that attracts vigorous participation by both industry and environmental advocates); Jody Freeman & Adrian Vermeule, Massachusetts v. EPA*: From Politics to Expertise*, 2007 SUP. CT. REV. 51, 93–94 (2007) (identifying a line of cases that exemplify the courts' impatience with "executive override of expert judgments" in ways that "appear to disregard established professional or bureaucratic practices and procedures").

219. "Hard look" review typically leads to a reversal and remand when the court finds the agency did not adequately respond to a comment, including underlying technical information. *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1, 40 (D.C. Cir. 1976).

stakeholders—and there is no downside to doing so. Expert analyses negotiated with industry to survive a "hard look" review are still likely to be supported by courts that conduct a deferential review of the technical record.[220]

Thus, rather than provide a disinterested assessment of all relevant information consistent with scientific norms, agencies are best able to withstand criticism from industry stakeholders when they synthesize the scientific literature with industry in mind.[221] Adhering to scientific norms—like engaging disinterested scientific staff and entertaining critical peer review—only gets in the way of achieving a negotiated consensus about the scientific record with industry stakeholders and hinders agencies' chances of surviving judicial review.

In sum, while courts seem well-positioned to interrogate the integrity of agency fact-finding processes and create incentives for agencies to design those processes in ways that comport with professional standards, in practice—at least for programs in which imbalanced participation is likely to be the norm—the courts effectively encourage the opposite. When stakeholders representing only one set of interests are those most likely to mount challenges against the scientific record, embracing disinterestedness, transparency, and even peer review in the agency's scientific factfinding becomes a liability rather than an asset.[222]

220. *See* Emily H. Meazell, *Super Deference, the Science Obsession, and Judicial Review as Translation of Agency Science*, 109 MICH. L. REV. 733, 734–35 (2011) (describing highly deferential, hands-off review). As long as courts take a hands-off approach and defer to agency experts, even a rare public interest group challenge identifying flaws in the agency's scientific record is well-positioned to survive judicial review.

221. *See, e.g.*, Richard J. Pierce, Jr., *Two Problems in Administrative Law: Political Polarity on the District of Columbia Circuit and Judicial Deterrence of Agency Rulemaking*, 1988 DUKE L.J. 300, 311 (1988) (arguing that courts often require "that agencies 'find' unfindable facts and support those findings with unattainable evidence"); *see also* R. Shep Melnick, *Administrative Law and Bureaucratic Reality*, 44 ADMIN. L. REV. 245, 247 (1992) ("Since agencies do not like losing big court cases, they reacted defensively [to the courts' requirements], accumulating more and more information, responding to all comments, and covering all their bets.").

222. For example, implementing more rigorous peer review practices could produce downsides for an agency by potentially identifying features of the agency's analysis that could be improved, thus opening up new areas of vulnerability ripe for litigation. Similarly, if agencies did disclose internal conflicts of interest and executive control over fact finding, it would assist opponents in arguing that the agency's facts are arbitrary when those arguments suit their ends. *See supra* note 159 (citing cases where courts struck down agency rules for political interference with the agency's scientific analysis). The scientific commitment to transparency of process may become a liability as well. In a legal climate in which evidence of the rigor of the agency's scientific processes is irrelevant to success, better to keep one's cards close to the vest and offer the bare minimum to increase the rule's imperviousness to judicial reversal. *See, e.g.*, Rohlf, *supra* note 149, at 578–79 (observing how, since agency's rule is judged based on "record," the agency is effectively in control of extent to which courts can oversee its deliberations).

3. Evidence on the Ground of Stakeholder Biases Infecting the Scientific Record

The biasing effect of APA processes is not inevitable, of course; agencies can still develop internal rules and processes to counteract the risks of one-sided pressure on the integrity of their expert advice. Yet beyond endeavoring to staff the agency with capable professionals, there is not much evidence at a programmatic level that the agencies have fortified themselves against these biasing incentives in most programs.[223] For example, given the industry pressures inflicted on agency scientists, one might imagine agencies would insulate their experts from stakeholders at the early stages of fact finding to enable them to provide a relatively unbiased synthesis of the scientific record. Instead, science-intensive agencies integrate agency experts with other staff, including lawyers, economists, and even political officials, at the very outset of a rule.[224] Rather than assigning expert scientists the task of conducting an independent, open-minded assessment of the scientific literature, agencies have learned it is far better to use these interdisciplinary teams to prepare the factual record.

Relatedly, we would expect scientific staff to be at least somewhat meticulous about ensuring the transparency and clarity of their technical analyses in the rulemaking record—another foundational professional norm. But perhaps in part because of this interdisciplinary approach, it has been difficult, if not impossible, for the public to trace the role the scientist has played in an analysis or even their methods for conducting the literature search.[225]

Finally, although one might expect staff to be eager to enlist external peer review in some form to help counterbalance systemic biases that threaten to skew fact finding, agencies generally forgo utilizing external peer review unless it is formally required or integrated into their programmatic processes (which is rare).[226] Even in programs that appear systematically afflicted with industry

223. *See* WAGNER, SCIENCE IN REGULATION, *supra* note 30, at 146–52, 154–57 (discussing various challenges of one-sided biases and conflicts of interest and recommending further study and action).

224. In his still-classic article of 1991, Tom McGarity documents how EPA develops integrated units of staff—ranging from technical to legal—to work through rulemaking and related programmatic decisions. *See* Thomas O. McGarity, *The Internal Structure of EPA Rulemaking*, 54 LAW & CONTEMP. PROBS. 57, 57–61 (1991); *see also* FISHER & SHAPIRO, *supra* note 14, at 56 (discussing interdisciplinary teams used to create factual records). Indeed, given the courts' current approach to evaluating agency science, these interdisciplinary teams are far more effective in heading off legal challenges than a firewalled structure that endeavors to insulate expert work at the foundational stage of the analysis.

225. Deliberative process privileges contribute to this opacity. *See supra* Section III.A.3; *see also* Science in the Administrative Process ACUS Recommendation #6, 78 Fed. Reg. 41357, 41358 (July 10, 2013) (recommending agencies at least identify staff scientific authors and other significant contributors by name in their technical reports).

226. *See infra* note 288 (observing limited use of external peer review in agencies).

biases, agencies such as the EPA do not seem to engage external reviewers in the vast majority of their science-intensive decisions.[227] Indeed, commissioning external review of staff analyses may cause some rules to become more, rather than less, vulnerable to litigation.[228]

The absence of formal agency procedures is hardly a fatal flaw—the professionalism of the scientific staff is likely to provide a kind of ballast that ensures that the agencies' work does not depart too far from scientific standards. Nevertheless, since legal processes tend to nudge expert staff toward more biased analyses when participation is largely one-sided, the absence of formal procedures to counteract these pressures is concerning.

Reinforcing these worries is scattered evidence that some expert staff have become "captured" and actively advocate for industry in ways that sometimes remain undetected.[229] In a series of investigative reports of EPA's technical analyses of pesticides and chemicals, whistleblowers reported that overtly industry-leaning decisions were being made at the career staff level (below the political appointee) in ways that flatly contravened scientific principles.[230] In another instance, in the EPA's chemical regulation program, career management tampered with a number of staff risk assessments without telling the scientist-authors about changes to their work.[231] While the impetus for these manipulations is inevitably multifaceted, at least some of the triggers point to the agencies' necessarily defensive posture and open-door policy with industry, which softens some staff to industry views.[232]

227. For example, the EPA's default policy (which appears to be followed most of the time) is to *not* solicit external peer review on pesticide licensing decisions, see WAGNER, SCIENCE IN REGULATION, *supra* note 30, at 41, even though a great deal of the relevant information comes from industry. *See, e.g.*, Danielle Ivory & Huffington Post Investigative Fund, *EPA Relies on Industry-Backed Studies to Assess Health Risks of Widely Used Herbicide*, SCI. AM. (July 28, 2010), https://www.scientificamerican.com/article/epa-atrazine-herbicide/ [https://perma.cc/PWY5-VRMX] (roughly half of studies considered by EPA to register atrazine were funded by industry).

228. *See supra* note 222.

229. *See* Whelan, *supra* note 128, at 1802–05 (describing evidence of industry-bias in analytical processes at the FDA that occurred (and appeared to originate) at staff level). *See generally* PREVENTING REGULATORY CAPTURE: SPECIAL INTEREST INFLUENCE AND HOW TO LIMIT IT (Daniel Carpenter & David A. Moss eds., 2014) (describing many incidents of "capture" in regulatory agencies).

230. *See generally* Sharon Lerner, *Whistleblowers Expose Corruption in EPA Chemical Safety Office*, INTERCEPT (July 2, 2021, at 07:00 ET), https://theintercept.com/2021/07/02/epa-chemical-safety-corruption-whistleblowers/ [https://perma.cc/L46M-YVM5 (staff-uploaded, dark archive)] (Intercept's 10-part series on corruption in EPA's chemical and pesticide staff).

231. *Id.*

232. Sharon Lerner, *New Evidence of Corruption at EPA's Chemical Division*, INTERCEPT (Sep. 18, 2021, at 06:02 ET), https://theintercept.com/2021/09/18/epa-corruption-harmful-chemicals-testing/ [https://perma.cc/8PDM-RUB7 (staff-uploaded, dark archive)] (discussing this $64 million dollar question); Sharon Lerner, *The Department of Yes*, INTERCEPT (June 30, 2021, at 11:35 ET), https://theintercept.com/2021/06/30/epa-pesticides-exposure-opp/ [https://perma.cc/9CQM-8N7G

C. *External Expert Peer Review as a Corrective*

There is still at least one way our institutional processes can locate and expose significant biasing influences on agency expert work: deploying external peer review to scrutinize the reliability of the agencies' science. While external expert peer review is far from perfect, when executed in keeping with scientific norms, it has the potential to highlight blind spots, flawed assumptions, and sleights of hand in agency analyses.[233] For these and many other reasons, key governmental organizations, including the National Academy of Sciences ("NAS"), the Administrative Conference of the United States ("ACUS"), and the President's Commission on Risk Assessment and Risk Management, emphasize the value of independent peer review for the science-intensive analyses embedded in regulatory decisions.[234]

Fortunately, both the legislative and the executive branches appreciate the substantial benefits of incorporating external peer review into administrative decision-making. Over the past fifty years, both branches have developed a steadily expanding number of directives that mandate, or at least encourage, external peer review for the most influential, science-intensive agency work. As OIRA notes in its Peer Review Bulletin, external "peer reviews can filter out biases and identify oversights, omissions, and inconsistencies. Peer review also may encourage [agency] authors to more fully acknowledge limitations and uncertainties."[235] Indeed, in interpreting the meaning of "best available science" mandates, natural resource agencies view external peer review as effectively

(staff-uploaded, dark archive)] (describing how scientific staff detailed "immense pressure from within the agency to overlook the risks they found" in industry studies on pesticide safety).

233. Prominent philosophers and historians of science roughly converge on the pivotal role that skeptical and diverse peer review plays in separating scientific processes from other ways of knowing. *See supra* note 98; *see also* Dennis D. Murphy & Paul S. Weiland, *Independent Scientific Review Under the Endangered Species Act*, 69 BIOSCIENCE 198, 199 (2019) (touting expert peer review of regulatory science as highly beneficial in "offering an independent view of the technical matter and a second opinion, both of which increase confidence that the knowledge being conveyed is reliable"); Joanna Wymyslo, *Legitimizing Peer Review in ESA Listing Decisions*, 33 ENVIRONS: ENV'T L. & POL'Y J. 135, 148–49 (2009) (identifying the "multiple benefits" of peer reviewing agency expert analyses in regulatory decision-making).

In her seminal book, *The Fifth Branch*, Sheila Jasanoff examined the use of these expert bodies and concluded that while they might not be capable of pronouncing the "scientific truth" for a number of reasons (particularly the mixed science-policy nature of the decisions), their reviews did provide a very effective insulating quality that helped to buffer agency decisions from unfair criticisms. *See* JASANOFF, THE FIFTH BRANCH, *supra* note 44, at 229–30.

234. *See, e.g.*, Noah, *supra* note 50, at 1035–36 (documenting this broad support by scientific community).

235. OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, OMB BULL. M-05-03, FINAL INFORMATION QUALITY BULLETIN FOR PEER REVIEW 4 (2004) [hereinafter OMB PEER REVIEW BULLETIN].

mandatory.[236] At least facially, then, a commitment by both political branches to institutionalize expert peer review should serve as a critical corrective for the problems introduced by political control and imbalanced interest group participation discussed in Sections III.A and B.

Once again, however, these noble goals get lost in real-world translation. Rather than engaging expert oversight in a manner consistent with scientific standards, governmental peer review processes are managed by political officials with partisan goals. This Section explores these disappointments. It begins with a review of our historical deployment of external peer review in the administrative state and then compares the established scientific conventions governing external peer review against how they are implemented in administrative processes today.

Before proceeding with this final critique, it is important to emphasize once again that just because our legal design of administrative process misses the mark does not mean that agency staff cannot make up the difference, at least in some settings, and conduct peer review processes that keep with their professional standards.[237] We will see, however, that the dysfunctions in our current legal design make it impossible to determine which peer review processes can be trusted and which cannot, leaving all external peer review tainted with a presumption of unreliability. In any event, it is a small comfort to imagine that the integrity of bureaucratic science rests solely with the selfless, professional commitments of staff scientists who must consistently work against formal legal processes that impede principled work.[238]

236. *See, e.g.*, Murphy & Weiland, *supra* note 233, at 198 (describing the longstanding "peer review policy" at FWS and National Marine Fisheries Service ("NMFS") that requires external peer review for listing recommendations and draft recovery plans).

237. Indeed, there is some evidence that the use of science advisory boards sometimes *does* rise above politics. At the FDA, for example, two separate studies conclude that the FDA's primary impetus for the use of science advisory boards is to uncover potential errors in the scientific analyses supporting drug approval because of the high political costs of scientific errors. As Moffitt notes, the driver in the use of these boards is to avoid "a Congressional oversight hearing at which the bureaucrats must publicly defend and explain ostensible agency failures." Susan L. Moffitt, *Promoting Agency Reputation Through Public Advice: Advisory Committee Use in the FDA*, 72 J. POL. 880, 889 (2010); *see also* Stéphane Lavertu & David L. Weimer, *Federal Advisory Committees, Policy Expertise, and the Approval of Drugs and Medical Devices at the FDA*, 21 J. PUB. ADMIN. RSCH. & THEORY 211, 231 (2010) (concluding in a similar vein that, in the drug approval process, the FDA uses advisory committees to provide extra scientific expertise to assist in resource-limited settings). *But see* U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-640, FDA ADVISORY COMMITTEES: PROCESS FOR RECRUITING MEMBERS AND EVALUATING POTENTIAL CONFLICTS OF INTEREST 35–37 (2008) (criticizing the FDA's use of advisory boards for the significant amount of conflicts of interests found on these boards).

238. The future use of AI by political officials may aggravate challenges for staff scientists endeavoring to conduct their work with scientific integrity. *See, e.g.*, Jesse Damiani, *The Risks of AI in Science, Per Princeton, Yale Professors*, FORBES (May 31, 2024, at 08:45 ET), https://www.forbes.com/sites/jessedamiani/2024/05/31/will-ai-change-scientific-research-for-the-better-or-worse/ [https://perma.cc/X3BS-Y7UB] (discussing multiple risks to scientific integrity from

1. How External Peer Review Works in U.S. Administrative Process: The Positive Account

The deployment of external peer reviewers to both advise and review the work of in-house agency scientific experts is a long-standing practice in the United States, beginning more than 150 years ago. The creation of the National Academies during the Civil War marked the first national foray into engaging outside experts to assist expert agencies in their work. Various science advisory committees created to supplement regulatory decision-making then sprang up during the early 1900s[239] and became even more widespread during the Great Depression and World War II to provide external expert assistance for high-visibility decisions.[240]

Decades later, agencies were the first to establish more routine use of external expert panels to review agency analyses.[241] Congress then joined the act, codifying a subset of the science advisory committees into law during the passage of environmental and public health legislation in the 1970s and 1980s.[242] In mandating this added step of soliciting external peer review in some agency programs, Congress explained that it believed "[m]uch of the criticism" of an agency like the EPA could "be avoided if the decisions of the Administrator were fully supported by technical information . . . reviewed by independent, competent scientific authorities."[243]

The growing prevalence of external advisory bodies across the health and environmental agencies soon raised concerns about their abuse and manipulation. To minimize those risks and make the use of advisory boards more transparent, Congress passed the Federal Advisory Committee Act ("FACA")[244] in 1972. This Act instituted various guardrails on all types of advisory boards, including those not used by agencies, to dispense scientific

AI); 2022 REPORT, *supra* note 144, at 27–28 (acknowledging risks of AI to the integrity of agency science).

239. *See* Noah, *supra* note 50, at 1048–49 (describing President Teddy Roosevelt's establishment of a distinguished board of scientific advisors to review the available information on use of benzoate of soda in 1908).

240. *See* Stuart Shapiro & David Guston, *Procedural Control of the Bureaucracy, Peer Review, and Epistemic Drift*, 17 J. PUB. ADMIN. RSCH. & THEORY 535, 537 (2006) (discussing the history of outside advisors in regulatory settings that does not involve allocation of research funding).

241. *See* Noah, *supra* note 50, at 1054 (discussing the FDA's use of advisory boards, only a few of which Congress established). The EPA's Science Advisory Board, as one example, was created through the EPA's own initiative shortly after the agency was established. *Id.* at 1052–53.

242. *Id.* at 1049–52.

243. H.R. REP. NO. 95-722, at 16 (1977) (Conf. Rep.), *as reprinted in* 1977 U.S.C.C.A.N. 3293, 3295 (offering statement in Congress's establishment of the Clean Air Scientific Advisory Committee ("CASAC") in Clean Air Act).

244. Federal Advisory Committee Act, Pub. L. No. 92-463, 86 Stat. 770 (1972) (codified as amended at 5 U.S.C.A. App. 2. §§ 1–16).

advice.[245] Among the requirements was the imposition of greater public oversight of the committees, including open meetings and soliciting comments.[246] FACA also requires that advisory boards be comprised in ways that are "fairly balanced in terms of the points of view represented and the functions to be performed. . . ."[247]

Since the 1970s, the use of science advisory boards in particular and external peer reviewers in general has become an institutionalized feature of science-intensive regulation. Known as the "Fifth Branch," 211 scientific advisory boards populate agency programs, particularly at the EPA and FDA.[248] In fact, they became so popular that some presidents issued caps on the number of advisory boards that agencies could create to contain costs.[249] In addition to these panels, agencies sometimes also solicit individual peer reviewers to scrutinize their work.[250]

The White House has also gotten into the act, both in encouraging and issuing guidelines to direct the agencies' use of external peer reviewers. As discussed *infra*, some of these White House directives are dubious, but when used in keeping with scientific integrity principles, external peer review boards and individual external reviewers provide a valuable way for the president to control bureaucratic drift and agency capture.[251]

245. Federal Advisory Committee Act § 3(2). With respect to science advisory panels in particular, Congress' explicit goal was to establish advisory boards that would operate above politics and provide reliable expert advice to the agencies. *See, e.g.*, Noah, *supra* note 50, at 1063 (citing both congressional documents and presidential statements in support of this argument).

246. For a fuller discussion of these transparency requirements, see the summary in Brian D. Feinstein & Daniel J. Hemel, *Outside Advisers Inside Agencies*, 108 GEO. L.J. 1139, 1148 (2020). *See also infra* note 264.

247. Federal Advisory Committee Act § 5(b)(2).

248. GSA, *Government-Wide Totals*, FACADATABASE.GOV, https://www.facadatabase.gov/FACA/s/GovtWideTotals [https://perma.cc/2U3C-KZD4 (staff-uploaded archive)] (listing 211 different science advisory committees that comprise about twenty-two percent of all FACA committees in 2023); *see, e.g.*, 15 U.S.C. § 2077(a) (using advisory boards for chronic hazards of consumer products); 21 U.S.C. § 360c(b) (medical devices); 42 U.S.C. § 300g-1(b)(3)(A)(i) (using peer-reviewed studies for drinking water contaminants). *See generally* JASANOFF, THE FIFTH BRANCH, *supra* note 44 (dedicating book-length treatment to the study of science advisory boards).

249. *See* Exec. Order No. 12838 § 3, 58 Fed. Reg. 8207 (Feb. 12, 1993); OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, OMB CIRCULAR A-135, MANAGEMENT OF FEDERAL ADVISORY COMMITTEES (1994) (requiring agencies to reduce the number of discretionary advisory committees by one-third).

250. *See* OMB PEER REVIEW BULLETIN, *supra* note 235, at 2665–66 (describing the varied use of external advisors and peer reviewers); U.S. GOV'T ACCOUNTABILITY OFF., GAO/RCED-99-99, FEDERAL RESEARCH: PEER REVIEW PRACTICES AT FEDERAL SCIENCE AGENCIES VARY (1999) (mapping out variation in peer review practices across agencies).

251. Feinstein and Hemel, for example, suggest this political control over advisory committees is normatively desirable; "by serving as a counterweight to the deep state, [political control over science advisors] may also help legitimize it." Feinstein & Hemel, *supra* note 246, at 1147; *see also* Shapiro & Guston, *supra* note 240, at 540–46 (discussing advantages to external peer reviewers as a way to control bureaucratic drift).

On the surface, then, the use of external peer review in the administrative state seems headed in the right direction, with both political branches acknowledging external peer review as a key ingredient in enhancing the scientific integrity of agency decisions.

2. How External Peer Review Works in U.S. Administrative Process in Practice: The Critique

However, several key design choices undermine the reliability of external peer review in practice, "erroneously imply[ing] that the agency decision was based on reliable knowledge."[252] The most glaring design flaw is that a political official is ultimately in charge of all features of the peer review process, including selecting which experts serve as reviewers. And the imbalanced nature of stakeholder oversight in most protective rules means that peer review boards stacked in industry's favor are likely to pass through undetected by stakeholders.

a. Expert Peer Review Is Controlled by Political Officials

When external peer review is utilized in ways that adhere to scientific conventions, it is a useful check on expert biases regardless of how and where it enters the process; however, in the United States, political officials are entrusted with full control of expert peer review, with few to no constraints.[253] Thus, the legal design leaves ample opportunities for peer review to be conducted in ends-oriented ways that are also shrouded in secrecy due to broad, deliberative process privileges.[254]

The most obvious strategy is to stack panels with experts predisposed to the political preferences of the administration (or staff).[255] FACA's requirement for "balance" is notoriously open ended, so panel stacking is relatively easily accomplished.[256] And, although advisory board members who serve on agency

252. Murphy & Weiland, *supra* note 233, at 199 (making this observation for NMFS in particular).

253. *See* Federal Advisory Committee Act, Pub. L. No. 92-463, 86 Stat. 770, 773–74 (1972) (codified as amended at 5 U.S.C.A. App. 2 § 9(a)) (allowing advisory committees to be established only by statute, the President, or head of an agency).

254. *See supra* Section III.A.3; *infra* note 333 and accompanying text.

255. The stacking can be done by both political officials (selecting ideologically compatible reviewers) or by career staff (if they enjoy influence in the decisions) by handpicking friendly reviewers that help insulate their analyses from scrutiny. *See* Shapiro & Guston, *supra* note 240, at 542–43 (discussing these risks).

256. FACA (and its authorizing regulations) only provides that the committee membership must "be fairly balanced in terms of the points of view represented and the functions to be performed." Federal Advisory Committee Act § 5(b)(2); *see* Daniel E. Walters, *The Justiciability of Fair Balance under the Federal Advisory Committee Act: Toward a Deliberative Process Approach*, 110 MICH. L. REV. 677, 688–89 (2012) (laying out difficulties in enforcing vague "balance" requirements, including dichotomization of committees used to review expert science versus assembling interested stakeholders). Perhaps not surprisingly, then, FACA and its implementing regulations are also silent on other key topics, such as

advisory panels for more than sixty days per year must generally submit a detailed conflict of interest form under the Criminal Financial Conflict of Interest Statute,[257] these disclosures do not preclude the stacking of committees. Some agencies even treat the conflict forms as confidential and share only general summaries, further limiting the disclosures' usefulness in exposing stacked panels.[258]

Though panel stacking is the most obvious approach to influencing peer review processes, the executive branch has "ample wiggle room" within the law to align expert peer deliberations with its policy agenda.[259] These methods include: controlling the charge or questions reviewers are asked to address;[260] determining whether to employ a new advisory panel or, conversely, terminate an existing one;[261] and deciding the best point in the process to employ expert

the necessary qualifications, conflict disclosures, and selection of peer reviewers; although as noted in the remainder of this subsection, some additional restrictions are imposed on a subset of advisory panels through other statutes and regulations.

257. *See generally* 18 U.S.C. § 208 (requiring the detailed conflict of interest form, including for Special Government Employees, defined at § 202(a) as any person who performs "duties" for the federal government). However, if the expert reviewer serves less than sixty days per year in performing their duties, they can be excused by the agency from submitting a detailed conflict of interest form. 5 C.F.R. § 2634.904(b). Even when the requirement applies to an expert reviewer (which it usually does for most science advisory boards, which typically run longer than sixty days over time), there remains significant discretion with agencies, including the definitional ambiguity in what constitutes a "conflict." *See, e.g.*, U.S. GOV'T ACCOUNTABILITY OFF., GAO-01-536, EPA'S SCIENCE ADVISORY PANELS: IMPROVED POLICIES AND PROCEDURES NEEDED TO ENSURE INDEPENDENCE AND BALANCE 7–8, 23 (2001) (noting this problem). Waivers can also be granted by the official in charge based on a balance of the conflict against the benefit of the reviewers' expertise. *See* Joe G. Conley, *Conflict of Interest and the EPA's Science Advisory Board*, 86 TEX. L. REV. 165, 170–71 (2007) (describing these exemptions). Not surprisingly, there are also well-documented enforcement gaps—both in when and how agencies actually comply with FACA's limited guidelines. *See* GAO, *supra* note 257; Conley, *supra*, at 171–79, 186–89 (describing these lapses). There are also disturbing reports of external scientists' noncompliance with the conflict disclosure requirements. *See, e.g.*, Conley, *supra*, at 166–67 (discussing these problems by drawing on case studies of EPA).

258. This is at least the case for the EPA. *See* EPA, PEER REVIEW HANDBOOK §§ 5.3.2, 5.3.8 (2015), https://www.epa.gov/sites/default/files/2020-08/documents/epa_peer_review_handbook_4th_edition.pdf [https://perma.cc/XMN9-X2KB] (referencing the confidential nature of COI forms collected for advisory board members and releasing only general summaries for the public).

259. Feinstein & Hemel, *supra* note 246, at 1144; *see also* Shapiro & Guston, *supra* note 240, at 546 (discussing how significant agency discretion in selecting peer reviewers allows for the politicization of the process).

260. *See* Murphy & Weiland, *supra* note 233, at 204 (discussing these challenges); *see also* PROJECT 2025, *supra* note 137, at 424 (recommending that the second Trump administration broaden the charge for EPA's CASAC beyond science to include economic and other considerations).

261. *See* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1763–65 (detailing politicization of decisions regarding whether to retain an advisory board or use it less often); *see also* PROJECT 2025, *supra* note 137, at 437 (recommending the second Trump administration "[s]uspend and review the activities of EPA advisory bodies").

reviewers (e.g., early in the analytical process or near the end of a rulemaking).[262]

While some of the resultant political control could still be aligned with scientific integrity norms if key discretionary choices were at least documented and transparent, the design of our institutional processes disappoints once again. All of the guidelines, including FACA, impose minimal requirements for documenting most key decisions entailed in assembling and using peer review panels, while also bowing to the broad invocation of the deliberative process privilege.[263]

b. Stakeholder Oversight Is Limited at Best

Although this legal structure leaves considerable room for manipulation by the executive branch, administrative design offers one last corrective: FACA enlists stakeholders to oversee the agencies' use of scientific peer review panels.[264] And, in regulatory settings in which participation is balanced and diverse, stakeholders have made use of this enhanced transparency to improve the use of science advisors.[265]

However, industry's dominance in protective rulemakings holds true in FACA's stakeholder oversight processes as well.[266] Some industry stakeholders

262. Ideally, expert review should come early in the process and be focused on the foundational scientific inputs, such as literature syntheses or staff assessments. *See* Noah, *supra* note 50, at 1072–74 (making the case for focusing peer review early in process). But in practice, administrations can use panels strategically near the end of the decision-making to provide a politically controlled "audit" to undermine agency findings that conflict with presidential priorities. *See* SHEILA JASANOFF, COMMENT ON OFFICE OF MANAGEMENT AND BUDGET (OMB) PROPOSED BULLETIN ON PEER REVIEW AND INFORMATION QUALITY 1–2 (Dec. 16, 2003), https://georgewbush-whitehouse.archives.gov/omb/inforeg/2003iq/159.pdf [https://perma.cc/3G42-LMAA].

263. To reduce executive discretion, some agencies such as the EPA develop structured processes governing their expert panels. For example, the EPA's peer review handbook requires an independent "decision maker" ("DM") to manage each peer review process. EPA, PEER REVIEW HANDBOOK, *supra* note 258, at 33. However, these same guidelines provide no constraints on the fact that political officials are the ones selecting and managing the DM. *See id.* at 31–33 (placing the Deputy Administrator in command). As a result, whether and when peer review is used, the form in which it is deployed (e.g., advisory board, individualized), the charge to the reviewer(s), the makeup of the panel, and even whether to disband an existing expert panel are left open-ended.

264. Federal Advisory Committee Act, Pub. L. No. 92-463, § 10(a), 86 Stat. 770, 774 (1972) (codified as amended at 5 U.S.C. § 1009). Once established, the agenda for every meeting of the board is determined by the agency and subject to exacting recordkeeping requirements, including not only a transcript but minutes that summarize the high points of the deliberation. *Id.* §§ 10(b)–(c), 11.

265. *See, e.g.*, Conley, *supra* note 257, at 180–83 (providing examples of how public interest research into candidates during notice-and-comment revealed important new information for science advisory panels).

266. Commentators observe that well-financed (industry) stakeholders regularly dominate the participatory processes hosted by science advisory boards. *See, e.g.*, JASANOFF, *supra* note 44, at 247 (observing based on "dozens of meeting transcripts and interviews" how participation at EPA FACA meetings was heavily dominated by industry); *cf.* Holly Doremus & A. Dan Tarlock, *Science, Judgment,*

reportedly even attempt to place pressure on individual panel members, particularly those they supported as nominees, through continued presence at meetings.[267]

For their part, the courts have largely opted out of overseeing challenges that allege improprieties in the agencies' use of science advisory panels as long as basic FACA procedures are followed.[268] If anything, the courts' cumulative contribution to overseeing expert peer review is a net negative; some mechanically treat scientific boards' opinions as reliable benchmarks for evaluating contested agency science without further investigation.[269] This only further rewards panel stacking and related manipulations.

3. Evidence of the Manipulation of External Peer Review in Agency Decisions

This discussion of design flaws that undermine the integrity of external peer review is not simply theoretical. There is substantial evidence documenting the manipulation of expert peer review panels.[270] In practice, "advisory committees are not neutral arbiters, but instead are very much part of the President's political coalition."[271]

and Controversy in Natural Resource Regulation, 26 PUB. LAND & RES. L. REV. 1, 34 (2005) (offering anecdotes of how well-financed participants tend to overwhelm science advisory members with extraneous information).

267. Industry also sometimes hires former science advisory members to advocate on its behalf at FACA meetings. *See* JASANOFF, *supra* note 44, at 245.

268. Instead, courts tend to extol the virtues of this external peer review without inquiring whether it is conducted in ways that comport with scientific integrity norms. *See, e.g.*, Asbestos Info. Ass'n/N. Am. v. Occupational Safety and Health Admin., 727 F.2d 415, 421 n.15 (5th Cir. 1984) ("When new data or, as in this case, new mathematical extrapolations, provide the basis for the new rule, independent peer reviews may be extraordinarily helpful to the court."). Some courts also refrain from reviewing the integrity of FACA panels at all or defer heavily to the agency in the course of their review. *See* Walters, *supra* note 256, at 681 (observing that in 2012 "two circuits treat section 5(b)(2) [requiring balance] as nonjusticiable under the [APA], while at least two other circuits treat the provisions as justiciable . . . [but] invariably hold that they must give agencies substantial deference in composing committee membership").

269. *See* Feinstein & Hemel, *supra* note 246, at 1156 (observing that "[i]n some cases, courts explicitly rely on an advisory committee's conclusions in deciding whether agency action satisfies the Act's reasonableness requirements" and in other cases "will cite an agency's decision to disregard an advisory committee recommendation as evidence that the agency action is 'arbitrary and capricious'"); *see also* OMB, Revised Information Quality Bulletin on Peer Review, 69 Fed. Reg. 23230, 23234 (Apr. 24, 2004) (touting advantages of peer review in minimizing litigation risks). Thus, it seems to follow from this trend that when a litigant argues that the agency's science is unreliable because it conflicts with the views of external peer reviews, courts may assume—without further inquiry—that the peer review panel is scientifically legitimate when in fact, the reverse may be true. In fact, agency staff could conduct their work with scientific integrity only to be reviewed by a stacked panel that was specifically convened to undermine their work, with the courts deferring to the latter.

270. As the following discussion reveals, in virtually every documented case, the manipulations favor the interests of industry rather than the diffuse public. *See* BRENNAN CTR., *supra* note 161, at 3–5 (noting that most of political tampering aligns with industry views).

271. Feinstein & Hemel, *supra* note 246, at 1168.

The most publicized incidents involve the political stacking of scientific advisory boards with biased experts. Indeed, some administrations have been quite bold about exercising their political prerogative in this way.[272] In one particularly notable case, President George W. Bush rejected several nominations proposed by Centers for Disease Control and Prevention ("CDC") officials to fill two open positions on the Advisory Committee on Childhood Lead Poisoning Prevention, appointing instead a professor who had served as an expert witness for the lead industry and another member who had served as an industry consultant.[273] In fending off criticism, the U.S. Department of Health and Human Services ("HHS") spokesperson argued that "it [is] disingenuous to criticize the Bush administration for installing like-thinking individuals [on science advisory boards] when every administration does that. . . . That's like saying, 'Gosh, there's gambling going on in this casino.'"[274]

The HHS spokesperson's insinuation was not confirmed until nearly twenty years later, when Hemel and Feinstein discovered precisely this phenomenon—namely a statistically significant correlation between the political allegiance of incoming FACA committee members (calculated using Campaign Finance ("CF") scores) and the administration appointing them.[275] While their study does not examine scientific committees in isolation, it does provide a case study on one particularly well-regarded board: the Clean Air Scientific Advisory Committee ("CASAC"). As Figure 1 shows,[276] "the ideology of the modal advisory committee member quickly flips from liberal to

272. *See* Robert Steinbrook, *Science, Politics, and Federal Advisory Committees*, 350 NEJM 1454, 1456 (2004) (criticizing the George W. Bush administration for stacking science advisory committees); BRENNAN CTR, *supra* note 161, app. at 32–34 (listing fifteen examples of stacking—all favoring industry—from literature); *see also* Jay S. Bybee, *Advising the President: Separation of Powers and the Federal Advisory Committee Act*, 104 YALE L.J. 51, 58–59 (1994) (documenting cases of stacking); Gretchen T. Goldman, Emily Berman, Michael Halpern, Charise Johnson, Yogin Kothari, Genna Reed & Andrew A. Rosenberg, *Ensuring Scientific Integrity in the Age of Trump: Policies to Protect Government Scientists Must Be Defended*, 355 SCIENCE 696, 696 (2017) ("Officials chose science advisory committee members based on who they voted for rather than scientific credentials."). President Reagan even attempted to develop a "hit list" of disfavored science advisors, an effort that failed only because it was leaked to the press. Eliot Marshall, *Hit List at EPA?*, 219 SCIENCE 1303, 1303 (1983).

273. *See, e.g.*, Dan Ferber, *Overhaul of CDC Panel Revives Lead Safety Debate*, 298 SCIENCE 732, 732 (2002), https://www.science.org/doi/epdf/10.1126/science.298.5594.732 [https://perma.cc/UTV4-MXN7 (staff-uploaded, dark archive)]. (identifying these two controversial expert choices (Drs. Tsuji and Banner) as well as another dubious expert)

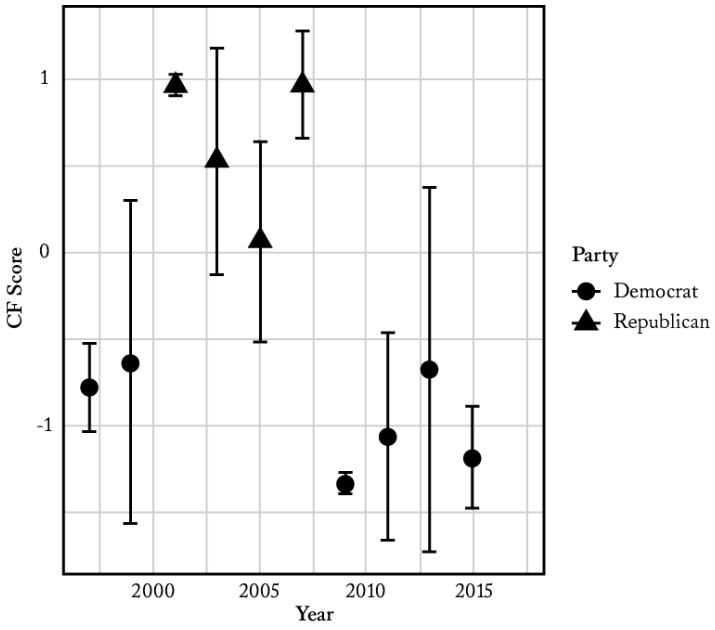
274. Dan Ferber, *Critics See a Tilt in a CDC Science Panel*, 297 SCIENCE 1456, 1457 (2002) (quotations omitted). The effort paid off, since the newly configured panel rejected the agency's analysis calling for a strengthened lead standard, a decision that the Obama administration later reversed. *See, e.g.*, Feinstein & Hemel, *supra* note 246, at 1185–86 (recounting details of case and discussing Obama administration's reversal of recommendation).

275. The authors found that "[o]f the 2,500 appointees [across all federal committees] in our random sample, 1,081 had corresponding CF scores, meaning that 43.2% . . . made at least two recorded campaign contributions," a rate of political giving "significantly higher than the . . . general population." Feinstein & Hemel, *supra* note 246, at 1165–66.

276. *Id.* at 1192.

conservative with the Clinton-to-Bush transition and back from conservative to liberal with the Bush-to-Obama transition."[277]

Figure 1: New Appointees to CASAC[278]



Beyond manipulating individual science advisory boards, the George W. Bush and Trump administrations also endeavored to control scientific peer review in protective rulemakings more systematically through issuing directives and guidelines. In President Bush's case, OIRA drafted a proposed peer review guidance[279] that not only drifted from scientific norms but evidenced a distinct industry-leaning bias.[280] Despite considerable opposition from the scientific

277. *Id.* at 1168. The authors note, however, that the Trump administration's stacking of CASAC was the most egregious since some of the scientists selected were industry consultants who were not generally regarded as respected experts by the scientific community. *Id.* at 1192–95.

278. This figure was adapted from Feinstein & Hemel. *Id.* at 1192 fig. 5.

279. *See* OFF. OF MGMT. & BUDGET, FINAL INFORMATION QUALITY BULLETIN FOR PEER REVIEW 1 (2004), https://www.epa.gov/sites/default/files/2015-01/documents/omb_final_info_quality_bulletin_peer_review_2004_1.pdf [https://perma.cc/HG89-QHPN (staff-uploaded archive)].

280. For scientific criticisms of these cumulative industry-leaning biases in OMB's Peer Review Guidelines, see Donald Kennedy, *Disclosure and Disinterest*, 303 SCIENCE 15 (2004); David Michaels, *Politicizing Peer Review: The Scientific Perspective*, *in* RESCUING SCIENCE FROM POLITICS 219 (Wendy Wagner & Rena Steinzor, eds., 2006); Shapiro, *supra* note 182, at 1097–98.

community,[281] the finalized guidelines did not address all its concerns about political control of the peer review process.[282]

President Trump's first administration was even more audacious in its efforts. His appointees at the EPA, for example, not only manipulated individual peer review boards,[283] but the administrator issued an agencywide policy that explicitly favored the selection of industry-affiliated experts and disfavored a large sector of academics who had received EPA grants in the recent past.[284] The policy was harshly criticized by the scientific community as an abomination of long-established conflict of interest policies, but it went into effect nevertheless.[285]

In some cases, the unprincipled use of peer review may result from the actions of career staff rather than political appointees. For example, there is circumstantial evidence that career staff sometimes identify and recommend peer reviewers whom they perceive to be particularly friendly to their

281. *See supra* note 279. OMB received 187 public comments on its proposed rule, two-thirds of which opposed it. Shapiro & Guston, *supra* note 240, at 539–40 (citing OMB Watch).

282. *See* Michaels, *supra* note 280, at 236 (concluding that revised bulletin is "a poorly camouflaged attempt to introduce delays . . . and further hamper government activities aimed at protecting the public health and environment"). For example, the Bulletin still equates financial ties to regulated entities as about the same, with respect to conflict of interests, as academic researchers receiving federal grants. OMB PEER REVIEW BULLETIN, *supra* note 235, at 37, sec. III.3 ("For scientific assessments relevant to specific regulations, a reviewer's financial ties to [both] regulated entities . . . and the agency should be examined."); *see also* Shapiro & Guston, *supra* note 240, at 543 (referencing residual industry friendly features in the OMB's revised final Bulletin).

283. *See* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1756–67 (documenting various incidents of stacking and other executive manipulations of peer review processes primarily by the first Trump administration).

284. E. SCOTT PRUITT, ADMINISTRATOR, U.S. EPA, STRENGTHENING AND IMPROVING MEMBERSHIP ON EPA FEDERAL ADVISORY COMMITTEES (2017), https://www.epa.gov/sites/production/files/2017-10/documents/final_draft_fac_directive-10.31.2017.pdf [https://perma.cc/SR5A-KXEL (staff-uploaded archive)] (ordering that "no member of an EPA federal advisory committee [shall] be currently in receipt of EPA grants"). Despite the fact that federal grants are not considered "conflicts of interest" within the scientific community, this order had the effect of excluding a large set of knowledgeable academic scientists from serving. *See* McGarity & Wagner, *Deregulation*, *supra* note 137, at 1762–63 (discussing its impact on existing board members). To ensure a larger pool of eligible candidates from industry, Pruitt also loosened EPA's existing conflict of interest policies governing industry-affiliated experts. Coral Davenport, *E.P.A. Dismisses Members of Major Scientific Review Board*, N.Y. TIMES (May 7, 2017), https://www.nytimes.com/2017/05/07/us/politics/epa-dismisses-members-of-major-scientific-review-board.html [https://perma.cc/E7DT-5ECF (dark archive)].

285. *See, e.g.*, Juan Carlos Rodriguez, *Pruitt's Grant Ban Stokes Concerns About EPA's Integrity*, LAW360 (Nov. 1, 2017), https://www.law360.com/articles/980575/pruitt-s-grant-banstokes-concerns-about-epa-s-integrity [https://perma.cc/T7WF-46RR (dark archive)] (quoting Dr. Thomas A. Burke: "[The directive will] "exclud[e] a subset of the best and brightest minds in environmental science from participation in what should be the highest science advisory role in the country.").

recommendations.[286] Doing so helps them survive political and public opposition, as well as threats of judicial review. The General Accounting Office ("GAO") noticed, for example, that the peer reviews commissioned by the Fish and Wildlife Service ("FWS") "overwhelmingly supported" the FWS decisions in the proposed listing of threatened and endangered species and draft recovery plans.[287] Moreover, despite the valuable role external peer review *could* play in counteracting biases introduced into agency decisions, it is apparently not used much outside of high-profile or "influential" rulemakings.[288] Some underutilization may be the choice of political officials, but it may also partly originate with staff who recognize the legal downsides of engaging critical review in their technical analyses.[289]

D. *Implications for the Future of Bureaucratic Expertise and Public Trust in the Regulatory State*

We have seen how the promise of bureaucratic expertise can be undermined by an institutional blueprint that impedes civil servants from adhering to professional norms and delivering advice that is objectively reliable. The structure of administrative process provides multiple, opaque paths through which scientific work can be manipulated or biased in ways the scientific community would deem disqualifying. The resultant breaches of scientific integrity—which range from under-protection of the public[290] to a

286. *See* Murphy & Weiland, *supra* note 233, at 199, 202–07 (identifying various ways that staff can unduly influence peer review process in ways that are very different from how scientific community conducts peer review); Wymyslo, *supra* note 233, at 148–52 (listing several features of the FWS's peer review process that place significant discretion in self-interested staff to conduct reviews). Given the deliberative process privilege and the lack of record-keeping, it is nearly impossible to disentangle the extent to which these observed biases can be attributable to staff initiative, to political intervention, or to a happy confluence of both.

287. U.S. GOV'T ACCOUNTABILITY OFF., GAO-03-803, ENDANGERED SPECIES: FISH AND WILDLIFE SERVICE USES BEST AVAILABLE SCIENCE TO MAKE LISTING DECISIONS, BUT ADDITIONAL GUIDANCE NEEDED FOR CRITICAL HABITAT DESIGNATIONS, 3 (2003).

288. *See* Noah, *supra* note 50, at 1051 ("EPA has not consistently sought advice from outside experts, and other federal agencies have not routinely done so either."); J.B. Ruhl & James Salzman, *In Defense of Regulatory Peer Review*, 84 WASH. U. L. REV. 1, 18–19 (2006) ("[F]ew regulatory agencies ever subject their regulatory decisions to peer review, and those that do limit the practice to standard-setting decisions.").

289. While some of the political incentives for under-utilizing peer review boards have been discussed *supra* note 222, the downsides of using external reviewers from the perspective of staff include: limited resources; added delays; the risk of damaging reviews that ultimately make the agency more vulnerable to litigation; and (at least for FACA panels), turning control of peer review over to political officials.

290. *See supra* notes 160–61. As one of many examples, EPA's failure to regulate PFAS for the three-plus decades during which hundreds of PFAS chemicals were in its chemical inventory can be explained, at least in part, by the structural pressures traced *supra* in Part III. *See* Wendy E. Wagner, Steve C. Gold & Thomas O. McGarity, *Breaking the Corporate Stranglehold over Toxics Regulation: A*

hollowing out of talented agency staff[291] can have consequences that are serious and far reaching. Yet perhaps the most profound consequence, and the one that is the most difficult to correct, is the loss of the public's faith in expertise itself.

As the public becomes aware that the scientific work of expert agencies can be compromised, their trust in these institutions—and in science more generally—declines.[292] Historically, scientists have been rated highly in surveys asking the public about their trust in various institutions to act on their behalf.[293] Brian Feinstein's survey on public perceptions also found expert-led agencies were seen as more legitimate and accountable than agencies controlled by political officials or ones that simply offered reasons for their decisions.[294]

In the wake of the pandemic and after decades of high regard and support, however, the public's trust in science has steadily declined[295] as illustrated in the figure below.[296] The missteps of key expert agencies, such as the CDC, became

Possible Path Forward, 74 DEPAUL L. REV. 723, 742–43, 754 (2025) (tying EPA's failure to regulate hundreds of PFAS over five decades in part to industry control over regulatory decision-making including by lobbying the White House and placing biasing pressures on agency scientists).

291. *See* Jacob Carter, Taryn MacKinney & Gretchen Goldman, *The Federal Brain Drain: Impacts on Science Capacity, 2016–2020*, UNION CONCERNED SCIENTISTS (Jan. 30, 2021), https://www.ucsusa.org/resources/federal-brain-drain [https://perma.cc/LP7L-VHRK] (documenting exodus of more than one thousand scientists from EPA during first Trump administration); *cf.* PROJECT 2025, *supra* note 137, at 423, 436–37 (recommending the reduction of research funds channeled to the EPA's Office of Research and Development ("ORD"), including for staff hires, as well as elimination of several ORD research offices).

292. The expert agencies' role in the Flint crisis, the under-regulation of toxic hazards, and other regulatory lapses continue to roll out in the headlines and likely lead some members of the public to question the integrity of expert agencies. *See, e.g.*, Kyle Bagenstose, *Is EPA Putting Interests of Chemical Companies Ahead of Your Health? These Experts Think So*, USA TODAY (Mar. 7, 2022), https://www.usatoday.com/story/news/2022/03/07/epa-regulation-dangerous-pfas-chemicals-raises-questions-red-flags/9224137002/ [https://perma.cc/CX6Z-8LZW (staff-uploaded, dark archive)]; Sharon Lerner & Al Shaw, *Formaldehyde Causes More Cancer Than Any Other Toxic Air Pollutant. Little Is Being Done to Curb the Risk*, PROPUBLICA (Dec. 3, 2024), https://www.propublica.org/article/formaldehyde-epa-trump-public-health-danger [https://perma.cc/Q2X7-KELG].

293. *See, e.g.*, Arthur Lupia, David B. Allison, Kathleen Hall Jamieson, Jennifer Heimberg, Magdalena Skipper & Susan M. Wolf, *Trends in US Public Confidence in Science and Opportunities for Progress*, at 4, *in* 121 PROC. OF THE NAT'L ACAD. OF SCI. OF THE U.S., art. 11 (2024) [hereinafter *PNAS Study*], https://www.pnas.org/doi/10.1073/pnas.2319488121 [https://perma.cc/ZTX3-DJ9N (staff-uploaded archive)].

294. *See, e.g.*, Brian D. Feinstein, *Legitimizing Agencies*, 91 U. CHI. L. REV. 919, 983 (2024).

295. *See, e.g.*, Brian Kennedy & Alec Tyson, *Major Declines in the Public's Confidence in Science in the Wake of the Pandemic*, ASSOCIATED PRESS NORC U. CHI. (June 15, 2023), https://apnorc.org/projects/major-declines-in-the-publics-confidence-in-science-in-the-wake-of-the-pandemic/ [https://perma.cc/YL6Y-XEPT] (reporting the overall drop in confidence in science community in 2022 and while Democrats returned to their pre-pandemic level of trust, Republicans dropped significantly below pre-pandemic level of trust).

296. *See* BRIAN KENNEDY & ALEC TYSON, AMERICANS' TRUST IN SCIENTISTS, POSITIVE VIEWS OF SCIENCE CONTINUE TO DECLINE 5 (Nov. 2023) [hereinafter KENNEDY & TYSON, 2023 REPORT], https://www.pewresearch.org/wp-content/uploads/sites/20/2023/11/PS_2023.11.14_trust-in-scientists_REPORT.pdf [https://perma.cc/NU4B-M2JL].

both more visible and personal for individual citizens[297] in ways that destabilized the public's confidence in these institutions.[298] Republican voters in particular place far less trust in scientists than was the case before 2020.[299] While the numbers have rebounded slightly, they still fall troublingly short of their pre-pandemic highs.[300]

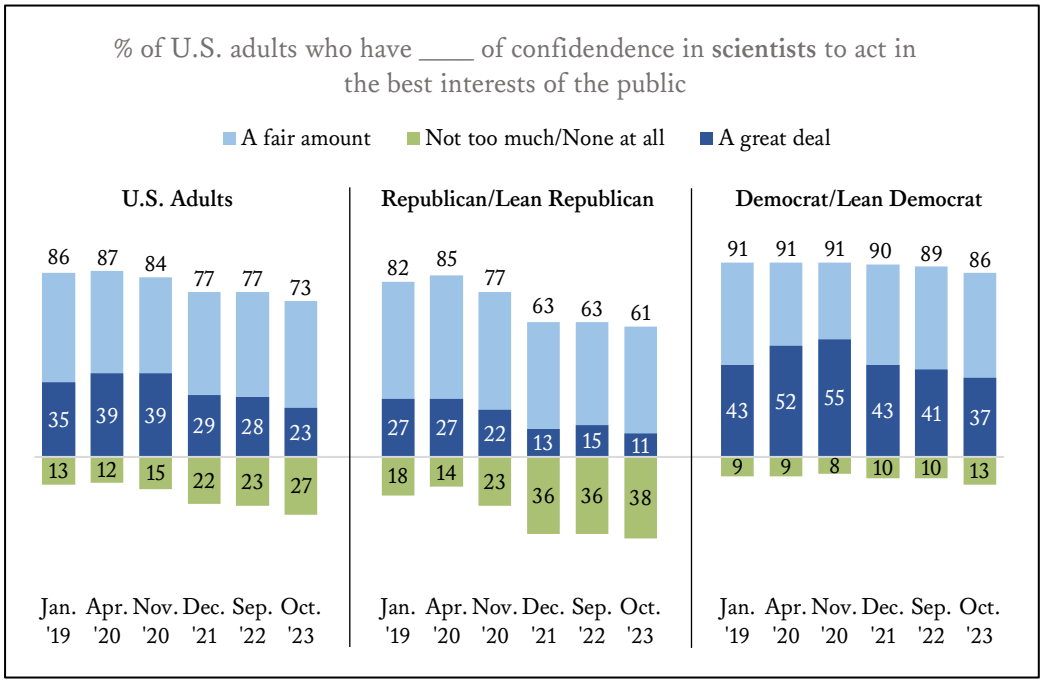
297. Lara Z. Jirmanus, Rita M. Valenti, Eiryn A. Griest Schwartzman, Sophia A. Simon-Ortiz, Lauren I. Frey, Samuel R. Friedman & Mindy T. Fullilove, *Too Many Deaths, Too Many Left Behind: A People's External Review of the U.S. Centers for Disease Control and Prevention's COVID-19 Pandemic Response*, at 6, *in* 3 AM. J. PREV. MED. FOCUS art. 100207 (2024), https://pmc.ncbi.nlm.nih.gov/articles/PMC11103433/pdf/main.pdf [https://perma.cc/9YLM-3CNU (staff-uploaded archive)]; *see also* Mary Van Beusekom, *Study Reveals Low Trust in US Public Health Agency Information Amid Pandemic*, CIDRAP, UNIV. OF MINN. (Mar. 7, 2023), https://www.cidrap.umn.edu/covid-19/survey-reveals-low-trust-us-public-health-agency-information-amid-pandemic [https://perma.cc/3UXH-3JYB] (reporting that forty-two percent of the public had a great deal trust in the CDC for COVID-19 information while only thirty-seven percent trusted the CDC for general health information).

298. *See generally* Van Beusekom, *supra* note 297 (noting declining public trust in the CDC amid perceived missteps during the pandemic).

299. According to a PEW survey, less than half of Republicans agreed that science has a mostly positive effect on society, down from seventy percent in 2019. *See* KENNEDY & TYSON, 2023 REPORT, *supra* note 296, at 6.

300. ALEC TYSON & BRIAN KENNEDY, PUBLIC TRUST IN SCIENTISTS AND VIEWS ON THEIR ROLE IN POLICYMAKING, PEW RSCH. CTR. 4–10 (Nov. 14, 2024), https://www.pewresearch.org/science/2024/11/14/public-trust-in-scientists-and-views-on-their-role-in-policymaking/ [https://perma.cc/6ATA-NLQN] (assessing differences in trust in scientists between parties, race, ethnicity, and education and reporting that while trust in scientists has stopped declining, it has yet to return to pre-pandemic levels).

Figure 2: Declining Levels of Public Trust in Scientists[301]



Researchers endeavoring to understand this decline trace it back primarily to a single, systemic failing—namely, that United States experts during COVID failed to demonstrate how or why their advice should be trusted.[302] During the pandemic, the public was told to "follow the science,"[303] even though the agencies' scientific advice vacillated over time[304] and involved questions not yet

301. This figure was adapted from KENNEDY & TYSON, *supra* note 296, at 5.

302. This is a major theme of the book, *COVID's Wake*. MACEDO & LEE, *supra* note 28, at 3, 9, 16, 21, 24, 25 (2025); *see also* F.D. Flam, *It's Past Time Scientists Admitted Their Covid Mistakes*, BLOOMBERG (Nov. 26, 2023), https://www.bloomberg.com/opinion/articles/2023-11-26/covid-public-health-mistakes-fueled-mistrust-in-scientists [https://perma.cc/BZL8-7PAC (staff-uploaded, dark archive)] (criticizing scientists' response to COVID). Although there are potentially many other explanations, it is interesting to note that trust in science in Germany around the pandemic (characterized by similar right-wing distrust) revealed a significant overall *increase* in trust in science over the course of the pandemic. *See, e.g.*, Rainer Bromme, Niels G. Mede, Eva Thomm, Bastian Kremer & Ricarda Ziegler, *An Anchor in Troubled Times: Trust in Science Before and Within the COVID-19 Pandemic*, *in* 17 PLOS ONE 2, art. e0262823, at 14 (2022).

303. MACEDO & LEE, *supra* note 28, at 9.

304. *See, e.g.*, Anne Flaherty & Cheyenne Haslett, *Surprise! CDC Reversal on Masks Leaves States, Businesses Scrambling*, ABC NEWS (May 15, 2021, at 19:34 ET), https://abcnews.go.com/Politics/surprise-cdc-reversal-masks-leaves-states-businesses-scrambling/

resolved by existing research.[305] At the same time, media reports made it clear that this scientific advice was constantly under pressure by political officials and economic interests.[306] Yet when disgruntled members of the public began asking why they should follow agency directives, they were told simply to trust the experts, without accompanying evidence that the expert advice was sound.[307]

This critical oversight in the agencies' expert advice—namely, providing substantive answers without communicating significant uncertainties or demonstrating the integrity of the work—shows up in a number of studies as one of the driving factors for the public's loss of confidence in science. Most notably, a Proceedings of the National Academy of Sciences ("PNAS") report synthesizing the literature in 2023 links the public's declining confidence in science during the pandemic directly to the public's underlying doubts about the reliability of the expert advice.[308] PNAS recommends, in response, that scientists "redouble their commitment to conduct, communicate, critique, and—when an error is found, or misconduct detected—correct" the record "in ways that both merit and earn public confidence."[309] PNAS's recommendation is bolstered by other respected panels and studies, each of which confirm that the scientists lost public trust by failing to adequately explain the many uncertainties in their advice.[310]

story?id=77691769 [https://perma.cc/K38N-XNW4]; Sasha Pezenik & Cheyenne Haslett, *Review Finds CDC Mishandled COVID-19 Pandemic Response*, ABC NEWS (Aug. 17, 2022, at 16:01 ET), https://abcnews.go.com/Politics/cdc-covid-guidance-confusing-overwhelming-organization-overhaul/story?id=88502792 [https://perma.cc/3YB5-4GE7].

305. MACEDO & LEE, *supra* note 28, 272–74 (discussing this problem and the ramifications of the experts' "noble lies").

306. *See* Jirmanus et al., *supra* note 297, at 7–9 (documenting the influence of commercial and political interests on the CDC's scientific interpretations); U.S. GOV'T ACCOUNTABILITY OFF., GAO-23-106529, CARES ACT: EXPERTS IDENTIFIED SAFEGUARDS TO HELP SELECTED HHS AGENCIES PROTECT AGAINST POTENTIAL POLITICAL INTERFERENCE 1–2 (2023) (acknowledging the role of politically and economically invested parties in science decision-making and proposing safeguards).

307. *See generally* MACEDO & LEE, *supra* note 28 (discussing how, during COVID-19, experts failed to demonstrate how or why their advice should be trusted); JACOB HALE RUSSELL & DENNIS PATTERSON, THE WEAPONIZATION OF EXPERTISE: HOW ELITES FUEL POPULISM (2025) (making this argument in different ways).

308. More specifically, PNAS concluded that "many U.S. adults are aware of some of the incentive-based challenges and are not certain that scientists, left to their own devices, will take actions that could benefit the public, but go against their own interests." *PNAS Study*, *supra* note 293, at 6; *see also id.* at 6–8 (synthesizing several studies in reaching this conclusion).

309. *Id.* at 8. See more generally a discussion of the critical role of integrity principles in their recommendations, *id.* at 7–8.

310. *See, e.g.*, *Higher Trust in Public Health Agencies During COVID-19 Driven More by Beliefs That Agencies Led With Clear, Science-Based Recommendations and Provided Protective Resources, Than by Beliefs That Agencies Controlled Outbreak*, HARV. SCH. PUB. HEALTH (Mar. 6, 2023), https://www.hsph.harvard.edu/news/press-releases/higher-trust-in-public-health-agencies-during-covid-19-driven-more-by-beliefs-that-agencies-led-with-clear-science-based-recommendations-and-provided-protective-resources-than-by-beliefs-that-agenci/ [https://perma.cc/7LED-ETJR] (stating

To the extent that the design of governmental agencies does not require scientific agency experts to explicitly align their advice with basic scientific transparency norms, we can expect more public distrust of agency experts in the future, particularly by those not already predisposed to trust them. Without actual evidence to document its integrity, the public will assess the reliability of scientific advice based on their varying perceptions of the trustworthiness of the source.[311] We can thus expect highly polarized attitudes about the reliability of expert agency advice to persist if not grow worse over time until this critical omission is corrected.

But there is perhaps an even more worrisome implication arising from the relationship between public trust and institutional design—namely, that those in control of the institutional architecture governing agencies, particularly the president, have considerable influence over the public's ultimate confidence in the expert agencies' work. If the political goal is to rollback protective regulation, then undermining the public's perception of the reliability of the agencies' expert work impairs public trust not only in the agencies' recommendations but also in the regulatory state as a whole.[312] Ironically, in fact, as agencies are viewed as less able to produce reliable advice, the public will turn to their elected officials to exert still more control over the "deep state," leading to a continuing, downward spiral in scientific integrity.

IV. REFORM

What began as a well-intentioned but incomplete effort to design processes to oversee both the scientific integrity and value-laden choices of agency experts has transformed into a set of institutional processes that effectively encourage the opposite result. Even civil servants who diligently

the surveys showed that public respondents judged reliable science not by whether agencies had "done a good job," but instead by whether agencies "communicated clear, science-based recommendations and provided protective resources" rather than commands); *PNAS Study*, *supra* note 293, at 6 ("When asked whether scientists can 'overcome their human and political biases' as revealing even lower agreement, with only 8% 'strongly agreeing' and 42% 'agreeing at any level.'").

311. *See* Austin Hegland, Annie Li Zhang, Brianna Zichettella & Josh Pasek, *A Partisan Pandemic: How COVID-19 Was Primed for Polarization*, 700 ANNALS AM. ACAD. POL. & SOC. SCI. 55, 55 (2022) (finding "partisan reactions to the pandemic were closely associated with [level of] trust in public health institutions," rather than with triggering effect of conservative media); Kathleen Hall Jamieson, Daniel Romer, Patrick E. Jamieson, Kenneth M. Winneg & Josh Pasek, *The Role of Non-COVID-Specific and COVID-Specific Factors in Predicting a Shift in Willingness to Vaccinate: A Panel Study*, at 1, 6 , *in* 118 PROC. NAT'L ACAD. SCI., art. 52 (2021); https://www.pnas.org/doi/epdf/10.1073/pnas.2112266118 [https://perma.cc/79W6-AAN4 (staff-uploaded archive)] (finding that "trust" and willingness to vaccinate was "inversely related to acceptance of COVID-specific conspiracy beliefs").

312. *See, e.g.*, PROJECT 2025, *supra* note 137, at 436 (describing the "EPA's scientific enterprise" as having "rightly been criticized for decades as precautionary, bloated, unaccountable, closed, outcome-driven, hostile to public and legislative input, and inclined to pursue political rather than purely scientific goals"); *id.* at 438 (proposing the need for incentives "for the public to identify scientific flaws and research misconduct" in scientific work of EPA staff).

follow the requirements imposed by the administrative process will find themselves regularly impeded from producing work that meets even minimal standards for scientific integrity.

Can anything be done to help fortify agency scientific expertise? This Subsection first reviews the scattered reform proposals already on the table, some of which are poised to set the system backwards rather than forwards. It then offers an alternative that proposes basic transparency requirements as a first-order corrective.

A. *Existing Reform Recommendations Fail to Resolve Fundamental Structural Problems*

Over the past fifty years, each new scandal that exposes flaws in the trustworthiness of agency science has drawn eager reformers to the scene. The result is a veritable explosion of administrative reform initiatives—many driven by opportunism rather than by a genuine commitment to integrity.[313] The reforms include a hodgepodge of enacted laws, bills, and executive initiatives, and more than eighty-five separate recommendations penned by organizations that span the political spectrum.[314] Nearly all are explicitly framed as efforts to close the integrity gap, and many even include "scientific integrity" in the title.

As one might expect, not all of these reforms are well-meaning or even remotely aligned with scientific norms and principles. Some are devious: they claim to improve the reliability of agency science but are in fact designed to do the opposite, providing powerful actors with additional tools and routes of influence.[315] Several enacted laws that purport to enhance research, for example,

313. The initial interest in reform emerging during the 1970s consisted primarily of bipartisan efforts to shore up the vastly expanding democracy, particularly with respect to the institutionalization of peer review. *See supra* notes 236–41 and accompanying text. It did not take long, however, for presidents like Reagan to recognize the annoying constraints that "facts" imposed on their policy goals and they began to take matters into their own hands. *See, e.g.*, *supra* notes 160, 272 and accompanying text. This trend continued to build steam that carries forward today.

Running alongside these political initiatives, however, are parallel charges of expert incompetence and bias in agencies. Raised primarily by industry coalitions, a series of white papers and reforms give the impression that some and perhaps much bureaucratic expertise is not "sound" or reliable. *See generally* MOONEY, *supra* note 160 (describing how the modern Right challenges science by questioning reliability). These charges then give the impression that political interventions into agency expertise are justified by the demonstrated lapses in the objectivity of the scientific staff.

314. *See* Table to Post.final, https://utexas.box.com/s/zpl74hxrkw9r8qpclncf3gvxmzsjrz5i [https://perma.cc/U5YW-P9BP] (UTBox) (table prepared by Matthew Hopper, U. of Texas JD Graduate, Spring 2024) (on file with the North Carolina Law Review and author) [hereinafter Excel Reform Table] (providing an excel table of eighty-five past reform proposals and their details; note there are likely other major reform proposals not included).

315. *See, e.g.*, Summer Allen, *Is Farm Bill's 'Sound Science Act' a Trojan Horse?*, AM. ASS'N FOR ADVANCEMENT SCI. (Jan. 13, 2014), https://www.aaas.org/taxonomy/term/7/farm-bills-sound-science-act-trojan-horse [https://perma.cc/C227-2FAW (staff-uploaded archive)] (describing the

were drafted by lawyers and economists seeking to impose more procedural constraints on agency staff.[316] One illustrative case is the transparency rule issued by EPA Administrator Pruitt discussed earlier. Drafted by industry lawyers and fiercely opposed by the scientific community, the rule appeared intended not only to bog the agency down in paperwork but also to justify the exclusion of respected academic studies that support more protective standards.[317]

Even after culling the opportunistic reforms, the remaining proposals almost all suffer from the same fatal flaw: they fail to address the structural problems of unlimited executive control, limited transparency, and imbalanced stakeholder oversight.[318] The reforms, in other words, treat symptoms rather than the disease itself.

President Biden's initiative, which makes the greatest progress among the proposals,[319] illustrates these deficiencies.[320] The White House guidance identified dozens of ways that science might be compromised as set against scientific integrity standards, benchmarks those standards against scientific

"Sound Science Act" with respect to its hidden goals and implications for protective regulation). Clever obstructionists, for example, misappropriate scientific norms, like default expectations for data transparency and reproducibility, and convert them into inflexible rules that can then be used to exclude valuable (but politically unwanted) research. *See, e.g.*, *supra* notes 176–78, 271–77; *see also* PROJECT 2025, *supra* note 137, at 439 (recommending the second Trump administration "[a]dd teeth to long-standing executive orders, memoranda, recommendations, and other policies to require that EPA regulations are based on transparent, reproducible science.").

316. *See* Jon Campbell, *Massachusetts case may give new teeth to the Data Quality Act*, SUNLIGHT FOUNDATION (Dec. 19, 2019, at 07:35 ET), https://sunlightfoundation.com/2019/12/30/massachusetts-case-may-give-new-teeth-to-the-information-quality-act/ [https://perma.cc/QM7K-8UMX (staff-uploaded archive)] (discussing industry consultant Jim Tozzi's role in orchestrating passage of the Information Quality Act, a rider that provides stakeholders with right to challenge agency science); Richard Shelby, *Accountability and Transparency: Public Access to Federally Funded Research Data*, 37 HARV. J. ON LEGIS. 369, 370–79 (2000) (discussing justification for his rider that required government to share its data but providing no scientific endorsement of need for legislation).

317. *See supra* notes 176–78.

318. *See* Excel Reform Table, *supra* note 314 (providing information on nature of reforms themselves). As just one example, while some of the reform proposals do make headway in precluding the most overt political interventions into the scientific record, see, for example, BRENNAN CTR., *supra* note 161, at 7–9, most of the reforms leave important sources of executive bias unaddressed.

319. President Biden issued two sequential reports on scientific integrity, each of which is filled with detailed recommendations. *See* 2022 REPORT, *supra* note 144, at i–ii; 2023 FRAMEWORK, *supra* note 74, at 3. The reports explicitly draw from and expand on the recommendations in prior presidential memoranda. *See* 2023 FRAMEWORK, *supra* note 73, at 4, 54–58 (situating recommendations against prior Executive memoranda).

320. *See Biden's Scientific Integrity Task Force Not Up to the Task*, PEER PUB. EMPS. FOR ENV'T RESP. (Jan. 12, 2024), https://peer.org/bidens-scientific-integrity-not-up-to-the-task/ [https://perma.cc/7VW9-PCH2] (discussing some of the weaknesses of the Biden proposal); Eric Katz, *Biden's New Policy to Protect Federal Scientists May Lack Teeth to Prevent Retaliation*, GOV'T EXEC. (Feb. 6, 2023), https://www.govexec.com/workforce/2023/02/bidens-new-policy-protect-federal-scientists-may-lack-teeth-prevent-retaliation/382625/ [https://perma.cc/S9J9-4UR8] (same).

practices, and positions the scientific community as the implicit referee.[321] But implementation relies in large part on voluntary staff reporting,[322] and many of the foundational structural features detailed in Part III that allow and sometimes encourage the biasing of agency science remain untouched.[323] Those adhering to a deep-state view of agency expertise will not be comforted by an approach that rests responsibility on the experts' shoulders yet imposes no requirements or expectations that they earn that trust. Conversely, for those worried about executive overreach, the initiative still leaves numerous concerning sources of influence unaddressed. For example, while the Biden framework prohibited executive interference in staff scientific work,[324] political appointees still selected the scientific integrity officers and retained ultimate authority over whether misconduct occurred,[325] and all of these internal deliberations remained subject to executive secrecy.[326] Additionally, stakeholders and government employees, including those from OIRA, could continue to influence the daily activities of staff scientists without meaningful constraints.[327]

321. Beyond defining "scientific integrity" for government science in ways that map against scientific practices, *see* 2023 FRAMEWORK, *supra* note 73, at 8, Biden's initiative also broadens the protections for that agency science by "shielding data collection and analysis from interference, encouraging legitimate scientific debates[,] . . . encouraging continued professional development of Federal scientists, and applying conflict of interest rules." *See* 2022 REPORT, *supra* note 144, at xii. For each of these four areas, the report provides examples of different practices that agencies might adopt. *Id.* 17–43. The Biden initiative also acknowledges the need for greater transparency and makes important headway on insulating scientific analyses from political interference using a variety of different techniques, including providing staff with formal procedures to allege scientific misconduct by political appointees. *Id.* at 20–21, 32–34.

322. *See* 2022 REPORT, *supra* note 144, at 7–10, 37–43 (targeting these goals and implementation pathways).

323. Incentives and opportunities for stakeholder or staff biasing of scientific analyses in existing programs are not considered nor are the incentives for executive secrecy or managerial influence that stop short of misconduct. As discussed, political officials also retain ultimate control over who and what the scientific integrity officers do. On the other hand, the initiative does gain significant traction on some, but not all, of the challenges identified with respect to external peer review boards in Section III.C. *See* 2023 FRAMEWORK, *supra* note 73, at 31, 33, 36 (recommending that the staffing of advisory boards be placed outside political process and that conflict disclosures be publicly shared). The initiative also suggests ways staff work might be better insulated from various internal influences. *See* 2022 REPORT, *supra* note 144, at 33–34 (recommending a separate approval of the scientific record as one innovation).

324. *Id.* at 7–10, 37–40.

325. *Id.* at xiii (proposing that agency heads select scientific integrity officers, chief scientific officers, and other officials to "serve as the focal point for scientific integrity issues").

326. 2023 FRAMEWORK, *supra* note 73, at 47 (making it clear that the scientific record consists only of "non-deliberative" documents).

327. *See, e.g.*, *supra* note 219 and accompanying text.

Thus, despite widespread agreement over the need for a fix,[328] the cumulative reforms to date all avoid confronting the central problems, and most provide little more than window dressing to obscure underlying pathologies. Meaningful reform needs to engage head-on with our institutional failure to ensure the transparency of the processes by which the agency does its scientific work.

B. *A Simpler Alternative: Mandating Process Transparency*

Effective reform must begin with a clear definition of the overarching goal for agency science. Vague appeals to "scientific integrity" risk being co-opted in ways that undermine fundamental scientific standards.[329] Traditionally, lawmakers have looked to established practices in science to provide benchmarks for assessing the reliability of agency science.[330] Implicit in this approach is the presumption that the scientific rather than political community serves as the arbiter of how to evaluate the reliability of scientific information.[331] And the scientists' evaluation of reliability turns not on whether results align with expected outcomes, but on the rigor and transparency of the process by which the work was produced. Disclosing sources of bias and influence, clarifying uncertainties and limitations, and subjecting analyses to critical scrutiny by disinterested peers are central to assessing whether information presented as scientific can be trusted.[332]

With the normative goal in place, the second step then entails incorporating these science-based process standards into administrative law.[333]

328. Indeed, the cumulative reform proposals give the aura of an almost hopeless-seeming dysfunction with respect to bureaucratic expertise. Surely, the public must wonder, if there are dozens (or perhaps ultimately hundreds) of separate reform recommendations penned by groups spanning the political spectrum, then bureaucratic expertise must be a train wreck. *See also supra* Section III.D.

329. A good illustration of the kind of political contortions that can result if there is no agreed-upon end goal is the 2024 partisan House investigation of President Biden's scientific integrity initiative, where politicians argued that the initiative's reporting provisions provided too much power to scientific staff. Letter from James Comer, House Oversight Chair, to Michael S. Regan, EPA Adm'r, at 2 (Nov. 14, 2024), https://oversight.house.gov/wp-content/uploads/2024/11/EPA-Scientific-Integrity-Letter-11132457.pdf [https://perma.cc/RVR4-72UF] (alleging that Biden scientific integrity initiative "risks . . . improperly empowering federal career bureaucrats to dictate ultimate agency policy" if "policy directives" are "deemed 'too political' by federal bureaucrats" and requesting the EPA to provide essentially all records on its development of the scientific integrity committee and on status of integrity complaints filed to date).

330. *See supra* notes 72–76 and accompanying text.

331. This deference to scientists in assessing scientific reliability may seem obvious, but under President Trump's latest Executive Order is currently not the case. *See* Gold Standard Executive Order, *supra* note 27.

332. *See supra* notes 97–101 and accompanying text.

333. Our "fetishized" approach to proceduralizing administrative law naturally gravitates towards converting the norms into a prescriptive set of mandatory rules. *See generally* Nicholas Bagley, *The Procedure Fetish*, 118 MICH. L. REV. 345, 345 (2019) (arguing administrative law relies too much on

Administrative lawyers will be tempted to convert the norms into a prescriptive set of mandatory rules, but this would be a grave mistake for a number of reasons.[334] Foremost among them, top-down mandates that constrain the scientific work of agency staff not only limit much-needed staff flexibility but are necessarily crafted by political officials. Any hope of enabling staff scientists to adhere to their professional standards in a way that accounts for the inevitable scientific nuances flies out the window.

The reform proposed here thus eschews prescription and advocates instead that agencies simply be required to explain and document whether and how their scientific work can be trusted based on the processes they used to produce it as set against scientific norms and practices for integrity. Thus, while we cannot allow the staff scientists free rein over all features of the scientific record given the malleable science-policy boundary, we can at least "get off their necks" enough to allow them to document the integrity of their scientific processes in keeping with their professional training.[335] Rather than dictating how agency expert decision-making *should* be done, however, a truly viable reform will simply ask the agency to document how its scientific work maps against established scientific integrity principles, such as author independence and disinterested peer review.

There may still be vigorous disagreements about whether the agency's substantive analyses are correct, but exposing the processes by which its scientific work was produced will sharpen these disagreements, just as they do in science. If the agencies' scientific processes are exemplary—no biasing influences, vigorous skeptical review, textbook transparency, and full explication of uncertainties—this will lend its substantive findings much greater

strict procedural rules). Indeed, at least two-thirds of reforms discussed in Section IV.A take the form of a mandatory requirement, recommending for example that elaborate peer review be required for all significant rules, that the underlying data be provided for every study the agency references in its analysis, and that agency scientists be firewalled from politics. *See* Excel Reform Table, *supra* note 314, at col. G (describing prescriptive policy recommendations for agencies).

334. For example, prescriptive requirements introduce added attachment points for litigation against the agency. *See, e.g.*, Toxic Substance Control Act, Pub. L. No. 114-182, § 6, 120 Stat. 448, 464 (2016) (codified at 15 U.S.C. § 2605(b)(4)(F)) (setting out five required analyses for chemical evaluation that can be used by opponents as ground for appealing agency decisions). Moreover, since most of the inner workings of the regulatory state are poorly understood, prescriptive requirements risk causing unintended consequences.

335. As one example, some scientific organizations have suggested that the EPA's current synthesis methods are outdated and should be improved. *See, e.g.*, UC HASTINGS PROGRAM ON REPRODUCTIVE HEALTH AND THE ENVIRONMENT, TO ENSURE TRANSPARENT AND UNBIASED EVALUATION OF CHEMICAL HARMS, EPA SHOULD USE SCIENCE-BASED SYSTEMATIC REVIEW METHODS 1 (2021), https://prhe.ucsf.edu/sites/g/files/tkssra341/f/wysiwyg/UCSF%20PRHE%20EPA%20Systematic%20Review%20v1.pdf [https://perma.cc/R9VL-ZVJV]. To the extent that scientific staff agree with these recommendations, they should be allowed to implement them, along with other scientifically-justified improvements to their analytical methods.

weight than if the agency processes were compromised by multiple biasing pressures and a circumvention or manipulation of meaningful peer review.

By placing the burden on agencies to demonstrate the integrity of their work, the proposed reform introduces a subtle yet potentially transformative change to the status quo. As things currently stand, the burden runs in the opposite direction: it is up to the public to identify and trace flaws in agency expert processes. Doing so requires the public to meticulously reconstruct the agencies' decision-making process using time-consuming Freedom of Information Act requests, sometimes to discover after months of delay that key information was never collected or has been withheld.[336] As a result, flawed fact finding is typically detected only in the most egregious cases, such as when the agency findings blatantly contradict established scientific consensus (a rare event) or when employees blow the whistle and come forward.[337]

C. *Getting from Here to There for the Agencies*

In practice, shifting the burden to agencies to establish the process integrity of their scientific work entails three interrelated—yet voluntary—steps.[338] First, agencies must identify the scope of their scientific or "factual" record or ignore this step at their peril.[339] Indeed, the need for greater clarity regarding where the scientific record ends and policy decisions begin has long been a source of concern.[340] By requiring agencies to explicitly distinguish between scientific findings and policy judgments, the proposal introduces much-needed discipline to counter familiar claims such as "the science made me

336. As one example, the author filed a FOIA request on September 9, 2023, with EPA requesting records relating to the selection of panelists for its 2024 Science Advisory Board. As of January 25, 2025, EPA still had not provided any documents.

337. *See, e.g.*, Chem. Mfr.'s Ass'n v. EPA, 28 F.3d at 1259, 1264–65 (D.C. Cir. 1994) (industry successfully challenged EPA's use of generic air dispersion model as arbitrary by establishing that pollutant of concern would be in solid form rather than emitted as gas at relevant temperatures).

338. When the transparency steps are followed in keeping with voluntary guidance, ideally drafted by the National Academies, the safe harbor provision would direct courts to presumptively grant blanket deference to the reliability of the agencies' scientific record. *See infra* note 340 and accompanying text.

339. If this step proves too burdensome, the agency could opt to implement a science-intensive rule without relying on a scientific record. However, the possibility of stakeholder oversight, judicial review, and Congressional scrutiny may deter officials from pursuing this path, especially in cases where statutes mandate the use of the "best available science." *See, e.g.*, *supra* note 72.

340. *See, e.g.*, BIPARTISAN POL'Y CTR., IMPROVING THE USE OF SCIENCE IN REGULATORY POLICY 15 (2009), https://bipartisanpolicy.org/report/science-policy-project-final-report/ [https://perma.cc/3G8L-E4MX (staff-uploaded archive)] (recommending that agencies be encouraged or even required to "explicitly differentiate, to the extent possible, between questions that involve scientific judgments and questions that involve judgments about economics, ethics and other matters of policy"). *See generally* Wagner, *The Science Charade*, *supra* note 68 (lamenting the ways that the fuzzy line between science and policy can be manipulated to gain advantages in legal and political circles). Because determining what constitutes a 'fact' or 'science' ultimately involves policy judgment, however, political officials will ultimately have the final say of where to draw the line.

do it" or that "scientific judgment" alone drove a decision.[341] Clearer line drawing can also create incentives for political officials to insulate parts of the fact-finding process from political influence when they want a rule to succeed—an outcome not currently encouraged by the structure of administrative law.

Second, the agency must provide a concise explanation of why this scientific record is reliable as set against the scientific integrity norms.[342] Again, the agency could refuse to do this, but that refusal may raise doubts about the reliability of its record.[343] For example, if the scientific staff collaborated with political appointees to develop the technical analysis informing a decision—such as in the case of Endangered Species Act listings—the agency would disclose and potentially defend this collaboration in its summary, similar to how authors with sponsorships provide conflict-of-interest statements.[344] Courts and stakeholders could then evaluate this potential source of bias when assessing the reliability of the agency's scientific analysis. Conversely, if the agency relies on a rigorous, peer-reviewed process that remains free from political influence, the agency's summary would reference this feature in its statement as evidence that bolsters the integrity of its work.

The third and final prong of the reform requires documentation to authenticate the summary statement provided in step two. This documentation might include, for example, a log of all interactions that might bias the agency's fact finding, as well as the substance of each interaction, such as the underlying

341. *See, e.g.*, Wagner, *The Science Charade*, *supra* note 68, at 1628–50 (discussing the overuse of these types of claims by agencies and political officials). When uncertainties infect the scientific record, see, e.g., *supra* notes 103–107, the agency would identify these uncertainties which would not be considered part of the factual record. To accomplish this heightened transparency regarding fact versus policy, agencies may ultimately need to be more mindful of when or whether they integrate scientists with policy and other staff in interdisciplinary teams.

342. This feature of the reform simply realigns our legal and institutional metrics for scientific integrity with those long held by the scientific community itself. *See* Admin. Conf. of the U.S., Recommendation 2013-3, *Science in the Administrative Process*, 78 Fed. Reg. 41358 (July 10, 2013) ("Agencies should explain in proposed and final decision documents how they ensured rigorous review of the scientific information underlying each science-intensive regulatory project.").

343. Reason-giving requirements thus return, but this time by expecting agencies to justify their analytical *processes* rather than just the scientific findings themselves. *See infra* notes 359–65 (discussing how this would change courts' existing approach). There is a risk that agency officials will offer pretextual reasons crafted to obscure underlying defects, but the parallel requirement that agencies also provide supporting documentation will discipline this tendency, at least partly. *See infra* notes 392–93 and accompanying text.

344. WAGNER, SCIENCE IN REGULATION, *supra* note 30, at 57–58 (describing this collaborative approach in ESA listings). Similarly, if the agency relies primarily or exclusively on research provided by regulated industry with potential conflicts of interest and neither inquires further nor demands added rigorous peer review of this research, then it should disclose the sources of potential bias on the scientific information that informs its decision. *Cf.* Recommendation 2013-3, *supra* note 342, #11 (recommending that agencies require conflict disclosures for all research conducted by private parties to inform regulatory decisions).

document, meeting, or telephone notes.[345] To ensure that agencies do not omit important evidence when providing their documentary record, it will also be essential to establish best-practice guidelines—ideally through a scientific institution such as the National Research Council ("NRC").[346] Agencies again could simply ignore some or all of these requirements without providing credible reasons or claiming deliberative process for pivotal documents, but spurning the requirements might increase an agency's vulnerability to litigation and adverse publicity.

D. *Implementation of the Proposal by the Political Branches*

In operationalizing the recommendation, the most straightforward path is for Congress to direct agencies to affirmatively establish the integrity of their scientific fact finding, while also making clear that these procedural requirements are not judicially reviewable.[347] Agencies that do not provide evidence of the integrity of their scientific findings will not be reversed for failure to comply with a mandated procedure, although litigants could argue that the agency's silence makes that fact finding presumptively unreliable and therefore arbitrary.

Conveniently, there is already a statutory provision in place that provides a model for this kind of transparency incentive: a recent amendment to the National Environmental Policy Act of 1969 ("NEPA") that requires agencies to "ensure the professional integrity, including scientific integrity, of the discussion and analysis in an environmental document."[348] Since this requirement only applies to agency actions that must comply with NEPA, however, it must be scaled up to apply to agency programs more generally.[349]

345. Any interactions (written or oral) that could impact the integrity of the scientific analysis positively (e.g., independent peer scrutiny) or negatively (e.g., interactions with stakeholders or political officials) would be tracked in the agency's administrative record. This documentation requirement also applies to the use of science advisory panels; if they are assembled and represented as providing valuable scientific review, then they will need to meet these disclosure steps. As discussed *infra* note 351–53 and accompanying text, this step ideally also requires eliminating current legal barriers to staff efforts to provide indicia of integrity, particularly the deliberative process privilege.

346. *See infra* note 349.

347. Even under the APA, agencies already face a risk, however low, that they might be asked to defend the scientific integrity of their factual record. Aggrieved stakeholders might argue, for example, that some critical aspect of the agency's scientific analysis cannot be trusted under the arbitrary and capricious clause because of evidence of White House interference. Indeed, several cases have been successful on those claims. *See supra* note 159.

348. 42 U.S.C. § 4332(2)(D).

349. Courts have held that agencies may be exempt from NEPA review if a statute provides "procedurally and substantively" for the "functional equivalent" of NEPA compliance. *See, e.g.*, Fund for Animals v. Hall, 448 F. Supp. 2d 127, 134 (D.D.C. 2006) (citing Amoco Oil Co. v. EPA, 501 F.2d 722, 749 (D.C.Cir.1974)). It is not clear how courts might assess an agency's functional equivalence with the new scientific integrity amendment, leaving open the possibility that this new requirement

Following the model, a simple phrase could be added to the Administrative Procedure Act to make it clear that arbitrary and capricious claims will now include a consideration of the integrity of the agency's scientific analysis.[350]

There are several reinforcing legislative initiatives that would make a scientific integrity amendment even more effective. First, in mandating the scientific integrity of agency science, Congress would ideally create a safe harbor provision for agencies that provide exemplary documentation of the integrity of their expert work. Because of the risks of politicization, Congress would need to delegate the creation of the safe harbor guidelines to an independent scientific entity such as the NRC.[351] Second, and also ideally, Congress would prohibit scientific misconduct by political appointees and institutionalize independent processes for reporting and investigating complaints, perhaps through congressional agencies like the General Accountability Office.[352] Finally, Congress would eliminate or significantly restrict the availability of the deliberative process privilege as applied to agency fact finding.[353]

might be extended to these programs. In other statutes, however, Congress expressly exempts agencies from NEPA compliance, thus seemingly foreclosing application of NEPA's new requirement. *See, e.g.*, 15 U.S.C. § 793(c)(1); 33 U.S.C. § 1371(c).

350. For example, 5 U.S.C. § 706(2)(A) could be revised to read: "arbitrary or capricious, *including with respect to the scientific integrity of the factual record*; an abuse of discretion; or otherwise not in accordance with law." Since the integrity of the agencies' scientific process has been ignored over the last eighty years, an amendment this simple should suffice to put this feature back on the courts' radar.

351. Establishing this kind of scientific safe harbor would not only provide compliant agencies with greater insulation from abusive litigation and overreach by ideological judges, but also provide outsiders with a benchmark for assessing agency performance. The NRC is the best choice for this assignment since they are considered the most respected and "neutral" scientific body in the US, are largely insulated from political control, and enforce high scientific standards for the selection of committee members. *See, e.g.*, NAT'L ACAD. SCIS., CODE OF CONDUCT (2018), https://www.nasonline.org/wp-content/uploads/2024/02/nas-code-of-conduct.pdf [https://perma.cc/T3CN-CZQS]; *see also* Fein, *supra* note 86, at 481–82 (discussing these virtues of the NRC).

352. The Biden Framework, which establishes an internal reporting system for misconduct, offers a promising starting point. However, modifications are needed to strengthen these procedures for reporting misconduct and political interference. Most importantly, the investigatory process should be overseen by personnel or an office not ultimately under the authority of a political appointee. Further research is warranted, but a second potential alteration is to make the internal reporting process available only to career staff and not to political management. This could reduce the risk of political officials misusing the process to intimidate or silence staff scientists through abusive misconduct allegations.

353. This is also consistent with court decisions prior to the 1980s. *See supra* note 151 and accompanying text. In fact, Congress may have relied on the Court's prior holding that factfinding was not protected by the deliberative process privilege at the time it passed the rash of protective statutes in the 1970s.

While in some settings the incentives for agencies to affirmatively establish the integrity of their facts will lead political officials to voluntarily waive the deliberative process privilege anyway, making this reform unnecessary, this may not always be the case. Thus, a mandatory bar on the ability of the agencies to use the privilege for factfinding would put greater pressure on the agency to produce

While legislative direction clearly provides the most comprehensive and durable approach to institutionalizing stronger protections for the integrity of agency science, in the interim, courts, agencies, or the executive branch could also require this kind of integrity showing more informally. As one example, a president could issue an executive order requiring that agencies document the scientific integrity of their science-intensive rules[354] and perhaps also waive the deliberative process privilege as applied to scientific fact finding. The motivation to provide this leadership, however, will obviously vary by president.[355]

E. *Defending the Proposal*

The reform proposed here may seem quite modest in relation to the depth and breadth of the problems identified in Part III. Can such a simple process of transparency realistically counteract the steady erosion of bureaucratic expertise?

There are several key virtues of the reform that should go a long way to reverse many of the structural problems outlined earlier. Most importantly, by expecting agencies to document the *processes* used to produce their work (for example, scientific independence and critical peer review), the reform begins to align the design of the expert bureaucracy with the standards scientists themselves use to evaluate integrity. To the extent that hidden biases are distorting scientific analyses, increased transparency should help bring those distortions to light.[356] Moreover, providing clear, process-oriented information in keeping with scientific practices will compel agency officials to be more

a defensible technical record while also assuring Congress that the agencies are in fact utilizing the "best available science" as required by some statutes. Indeed, if Congress simply eliminated the deliberative process privilege as applied to factfinding—even without passing a scientific integrity mandate—it would make progress by bringing all of the executive interactions out into the open.

354. Best practice guidelines would again be immensely useful, but the development of these guidelines would have to be delegated to an independent, respected institution like the NRC. Politically drafted guidelines would be next to worthless for the reasons discussed *supra* in Sections III.A. and C.

355. While a President campaigning on reigning in the deep state might also see the benefits of drawing the agency's internal decision-making out into the light, doing so might expose his own control in ways that could prove embarrassing.

356. If agencies are affirmatively required to document the integrity of their factual record, then their incentives to shore up the scientific integrity of their processes will, in turn, be enhanced. Once on the political radar, agency expertise will also be subjected to greater congressional oversight, public oversight, and investigative reporting. Congress or perhaps OSTP in the executive branch could amplify the incentives by requiring more systematic auditing of the scientific integrity of agency expert work.

forthright about where the science ends and the policymaking begins, which has been a persistent challenge in agency science-intensive decisions.[357]

Once their work is brought into the open, agency experts engaged in high-quality analysis will also be better able to stave off criticism and build trust in the quality of their work. Those concerned about the integrity of line-level bureaucrats operating in the "deep state" will now be equipped with key information about the reliability of the agencies' scientific work, while those concerned with industry capture of agency technocrats will be equally gratified for enhanced transparency about their potential influences.

However, since we actively discourage agency staff from developing or documenting how their expert processes inculcate basic scientific norms for more than a half-century, we can anticipate strong headwinds against even a relatively simple proposal that expects agencies to explain why their fact finding can be trusted. This closing Section engages with some troubleshooting and suggests a few added adjustments to the proposal as a result.[358]

1. Concern #1: Enhanced Transparency Will Not Change Agency Behaviors

The first and most obvious worry is that transparency, standing alone, will not budge agency expert practices because the various integrity problems are too deeply entrenched by the most powerful and determined actors. In fact, we have witnessed some presidential administrations proceed with intentional violations of scientific integrity and remain unfazed by any reputational stigma or judicial risks that result.[359]

However, even in these worst-case settings, the proposal will still make meaningful progress, especially if it includes a prohibition against political interference in the agencies' scientific work. By requiring agencies to document potential compromises to the scientific record, political manipulation becomes harder to conceal. Such interference will now surface explicitly through disclosures or disciplinary action, or implicitly through an unexplained refusal to release records. In response to troubling disclosures or stonewalling, a vigilant Congress might even be spurred to act to protect its statutory delegations with respect to rigorous fact finding. Moreover, for many and perhaps most agency decisions—even under presidents indifferent to scientific

357. *See generally* Wagner, *The Science Charade*, *supra* note 68 (examining past failures of science-based regulatory strategies); Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029 (1997) (exploring the appropriate role of science in the creation and implementation of conservation policy).

358. This Section does not provide comprehensive troubleshooting but endeavors to anticipate the most significant objections.

359. *See supra* notes 177–79, 274, 279–85 and accompanying text.

integrity—the agency staff will likely welcome greater transparency as it aligns with their professional training and incentives.[360]

Relatedly, greater process transparency of the agencies' fact finding will position courts in a more constructive role in presiding over APA challenges to agency scientific expertise. As a result of the proposal, the courts' bifurcated approach to reviewing arbitrary and capricious claims—providing either super deference or a "hard look"—should converge into a more uniform approach that provides greater deference to the scientific findings of agencies that demonstrate the integrity of their fact-finding processes.[361] Rather than second-guess battles between experts, courts would instead focus their firepower on the integrity of the agencies' analytical processes—specifically, whether the science was conducted in accordance with standards such as independence, rigorous peer review, and transparent methods.[362] The fuzzy line between *Loper Bright* and arbitrary-and-capricious challenges will also be sharpened to the extent that the agency delineates its scientific record more clearly.[363]

Finally, by expecting agencies to document their processes against scientific norms, agency staff, political officials, and even stakeholders may discover problematic sources of influence and bias that otherwise would have gone undetected.[364] Indeed, the literature reveals that one of the primary virtues

360. By allowing scientific staff to abide by their professional standards, they will enjoy a level of professional independence not provided in current administrative process. Scientific colleagues outside the agency will also find at least some of the agencies' work more trustworthy and hence cite-worthy as a result of the enhanced transparency, which in turn allows agency professionals to make an even larger impact within their own discipline. Finally, heightened transparency will provide occasions for celebrating the work of agency experts. Learning that expert agencies are generating highly reliable scientific advice should help increase public faith in government institutions and draw in still more talented public servants. *See supra* Section III.D. Agency success stories also place greater visibility and pressure on agencies lagging behind.

Even an otherwise recalcitrant administration might see benefits to shoring up their scientific records in individual cases when it helps insulate a pet project from judicial reversal and larger condemnation.

361. Rather than evaluate the accuracy of the agency's science, judges will turn their attention to overseeing the quality of fact-finding processes, a focus more in keeping with their expertise and one likely to produce greater consistency across judges.

362. Providing a transparent summary and record of the scientific process underlying agency decisions should also enable financially-strapped stakeholders to learn of unreliable factfinding that otherwise is likely to fly under the radar. These stakeholders will no longer be forced to resort to the use of FOIA to search for clues of executive interference, industry capture, or manipulations of the peer review process. Instead, these records will be provided (or suspiciously omitted) with (or ideally prior to) the agency's decision.

363. *See* Loper Bright Enters. v. Raimondo, 144 S. Ct. 2244, 2261 (2024). Once the agency has identified its factual record with precision, challenges to those "facts" should be limited to the "arbitrary and capricious" test of Section 706 of the APA, rather than to disputes over statutory interpretation.

364. Indeed, civic-minded political officials might be aghast to discover that their fact-finding processes allow for so many hidden and cumulative sources of bias to afflict agency decisions. Because these officials may not be attuned to one-sided stakeholder pressures on the ground and may not even

of the transparency requirements is the self-knowledge it generates, which can lead to voluntary improvements as a result of unexpected revelations.[365] If the agencies document the reliability of their scientific work in rigorous ways, the resulting successes might also help reverse declining trust in expert agencies.[366]

2. Concern #2: Risks of Capture by Political and Economic Interests

A second concern is that political or economic interests could still co-opt the reform by manipulating key definitions and implementation practices behind the scenes. Skeptics will rightly point out that efforts to institutionalize scientific integrity in the past have often been subverted by politics.[367] A vivid illustration is President Trump's "Gold Standard Science" Executive Order, which places political officials in charge of defining and implementing scientific integrity policies.[368]

A key safeguard against such capture is to explicitly anchor the definition of scientific integrity in the standards and norms of the scientific community itself. Trusted institutions—such as the National Academies, leading scientific organizations, and editors of major scientific journals—must play the central role in developing process-based standards that reflect their longstanding practices. Ideally, reform would also require institutions, such as the NAS, to design and oversee independent audit mechanisms to monitor adherence to scientific integrity standards across agencies over time.[369] The NAS has historically acted as an authoritative voice in assessing the reliability of agencies'

be aware of other top-down pressures coming from their own staff or departments, biasing influences might infect the fact-finding record unintentionally, including from the career staff themselves. It seems entirely possible that had the NIH and CDC institutionalized more vigorous levels of review over their scientific advice, the enhanced vetting and transparency may have avoided some of the adverse consequences that ultimately transpired as detailed by Macedo and Lee. *See* MACEDO & LEE, *supra* note 28, at 202–99.

365. *See* William M. Sage, *Regulating Through Information: Disclosure Laws and American Healthcare*, 99 COLUM. L. REV. 1701, 1778 (1999) (arguing that information disclosures can exert powerful influence on internal decision-making and can reveal valuable information that changes internal decisions); *see also* Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 346 (2001). If enhanced transparency yields valuable revelations to agencies internally, this in turn could lead to voluntary adjustments by agency managers, irrespective of whether stakeholders or Congress are aware of the problems.

366. *See supra* Section III.D.

367. *See, e.g.*, *supra* notes 176–**Error! Bookmark not defined.** and 279–289 and accompanying text (providing systematic guidelines issued by presidents that follow this pattern).

368. *See supra* note 27 and accompanying text.

369. Although established by an act of Congress, the National Academies of Science, Engineering, and Medicine are private, nonprofit institutions. *See Frequently Asked Questions*, NAT'L ACAD. SCIS., https://www.nasonline.org/about-the-nas/faq/ [https://perma.cc/DW76-2XEV]; *About the National Academy of Engineering (NAE)*, NAT'L ACAD. ENG'G, https://www.nae.edu/19580/About [https://perma.cc/T2W6-45WP]; *About the National Academy of Medicine*, NAT'L ACAD. MED., https://nam.edu/about-the-nam [https://perma.cc/SBG5-5XNF].

scientific analyses and research.[370] Conveniently, they also have a vested interest in protecting the integrity of expert processes from distortions or politicization since their reputation and the reputation of science itself hinges in part on the public's trust in expert bureaucracy.[371]

Still, skeptics may worry that the scientific institutions entrusted with oversight could themselves be co-opted by powerful private interests. While such risks can never be fully eliminated, the credibility and influence of the scientific enterprise rest fundamentally on the perceived trustworthiness of its work. Evidence of corruption and compromise within science has proven devastating to the scientists and institutions involved.[372] Empirical studies of scientific organizations, including the NAS, in fact observe that reputational concerns and their instincts for self-preservation tend to reinforce their insistence on ensuring independence and neutrality in the face of political or economic pressure.[373]

That said, the greater risk from delegating to scientific institutions may lie in the opposite direction: that scientists overstep by designing integrity systems that intrude on legitimate policy decisions.[374] To guard against this, reforms should also incorporate checks such as interdisciplinary peer review and opportunities for public comment. These layers of oversight will strengthen

370. *See, e.g.*, Fein, *supra* note 86, at 481–82 (discussing these strengths of NRC which appear well-accepted in the literature); David Policansky, *Science and Decision Making for Water Resources*, 8 ECOLOGICAL APPLICATIONS 610, 610 (1998) ("[NRC] is often called on by the U.S. Congress or executive-branch agencies to help resolve controversies about natural resources . . .").

371. *See supra* Section III.D.

372. *See, e.g.*, DANIEL KEVLES, THE BALTIMORE CASE: A TRIAL OF POLITICS, SCIENCE, AND CHARACTER 9–12 (1998); SHELDON KRIMSKY, SCIENCE IN THE PRIVATE INTEREST: HAS THE LURE OF PROFITS CORRUPTED BIOMEDICAL RESEARCH?, at x–xi (2003); *see also* Donald Kennedy, Editorial, *Responding to Fraud*, 314 SCIENCE 1353, 1353 (2006) (as the reigning editor-in-chief, Kennedy describes in agonizing terms how falsified science reports were retracted after being published in *Science* and outlines various means that the journal plans to combat false science in the future).

373. *See, e.g.*, BRUCE BIMBER, THE POLITICS OF EXPERTISE IN CONGRESS: THE RISE AND FALL OF THE OFFICE OF TECHNOLOGY ASSESSMENT 50–59 (1996) (discussing this dynamic as partly explaining the Office of Technology Assessment's success in remaining above the political fray). *See generally* Lawrence McCray, Doing Believable Knowledge Assessment for Policymaking: How Six Prominent Organizations Go About It (Feb. 11, 2004) (unpublished manuscript), https://www.files.ethz.ch/isn/19524/McCray-DoingBelieveableKnowledgeAssessment.pdf [https://perma.cc/YMA9-9HNE] (describing "high end" independent scientific organizations and exploring how they have managed to maintain their credibility on contested issues of regulatory science).

374. Indeed, the source of the harshest criticism of the NAS is its tendency to overreach its charge and opine about policy-relevant issues. *See, e.g.*, Fein, *supra* note 86, at 469 (stating that NRC experts can "hold agency decisions to a more rigorous evidentiary burden than traditionally deferential judicial review, and provide ammunition for regulatory opponents who wish to challenge agency environmental protections"); STEPHEN HILGARTNER, SCIENCE ON STAGE: EXPERT ADVICE AS PUBLIC DRAMA 146–50 (2000); CTR. FOR THE SCI. IN THE PUB. INT., ENSURING INDEPENDENCE AND OBJECTIVITY AT THE NATIONAL ACADEMIES (2006), https://www.cspinet.org/sites/default/files/media/documents/resource/nasreport.pdf [https://perma.cc/YD22-5VRV].

both the substance and legitimacy of the resulting integrity standards. Yet even with such safeguards in place, the scientific community must remain the primary authority in defining scientific integrity and the processes that uphold it. If the issue is the reliability of scientific analysis, then the criteria must ultimately come from science—not from politics.

3. Concern #3: The Reform Will Never Be Adopted

Even if the proposed reform were the perfect antidote, any kind of rebooting of the administrative state seems fanciful. With Congress perpetually deadlocked, the executive busy demolishing the expert bureaucracy, rich stakeholders benefiting from still greater power, and the courts actively reinforcing key pathologies in administrative structure, we seem to lack an able protagonist to press for reform. Each of these institutional leaders, however, may face some positive incentives at some point over the next few decades to institute transparency-based requirements on agency expertise.

First, it is possible that the courts might be able to move the ball forward, at least where litigants clearly frame the issues and press the courts into action. As noted earlier, courts have already shown some receptivity to evidence of corrupted processes that violate basic scientific norms in the course of their arbitrary and capricious review.[375] Although less likely, it is also possible that, with sufficient prompting by litigants, courts might even revive the "fact finding" exception to deliberative process—an exception that, while dormant, has never been explicitly overruled—as a way to enhance the transparency of agency expertise.[376]

Given the damage courts have done to science over the years,[377] it may also be time to revisit the case for creating specialized science courts to adjudicate disputes involving science-intensive issues.[378] While this would be a more radical step, a bird's-eye view of how courts have mishandled scientific

375. *See supra* note 159 and accompanying text. Courts going forward could simply be more explicit that when a litigant demonstrates the agency processes violated critical scientific conventions for ensuring the integrity of the work, this showing might lead the court to expect the agency to affirmatively defend the reliability of its scientific factfinding.

376. *See supra* notes 151–52 (discussing the courts' historical approach to drawing this line).

377. One of several other problem areas concerns the courts' less-than-adept application of the *Daubert* test in resolving challenges to the admissibility of expert testimony. For a sampling from hundreds of articles on this issue, see Edward K. Cheng, *The Consensus Rule: A New Approach to Scientific Evidence*, 75 VAND. L. REV. 407, 422 (2022); Sophia I. Gatowski, Shirley A. Dobbin, James T. Richardson, Gerald P. Ginsburg, Mara L. Merlino & Veronica Dahir, *Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World*, 25 LAW & HUM. BEHAV. 433 (2001).

378. *See, e.g.*, Alan Kantrowitz, *The Science Court Experiment*, 17 JURIMETRICS J. 332, 333 (1977). *But see* Barry M. Casper, *Technology Policy and Democracy: Is the Proposed Science Court What We Need?*, 194 SCIENCE 29, 29 (1976) (arguing that science court proposal is misguided given political nature of most technical questions).

controversies may ultimately suggest that such an institution is not only warranted, but necessary.

Although the immediate prospects for legislative change are dim, a bipartisan congressional coalition could ultimately support transparency-enhancing reforms to the APA since compromised fact finding undermines the implementation of their statutes. Particularly in the case of a future Democratic president, otherwise reluctant Republican congresspersons might find themselves eager to reign in unchecked executive powers over fact finding.[379] Encouraging agencies to document the integrity of their fact-finding process may also be difficult for congresspersons to credibly oppose.[380] Thus, while counting on Congress for leadership in requiring agencies to document the integrity of their scientific facts is hardly a sure thing, it is not out of the question; the recent "scientific integrity" amendment to NEPA provides a case in point.[381]

The executive branch, especially under presidents such as Trump, is our least likely protagonist for reform despite the President's central role in coordinating the scientific integrity of the agencies' work.[382] But President Biden signaled greater receptivity to taking executive-wide measures to protect the scientific integrity of agency science, even though he did not go far enough.[383] Thus some presidents can and do endeavor to enhance the integrity of the agencies' scientific work.

4. Concern #4: Creative Compliance and Abusive Litigation Will Undermine the Proposal

Some will worry that the proposed reform is a net negative since it requires additional work by the agencies while making them potentially more vulnerable

379. Nevertheless, for industry, there are potential downsides to sharpening the courts' review of factfinding in ways that align with scientific integrity principles that might cause some republican members to shy away from reforming the process in this way.

380. The more modest legislative act of amending the deliberative process privilege of FOIA (and related attorney-client and other executive privileges) with respect to "factfinding" may be even more politically palatable for Congress in the coming years, again at least when a democratic president is in power. One can also image a great deal of public support for this kind of statutory adjustment if it is publicized effectively. *See supra* Section III.D.

381. *See supra* note 348 and accompanying text.

382. *See supra* notes 2, 5, 6. Since formalizing rigorous expert processes reduces executive power over internal deliberations and, to some extent, expert staff, our unitary executive would likely advance the reform only under considerable pressure and visibility. For example, a democratic president shamed and stigmatized for allowing agency processes to be corrupted might take up the task of developing enhanced transparency requirements that counteract political and stakeholder pressures on agency expertise. Perhaps if agencies themselves embrace the value of added transparency in internal processes and rules, this will also generate some momentum for more executive leadership. But these efforts may not progress as far in more hostile administrations.

383. *See supra* notes 319–26.

to litigation. These concerns can be mitigated with some added tweaking of the proposal.

a. Abusive and One-Sided Litigation Can Be Anticipated and Discouraged

Shining a light on the integrity of the agencies' fact-finding processes will ultimately present greater litigation risks for agency rules that may lead to still greater imbalanced stakeholder participation and oversight.[384] Industry in particular may find it beneficial to scour the records for integrity lapses that they can then raise in litigation to delay or block unwelcome rules. If an activist judge hostile to the administrative state presides over these challenges, heightened transparency could also be transformed into a weapon to reverse and remand agency decisions they find disagreeable.[385]

In fact, given the record of lopsided comments in agencies' protective rules, there is a very real danger that industry will be the predominant overseer of the agencies' documentation of its integrity. Addressing this problem may require subsidies to strengthen public interest representation or the appointment of public advocates to engage in technical rulemakings across the entire regulatory life cycle.[386] Agencies could also be required—for technical rules—to be more comprehensive and systematic in logging in the pre-Notice-of-Proposed-Rulemaking communications with stakeholders.[387] The courts and/or Congress should also alter the exhaustion requirements to leave more

384. Some of this litigation will be poised to enhance the integrity of the bureaucratic science, but some will likely be abusive and brought to delay protective rules by capitalizing on modest discrepancies in the agencies' records.

385. Since the current design of agency processes leans in industry's direction, it is particularly important to imagine ways that the proposal might unwittingly exacerbate industry's disproportionate influence over agency expert decisions. The new "litigation hooks" introduced by the proposal include, for example, possible arguments that the agency failed to document important features of its process, that its factual record is inadequate to support the scientific analysis, or that that analysis was done in ways that are "arbitrary" since they conflict with scientific norms. Even if the merits of these arguments are unlikely to prevail, filing an appeal can sometimes delay or otherwise hamstring implementation of a protective rule.

At the same time, however, there are some offsetting benefits from some of this litigation. In anticipation of the claims, agencies might tend to err on the side of creating a robust scientific record to avoid claims that the rule is not factually supported. The risks of hostile judicial oversight may also encourage agencies to be much clearer about the underlying scientific uncertainties in their decision-making since they will otherwise be at risk of being challenged for adopting unreliable assumptions.

386. *See, e.g.*, Wagner, *Administrative Law, Filter Failure*, *supra* note 188, at 1414–16 (referencing the possible need for monetary subsidies and appointed advocates to counterbalance inequitable engagement in rulemakings); Neil Komesar & Wendy Wagner, *The Administrative Process From the Bottom Up: Reflections on the Role, if Any, for Judicial Review*, 69 ADMIN. L. REV. 891, 944-47 (discussing in some detail the merits of a public advocate, which is analogous to the scientific ombudsmen proposed here).

387. *See, e.g.*, Wagner, *Administrative Law, Filter Failure*, *supra* note 188, at 1413 (proposing "a complete accounting of all interest group participation occurring throughout the entire life cycle of the rule's development" through a logging or tracking system).

room for resource-strapped litigants to bring claims when they did not have the resources to file specific comments on technical flaws.[388]

In technical rulemakings—particularly those in which industry has historically been the dominant participant—peer review by disinterested experts may be necessary to provide an independent check on potential agency bias. For example, in the context of the EPA's pesticide registration process, agency assessments are not currently subject to external peer review, even though industry supplies both the majority of the underlying scientific data and most of the critiques applied to the agency's analyses.[389] In such proceedings, where industry influence is pervasive, disinterested peer review could be presumptively required. Ideally, public interest groups could also be given the opportunity to nominate or select at least one external reviewer, helping to ensure that peer oversight is both diverse and balanced.

However it is achieved, applying more balanced and diverse external scientific and stakeholder scrutiny to agency technical rules will be essential. Once agencies begin receiving this broader oversight, they may proactively adjust their internal analytical processes to anticipate it—especially as the risk of challenge will now come from multiple directions.

Courts might also undermine the effectiveness of a scientific integrity reform—for example, by converting integrity standards into new attachment points that give well-financed stakeholders additional grounds to obstruct agency action. Several adjustments can help anticipate and reduce the risks posed by these judicial missteps. First, as already noted, a respected set of best practices that establish exemplary documentation of integrity—ideally established by Congress through a delegation to the NAS—would give courts fewer opportunities to seize on minor procedural discrepancies in agency processes as a pretext for reversing an agency's protective rule.[390] Litigants might likewise conclude that agency decisions that follow the safe harbor guidelines are not worth the cost and effort of litigation. Second, courts should also be directed—preferably through congressional direction or controlling

388. Stakeholders could be permitted to appeal a rule if, for example, they were able to demonstrate financial hardships that precluded the filing of timely comments. *See* Markoff, *supra* note 200, at 1086–92 (recommending similar types of revisions to exhaustion requirement in administrative law).

389. *See, e.g.*, Wagner, SCIENCE IN REGULATION, *supra* note 30, at 40–48 (providing a detailed description of EPA's pesticide registration process, including the limited use of external peer review). To encourage a rich supply of vigorous, disinterested peer reviewers, additional institutional reinforcements may be necessary. *See, e.g.*, BIPARTISAN POL'Y CTR., *supra* note 340, at 45–46 (offering suggestions).

390. The guidelines should not only clarify what the basic conventions are in science but should suggest how they can be operationalized in various types of agency decision-making contexts, which in turn provides guidance for courts during judicial review. Hence, if industry argues that EPA should have shared the underlying datasets used in its predictive modeling, but there are fully justified reasons within science (e.g., confidential data) that preclude data sharing, the judge will be alerted to these scientific practices that conflict with litigants' arguments.

precedent—on the appropriate remedy for integrity violations. Rather than vacating a rule found to be insufficiently supported, the default remedy should be a remand that keeps the existing rule in place and subject to enforcement.[391] Clarifying this standard would reduce industry incentives to bring claims aimed primarily at delaying implementation.[392]

b. Worries About New Burdens on Over-Burdened Agencies Are Misplaced

Rather than loosening the reins on expert bureaucrats, the proposal, at least on the surface, may appear to some to impose more prescriptive requirements on how agency scientists do their work, such as expecting added documentation. But viewing the proposal in this light would be a mistake. Recall that the central problem that has preoccupied the analysis from the start is the lack of process transparency for how agencies are conducting their scientific work. Under the existing structure, agency scientists are not independent, disinterested experts and hence are generally not allowed to be transparent about biasing influences on their work, in the use of peer review, or in how their findings are presented to the public.

By enabling staff to follow their professional norms in communicating their analyses, the proposal thus *loosens* the constraints imposed on the scientists' work. Agency experts will now be encouraged to explain the reliability of their analyses in a manner similar to scientific peers doing federally funded research.[393] While the resultant documentation will likely entail added paperwork and tracking, even these burdens are not mandatory and in keeping with the standards of science. Moreover, under the proposal, it is ultimately up to the experts to decide when and how to document the integrity of their work, and if management interferes in these expert decisions, those points of interference would need to be documented in the record.

c. The Risks of Non- or Creative Compliance Can Be Reduced

A final concern centers on the pressure agencies may face to comply with the letter, but not the spirit, of disclosure obligations—particularly when factual

391. The courts might also issue time-limited stays in lieu of vacatur, for example. *See, e.g.*, Nat. Res. Def. Council v. EPA, 489 F.3d 1250, 1262–64 (D.C. Cir. 2007) (Randolph, J., concurring) (recommending time-limited stays as the preferable remedy to vacaturs).

392. *See* Patricia M. Wald, *Judicial Review in the Time of Cholera*, 49 ADMIN. L. REV. 659, 665 (1997) (observing in 1997 that nearly forty percent of the vacaturs of agency regulations apparently occurred because the agency failed to adequately explain or document its reasoning).

393. The agency scientists still will not have the authority to decide when or whether to make their work public, but once public, they will be expected to defend the reliability of their analyses using scientific standards. While the proposal merely seeks to align agency scientists' recordkeeping practices with the norms of their profession, documenting the integrity of analytical work could introduce some additional administrative burdens. Ensuring that such documentation remains streamlined and not unduly time-consuming will be an important aspect of implementation.

records conflict with the preferred outcomes of powerful stakeholders, political officials, or even the staff themselves. In such situations, agencies may engage in subtle forms of creative compliance to obscure inconvenient facts. And when these efforts prove insufficient, some agency actors may go further and submit false or misleading information.

We can expect, for example, that agencies will seek to present their analytical processes in the most favorable light possible, potentially creating a misleading picture of their adherence to integrity standards. In such cases, the two-tiered documentation requirement serves as an important safeguard. If a reluctant agency was asked only to produce detailed logs without a summary statement, it might obscure biasing influences by overloading logs with undigested or irrelevant detail.[394] Conversely, if required to produce only a summary statement with no supporting documentation, the agency could rely on vague language to gloss over problematic sources of bias. Requiring both types of records makes it significantly harder for an agency to conceal objectively deficient processes. A best-practice guideline that establishes clear standards for the two documentation steps would further reduce opportunities for obfuscation.

More troubling are situations in which the stakes are high enough that agencies are tempted to submit intentionally false reports of their scientific processes. The most effective safeguards against this type of misconduct are robust internal reporting systems, ideally implemented by Congress and overseen by an independent congressional office like the GAO. As noted earlier, the Biden framework aimed to institutionalize procedures for identifying and addressing scientific misconduct by providing procedures for reporting violations by both staff and political appointees.[395] Formalizing and enforcing rules that prohibit scientific fraud, coupled with meaningful penalties, will help deter deliberate distortions, even though the risks cannot be eliminated completely. Stronger whistleblower protections will also be important.[396]

The risk of noncompliance can be further mitigated by incorporating periodic, independent audits of agency expert processes by neutral third parties.[397] This added layer of oversight would not only increase the likelihood

394. *See* Wagner, *Administrative Law, Filter Failure*, *supra* note 188, at 1384–88 (discussing how this kind of data bombing impedes external oversight and reduces accountability).

395. *See supra* note 319 and accompanying text.

396. *See* KITROSSER, *supra* note 139, at 140–42 (discussing checks, such as whistleblower protections, as a way to improve information integrity in the executive branch).

397. This type of oversight could perhaps be conducted by the agencies' own inspector general, a congressional office such as GAO, a White House office such as OSTP, or even the National Academies.

of detecting malfeasance but also provide valuable feedback to improve implementation and evolution of the reform over time.[398]

CONCLUSION

As we reflect on the erosion in public confidence in agency experts that accelerated during COVID, face a new administration committed to restraining the "deep state," and confront a Supreme Court intent on reshaping the structure of administrative law, it is time to take stock of whether, in this uncertain future, agency experts can provide reliable and trustworthy scientific analyses to inform policy.

Can we trust the work of agency experts? A structural audit of the legal architecture governing science policy in the administrative state yields an unmistakable "no," even in administrations that are supportive of a high-functioning expert bureaucracy. The legal design of expert administrative processes in place today diverges, often significantly, from the processes used by the scientific community. And, while excellent scientific staff may still produce high-quality work in some settings, our ineffectual design makes it impossible to distinguish reliable work from badly compromised agency analyses.

The architects who designed our current administrative process were incapable of anticipating many of the developments that threaten to undermine the integrity of the agencies' science today. But now, in the wake of more expansive presidential control, a steady stream of poorly conceived judicial doctrines, and counterproductive legislative and executive prescriptions imposed on agency expertise, the flaws in our legal structure have passed the tipping point, at least for environmental and health regulation.

The diagnosis may appear bleak, but the root of the problem lies not in the inherent difficulties of bridging science and policy, but in correctable legal missteps. Rather than modeling agency expert processes on established scientific practices, the current framework often ignores—or even undermines—those standards. Going forward, legal architects must better align administrative design with the norms of the scientific community.

At its core, the reform proposed here seeks to re-anchor agency science in those norms. By establishing clear, independent standards for process integrity—and requiring agencies to document their compliance—it builds a legal framework that rewards rigor, transparency, and accountability. No reform

398. For example, an inspector general audit might recommend that greater attention needs to be given to the quality and integrity of the data and research the agency uses for its factfinding. Or an audit might find that informal communications with industry by agency staff or officials present significant sources of biasing that not only need to be logged but should be presumptively prohibited as ex parte contacts.

can fully insulate science from politics, but this one would make it far more difficult for powerful actors to manipulate scientific processes behind closed doors. Just as important, it would provide policymakers, courts, and the public with better tools to detect and confront scientific distortions when they arise. In that way, the reform offers a meaningful step toward restoring the trustworthiness of agency expertise—and, with it, the legitimacy of the administrative state.