Michigan Law Review

Volume 109 | Issue 5

2011

Super Deference, the Science Obsession, and Judicial Review as Translation of Agency Science

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SUPER DEFERENCE, THE SCIENCE OBSESSION, AND JUDICIAL REVIEW AS TRANSLATION OF AGENCY SCIENCE

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When courts review agencies' scientific and technical determinations, they often emphasize that the specialized subject matter requires them to be at their most deferential. This "super-deference" principle seems appealing because it is supported by basic notions of institutional competence and accommodates a natural judicial tendency to avoid deep encounters with science. But it stands in stark tension with the expectation that courts must reinforce administrative-law values like participation, transparency, and deliberation. And it fails to further the legitimizing function of incorporating the best possible science into institutional decision making. Surprisingly, there is no scholarship comprehensively assessing super deference. This Article begins to fill that gap by evaluating super deference contextually, taking into consideration the norms of both science and administrative law. This analysis reveals that not only does super deference lack merit, it also lacks a clear meaning and a framework for principled application. Further, it has fallen into disuse, giving way to traditional hard-look review. Building on these observations, this Article develops a normative account of the courts' role with respect to agency science. When courts engage in such review, they can use their generalist perspectives to their advantage by serving an important translating function for generalist consumers such as Congress and the public at large—an approach that reinforces both scientific and administrative-law values.

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* Associate Professor, University of Oklahoma College of Law. For their insightful comments, I thank Professors Elizabeth Bangs, Katheleen Guzman, and Wendy Wagner. For their invaluable research assistance, I thank Associate Director of the Law Library Joel Wegemer and research assistants Jennifer Hawk and Annie Nagle. I also thank the editors of the *Michigan Law Review* for their excellent work on this piece.

INTRODUCTION

In the quest for better alignment of science and administrative law, the role of the judiciary eludes easy assessment. The premise that expert agencies are better situated than generalist judges to make policy decisions in light of scientific uncertainty is an obvious enough starting place. Indeed, this view is encapsulated in the principle that courts ought to be at their "most deferential" when reviewing an agency's scientific determinations.[1]

This approach, which I refer to as "super deference," is appealing: it is supported by basic notions of institutional competence and plays into a natural judicial tendency to avoid any deep confrontations with science. If we are to believe observers of judicial science—not to mention the courts themselves—super deference has the salutary impact of shifting power over science from inept generalists to superior experts.[2] Broader administrative-law values support this view: if agency science is mostly about policy, and

1. Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 103 (1983); *see also* Indus. Union Dep't v. Hodgson, 499 F.2d 467, 474–75 (D.C. Cir. 1974) (suggesting deference for determinations at "frontiers of scientific knowledge").

2. *See, e.g.*, Martin Shapiro, *Administrative Discretion: The Next Stage*, 92 YALE L.J. 1487, 1507 (1983) ("[T]echnocrats do understand and judges clearly cannot understand.").

the politically accountable executive controls agencies, then agencies are the more legitimate institution with respect to science.[3]

A closer look, however, reveals a more nuanced picture. As noted by scholars in other contexts, extraordinary deference as a general matter stands in tension with the expectation that courts must reinforce administrative-law values like participation, transparency, and deliberation.[4] Not only do these values reflect the constitutional design, but they are buttressed by Congress's intent as expressed in the judicial-review provisions of the Administrative Procedure Act ("APA").[5] And unlike the direct relationship between courts and legislatures when statutes are under review and deference is sometimes justified,[6] judicial review of agencies implicates all three branches because courts not only check executive power, but must also be mindful of legislative preferences.[7]

Further, administrative agencies cannot make an exclusive claim on science because science plays a legitimizing role throughout government. Suppose an administrative agency were to make a fundamental scientific error that becomes the basis of a regulation. A judicial rule requiring extreme deference—even to blatant scientific errors—would magnify those errors and produce unfair results.[8] If we want judicial review to enhance the legitimacy of agency action, we ought to think critically about whether super deference contributes to that end. If fairness and rationality are both furthered when agencies capture the best that science can offer, perhaps a more searching role for the courts—one that encourages agencies' principled use of science—is called for.

Adding to the intricacies, agency science is a peculiar product, quite removed from the traditional image of pure research science. It is laced with

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3. *See* Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 863 (1984) (noting agencies make interpretations "in the context of implementing policy decisions in a technical and complex arena").

4. *See* Cass R. Sunstein, *On the Costs and Benefits of Aggressive Judicial Review of Agency Action*, 1989 DUKE L.J. 522, 529 ("[A] world without aggressive judicial review might well suffer from increases in lawlessness, carelessness, overzealous regulatory controls, and inadequate regulatory protection.").

5. 5 U.S.C. §§ 701–06 (2006). The APA is codified at 5 U.S.C. §§ 551–59, 701–06; for more on the scope and intent of the APA, see *infra* Section I.A. (describing judicial review under the APA).

6. For a critical analysis of extreme judicial deference to legislative science, see Emily Hammond Meazell, *Scientific Avoidance: Toward More Principled Judicial Review of Legislative Science*, 84 IND. L.J. 239 (2009).

7. *See generally* Lisa Schultz Bressman, *Procedures as Politics in Administrative Law*, 107 COLUM. L. REV. 1749 (2007) [hereinafter Bressman, *Procedures as Politics*]. Professor Bressman presents a model of administrative law in which the Supreme Court is positioned as a mediator between executive and legislative branches. As she states, "[T]he Court may enforce administrative procedures in order to help ensure that agency decisions track dominant legislative preferences." *Id.* at 1751.

8. *See* Carl F. Cranor, *The Dual Legacy of* Daubert v. Merrell-Dow Pharmaceutical*: Trading Junk Science for Insidious Science*, *in* RESCUING SCIENCE FROM POLITICS: REGULATION AND THE DISTORTION OF SCIENTIFIC RESEARCH 120, 122 (Wendy Wagner & Rena Steinzor eds., 2006) [hereinafter RESCUING SCIENCE] (arguing that legal endorsement of mistaken science threatens the legitimacy of law as an institution).

policy decisions at numerous levels, making it susceptible to misuse.[9] For example, interested parties and agencies alike are incentivized to cloak their policy choices in the seemingly unassailable mantle of science. The occurrence of this phenomenon in agency decision making is well documented. But neither the other branches nor the public is immune from this tendency to mistake policy for science. Calls for "good" or "improved" science in agencies are often motivated by the desire to change policy outcomes rather than agencies' use of flawed science in reaching them.[10]

Despite the scholarly literature's attention to the features of agency science specifically and the role of judicial review in administrative law generally, there has been no detailed examination of super deference as a principle in its own right. The courts persist in emphasizing it as a reason to avoid becoming too entangled in science, yet the few scholarly references are not focused on furthering our understanding of super deference. Two commentators lodged early criticisms in the wake of the modern super-deference case, *Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*,[11] but, of course, they could not evaluate how the principle was to be applied in years to come.[12] Otherwise, super deference is sometimes mentioned with criticism,[13] sometimes simply recited as a principle of judicial review,[14] and sometimes noted for the role it plays in judicial vacillation

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9. Scholars have long recognized this potential. Some especially noteworthy works are RESCUING SCIENCE, *supra* note 8; Holly Doremus, *Science Plays Defense: Natural Resource Management in the Bush Administration*, 32 ECOLOGY L.Q. 249 (2005); Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613 (1995) [hereinafter Wagner, *Science Charade*]. Furthermore, even pure research science incorporates policy decisions; as discussed in Section I.B., the juxtaposition of science and the administrative process thus results in a pancaking of policy decisions.

10. *See* SHEILA JASANOFF, THE FIFTH BRANCH: SCIENCE ADVISORS AS POLICYMAKERS 20 (1990) ("Although these controversies seemed on their face to be about science, the alignment of parties on either side generally conformed to basic political and ideological cleavages between pro- and antiregulation interests in American society."); Thomas O. McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385, 1400 (1992) [hereinafter McGarity, *Deossifying*] ("[Commentators] pick apart the agencies' preambles and background documents and launch blunderbuss attacks on every detail of the legal and technical bases for the agencies' rules."); Wagner, *Science Charade*, *supra* note 9, at 1657 ("[A]dvocates . . . become single-mindedly engaged in presenting opposing scientific justifications, demanding outside scientific review, or attacking the competence of the agency's science when it leads to results that run counter to their own unexpressed policy preferences."). *See generally* Cary Coglianese & Gary E. Marchant, *Shifting Sands: The Limits of Science in Setting Risk Standards*, 152 U. PA. L. REV. 1255, 1264 (2004) ("Science has considerable rhetorical appeal when it comes to defending regulatory decisions, as it is often described and perceived as being 'objective.'").

11. 462 U.S. 87 (1983). For a detailed discussion of *Baltimore Gas*, see *infra* Section II.B.

12. *See* Andrew D. Siegel, *The Aftermath of* Baltimore Gas & Electric Co. v. NRDC*: A Broader Notion of Judicial Deference to Agency Expertise*, 11 HARV. ENVTL. L. REV. 331, 378–80 (1987) (criticizing the broad deference to agencies in *Baltimore Gas*); Joel Yellin, *Science, Technology, and Administrative Government: Institutional Designs for Environmental Decisionmaking*, 92 YALE L.J. 1300, 1320–24 (1983) (arguing that deference neither contributes to balance between institutions nor encourages reasoned decision making).

13. *See, e.g.*, Wagner, *Science Charade*, *supra* note 9, at 1661–67 (arguing super deference contributes to science charade).

14. *See, e.g.*, Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 TEX. L. REV. 1601, 1631 (2008) (citing super-deference principle); Theodore C. Hirt, *Current Issues*

between "hard" and "soft" review[15]—but all in other contexts, with other focuses.

This gap in the literature is surprising because the stakes are high. Super deference is not grounded in realistic notions of agency science;[16] it may contribute to ossification[17] and the science charade;[18] and it appears to have a disparate impact on environmental law.[19] Measured against broader administrative-law values, super deference also inhibits transparency;[20] undermines deliberation;[21] fails to accord with political accountability;[22] and generally abdicates the courts' role in the constitutional scheme by encouraging

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Involving the Defense of Congressional and Administrative Agency Programs, 52 ADMIN. L. REV. 1377, 1397 (2000) ("In determining whether the agency's decision is arbitrary and capricious, the court is not to weigh the scientific evidence or inquire into the wisdom of regulations based on that evidence."); Carla Mattix & Kathleen Becker, *Scientific Uncertainty Under the National Environmental Policy Act*, 54 ADMIN. L. REV. 1125, 1158 (2002) (reciting super deference as part of the arbitrary and capricious standard).

15. *See, e.g.*, Sidney A. Shapiro & Richard E. Levy, *Heightened Scrutiny of the Fourth Branch: Separation of Powers and the Requirement of Adequate Reasons for Agency Decisions*, 1987 DUKE L.J. 387, 411 (noting vacillation); Sidney A. Shapiro & Richard E. Levy, *Judicial Incentives and Indeterminacy in Substantive Review of Administrative Decisions*, 44 DUKE L.J. 1051, 1064–66 (1995) [hereinafter Shapiro & Levy, *Judicial Incentives*] (describing the "proliferation of manipulable categories to which different degrees of deference apply"); Donald W. Stever, Jr., *Deference to Administrative Agencies in Federal Environmental, Health, and Safety Litigation—Thoughts on Varying Judicial Application of the Rule*, 6 W. NEW ENG. L. REV. 35, 45 (1983) (describing the spectrum of "hard look," "quick look," and "no look" cases).

16. *See, e.g.*, E. Donald Elliott, *Strengthening Science's Voice at EPA*, LAW & CONTEMP. PROBS., Autumn 2003, at 45, 47 ("[S]cience is conspicuously absent from internal EPA deliberations."); Steven Goldberg, *The Reluctant Embrace: Law and Science in America*, 75 GEO. L.J. 1341, 1365–66 (1987) ("Regulatory agencies are regularly accused of being 'captured' by industry, consumer groups, members of Congress, or bureaucratic inertia. They are never accused, however, of being captured by scientists.").

17. *But see* Thomas O. McGarity, *The Courts and the Ossification of Rulemaking: A Response to Professor Seidenfeld*, 75 TEX. L. REV. 525, 528 (1997) [hereinafter *Ossification*] ("[C]ontinuing scrutiny of reviewing courts under the hard-look doctrine caused the rulemaking process to 'ossify' to a disturbing degree.").

18. *See* Wagner, *Science Charade*, *supra* note 9, at 1661–67 (contending that the desire to minimize judicial review incentivizes agencies to deliberately emphasize the scientific aspects of what are ultimately value choices).

19. *See* Jim Chen, *Legal Mythmaking in a Time of Mass Extinctions: Reconciling Stories of Origins with Human Destiny*, 29 HARV. ENVTL. L. REV. 279, 299–300 (2005) (noting that "[m]ore than most other areas of legal endeavor," environmental law involves scientific determinations within agency's expertise); Jim Chen, *Webs of Life: Biodiversity Conservation as a Species of Information Policy*, 89 IOWA L. REV. 495, 517 (2004) (calling "hard look" under NEPA "toothless," and citing *Baltimore Gas*); Holly Doremus, *The Purposes, Effects, and Future of the Endangered Species Act's Best Available Science Mandate*, 34 ENVTL. L. 397, 429–30 (2004) (suggesting that deference may undermine the Endangered Species Act's best available science mandate). Indeed, a February 2010 Westlaw search of 185 cases citing *Baltimore Gas* for the super-deference principle revealed that over 75 percent of those cases involved environmental law.

20. *See* Wagner, *Science Charade*, *supra* note 9, at 1662–66.

21. *See* Peter H. Schuck & E. Donald Elliott, *To the* Chevron *Station: An Empirical Study of Federal Administrative Law*, 1990 DUKE L.J. 984 (presenting empirical evidence suggesting that changes in law increasing judicial deference result in more agency decisions being rationalized on the basis that has promised judicial deference). *But see* Elliott, *supra* note 16, at 51 (arguing judicial review is too "episodic, confused, and inconsistent to have much of a systematic effect on reforming agency practices").

22. *See* Barry Friedman, *Dialogue and Judicial Review*, 91 MICH. L. REV. 577, 637 (1993).

outcome-oriented review.[23] For these and many other reasons, I contend that super deference has very little utility.

Given this conclusion, one might ask what should replace super deference: how *should* courts review agency science? A detailed review of how the courts apply super deference reveals a trend away from super deference toward hard-look review, albeit couched in super-deference terminology. This closer look reveals that traditional hard-look review can sufficiently protect administrative-law values while reflecting our instinctive notions about comparative institutional competence with respect to science. In making this claim, I am aware of a longstanding debate about the efficacy of hard look generally.[24] My aim, however, is not so much to enter that debate as to provide an account of the courts' role in reviewing agency science.

Indeed, I contend that the courts' comparative disadvantages with respect to science can actually enhance their role in the constitutional framework. Drawing on insights from political theory, social science, and the broader administrative-law discourse, I argue that thoroughly written judicial opinions serve an important function for science in our legal institutions. These opinions, written by generalists, necessarily reflect a generalist understanding of the science and policy issues present in agency decision making. That is as it should be, because they in turn provide important translations for generalist consumers—Congress, the public, the media, and interest groups—that can bring additional political checks to bear on agencies' decision making.

Part I of this Article lays the descriptive foundation necessary for assessing judicial review of agency science. It begins by outlining the relevant parameters of the APA, calling attention to the spectrum of scrutiny that courts bring to bear as they examine agencies for reasoned, science-based decision making. Next, it highlights the importance of the record on review, paying special attention to the science-specific features of such a record. This leads to a discussion of science in agencies generally. Even in the stereotypical, academic research setting, science is bound to policy—all the more so when marshaled to support agency action. Part II locates the modern super-deference case, *Baltimore Gas*,[25] in its historical and contextual place. A detailed look at the courts' subsequent treatment of super deference demonstrates that the principle has largely lost its teeth. Yet as Part III argues, this rich array of science-based caselaw provides a basis for thinking critically about the institutional role courts play with respect to agency science. Courts are using their generalist approach in a way that benefits

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23. *See* Shapiro & Levy, *Judicial Incentives*, *supra* note 15, at 1064 (describing the "proliferation of manipulable categories to which different degrees of deference apply").

24. *See* Matthew C. Stephenson, *A Costly Signaling Theory of "Hard Look" Judicial Review*, 58 ADMIN. L. REV. 753, 761 n.31 (2006) (collecting defenders of hard-look review because it ensures agency has truly engaged in reasoned decision making); *id.* at 763–65 (collecting criticisms); *see also* Bressman, *Procedures as Politics*, *supra* note 7, at 1766 (stating most views of judicial review fall into two camps: those favoring and those disfavoring additional emphasis on agency procedure).

25. Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87 (1983).

administrative law as well as science values. As a normative matter, this model provides a way to gauge the courts' effectiveness when confronted with agency science.

I. BACKGROUND PRINCIPLES: AGENCY SCIENCE IN THE COURTS

Before assessing the role of super deference, it will be helpful to address a few foundational matters. First, the APA-driven structure of judicial review of agency science provides the background upon which super deference is built. Second, the roles of science and policy in agency decision making foreshadow the conceptual weaknesses in super deference. Finally, there are some special problems in administrative law that have particular relevance to review of agency science.

A. *Judicial Review Under the APA*

When courts review agency science, they are operating within the parameters set forth in the APA. As they have done with many other legislative enactments, the courts provide meaning to the terms they encounter. The discussion below describes the basic contours of the APA relevant to judicial review of agencies' scientific findings, including the judicial gloss applied to those provisions. While judicial review generally imposes a "reasoned decision-making" requirement on agencies, "reasonable" is a flexible term. According to the caselaw, it can mean anything from hard-look review to *Baltimore Gas* super deference. Regardless of how strictly a court reviews an agency, it does so on the basis of a record, the attributes of which are described below.

1. *APA Basics*

The starting place for judicial review of administrative agencies is § 706 of the APA. In particular, the provisions that implicate agencies' scientific findings, as well as the policy decisions made in light of scientific uncertainty, are §§ 706(A) and (E). These subsections require the reviewing court to:

> hold unlawful and set aside agency action, findings, and conclusions found to be—
>
> (A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;
>
> . . . .
>
> (E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute . . . .[26]

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26. 5 U.S.C. §§ 706(2)(A), (E) (2006). Another possibly relevant subsection is § 706(2)(C) (relating to agency action "in excess of statutory jurisdiction, authority, or limitations, or short of

While subsection (E) applies by its terms only to "formal" rulemaking and adjudication—that is, proceedings that produce a closed, trial-like record[27]—subsection (A) serves as a catch-all standard that generally applies, for purposes within the scope of this Article, to review of informal adjudication and rulemaking.[28]

Whether an agency is engaging in rulemaking or adjudication, formal or informal, the agency will base its decision making on factual information and policy choices. When agencies must act in the scientific arena, the factual information will include scientific knowledge, and the policy choices will necessarily represent decisions made in light of scientific uncertainty. Although the formality of the agency action will dictate which of the above standards applies, in practice the two standards are largely indistinguishable for purposes of judicial review.[29] In essence, each simply requires reasonableness. The agency must explain its decision in a reasonable way, and the court may not substitute its judgment for that of the agency.[30] Notably, courts will not supply a reasoned basis for an agency's action.[31] The reason-

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statutory right"), which may be implicated when courts review agencies' interpretation of their statutory mandates and apply the *Chevron* doctrine. *See* Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837 (1984). As *Chevron* itself illustrates, an agency's interpretation of its ambiguous statutory mandate often implicates the agency's expertise. *Id.* at 865. Although consideration of the *Chevron* doctrine would also yield policy decisions made in light of scientific uncertainty, the statutory-interpretation basis for applying *Chevron* sets that doctrine beyond the scope of this Article. *Cf.* Lisa Schultz Bressman, Chevron*'s Mistake*, 58 DUKE L.J. 549, 585 (2009) ("[T]he effect of each is much the same."). Nevertheless, *Chevron* has a great deal to say about the relationship between courts and agencies generally, and to that extent, I draw on *Chevron* for support. *See, e.g.*, 467 U.S. at 865 ("Judges are not experts in the field, and are not part of either political branch of the Government. . . . While agencies are not directly accountable to the people, the Chief Executive is, and it is entirely appropriate for this political branch of the Government to make such policy choices . . . .").

27. Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 414–15 (1971). Formal rulemaking and adjudication are governed by §§ 556 and 557 of the APA. *See* 5 U.S.C. §§ 553(c), 554(a) (2006) (specifying the applicability of formal procedures to rulemaking and adjudication, respectively).

28. *See* Camp v. Pitts, 411 U.S. 138, 138–40 (1973) (per curiam) (illustrating the catch-all approach); *Overton Park*, 401 U.S. at 416; Ass'n of Data Processing Serv. Orgs. v. Bd. of Governors, 745 F.2d 677, 683 (D.C. Cir. 1984) (Scalia, J.) (calling arbitrary and capricious provision a "catchall").

29. *See Ass'n of Data Processing*, 745 F.2d at 683 (the substantial evidence standard is "separately recited in the APA not to establish a more rigorous standard of factual support but to emphasize that in the case of formal proceedings the factual support must be found in the closed record as opposed to elsewhere").

30. *Overton Park*, 401 U.S. at 416 ("Although this inquiry into the facts is to be searching and careful, the ultimate standard of review is a narrow one. The court is not empowered to substitute its judgment for that of the agency.") (arbitrary and capricious); *see also* Universal Camera Corp. v. NLRB, 340 U.S. 474, 488 (1951) (stating that court may not "displace" the agency's "choice between two fairly conflicting views, even though the court would justifiably have made a different choice had the matter been before it *de novo*") (substantial evidence). As described in *Overton Park*, the arbitrary and capricious standard requires that agencies have made a decision "based on a consideration of the relevant factors" without "clear error of judgment." 401 U.S. at 416. Substantial evidence, on the other hand, means "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." Consol. Edison Co. v. NLRB, 305 U.S. 197, 229 (1938); *see also Universal Camera*, 340 U.S. at 487–88 (APA requires reviewing courts to consider the whole record to ascertain substantiality).

31. SEC v. Chenery Corp., 332 U.S. 194, 196 (1947).

ableness standard is thus meant to help ensure that the agency has acted with deliberation by considering its action in a careful, logical way.[32]

This "reasoned decision-making" requirement pervades administrative law.[33] The simplicity of the phrase itself, however, misleadingly masks the nuances of its application. It is used to describe judicial review that ranges in intensity from searching hard look to lenient super deference.

For example, a representation of the hard-look doctrine is embodied in the now-ubiquitous language from *Motor Vehicle Manufacturers Ass'n. v. State Farm Mutual Automobile Insurance Co.*[34]:

> Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.[35]

State Farm, in which the Court struck down an agency's rescission of passive-restraint regulations for automobiles, has been called "a strong endorsement of quite aggressive judicial review of agency action . . . ."[36] It is characterized by its extremely detailed and critical discussion of the agency's reasoning, though its remedy—a remand to the agency to explain itself anew—is typical.[37]

Just prior to *State Farm*, however, the Supreme Court handed down *Baltimore Gas* and announced the modern super-deference principle, all within the rubric of "reasoned decision making."[38] As described more fully below, that case involved a National Environmental Policy Act ("NEPA") challenge to the Nuclear Regulatory Commission's ("NRC") decision to treat nuclear-waste disposal issues generically for purposes of licensing individual nuclear power plants.[39] The generic assumption at the root of the challenge was that the resulting nuclear waste could be stored in such a way as to

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32. *See* Bressman, *Procedures as Politics*, *supra* note 7, at 1778 ("The standard legal justification for the reasoned decisionmaking requirement is that it promotes rationality, deliberation, and accountability.").

33. *See* Greater Boston Television Corp. v. FCC, 444 F.2d 841, 850–51 (D.C. Cir. 1970) (using term "reasoned decision-making").

34. 463 U.S. 29 (1983).

35. *Id.* at 43.

36. Peter L. Strauss, *One Hundred Fifty Cases Per Year: Some Implications of the Supreme Court's Limited Resources for Judicial Review of Agency Action*, 87 COLUM. L. REV. 1093, 1129 (1987). *But see* Bressman, *Procedures as Politics*, *supra* note 7, at 1782–83 (explaining *State Farm*'s approach as connected to congressional monitoring).

37. *See* 463 U.S. at 57.

38. Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87 (1983). For now, I simply describe *Baltimore Gas* and the super-deference principle. For a critical examination of that case, see *infra* Section II.B.

39. 462 U.S. at 89–90.

eliminate any releases of radioactive material.[40] In upholding this "zero-release" assumption, the Court emphasized that deference was particularly warranted:

> [A] reviewing court must remember that the Commission is making predictions, within its area of special expertise, at the frontiers of science. When examining this kind of scientific determination, as opposed to simple findings of fact, a reviewing court must generally be at its most deferential.[41]

Thus, there is a spectrum of deference within the umbrella of "reasonableness." While later Sections provide a discussion of the problems associated with singling out science for the special, super-deferential end of the spectrum, it is worth noting at this point that the Court's mixed signals about the meaning of "reasoned decision making" have perplexed many administrative-law observers.[42]

Even so, some principles frame the discussion. Broadly, agency science is reviewed for arbitrariness or for substantial evidence. In either case, courts will look for reasoned decision making (although this standard is flexible, to say the least). Two further points are relevant here. First, some courts apply a different formulation to mixed questions of law and fact on review of formal agency proceedings. That formulation, expressed in the pre-APA opinion *NLRB v. Hearst Publications, Inc.*,[43] asks whether the agency's action has "warrant in the record" and "a reasonable basis in law."[44] Again, the hallmark of this test is reasonableness. Second, some agencies' statutory mandates specify substantial evidence as the governing standard and may set forth additional substantive standards.[45] For purposes of the discussion that follows, I will note any particular nuances that may alter the standard of review, but otherwise the cross-cutting, deferential reasonableness approach enables us to focus on the particular scientific and policy decisions at issue in a wide range of examples.

2. *The Record on Review*

What science do courts have before them when they engage in a reasonableness review of agency actions? The general principle, applicable in scientific cases as well as others, is that courts are limited to the record pro-

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40. *Id.* (describing the "zero-release" assumption).

41. *Id.* at 103.

42. *See supra* note 15 (collecting sources).

43. 322 U.S. 111 (1944).

44. *Id.* at 131.

45. *E.g.*, Occupational Safety and Health Act, 29 U.S.C. § 655(b)(5) (2006) (requiring the "best available evidence" in promulgating exposure standards for toxic materials or harmful physical agents); Clean Water Act, 33 U.S.C. § 1314(a)(1) (2006) (requiring the "latest scientific knowledge" for water quality criteria); Clean Air Act, 42 U.S.C. § 7408(a)(2) (2006) (requiring the "latest scientific knowledge" for air quality criteria documents).

duced by the agency itself.[46] Thus, even if an agency is not required to undertake a formal decision-making process (which would generate a closed record), a reviewing court will consider the record that was before the agency at the time it made its decision. Further, a court should normally not consider evidence outside of the record when confronting a challenge to agency action.[47] This important feature distinguishes administrative law from other proceedings that arise in the courts where science may be at issue: unlike the typical trial scenario, courts reviewing agencies normally do not engage in any de novo examinations of scientific issues.

The record requirement is justified by its role in enhancing accountability and transparency. Yet agencies' records might consist of thousands of pages of information.[48] Where science is at issue, the record may include expert affidavits, letters from scientific and other interested organizations, published and unpublished scientific studies, scientific data produced or compiled by the agency or other agencies, and scientists' and policymakers' assessments of all the foregoing.[49] The record and reasoned decision-making requirements together are meant to enhance the legitimizing administrative-law values of deliberation, accountability, and transparency.

B. *Constructing the Record: The Scientific Enterprise in Agencies*

If a record is to support science-informed agency action, that record must include science. But science in agencies is far removed from the stereotypical academic research setting. Although traditional science is infused with policy decisions, agency science is even more so because it is conducted for different purposes. That is, agency science is marshaled to fulfill legal standards in statutes consistent with executive-branch policy. Using concrete examples, this Section briefly describes where those policy decisions fit in the scientific decision-making process generally. Next, this Section focuses on common sources of agency science, which support the notion that science in agencies is a unique construct. The bottom line is that where there is scientific uncertainty, policy must fill the gap, even more so

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46. Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 420 (1971); *see also* APA, 5 U.S.C. § 706 (2006) ("In making the foregoing determinations, the court shall review the whole record or those parts of it cited by a party . . . .").

47. There are some narrow exceptions. For example, if a proponent alleges an agency ignored a significant aspect of the problem, that proponent may seek to have evidence admitted that would be relevant to the agency's failings. *See, e.g.*, Nat'l Audubon Soc'y v. U.S. Forest Serv., 46 F.3d 1437, 1447 (9th Cir. 1993) (describing exceptions to the record evidence rule). That evidence would be subject to the principles set forth in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 479 (1993). *See, e.g.*, Hells Canyon Pres. Council v. Jacoby, 9 F. Supp. 2d 1216, 1223–24 (D. Or. 1998) (applying *Daubert* to extra-record evidence); *cf. infra* text accompanying notes 109–111 (distinguishing *Daubert*'s trial context from that of administrative law).

48. *See, e.g.*, Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 98 & n.11 (1983) (describing the "sheer volume" of proceedings). On the dangers that too much information poses to administrative-law values, see Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321 (2010).

49. For a discussion of how agencies generate this science, see *infra* Section I.B.1.

in agencies than in the "pure" scientific community. As discussed later, these attributes have important implications for judicial review of agency science.

1. *The Role of Policy in Science*

Legal institutions and the citizenry at large suffer from a science obsession, assuming that if only we had answers from science, we would know what regulatory decisions are "correct."[50] Certainly, our institutions ought to do their best to incorporate good science into decision making, but the ultimate decisions that must be made are policy choices.[51] Not only that, but policy informs everything from how an experiment is designed to how results are interpreted and communicated. I find it helpful to characterize the necessary policy decisions as falling in any of three categories: "metapolicy" choices, which relate to ultimate decisions; "mesopolicy" choices, which relate to interpretive and communicative decisions; and "protopolicy" choices, which relate to interstitial decisions like experiment design.[52] Taken together, the science and the policy choices comprise an agency's scientific determination—and as will be discussed later, litigation directed at agency science typically involves challenges to these policy choices, rather than to science itself.

"Metapolicy" describes the ultimate regulatory decision made in light of scientific uncertainty. It is informed by scientific information (some types of which I describe below) but is shaped by the normative goals of statutory mandates as well as political pressures.[53] A regulation is the paradigmatic example of metapolicymaking. For example, when the Occupational Safety and Health Administration ("OSHA") sets a workplace exposure limit, it might have assessed a number of toxicological studies that frame results in probabilistic terms. But none of those studies gives an answer to the question of what the best limit is. Rather, OSHA must consider the requirements of its statutory mandate, the current administration's policy goals, the costs and benefits of regulation, and the like, in addition to the limited scientific infor-

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50. *See generally* Coglianese & Marchant, *supra* note 10, at 1260 ("In short, EPA's use of a science-based rhetoric enabled it to avoid responsibility for providing any clear, consistent reasons for its policy choices in setting air quality standards."); Meazell, *supra* note 6, at 251 (collecting sources); Daniel Sarewitz, *The Rightful Place of Science*, ISSUES IN SCI. & TECH., Summer 2009, at 89 (collecting examples from early in the Obama Administration).

51. I define "policy" broadly to include courses of action selected from among alternatives in light of such factors as professional judgment, institutional and cultural norms, and external pressures.

52. Professor Wagner has illustrated similar concepts in what she has termed the "zigzag between science and science policy." Wendy E. Wagner, *The "Bad Science" Fiction: Reclaiming the Debate Over the Role of Science in Public Health and Environmental Regulation*, LAW & CONTEMP. PROBS., Autumn 2003, at 63, 65 [hereinafter Wagner, *"Bad Science" Fiction*].

53. Doremus, *supra* note 9, at 290 ("Political choices cannot be removed from the process. Instead of trying to remove them, it would be more helpful to focus on making the political elements of these decisions more transparent.").

mation, in coming up with a single number that regulates workplace exposure.[54]

If the ultimate regulatory decision is metapolicy, the decision about how to interpret and communicate scientific findings is an intermediate step—hence the term "mesopolicy."[55] Consider this example: Science is uncertain about the effects on human health associated with very low levels of radioactive exposure.[56] The same body of data has led scientists to three reasonable, but divergent conclusions. First, it may be that adverse health effects increase proportionally with increasing levels of exposure, regardless of the level of exposure. Second, it may be that very few adverse health impacts are seen at low levels, until the exposure reaches some boundary amount that causes significant and increasing adverse health effects. Finally, it may be that low levels of exposure cause adverse health impacts, but those impacts do not increase significantly with increasing levels of exposure.[57] The point is not which of these is correct; rather, the point is that reasonable scientists, exercising scientific judgment, will disagree on how to interpret and communicate the very same set of data.[58]

Finally, "protopolicy" refers to the judgments scientists make while conducting science. These might be decisions about such things as what to include or exclude in an experiment, what parameters to set for a model, the choice of measurement techniques, or intentional or even unknowing assumptions.[59] The scientific method does not reveal the "right" choices to make at these junctures; these issues transcend science and represent interstitial policy choices. Consider, for example, a study to determine whether contaminant levels in a stream are likely to exceed a regulatory standard.[60]

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54. This example is based on *Industrial Union Department v. American Petroleum Inst. (Benzene)*, 448 U.S. 607 (1980), discussed *infra* text accompanying notes 162–171.

55. *See* Thomas O. McGarity, *Our Science is Sound Science and Their Science is Junk Science: Science-Based Strategies for Avoiding Accountability and Responsibility for Risk-Producing Products and Activities*, 52 U. KAN. L. REV. 897, 932 (2004) [hereinafter McGarity, *Our Science*] ("[P]olicy nearly always drives the inferences that an expert draws from scientific studies.").

56. In his pathbreaking work, nuclear physicist Alvin M. Weinberg coined the term "trans-science" to describe questions that, while capable of being posed in scientific terminology, "are unanswerable by science; they transcend science." Alvin M. Weinberg, *Science and Trans-Science*, 10 MINERVA 209, 209 (1972). Examples of trans-scientific questions stem from his work in the nuclear industry and include the biological effects of very low-dose contaminant exposures; the probability of extremely improbable events; the judgments that must be used to make decisions when thorough data is unavailable; and value choices between different types of science. *See id.* at 210–13.

57. An illustration and discussion of these possible dose-response curves is set forth in Carol L. Silva & Hank C. Jenkins-Smith, *The Precautionary Principle in Context: U.S. and E.U. Scientists' Prescriptions for Policy in the Face of Uncertainty*, 88 SOC. SCI. Q. 640, 641 (2007).

58. Doremus, *supra* note 14, at 1624 ("Scientific integrity allows for the honest difference of opinion.").

59. *See* Barbara Cosens, *Resolving Conflict in Non-Ideal, Complex Systems: Solutions for the Law-Science Breakdown in Environmental and Natural Resource Law*, 48 NAT. RESOURCES J. 257, 291 (2008) ("[T]his is a fundamental aspect of the scientific study of complex, non-ideal systems.").

60. For a detailed presentation of this example, see David E. Adelman, *Two Models for Scientific Transparency in Environmental Law*, *in* RESCUING SCIENCE, *supra* note 8, at 201–03.

Where little empirical information is available about the stream, the logic of Bayes' theorem might prove useful for inductively assessing that probability.[61] Bayes' theorem, however, requires an initial scientific judgment about the system being studied, or the "prior distribution." In the stream example, an industry scientist might assume the prior distribution involves low concentrations of the contaminant; by applying Bayes' theorem to a limited number of actual samples, the result would suggest that the most probable mean contaminant levels would fall below the regulatory standard.[62] A scientist from an environmental group, on the other hand, might assume a higher prior distribution that results in the most probable mean exceeding the regulatory standard.[63]

In providing these examples, I do not mean to suggest there is anything inherently wrong with such policy choices.[64] To the contrary, they cannot be avoided, and good scientific practice involves documenting those choices, providing transparency and accountability.[65] It may not be possible to isolate every policy decision that has been made,[66] but to the extent one can identify specific junctures that involve policy, the norms of the scientific community demand disclosure. This is fortuitous for observers of administrative law because the legitimizing values of transparency and accountability provide axes on which administrative-law and scientific values are aligned.

Given that agencies are tasked with making policy decisions and must do so using data that is already intertwined with policy, it is not surprising that their scientific records can vary widely. Although some agencies do conduct their own research, most information is collected and synthesized from outside sources.[67] During the rulemaking process, for example, any

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61. *Id.* at 201. For more on Bayesian analysis, see WILLIAM H. GREENE, ECONOMETRIC ANALYSIS 600–25 (6th ed. 2008) (presenting Bayesian techniques); ANDREW GELMAN ET AL., BAYESIAN DATA ANALYSIS 3 (2d ed. 2004) ("The essential characteristic of Bayesian methods is their explicit use of probability for quantifying uncertainty in inferences based on statistical data analysis.").

62. Adelman, *supra* note 60, at 202.

63. *Id.* Ultimately, sufficient sampling and testing should make the Bayesian predictions from these two approaches converge.

64. By contrast, scholars have documented policy-driven abuses of the scientific process itself. *See, e.g.*, Doremus, *supra* note 14, at 1609–13 (describing censorship of scientific information); Wagner, *Science Charade*, *supra* note 9, at 1640–50 (describing intentional and premeditated instances of science charade).

65. *See* Adelman, *supra* note 60, at 212 ("Careful explanation of experimental results is a fundamental principle of science.").

66. Cosens, *supra* note 59, at 292 ("[L]aw, agency policy, and scientific judgment may all play a role in reaching a single decision. Separating them for the sake of transparency, as recommended by some, may not be so easily done.").

67. *See* JASANOFF, *supra* note 10, at 77 ("[R]egulatory science includes a substantial component of knowledge synthesis.") (italics omitted); Mary Jane Angelo, *Harnessing the Power of Science in Environmental Law: Why We Should, Why We Don't, and How We Can*, 86 TEX. L. REV. 1527, 1565 (2008) ("EPA gets most of its scientific information from outside of the agency."); Thomas O. McGarity, *The Complementary Roles of Common Law Courts and Federal Agencies in Producing and Using Policy-Relevant Scientific Information*, 37 ENVTL. L. 1027, 1028–29 (2007) ("The agencies have become repositories for huge amounts of scientific information that they may use in taking regulatory action or disseminate to the public by way of warnings or cautionary state-

interested parties may take advantage of the opportunity for comment by submitting scientific information.[68] Indeed, agencies may specifically request such information in their notices of proposed rulemaking.[69] Agencies sometimes fund studies or work under cooperative agreements to develop data.[70] Many also have internal peer review policies[71] and science advisory consulting requirements.[72] All of this information ultimately comprises the record.

But even with such a broad record, agency science differs significantly from pure research science because its purpose is to "further the task of policy development."[73] As a matter of institutional design, government, interest groups, and regulated entities are heavily involved in the production and scrutiny of scientific information. Numerous nonscientific internal and external demands on agencies may color the regulatory science, from imposing strict timetables to impacting various meso- and protopolicy determinations.[74]

These characteristics relate to the typical justifications for deferential review of agency science, which tend to focus on the policymaking role

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ments."); *cf.* J.B. Ruhl & James Salzman, *In Defense of Regulatory Peer Review*, 84 WASH. U. L. REV. 1, 6 (2006) (advocating regulatory peer review for the "outside evaluation of an administrative agency's compilation, selection, or use of scientific data to support a proposed regulatory decision such as a rule, standard, permit, or other policy").

68. APA, 5 U.S.C. § 553(c) (2006) ("[T]he agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments . . . ."); *cf.* Stephen M. Johnson, *Junking the "Junk Science" Law: Reforming the Information Quality Act*, 58 ADMIN. L. REV. 37, 78 (2006) ("Traditionally, when an agency sets a pollution standard or takes some other action to protect health or the environment under the environmental laws, the agency relies on a broad range of scientific data and studies and describes those data and studies in the decision that supports its action.").

69. *See, e.g.*, Endangered and Threatened Wildlife and Plants; Proposed Listing for the Largetooth Sawfish, 75 Fed. Reg. 25,174 (proposed May 7, 2010) (requesting information "relevant to the status and conservation of the species"); Mandatory Reporting of Greenhouse Gases: Additional Sources of Fluorinated GHGs, 75 Fed. Reg. 18,651, 18,654 (proposed Apr. 12, 2010) (requesting comment on various issues related to fluorinated greenhouse gas emissions); Mandatory Reporting of Greenhouse Gases: Injection and Geologic Sequestration of Carbon Dioxide, 75 Fed. Reg. 18,575, 18,579 (proposed Apr. 12, 2010) (seeking comment on options for monitoring, reporting, and verification of potential carbon dioxide leakage).

70. EPA, GUIDELINES FOR ENSURING AND MAXIMIZING THE QUALITY, OBJECTIVITY, UTILITY, AND INTEGRITY OF INFORMATION DISSEMINATED BY THE ENVIRONMENTAL PROTECTION AGENCY 6–7 (2002), *available at* http://epa.gov/quality/informationguidelines/documents/EPA_InfoQualityGuidelines.pdf [hereinafter EPA GUIDELINES].

71. *See, e.g.*, Endangered and Threatened Wildlife and Plants: Notice of Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities, 59 Fed. Reg. 34,270, 34,270 (July 1, 1994); EPA GUIDELINES, *supra* note 70, at 11 (describing peer review system).

72. *E.g.*, EPA GUIDELINES, *supra* note 70 at 19; *see also* Holly Doremus, *Data Gaps in Natural Resource Management: Sniffing for Leaks Along the Information Pipeline*, 83 IND. L. J. 407 (2008) (exploring the process by which scientific and technical information is produced, expressed, transmitted, and ultimately incorporated into regulatory decisions).

73. JASANOFF, *supra* note 10, at 77. Professor Jasanoff has identified numerous differences between regulatory and research science; for a helpful summary, see *id.* at 80.

74. *See id.* at 76–80 (exploring such differences).

bestowed upon the executive branch generally by the Constitution;[75] the policymaking role bestowed on agencies specifically by Congress;[76] and the participatory elements of agency decision making that enable agencies to at least have before them far more scientific information than would a court.[77] Add to that mix an assumption that agencies are more qualified than courts to process scientific information,[78] and these considerations support what Professor Jasanoff has called the "science policy paradigm." That is, (1) agencies should be able to make decisions even on the basis of imperfect knowledge; (2) a scientific determination may be considered valid even if there is not universal scientific consensus to that effect; and (3) when experts disagree about the science, agencies should have the authority to choose a position consistent with their statutory mandates.[79]

2. *Challenges to Agency Science*

This discussion highlights a critical question: what should a court do if an agency gets science wrong? As it turns out, the premise of that question—that administrative-law litigation involves challenges to positive science—is belied by our later examination of the super-deference caselaw.[80] Rather, most judicial challenges involve nitpicking at the proto- and meso-political levels; these are more easily characterized as "scientific" decisions because they take place when science is being conducted or reviewed, and hence they seem more amenable to judicial scrutiny than to, say, metapolicy decisions.[81]

To further illustrate, consider the key features of litigation involving agency science. Typically, interest groups act as watchdogs to assess agency

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75. Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 865 (1984) ("While agencies are not directly accountable to the people, the Chief Executive is, and it is entirely appropriate for this political branch of the Government to make such policy choices . . . .").

76. Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 97 (1983) ("Resolution of these fundamental policy questions lies, however, with Congress and the agencies to which Congress has delegated authority . . . .").

77. *See Chevron*, 467 U.S. at 864 ("The arguments over policy that are advanced in the parties' briefs create the impression that respondents are now waging in a judicial forum a specific policy battle which they ultimately lost in the agency . . . . Such policy arguments are more properly addressed to legislators or administrators, not to judges.").

78. For a discussion of science in the courts, see Meazell, *supra* note 6, at 252–56.

79. JASANOFF, *supra* note 10, at 50; *see also* Cellular Phone Taskforce v. FCC, 205 F.3d 82, 91 (2d Cir. 2000) ("The argument that the FCC should create greater safety margins in its guidelines to account for uncertain data is a policy question, not a legal one. As a policy matter, an agency confronted with scientific uncertainty has some leeway to resolve that uncertainty by means of more regulation or less.").

80. *See infra* Section II.C.

81. For other accounts of this observation, see McGarity, *Deossifying*, *supra* note 10, at 1400 ("[Commentators] pick apart the agencies' preambles and background documents and launch blunderbuss attacks on every detail of the legal and technical bases for the agencies' rules."); Wagner, *Science Charade*, *supra* note 9, at 1657 ("[Advocates] become single-mindedly engaged in presenting opposing scientific justifications, demanding outside scientific review, or attacking the competence of the agency's science when it leads to results that run counter to their own unexpressed policy preferences.").

decisions against the particular groups' policy preferences. To be sure, these groups monitor agencies and participate in agency lawmaking long before an action is final and subject to judicial review. But when a final decision runs counter to a group's policy preferences, a judicial challenge may be the next step.

Although the challenged decision is likely one of policy, the hallmark of these lawsuits is the challenger's obsession with the scientific underpinnings of the agency's decision. The textbook approach is to argue that an agency used "bad science"—that it ignored important scientific studies, that the agency's own science involved flawed methodologies, that the agency did not do enough science, or that the science somehow dictated a different conclusion—in essence, that if the science had been "right," a different outcome would have resulted.

That route is sometimes successful, if for different reasons. For example, if an agency actually does ignore important studies, rely on seriously flawed methodology, or reach a conclusion that seems at odds with the relevant science, *and it fails to explain itself in a reasoned manner*, it may well face a remand. This result is simply consistent with the reasoned decision-making requirement. If the record is fundamentally flawed, it is rightfully susceptible to a challenge, regardless whether the record contains scientific information.[82] At their core, the cases that are most often cited as examples of bad agency science are usually explained on this basis, or are simply cases involving metapolicy with which the speaker disagrees.[83] Indeed, as Professor Wagner has exhaustively demonstrated, there are very few examples of agencies actually getting positive science wrong.[84]

Yet these observations do not suggest super deference is justified. Rather, they support a role for the courts consistent with the basic principles of reasoned decision making: while a court may not substitute its judgment for an agency's, it ought to ensure the agency has acted reasonably. If courts fall prey to the science obsession and give too shallow a look at agency science, they risk missing not just the rare mistake of positive science, but the

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82. *See, e.g.*, Chlorine Chemistry Council v. EPA, 206 F.3d 1286 (D.C. Cir. 2000) (remanding to agency where, pursuant to Safe Drinking Water Act, EPA set maximum contaminant levels for chloroform at zero despite widespread scientific consensus that exposure thresholds had been demonstrated for chloroform).

83. For example, the leading proponents of applying the principles of *Daubert v. Merrell Dow Pharmaceuticals Co.*, 509 U.S. 479 (1993), to judicial review of administrative science cite the following as examples of bad agency science: *Flue-Cured Tobacco Cooperative Stabilization Corp. v. EPA*, 4 F. Supp. 2d 435 (M.D.N.C. 1998), *rev'd*, 313 F.3d 852 (4th Cir. 2002); *Chemical Manufacturers Ass'n v. EPA*, 28 F.3d 1259 (D.C. Cir. 1994); and *Puerto Rico Sun Oil Co. v. EPA*, 8 F.3d 73 (1st Cir. 1993). *See* Alan Charles Raul & Julie Zampa Dwyer, *"Regulatory* Daubert*": A Proposal to Enhance Judicial Review of Agency Science by Incorporating* Daubert *Principles Into Administrative Law*, LAW & CONTEMP. PROBS., Autumn 2003, at 7, 19–20. In only one of those, *Chemical Manufacturers Ass'n*, did the agency actually get the science wrong: it treated a solid molecule as if it were a gas. 28 F.3d at 1266. The other cases may be explained on the basis that the agencies did not engage in reasoned decision making—not that science was "bad."

84. Wagner, *"Bad Science" Fiction*, *supra* note 52, at 72–87; *see also* McGarity, *Our Science*, *supra* note 55, at 934 ("[T]here is little evidence that the scientific information that the agencies are currently using and disseminating is unreliable.").

failures of reasoned decision making Congress has entrusted the courts with identifying. Further, even if agencies do relatively well with positive science, administrative law contains some trouble spots that have particular ramifications for judicial review of agency science. Any analysis of super deference, therefore, would be remiss if it failed to consider those particular issues both as background building blocks and as normative guideposts—a task to which I now turn.

C. *Ossification, the Science Charade, and the Good Science Movement*

Three recurring issues of science in administrative law inform the critique of super deference: ossification, the science charade, and the good science movement. Each reveals that super deference has the potential to deepen problems that are present more broadly in administrative law and to undermine in particular the goal of incentivizing scientific transparency, accountability, and deliberation within agencies.

1. *Ossification*

The ossification hypothesis posits that, among other things, intrusive standards of judicial review make informal rulemaking increasingly burdensome and unattractive to agencies.[85] This undermines administrative-law values because it incentivizes agencies to choose other, less participatory regulatory methods, such as using nonlegislative rules.[86] With respect to science specifically, the concern is that overly stringent judicial review causes excessive gathering of scientific data and drawn-out analyses.[87] Essentially,

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85. The term is credited to Professor E. Donald Elliott, former general counsel to the EPA. *See* E. Donald Elliott et al., *Science, Agencies, and the Courts: Is Three a Crowd?*, 31 ENVTL. L. REP. 10,125, at 10,134 (2001) (comments of Thomas O. McGarity). Whether judicial review actually causes ossification is hotly contested. There are many supporters of that hypothesis. *E.g.*, STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION 49 (1993); McGarity, *supra* note 17, at 528 ("[T]he courts have played a prominent role in the ossification of informal rulemaking."); McGarity, *Deossifying*, *supra* note 10, at 1419 ("The predictable result of stringent 'hard look' judicial review of complex rulemaking is ossification."); Richard J. Pierce, Jr., *Seven Ways to Deossify Agency Rulemaking*, 47 ADMIN. L. REV. 59, 65 (1995) ("With the exception of a few agencies, the judicial branch is responsible for most of the ossification of the rulemaking process."); 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, 308–13. There are also numerous detractors. *See* William S. Jordan, III, *Ossification Revisited: Does Arbitrary and Capricious Review Significantly Interfere with Agency Ability to Achieve Regulatory Goals Through Informal Rulemaking?*, 94 NW. U. L. REV. 393 (2000); Mark Seidenfeld, *Why Agencies Act: A Reassessment of the Ossification Critique of Judicial Review*, 70 OHIO ST. L.J. 251 (2009).

86. McGarity, *Deossifying*, *supra* note 10, at 1386. Empirical studies have had difficulty verifying this assertion. *See* Cary Coglianese, *Empirical Analysis and Administrative Law*, 2002 U. ILL. L. REV. 1111, 1127–31 ("[A] retreat from rulemaking in the face of stringent judicial review is not nearly as clear as has been generally supposed."); *see also* Anne Joseph O'Connell, *Political Cycles of Rulemaking: An Empirical Portrait of the Modern Administrative State*, 94 VA. L. REV. 889, 923, 963–64 (2008) (discussing empirical findings suggesting agencies engage in considerable notice-and-comment rulemaking and are therefore not greatly ossified).

87. Jordan, *supra* note 85, at 395.

agencies will make every effort to ensure a thorough record that can withstand review the first time around, slowing the process.[88] This particular prediction, focused on science, would be quite difficult to test empirically, and it does not appear to have been so tested.[89] Nevertheless, it seems a matter of common sense that agencies are mindful of the possibility of judicial review for major rulemakings and would therefore approach rulemaking more deliberately.

At first blush, it seems that super deference might contribute to deossification, at least at the margins. If super deference means courts will not take a hard look at agency science, agencies should not feel compelled to amass the volumes of supporting scientific materials that they normally would in order to justify their decisions. There are at least two problems with this prediction, however. First, as I demonstrate below, super deference lacks enough guiding principles to be predictable. Moreover, it is difficult to predict whether a court will actually use super deference; the enduring prevalence of the hard-look approach would likely incentivize agencies to err on the side of more, not less, scientific record-building at the decision-making stage.

Second, super deference could provide a counterincentive that exacerbates the ossification problem and undermines administrative-law values: if agencies know scientific determinations get the most deference, they might logically increase the amount of scientific data underpinning their decisions to ensure those decisions will be classified by the courts as "scientific determinations." As discussed below, this is a major feature of the science charade. And indeed, early criticisms of *Baltimore Gas* made this very point.[90] This approach does nothing to further transparency, as it obfuscates the true bases for decisions. Nor does it further participation: if the public is already daunted by the amount of science in agency decision making, adding more, unnecessary science surely does not help.

2. *The Science Charade*

The "science charade" posits that agencies cloak policy decisions in a shroud of science, exaggerating the role of science to the detriment of administrative-law values, statutory goals, and science itself.[91] As Professor Wagner explains in her illuminating work on toxic risk regulation, agency scientists and bureaucrats fail to identify the gaps left by uncertain science or to reveal the policy choices made to fill those gaps.[92] This might take the form of agency scientists searching indefinitely for scientific answers that

88. McGarity, *Deossifying*, *supra* note 10, at 1400–01; *see also id.* at 1401 ("The courts can also impose analytical requirements in a more direct way by reading into agency statutes analytical obligations not obvious in Congress's words.").

89. *See* Jordan, *supra* note 85, at 395.

90. *See infra* text accompanying note 176.

91. The classic account is Professor Wagner's *Science Charade*, *supra* note 9.

92. *Id.* at 1629.

do not exist, or of scientists inserting their own policy choices into their analyses but characterizing their results as based only on science.[93] The science charade might also involve intentional or even premeditated characterizations of decisions as based on science even if those decisions are really somewhat arbitrary.[94] These behaviors undercut transparency because they do not make clear precisely how an agency reached its decision. They also hinder participation and accountability because they drown policy choices in inaccessible science.[95]

Several legal incentives have been blamed for the charade, the most important for our purposes being the parameters of judicial review.[96] As explained above, the reasoned decision-making requirement means that courts expect agencies to explain their decisions in a reasonable way. Agencies must therefore support their scientific decisions with scientific evidence. If agencies know courts will look for scientific explanations for scientific determinations, the agencies are incentivized to err on the side of amassing large volumes of science in the record. This leads to the underrepresentation of the myriad policy decisions being made, which are not considered scientific and thus do not seem to support scientific determinations.[97] Furthermore, this amassing of science feeds into the ossification hypothesis: if agencies are spending more time creating large records and obscuring the true bases for their decisions, they are necessarily slowing down the rulemaking process.

As it does with ossification, super deference would seemingly contribute to the science charade. If agencies know that courts will be at their most deferential when reviewing scientific determinations, they will rationally emphasize the scientific aspects of their decisions to the detriment of clearly identifying the policy decisions filling the scientific gaps.[98]

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93. *Id.* at 1632.

94. *Id.* at 1640, 1644.

95. *See id.* at 1674–77.

96. Other possibilities include the public participation requirement of the APA, *id.* at 1654–55, perverse incentives set up through interest group oversight, *id.* at 1657, and science-based legislative mandates, *id.* at 1667.

97. There has been some suggestion that agencies are punished if they make explicit that they have made policy choices in light of scientific uncertainty. *Id.* at 1663 & n.183. But in light of the super-deference principle's grounding in the Supreme Court's view that agencies are the appropriate policymaking branch—and the *Baltimore Gas* facts themselves, in which the agency was forthcoming about scientific uncertainty and policy—it seems that other factors may better explain remands even where agencies have been explicit. Indeed, Professor Bressman has explained the remand in *State Farm* as influenced by the Court's perception that the agency needed to make explicit the political factors influencing its decision. Bressman, *Procedures as Politics*, *supra* note 7, at 1783 ("One message to the agency was to better cloak its politically based decisions in technical dress. Another was to reveal the political as well as the technical basis for its decisions.").

98. *See* Wagner, *Science Charade*, *supra* note 9, at 1665–66 ("By insisting on technical justifications on the one hand and pledging not to scrutinize the accuracy of the technical explanations on the other, the courts not only fail to prevent the science charade, they make it almost obligatory.").

3. *The Good Science Movement*

As noted earlier, most judicial challenges to agency science are directed not so much at the science as at the meta-, meso-, and protopolicy decisions embedded in the science. Nevertheless, these challenges are often packaged as "pure" science challenges, with challengers arguing that agencies have used unreliable "junk" science. In the courts, the junk science debate centers on *Daubert v. Merrell Dow Pharmaceuticals Co.*[99] In the agencies, *Daubert* has likewise become the metaphor for "good science." Proposals (and some reforms) centered on extending *Daubert* to the administrative-law context have targeted the agencies themselves,[100] executive oversight,[101] and judicial review.[102] There has been much debate on the merits of these proposals,[103] and there remains the more basic question whether such reforms are necessary in the first place.

Still, most people can probably agree that judicial review ought to reinforce an agency's use of "good" science as much as possible, while avoiding the tendency to legitimize "bad" science. In other words, we want our judicial outcomes, as much as our substantive administrative law, to capture the state of science as accurately as possible.[104] Thus, judicial review of agency science ought to maximize both good science and administrative-law values. Related to the science charade, legal rules ought to seek ways to improve transparency so that science-based policy challenges can be unveiled and examined for what they really are.

With these points in mind, I highlight one proposed "good science" reform for its marked contrast to super deference: regulatory *Daubert*. Proponents of this approach argue that courts should engage in *Daubert*-like

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99. 509 U.S. 579 (1993). In *Daubert*, the Supreme Court held that Federal Rule of Evidence 702 requires courts to act as gatekeepers to determine whether scientific evidence is reliable and relevant. *Id.* at 589.

100. *E.g.*, Paul S. Miller & Bert W. Rein, *"Gatekeeping" Agency Reliance on Science and Technical Materials After* Daubert*: Ensuring Relevance and Ability in the Administrative Process*, 17 TOURO L. REV. 297, 324–27 (2000) (arguing for a *Daubert* executive order).

101. Information Quality Act of 2001 ("IQA"), Pub. L. No. 106-554, § 515, 114 Stat. 2763A-153–154 (2000); *see* Johnson, *supra* note 69, at 41 (criticizing the IQA); Wendy E. Wagner, *Importing* Daubert *to Administrative Agencies Through the Information Quality Act*, 12 J. LAW & POL'Y 589, 597 (2004) (commenting that certain IQA petitions "bear a striking resemblance to *Daubert* motions"). Another reform targeting information disclosure is the Shelby Amendment, which requires federal agencies to make research data available to the public in certain circumstances. FY 1999 Omnibus Appropriations Act, 144 CONG. REC. H11178 (daily ed. Oct. 19, 1998).

102. *E.g.*, Raul & Dwyer, *supra* note 83.

103. Merits, and criticisms, have been extensively debated in the scholarly literature. *See, e.g.*, Wagner, *"Bad Science" Fiction*, *supra* note 52 (criticizing reforms and questioning the premise of bad science).

104. *See* Stephen J. Breyer, Assoc. Justice, Supreme Court of the United States, Speech, The Interdependence of Science and Law (Feb. 16, 1998), *available at* http://www.aaas.org/spp/yearbook/chap9.htm (revised transcript) (courts ought to aim for decisions that "approximately reflect the scientific state of the art").

scrutiny of agency science on judicial review.[105] According to proponents of Daubertized review, enhanced judicial scrutiny of agency science is necessary because "agency decisions too often either disregard scientific evidence or reflect public policy considerations merely masked as science."[106] The *Daubert* principles, they argue, are consistent with the reasoned decision-making requirement and would enhance the consistency of judicial review.[107]

Critics of this approach have far outweighed supporters.[108] *Daubert*, of course, is inapplicable in a strict sense because it governs admissibility under the Federal Rules of Evidence.[109] When courts review agencies, by contrast, that review is usually limited to a record already in existence. More fundamentally, if *Daubert* operates as a check on a generalist judiciary (in the sense that it combats the problem of courts admitting junk science), it seems odd to think that the generalist judiciary ought to wield it against the expert agencies.[110] This is particularly true considering the policy decisions embedded in agency science and the courts' institutional role vis-à-vis agencies: *Daubert* fails to account for these important considerations that go beyond, for example, private tort litigation.[111]

Even if courts have rejected invitations to expressly apply *Daubert* to agency science, a few have used the "spirit of *Daubert*" to inform their analysis. That

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105. *E.g.*, Raul & Dwyer, *supra* note 83, at 7 ("*Daubert* provides a suitable framework for reviewing the quality of agency science and the soundness of agency decisions . . . ."); Miller & Rein, *supra* note 100, at 298 ("In our view, [the *Daubert*] principles require federal courts reviewing administrative actions to enforce the same 'gatekeeper' standards as those courts now require when reviewing a trial court's treatment of scientific and technical evidence.").

106. Raul & Dwyer, *supra* note 83, at 9.

107. *See* Elliott et al., *supra* note 85, at 10, 129–30 (comments of Alan Charles Raul).

108. *See, e.g.*, Thomas O. McGarity, *On the Prospect of "Daubertizing" Judicial Review of Risk Assessment*, LAW & CONTEMP. PROBS., Autumn 2003, at 155; Wagner, *"Bad Science" Fiction*, *supra* note 52.

109. Courts have uniformly concluded that *Daubert* does not apply to judicial review of agency action, and have invoked various justifications. *See, e.g.*, Lobsters, Inc. v. Evans, 346 F. Supp. 2d 340, 344 (D. Mass. 2004) ("*Daubert* and its progeny interpret the Federal Rules of Evidence, however, and the federal rules of evidence [sic] do not apply to NOAA hearings."); Stewart v. Potts, 996 F. Supp. 668, 678 n.8 (S.D. Tex. 1998) ("It does not apply to APA review of agency action. . . . The agency in this case is the factfinder, and the Court must give a high degree of deference to its expertise."). Another explanation stems from separation-of-powers values. *See, e.g.*, Sierra Club v. Marita, 46 F.3d 606, 622 (7th Cir. 1995) ("While such a proposal might assure better documentation of an agency's scientific decisions, we think that forcing an agency to make such a showing as a general rule is intrusive, undeferential, and not required."). Agencies have likewise rejected requests to use *Daubert* as part of their rulemakings. *See* Claire R. Kelly, *The Dangers of* Daubert *Creep in the Regulatory Realm*, 14 J.L. & POL'Y 165, 187–89 (2006) (collecting examples).

110. *See* Elliott et al., *supra* note 85, at 10,137 (comments of Richard Pierce) ("Federal judges don't know much about science. They know a lot less about science than do agencies."); McGarity, *supra* note 108, at 156 ("Judges' limited competence in areas involving scientific data and analysis, complex modeling exercises, and large uncertainties is well recognized in administrative law and has been effectively demonstrated by the courts themselves in post-*Daubert* toxic torts opinions."); Wagner, *"Bad Science" Fiction*, *supra* note 52, at 97 ("[I]f the courts' scientific competency is less than that of the party they are reviewing, it is unclear what the courts are contributing to the exercise.").

111. *See* McGarity, *supra* note 108, at 156 ("Assigning a *Daubert*-like gatekeeper role to courts engaged in judicial review of agency risk assessments is a profoundly bad idea.").

is, they acknowledge *Daubert* is not directly applicable but use the *Daubert* standard of reliability to assess the weight of the scientific information that was before an agency when it made its decision. The "spirit of *Daubert*" cases seem largely confined to the Seventh Circuit and judicial reviews of agency adjudication,[112] but there is some indication that the concept is spreading.[113] Moreover, at least one scholar has warned of a *Daubert* creep in which courts may be applying a sort of de facto *Daubert* analysis without making clear that they are doing so.[114] This proposition is difficult to test, and the few cases cited for this proposition might be explained as examples of straightforward hard-look review.[115] Even so, an implicit Daubertization would be subject to the same criticisms as an explicit approach, with the additional concern that judicial opinions would be less transparent.

There are many contrasts to be drawn between super deference and Daubertization. While *Daubert* requires judges to act as gatekeepers, assessing scientific evidence against the norms of science itself, super deference means that courts will defer to the agencies' choices regarding the reliability of science. Unlike *Daubert*, super deference does not ask judges to dig deeply into agency science, recognizing that judges are the generalists and agencies the experts. And super deference is built on an understanding that agencies are the proper policymaking institution; it thus avoids the fear that Daubertization would impermissibly mire judges in policymaking because agency science is such a policy-laden enterprise. In these senses, then, the Daubertization debate makes super deference look like a good idea.

Yet this conclusion is not entirely satisfactory. *Daubert* is directed to reliability, not reasonableness, and as discussed above, super deference does not necessarily identify lack of reason. Further, super deference has its ossification and science charade shortcomings, and as demonstrated below, it is undermined in its own right by its context, reasoning, and application. Even so, the *Daubert* debate has always been helpful for placing the spotlight on

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112. *See, e.g.*, Pasha v. Gonzales, 433 F.3d 530, 535 (7th Cir. 2005) (concluding expert should not have been permitted to testify); Rodriguez Galicia v. Gonzales, 422 F.3d 529, 539 (7th Cir. 2005) (invoking "spirit" to reason that nothing in experts' curricula vitae indicated that they were unqualified); Niam v. Ascroft, 354 F.3d 652, 660 (7th Cir. 2004) ("[T]he spirit of *Daubert* . . . does apply to administrative proceedings. . . . 'Junk science' has no more place in administrative proceedings that in judicial ones."); Peabody Coal Co. v. McCandless, 255 F.3d 465, 469 (7th Cir. 2001) ("An agency must *act* like an expert if it expects the judiciary to treat it as one.").

113. *See, e.g.*, McElmurray v. U.S. Dep't of Agric., 535 F. Supp. 2d 1318, 1325 (S.D. Ga. 2008) ("While *Daubert* does not apply to agency decisions in any formal respect, the principles underlying that decision do apply." (citing *Pasha*, 433 F.3d at 535)).

114. *See* Kelly, *supra* note 109.

115. *See* Cellular Phone Taskforce v. FCC, 205 F.3d 82, 90 (2d Cir. 2000) (citing Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins., 463 U.S. 29, 43 (1983)); Miller & Rein, *supra* note 100, at 316–18 (citing *Cellular Phone Taskforce* for proposition that courts are implicitly applying a *Daubert* review model); *see also* U.S. Steel Mining Co. v. Dir., Office of Workers' Comp. Programs, 187 F.3d 384, 388–89 (4th Cir. 1999) (finding in 5 U.S.C. § 556(d) support for the proposition that ALJs must perform "a gate keeping function while assessing evidence to decide the merits of a claim").

judicial strengths and weaknesses vis-à-vis science.[116] The problem, then, is fitting the generalist judiciary understanding arising from *Daubert* together with the very different context of judicial review of agency science.

II. SUPER DEFERENCE: A CRITICAL ASSESSMENT

As is already clear, agencies enjoy considerable deference from courts when they act within their expertise. For political and practical reasons, this makes sense. Not only are agencies accountable to the elected executive, but they have been created largely by Congress for the purpose of performing the work of experts. Both these characteristics serve a legitimizing function and provide authority for agencies to make policy decisions. Courts, on the other hand, involve unelected, generalist judges; while the judicial check also serves to legitimize agencies, §§ 706(2)(A) and (D) of the APA set limits on the scope of judicial scrutiny.

Even though, as a baseline matter, agencies receive great deference, the super-deference principle considers agencies' scientific and technical endeavors as deserving of *even more* deference. This Part begins by tracing the origins of super deference, revealing that it is in some ways an anomaly born of the legal climate and the nuclear energy debate. Next, the Part evaluates the flagship super-deference case, *Baltimore Gas*, in detail, illustrating further the principle's singularity. Taken with the concerns raised above, this analysis leaves little to commend super deference from a theoretical perspective. Turning to a practical perspective, this Part evaluates major super-deference opinions and finds little in the way of principled application.

A. *Historical Antecedents and Deference to Agency Expertise*

To understand the context of *Baltimore Gas*, it is important to start with the rise of modern administrative law from the New Deal and the enactment of the APA.[117] Coming on the heels of the *Lochner* era,[118] the post-New Deal period reflected an expertise model of administrative law.[119] There was, at this time, great faith in the "ability of experts to develop effective solutions

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116. *See generally* Edward K. Cheng & Albert H. Yoon, *Does* Frye *or* Daubert *Matter? A Study of Scientific Admissibility Standards*, 91 VA. L. REV. 471 (2005) (so concluding).

117. For a detailed account of administrative law beginning in the 1800s, see Robert L. Rabin, *Federal Regulation in Historical Perspective*, 38 STAN. L. REV. 1189 (1986); *see also* Bressman, *supra* note 7, at 1758–67 (describing progression of eras in administrative law); Richard B. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1667 (1975) (providing a descriptive and a critical historical account).

118. *See* Lochner v. New York, 198 U.S. 45 (1905). For a detailed historical account of rate-making, its interplay with the *Lochner* era, and its ultimate demise in what I consider to be a super-deference predicate case, *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944), see Steven Siegel, *Understanding the* Lochner *Era: Lessons from the Controversy Over Railroad and Utility Rate Regulation*, 70 VA. L. REV. 187 (1984).

119. Bressman, *supra* note 7, at 1759; *see also* Stewart, *supra* note 117, at 1678.

to the economic disruptions created by a market system."[120] Indeed, economic regulations were the most common, such as those governing ratemaking by railroads and utilities.[121] Judicial review was characterized by great deference on account of the agencies' expertise.

Things had changed by the late 1960s and 1970s, however. Congress enacted a sweeping array of health, safety, and environmental statutes such as the Occupational Safety and Health Act,[122] the Consumer Product Safety Act,[123] the Clean Air Act,[124] the Clean Water Act,[125] and the National Environmental Policy Act.[126] Suddenly agencies were doing much more than making the economic predictions that had been their bread and butter since the New Deal; they were being asked to set standards under significant scientific uncertainties, where the stakes were potentially life-and-death.

Agencies were making procedural changes as well. While adjudication had been a staple of agency policymaking, agencies were now using informal rulemaking as the primary vehicle for setting policy.[127] As noted earlier, the governing APA provision, § 553, provides far fewer requirements for informal rulemaking than the formal requirements set forth in §§ 556–57. Thus, informal procedures provided more efficient means for agencies to make law, and agencies took advantage of those procedures in the face of dramatically increased workloads.

Since the New Deal, judicial review had taken a laissez-faire approach to agencies, who after all were viewed as experts in administering what was largely economic regulation. But as Congress began mandating specific protective standards, it seemed that perhaps agencies needed to arrive at the

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120. Rabin, *supra* note 117, at 1266–67.

121. For example, the *Hope Natural Gas* Court explained its deferential approach:

> It is not the theory but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the Act is at an end. The fact that the method employed to reach that result may contain infirmities is not then important. Moreover, the Commission's order does not become suspect by reason of the fact that it is challenged. It is the product of expert judgment which carries a presumption of validity.

320 U.S. at 602.

122. The Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, 84 Stat. 1592 (codified as amended at 29 U.S.C. §§ 651–678 (2006)).

123. Consumer Product Safety Act of 1972, Pub. L. No. 92-573, 86 Stat. 1207 (codified as amended at 15 U.S.C. § 2051-84 (2006)).

124. Clean Air Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676 (codified as amended at 42 U.S.C. §§ 7401–7671q (2006)).

125. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 86 Stat. 816 (codified as amended at 33 U.S.C. §§ 1251–1387 (2006)).

126. National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified at 42 U.S.C. §§ 4321–4370f (2006)).

127. J. Skelly Wright, *The Courts and the Rulemaking Process: The Limits of Judicial Review*, 59 CORNELL L. REV. 375, 375 (1974); *see also* McGarity, *Deossifying*, *supra* note 10, at 1385 (calling 1970s "rulemaking era"). This change was also facilitated by the Supreme Court's opinion in *United States v. Florida East Coast Railway Co.*, 410 U.S. 224 (1973), which established a presumption against formal rulemaking.

"Right Answer."[128] And as agencies used less formal procedures for arriving at their answers, it seemed to many courts that there was not enough information available when it came to judicial review.[129] Against this backdrop, the judiciary made an important shift critical to understanding super deference.

This shift moved the courts from deference to agency expertise to a period of both substantive scrutiny and the imposition of additional procedure. In fact, two camps emerged, one advocating substantive methods and the other procedural methods for achieving meaningful judicial review.[130] The substantive approach, exemplified by Judge Leventhal's opinion in *International Harvester Co. v. Ruckelshaus*,[131] required that agencies be prepared to defend their methodologies as "reliable," and encouraged courts to delve deeply into the agencies' scientific and technical determinations.[132] The second camp, exemplified by Judge Bazelon's concurrence in *International Harvester*, worried that courts lacked the technical expertise to scrutinize agency science so carefully;[133] instead, this camp espoused court-imposed procedures meant to ensure "a reasonable decision-making process."[134]

This latter approach—imposing procedures on agencies beyond those required by the APA—became known as "hybrid rulemaking."[135] And of critical importance, *Baltimore Gas*'s pedigree includes the landmark case *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*,[136] in which the Supreme Court rejected judicially imposed hybrid rulemaking procedures.[137] *Vermont Yankee* involved the Natural Resources Defense Council's ("NRDC") challenge to the NRC's grant of a license

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128. Rabin, *supra* note 117, at 1311; *see also* Int'l Harvester Co. v. Ruckelshaus, 478 F.2d 615, 648 (D.C. Cir. 1973) ("It is in this perspective that we have not flinched from our discussion of the economic and ecological risks inherent in a 'wrong decision' by the Administrator."). Note that the industry capture model of agency behavior also gained ground during this period, raising skepticism about agencies' abilities to regulate solely in the public interest. *See* ROGER G. NOLL, REFORMING REGULATION: AN EVALUATION OF THE ASH COUNCIL PROPOSALS 40–43 (1971).

129. *See* Rabin, *supra* note 117, at 1309 ("[T]he courts were centrally concerned with the question of how to control effectively the exercise of administrative discretion in the singularly perplexing cases of scientific and technological complexity. Deference to traditional processes of informal rulemaking and adjudication in such cases appeared to be tantamount to surrendering the function of judicial review.").

130. *Id.* at 1307. Note how the modern Daubertization debate echoes these themes. *Supra* text accompanying notes 99–111.

131. 478 F.2d 615.

132. *Id.* at 645, 647.

133. *Id.* at 651 (Bazelon, C.J., concurring) ("I recognize that I do not know enough about dynamometer extrapolations, deterioration factor adjustments, and the like to decide whether or not the government's approach to these matters was statistically valid. Therein lies my disagreement with the majority.").

134. *Id.*

135. *See* Clark Byse, Comment, Vermont Yankee *and the Evolution of Administrative Procedure: A Somewhat Different View*, 91 HARV. L. REV. 1823, 1823 (1978) (calling hybrid rulemaking an "unwholesome trend").

136. 435 U.S. 519 (1978).

137. *See* Rabin, *supra* note 117, at 1309 (calling *Vermont Yankee* "[t]he key case that questioned an expansive conception of judicial review" that had arisen in this era).

(under the predecessor to the *Baltimore Gas* zero-release assumption) to Vermont Yankee Nuclear Power Corporation to operate a nuclear power plant.[138] The D.C. Circuit vacated and remanded because it perceived deficiencies in the agency's rulemaking procedures.[139] As the court explained, it could not perform its duty to review the administrative record because inadequate procedures led to underdeveloped factual issues regarding waste disposal.[140]

The Supreme Court reversed, holding that courts may not impose procedures on agencies beyond those found in the APA. In so doing, the Court emphasized that agencies are better situated than courts to design procedures appropriate for their respective regulated entities.[141] More specifically, the Court invoked separation-of-powers concerns by rooting its analysis in the institutional structure whereby Congress entrusts agencies with substantive functions.[142] It specifically rejected NRDC's argument that courts were free to require extra procedures, when, among other things, the agency's proposed rule addressed complex or technical factual issues.[143] Essentially, the Court was concerned that judicially imposed procedures interfered with Congress's design of the APA, which left considerable discretion to agencies as to the format for informal rulemaking.[144] Further, the possibility of such hybrid procedures stood to undermine the values of uniformity and predictability.[145] The Court remanded for review of whether the original rule had support in the administrative record; ultimately, the NRC adopted the zero-release rule which was then challenged in the D.C. Circuit, and this time reviewed substantively under the name *Baltimore Gas*.[146]

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138. *Vermont Yankee*, 435 U.S. 519. In a second decision also before the Supreme Court in *Vermont Yankee*, the D.C. Circuit had remanded a decision of the NRC to grant a permit to construct another plant to Consumers Power Company. Aeschliman v. NRC, 547 F.2d 622 (1976).

139. Natural Res. Def. Council, Inc. v. NRC, 547 F.2d 633, 653 (D.C. Cir. 1976), *rev'd sub nom.* Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc. 435 U.S. 519 (1978).

140. *Id.* at 654.

141. *Vermont Yankee*, 435 U.S. at 524–25 (citing FCC v. Schreiber, 381 U.S. 279, 290 (1965)).

142. *Id.* at 525. Indeed, the Court cited its opinion in *SEC v. Chenery*, 332 U.S. 194, 196 (1947), for the proposition that allowing court-imposed procedures would "propel the court into the domain which Congress has set aside exclusively for the administrative agency."

143. 435 U.S. at 545.

144. *Id.* at 548.

145. *Id.* at 546–47.

146. *See* Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 92–95 (1983) (describing history). Note that *Vermont Yankee* and *Baltimore Gas* were part of a broader progression toward great deference that ushered in the presidential era of administrative law. *See* Elena Kagan, *Presidential Administration*, 114 HARV. L. REV. 2245, 2246–49 (2001). As exemplified by *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984), this model grounds administrative law in the president's accountability and constitutional policymaking role. *See* Bressman, *Procedures as Politics*, *supra* note 7, at 1764 (describing presidential control model of administrative law as reflected by increasing judicial deference to agency decisions, the most prominent example being *Chevron*). Taken together, these cases represent a Court growing more willing to once again revert to deference to agencies on matters within their expertise.

B. Baltimore Gas *Scrutinized*

As noted above, *Baltimore Gas* involved another challenge to the NRC's "zero-release assumption."[147] Recall that the rule required licensing boards deciding whether to license nuclear power plants to make the generic assumption that permanent storage of certain nuclear waste would have no impact on the environment; that is, there would be zero chance of release.[148] Following the *Vermont Yankee* remand, the substantive reasonableness of that assumption was at the heart of the case.[149]

The NRC had acknowledged that the risks of a long-term repository failure were uncertain.[150] However, it predicted that an appropriate site could be found that would maintain its integrity, and it also explained that the optimism of the zero-release assumption would be offset by other more precautionary assumptions that licensing boards were required to make.[151] The D.C. Circuit held that the zero-release assumption was arbitrary and capricious.[152] Because the NRC had failed to factor the uncertainties surrounding the assumption into the licensing process in such a way that it could potentially be outcome-determinative in an individual licensing proceeding, the appellate court reasoned, the assumption failed NEPA's requirement that an agency consider all significant environmental risks from its proposed action.[153] Alternatively, the assumption required licensing boards to ignore factors relevant to NEPA, which was a clear error in judgment and therefore arbitrary and capricious.[154]

The Supreme Court rejected these rationales, citing three factors as critically important. First, the zero-release assumption was established for a very limited purpose, and other more comprehensive programs had been created for the broader purpose of evaluating long-term waste disposal technologies.[155] Second, the assumption was a single figure in an entire table, and the overall table represented a precautionary, over-conservative approach.[156] Next, the Court made its super-deference pronouncement:

> [A] reviewing court must remember that the Commission is making predictions, within its special area of expertise, at the frontiers of science. When examining this kind of scientific determination, as opposed to sim-

147. 462 U.S. at 89–90.

148. *Id.*

149. *Id.* at 92.

150. *Id.* at 94.

151. *Id.* at 94–95. The agency also rejected the option of having licensing boards reconsider those uncertainties in individual licensing proceedings, explaining that this was a generic question properly dealt with in rulemaking. *Id.* at 95–96.

152. *Id.*

153. *Id.*

154. *Id.* at 96.

155. *Id.* at 101–02.

156. *Id.* at 102–03.

> ple findings of fact, a reviewing court must generally be at its most deferential.[157]

Later, the Court emphasized that the zero-release assumption was a policy judgment[158]:

> We are acutely aware that the extent to which this Nation should rely on nuclear power as a source of energy is an important and sensitive issue. Much of the debate focuses on whether development of nuclear generation facilities should proceed in the face of uncertainties about their long-term effects on the environment. Resolution of these fundamental policy questions lies, however, with Congress and the agencies to which Congress has delegated authority, as well as with state legislatures and, ultimately, the populace as a whole. Congress has assigned the courts only the limited, albeit important, task of reviewing agency action to determine whether the agency conformed with controlling statutes. As we emphasized in our earlier encounter with these very proceedings, "[a]dministrative decisions should be set aside in this context, as in every other, only for substantial procedural or substantive reasons as mandated by statute . . . , not simply because the court is unhappy with the result reached."[159]

Under the *Overton Park* standard, the agency had considered the relevant factors and "articulated a rational connection between the facts found and the choice made," and so its action was not arbitrary and capricious.[160]

To assess the strength of the super-deference concept, three observations regarding the opinion itself are relevant. First, the super-deference principle was but one of three factors that the Court considered.[161] Viewed as a mere factor, it was probably not outcome-determinative. Indeed, given the Court's ultimate emphasis on its belief that the zero-release assumption was a policy decision, super deference was likely not necessary to the Court's decision at all. And considering that the agency's decision was made in light of scientific uncertainty, the zero-release assumption was not really a scientific determination, but a metapolicy choice.

Yet the ultimate emphasis on policy raises questions about a second observation. In its statement of super deference, the Court distinguished between "scientific determination[s]" and "simple findings of fact." But there was neither guidance as to how to delineate the two nor any explanation of the mechanics of applying the *Overton Park* standard in different ways for each. Further, why should the distinction matter if the zero-release assumption was not a scientific determination at all, but rather a policy decision? Was this statement of super deference almost dictum?

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157. *Id.* at 103.

158. *Id.* at 105.

159. *Id.* at 97 (quoting Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519, 558 (1978)).

160. *Id.* at 105–06 (citing Bowman Transp., Inc. v. Arkansas-Best Freight Sys., Inc., 419 U.S. 281, 285–86 (1974); Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402 (1971)).

161. *Id.* at 101–03.

This question haunts the opinion, particularly given the final observation about *Baltimore Gas*'s reasoning: as authority for super deference, the Court cited the *Benzene* case.[162] It is a stunning use of authority, because the *Benzene* decision is known not for its extreme deference, but for the plurality's poor treatment of science and particularly *un*-deferential approach.[163]

In *Benzene*, the Court struck down OSHA's health standard limiting occupational exposure to benzene. Reduced to its essence, the opinion took issue with OSHA's methodology: "The agency made no finding . . . that exposure to benzene at or below the 10 ppm level had ever in fact caused leukemia."[164] The Court seemed to review the scientific evidence before OSHA anew, criticizing OSHA's decisions regarding the strength of various studies and its assumptions regarding risk.

Indeed, as Justice Marshall's dissent in *Benzene* highlighted, "[t]he critical problem in cases like the ones at bar is scientific uncertainty."[165] He emphasized that "judicial review under the substantial evidence test is ultimately deferential"[166] and took the majority to task for substituting its judgment for that of the agency. Although he acknowledged that judicial review is difficult where there is a high level of technical complexity, he emphasized that factual issues may not be subject to any definitive resolution.[167] And "when the question involves determination of the acceptable level of risk, the ultimate decision must necessarily be based on considerations of policy as well as empirically verifiable facts."[168]

Not only does the *Benzene* plurality fail generally to support any sort of super deference, the specific portion of the *Benzene* plurality opinion to which *Baltimore Gas* cites fails to support the sweeping regular facts-scientific determination distinction. The *Benzene* plurality stated that OSHA's statutory mandate, which allowed the secretary to regulate on the basis of the "best available evidence," gave OSHA "some leeway where its findings must be made on the frontiers of scientific knowledge."[169] Neither

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162. Indus. Union Dep't, AFL-CIO v. Am. Petroleum Inst. (*Benzene*), 448 U.S. 607 (1980) (plurality opinion).

163. There are numerous criticisms of the case. *See, e.g.*, Wagner, *"Bad Science" Fiction*, *supra* note 52, at 119 n.245 (collecting opinions that have cited *Benzene* for raising the burden of proof beyond what may be called for in statutory mandates); Elliott et al., *supra* note 85, at 10,137 (comments of Richard J. Pierce, Jr.) ("Anyone who has had Toxicology 101, even if they got a D in it, can see that the risk that the [*Benzene*] court calls trivial is much larger than the risk the court calls plainly unacceptable. I don't want fools like that messing around with science, and that's the *best* of our judiciary.").

164. 448 U.S. at 634.

165. *Id.* at 690 (Marshall, J., dissenting); *see also id.* at 662 (Burger, C.J., concurring) ("These cases press upon the Court difficult unanswered questions on the frontiers of science and medicine.").

166. *Id.* at 705 (Marshall, J., dissenting).

167. *Id.* at 705–06.

168. *Id.* at 706; *cf. id.* at 693 ("[T]he requirement that the Secretary act on the basis of 'the best *available* evidence' was intended to ensure that the standard-setting process would not be destroyed by the uncertainty of scientific views.").

169. *Id.* at 656.

of the cases cited by the *Benzene* plurality is particularly valuable for understanding the super-deference principle. One, *Industrial Union v. Hodgson*, merely states the core of *Overton Park* in another way: "[W]hen the Secretary is obliged to make policy judgments where no factual certainties exist or where facts alone do not provide the answer, he should so state and go on to identify the considerations he found persuasive."[170] The other, *Society of the Plastics Industry v. OSHA*, simply cited *Hodgson* for the proposition that the secretary permissibly established a conservative exposure threshold in light of scientific uncertainty.[171]

The dubious necessity of, and support for, the super-deference principle as stated in *Baltimore Gas*, coupled with its historical background and *Vermont Yankee* pedigree, makes it possible to draw two rather different conclusions. On one hand, *Baltimore Gas*'s strong language could be viewed as a signal that the Supreme Court was retreating from its tolerance of extreme substantive scrutiny exemplified by the Leventhal approach, and evidenced by the Court itself in cases like *Benzene*.[172] On the other hand, it could simply have been a strongly worded rebuke to the D.C. Circuit to stop getting in the way of the NRC.[173] Neither possibility is particularly satisfying, and neither explains the mysterious distinction made in *Baltimore Gas* between "scientific determination[s], as opposed to simple findings of fact."[174]

Baltimore Gas received surprisingly little scholarly attention. Some commentators, critical of super deference, attempted to confine that principle to the nuclear policy debate: "[The case] sets no standard of agency behavior, but instead disrupts the institutional balance by reaffirming the Court's past practice of blocking judicial oversight of nuclear power regulation."[175] Yet the commentary also raised a more generalized concern familiar to current observers of the science charade: a highly deferential approach to scientific and technical determinations incentivizes agencies to cloak their

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170. Industrial Union v. Hodgson, 499 F.2d 467, 476 (D.C. Cir. 1974); *see id.* at 474 ("[S]ome of the questions involved in the promulgation of these standards are on the frontiers of scientific knowledge .... Decision making must in that circumstance depend to a greater extent upon policy judgments and less upon purely factual analysis.").

171. 509 F.2d 1301, 1308 (2d Cir. 1975).

172. *See* Comment, *The Emerging Jurisprudence of Justice O'Connor*, 52 U. CHI. L. REV. 389, 409 n.81 (1985) (commenting that Justice O'Connor's restraint in *Baltimore Gas* was consistent with her opposition to the judiciary's undertaking scientific judgment in abortion cases).

173. *See* Siegel, *supra* note 12, at 362 (arguing that the years immediately following *Baltimore Gas* saw a trend illustrating "the courts' general unwillingness to exercise a significant role in overseeing the operation of the nuclear power industry"); Yellin, *supra* note 12, at 1320 n.128 (calling *Baltimore Gas* cases "shadow versions of the debate about the legitimacy and long-term viability of the commercial nuclear power industry in which the courts have no institutional role").

174. Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 103 (1983).

175. Yellin, *supra* note 12, at 1323 (citation omitted); *see also* Paul Weinstein, Note, *Substantive Review Under NEPA After* Vermont Yankee IV, 36 SYRACUSE L. REV. 837, 879 (1985) (confining super-deference language to the case's facts and noting that "it entailed a decision by the NRC on whether that agency would continue to carry on a major function long committed to it—the decision of whether to continue to license nuclear reactors").

true reasoning behind an unassailable mantle of science.[176] Even so, the initial scholarly responses to *Baltimore Gas*—appearing from 1983 though 1987—had little caselaw from which to assess how *Baltimore Gas* would impact judicial review of agency science.[177] With the benefit of nearly thirty years of super deference, we can now make that assessment.

C. *Progeny and Modern Applications*

A cursory look at super deference in the caselaw suggests the principle is alive and well because it continues to be cited frequently by courts confronting agency science. The number of citations, however, is misleading. The Supreme Court has used the principle only once, and—although initially the courts seemed to take super deference to an extreme—it seems to have become meaningless boilerplate that obscures what courts are really doing: hard-look review. Even so, tracing the path of super deference is rewarding because it suggests a better normative account of the courts' role with respect to agency science.

1. *The Supreme Court*

Since *Baltimore Gas*, the only Supreme Court opinion to cite the super-deference principle is *Marsh v. Oregon Natural Resources Council*, another NEPA case.[178] There, the Court upheld the district court's judgment in favor of the Army Corps of Engineers, where the Corps determined that a supplemental Environmental Impact Statement ("EIS") was not necessary to address information that developed after the preparation of the original EIS. At issue was the construction of a dam and environmental organizations' claims that the dam would cause increased turbidity in water downstream that would impair fishing.[179] The Corps' EIS concluded that the proposed dam might occasionally impair fishing, but ultimately the Corps decided to proceed with the construction.[180] The environmental organizations argued

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176. *See* Siegel, *supra* note 12, at 346 n.82 (arguing *Baltimore Gas*'s reference to the "sheer volume" of proceedings improperly suggested an agency can comply with statutory requirements merely by amassing paper); *id.* at 377 ("One possible result of the deference rule is that agencies will strain to characterize their policy decisions, especially if they are controversial, as resting on technical or scientific judgments."); Yellin, *supra* note 12, at 1317–18 ("It remains to be seen whether as agencies grow more sophisticated in facing reviewing courts, they defeat the adaptive process, increasing their discretionary powers by drawing more of the real substance of decisions into a realm that plausibly can be described as the scientific and technological frontier."); *see also* Stever, *supra* note 15, at 68–69 (articulating two concerns about super deference: a "potential for the development of a tyranny by bureaucrat-technicians in the absence of strong minded judicial review," and the possibility that nontechnical bases for decisions may be "obscured by agency lawyers who cloak the regulation in scientific or technical buzzwords").

177. *See generally* Siegel, *supra* note 12, at 361–72 (describing opinions issued between 1983 and 1986 citing the super-deference principle).

178. 490 U.S. 360 (1989).

179. *Id.* at 378–79. Turbidity is a measure of the light that is reflected by material in water; it is an indirect measure of the amount of suspended matter in the water. *See id.* at 364 n.2.

180. *Id.* at 366–67.

that two new sources of data justified a supplemental EIS: a memo suggesting that the dam would adversely impact downstream fishing based on a draft study by the Oregon Fish and Wildlife Department and a Soil Conservation Service soil survey that could be interpreted to predict greater downstream turbidity than the EIS contemplated.[181]

Before turning to the merits, the Court resolved a dispute about the appropriate standard of review. It rejected the organizations' contention that the issue was primarily a question of law deserving no deference. Instead, the Court determined that the arbitrary and capricious standard of § 706(2)(A) applied. As the Court remarked, this was "a classic example of a factual dispute the resolution of which implicates substantial agency expertise."[182] The Court cited *Baltimore Gas* for the proposition that because analysis of the new information requires a high level of expertise, the Court should defer to the informed discretion of the agency, emphasizing that in such circumstances, the Court should be at its "most deferential."[183]

This is an intriguing use of super deference because, rather than applying it as an exercise in deference, the Court used it as authority for *which* deference ought to be applied in choosing from the options set forth in § 706 of the APA. Indeed, when the Court later turned to the merits, it cited *Overton Park* rather than *Baltimore Gas* for the standard of review and stated, "When specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive."[184] Still, the Court stated that it was nevertheless important to fulfill the role of judicial review by carefully reviewing the record to ensure the agency had made a reasoned decision.[185] The Court did not mention super deference again, and proceeded to apply an ordinary hard-look-style reasonableness review. As to the memo, the Corps had determined that its conclusions were based on a study with faulty methodology; and as to the soil survey, the Corps had undertaken a more detailed study of turbidity issues and considered more information than a simple soil survey map.[186] The Court therefore concluded that the Corps had "conducted a reasoned evaluation of the relevant information and reached a decision that, although perhaps disputable, was not 'arbitrary or capricious.' "[187]

Marsh illustrates that a special super-deference principle is not needed, and it hints at reasons why. First, the Court was obviously aware of the *Baltimore Gas* standard since it cited that case for a different proposition,

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181. *Id.* at 370.

182. *Id.* at 376.

183. *Id.* at 377 (citing Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 103 (1983)).

184. *Id.* at 378 (citing Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402 (1971)).

185. *Id.*

186. *Id.* at 382–85.

187. *Id.* at 385.

but its omission of that standard in substantive review suggests that it is superfluous. Second, the Court's use of *Overton Park* provides a justifiable basis for the omission. As the Court applied *Overton Park*, agencies were the specialists entitled to rely on their expertise to engage in reasoned decision making. While this standard was deferential—it accounted for the Corps' scientific and technical knowledge and did not dig deeply into its methodology—the Court nevertheless required the Corps to explain itself reasonably.

It is also notable that, even though the Court has encountered agencies' scientific determinations in the years following *Marsh*, it has never elaborated on the super-deference standard;[188] yet in none of those cases does the super-deference principle appear. This stands in marked contrast to the Court's ongoing willingness to defer to legislatures in matters of science, even when the legislature got some of the science wrong.[189]

Lower-court opinions do continue to cite *Baltimore Gas* and the super-deference principle. Viewed as a whole, they appear to demonstrate a trend towards reduced deference. At the same time, they fail to demonstrate any norms of principled application or, for that matter, any guiding consensus at all.

2. *Initial Lower-Court Responses*

As described above, *Baltimore Gas*'s nuclear-policy context is an important dimension to the case. Although left tacit in *Baltimore Gas*, the courts have long envisioned for themselves a "very limited role . . . in the statutory scheme regulating the construction and operation of commercial nuclear power plants."[190] This heritage made the super-deference principle easy to

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188. *See, e.g.*, Winter v. Natural Res. Def. Council, Inc., 129 S. Ct. 365, 376–78 (2008) (upholding the Navy's use of mid-frequency active sonar in training exercises against a challenge that such sonar harmed marine mammals); Alaska Dep't of Envtl. Conservation v. EPA, 540 U.S. 461, 496–501 (2004) (upholding, under § 706(2)(A), the EPA's stop-construction orders where the agency concluded that the state permitting authority made unreasonable determinations under the Clean Air Act); *cf.* Dickinson v. Zurko, 527 U.S. 150, 165 (1999) (holding the substantial evidence standard applies on judicial review of Patent and Trademark Office findings; rejecting, inter alia, the argument that a stricter clearly erroneous standard would encourage better-developed administrative records). The Supreme Court has infrequently cited *Baltimore Gas* for the proposition that NEPA assures the public that an agency has considered environmental impacts. *E.g.*, Dep't of Transp. v. Public Citizen, 541 U.S. 752, 768 (2004) (holding that an agency is not bound by NEPA); Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989) (holding that the agency complied with NEPA's mandate).

189. *See generally* Meazell *supra* note 6 (exploring this approach of "scientific avoidance" with respect to legislative science).

190. Ohio v. NRC, 814 F.2d 258, 264 (6th Cir. 1987); *see also* Massachusetts v. NRC, 924 F.2d 311, 324 (D.C. Cir. 1991) ("[T]he Commission's licensing decisions are generally entitled to the highest judicial deference because of the unusually broad authority that Congress delegated to the agency under the Atomic Energy Act."); Ohio v. NRC, 868 F.2d 810, 812 (6th Cir. 1989) ("Congress has recognized the highly technical nature of such regulations and has accordingly circumscribed the power of the courts both to review and to overturn decisions made by the NRC.") (citing *Baltimore Gas*'s super-deference principle); Siegel v. Atomic Energy Comm'n, 400 F.2d 778, 783 (D.C. Cir. 1968) (noting the Atomic Energy Act of 1954 creates "a regulatory scheme which is virtually unique in the degree to which broad responsibility is reposed in the administrative agency,

assimilate in nuclear power cases. *Carstens v. NRC*[191] provides a typical example. There, the D.C. Circuit considered a challenge to the NRC's decision to grant an operating license to a nuclear power plant in an area of seismic activity in California. In considering whether to grant the license, the licensing board conducted hearings that collected extensive evidence on the seismic activity issue.[192] As the court noted, the petitioners did not argue that the NRC had failed to follow the required procedures in addressing the seismic issue; "rather, they take issue with the substantive outcomes of those investigations. Unfortunately for them, it is in these substantive areas that this court's deference to the agency justifiably reaches its zenith."[193]

The court emphasized that the regulatory scheme at issue was "virtually unique" in the broad discretion assigned to the NRC under the Atomic Energy Act.[194] Quoting *Baltimore Gas*, the court added that "the Supreme Court has made it crystal clear that our review of NRC licensing decisions is 'limited.'"[195] And "[t]he voluminous record persuasively evidences the care with which the NRC discharged its statutory duties. Without hesitation, we find that this decision is supported by substantial evidence, and that its actions were not arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."[196]

Although the court's rhetoric was strong, it nevertheless addressed the petitioners' specific contentions and described the agency's response. The opinion further reveals that the petitioners' substantive arguments were directed at proto- and mesopolicy decisions. For example, the parties disagreed over the mesopolicy issue of how to interpret a U.S. Geological Survey ("USGS") model of one of the fault zones.[197] The licensing board's interpretation, however, was supported by record evidence: a USGS witness testified at the hearing and explained its own interpretation, which the agency found persuasive.[198] Indeed, the court, perhaps unnecessarily, stated, "Petitioners' reading of the description set forth in the USGS model . . . is entirely understandable, particularly in light of the fact that petitioners are not and do not purport to be trained seismologists."[199]

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free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives"); *cf.* Citizens Awareness Network, Inc. v. NRC, 59 F.3d 284 (1st Cir. 1995) (holding arbitrary and capricious the NRC's unexplained change in decommissioning policy, which was contrary to the agency's own regulations).

191. 742 F.2d 1546 (D.C. Cir. 1984).

192. *Carstens*, 742 F.2d at 1548–49.

193. *Id.* at 1550–51.

194. *Id.* at 1551.

195. *Id.* (quoting Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 97 (1983)).

196. *Id.*

197. *Id.* at 1555.

198. *Id.*

199. *Id.*

As another example, the petitioners contended that the agency's determination that the reactors' design was adequate to protect public safety was unsupported by substantial evidence.[200] One witness had used a mean value to arrive at the designed-for earthquake magnitude; the petitioners made the protopolicy argument that he should have used the mean-value-plus-one standard deviation.[201] Yet the court determined that the NRC's reliance on that witness was reasonable: the agency had explained the conservative assumptions inherent in his model and his findings were corroborated by other testimony.[202]

In sum, the petitioners' arguments seemed directed at policy: they argued that the scientific uncertainty associated with earthquakes coupled with the statutory requirement that reactor design be based on conservative assumptions, dictated that the court impose a different outcome.[203] But as the court explained, "[P]etitioners fundamentally misperceive the judiciary's role in complex regulatory matters. The uncertainty of the science of earthquake prediction only serves to emphasize the limitations of judicial review and the need for greater deference to policymaking entities."[204]

Because *Carstens* addressed each of the petitioners' contentions and described why the NRC had nevertheless acted reasonably, it cannot be said that the court mechanically applied super deference without exercising any oversight.[205] This is particularly true when one considers the proto- and mesopolicy nature of the petitioners' substantive arguments and the fact that reasonable experts, exercising professional judgment, could disagree on those matters. Even so, the court's strong language seemed to pit the might of science against the petitioners' relative lack of expertise. Coupled with the court's emphasis on the voluminous record, one can easily surmise that this early post-*Baltimore Gas* exemplar reinforced agency incentives to amass favorable science, stacking the deck for favorable future litigation and contributing to ossification and the science charade.[206]

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200. *Id.* at 1556.

201. *Id.* Standard deviation measures the dispersion of sample observations. GREENE, *supra* note 61, at 1020. The mean-plus-one standard deviation would have produced a more precautionary design assumption.

202. 742 F.2d at 1556.

203. *See id.* at 1557.

204. *Id.*

205. *But see* Siegel, *supra* note 12, at 366 (arguing *Carstens* demonstrates judicial willingness to mechanically apply super deference, particularly in nuclear power decisions).

206. Numerous other nuclear power opinions, many coming closely on the heels of *Baltimore Gas*, are similar to *Carstens* in their approaches and outcomes. *E.g.*, Citizens for Fair Util. Regulation v. NRC, 898 F.2d 51, 54 (5th Cir. 1990) (citing *Baltimore Gas* for the general proposition of deference and upholding the NRC's denial of a petition to intervene in a nuclear power plant licensing proceeding); Envtl. Def. Fund v. NRC, 902 F.2d 785, 788–89 (10th Cir. 1990) (citing the *Baltimore Gas* super-deference principle in the *Chevron* context with respect to a regulation of uranium and thorium mill tailings); Ohio v. NRC, 868 F.2d 810, 818–19 (6th Cir. 1989) (upholding the denial of a hearing to revoke a power plant's operating license because of challenges to its emergency preparedness plan; the NRC did not act arbitrarily where it found that adequate measures were in place should an emergency arise); Ohio v. NRC, 814 F.2d 258 (6th Cir. 1987) (rejecting a

Although there may have been reasons to confine *Baltimore Gas* to its unique nuclear-power context, the opinion itself is worded broadly, and courts were quick to incorporate the super-deference principle in other contexts. The D.C. Circuit opinion in *Motor Vehicle Manufacturers Ass'n v. Ruckelshaus* provides an example.[207] *Ruckelshaus* involved a challenge to vehicle emissions testing requirements established by the EPA pursuant to the Clean Air Act. In setting the standards, Congress mandated that the EPA ensure that its "short test" requirements—protocols for testing emissions of in-use vehicles—would correlate reasonably with tests used on preproduction vehicles.[208] The petitioners argued that the agency failed to comply with its mandate that it use "good engineering practice[s]" because short-test results could not be correlated with preproduction tests due to differences among temperature, humidity, and atmospheric pressure—a protopolicy argument.[209] The EPA explained, however, that the standards levels, or "cutpoints," it adopted, which utilized greatly simplified assumptions, were designed to result in false positives no more frequently than in preproduction tests and made variations in ambient conditions insignificant.[210]

The court reasoned that the "use of cutpoints to fudge complex technological problems" was permissible so long as it was consistent with the statutory scheme.[211] "In this respect," the court explained, "we are mindful of the Supreme Court's recent admonition" in *Baltimore Gas* that requires reviewing courts be at their most deferential when agencies act within their expertise on the frontiers of science.[212] Arguably, this factual scenario was similar to *Baltimore Gas*: faced with the inability of science and technology to fine-tune the agency's analysis, the agency made certain working assumptions that it acknowledged were imperfect. According to the court, those assumptions were accorded deference because they reflected reasoned

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challenge to the NRC's denial of a motion to intervene and reopen proceedings; would-be intervenors challenged the sufficiency of a nuclear power plant design in light of an earthquake that occurred in the plant's vicinity, but, the possibility of an earthquake had been considered in the plant design and the NRC did not act arbitrarily in refusing to reopen proceedings); Lorion v. NRC, 785 F.2d 1038, 1043 (D.C. Cir. 1986) (declining the invitation to reverse the NRC's substantive decision regarding the susceptibility of reactor vessels to pressurized thermal shock and explaining that the issue falls squarely within *Baltimore Gas*); Aamodt v. NRC (*In re* Three Mile Island Alert, Inc.), 771 F.2d 720 (3d Cir. 1985) (upholding the decision to reopen a nuclear power plant following an accident); *see also* Massachusetts v. NRC, 924 F.2d 311, 324 (D.C. Cir. 1991) (acknowledging distinctions, but illustrating that there is little practical difference between *Baltimore Gas* super deference accorded to the agencies' interpretations of their own regulations and "the heightened deference for NRC licensing decisions that flows from its broad statutory mandate").

207. 719 F.2d 1159 (D.C. Cir. 1983).

208. *Ruckelshaus*, 719 F.2d at 1161–62.

209. *Id.* at 1167. In other words, the preproduction tests took place in controlled laboratory conditions, *id.* at 1161, whereas the short tests were conducted under real-world, ambient conditions. The petitioners argued this difference was inconsistent with good engineering practices because it made the tests impossible to correlate. *Id.* at 1167.

210. *Id.*

211. *Id.*

212. *Id.* (citing Balt. Gas & Electric Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 103 (1983)).

judgment and incorporated policy choices—here, in accommodating the conflicting interests of vehicle manufacturers and the public.[213]

Yet *Ruckelshaus* is notable for the cursory look it gave to the agency's response to the ambient-conditions issue. Unlike *Baltimore Gas*, which explained the data relied on by the petitioners as well as how the agency addressed those considerations, the *Ruckelshaus* opinion is silent as to the potential impact of the petitioners' ambient conditions consideration, and it does not describe why the agency's approach amounted to "good engineering practice." In fact, the opinion cites only the agency's *ipse dixit* to support its determination that the agency acted reasonably.[214] In these respects, *Ruckelshaus* seemed to go further than *Baltimore Gas* itself. Not only did it give deference to the agency's technical determinations, but it did not even explain what those determinations were or why they were consistent with the agency's statutory mandate.[215] This approach seems unlikely to uncover administrative science errors and it does little to reinforce transparency, deliberation, or accountability.

3. *Transitions*

While the super-deference principle continued to be cited in the coming years, the extreme deference of the early post-*Baltimore Gas* period seemed to give way to a more measured approach. An illustrative case is *American Legion v. Derwinski*, in which the D.C. Circuit relied on the principle to uphold the Secretary of Veterans Affairs's ("VA") decision to abandon its study of the long-term health effects of exposure to the chemical defoliant Agent Orange.[216] The unusual statutory scheme at issue, the Agent Orange Act of

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213. *See id.* (describing agency's use of cutpoints as "a reasonable accommodation of the conflicting interests").

214. *Id.*

215. Numerous other opinions, likewise involving little analysis, were issued shortly after *Baltimore Gas*. *See, e.g.*, Am. Petroleum Inst. v. EPA, 858 F.2d 261, 264 n.3 (5th Cir. 1988) (citing *Baltimore Gas* amongst list of deferential citations in support of upholding, following remand, the EPA's best available technology determination pursuant to the CWA); Nat'l Wildlife Fed'n v. Hodel, 839 F.2d 694, 761 & n.107 (D.C. Cir. 1988) (citing *Baltimore Gas* and upholding agency regulation related to top soil storage pursuant to the Surface Mining Control and Reclamation Act, where the agency made a reasoned decision relevant to "highly technical issue"); Natural Res. Def. Council, Inc. v. EPA, 863 F.2d 1420, 1430 (9th Cir. 1988) ("Here we deal with issues not of fact or law but of scientific measurement. In assessing difficult issues of scientific method and laboratory procedure, we must defer to a great extent to the expertise of the EPA." (citing *Baltimore Gas*)); New York v. EPA, 852 F.2d 574, 580–81 (D.C. Cir. 1988) (citing super deference to support upholding the agency's interpretations of scientific evidence underpinning the denial of state petitions to reevaluate CAA implementation plants); Michigan v. Thomas, 805 F.2d 176, 182–83 (6th Cir. 1986) (citing the super-deference principle and upholding the EPA's disapproval of the state's proposed rules to control fugitive dust emissions); Hawaiian Electric Co. v. EPA, 723 F.2d 1440, 1446 (9th Cir. 1984) (citing the super-deference principle to support upholding the agency's reliance on its modeling techniques for Clean Air Act permitting). *But see* Found. on Econ. Trends v. Heckler, 756 F.2d 143 (D.C. Cir. 1985) (relying not on super deference but on *Baltimore Gas*'s more general language describing the role of NEPA in ensuring that an agency has taken a "hard look" at environmental consequences to uphold injunction on experiment using release of genetically altered bacteria).

216. 54 F.3d 789 (D.C. Cir. 1995).

1991,[217] involved a congressionally mandated study to investigate these effects in Vietnam veterans.[218] Numerous agencies were involved, including the Centers for Disease Control ("CDC"), the Office of Technology Assessment, and a presidential oversight panel. The court began by meticulously describing various failed attempts at designing a study, after which the VA issued a letter to Congress that stated:

> [N]o one has successfully identified a large enough group of Vietnam veterans known to have been exposed to Agent Orange or other herbicides to allow the preparation of a protocol and the conduct of an epidemiological study as required by [the statute]. I must, therefore, advise you that no scientifically sound study can be undertaken and request that the VA be relieved of the requirement to do this research.[219]

The American Legion challenged this determination, arguing it was arbitrary and capricious. In its recitation of the standards applicable to the challenge of this determination, the court began with typical *State Farm* and *Overton Park* language, emphasizing that it would examine challenges to the agency's scientific conclusions, but would afford those conclusions super deference.[220]

Among other things, the plaintiffs challenged the merit of the CDC's methodology in concluding that exposure estimates based on military records were not scientifically valid.[221] The court rejected this protopolicy challenge, emphasizing that the secretary had acted reasonably in the face of scientific impossibility.[222] Relatedly, the plaintiffs challenged the VA's decision to cancel the Agent Orange study. The court likewise rejected this argument, listing the various sources of evidence upon which the VA had relied, and concluding that the VA's conclusion that no scientifically valid study could be performed was reasoned.[223]

American Legion represents a transitional super-deference approach for two reasons. First, it is notable that the court included the super-deference citation in the same recitation of standards that included the hard-look *State Farm* citation. This usage hints that super deference was becoming boilerplate—a suggestion confirmed by later cases.[224] Second, although lacking in detailed analysis, the opinion presented a sufficiently full discussion of the

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217. Pub. L. No. 102-4, § 2(a)(1), 105 Stat. 11 (1991) (codified as amended at 38 U.S. § 1116 (2006)).

218. Am. Legion v. Derwinski, 827 F. Supp. 805, 807 (D.D.C. 1993), *aff'd*, 54 F.3d 789 (D.C. Cir. 1995).

219. 54 F.3d at 794.

220. *Id.* at 795.

221. *Id.* at 799.

222. *Id.* at 801. On this same point, the district court had opined, "At the heart of plaintiffs' arguments, however, is a challenge to the scientific merit of the CDC's research rather than the rationality of its conclusion. . . . [T]he Court finds that the CDC's methodology and research exhibit reasoned decisionmaking . . . ." 827 F. Supp. at 813.

223. 54 F.3d at 801.

224. *See infra* Section II.C.4 (providing examples of this development).

facts to provide support for its later conclusion that the agency engaged in reasoned decision making. As discussed below, later cases reveal an increasingly less super-deferential approach, wherein courts carefully discuss the scientific issues raised. *American Legion* therefore exemplifies an intermediate step between cases like *Ruckelshaus* and what was to come.[225]

4. *Modern Applications: Super Deference as Boilerplate and the Return to Hard Look*

Recent applications of super deference support these conclusions. First, the principle has become meaningless boilerplate. It is typically cited by courts along with the hard-look standards set forth in *State Farm*, and it is rarely used separately to illuminate courts' analyses.[226] Second, the courts have moved away from the extreme deference exhibited by cases like *Carstens* and *Ruckelshaus*, returning to a hard-look approach that systematically describes and evaluates each major scientific contention.[227]

Consider *American Coke & Coal Chemicals Institute v. EPA*,[228] in which the D.C. Circuit upheld an EPA rule that revised nationwide limitations on certain water pollutant discharges associated with coke making.[229] The challenge focused primarily on assumptions the EPA made in setting industry effluent limitations. For example, to compensate for data gaps relevant to the ability of publicly owned treatment works ("POTW") to remove coke-making pollutants, the EPA made two estimates. First, where POTWs provided data on the minimum detected levels of the pollutants in effluent, the EPA assumed that influent contained ten times those minimum levels.[230] Second, where the pollutants were below detectable levels, the EPA assumed that influent contained the minimum detectable levels.[231] In its explanation of these selections,

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225. For opinions illustrating similar approaches, see, for example, *Associated Fisheries of Me., Inc. v. Daley*, 127 F.3d 104, 110 (1st Cir. 1997) (brief analysis following description of facts; upholding agency action under Magnuson Act); *Henley v. FDA*, 77 F.3d 616, 620–21 (2d Cir. 1996) (citing *Baltimore Gas* along with *State Farm*, but providing more discussion of evidence supporting petitioner's and the FDA's positions with respect to labeling of oral contraceptives); and compare *Harris v. United States*, 19 F.3d 1090, 1096 n.8 (5th Cir. 1994) (describing the scientific evidence for both sides but upholding FWS delineation of wetlands).

226. An occasional early case took this approach. *See, e.g.*, New Mexico v. HUD, No. 84-2347, 1987 WL 109007, at *2–3 (10th Cir. Jan. 7, 1987) (unpublished opinion) (citing both *State Farm* and *Baltimore Gas* super deference and upholding safety standards for formaldehyde levels in manufactured housing).

227. These observations belie one *Baltimore Gas* observer's early prediction that *State Farm* ought to be viewed as a specialized exception to *Baltimore Gas*: "In review of administrative environmental determinations, the *Baltimore Gas* standard clearly dominates." Siegel, *supra* note 12, at 375.

228. 452 F.3d 930 (D.C. Cir. 2006).

229. As the court explained, coke is "cooked" coal. *Am. Coke & Coal Chems.*, 452 F.3d at 933 n.2. The court defined the various pollutants at issue, which included naphthalene, a primary ingredient in mothballs. *Id.* at 933 n.4.

230. *Id.* at 935.

231. *Id.*

the EPA acknowledged that these choices might lead to both over- and under-estimations of the actual influent levels.[232]

Citing both *State Farm* and the super-deference principle, the court rejected the protopolitical challenges to this methodology.[233] As the court explained, the "EPA was confronted with a situation in which it was not possible, given the current state of technology, to establish conclusively the relative effectiveness" of types of treatment.[234] The petitioner had cited nothing suggesting the EPA's assumptions were unreasonable; thus, the court upheld the EPA's approach, emphasizing that "[s]uch decisions involve expert statistical and scientific judgments to which this court properly defers."[235] Still, even though the court could have easily rejected the petitioner's challenge for failing to provide competing evidence, the court took each contention in turn, explaining the issues and evidence supporting the reasonableness of the agency's determination.[236]

Likewise, in *Catawba County v. EPA*, the D.C. Circuit considered challenges to the EPA's 2004 designations for the national ambient air quality standards ("NAAQS") applicable to fine particulate matter pursuant to the Clean Air Act.[237] After rejecting challenges that the EPA improperly failed to use notice-and-comment rulemaking procedures and failed to properly interpret its statutory mandate pursuant to *Chevron*, the court turned to the argument that the designations rule was arbitrary and capricious because it was "riddled with methodological flaws and inconsistencies."[238] The court cited the general standard for arbitrary and capriciousness, and stated, "Of particular note in this challenge, we give an extreme degree of deference to [the EPA] when it is evaluating scientific data within its technical expertise."[239]

Thereafter, the court turned to each of the challengers' many arguments. For example, the challengers contended that the EPA had "relied upon a mistaken estimate of carbon emissions by power plants that burn bituminous coal."[240] It turned out that the EPA was wrong about those estimates, and it

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232. *Id.* at 935 & n.10.

233. *See id.* at 941–42 ("The court owes particular deference to EPA when its rulemakings rest upon matters of scientific and statistical judgment within the agency's sphere of special competence and statutory jurisdiction.").

234. *Id.* at 942–43.

235. *Id.* at 943.

236. *Id.* at 943–48.

237. 571 F.3d 20 (D.C. Cir. 2009). In the popular media, "fine particular matter" is often called "soot." *See, e.g.*, Jane Kay, *EPA Ignores Advice for Annual Limits on Tiny Soot: Science Panel Had Urged Tighter Rules, Citing Health Effects*, S.F. CHRON., Sept. 22, 2006, at A3. As the court explained, the size of the particulate matter being regulated was 2.5 micrometers or smaller, "less than one-thirtieth the thickness of a human hair." *Catawba Cnty.*, 571 F.3d at 26.

238. 571 F.3d at 40. Note that the court applies the same standard of review for arbitrary and capriciousness under the Clean Air Act as under the APA. *Id.* at 41.

239. *Id.* at 41 (second alteration in original) (internal quotation marks omitted).

240. *Id.* at 44. The term "bituminous" refers to a classification reflecting the amount of carbon in coal. *See Coal Explained*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/

revised its carbon emission profile for those plants in 2006.[241] But the 2004 designations were based on the old estimates; thus, the industry petitioners argued that the nonattainment designations for power plants burning bituminous coal were flawed. The EPA responded that "its ultimate designations did not turn on any one estimate of a single chemical component of [fine particulate matter]."[242] "Rather, [it] relied on numerous data points . . . that were largely unaffected by the lower carbon estimate."[243] Further, the EPA explained that as the carbon estimate decreased, the crustal estimate actually increased, so the overall determination was not substantially impacted.[244]

At this juncture, the court reasoned that the EPA was not required to upend its entire process when it discovered its mistake; all that was required was for the agency to use the best information available when making its decisions, and to deal with newly acquired evidence " 'in some reasonable fashion.' "[245] Here, the court explained, the EPA dealt reasonably with the new evidence because it explained why it would not have changed the designations. In fact, the EPA even granted a March 2006 request to recalculate the weighted emissions scores using the revised emissions estimates and concluded that doing so would not change the outcome.[246]

Notably, the court did not mention the super-deference principle in any of its analysis of the arbitrary-and-capricious review of the agency's actions. It did mention *State Farm* once,[247] for upholding a decision of "less than ideal clarity if the agency's path may reasonably be discerned,"[248] and it later referenced the same case for the concept of deferential review, where an agency must articulate a "rational connection between the facts found and the choice made."[249] The closest the court came to super-deference language was in its unremarkable discussion of the remedy: "In light of the agency's scientific expertise and the complexity of the designation process, we remand to give EPA another opportunity to provide a coherent explanation for its designation."[250]

Courts have likewise cited the super-deference principle when reviewing adjudications. *Hayward v. United States Department of Labor* involved an

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energyexplained/index.cfm?page=coal_home (last updated Jan. 26, 2010). Bituminous coal is the most abundant type of coal in the United States. *Id.*

241. 571 F.3d at 45.

242. *Id.*

243. *Id.*

244. *Id.*

245. *Id.* (quoting Am. Iron & Steel Inst. v. EPA, 115 F.3d 979, 1007 (D.C. Cir. 1997)).

246. *Id.* at 45–46. Although the court upheld the rulemaking generally, it did remand the designation applied to a single New York county because that county was designated as a nonattainment area, even though similarly situated counties in a different region were designated attainment areas. *Id.* at 51.

247. Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29 (1983).

248. 571 F.3d at 50 (quoting 463 U.S. at 43).

249. *Id.* at 52 (quoting 463 U.S. at 43).

250. *Id.*

adjudication for survivor benefits under the Energy Occupational Illness Compensation Program Act, which provides benefits to employees with illnesses caused by exposure to radiation while working for the Department of Energy.[251] The specific provision at issue allowed employees' eligible survivors to receive a lump-sum payment for cancer caused by exposure to radiation; however, entitlement required the cancer to have been "at least as likely as not related to employment."[252] When an individual seeks such a payment, the Office of Workers' Compensation Programs uses a specified computer software program to make a probability-of-causation calculation.[253] While the program's default settings account for uncertainty from several sources, the model allows the user to adjust those default settings to account for additional uncertainty.[254] According to the program's manual, adjustments should be made only for sufficient justifications accompanied by written rationales.[255]

The petitioner, a widow, contested the agency's denial of benefits. The agency had determined that there was just over a 21 percent likelihood that the deceased's cancer was caused by radiation exposure.[256] At a hearing before the agency, the widow raised the protopolitical contentions that the model should have been adjusted to account for the rarity of her husband's cancer and for its allegedly higher correlation with radiation exposure.[257] The Department of Labor consulted with a physicist as well as a representative of the program's developer, and determined that the default settings should not have been adjusted.[258]

The Fifth Circuit upheld the district court's grant of summary judgment to the agency, applying the arbitrary and capricious standard.[259] After reciting the usual *State Farm* and *Overton Park* formulations of the standard, the court also noted that, for technical decisions like this one, "[w]e must look at the decision not as a chemist, biologist, or statistician that we are qualified neither by training nor experience to be, but as a reviewing court exercising our narrowly defined duty of holding agencies to certain minimal standards of rationality."[260] Applying these principles, the court reasoned that

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251. 536 F.3d 376, 377 (5th Cir. 2008).

252. *Hayward*, 536 F.3d at 377 (quoting 42 U.S.C. § 7384n(b) (2006)).

253. *Id.* at 378. The program uses dose-response data from the Japanese atomic-bomb-survivor cohort, coupled with an employee-specific dose reconstruction. *Id.*

254. *Id.*

255. *Id.*

256. *Id.* at 379.

257. *Id.*

258. *Id.*

259. *See id.* (describing the procedural background and standard of review).

260. *Id.* at 380 (quoting Gulf Restoration Network v. U.S. Dep't of Transp., 452 F.3d 362, 368 (5th Cir. 2006)). This statement is traceable to the 1983 decision *Avoyelles Sportsmen's League v. Marsh*, 715 F.2d 897 (5th Cir. 1983), which borrowed language from *Ethyl Corp. v. EPA*, 541 F.2d 1, 36 (D.C. Cir. 1976) (*en banc*). Interestingly, *Ethyl Corp.* is frequently cited as an example of the trend of examining agencies' records in great detail. *E.g.*, Reuel E. Schiller, *Rulemaking's Promise:*

the agency had specifically addressed both the widow's contentions and had reasonably explained its decision.[261] The model already accounted for rare cancers in one of its formulae, and any adjustment would have over-represented the rare cancers.[262] As for the decedent's cancer being more radiogenic than others, the agency rejected the widow's proffered study because it involved development of the rare cancer in patients already undergoing radiation treatment for existing cancer.[263]

American Coke, *Catawba County*, and *Hayward* illustrate the convergence of the super-deference cases and "ordinary" hard-look cases. In each, the court described the science at issue, the particular contentions of the parties, and the basis in the record for concluding the agency engaged in reasoned decision making.[264] This substantive approach, combined with the recitations of super deference in boilerplate along with *State Farm*, illustrates the lack of any real meaning remaining for the super-deference standard. The numerous other recent opinions citing *Baltimore Gas* for super deference illustrate these same tendencies.[265]

One final case warrants discussion because it suggests a possible enduring role for super deference. In *Miccosukee Tribe of Indians of Florida v. United States*,[266] the Eleventh Circuit reviewed the Fish and Wildlife Service's biological opinion on a Corps of Engineers plan to restrict water

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Administrative Law and Legal Culture in the 1960s and 1970s, 53 ADMIN. L. REV. 1139, 1160 n.112 (2001); *see also* Ronald J. Krotoszynski, Jr., *The Bazelon-Leventhal Debate and the Continuing Relevance of the Process/Substance*, 58 ADMIN. L. REV. 995, 997 (2006) (citing *Ethyl Corp.* as example of process/substance debate).

261. 536 F.3d at 381.

262. *Id.* at 381. The court explained the agency's reasoning both with technical terminology, and "in other words," using an alternative, perhaps more accessible, explanation. *Id.*

263. *Id.* at 381–82.

264. For but one example of an ordinary hard-look case doing the same thing, see *Kennecott Greens Creek Mining Co. v. Mine Safety & Health Admin.*, 476 F.3d 946 (D.C. Cir. 2007) (upholding mine safety standards for exposure to diesel particulate matter).

265. *See, e.g.*, Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177, 192 (4th Cir. 2009) (citing both *State Farm* and *Baltimore Gas* and upholding issuance of Clean Water Act permits); *id.* at 201, 205 (using *Baltimore Gas* in analysis); Utah Envtl. Cong. v. Russell, 518 F.3d 817, 823–24 (10th Cir. 2008) (citing *Marsh*'s *Baltimore Gas* quotation of super deference along with *State Farm* factors, describing the evidence, and upholding the forest management plan); Citizens Coal Council v. EPA, 447 F.3d 879, 890 (6th Cir. 2006) (*en banc*) (citing *State Farm* and *Baltimore Gas* super deference in recitation of standards and upholding the EPA's Clean Water Act effluent limitations for coal-mining activities with thorough analysis); Am. Rivers, Inc. v. U.S. Army Corps of Eng'rs (*In re* Operation of Mo. River Sys. Litig.), 421 F.3d 618, 628 (8th Cir. 2005) (citing *State Farm* and *Marsh* in recitation of standards, discussing each contention, and upholding federal management of Missouri River); Envtl. Def. v. EPA, 369 F.3d 193, 204–05 (2d Cir. 2004) (citing both *State Farm* and *Baltimore Gas* in analysis and upholding the EPA's approval of state implementation plan under the Clean Air Act); *cf.* Tuscon Herpetological Soc'y v. Salazar, 566 F.3d 870, 878–80 (9th Cir. 2009) (citing *State Farm*, comparing *Baltimore Gas*, and discussing in detail and holding arbitrary and capricious the agency's reliance on "ambiguous" evidence regarding lizard population to withdraw proposed threatened listing). Even recent nuclear-related opinions are consistent with this trend. *See, e.g.*, Morris v. NRC, 598 F.3d 677 (10th Cir. 2010) (upholding agency's approval of uranium mining).

266. 566 F.3d 1257 (11th Cir. 2009).

flowing to a portion of the Everglades.[267] The plan was meant to benefit the endangered cape sable sea sparrow, but would have negative impacts on another endangered species, the everglades snail kite.[268] Among the contentions of the tribe challenging the opinion was that it was arbitrary and capricious because it arrived at conclusions counter to scientific data in the record and so implausible as to go beyond a difference in expert opinion.[269]

The court's analysis suggests a possible use for the super-deference principle as a balance-tipper. In outlining the applicable standards, the court began by quoting both *State Farm* and the *Baltimore Gas* super-deference principle.[270] The biological opinion had concluded that the kite would not be jeopardized if the plan's implementation continued into the early 2010s. But the opinion conceded that the plan would harm about 20 percent of the kite's habitat.[271] Further, the plan anticipated water-level-related threats to kite nests, reduced foraging habitat, and reduced abundance of the kite's primary prey.[272] The court seemed skeptical; the agency argued that no permanent loss was expected, but cited no authority for the proposition that negative impact on a species' habitat must be permanent to amount to adverse modification.[273]

Despite the court's skepticism, it upheld the agency's action. The agency reached its conclusion not solely on the duration of habitat loss, but took into account the species' life cycle and behavior.[274] Then the court stated: "[W]e do owe a high level of deference to the Service's scientific determinations. The deference owed the 2006 biological opinion is especially strong because the agency had to predict future hydrologic conditions and estimate the likelihood, extent, and duration of injury to a species."[275] Even so, the court carefully underscored the factual context of the case: the opinion was part of a long-term program to eventually restore the Everglades and hopefully benefit both birds; and the temporary flooding was done in an effort to avoid the extinction of another endangered species.[276] In light of this background, the court ruled that the agency's determination of no adverse impact was not arbitrary and capricious, but confined the opinion to its facts.

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267. The court used colorful language in its description of the history of the "river of grass," whose water people had attempted to "bend" and "tame." *Miccosukee Tribe*, 566 F.3d at 1261.

268. *Id.* at 1262–64. As the court noted, the dispute "pit[ted] a sparrow against a hawk." *Id.* at 1262.

269. *Id.* at 1265.

270. *Id.* at 1264.

271. *Id.* at 1269.

272. *Id.* at 1269–70.

273. *Id.* at 1270 ("Evidently the Service is under the impression that flooding twenty percent of the kites' critical habitat to a depth that kills the woody vegetation the bird likes to perch on, that drives off the apple snails it likes to eat, and that reduces its nesting success is not 'adverse modification' of critical habitat within the meaning of the Act.").

274. *Id.* at 1271.

275. *Id.*

276. *Id.*

Miccosukee suggests a vestigial use for the super-deference principle. Although the court evinced doubt about the actual ability of the plan to prevent harm to the kite population, it used super deference as a balance-tipper. Without needing to separate science from policy, the court mentioned that deference should be "especially strong" because the agency had predicted future hydrologic conditions and estimated the likelihood, extent, and duration of injury to the kite.[277] Those scientific determinations were of course uncertain; they were proto- and mesopolitical predictions.

Although super deference might be viewed as a balance-tipper, the principle has come a long way since *Baltimore Gas*. Even in *Miccosukee*, it is cited along with the classic hard-look *State Farm* standard in a way that suggests it has lost its original meaning.[278] Probing further, the analysis the courts apply seems more detailed, and less superficial, than initial cases like *Carstens*, and especially *Ruckelshaus*. Given the historical, contextual, and practical problems associated with super deference, one can hardly mourn the principle's fall into disuse. But its demise leaves a question both unarticulated, and unanswered: what ought to be the role of courts in reviewing agency science?

III. COURTS AS TRANSLATORS

Taking the super-deference cases together as a whole, a different picture of the courts' role with respect to science emerges. What the *American Coke*, *Catawba County*, *Hayward*, and *Miccosukee* courts are doing is conveying vital information about the agency science at issue. They are explaining the science, the uncertainties, and the differing arguments: they are *translating* the highly technical and scientific information in agency records for public consumption. This observation suggests a normative role for the generalist courts whereby they convey specialized information, enhancing opportunities for participation and encouraging transparency, deliberation, and accountability.

Scholarship investigating the functions of written judicial opinions focuses on the ability of written opinions to impose a disciplined decision-making process, facilitate the precedent system, and legitimate the judicial decisions.[279] I contend, however, that judicial opinions reviewing agency science can serve an additional function in providing generalist accounts of specialized information for largely nonscientific consumers. Indeed, what we ought to expect from the reasoned decision-making requirement is for

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277. *Id.*

278. Courts persist in this approach. *See, e.g.*, AES Sparrows Point LNG, L.L.C. v. Wilson, 589 F.3d 721, 733 (4th Cir. 2009) (citing the super-deference standard as boilerplate and upholding the denial of Clean Water Act permit on substantive grounds); Forest Serv. Emps. for Envtl. Ethics v. U.S. Forest Serv., 689 F. Supp. 2d 891, 895 (W.D. Ky. 2010) (citing *Baltimore Gas*'s super-deference principle as well as *State Farm* in recitation of standards, with no mention in the actual analysis); *cf.* San Luis & Delta-Mendota Water Auth. v. Salazar, 693 F. Supp. 2d 1145, 1151 (E.D. Cal. 2010) (citing *Baltimore Gas* in standards section in conjunction with best science standard for biological opinions).

279. *See, e.g.*, Chad M. Oldfather, *Writing, Cognition, and the Nature of the Judicial Function*, 96 GEO. L.J. 1283, 1317 (2008).

courts to be able to explain the science and the uncertainties, and acknowledge the policy considerations when engaging in review. If a generalist judge is able to do this for a lay audience, it furthers the participatory goals inherent in the constitutional design and it enhances the opportunities for oversight of agency science.

As demonstrated most prominently—but by no means exclusively—by the "good science" movement discussed above, many observers of the courts would like courts' roles to involve "fixing" bad science. The great practical difficulty with all of these cases that involve proto- and mesopolicy challenges, however, is that it is nearly impossible to assess how "right" their facts are with respect to science. Barring any obvious scientific or political misconduct, it is perfectly legitimate to think that reasonable scientists, exercising their best professional judgment, would disagree with some of the outcomes, whether in the agencies or the courts. Moreover, the various areas of scientific uncertainty are so specialized that it would require a broad array of specialists to truly assess that "rightness"—something jurists are not trained to do. And of course, scientific "rightness" is a relative and moving target. But perhaps these observations make the point: if reasonable scientists would disagree, and agencies adopt metapolicy choices in keeping with the then-governing administration, courts ought not further their own policy-driven goals by policing agencies too tightly. Nevertheless, they stand to fulfill a very important function in their translations by bringing clarity to complex issues of agency science.

Indeed, the processes necessary for translation and technical communication suggest analogous processes for courts reviewing agency science. A translator, for example, must engage the source text to produce an altogether new product: the text in the target language.[280] Likewise, a technical communicator must develop a command of the relevant science sufficient to convey that information to a nonscientific audience.[281] So too does hard-look review afford the opportunity for courts to develop the literacy necessary to translate scientific issues into understandable prose for consumers of legal opinions.

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280. *See* JEREMY MUNDAY, INTRODUCING TRANSLATION STUDIES 63 (2d ed. 2008) (setting forth cognitive process of translation, including reading and understanding the source text, deverbalizing, and reexpressing the sense of the source text in the target language).

281. A traditional theoretical perspective views this process as akin to interpretation. *See* Gregory Clark, *Ethics in Technical Communication: A Rhetorical Perspective*, 30 IEEE TRANSACTIONS ON PROF. COMM. 190, 191 (1987) ("[T]his perspective describes a person who communicates technical information functioning as an interpreter . . . ."). Further, the translation hypothesis opens the way for judicial opinions to be considered in light of their ethical implications. *See* Gregory Clark, *Ethics in Technical Communication: A Rhetorical Perspective*, 30 IEEE TRANSACTIONS ON PROF. COMM. 190 (1987) (describing various models of ethics in technical communication and suggesting a collaborative perspective aided by research in rhetoric).

In addition, the necessity of understanding one's audience[282] casts the generalist background of judges as a strength because consumers of judicial opinions are often generalists themselves. Note that the language in opinions like *American Coke*, *Catawba County*, *Hayward*, and *Miccosukee* reveals devices that both illustrate the courts' comprehension and serve to enhance the readers' understanding. For example, these opinions use analogies,[283] metaphors,[284] plain-language definitions,[285] and restatements of key ideas[286] that make the complex science at issue more accessible.[287]

Conceptualizing the courts as translators helps align the democracy-forcing normative goals of judicial review with observations from other disciplines about the role of science rhetoric in the development of policy.[288] As Dr. Waddell has argued, science-based rhetoric has the capacity to "educate a democratic audience," thereby maximizing the powers of the citizenry to

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282. A classic account may be found in KENNETH BURKE, A RHETORIC OF MOTIVES (Univ. of Cal. Press 1969) (1962). *See, e.g.*, *id.* at 55 ("You persuade a man only insofar as you can talk his language by speech, gesture, tonality, order, image, attitude, idea, *identifying* your ways with his."); *see also* Clark, *supra* note 281, at 194 (arguing technical communication ought to be judged by its ability to facilitate a common understanding between communicators and their audiences, "including an understanding of problems, conclusions, consequences, and implications").

283. *E.g.*, Catawba County v. EPA, 571 F.3d 20, 26 (D.C. Cir. 2009) (describing the size of particulate matter at issue as 1/30th the thickness of human hair). This same analogy appeared in the final rule being challenged under the heading, "What are Fine Particles?" *See* Designations of Areas for Air Quality Planning Purposes, 40 C.F.R. § 81 (2009). Following the issuance of the court's opinion, the Bloomberg News Service also borrowed the human-hair analogy. Cary O'Reilly, *EPA Air-Pollution Rules on Soot Upheld on Appeal (Update 1)*, BLOOMBERG (July 7, 2009), http://www.bloomberg.com/apps/news?pid=newsarchive&sid=ai7oYjEiOcuk.

284. *Miccosukee Tribe of Indians of Fla. v. United States*, 566 F.3d 1257 (11th Cir. 2009), is full of metaphors. *E.g.*, *id.* at 1261 (describing the Everglades as a "river of grass," and speaking of "tam[ing] the Everglades" and "bend[ing] the water"); *id.* at 1265 (noting the party's arguments "do not hold water").

285. *E.g.*, Am. Coke & Coal Chems. Inst. v. EPA, 452 F.3d 930, 933 n.2 (D.C. Cir. 2006) (defining coke as "cooked" coal); *id.* at 933 n.4 (defining pollutants at issue and including everyday example that naphthalene is the primary ingredient in mothballs).

286. *E.g.*, *Miccosukee Tribe*, 566 F.3d at 1270; Hayward v. U.S. Dep't of Labor, 536 F.3d 376, 381 (5th Cir. 2008).

287. These have long been recognized both as helpful tools in communicating scientific and technical information and as inescapable components of scientific rhetoric. *See, e.g.*, MICHAEL ALLEY, THE CRAFT OF SCIENTIFIC WRITING 115 (3d ed., Springer 1996) ("Two of the best tools for explaining unfamiliar concepts are examples and analogies."); S. Michael Halloran & Annette Norris Bradford, *Figures of Speech in the Rhetoric of Science and Technology*, *in* ESSAYS ON CLASSICAL RHETORIC AND MODERN DISCOURSE 179, 183–88 (Robert J. Connors et al. eds., 1984) (providing examples demonstrating the communicative strength of figures of speech); Larry D. Yore et al., *Written Discourse in Scientific Communities: A conversation with two scientists about their views of science, use of language, role of writing in doing science, and compatibility between their epistemic views and language*, 28 INT'L J. OF SCI. EDUC. 109, 138 (2006) ("[A]nalogies and metaphors play an important role in communicating science.").

288. That is, scientists must increasingly present and interpret complex technical information for the benefit of nonscientific policymakers. Craig Waddell, *The Role of Pathos in the Decision-Making Process: A Study of the Rhetoric of Science Policy*, *in* LANDMARK ESSAYS ON RHETORIC OF SCIENCE 127, 127–28 (Randy Allen Harris ed., 1997). This process falls within the traditional realm of rhetoric. *Id.*

engage in the democratic process.[289] Waddell's research focuses on the rhetoric of scientists themselves, but judicial opinions similarly stand to provide accessible information about the relevant science to a generalist audience, enabling informed participation.

Consider the various scenarios that might arise. First, suppose an agency does everything "right" with respect to science, yet the court fundamentally misunderstands the science at issue and as a result, holds the action arbitrary and capricious. The typical remedy is a remand, whereupon the agency would have the opportunity to correct the misunderstanding and perhaps better explain itself the second time. At the same time, the court's opinion—reflecting its own understanding that developed as it engaged in hard-look review—ought to reveal judicial scientific misconceptions. As has been noted elsewhere, there is an army of judicial watchdogs looking for such judicial errors.[290] Judicial opinions translating science for a lay audience ought to make the watchdog task less burdensome because those groups could more easily identify any errors and bring those to the agency's attention on remand.

Second, suppose the agency and the court *both* make fundamental errors of science, resulting in a court's upholding an agency action. At this point, the hard-look translation is even more important because it makes those errors understandable to a broad audience. More accessible to the public and Congress than an administrative record, the translation affords the opportunity for such consumers to be alerted to the problem, bringing political pressure or corrective statutes to bear on the agency.

More importantly, even if the agency and court both get science "right," an opinion that sufficiently explains the science and policy at issue provides valuable information highlighting the proto-, meso-, and metapolitical aspects of the case.[291] Take, for example, the *American Legion* case discussed above. As detailed in the court's opinion, there were a number of reasons that the agencies involved concluded it would be impossible to design a study of the impacts of exposure in Vietnam veterans. Prior to the case, the House Committee on Government Operations issued a report to Congress entitled "The Agent Orange Coverup: A Case of Flawed Science and Political Manipulation."[292] The report generally accuses the agencies involved of

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289. *Id.* at 145. Likewise, there is some evidence that nonscientist members of the public draw on science for their arguments during notice-and-comment rulemaking. *See generally* Danielle Endres, *Science and Public Participation: An Analysis of Public Scientific Argument in the Yucca Mountain Controversy*, 3 ENVTL. COMM. 49 (2009).

290. *See* Wendy E. Wagner, *Congress, Science, and Environmental Policy*, 1999 U. ILL. L. REV. 181, 199 (describing "scholarly attention to specific deficiencies in environmental laws and the rash of attacks on junk science").

291. There is a role for detailed dissents here, too. *See, e.g.*, Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177, 225–26 (4th Cir. 2009) (Michael, J., dissenting in part and concurring in part) (concluding agency acted arbitrarily); Citizens Coal Council v. EPA, 447 F.3d 879, 915–23 (6th Cir. 2006) (*en banc*) (Martin, J., dissenting) (arguing, in detail, why agency's actions were arbitrary and capricious).

292. H.R. REP. No. 101-672 (1990). It is difficult to overstate the highly charged political nature of this issue.

using flawed science, and the Reagan Administration of controlling and obstructing the study.[293] Although the truth of these assertions was probably not resolved by the *Agent Orange* litigation, that truth is somewhat immaterial because Congress, aware of the *Agent Orange* case,[294] continued to compensate exposed veterans even though the science was uncertain. For example, the Veteran's Health Care Eligibility Reform Act of 1996 provides that "[a] Vietnam-era herbicide-exposed veteran is eligible . . . for hospital care, medical services, and nursing home care . . . for any disability, notwithstanding that there is insufficient medical evidence to conclude that such disability may be associated with exposure."[295]

The story of Agent Orange suggests a possible objection to my hypothesis. It is certainly costly to correct agency action after it has become final and been litigated.[296] Although costlier to respond to agency science after, rather than before, agency action, we should want our judicial opinions to be as accessible as possible, particularly when scientific and technical issues are involved. And even if it is preferable to address problems in agencies in the first instance, the very design of our system contemplates an ongoing dialog between the branches.

Several other possible objections are worth considering. First, we know that translation carries the risk that the translator will subtract from, add to, or fundamentally alter the meaning set forth in the source text.[297] In translating agency science, courts ought to avoid making such changes, and the parties ought to be alert to instances where this may possibly occur. But are we asking too much of courts in this respect? It may be argued that courts are simply not up to the task; they are not suited to reviewing science, let alone communicating it.

Although courts are not scientists themselves, they are well-versed in the broader process of understanding the facts presented and the logical links

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293. *Id.*, pt. 1, at 1–3. [Executive Summary].

294. *See, e.g.*, *American Legion Legislative Presentation: Joint Hearing on Legislative Priorities of the American Legion Before the H. and S. Veterans Affairs Comms.*, 104th Cong. (1995) (statement of Daniel Ludwig, National Commander, American Legion) (referencing petition for certiorari to Supreme Court in *American Legion*).

295. 38 U.S.C. § 1710(e)(1)(A) (2006) (emphasis added).

296. When the legislature directly monitors agency action, this approach is known as "police-patrol oversight." Arthur Lupia & Mathew D. McCubbins, *Learning from Oversight: Fire Alarms and Police Patrols Reconstructed*, 10 J.L. ECON & ORG. 96, 97 (1994) ("By definition, police-patrol oversight is likely to be an effective way for legislators to track bureaucratic actions. However, it is also likely to be very costly in terms of the time and resources needed to conduct it."); *see also* Frank B. Cross, *Shattering the Fragile Case for Judicial Review of Rulemaking*, 85 VA. L. REV. 1243, 1303 (1999) (noting high transaction costs).

297. *See* JAMES BOYD WHITE, JUSTICE AS TRANSLATION 235 (1990) (crediting Ortega y Gasset for describing these modifications as "deficiencies" and "exuberances," respectively). Professor White's work suggests that judges act as translators of legal texts, such as the Constitution, and in so doing, ought to apply meaning in light of modern issues and culture. *See id.* at 269. For reviews of this work, see Susan Sage Heinzelman, *Another Version of "Sweetness and Light": White on Cultural and Legal Criticism*, 17 LAW & SOC. INQUIRY 259 (1992) (book review); Sanford Levinson, *Conversing About Justice*, 100 YALE L.J. 1855 (1991) (book review); Kenneth L. Karst, *The Interpreters*, 88 MICH. L. REV. 1655 (1990) (book review); Mark V. Tushnet, *Translation as Argument*, 32 WM. & MARY L. REV. 105 (1990) (book review).

between those facts and the relevant legal standards. That sort of analysis transcends subject matter. And one of the problems in *Baltimore Gas* was treating science as though it was somehow special or different. Asking courts to act as translators simply asks them to examine the administrative record with the same analytical mindset courts ought to bring to any complex issue, and then convey their analysis to others.

Still, courts' struggles with scientific concepts have been well documented in other contexts. Much of the *Daubert* literature, for example, emphasizes the mistakes of science that courts make in applying that standard.[298] Part of the problem with *Daubert* is that it requires courts to artificially channel science into a reliability matrix that has more to do with the exigencies of litigation than the norms of science. Unlike the *Daubert* context, courts reviewing agency science are not required to delve deeply into the relevant scientific norms, but rather to assess what an agency has done for reasonableness. Admitting that mistakes of science may happen even in the agency-science context, however, I hope that the translation approach can at least provide transparency in judicial reasoning. Again, if courts are good science communicators, it ought to be easier to assess where they have gone astray with respect to science.

Second, rhetoricians of science have recognized the possibility that logic can wholly supplant ethics; put in legal terminology, an opinion focusing only on science would obscure the policy considerations relevant to the agency's action.[299] Relatedly, a criticism of hard-look review involves the possibility that courts will impose their own policy views on agencies in the guise of searching scrutiny.[300] Admittedly, my argument for the translation approach assumes that the costs of super deference are higher than those of hard-look review, and indeed, I have not purported to respond to the many criticisms of hard-look in this Article. I believe, however, that these objections do not suggest any new vulnerabilities, but rather represent new ways to understand what might be going on in judicial opinions. So conceived, we can consider these not as objections, but as part of the normative framework that can enlighten our assessments of the strength of such opinions.

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298. *See* Cranor, *supra* note 8; Meazell, *supra* note 6, at 253 & n.72 (collecting criticisms). Scholars of administrative law have raised similar objections. *See supra* note 113 and accompanying text.

299. For an extreme example, see Steven B. Katz, *The Ethic of Expediency: Classical Rhetoric, Technology, and the Holocaust*, 54 C. ENG. 255 (1992), which discusses the ability of the Nazi regime to mask Holocaust atrocities with seemingly benign or highly technical rhetoric.

300. *See, e.g.*, Stephenson, *supra* note 24, at 765 ("[C]ritics charge that hard look review may give judges an excuse to strike down policies they dislike on substantive grounds."). The judicial ideology literature further suggests that "the ideological preferences of judges and Justices have considerable explanatory power in the context of judicial review of agency actions." Richard J. Pierce, Jr., *What Do the Studies of Judicial Review of Agency Actions Mean?*, 9 (George Washington Univ. L. Sch. Pub. Law & Legal Theory, Working Paper No. 505, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1604701. If this is so, perhaps one answer is that ideology is a complication that impacts judicial review regardless of where one lies on the hard-look–super-deference spectrum.

Finally, I am mindful that if a court is to provide a strong generalist translation, it must rely on the litigating parties for help. But if agencies are expecting a hard look, they will be incentivized to use normal language and accessible explanations, and challengers of agency action ought to do the same. Consider also the alternative: if super deference is applied as it was in cases like *Carstens* and *Ruckelshaus*, administrative-law values and science suffer. Those cases incentivize impenetrable records by the agencies and shallow review by the courts. By viewing the courts as important generalist conveyors of information, we can assess their opinions as generalists and act on the information provided. This approach not only helps the lay audience understand the science–policy continuum, but it reinforces the notions of transparency, deliberation, and accountability that legitimize administrative lawmaking.

CONCLUSION

This Article has offered both a new description and a normative account of the relationship between courts and agencies with respect to science. The traditional view, encompassed in super deference, is that generalist courts ought to be at their most deferential when expert agencies regulate at the frontiers of science. But this position fails to consider that agency science is a policy-infused construct, and it disincentivizes transparency with respect to such policy. It further rewards agencies for amassing impenetrable records, undermining the participatory and deliberative goals of administrative law. In addition, such a superficial judicial review of agency science risks compounding scientific errors, doing little to legitimize the administrative process.

A comprehensive assessment of super deference lays bare these weaknesses, but it also does something more. This Article hypothesizes that generalist courts act as translators, providing a bridge between the technical generators of agency science and the lay consumers of it. This account sees the courts' generalist perspective as an asset, because it enables the courts to provide accessible descriptions of even the most technical agency science. In turn, courts reinforce administrative-law values by educating Congress, judicial watchdogs, and the public about science in the regulatory state.