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Decisions, Disasters, and Deference: Rethinking Agency Expertise After Fukushima

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INTRODUCTION

On March 11, 2011, a magnitude 9.0 earthquake triggered a massive tsunami that devastated the Sendai region of Honshu Island, Japan,[1] and disrupted electrical transmission to the Fukushima Dai-ichi nuclear power plant. Backup generators failed at all six reactors, causing a complete station blackout. Despite circumstances for which they were entirely unprepared, including total darkness inside the buildings, plant workers heroically attempted to maintain safety equipment. Nonetheless, without electricity, essential cooling systems eventually failed, precipitating spent fuel pool fires, reactor fuel melting, hydrogen explosions, and major releases of radioactive materials.[2]

The Fukushima Dai-ichi accident gave a wake-up call to nuclear power regulators around the globe. The sight of a devastating nuclear accident unfolding in Japan—a technologically modern country viewed as having well-developed nuclear safety programs—prompted the International Atomic Energy Agency and member countries to initiate review of the their own regulatory programs. For the U.S. Nuclear Regulatory Commission (NRC), post-Fukushima review uncovered critical gaps in domestic reactor oversight and prompted high level NRC managers to recommend broadly reforming the agency's "patchwork" approach to create a "logical, systematic, and coherent regulatory framework."[3]

Despite our collective hopes for rational, well-informed, and adaptive governance, it often takes a large-scale catastrophe to prompt reevaluation of entrenched but maladaptive regulatory patterns. The accident and subsequent analysis offer a teachable moment for U.S. nuclear power regulation and for administrative law more broadly. Had the NRC embraced (or at least not undercut) the decision-making model provided by the National Environmental Policy Act (NEPA) and reflected in modern administrative law norms, U.S.

1. NUCLEAR REGULATORY COMM'N, RECOMMENDATIONS FOR ENHANCING REACTOR SAFETY IN THE 21ST CENTURY: THE NEAR-TERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT 7, 9 (July 12, 2011) [hereinafter NTTF REPORT].

2. *Id.*

3. *Id.* at 20-22.

regulatory failures identified after Fukushima could have been remedied much earlier. Instead, the agency's NEPA regulations and administrative procedures undermined the agency's responsiveness to safety and environmental hazards in three ways: (1) by blocking information from outside parties (including states and other federal agencies), (2) by segregating information on interrelated issues, and (3) by precluding licensing boards from considering individual plants' unique risks.[4] Because the federal courts' extreme deference toward the NRC permitted and exacerbated these decision-making flaws, this specific case illuminates broader administrative law debates over judicial review of agency policy-making.

Since Fukushima, the NRC has now determined that U.S. licensees should be much better prepared for severe accidents, station blackouts, earthquakes, and other hazards.[5] Measures that the NRC now recognizes as critical to plant safety in light of the post-Fukushima analyses had been raised years (and sometimes decades) earlier by commentators on rulemakings, intervenors in licensing proceedings, and petitioners for regulatory action. Other federal agencies, states, localities, individuals, and nonprofits repeatedly urged the agency to reconsider its outdated or incomplete analysis of seismic risk,[6] flooding hazards,

4. This Article bases these conclusions on analysis of numerous sources: NRC policy statements and individual Commissioners' comments in voting records on those policies (e.g., for station blackouts, severe accidents, and waste confidence); the Fukushima Task Force Report, draft staff responses, Commission decisions reviewing staff proposals for responding to the Task Force Report, follow-up reports from staff to the Commission providing updates on regulatory changes; letters to licensees, incident reports, licensees' responses to NRC requests for information; NRC adjudicative decisions by licensing boards, appeals boards, and the five-member Commission, including dissents; the NRC staff Practice and Procedures Manual; draft and final NEPA regulations, draft and final environmental impact statements and public comments; General Accountability Office Reports; NRC internal review of prior regulations' effectiveness; and publications by the NRC's history department.

5. R.W. Borchardt, *Third 6-Month Status Update on Response to Lessons Learned from Japan's March 11, 2011 Great Tohoku Earthquake and Subsequent Tsunami*, NUCLEAR REGULATORY COMM'N 2 (2013), http://www.nrc.gov/reading-rm/doc-collections/commission/ secys/2013/2013-0020scy.pdf ("Safety enhancements at nuclear power plants are being realized as implementation continues. For example, issues identified during walkdowns of structures, systems, and components that protect against seismic and flooding hazards are being corrected through licensee corrective action programs, and resolution is being monitored by the NRC's resident inspectors . . . . Licensees have also procured many pieces of additional equipment that can be used to mitigate a prolonged station blackout.").

6. *See, e.g.*, Ohio v. Nuclear Regulatory Comm'n, 814 F.2d 258 (6th Cir. 1987) (finding that the NRC did not abuse its discretion in refusing to allow state to intervene and reopen licensing hearing issues regarding emergency planning to address new information from a 5.0 Richter scale earthquake that occurred ten miles from plant); San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm'n, 789 F.2d 26 (D.C. Cir. 1986) (holding that the NRC could exclude analysis of earth-

plants' capability to withstand prolonged blackout,[7] emergency core cooling standards,[8] and emergency planning to protect surrounding communities in the event of a severe accident.[9] In some cases the agency considered and rejected these arguments. But more often, the NRC did not make any expertise-informed judgment about these concerns. Instead, as described further below, its hearing procedures and environmental review regulations simply prevented these issues from being fully vetted. As it turns out, these were not trivial matters.

Like its predecessor, the Atomic Energy Commission, the NRC regulates in a high-stakes context with many competing demands. Nuclear power plants are expensive to build, complex to operate and maintain safely, and impossible to move (at least the large types we now use). The plants supply approximately twenty percent of U.S. electricity;[10] if current licenses are allowed to expire, these sources of low-carbon electricity will go offline. Absent financial and regulatory inducements, plants' massive upfront investment costs will deter investors. Since the 1950s, the federal government has pushed private commercial reactor development, while states, tribes, local governments, and individuals often adamantly oppose facilities in their communities. Whether or not the public accurately perceives the risk, Three Mile Island, Chernobyl, and now Fukushima have made the potential for catastrophic accidents impossible to ignore.[11] Yet, from its origins as the Atomic Energy Commission, the agency has

quakes as complicating factors in emergency evacuation planning required for licensing proceeding).

7. *See, e.g.*, Dickinson v. Zech, 846 F.2d 369 (6th Cir. 1988) (challenging the adequacy of backup diesel generators in case of offsite power loss).

8. *See, e.g.*, Nader v. Nuclear Regulatory Comm'n, 513 F.2d 1045 (D.C. Cir. 1985).

9. *See, e.g.*, Mass. v. Nuclear Regulatory Comm'n, 924 F.2d 311 (D.C. Cir. 1991) (holding that the NRC could find an evacuation plan adequate without showing that it could achieve minimum evacuation times and minimum radiation protection and further allowing it to presume that state and local officials would assist utility with emergency evacuation despite officials' purported refusal due to plan inadequacies); Mass. v. NRC, 878 F.2d 1516 (1st Cir. 1989) (finding that NRC acceptance of utility's emergency management plan and consequent authorization to restart nuclear power plant was not arbitrary and capricious despite Federal Emergency Management Agency findings); State of Ohio v. Nuclear Regulatory Comm'n, 812 F.2d 288 (6th Cir. 1987); Long Island Lighting Co. v. Suffolk County, N.Y., 628 F. Supp. 654 (E.D.N.Y. 1986).

10. *See Annual Energy Outlook with Projections to 2040*, U.S. ENERGY INFO. ADMIN. 44 (2013), http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf.

11. *See* J. SAMUEL WALKER, THREE MILE ISLAND: NUCLEAR CRISIS IN HISTORICAL PERSPECTIVE 237-44 (2004).

been pressured to simultaneously develop and promote new technology, ensure its safety and economic viability, and to do this all very quickly.[12]

The agency has responded to these pressures by insulating itself from environmental and safety input. As described below, the NRC's procedures make its licensing decision-making almost impervious to public participation and limit the effectiveness of dissenting voices from within. The agency's resistance to input in its NEPA environmental review process appears unique or at least makes it an outlier.[13] Extreme judicial deference has supported this fortress culture.

The NRC's regulatory story provides important insights both for nuclear power policy and for administrative law. Current debate over nuclear power's potential contribution to a low-carbon energy future evaluates the technology in isolation from its regulatory context. But the merits of any complex technology can only be understood properly in connection with the laws that shape its design and evolution. Nuclear power will be a better option in an improved regulatory context. Understanding the strengths and weaknesses of the NRC's approach is particularly important given the necessity of long-term oversight of nuclear reactors. Whether or not investors decide to continue building new reactors, the existing fleet will operate for at least the next two decades. When these plants eventually close, the agency will oversee a decommissioning process that lasts up to 60 years. On a pragmatic level, high-quality regulatory controls are certainly preferable for public safety. Post-Fukushima review uncovered serious omissions in reactor oversight that exposed the American public to unnecessary risk.

Analysis of the NRC's decision-making also informs broader administrative law debates. This Article argues that more rigorous judicial review of the NRC's decisions and more stringent enforcement of NEPA procedures would improve nuclear power regulation. This argument contradicts a well-respected body of administrative law scholarship that perceives statutorily created analytical requirements, judicially-imposed procedures, and hard look review to create "os-

12. *See* J. Samuel Walker & Thomas R. Wellock, *A Short History of Nuclear Regulation 1946-2009*, NUCLEAR REGULATORY COMM'N HISTORY DEP'T 2, 4 (2010). Walker and Wellock describe how the commercial nuclear program began amidst fear that "surrendering America's lead in expanding the peaceful applications of atomic energy would deal a severe blow to its international prestige and world scientific dominance." *Id.* at 2. *See also* Alice Buck, *A History of the Energy Research and Development Administration*, DEP'T OF ENERGY 4-5 (1982), http://energy.gov/sites/prod/files/ERDA%20History.pdf (describing the first national energy plan of 1975 as reflecting a "sense of urgency" based on the significant risks to the country if it failed to quickly develop new energy supply sources, including nuclear power).

13. Indeed, one textbook on NEPA Environmental Impact Statement (EIS) preparation uses the NRC's NEPA process in its first chapter as a case study of "how not to prepare an EIS," describing it as a "lucid case study of unsound, flawed, and even deceptive EIS management practices." CHARLES H. ECCLESTON, THE EIS BOOK: MANAGING AND PREPARING ENVIRONMENTAL IMPACT STATEMENTS 1 (2013).

sification,"[14] undermining agencies' ability to effectively and efficiently regulate.[15] While this scholarship identifies important concerns applicable to many regulatory contexts, the prevailing monolithic image of administrative agencies obscures the need for institution-specific analysis. Agencies' approaches to policy decisions will vary substantially depending upon their unique histories, legal mandates, structures, and organizational cultures, all of which affect the balance struck between conflicting demands for efficiency, reasoned analysis, and participation. In the NRC's case, insularity combines with extreme judicial deference to undermine the NRC's environmental and safety decision-making pro-

14. *See, e.g.*, JERRY MASHAW & DAVID HARFST, THE STRUGGLE FOR AUTO SAFETY 74-81, 172-291 (1990) (describing how auto manufacturers used administrative procedures to block standards and how the threat of litigation caused the agency to shift resources from engineering standards to legal defense); Thomas McGarity, *The Courts and the Ossification of Rulemaking: A Response to Professor Seidenfeld*, 75 TEX. L. REV. 525, 536 (1997) ("The stronger the insistence by the reviewing courts on information, analysis, and logical reasoning, the less likely that the agencies will be able to impose regulatory requirements upon unwilling regulates."); Thomas McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385 (1992) (arguing that judicial enforcement of new analytical methods—many imposed at industry's request—leads to agency unresponsiveness); Richard J. Pierce, Jr., *The Unintended Effects of Judicial Review of Agency Action: How Federal Courts Have Contributed to the Electricity Crisis in the 1990s*, 43 ADMIN. L. REV. 7, 8 (1991) (describing judicial review of Federal Energy Regulatory Commission rulemakings as an important "indirect cause of the electricity shortage" and claiming that "increasing evidence" shows that the powerful deterrent created by judicial review has caused "policy paralysis" in other agencies as well). Nonetheless, a good number of scholars continue to advocate hard look review either generally or in specific contexts. *See, e.g.*, William W. Buzbee, *Preemption Hard Look Review, Regulatory Interaction and the Quest for Stewardship and Intergenerational Equity*, 77 GEO. WASH. L. REV. 1521, 1557 (2009) ("[N]ormative goals of encouraging agency transparency, accountability, and open process are furthered by hard look review."); Richard A. Nagareda, *Turning from Tort to Administration*, 94 MICH. L. REV. 899, 945 (1996) (arguing that hard look review "guard[s] against precisely the kinds of infidelities that lie at the core of the agency cost problem in administrative law"); Catherine M. Sharkey, *Federalism Accountability: "Agency-Forcing" Measures*, 58 DUKE L.J. 2125, 2181 (2009) (describing how hard look review can "ensure that agencies disclose relevant data and provide reasoned responses to material objections raised during the rulemaking process"); Adam S. Zimmerman, *Distributing Justice*, 86 N.Y.U. L. REV. 500, 568-71 (2011) (advocating "hard look" review of agency settlements).

15. McGarity, *The Courts and the Ossification of Rulemaking*, *supra* note 14, at 528.

cesses.[16] Courts' deferential stance toward the agency has allowed it to create information-blocking rules and procedures that defeat NEPA's primary purpose: to have agencies incorporate environmental impact analysis into decision-making.

An agency's response to competing demands will be reflected not only in the substantive policies it produces but also in the procedures it adopts. Although courts constrain agencies to exercise discretion within the bounds of their statutory mandates, the judiciary gives administrators wide latitude in choosing *how* to exercise the authority they do have.[17] Despite significant variation in agencies' selection of regulatory instruments,[18] we actually know very little about how agencies choose from their many available tools and the substantive consequences of these choices. This Article examines the NRC as a case study of agency policy decision-making processes, to illuminate the internal—and often "invisible"[19]—workings of administrative agencies. When brought to light, these internal decision-making processes may help to refine our approach to agency oversight and offer options better tailored to an agency's particular situation.

This discussion proceeds as follows. Part I describes administrative law principles that inform judicial deference to agencies. It discusses the "ossification" claim that statutorily imposed decision procedures, such those created by NEPA, and hard look judicial review impede agency experts from efficiently and effectively regulating. It argues that overly-broad claims about ossification fail to account for the diversity of agency cultures and regulatory activities, as well as the potential corrective function of public input and judicial review. It then explains how NEPA offers similar correctives if properly applied.

Part II describes the NRC's regulatory setting, beginning with conflicting political imperatives to both promote and regulate private commercial reactors. It then analyzes the courts' extreme deference to the NRC, a view locked in by two Supreme Court cases, *Vermont Yankee*[20] and *Baltimore Gas*[21], that have

16. The quality of administrative agencies' substantive decisions is difficult to measure, particularly for policy choices that do not have a "right answer," such as setting risk tolerance or degrees of environmental harm to be traded against other values. Nonetheless, this difficulty should not prevent scholars from seeking ways to assess agency judgments. In this case, the Fukishima accident highlights the inadequacy of the decision process within the NRC that blocks relevant input.

17. *See generally* Elizabeth Magill, *Agency Choice of Policymaking Form*, 71 U. CHI. L. REV. 1383, 1403-04 (2004) (describing the multiple forms available to most agencies and the "orthodox" doctrine that courts will not interfere with agency choice).

18. *See id.* at 1386-87.

19. Jerry L. Mashaw, *The American Model of Federal Administrative Law: Remembering the First One Hundred Years*, 78 GEO. WASH. L. REV. 975, 976 (2010).

20. Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc. 435 U.S. 519 (1978).

shaped judicial review in NEPA cases and broader administrative law doctrine. It explains how the "scientific" judgment to which the Supreme Court deferred in *Baltimore Gas* actually had little to do with scientific or technical expertise but consisted largely of crystal ball predictions about future political and legal developments. It then describes the Fukushima Near Term Task Force (Task Force) recommendations and subsequent changes adopted by the Commission.

Part III illustrates how the NRC's choice of procedures, both for licensing hearings and NEPA review, blocked experts from receiving and acting upon important safety and environmental information. These combined limits undermined standards for spent fuel, reactor accidents, earthquakes, emergency planning, and station blackout—the very issues reconsidered in light of Fukushima. Part IV argues that critical lessons from Fukushima have yet to reach the NRC—as illustrated by continued use of information-blocking procedures that favor expeditious licensing over environmental and safety values. It then discusses the role that more stringent judicial review could play in shifting this perspective.

I. Administrative Law and NEPA

A. Trans-substantive Principles and Deference

Enactment of the Administrative Procedure Act[22] (APA) and other legal developments in the mid-twentieth century transformed administrative law from "the artifact of particular statutes and practices within individual agencies" to a set of laws based on "trans-substantive legislation and judicial interpretations."[23] Modern American administrative law is characterized by norms supporting public participation, governmental transparency, rational legislative rulemaking supported by reasoned analysis, and procedural fairness.[24] The APA enshrines these values with procedural requirements for notice and comment rulemaking, disclosure provisions, mandated opportunities for public participation, and trial-like procedures for adjudicative decisions. These requirements, in turn, "are viewed as central to achieving administrative legitimacy and thus justifying judicial deference."[25] Administrative agencies are understood to have the time and expertise to implement Congress's intent.[26] This vision of agency expertise frames their legal relationship with courts.

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

22. 5 U.S.C. §§ 500-596 (2012).

23. Mashaw, *supra* note 19, at 980-81.

24. *Id.* at 981.

25. Brietta Clark, *APA Deference After Independent Living Center: Why Informal Adjudicatory Action Needs a Hard Look*, 102 Ky. L.J. 211, 214 (2013-14).

26. *Id.* at 229-30 ("[G]iven their expertise and accountability to the executive, agencies are in a better position than courts to fill in legislative gaps that involve value judgments and the balancing of policy goals.").

Indeed, Douglas Ginsburg describes judicial deference to administrative agencies as the "hallmark" of the U.S. system of administrative law,[27] as evidenced by lenient *Chevron* review of agencies' statutory interpretations,[28] the indulgent substantial evidence standard for factual determinations, and "arbitrary and capricious" review of policymaking and other actions.[29] These standards provide efficiency and legitimacy because "agencies . . . develop expertise in the field or industry they are charged with regulating."[30] Moreover, because statutes often require administrative decisions to resolve conflicts between "competing and often wholly incommensurable values," deference places these policy decisions in the hands of agencies that, unlike courts, have at least indirect political accountability.[31]

This deferential stance extends to procedural choices as well. So long as agencies meet the basic requirements of their organic statutes, the APA, and the Constitution, they may create their own hearing procedures, choose quite freely between adjudication and rulemaking,[32] select among a range of formal or informal enforcement mechanisms, and can often choose not to regulate at all.[33] Although respect for agency expertise broadly undergirds legal rules shaping courts' review of agency substantive and procedural decisions, academic and judicial perspectives on the appropriate degree of deference have vacillated over time, as described in the next section.

B. Expertise and Ossification

Although deference to expertise continues to broadly frame legal rules, historical review shows shifting trends in scholars' and judges' view of agencies'

27. Douglas H. Ginsburg, *Appellate Courts and Independent Experts*, 60 CASE W. RES. L. REV. 303, 317 (2010) (internal citations omitted).

28. Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837 (1984). Under *Chevron*, courts will uphold "permissible" agency interpretations of ambiguous statutory text. *Id.* at 866.

29. *See* 5 U.S.C. § 706(2)(A)(2012).

30. Ginsburg, *supra* note 27, at 319; *see also* Martin Shapiro, *Administrative Discretion: The Next Stage*, 92 YALE L.J. 1487, 1507 (1983) (describing agency experts' understanding of policy matters as superior to generalist judges).

31. Ginsburg, *supra* note 27, at 319.

32. *See* NLRB v. Bell Aeropspace Co., 416 U.S. 267, 294 (1974) ("[T]he choice between rulemaking and adjudication lies in the first instance within the Board's discretion."); SEC v. Chenery Corp., 332 U.S. 194, 203 (1947) (*Chenery II*) ("[T]he choice made between proceeding by general rule or by individual, ad hoc litigation is one that lies primarily in the informed discretion of the administrative agency."). *See also* Magill, *supra* note 17.

33. *See* Adrian Vermeule & Cass R. Sunstein, *The Law of 'Not Now': When Agencies Defer Decisions*, 103 GEO. L. REV. 157, 161-62 (2014) (describing the broad discretion that agencies enjoy to defer regulation but identifying three specific limitations).

ability and willingness to address social problems. In the New Deal era, scholars and judges optimistically presumed that agencies' apolitical expertise would bring the benefits of rational technocratic problem solving to public policy.[34] Yet it soon became apparent that agencies were not merely mechanically applying science to definitive congressional mandates but were drawn into discretionary balancing among competing values.[35]

During the 1950s and 1960s, observers questioned the lack of democratic representation in value-laden agency policymaking, and critics raised the specter of regulatory capture.[36] In light of these concerns and the expanding role of administrative agencies, all three branches began imposing public participation and analytic requirements during the 1970s; these "outside-in" approaches to agency decision-making (including NEPA) aimed to ensure that agency decisions were rational and considered relevant values.[37]

Judicial constraints upon agency policy-making discretion are reflected in the development of the "hard look" doctrine, which ratcheted up judicial interrogation of the basis for policymaking decisions under the arbitrary and capricious standard. The D.C. Circuit's decision in *Greater Boston Television Corp. v. FCC*[38] reflects this view. Given agencies' broad powers to "select policies deemed in the public interest," the courts should ensure that agencies' judgments properly considered "all material facts and issues" in a well-reasoned manner:

> This calls for insistence that the agency articulate with reasonable clarity its reasons for decision, and identify the significance of the crucial facts, a course that tends to assure that the agency's policies effectuate

34. *See* Richard P. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1669, 1695 (1975). The New Deal era saw a strong faith in the apolitical bureaucratic application of expertise to social problems. *See* James O. Freedman, *Expertise and the Administrative Process*, 28 ADMIN. L. REV. 363, 364 (1976) ("Those who rationalized the New Deal's regulatory initiatives regarded expertise and specialization as the particular strengths of the administrative process.").

35. Stewart, *supra* note 34, at 1684 ("[B]road legislative directives will rarely dispose of particular cases once the relevant facts have been accurately ascertained. More frequently, the application of legislative directives requires the agency to reweigh and reconcile the often nebulous or conflicting policies behind the directives in the context of a particular factual situation with a particular constellation of affected interests. The required balancing of policies is an inherently discretionary, ultimately political procedure. . . . Such choices clearly do not turn on technical issues that can safely be left to the experts.").

36. *See* MARVER BERNSTEIN, REGULATING BUSINESS BY INDEPENDENT COMMISSION (1955).

37. *See* Sidney Shapiro, Elizabeth Fisher & Wendy Wagner, *The Enlightenment of Administrative Law: Looking Inside the Agency for Legitimacy*, 47 WAKE FOREST L. REV. 463 (2012).

38. 444 F.2d 841 (D.C. Cir. 1970).

> general standards, applied without unreasonable discrimination. . . . Its supervisory function calls on the court to intervene not merely in case of procedural inadequacies, or bypassing of the mandate in the legislative charter, but more broadly if the court becomes aware, especially from a combination of danger signals, that the agency has not really taken a 'hard look' at the salient problems, and has not genuinely engaged in reasoned decision-making.[39]

Many scholars have criticized the hard look doctrine for impeding efficient use of informal rulemaking, thus ossifying rules.[40] Important to this critique is the belief that notice-and-comment rulemaking provides a better regulatory tool for agency policymaking than adjudication because it promotes efficiency, public participation, and predictability.[41] Lisa Bressman aptly summarizes the reasons for this commonly held preference as follows:

> Notice-and-comment rulemaking, by its nature, facilitates the participation of affected parties, the submission of relevant information, and the prospective application of the resulting policy. As a result of the reasoned decision-making requirement that accompanies it, notice-and-comment rulemaking fosters logical and thorough consideration of policy. To the extent notice-and-comment rulemaking issues general rules that rely for their enforcement on further proceedings, it also promotes predictability.[42]

Concern with preserving the benefits of rulemaking prompted calls for a shift back to a more deferential judicial stance towards agency decision-making. Proponents of the ossification thesis blame judicial misinterpretation of the APA's concise general statement rule for spawning an era of voluminous and encyclopedic rulemaking records that agencies prophylactically develop to defend against anticipated review.[43] The time and resources required for such record-making bogs the agency down, making it more difficult to respond to immediate issues and to update rules as new information arises. Moreover, the

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39. *Id.* at 851.

40. *See, e.g.*, McGarity, *supra* note 14; Richard J. Pierce, Jr., *Rulemaking Ossification Is Real: A Response to Testing the Ossification Thesis*, 80 GEO. WASH. L. REV. 1493, 1496-97 (2012).

41. *See* William D. Araiza, *Agency Adjudication, The Importance of Facts, and the Limitation of Labels*, 57 WASH. & LEE L. REV. 351, 383 (2000) ("Agency use of adjudication to establish a rule may well deprive subsequent defendants of any meaningful participation right . . . ."); Lisa Schultz Bressman, *Beyond Accountability: Arbitrariness and Legitimacy in the Administrative State*, 78 N.Y.U. L. REV. 461, 541 (2003) (summarizing this literature); Katie R. Eyer, *Administrative Adjudication and the Rule of Law*, 60 ADMIN. L. REV. 647, 649 (2008).

42. Bressman, *supra* note 41, at 541-42.

43. *See, e.g.*, Pierce, *supra* note 40, at 1400; *see also* 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, 309.

sheer volume of comments submitted on proposed rulemaking prevents "overstretched agency staff" from getting to their most important jobs: "The law does not permit the agency to shield itself from this flood of information and focus on developing its own expert conception of the project."[44] Worse, some critics contend that the very participation requirements intended to give the public access to agency decision-making disproportionately favor regulated industries and allow them to impede administrators' oversight.[45]

Proponents of the ossification thesis laud the Supreme Court's decision in *Vermont Yankee* [46] for reigning in a Circuit Court trend towards increasing procedural requirements for informal rulemaking under the APA.[47] This seminal decision held that courts should defer to agencies' decision not to provide additional procedures for notice-and-comment rulemaking beyond statutory minimums.[48] Thus, the APA provided the "maximum procedural requirements which Congress was willing to have the courts impose upon agencies in conducting rulemaking procedures."[49] In addition to the APA, the opinion cited historical deference to agencies' procedural choices: "[T]his Court has for more than four decades emphasized that the formulation of procedures was basically to be left within the discretion of the agencies to which Congress had confided the responsibility for substantive judgments."[50]

The Court explained that agency discretion to set procedures stemmed from Congress's "determination that administrative agencies and administrators will be familiar with the industries which they regulate and will be in a better position than federal courts or Congress itself to design procedural rules adapted to the peculiarities of the industry and the tasks of the agency involved."[51] This delegation of authority extended to "the scope of the inquiry, whether applications should be heard contemporaneously or successively,

44. Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321, 1325 (2010).

45. *See* Pierce, *supra* note 43, at 309; *see also* McGarity (1997) *supra* note 14 ("The stronger the insistence by the reviewing courts on information, analysis, and logical reasoning, the less likely that the agencies will be able to impose regulatory requirements upon unwilling regulates."); McGarity (1992) (arguing that judicial enforcement of new analytical methods—many imposed at industry's request—leads to agency unresponsiveness).

46. 435 U.S. 519 (1978).

47. Pierce, *supra* note 40, at 1500 (describing *Vermont Yankee* as a "landmark deossifying opinion").

48. *Vermont Yankee*, 435 U.S. at 524 ("Agencies are free to grant additional procedural rights in the exercise of their discretion, but reviewing courts are generally not free to impose them if the agencies have chosen not to grant them.").

49. *Id.*

50. *Id.*

51. *Id.* at 525 (quoting FCC v. Schreiber, 381 U.S. 279, 290 (1965)).

whether parties should be allowed to intervene in one another's proceedings and similar questions."[52] In other words, agencies are given free reign over a broad range of procedures. The Court described the rule that agencies "should be free to fashion their own rules of procedure" as a "very basic tenet of administrative law."[53]

Dueling analyses of *Vermont Yankee*'s impact appeared in a 1978 Harvard Law Review symposium. Then-Professor Stephen Breyer condoned the Court's restriction on judicially-imposed procedures but criticized statements allowing the Court of Appeals to require record supplementation on remand.[54] He feared that this excessive intrusion into agency processes would allow courts to make value determinations better left to the agency.[55]

In contrast, Richard Stewart criticized *Vermont Yankee*'s bar on judicially-created procedural innovations for leaving agencies with outdated APA procedures unsuited to the modern demands on agencies.[56] Given the APA's binary choice of policymaking options, administrators facing greater workloads had increasingly shifted from the APA's cumbersome trial-like procedures for case-by-case adjudication to reliance to notice and comment rulemaking.[57] By requiring agencies to support their rules with greater evidentiary records than the APA explicitly required, courts had managed to accommodate administrative workloads while addressing concerns that agencies could not fairly and wisely balance social values.[58] He hoped that the salutary development of hybrid rulemaking would not be entirely undermined by *Vermont Yankee*.[59]

Although *Vermont Yankee* is most frequently cited for its limitation on judicially-mandated procedures, Breyer's fears and Stewart's hopes reflect a second legacy: acceptance of the judicial role in ensuring that agencies develop an adequate substantive record. The inconsistencies between these two aspects of the decision left room for the Supreme Court to endorse an apparent version of the hard look standard in *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Company*[60] when it required the agency to "exam-

52. *Id.* (quoting FCC v. Pottsville Broadcasting Co., 309 U.S. 134, 138 (1940)).

53. *Id.* at 543, 544.

54. Stephen Breyer, Vermont Yankee *and the Courts' Role in the Nuclear Energy Controversy,* 91 HARV. L. REV. 1833, 1833 (1978).

55. *Id.* (stating that judges were "intruding too deeply upon the administrative process perhaps without full realization of their implicit premises or of the potential consequences").

56. Richard Stewart, Vermont Yankee *and the Evolution of Administrative Procedure,* 91 HARV. L. REV. 1805, 1811 (1978).

57. *Id.* at 1811-12.

58. *Id.*

59. *Id.* at 1816, 1821.

60. 463 U.S. 29, 57 (1983).

ine the relevant data and to articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'"[61] The Court explained that decisions will normally be arbitrary and capricious where the agency

> 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.[62]

Some scholars have urged the Court to eliminate hard look review altogether, along with other legal doctrines that purportedly violate the spirit of *Vermont Yankee*.[63] Richard J. Pierce, for example, argues that hard look review "arose through the same kind of arrogant and illegitimate judicial decision-making process that spawned the practice the Court condemned in *Vermont Yankee*."[64] Like other adherents to the ossification thesis, Pierce aims to reduce unpredictable litigation delays and preserve the benefits of informal rulemaking.[65]

C. When Hard Look Review Looks Good

While socially beneficial rulemakings have no doubt sometimes been delayed or scuttled by ossifying procedures, the prevailing monolithic image of agencies has led scholars to make overly broad recommendations. Proponents of the ossification thesis have highlighted cases in which burdensome procedures and rigorous judicial review blocked agencies from addressing important health and safety issues.[66] However, significant variations in agencies' structures, mandates, cultures, and degrees of political accountability inevitably will

61. *Id.* at 43.

62. *Id.*

63. *See, e.g.*, Richard J. Pierce, Jr., *Waiting for Vermont Yankee III, IV, and V? A Response to Beerman and Lawson,* 75 GEO. WASH. L. REV. 902, 903 (2007); Paul Verkuil, *Judicial Review of Informal Rulemaking: Waiting for Vermont Yankee II*, 55 TUL. L. REV. 418, 419-21 (1981).

64. Pierce, *supra* note 63, at 906.

65. *Id.* at 909-10. Pierce sees one exception to this litigation unpredictability in the extent to which case outcomes reflect the predictable political preferences of the reviewing panel. *Id.*

66. *See, e.g.*, MASHAW & HARFST, *supra* note 14; Richard J. Pierce, Jr., *Seven Ways to Deossify Agency Rulemaking*, 47 ADMIN. L. REV. 59, 61 (1995) (describing the "impossible plight of agencies charged with the responsibility to promulgate rules concerning environmental protection, health and safety, and economic regulation" and judicial reversal of expensive and time-consuming EPA and OSHA rulemakings designed to limit exposure to hazardous and toxic substances).

shape their approaches to policy decisions. Policymaking will reflect this unique background as well as each agency's response to tensions between conflicting theoretical and practical goals. In the NRC's case, overemphasis on expeditious licensing prompted the agency to adopt regulations that prevent staff and licensing boards from utilizing relevant data in decision-making. Judicial acquiescence to the NRC's procedural choices in the name of agency expertise, thus ironically undercuts the very values that such deference seeks to preserve.

Agencies also employ informal rulemaking for a diverse range of activities. As described in Part III, the NRC has used rulemaking not only to establish regulatory standards and set policies, but also to shift power from independent licensing boards to agency staff, to constrain public participation in licensing proceedings, and to undermine NEPA analysis. Moreover, the NRC has used rulemaking to impose a backfitting rule upon itself, limiting the agency's ability to impose updated standards on licensees.[67]

Broad claims about expertise can mask the fact that an agency's official policy rarely reflects a single and obvious option reached by consensus among experts. Different branches, divisions, and individuals often disagree, and the official statement represents either a compromise or a victory by one contingent. Courts' reification of the final product as *the* expert opinion masks internal dissent over substance and power struggles over procedures. As a practical matter, courts obviously must review a single and final policy statement and not reweigh matters sufficiently evaluated at the agency level. However, excessive judicial deference can privilege particular contingents and allow agency procedures to shift the policy balance. Thus, instead of incorporating multiple Congressional concerns—economic efficiency, environmental protection, public safety, technology promotion—an agency may respond to external (nonjudicial) pressure by jettisoning some values in favor of others. Extreme deference permits the analysis to become quite skewed.[68] In the NRC's case, the agency has increasingly adopted procedures for licensing hearings and NEPA review that limit information available to agency experts in the service of prompt licensing. However final decisions appear from the outside, development of the reactor licensing scheme has been fraught with internal and external conflict.[69] Fukushima and its aftermath have shown the regulatory regime that evolved from this process to be deeply flawed.

One need not attribute regulatory failures to improper influences to support hard look review. Insights from cognitive psychology suggest that even well-intentioned governmental actors often choose poorly among policy options because human psychology generates cognitive errors.[70] Indeed, the same

67. 10 C.F.R. § 50.109. Implications of this regulation are discussed further in Section II.A.

68. *See* Section II.C *infra.*

69. *See* WALKER, *supra* note 11, at 40-43.

70. Jeffrey Rachlinski & Cynthia Farina, *Cognitive Government and Optimal Government Design*, 87 CORNELL L. REV. 549, 562-63 (2002).

expertise that enable agencies to resolve issues efficiently can also lead to irrational decisions.[71] The human tendency towards overconfidence in one's own judgment can be exaggerated in experts, who are "often wrong but rarely in doubt."[72] Moreover, experts may deploy a particularly narrow analytical perspective due to their "tend[ency] to have great faith that their profession has identified most of the problems they are likely to face."[73] Experts can suffer from tunnel vision, "myopically focus[ing] on issues within their area of expertise and thereby fail[ing] to recognize that a decision would benefit from accessing other bodies of knowledge or ways of thinking."[74]

Despite employing procedures such as formalized risk modeling that reduce cognitive error, agency decision-making may be plagued with biases. Cass Sunstein and Reid Hastie argue that group deliberation processes within large institutions can "amplify" individual cognitive errors, deterring individuals from sharing unique information and pushing groups to more extreme positions.[75] Organizational structures that functionally segregate related information across time or between departments can further impede recognition of interacting risk factors. As John Darley has described in the products liability context, although an organization may collectively have sufficient information, "because the information is not pulled together and put in front of a competent individual, the organization can be said not to know that the product is harmful."[76]

While they do not contend that lawmakers designed the APA to remedy these decision-making biases, Jeffrey Rachlinski and Cynthia Farina argue that twentieth-century administrative law developments, particularly increased public participation and judicial review, provide useful antidotes to cognitive biases and judgment errors. Public participation combined with hard look judicial review can reduce expert overconfidence and tunnel vision by requiring agencies to articulate reasons for their decisions and to explain rejection of alternative approaches.[77] Moreover, public participation introduces multiple perspectives

71. Mark Seidenfeld, *Cognitive Loafing, Social Conformity, and Judicial Review of Agency Rulemaking*, 87 CORNELL L. REV. 486, 491-508 (2002).

72. Rachlinski & Farina, *supra* note 70, at 560.

73. *Id.*

74. *Id.*; *see also* Cass R. Sunstein, Daniel Kahneman, David Schkade & Ilana Ritov, *Predictably Incoherent Judgments*, 54 STAN. L. REV. 1153 (2002).

75. *See* Cass R. Sunstein & Reid Hastie, *Garbage in, Garbage out? Some Micro Sources of Macro Errors*, J. INSTITUTIONAL ECON. 2-4 (2014) (describing how group deliberation can aggravate individual cognitive biases due to informational signals and social pressures).

76. John M. Darley, *How Organizations Socialize Individuals into Evildoing*, *in* CODES OF CONDUCT 17 (David M. Messick & Ann E. Tenbrunsel eds., 1996).

77. Rachlinksi and Farina, *supra* note 70 at 588-89.

into policy analysis and gives experts feedback, including critiques that may not be heard from others within the agency due to groupthink or social pressure.[78]

Because it enables public participation, structures the scope and manner of decision-procedures, and requires reasoned analysis, NEPA can similarly reduce cognitive biases if properly applied. While this Article does not attribute specific decisions to identified biases, it does argue that the NRC's regulatory choices exacerbate the risk that cognitive biases will influence its decisions. As described further below, the NRC disaggregates decision-making in a manner that impedes recognition of potentially critical interactions between issues such as spent fuel storage and accident risk, severe accidents and natural hazards, as well as earthquakes and emergency planning. Barriers to participation and limits on licensing boards' scope of investigation reduce the likelihood that these interactions will be recognized. The Commission's generic findings preclude plant-specific analysis of environmental impacts, increasing the risk that overconfident or time-pressured staff will overlook a plant's unique hazards. Consistent judicial enforcement of NEPA procedures could help to counteract these risks by requiring interdisciplinary evaluation of a range of impacts, consideration of alternatives, and engagement with public comments. However, as explained in Part III, thus far the NRC has structured its decision-making in ways that undermine NEPA's benefits. The judiciary has overwhelmingly deferred to the agency's choices, treating these as procedural decisions appropriately left to the choice of agency experts.

The Supreme Court's conflation of substantive expertise with procedural prowess in *Vermont Yankee* presumed that an agency's scientific experts are also better positioned to create decision-making procedures. But an agency's choice of procedures does not merely implement foregone substantive judgments. Rather, procedural choices shape substantive policy in underappreciated ways: by framing or limiting information available to future decision-makers and determining the potential for alternative viewpoints (from external critics of policy proposals or internal dissenters) to be heard.[79] Adoption of apparently procedural rules can reflect substantive decisions to have future policy judgments favor certain values at the expense of others. Moreover, in the NRC's case, the courts have deferred on decisions far afield from the agency's technical expertise.[80] Finally, to the extent agencies suffer from common decision-making errors, extreme deference undermines potential correctives that public participation and judicially-enforced administrative NEPA analysis could offer.

D. The National Environmental Policy Act

78. *See* Sunstein & Hastie, *supra* note 75, at 2.

79. *See, e.g.*, SERGE TAYLOR, MAKING BUREAUCRACIES THINK (1984) (describing how judicial review of agency analysis under NEPA empowered a new cadre of environmental analysts within agencies); *see also* William Pederson, *Formal Records and Informal Rulemaking*, 85 YALE L.J. 38, 59-60 (1975).

80. *See* discussion of *Vermont Yankee* and *Baltimore Gas, infra* Section II.B.

Modern administrative law norms of transparency, participation, and rationalized process are epitomized in NEPA. Among its few express provisions, NEPA mandates that federal agencies prepare a detailed environmental impact statement (EIS) for "major federal actions significantly affecting the quality of the human environment."[81] The EIS process requires agencies to study the environmental impacts of proposed activities, compare each proposal with alternative approaches, and consider mitigation measures to reduce any significant impacts. NEPA requires agencies to evaluate this information before deciding to undertake discretionary[82] actions, including adopting regulations and approving private activities, such as licensing nuclear power plants.[83]

Once a proposal triggers NEPA review, the depth of required analysis depends upon the likelihood that the action will cause significant environmental impacts.[84] For many projects that will undoubtedly cause adverse effects, agencies initiate review with the full EIS process. However, NEPA allows agencies to forgo this in-depth study under two circumstances. First, agencies may exclude entire categories of recurring actions (such as non-substantive corrections to contracts) from review if they have been found through notice and comment rulemaking to have no significant environmental impacts.[85] As discussed below,

81. 42 U.S.C. § 4332(2)(C) (2012). The Act mandates that

> all agencies of the Federal Government shall . . . include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement . . . on—
>
> (i) the environmental impact of the proposed action,
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
> (iii) alternatives to the proposed action,
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
> (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."
> *Id.*

82. *See* Dep't of Transp. v. Public Citizen, 541 U.S. 752, 756 (2004) (holding that, because the Federal Motor Carrier Safety Administration lacked discretion to control cross-border operations of Mexican-domiciled motor carriers, the agency had no duty under NEPA to evaluate impacts in promulgating safety inspection regulations that would precede lifting of presidential moratorium).

83. *See* 40 C.F.R. § 1508.18(b) (describing the categories of actions that fall within NEPA as including "adoption of regulations" and "approval of specific projects, such as construction or management activities located in a defined geographic area . . . includ[ing] actions approved by permit or other regulatory decision").

84. Many factors can affect a finding of significance. *See* 40 C.F.R. § 1508.27.

85. *See* 40 C.F.R. § 1508.4.

over the last few decades the NRC increasingly deployed categorical exclusions to limit analyses of arguably important issues.

Second, projects that are not categorically exempted may nonetheless be individually excused from full EIS preparation requirements based upon more limited, preliminary analysis in a concise "environmental assessment" (EA) document.[86] If the EA shows the action will have no significant impacts, the agency may issue a "finding of no significant impact" (FONSI) briefly explaining its decision and concluding NEPA proceedings.[87] However, if the EA reveals any potentially significant impacts, the agency must then prepare a full EIS. Courts review an agency's decision not to prepare an EIS under the arbitrary and capricious standard.[88]

The EIS process promotes public participation and reasoned analysis through several mechanisms. The agency must begin with a "scoping" process, soliciting public and outside agency input on the range of impacts for study.[89] The lead agency then produces a draft EIS predicting the proposed action's environmental impacts and comparing impacts under alternative approaches.[90] After circulating the draft EIS, the agency issues a final EIS that must include responses to governmental and public comments. The final EIS explains changes or new analyses stemming from this outside input and gives reasons for rejecting other comments. To be adequate, the final EIS must provide a "full and fair discussion of significant environmental impacts" and inform "decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[91] The agency provides a "record of decision" explaining its choice among alternatives and its reasons for rejecting environmentally preferable alternatives or mitigation.[92] NEPA's central purpose—for thorough analysis of environmental impacts to inform decision-makers *before* they commit to discretionary actions—is evident in the timing requirements. NEPA requires agencies to begin analyzing environmental impacts early enough for the analysis to "serve practically as an important contribution to the decision-making process" and to ensure that it "will not be used to rationalize or justify decisions already made."[93]

86. *See* 40 C.F.R. §§ 1501.3-1501.4. The EA, a "concise public document," discusses the need for and alternatives to the proposed action, as well as the environmental impacts of both the action and its potential alternatives. 40 C.F.R. § 1508.9.

87. 40 C.F.R. §§ 1508.9(a)(1), 1508.13.

88. *See* Dep't of Transp. v. Public Citizen, 541 U.S. 752, 763 (2004).

89. *See* 40 C.F.R. § 1501.7(a).

90. NEPA provides that federal agencies must, to the fullest extent possible, "[s]tudy, develop, and describe appropriate alternatives to recommended courses of action in any proposal . . . ." 42 U.S.C. § 4332(2)(E) (2012).

91. 40 C.F.R. § 1502.1.

92. 40 C.F.R. § 1505.2.

93. 40 C.F.R. § 1502.5.

A decade after its passage, the Supreme Court interpreted NEPA to be an "essentially procedural" statute.[94] Consequently, the courts will not second-guess the agency final selection among alternatives because NEPA does not mandate "that agencies achieve particular substantive environmental results."[95] Courts review NEPA decisions under the APA's arbitrary and capricious standard and require agencies to take a "hard look" at impacts.[96] Courts should ensure that federal agencies "consider every significant aspect of the environmental impact" of the proposed action, and "inform the public that it has indeed considered environmental concerns in its decision-making process."[97] A hard look under NEPA requires the agency to consider "all foreseeable direct and indirect impacts"[98] including the cumulative "incremental impact[s] of the action when added to past, present, and reasonably foreseeable future actions."[99]

Despite interpreting NEPA to preclude judicial review of an agency's substantive policy choices, the Supreme Court has repeatedly expressed optimism that NEPA can rationalize the decision-making process and infuse it with environmental values. The Court claims that NEPA will "inject environmental considerations into the federal agency's decision-making process"[100] and "integrate"[101] these concerns with that decision-making. The Court presumes that NEPA will "ensure[] that the agency . . . will have available, and will *carefully consider*, detailed information concerning significant environmental impacts."[102]

Literature on NEPA and its progeny often posits that that environmental impact assessment creates a fundamental cultural shift that makes agencies more protective of the environment than they would be otherwise.[103] Despite the difficulty of broadly measuring the statute's impacts given the impossibility of comparison with a NEPA-free control decision, the statute has no doubt im-

94. Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519, 558 (1978).

95. Marsh v. Or. Natural Res. Council, 490 U.S. 360, 371 (1989).

96. 5 U.S.C. § 706 (2012); Hanly v. Kleindienst, 471 F.2d 823 (2d Cir. 1973).

97. Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 97 (1983) (quoting *Vermont Yankee*, 435 U.S. at 558); *see also* 42 U.S.C. § 4331 (2012).

98. Idaho Sporting Cong. v. Rittenhouse, 305 F.3d 957, 963 (9th Cir. 2002).

99. 40 C.F.R. § 1508.7.

100. Weinberger v. Catholic Action of Hawaii/Peace Educ. Project, 454 U.S. 139, 143 (1981).

101. Andrus v. Sierra Club, 442 U.S. 347, 350 (1979).

102. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349 (1989) (emphasis added).

103. JANE HOLDER, ENVIRONMENTAL ASSESSMENT: THE REGULATION OF DECISION-MAKING 23 (2006).

proved environmental judgments in many instances.[104] Prior to NEPA, some federal agencies (notably the Atomic Energy Commission) explicitly refused to consider environmental impacts, arguing that these concerns exceeded their authority. Even those agencies that did consider environmental impacts (either *sua sponte* or in response to public pressure) often conducted haphazard reviews.[105] By unequivocally requiring agencies to consider these impacts and by creating the Council on Environmental Quality (CEQ) to further NEPA's policies,[106] the statute advanced both environmental awareness and systematic analysis.

Scholars contend that data gathering procedures reduce potential informational biases and render decisions more rational.[107] NEPA aims to improve agency decision-making in several ways. The statute expressly mandates "a systematic, interdisciplinary approach."[108] NEPA requires the agency to integrate analyses of multiple issues in a single EIS, making it harder to separate issues over time. Issue segregation is further discouraged by a broad definition of environmental effects and mandated analysis of cumulative impacts. The requirement that EIS preparation precede decision-making reduces momentum behind proposals with poorly-understood impacts. NEPA's mandate that agencies consider alternatives and mitigation measures further broadens decision options.

Although NEPA provides tools for improving decision-making and pushes agencies to incorporate environmental concerns into policy judgment, it does

104. *See, e.g.*, Taylor, *supra* note 79 at 130 ("There is no question that all [Army Corps of Engineers] districts and [Forest Service] forests do better in terms of avoiding environmental damage than they did before NRPA."); Richard Lazarus, *The National Environmental Policy Act in the United States Supreme Court: A Reappraisal and a Peek Behind the Curtains*, 100 GEO. L.J. 1507, 1586 (2012) ("Even in ruling against environmental plaintiffs, the Supreme Court has promoted a view of NEPA that, in important respects, is likely far greater than its drafters envisioned at the time. The Act has already had a profound and important impact on federal agency decision making.").

105. *See* TAYLOR, *supra* note 79, at 8-13. Prior to NEPA's enactment, the likelihood that the environment would be considered at all depended on the vagaries of chance—that information would come to light and someone would have sufficient interest and power to require its examination.

106. *See* 42 U.S.C. § 4341-47 (2012). The statute directs the CEQ to "assist and advise" the President, "review and appraise" federal programs in pursuit of NEPA's goals, and to "develop and recommend policies to foster and promote improvement of environmental quality." 42 U.S.C. § 4344 (2012). The CEQ's NEPA regulations have been held to be binding on federal agencies, including independent Commissions. *See* Andrus v. Sierra Club, 442 U.S. 347, 358 (1979) (describing the CEQ's NEPA regulations as applying to "all federal agencies").

107. HOLDER, *supra* note 103, at 284.

108. 42 U.S.C. § 4332(A) (2012).

not guarantee sound analysis.[109] Despite its place in a trans-substantive vision of administrative law, NEPA's effectiveness varies by context and agency culture. One comparative study concluded that environmental impact assessment is a necessary but not sufficient condition for improving agencies' incorporation of environmental values into decision-making.[110] Because "every EIA [Environmental Impact Assessment] procedure operates within a political, legal, administrative and policy context peculiar to the jurisdiction . . . [t]o successfully achieve real shifts in the weight given to environmental impacts, the EIA procedure must interact positively with its jurisdictional context."[111]

As seasoned NEPA practitioner Charles Eccleston described the domestic impact of the statute, "most agencies have made substantial strides in learning to comply with NEPA and its EIS requirements. Despite Congress's clear congressional intent and more than 40 years of operating experience, however, a few agencies still have not learned the lessons."[112] In addition to statutory requirements, case law, and CEQ's guidelines, an agency's own NEPA regulations govern its process. As described below, the NRC's NEPA regulations limit the depth of investigation for licensing decisions by emphasizing generic factual determinations through rulemaking, over-utilizing categorical exclusions, and narrowing the scope relicensing proceedings. These policies combine to constrain information flow and exacerbate the potential for information disaggregation within the organization. In the NRC's case, a few judicially enforced examples of regulatory improvement can be seen, but generally the agency undermines NEPA potential by disassembling information, precluding consideration of individualized plant circumstances in licensing proceedings, and generally attempting to buffer itself from external input. Indeed, the NRC serves as Eccelston's model of "how *not* to prepare an EIS."[113] However, if properly executed, environmental review could improve agency decision-making by providing analytical checks, creating an occasion for assembling disaggregated knowledge, and sometimes introducing high quality information.

109. *See, e.g.*, Dinah Bear, *Some Modest Suggestions for Improving Implementation of the National Environmental Policy Act,* 43 NAT. RESOURCES L.J. 931, 935 (2003); Roger C. Crampton & Richard K. Berg, *On Leading a Horse to Water: NEPA and the Federal Bureaucracy*, 71 MICH. L. REV. 511, 536 (1973). NEPA analysis can also be executed poorly through overkill, burying decision-makers in unhelpful data and wasting time and money.

110. CHRISTOPHER WOOD, ENVIRONMENTAL IMPACT ASSESSMENT: A COMPARATIVE REVIEW 7-8 (2003).

111. *Id.* at 8 (also discussing other reviews of EIA effectiveness).

112. CHARLES H. ECCLESTON, THE EIS BOOK: MANAGING AND PREPARING ENVIRONMENTAL IMPACT STATEMENTS xxxii (2014).

113. *Id.* at 1. The first chapter of this lengthy book on EIS best practices is entitled "Scientific facades: How not to prepare an EIS." The chapter describes the NRC's NEPA process as "disingenuous," *id.* at 9, and contends that mismanagement of environmental review imposes safety risks on the public, *id.* at 11.

II. The Setting for Nuclear Regulation

A. Political Context

The Atomic Energy Act of 1954 established the NRC's predecessor, the Atomic Energy Commission (AEC), and authorized it to oversee development of the country's first fleet of privately-owned commercial nuclear reactors.[114] The 1954 Act charged the AEC with both *regulating* and *promoting* the development of commercial nuclear power.[115] Criticism of the AEC's potentially conflicting roles prompted passage of the Energy Reorganization Act of 1974. The 1974 statute established the Nuclear Regulatory Commission, authorizing it to regulate civilian nuclear technology while shifting development and promotion activities to other agencies.[116] Nonetheless, the NRC's organizational culture continues to reflect a promotional stance towards nuclear power, and some scholars believe that this perspective overshadows environmental and safety regulatory goals.[117] Even after passage of the Energy Reorganization Act in 1974, the Supreme Court recognized Congress' continuing directive to advance private commercial development of nuclear power:

> There is little doubt that a primary purpose of the Atomic Energy Act was, and continues to be, the promotion of nuclear power. The Act itself states that it is a program "to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public." The House and Senate Reports confirmed that it was "a major policy goal of the United States" that the involvement of private industry would "speed the further development of the peaceful uses of atomic energy."[118]

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114. 42 U.S.C. § 2011 (2012).

115. Atomic Energy Act of 1954, Ch. 1073, 68 Stat. 919 (1954) (codified as amended at 42 U.S.C. § 2011 (2012)).

116. Energy Reorganization Act of 1974, 42 U.S.C. § 5801 (shifting authority over nuclear power promotion to the Energy Research and Development Administration). In 1977, ERDA was combined with another agency to form the Department of Energy. *See* 42 U.S.C. §§ 7151(a)-(b), 7293 (2012); *see also* Alice Buck, *A History of the Energy Research and Development Administration*, DEP'T OF ENERGY 15 (1982), http://energy.gov/sites/prod/files/ ERDA%20History.pdf.

117. *See, e.g.*, Diane Carter Maleson, *The Historical Roots of the Legal System's Response to Nuclear Power*, 55 S. CALIF. L. REV. 597 (1982).

118. Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 221 (1983) (internal citations omitted). The Court found further support in subsequent Congressional enactments of the Price-Anderson Act which limited

Although the reasons have changed, the federal government has enthusiastically supported the development of private nuclear power since the beginning of the private commercial program.[119] In the 1950s, the desire to maintain U.S. leadership and demonstrate the peaceful benefits of the technology "infused the atomic power program with a sense of urgency."[120] Although the public initially strongly favored nuclear power, by the 1960s, public attitudes had shifted, subjecting nuclear power to widespread protests.[121] Meanwhile, regulators were tasked with developing safety standards for new reactors while the first plants were being designed, without the benefit of operating experience.[122] At the same time that the AEC and NRC have faced huge regulatory tasks with conflicting pressures, Congress and the President have often left them with limited staff resources.[123] These limitations influenced the regulatory approach, including the reluctance to devote substantial resources to NEPA analysis.[124]

B. Judicial Deference: Vermont Yankee *and* Baltimore Gas

As discussed above, the Supreme Court's *Vermont Yankee* opinion strongly endorsed the expertise model of agency decision-making and held that judicial deference extended to the agency's choice of procedures.[125] In addition to its influence on administrative law generally, the opinion also significantly shaped the relationship between courts and the NRC. Because it resolved the case by rejecting the Circuit's purported procedural requirements, the Court avoided the substantive merits, leaving these issues to be decided on remand.[126] Substantively, this decision concerned one of the most difficult challenges for nuclear regulators: how to manage highly radioactive waste produced by nuclear reactors.[127] Based on proposed solutions to the nuclear waste problem, the NRC had concluded that the incremental effect of additional licensing would not be sig-

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private liability for nuclear accidents "in order to protect the public and to encourage the development of the atomic energy industry." *Id.* (internal quotations and citation omitted).

119. *See* GEORGE T. MAZUZAN & J. SAMUEL WALKER, CONTROLLING THE ATOM 91 (1985).

120. Walker & Wellock, *supra* note 12, at 3.

121. *See* J. SAMUEL WALKER, CONTAINING THE ATOM 387-88, 405-14 (1992).

122. MAZUZAN & WALKER, *supra* note 119, at 119.

123. *See id.* at 423.

124. *Id.* at 370.

125. Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519 (1978).

126. *Id.* at 549.

127. *See* Charles de Sailan, *Disposal of Spent Nuclear Fuel in the United States and Europe: A Persistent Environmental Problem*, 34 HARV. ENVTL. L. REV. 461, 472 (2011).

nificant and hence it need not reopen licensing conducted before the agency began considering waste storage impacts.[128]

After remand, the case returned to the Supreme Court in *Baltimore Gas & Electric Co. v. Natural Resource Defense Council, Inc.*[129] This decision reviewed the NRC's use of rulemaking to pre-determine the nuclear fuel cycle's environmental costs and requirement that licensing boards employ these conclusions in NEPA analyses for individual proceedings. The Rule set forth these findings in a table using a "zero-release" assumption, reflecting a conclusion that high-level waste stored in a common offsite repository would cause no significant environmental impacts.[130] Relying on *Vermont Yankee*, the Court stated: "NEPA does not require agencies to adopt any particular internal decisionmaking structure. Here, the agency has chosen to evaluate generically the environmental impact of the fuel cycle and inform individual licensing boards, through the Table S-3 rule, of its evaluation."[131]

The Court concluded that this generic method satisfied the "hard look" required by NEPA, accepting the NRC's view that "[t]he environmental effects of much of the fuel cycle are not plant specific [because] any plant . . . will create additional wastes that must be stored in a common long-term repository."[132] Moreover, it noted the efficiency and consistency provided by generic rulemaking, which avoids "needless repetition of the litigation in individual proceedings."[133] Given this endorsement, it is not surprising that the NRC's use of generic rulemaking expanded significantly after this case, as described further below. Rejecting the Court of Appeals' conclusion that the zero-release assumption failed to reflect uncertainties, Justice O'Connor wrote: "[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.*"[134]

Yet while the court's deferential stance stemmed from the agency's purported application of scientific expertise to predict matters "at the frontiers of science," the critical substantive determinations actually had little to do with nuclear science or engineering. Contrary to *Vermont Yankee*'s reasons for deferring to agency procedural decisions, it also had nothing to do with the NRC's understanding of the specific industry in its domain. As the Court of Appeals explained, the most important areas of uncertainty were not technical, but rather political and institutional: whether the federal government could even lo-

128. Vermont Yankee, 435 U.S at 538.

129. 462 U.S. 87 (1983).

130. *Id.* at 101-03.

131. *Id.* at 100-01.

132. *Id.* at 101.

133. *Id.*

134. *Id.* at 103 (emphases added).

cate a site for the permanent repository and garner agreement from affected state, local, and tribal governments.[135] Moreover, the primary responsibility for developing a repository resided in another agency, the Department of Energy, and success would require cooperation between numerous agencies at all levels of government. Thus, the "scientific determination" to which the Supreme Court deferred consisted predominantly of the NRC's prediction that another agency would garner sufficient resources and political will to successfully site and construct the underground repository. The projected answer that the NRC gave to this political question depended upon factors far beyond the particular competence of nuclear engineers. By uncritically collapsing all decision factors into matters of scientific expertise, the Court gave unquestioning "super-deference" to the NRC.[136]

Whatever factors explain judicial deference to the NRC's decision-making,[137] review of both formal doctrine and case outcomes demonstrates that the NRC receives an extreme degree of judicial deference. The Supreme Court has stated that the Atomic Energy Act (AEA) gave the agency "broad regulatory

135. Natural Res. Def. Council, Inc. v. Nuclear Regulatory Comm'm, 685 F.2d 459, 480-81 (D.C. Cir. 1982) ("[T]he record indicates that serious concerns were raised over the likelihood of developing the human institutions or political consensus necessary to establish and maintain the hypothesized facilities. The IRG Report noted, in fact, 'that the resolution of institutional issues may well be more difficult than finding solutions to remaining technical problems.' . . . In its Statement of Consideration for the final Rule, 'the Commission note[d] and agree[d] . . . that areas of uncertainty remain regarding both the likelihood of finding a site and the probability that it will perform as expected.' . . . Moreover, revealing even more of the uncertain nature of its judgment, the Commission concluded that the evidence, although 'tentative' and general in nature, 'favors the view that suitable sites can be found.'").

136. *See* Emily Hammond Meazell, *Super Deference, The Science Obsession, and Judicial Review of Agency Science*, 109 MICH. L. REV. 733, 734 (2011) (describing the principle that "courts ought to be at their 'most deferential' when reviewing an agency's scientific determinations" as the "super deference" approach). Indeed, preliminary empirical work suggests that that the Court gives greater deference to agencies that work in highly technical areas, regardless of the complexity of the specific policy. *See* Connor N. Raso & William N. Eskridge, Jr., "Chevron" *as a Canon, Not a Precedent: An Empirical Study of What Motivates Justices in Agency Deference Cases*, 110 COLOMB. L. REV. 1727, 1782-83 (2010) ("[T]he complexity of the agency policy decision at issue was not correlated with application of deference doctrine. This was a surprising finding, because agency expertise has since the New Deal been the most commonly expressed rationale for judicial deference. . . . [H]owever, the Justices did not grant agencies greater deference when evaluating 'technical' agency policies. . . . [W]e also found that the Justices were less apt to overturn policies issued by agencies in highly and modestly technical areas.").

137. Scholars have developed numerous competing theories to explain judicial choice of deference regimes—from individual ideological convictions, to rational choices, to sincere concern with the legal rules, among other things. *See, e.g.*, Raso & Eskridge, *supra* note 136, at 1743-52.

authority over the development of nuclear power."[138] Lower courts have taken the NRC's special deference treatment seriously. As the D.C. Circuit stated: "we have . . . long noted the increased deference due NRC procedural rules because of the 'unique degree "to which broad responsibility is reposed in the [Commission], free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives.'"[139] This deferential legal stance is reflected in a very high win rate for the agency.[140]

As one scholar explained, Congress's heavy reliance on scientists to comprehend nuclear technology caused it to make an "unprecedented delegation of power to an agency run by appointed officials and funded by persons who did not understand its inner workings."[141] Despite the value of judicial review in such circumstances, "any attempt on the part of municipal and state officials, trial judges, scientists, or others, to question the wisdom and authority of this extraordinary legislative creation has been met with an almost impenetrable wall of Supreme Court deference to agency expertise."[142] Given this context, the NRC has had free reign to develop rules and procedures for licensing commercial nuclear power plants.

C. Inside the NRC: Task Force Review and Post-Fukushima Actions

After Fukushima, the NRC's former Chairman, Gregory Jackzo, created the Task Force to determine whether lessons learned from the accident demonstrated the need to revise the NRC's policy direction, regulatory structure, or specific technical and operational requirements.[143] The NRC's Operations Director assembled a group of high-level managers from several departments within the agency to staff the Task Force. Although it concluded that continued operation of U.S. reactors created no imminent danger because similar triggering events were unlikely to occur in the United States, the group identified significant gaps in the NRC's regulatory structure and in oversight of specific hazards. The Task Force recommended changes to both the content and manner of

138. *Vt. Yankee*, 435 U.S. at 526.

139. Union of Concerned Scientists v. Nuclear Regulatory Comm'n, 920 F.2d 50, 54 (D.C. Cir. 1990) (quoting BPI v. Atomic Energy Comm'n, 502 F.2d 424, 428 n.3 (D.C. Cir. 1974)); *see also* Cities of Statesville v. Atomic Energy Comm'n, 441 F.2d 962, 977 (D.C. Cir. 1969) (en banc) (noting that the NRC "should be accorded broad discretion in establishing and applying rules for . . . public participation").

140. *See e.g.*, William N. Eskridge, Jr. & Lauren E. Bauer, *The Continuum of Deference: Supreme Court Treatment of Agency Statutory Interpretation from* Chevron *to* Hamdan, 90 GEO. L.J. 1083, 1145, 1204 (2013) (showing a ninety-three percent win rate in energy cases, with NRC cases predominantly populating the sample).

141. Maleson, *supra* note 117, at 607.

142. *Id.*

143. NTTF REPORT, *supra* note 1, at vii.

NRC regulations, urging the agency to replace its "patchwork"[144] approach with "a logical, coherent, and systematic regulatory framework."[145] Preparing for complex accidents like Fukushima required improving regulations on several critical issues, including reactor accidents, station-blackout, and seismic hazards.[146] The Task Force also identified multiple instances in which safety standards had been inconsistently applied,[147] including flooding and earthquake standards adopted in 1996 and 1997 that existing reactors were not required to meet.[148] Different standards were applied to plants depending not upon their specific vulnerabilities to natural hazards but rather upon the historical accident of their construction and licensing dates.[149]

Regarding accident risk, the Task Force criticized the NRC's over-reliance on postulated "design-basis" accident models to the neglect of updated analysis for more complex scenarios. In order to modify these (often decades old) standards as new information arose, the Commission had relied on "a patchwork of beyond-design-basis requirements" found in memoranda, guidance documents, policy statements, and voluntary initiatives to maintain plant safety.[150] The Task Force recommended that these informal rules be formalized in rulemaking[151] and advised that voluntary industry initiatives "should not serve as a substitute for regulatory requirements but as a mechanism for facilitating and standardizing implementation of such requirements."[152] Formally established strategies to address these complex accidents would better comport with NRC's guiding "defense-in-depth" philosophy which emphasizes redundant layers of protection.[153] The Task Force also recommended that the NRC adopt regulations mandating preparation for beyond-design-basis events at *all* plants.[154]

144. *Id.*

145. *Id.* at 15.

146. *Id.* at ix.

147. *Id.* at vii ("The result is a patchwork of regulatory requirements and other safety initiatives, all important, but not all given *equivalent* consideration and treatment by licensees or during NRC technical review and inspection." (emphasis added)).

148. *Id.* at 26, 29.

149. *Id.* at 28 ("[T]he licensing bases, design, and level of protection from natural phenomena differ among the existing operating reactors in the United States, depending on when the plant was constructed and when the plant was licensed for operation.").

150. *Id.* at 18.

151. *Id.* at 20-21.

152. *Id.* at viii.

153. *Id.* at 20.

154. *Id.* at viii.

In light of the Task Force's findings and other analyses, the Commission identified priority "Tier One" actions "to be taken without delay."[155] Among other things, the NRC ordered all licensees to inspect systems, structures, and components that protect against seismic hazards; report degraded or nonconforming conditions; and reevaluate the adequacy of power supplies and emergency preparedness staffing to address accidents involving multiple reactors.[156] Many plant inspections and hazard reevaluations showed a need for updated equipment.[157]

The agency also initiated rulemaking to raise standards for emergency preparedness, severe accident mitigation, spent fuel pool instrumentation, reactor containment vessels, and backup power supplies in case of station blackout.[158] The Commission directed staff to develop a probabilistic risk assessment methodology "to evaluate potential enhancements to plants' capability to prevent or mitigate seismically induced fires and floods."[159] Numerous other Tier 2 and 3 activities remain to be implemented, including the Task Force's primary recommendation that the NRC replace its "patchwork" of safety standards with a "logical and consistent regulatory framework."[160]

As of July 2014, the NRC had issued orders requiring new procedures for maintaining safety during prolonged loss of electrical power, improved containment venting systems,[161] and requirements for instrumentation that could provide a "reliable indication of water level in . . . spent fuel storage pools."[162] The NRC also required all licensees to reevaluate hazards from earthquakes, flooding, and station blackout.[163] Reevaluation of seismic hazards after Fukushima revealed that numerous plants face potential earthquakes exceeding their design bases. Updated analysis showed that the data used to set initial licensing

155. R.W. Borchardt, *Prioritization of Recommended Actions To Be Taken in Response to Fukushima Lessons Learned*, NUCLEAR REGULATORY COMM'N (2011), http://pbadupws.nrc.gov/ docs/ML1126/ML11269A204.pdf.

156. Borchardt, *supra* note 5.

157. *Id.*

158. *Id.*

159. *Id.*

160. NTTF REPORT, *supra* note 1, at 15, 69.

161. This provision aimed to provide a reliable heat and containment venting system for boiling water reactors Mark I or Mark II, which, like the reactors at the Fukushima-Dai-ichi plant were General Electric designs with the same vulnerabilities.

162. NUCLEAR REGULATORY COMM'N, Order EA 12-051, ORDER MODIFYING LICENSES WITH REGARD TO RELIABLE SPENT FUEL POOL INSTRUMENTATION 33 (2012).

163. NUCLEAR REGULATORY COMM'N, REQUEST FOR INFORMATION ON SEISMIC, FLOODING, AND EMERGENCY PREPAREDNESS (2012).

criteria significantly understated potential ground motion.[164] For these plants, the NRC required licensees to reassess their equipment needs to ensure that plants could be safely shutdown in the case of larger earthquakes, particularly when loss of electrical power complicated responses.[165]

It must be acknowledged that development of these new protections required tremendous staff effort and reflects a positive aspect of the NRC's culture: a willingness to seek criticism to benefit regulatory learning. Nonetheless, it should not take a major accident to recognize unnecessary hazards. These concerns that are finally being addressed did not come out of the blue. Rather, as described below, multiple parties—including states, localities, nonprofits, internal critics, and other federal agencies—have repeatedly raised the same issues for many years. However, the NRC's choice of regulatory tools blocked consideration of this input. As discussed in Part III, the agency's hearing procedures and generic NEPA rules prevented adequate evaluation of individualized plant circumstances and potential adverse interactions between various safety systems. Commission-imposed restrictions on staff's ability to revise license requirements compounded these problems. In combination, these factors rendered agency experts partially illiterate. Unfortunately, the NRC's recent NEPA and Waste Confidence rulemakings described in Part IV suggest that the agency has not recognized these effects and thus has overlooked important lessons from Fukishima.

III. Agency Illiteracy: Licensing Procedures and NEPA Regulations

The following describes NRC regulations that have undermined regulatory oversight of commercial reactors. After providing background on the licensing process, Section A explains how the agency's backfitting restriction imposed ossification from within. It then discusses participation limits that blocked the flow of information to policymakers in licensing decisions. Evolving regulations increasingly constrained public participation by raising specificity requirements for intervenors' claims, using unreviewable license exemptions instead of license amendments, and limiting the scope of relicensing proceedings. Section B describes how the agency's overuse of generic factual determinations precluded licensing boards from considering plant-specific risks. It shows how this approach prevented the public and internal dissenters from effectively raising important safety and environmental concerns, leaving the NRC illiterate as to the very hazards Fukushima highlighted.

Section C discusses the NRC's adoption of NEPA regulations for relicensing that deployed generic findings to significantly limit environmental analysis,

164. *See* Memorandum from Scott C. Flanders, Nuclear Regulatory Comm'n, to David Skeen, Director, Office of Nuclear Reactor Regulation, Regarding Support Document for Screening and Prioritization Results Regarding Seismic Hazard Re-Evaluations for Operating Reactors in the Central and Eastern United States (May 21, 2014).

165. *Id.* at 2.

thereby contributing to the NRC's failure to consider updated analysis and investigate systemic interactions. The agency's particularly illogical finding that the impact of severe accidents could be generically determined to be "small" for all of the nation's one hundred reactors precluded consideration of plant location and unique hazards in relicensing proceedings. Finally, Section D describes the agency's use of categorical exclusions to further limit NEPA analysis. Taken together these agency rules contributed to the regulatory failures identified after Fukushima.

A. Licensing, Backfitting, and Public Participation Limits

1. Licensing Overview and Ossification from Within

One of the NRC's key functions is to oversee commercial power reactor licensing. The NRC grants initial licenses for a period of forty years,[166] with license renewals available for twenty-year periods.[167] The vast majority of the roughly one hundred operating nuclear reactors in the United States were initially licensed during the 1960s and 1970s. Most plants either already have or soon will need a renewed license to continue operations.[168] As of February 2013, the NRC had already renewed seventy-three licenses.[169] The Atomic Energy Act and NRC regulations subject licensing decisions to review by independent licensing boards. Initial adjudication of commercial reactor licenses occurs before the Atomic Safety Licensing Board (Licensing Board),[170] with automatic appeals to the Atomic Safety and Licensing Appeal Board (Appeal Board), also composed of three members. The five-member Nuclear Regulatory Commission may review these decisions at its discretion and makes ultimate determinations as to whether the licensing "will be in accord with the common defense and security and will provide adequate protection to the health and safety of the public."[171]

166. 42 U.S.C. § 2133(c) (2012) (specifying that the initial licensing period is limited to forty years).

167. 10 C.F.R. § 54.31(b).

168. GOV'T ACCOUNTABILITY OFFICE, NUCLEAR REACTOR LICENSE RENEWAL 13-493, at 5.

169. *Id.*

170. 42 U.S.C. § 2241 (2012) (authorizing the Commission to establish licensing boards with three members, "one of whom shall be qualified in the conduct of administrative proceedings and two of whom shall have such technical or other qualifications as the Commission deems appropriate to the issues to be decided").

171. 42 U.S.C. § 2232(a) (2012). The Courts of Appeals have exclusive initial jurisdiction to review final licensing orders. 28 U.S.C. § 2342(4) (2012); 42 U.S.C. § 2239(b) (2012).

Federal law charges the NRC with ensuring adequate protection of the public's health and safety,[172] although this vague standard is not defined in the Atomic Energy Act or NRC regulations. The NRC relies heavily on licensees to ensure that their operations meet the adequate protection standard and to provide the agency with information about the effectiveness of plant components and safety features.[173] License applicants must provide "reasonable assurance" that the reactor design and operation will adequately protect public health and welfare, but the NRC has refused to precisely define this latter term, contending that "'[r]easonable assurance' is not susceptible to formalistic quantification or mechanistic application. Rather, whether the reasonable assurance standard is met is based upon sound technical judgment applied on a case-by-case basis."[174] The upshot is that these vague standards leave room for the NRC to make policy determinations that balance competing values, implicating the ongoing debate in administrative law over the legitimacy, efficacy, and role of experts in discretionary agency judgments.

Operating license applications must include a Safety Analysis Report describing design features and procedures that demonstrate adequate protection, as well as an Environmental Report providing preliminary NEPA analysis. The NRC staff reviews these submissions and produces a publicly available Safety Evaluation Report and draft NEPA documents for review and comment. The Safety Analysis Report, among other things, discusses postulated hypothetical accidents and describes features that will be incorporated into the design and operation to prevent and mitigate these accidents. The NRC characterizes this set of postulated accidents as "design-basis accidents."[175] The plant must be designed with technical specifications to ensure that it can withstand these specific accident sequences. Design-basis accidents have been described as a "collection of events each of which is considered to have some likelihood of occurrence

172. 42 U.S.C. § 2232 (2012) (stating that the Commission must ensure that "the utilization or production of special nuclear material will . . . provide adequate protection to the health and safety of the public").

173. NUCLEAR REGULATORY COMM'N, STAFF PRACTICE AND PROCEDURE DIGEST Sec. 3.8.1 (Mar. 2011) ("A licensee of a nuclear power plant has a great responsibility to the public, one that is increased by the Commission's heavy dependence on the licensee for accurate and timely information about the facility and its operation. The NRC is dependent upon all of its licensees for accurate and timely information. The licensee must have a detailed knowledge of the quality of installed plant equipment." (internal citations omitted)).

174. AmerGen Energy Co., LLC (Oyster Creek Nuclear Generating Station), 66 NRC 327, 340 (2007), *aff'd*, 69 NRC 235, 263 (2009) (rejecting the argument that reasonable assurance should be quantified with ninety-five confidence).

175. *See* NUCLEAR REGULATORY COMM'N, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants Grand Gulf SEIS S-GEIS, 5-1 (June 2013); 10 C.F.R. § 50 (regarding licensing); 10 C.F.R. § 100 (regarding reactor site clearance) [hereinafter NUREG-1437].

during the lifetime of the plant."[176] They provide a set of "what if" occurrences against which the plant design can be assessed to determine if it adequately protects the public from excessive radiation.[177] While design-basis accidents receive methodological scrutiny, accident sequences deemed to be too improbable and hence "beyond" the design-basis category have received only haphazard review. Fukushima showed many of these more complicated sequences to be possible, such as failures at multiple reactors on the same site and lengthy station blackout. As discussed in the next section, the Task Force specifically critiqued the NRC's failure to systematically address accident sequences deemed beyond the design-basis.

A major constraint on staff's ability to update hazard protections stems from the Commission's rulemaking on "backfitting."[178] The backfitting rule requires staff to formally analyze the costs and benefits of any new or revised safety standard before imposing it upon existing licensees.[179] Analysis must demonstrate that the new or revised requirement will provide "a substantial increase in protection to the public health and safety or the common defense and security whose costs are justified in light of the increased protection."[180] Licensees can appeal staff determinations regarding what actions constitute a backfit as well as the adequacy of the cost-benefit analysis.[181]

The initial rulemaking imposing cost-benefit analysis requirements for backfitting was highly controversial, finalized over the dissent of two of the five NRC Commissioners.[182] Indeed, Commissioner Asselstine described the rule as an "unprecedented" self-imposed limitation on the administrative discretion to

176. *In re* United States Dep't of Energy Project Mgmt. Corp. Tenn. Valley Auth. (Clinch River Breeder Reactor Plant), 19 N.R.C. 288, 306 (1984).

177. *Id.*

178. *See* 10 C.F.R. § 50.109 ("Backfitting is defined as the modification of or addition to systems, structures, components, or design of a facility; or the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility; any of which may result from a new or amended provision in the Commission's regulations or the imposition of a regulatory staff position interpreting the Commission's regulations that is either new or different from a previously applicable staff position.").

179. *Id.*

180. *See* 10 *Id.*. The regulation also allows a new standard to be applied to existing licensees if the standard is "necessary to ensure that the facility provides adequate protection." *Id.* However, staff invocation of this provision requires the redefinition of statutory mandates. *Id.*

181. NUCLEAR REGULATORY COMM'N, OFFICE OF NUCLEAR REGULATORY RESEARCH, COMMISSION DIRECTIVE HANDBOOK 8.4, MANAGEMENT OF FACILITY-SPECIFIC BACKFITTING AND INFORMATION COLLECTION, 12-16 (Oct. 9, 2013).

182. *See* NUCLEAR REGULATORY COMM'N, Revision of Backfitting Process for Power Reactors, 50 Fed. Reg. 38,097-02, 38, 104 (noting disapproval by Commissioners Asselstine and Bernthal).

update safety requirements, remarking: "I can think of no other instance in which a regulatory agency has been so eager to stymie its own ability to carry out its responsibilities."[183] Technical staff, including the Commission's chief safety officer, shared Asselstine's concerns, opposing the rule.[184] Because the backfitting rule hindered identification and correction of safety problems at nuclear power plants, the chief safety officer believed it would perpetuate the "piecemeal, reactive approach to safety which has been responsible for many of the failures of the past."[185]

Because the rule increases the legally-mandated analytical burden beyond APA requirements, it can be viewed as ossification from within. The backfitting regulations imposed "a very high standard or threshold the Commission must meet before it can institute safety improvements."[186] The rule created a "lawyer's paradise"[187] that Commissioner Bernthal believed to "contain[] the seeds for rulemaking chaos," increasing litigation, unpredictability, and lengthening an already "tortured" rulemaking process.[188]

Although the rule could be characterized as "procedural," the backfit regulation reflects a substantive policy choice by the NRC to reduce regulatory burdens upon licensees and limit the discretion of future NRC policymakers to strike a different balance between economics and safety. Because the rule does not apply to new licensees or voluntarily licensee actions, it promotes the over-reliance on voluntary initiatives and a lack of standardization both of which were identified by the Task Force.

2. Public Participation Limits

In general, "interested parties" can request a hearing on licensing decisions and regulatory changes that affect licensing.[189] Under the NRC's practice procedures, intervenors must first establish that they have affected interests, a requirement that parallels standing requirements in federal court.[190] To be admit-

183. *Id.* at 38,106 (views of Commissioner Asselstine).

184. *Id.*

185. *Id.*

186. *Id.*

187. *Id.*

188. *Id.* at 38,110 (views of Commissioner Bernthal).

189. 42 U.S.C. § 2239(a)(1)(A) (2012) ("In any proceeding under this chapter, for the granting, suspending, revoking, or amending of any license or construction permit . . . and in any proceeding for the issuance or modification of rules and regulations dealing with the activities of licensees . . . the Commission shall grant a hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding.").

190. *See* 10 C.F.R. § 2.714; *In re* Duke Energy Corporation (Catawba Nuclear Station), 59 N.R.C. 129 (2004) ("[L]icensing boards look to judicial concepts of standing for

ted, and for the agency to even consider the issues, interested parties must also submit at least one narrow contention referring to specific documents or experts that support facts sufficient to establish a genuine issue of material fact or law.[191] In 1989, the agency amended its practice rules, significantly heightening specificity requirements. Under the new rules, in order to file timely contentions, intervenors must make their submissions long before staff completes its review of the applicant's submissions and publishes the draft EIS. These changes were upheld by the D.C. Circuit in 1990.[192]

During that same period, the NRC adopted new licensing procedures that further limited public participation. Until 1989, operators had to undergo a two-step initial licensing process, obtaining a construction and then an operating license, both subject to licensing board review and potential challenge. To encourage investment in nuclear power, new regulations streamlined the process by allowing operators to obtain a combined construction and operating license in one step.[193] In addition, the NRC created a rulemaking process to approve standard reactor designs, thus improving prospects for uniform plant designs that would be easier to regulate while also precluding potential plant design challenges during licensing hearings.[194]

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guidance in determining whether a petitioner has established the necessary interest under 10 C.F.R. § 2.714(d)(1). To qualify for standing under these concepts, a petitioner must allege (1) a concrete and particularized injury that is (2) fairly traceable to the challenged action and (3) likely to be redressed by a favorable decision, criteria commonly referred to, respectively, as 'injury in fact,' causality, and redressability. The injury may be either actual or threatened, but must lie arguably within the 'zone of interests' protected by the statutes governing the proceeding.").

191. 10 C.F.R. § 2.714(b); *see also* Nuclear Regulatory Commission Issuances, *Opinions and Decisions of the Nuclear Regulatory Commission with Selected Orders* January 1-June 30, 2000 at 29, pbadupws.nrc.gov.docs/ML0205/ML020560610.pdf ("In order for a petition for leave to intervene to be granted, the petitioner must proffer at least one contention conforming to the requirements of 10 C.F.R. §§ 2.714(b) and (d). In particular, a contention must include (1) a brief explanation of the bases of the contention; (2) a concise statement of the alleged facts or expert opinion on which the petitioner intends to rely, including references to specific sources and documents; and (3) sufficient information to show that a genuine dispute exists with the applicant (or licensee) on a material issue of law or fact.").

192. *See* Union of Concerned Scientists v. Nuclear Regulatory Comm'n, 920 F.2d 50 (D.C. Cir. 1990).

193. *See* 10 C.F.R. § 52 Subpart C (effective Sept. 27, 2007); *see also* 54 Fed. Reg. 15,372, 15,379 (Apr. 18, 1989) (Arguing that the AEA does not require a two-step process and that the NRC is authorized to combine construction and operating permits).

194. *See* Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors, 54 Fed. Reg. 15,372, 15,382–83 (codified at 52 C.F.R. subpart B) (describing the design certification process).

Procedures allowing existing licensees to seek revisions also limit public participation. The NRC processes numerous license amendments, which, like other licensing actions, are also generally subject to a hearing upon the request of an interested party; however, the agency may forgo the potential hearing if it finds that the amendment involves no significant hazards.[195] In practice, these determinations prove difficult to challenge because they shift the burden on the challenger to identify and demonstrate the significant hazard.

The NRC has increasingly used exemptions rather than amendments, an approach that allows ad hoc changes to licensing requirements without public participation or judicial review. In contrast to license amendments, courts have found exemptions from license requirements to be unreviewable while also deferring to agency categorization of actions as exemptions.[196] In 2009, the Second Circuit held in *Brodsky v. Nuclear Regulatory Commission*[197] that the NRC could characterize its order allowing an operator to forgo certain fire safety regulations as an "exemption" rather than as a license amendment, thus placing it outside the court's jurisdiction. Although the order could have been characterized as a license amendment, the court found that the NRC reasonably applied its regulations by treating the issue as an exemption.[198] One year after *Brodsky*, the NRC expanded its list of NEPA categorical exclusions to include exemptions from license requirements,[199] thus blocking the public from challenging these changes to licensing requirements on either substantive or NEPA grounds.

3. Narrow Scope of Relicensing Review

Under NRC rules adopted in the early 1990s, staff performs a much more limited review of safety and technical issues in relicensing proceedings than was required for initial licensing.[200] Applicants are only required to submit technical data on impacts from aging of plant components—such as metal fatigue, corrosion, and embrittlement. Technical review focuses on safe management of these "aging related" issues.[201] The NRC limits license renewal proceedings to consid-

195. 42 U.S.C. § 2239 (2)(A) (2012) ("The Commission may issue and make immediately effective any amendment to an operating license or any amendment to a combined construction and operating license, upon a determination by the Commission that such amendment involves no significant hazards consideration, notwithstanding the pendency before the Commission of a request for a hearing from any person. Such amendment may be issued and made immediately effective [before] completion of any required hearing.").

196. Brodsky v. Nuclear Regulatory Comm'n, 578 F.3d 175 (2d Cir. 2009).

197. *Id.*

198. *Id.* at 180-83.

199. *See* 75 Fed. Reg. 20,248 (Apr. 19, 2010) (amending 10 C.F.R. § 51.22).

200. *See* Walker & Wellock, *supra* note 12, at 69.

201. *See* 10 C.F.R. pt. 54.

eration of issues concerning (1) age-related degradation unique to license renewal and (2) compliance with NEPA requirements."[202] The NRC has read the first limitation to also constrain the second. Based on the narrow scope of relicensing hearings, the NRC has limited NEPA analysis to environmental impacts solely from an additional twenty years of operation or aging of plant components.[203] Thus, the NRC has refused to analyze emergency planning and severe accident risk during NEPA analysis of relicensing on the rationale that the additional twenty years of operation do not directly create new environmental impacts.[204] However, this leaves the agency reliant on decades-old data (and potentially outdated design standards) for many hazards and further forgoes NEPA's opportunity to identify systemic risks by combining analysis of multiple issues in one proceeding.

The NRC's rationale for excluding broader technical and environmental analysis during relicensing goes like this: the initial licensing process (nearly forty years earlier) and ongoing oversight are sufficient to address all important reactor safety and environmental issues. Hence there is no need for analysis and public comment during the relicensing process, except on a very limited range of issues. The agency thus excludes other considerations, stating "ongoing regulatory processes are adequate to ensure that all currently operating reactors are operated safely within their licensing bases now and will continue to be in the future" and that "the manner in which these reactors are currently maintained will be similarly maintained beyond the original forty-year operating period."[205] However, the Task Force Report uncovered a regulatory culture that undermined safety by failing to consistently apply standards, refusing to require existing reactors to meet updated requirements, and excessively relying on voluntary compliance measures that lacked oversight. This variation belies the agency's justification for limiting the scope of NEPA analysis of relicensing based on broad claims that "ongoing procedures" keep licensees' designs up-to-date.

Staff responses to Task Force recommendations further undermine this claim. In a document produced by the working group charged with implementing the Task Force's recommendations, staff rejected the notion that evolving design-basis should be applied to existing plants, proposing a "forward fit" rather than a "retrospective" approach: "The staff believes that a forward-fit is the

202. *See* 10 C.F.R. § 54.29(a), (b). The NRC will conduct a hearing on an application to renew a nuclear power reactor operating license. 10 C.F.R. § 54.27 However, a formal "on-the-record" hearing under the APA is not required for reactor license renewal proceedings. *See* Balt. Gas & Electric Co., 48 NRC 325, 342 (1998).

203. GOV'T ACCOUNTABILITY OFFICE, *supra* note 168, at 5; NUCLEAR REGULATORY COMM'N, STAFF PRACTICE AND PROCEDURE DIGEST 6.11 (2011).

204. *Id.* (citing 10 C.F.R. §§ 54.29(c), 2.335 (formerly § 2.758(b)(2))). Although the Commission has discretion to admit other issues based on intervenors' contentions, the filing must "demonstrate that the issue raises a concern relating to adequate protection which would occur only during the renewal period." *Id.*

205. GOV'T ACCOUNTABILITY OFFICE, *supra* note 168, at 11.

more effective approach especially given that, under the staff's proposed approach, the processes for identifying and making decisions on the regulatory requirements are unchanged."[206] This approach contradicts the Task Force's recommendation that design-basis should evolve in response to new hazard information and be applied consistently to all plants. It also illustrates the hollow nature of earlier claims regarding "ongoing oversight."

Litigation over Entergy's Indian Point reactor relicensing in New York illustrates how relicensing procedures restrict the flow of relevant information. The State of New York and others challenged the relicensing application for ignoring updated seismic risk analysis showing that the decades-old original licensing data upon which Entergy relied "significantly underestimated" earthquake risks.[207] The Board's explanation for rejecting this claim shows the NRC to reverse NEPA responsibility to study and disclose impacts, instead shifting the burden to challengers to demonstrate how the absent information would alter the analysis:

> NYS does not explain why "the most recent information" is sufficiently different from the earlier data to make a material change in the conclusions of the seismic SAMA [Severe Accident Mitigation Analysis]. Likewise NYS does not suggest feasible alternatives to address risks posed by the new data, nor does it estimate the cost of the increased margin of safety that would result from any severe accident mitigation action. Similarly, while NYS questions whether the seismic SAMA analysis is conservative, it does not demonstrate to what degree the assumptions used by Entergy in the ER are not conservative.[208]

After Fukushima, the NRC finally revisited seismic hazard analyses to determine whether original licensing design standards sufficiently protected reactors from earthquake damage. Reassessment placed Indian Point in a category of reactors with the "highest re-evaluated hazard relative to the original plant seismic design basis."[209]

206. NUCLEAR REGULATORY COMM'N, STAFF WORKING GROUP EVALUATION OF ALTERNATIVES FOR THE DISPOSITION OF RECOMMENDATION 1 OF THE FUKUSHIMA NEAR-TERM TASK FORCE REPORT 8 (May 14, 2013).

207. *In re* Entergy Nuclear Operations, Inc. (Indian Point, Units 2 & 3), 68 N.R.C. 43, 45.

208. *Id.*

209. *See* NUCLEAR REGULATOR COMM'N, SCREENING AND PRIORITIZATION RESULTS REGARDING INFORMATION PURSUANT TO TILTE 10 OF THE CODE OF FEDERAL REGULATIONS 50.54(F) REGARDING SEISMIC HAZARD RE-EVALUATIONS FOR RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI 5, enc. 2 (May 9, 2014); *see also* Matthew L. Wald, *Agency Urges Quake Study for Indian Point*, N.Y. TIMES (May 9, 2014).

B. Increasing Reliance on Generic Rules: The 1980s

The NRC has increasingly used generic rules to limit the scope of analysis in individual license adjudications. Through generic rulemaking, the agency makes general determinations that purportedly apply to all reactors, thus displacing individualized analysis. These generic proceedings offer regulatory efficiency but also run the risk of creating disconnects between critically related pieces of information. Generic rules combine with other agency limits on public participation to exacerbate potential decision-making errors. By constraining evaluation of potentially interrelated and plant specific risks during NEPA review for individual licensing adjudications, the agency misses the opportunity to identify interconnections, learn from outsiders, and correct decision-making biases.

Moreover, the seemingly scientific (and hence expertise-based) substantive determination used for generic rules significantly affects procedures by undermining public participation. Generic issues are decided during rulemaking many years before individual licenses come up for renewal. Public opposition to plant operations will stem from site-specific events (such as license renewals and amendments) or time-specific events (such as accidents, news stories, or official reports). Even sophisticated challengers, such as state attorneys general, are unlikely to have the resources to follow all NRC rulemakings, particularly if they occur before a reactor has been sited in the state. For local opponents—public, private, and nonprofit—these impediments are even greater. In contrast, the Nuclear Energy Institute and utilities with nuclear power plants have a single-issue focus and usually far greater resources, resulting in an overrepresentation of their views. By the time a state or locality discovers that a plant license change is pending or that a new plant is expected nearby, it will be too late to challenge the regulation. Thus, although scholars often describe one of the benefits of rulemaking over adjudication as enhanced public participation, in the case of nuclear power plants just the opposite is true.

In addition to reducing participation opportunities and impeding good decision-making, the inappropriate use of "generic" analysis for dissimilar issues prevents identification and analysis of site-specific impacts during adjudication. The following section discusses early developments in the use of generic analysis of severe accidents, earthquakes and emergency planning, and station blackout.

1. Severe Accident Risk

The NRC identifies two broad categories of reactor accidents in licensing: design-basis and severe accidents. As discussed above, preparation for postulated design-basis accidents forms a key component of licensing. In contrast, severe accidents have received much less systematic treatment, prompting the Fukushima Task Force to recommend much greater coherence in severe accident oversight. Severe accidents include those that can lead to core melt, generally from a complex series of technical and operational errors. At the beginning of the domestic nuclear power program, the Atomic Energy Commission (the

NRC's predecessor) thought severe accidents were too unlikely to warrant consideration.[210] Thus, NEPA documents in this early period did not analyze impacts from severe accidents,[211] and legal challenges to this policy failed.[212]

Several events in the late 1970s—the development of new risk assessment tools, studies showing greater accident probabilities, and the Three Mile Island partial core melt—made it difficult to continue discounting severe accident risk.[213] The NRC responded by drafting a policy that, among other things, required analysis of severe accidents in NEPA documents.[214] The agency also expanded emergency preparedness requirements[215] and began a program to develop measures to mitigate the impact of severe accidents.[216]

In 1985, the NRC finalized the Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plantsm (Policy Statement)[217] for accidents causing "substantial damage . . . to the reactor core."[218] While recognizing severe accident preparation as an appropriate subject for oversight, the Policy Statement constrained subsequent decision-making in two ways. First, it found that "existing plants pose no undue risk to public health or safety" and consequently "require no further regulatory action to deal with severe accident issues unless significant new safety information arises."[219] Thus, operating reactors would not be subject to new regulatory requirements being developed for new reactors. Second, the Policy Statement largely confined severe accident

210. Throughout the 1970s, the AEC based its NEPA analysis of accidents on an accident rating scale, ranging from 1 (trivial) to 9 (severe). Classes 1-8 addressed various design-basis accidents, all subject to analysis (except the "trivial" class 1 category). Class 9 included "more complex sequences of successive failures, such as a partial reactor core melt accompanied by the production of large quantities of steam and gas or the rupture of the containment vessel." Limerick Ecology Action v. Nuclear Regulatory Comm'n, 869 F.2d 719, 725-26 (3d Cir. 1989).

211. *Id.* (citing Carolina Envtl. Study Grp. v. United States, 510 F.2d 796, 798-800 (D.C. Cir. 1975)).

212. *Id.*

213. *Id.* at 725 (citing RISK ASSESSMENT REVIEW GROUP REPORT TO THE U.S. NUCLEAR REGULATORY COMMISSION, NUREG/CR–0400 vi-x, 4–5 (1978)); *see also* WALKER, *supra* note 11, at 216-25.

214. *See Limerick*, 869 F.2d at 726 (citing Statement of Interim Policy, Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969, 45 Fed. Reg. 40,101 (1980) [hereinafter NEPA Interim Policy Statement]).

215. *Id.*

216. Potential mitigation measures included, for example, strengthening reactor core containment systems to prevent the sudden release of radioactive materials.

217. Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants, 50 Fed. Reg. 32138-01 (1985).

218. *Id.*

219. *Id.* at 32,143-44.

analysis to generic rulemaking (a decision likely bolstered by its success in *Baltimore Gas* two years earlier). This procedural choice precluded licensing boards from considering unique plant-specific risks in safety analysis for individual licensing proceedings.

Based on the Policy Statement's generic conclusions, the NRC staff also refused to analyze potential measures to mitigate environmental impacts from severe accidents during NEPA review for licensing. This issue came to the Third Circuit in *Limerick Ecology Action v. Nuclear Regulatory Comm'n.*[220] In *Limerick*, the court rejected the NRC's contention that it could omit analysis of Severe Accident Mitigation Design Alternatives (SAMDAs) from NEPA review in individual licensing proceedings by relying on a Policy Statement's generic conclusion that impacts would be small. The decision turned in part on the regulatory tool employed: unlike the table used to generically define spent fuel impacts at issue in *Baltimore Gas,* the Policy Statement was not adopted through notice and comment rulemaking but rather through an informal mechanism.[221]

The court also distinguished the case on the substantive merits of using a generic approach. In *Baltimore Gas,* a generic approach had a better rationale given that it presumed common storage in a single federal waste repository rather than storage at individual plants.[222] In contrast, the impact of SAMDAs on the environment will differ with the particular plant's design, construction and location. Relying on *Baltimore Gas*'s definition of risk and the NRC's own statement that the magnitude of impact from radiation release depended upon the surrounding population's size,[223] the court identified the large variation in accident consequences among different plants:

> [B]ecause risk equals the likelihood of an occurrence times the severity of the consequences . . . even assuming that all plants are of exactly equal design and construction, which they obviously are not, the risk will vary with the potential consequences. Because the potential consequences will largely be the product of the location of the plant, the risk will vary tremendously across all plants.[224]

The court doubted that generic analysis could adequately identify the likelihood of severe accidents, particularly given the NRC's recognition of greater hazards at some plants and the Policy Statement's requirement for individualized consideration at new plants.[225] Thus, it held that decision-makers had not taken the required "hard look" at potential design alternatives for mitigating severe accidents. It further held that the SAMDAs could not be treated generi-

220. *Limerick*, 869 F.2d 719.

221. *Id.* at 736-37.

222. *Id.* at 738.

223. *See id.* (citing 48 Fed. Reg. at 16,020).

224. *Id.* (citing *Baltimore Gas*, 462 U.S. at 104–05).

225. *Id.* at 739 n.23.

cally under NEPA and that preclusion of their consideration in individual proceedings was inappropriate.[226]

After *Limerick*, the NRC required applicants to analyze SAMDAs if they had not previously done so, demonstrating that judicial review can affect decision-making processes. Although use of generic rulemaking to pre-adjudicate NEPA issues expanded significantly after *Baltimore Gas*, the NRC continued to specifically carve out SAMDAs for plant specific environmental impact assessment. However, the NRC did not take to heart the analytical basis for the ruling: the court's recognition that individual plant vulnerabilities differ. The Policy Statement was later incorporated into a 1996 rulemaking that generically concluded that both design-basis and severe accidents would have only "small" environmental impacts for all plants.[227]

The generic approach to severe accidents was not without sharp critics from within the NRC. The Policy Statement and later NEPA regulations concluded that severe accident risk was both generic and small based on the "probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, release to groundwater, and society and economic impacts from severe accidents."[228] Yet, as articulated by both the *Limerick* court and the dissenting commissioner in the 1985 Severe Accident Policy Statement, the use of median risk to set a specific accident probability not only overlooks broad variation among individual plants, but also mischaracterizes accident risk as corresponding with a specific number rather than a range of values. Dissenting Commissioner Asselstine criticized the Policy Statement for "focus[ing] on a median number, ignoring the actual range of values and the uncertainties inherent in using a median number for decision making."[229] Indeed, on the most concerning end of the range, the numbers would likely contravene most public notions of reasonable assurances: "[T]he information before the Commission indicates that there could be anywhere between a 20 percent chance and a 0.1 percent chance of an accident at a nuclear reactor in the next 15 years that would result in lethal doses to about 1,000 people."[230]

Commissioner Asselstine also criticized the Commission for claiming that accident risk had been fully evaluated despite the absence of any substantiating evidence.[231] He noted that the claim to have studied an "extensive range of tech-

226. *Id.* at 739.

227. *See* NUREG-1437, *supra* note 175, at Revision 1, 2-15, tbl.2.1-1.

228. *Id.*

229. POLICY STATEMENT ON SEVERE REACTOR ACCIDENTS REGARDING FUTURE DESIGNS AND EXISTING PLANTS, 50 Fed. Reg. 32,138, 32,147 (AUG. 8, 1985) (Comm'r Asselstine, dissenting).

230. *Id.*

231. *Id.* ("The Commission claims in this policy statement to have examined an extensive range of technical issues relating to severe accident risks in reaching its judgment 'that existing plants do not pose an undue level of risk to the public.' The Commission's policy statement does not, however, incorporate an explanation, or

nical issues" was not supported by any description of these issues, methodology, or decision criteria.[232] While acknowledging that risk assessment methodologies vary, he concluded that it was "impossible to discern the bases for the Commission's decision."[233]

By carving off severe accidents from analysis of other issues, it also prevented the integration of information regarding various accident triggers into one hearing. For example, the generic analysis did not assess the impact of severe accidents caused by external phenomena such as extreme weather, earthquakes, and flooding. Instead, the NRC presumed that analysis of accidents caused by internal factors would be sufficient to characterize impacts of accidents caused by external events. Thus, the environmental impacts for an externally caused accident were assumed to be no worse than the damage expected from internal events. Based on this presumption, the NRC precluded individual licensing boards from analyzing accidents triggered by external off-site events, such as earthquakes, fires, floods, outside actors, and severe weather or offsite accidents that disrupt power supplies.[234]

From 50,000 feet, the Commission's general claim—that it relied on technical analysis to conclude that severe accidents posed no undue public risk—appears to be backed up by agency expertise. Yet if this claim relies on a hunch rather than data, courts will not spot the difference unless they at least look to see if the analysis exists. This does not require courts to reanalyze the data itself, but does require them to check the agency's broad claims to see if the agency actually used its expertise in reaching a policy conclusion.

2. Station Blackout

Segregation of interrelated issues can also be observed in the NRC's rulemaking for station blackouts. Because removal of decay heat from the reactor core and containment vessel depends upon electrically-operated safety systems, loss of offsite power can trigger a severe accident absent sufficient backup power.[235] Indeed, power loss contributes more than seventy percent of overall risk

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for that matter even a description, of the most significant issues that have been resolved and the manner in which they were resolved. Nor does it include a description of the methods of analyses used in resolving the issues or decision criteria that were used for reaching the ultimate judgment. It is, therefore, impossible to discern the bases for the Commission's decision. . . . The range of chances could be larger than this if one considers all contributors to the core meltdown probability and all uncertainties. . . . Admittedly, there are many ways of going about estimating the range of risks. However, if there is validated quantitative information on core meltdown risks that is better, it has not yet been demonstrated.").

232. *Id.*

233. *Id.*

234. NUREG-1437, *supra* note 175, at 5-2.

235. *See* 77 Fed. Reg. 16,175, 16,178 (2012) [hereinafter Station Blackout ANPR].

for some plants.[236] This danger was unaddressed until the 1975 Reactor Safety Study demonstrated that potential AC power outages could be an important contributor to accident risk.[237] The Commission designated station blackout as an "unresolved safety issue" in 1980, prompting staff to study the issue and ultimately propose a new rule.[238]

In 1988, the NRC finalized an Evaluation of Station Blackout Accidents at Nuclear Power Plants[239] in support of a new generic rule. After analyzing a database compiling loss of offsite power events, the rule relied on average occurrence rates and blackout durations to characterize blackout risk: "Historically, a loss of off-site power occurs about once per 10 site-years. The typical duration of these events is on the order of one-half hour."[240] However, the analysis recognized that "at some power plants the frequency of offsite power loss has been substantially greater than the average, and at other plants the duration of offsite power outages has greatly exceeded the norm."[241] The study identified multiple site-specific factors that significantly affected both the likelihood and potential duration of station blackouts at individual plants, including "design characteristics, operational features, and the location of nuclear power plants within different grids and meteorological areas."[242]

The final regulation required that nuclear power plants have the capability to maintain core cooling and containment integrity for a certain duration, depending upon several factors, some of them site-specific.[243] Critically, the NRC concluded that operators need not consider potential power outages from fire, flood, and seismic events in determining the risk of offsite power loss.[244] The rule was limited in another important respect: the rule only required onsite emergency power for "unit specific" outages and did not consider loss of AC

236. *Id.* ("Unavailability of power can have a significant adverse impact on a plant's ability to achieve and maintain safe-shutdown conditions. In fact, risk analyses performed for nuclear power plants indicate that the loss of all AC power can be a significant contributor to the risk associated with plant operation, contributing more than 70 percent of the overall risk at some plants.").

237. *Id.*

238. *Id.*

239. Office of Nuclear Regulatory Research, *Evaluation of Station Blackout Accidents at Nuclear Power Plants: Technical Findings Related to Unresolved Safety Issue A-44, Final Report*, NUREG-1032, NUCLEAR REGULATORY COMM'N (June 1988).

240. *Id.* at 3-1.

241. *Id.*

242. *Id.*

243. One factor considered the station's existing capability in terms of the redundancy and reliability of onsite emergency power. Two other factors assessed site-specific risks: expected frequency and duration of loss of offsite power events. Station Blackout ANPR, *supra* note 235, at 16,178.

244. *Id.*

power to all reactor units at a given site.[245] By separating analysis of seismic, flood, and fire events (which were addressed in other rulemakings in terms of their direct effect on plants) from potential power losses, the NRC omitted analysis of potentially devastating interactions, as evidenced by the Fukushima disaster, in which seismic and flooding events caused a station blackout that precipitated onsite fires and containment breach. Fukushima also illustrated the potential for multiple reactor events to overwhelm underprepared staff.

The site-specific nature of these risks was not incorporated into NEPA analysis, which treated issues affected by station blackouts generically. The generic approach to decision-making caused the agency to rely on average likelihoods of blackouts to determine regulatory actions. However, the analysis demonstrates that the plants are not sufficiently similar for averaging to accurately capture the potential risks and necessary remedies. The agency's use of averaging can mask the substantial risk at individual plants and subsume important differences between specific plants and locales. In addition, the NRC specifically refused to coordinate consideration of external events (such as fires and earthquakes) with the risk of station blackout. Consequently, the agency overlooked the potential risk from loss of monitoring instruments over spent fuel pools and other plant safety mechanisms.[246]

Station blackout rulemakings also demonstrate how issue segregation can prevent information from being assembled. Segregation of issues limits the agency's ability to see interconnections. The accident at Fukushima, however, illustrated the utter inadequacy of such segregated analysis.

3. Earthquakes and Emergency Planning

The Commission's determination that licensing should proceed based on centralized rules without the distraction of individualized, plant-specific analysis can be seen in its displacement of individual licensing boards' initiative in safety evaluations. In the licensing proceeding for the San Onofre plant, for example, the licensing board raised emergency planning issues *sua sponte,* inquiring whether emergency plans should account for how earthquake damage to infrastructure might complicate accident management and evacuation.[247] On its own motion, the Commission took up the issue in September 1981, deciding that "current regulations do not require consideration of the impacts on emergency planning of earthquakes which cause or occur during an accidental radiological release."[248] Rather, the issue should be considered generically, if at all, and the licensing board should "not to pursue this issue in this proceeding."[249]

245. *Id.* at 16,179.

246. NTTF Report, *supra* note 1.

247. *In re* So. Cal. Edision Co. (San Onofre), 14 NRC 1091, 1091-92 (1981).

248. *Id.* at 1091.

249. *Id.* at 1092.

This 3-2 Commission decision drew rebuke from dissenting Commissioners who saw this decision as part of a broader pattern: "It appears the Commission will go to any length to avoid having a Licensing Board deal with a question the Board itself has raised."[250] Commissioner Gilinsky argued:

> The San Onofre Board asked . . . whether the applicant and NRC staff had considered the possibility that an earthquake which damages the reactor might simultaneously disrupt evacuation routes and sever offsite communication. It seems a reasonable question to ask about a nuclear plant in an earthquake-prone area . . . . A common sense approach would let the Board examine and decide the issue in the particular circumstances of this case. This could be done simply and quickly and the Commission would have a chance to review the result. Instead, to take the matter outside the adjudicatory process, the Commission has decided that the question . . . should therefore be handled "on a generic basis" . . . . The Commission will be drawn into ponderous rulemaking. But the most elementary steps to assure public protection will not be taken. An all too familiar story.[251]

Commissioner Bradford criticized the majority opinion, seeing it as part of a pattern favoring industry at the expense of public protection[252] and fearing that it would lead to long-lasting safety lapses:

> [T]he Commission is telling a Board that has had the foresight to uncover "a serious safety matter" . . . that it may not inquire into the matter further, even though the Board apparently doubts that it has "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." The result of this action could easily be an inadequacy in San Onofre emergency planning that goes unremedied for a long time.[253]

Post-Fukushima analysis of reactor oversight shows this very issue to be a key concern, with new measures requiring licensees to evaluate how seismic activity that damages the reactor could also complicate emergency planning. Whatever motives explain the Commission's choice here—political preference for centralized control, capture by industry, concern with consistency, or some-

250. *Id.* at 1095 (Gilinksy, Comm'r, dissenting).

251. *Id.*

252. *Id.* (Bradford, Comm'r, dissenting) ("I agree with the views of Commissioner Gilinsky. In addition, I would note that the Commission has had a number of opportunities over the last three years to review on-going proceedings to correct problems arising from Licensing or Appeal Board decisions. . . . When it has stepped into proceedings in progress, it has curtailed investigation of issues unfavorable to the applicant; the Commission has stayed its hand when that action upholds Board or staff conduct favorable to the applicant. It has rarely required a Board or the staff to expand safety or environmental considerations. This case presents an especially unfortunate manifestation of that tendency.").

253. *Id.*

thing else—the instrument choice (generic over individual adjudication) blocked decision-makers' use of relevant information in assessing plant safety. Courts accepted this issue segregation.[254]

C. Generic Analysis for Relicensing: 1996 NEPA Rulemaking

In 1996, the agency finalized NEPA regulations for relicensing that limited the scope of analysis by generically pre-determining impacts in a broad range of areas. The regulations divided environmental impacts from relicensing into two categories. Category 1 included "generic" impacts that the agency determined would be "the same or similar for all plants."[255] The regulations precluded licensing boards from reviewing analysis of Category 1 issues in individual relicensing proceedings.[256] The 1996 rule found sixty-nine out of ninety-two environmental issues appropriate for generic treatment.[257] Category 2 included the remaining issues that the NRC acknowledged could have site-specific impacts.[258] For these, the NRC required applicants to produce a supplemental environmental impact statement (SEIS) to address plant-specific impacts. However, the applicant need not include information regarding Category 1 issues.[259]

The NRC used rulemaking to pre-adjudicate both the nature and the extent of specific environmental impacts. After categorizing impacts for all generic issues to be either "small," "medium," or "large," the NRC determined that design-basis and severe accidents would have only "small" environmental impacts.[260]

The NRC's NEPA regulations do provide for site-specific evaluation of an otherwise generic issue if "new and significant information" demonstrates the

254. *See, e.g.*, San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm'n, 789 F.2d 786, (D.C. Cir 1986) (en banc) (upholding a subsequent Commission's refusal to consider how earthquakes could complicate emergency planning).

255. 78 Fed. Reg. 37,282, 37,282-83 (2013).

256. 10 C.F.R. §§ 51.71(a), 51.95(c) (limiting challenge to site-specific impacts); NUCLEAR REGULATORY COMM'N, *supra* note 255.

257. GOV'T ACCOUNTABILITY OFFICE, *supra* note 168, at 14.

258. 10 C.F.R. § 51.53.

259. 10 C.F.R. § 51.71(d); GOV'T ACCOUNTABILITY OFFICE, *supra* note 168, at 16 n.33.

260. *Environmental Review for Renewal of Nuclear Power Plant Operating Licenses*, NUCLEAR REGULATORY COMM'N tbl.B-1 (May 29, 1996). Per *Limerick*, the NRC required specific plants to consider severe-accident mitigation design alternatives if they had not previously done so, but nonetheless insisted that accident impacts would be "small" at all plants. Other notable impacts found to be generic and small included effects of refurbishment on surface water and ground water quality; occupational exposures during refurbishment; occupational and public radiation exposure during the license renewal term; onsite storage of spent fuel; low-level and mixed waste storage and disposal, and decommissioning impacts on water quality, ecological resources, and waste management.

need to assess the issue in an individual proceeding.[261] Notably, as of March 2013, NRC had never found new and significant information sufficient to warrant such site-specific review of one of these issues in any of its seventy-three license renewals to that date.[262]

This approach to the NEPA process, while ostensibly acknowledging the potential for changing circumstances to affect earlier decisions, greatly reduces the likelihood that changing circumstances will be considered when compared with NEPA best practices. Why? Generally, NEPA places the burden on the agency to evaluate potential impacts identified during scoping and through public comments unless the agency can explain why the information is not relevant. Usually, environmental analysts not only anticipate areas of contention in developing their analysis, but also respond to comments on these issues that can be brought by other agencies or the public. But a generic rule with potential supplementation for new and significant information significantly impedes recognition of new circumstances by reversing the burden, requiring outside parties (who have the least access to information) to demonstrate the nature of the information, a highly technical showing. It also deflects the agency's responsibility to search out relevant areas of analysis for the EIS process.

D. Precluding NEPA Analysis: Categorical Exclusions in 2010

As discussed above, NEPA permits agencies to use rulemaking to establish categories of actions that it finds will normally not have significant environmental impacts and thus to exempt them from NEPA analysis. The NRC defines a categorical exclusion as a "category of actions" which does not require either an EA or an EIS because it "do[es] not individually or cumulatively have a significant effect on the human environment and which the Commission has found to have no such effect."[263] The NRC has progressively expanded its list, amending its initial rulemaking fourteen times to exclude additional actions from NEPA analysis.[264] In 2010, the agency amended its NEPA rules to broaden the scope of categorical exclusions to include granting a licensee's request for exemption from licensing requirements "pertaining to the installation or use of a facility component."[265] While the categorical exclusion applies so long as the agency determines that the exemption involves "no significant hazard determination," it reverses the burden by placing the onus on challengers to demonstrate harm.

261. 10 C.F.R. § 51.92(e)(7).

262. GOV'T ACCOUNTABILITY OFFICE, *supra* note 168, at 19.

263. 10 C.F.R. § 51.14; *see also* 10 C.F.R. § 51.22 (discussing NRC procedures for establishing a categorical exclusion).

264. *See* Final Rule Amending Categorical Exclusions from Environmental Review, 75 Fed. Reg. 20,248, 20,256 (April 19, 2010).

265. *Id.*

The regulations now also exclude from environmental review amendments and exemptions to some required materials safeguards, including changes to transportation routes, design revisions for nuclear materials packaging, and modifications to security and accountability systems.[266] Because these latter amendments and exemptions are not limited to circumstances with a no significant hazard determination, staff is not required to make this determination before issuing the exemption. The agency also entirely exempted from environmental analysis approvals of standard reactor designs and Commision findings required for operation under combined licenses.[267]

IV. Failure to Learn: A Tale of Two Choices

This Part discusses two NRC decisions—2013 updates to NEPA regulations and the environmental analysis of the agency's updated Waste Confidence Decision—that show that a culture of nuclear power promotion continues to overshadow other concerns, even after the Fukushima accident. The discussion then turns back to agency expertise, arguing that despite the apparently scientific nature of the NRC's judgments, more rigorous judicial review would be beneficial.

A. Post-Fukushima Update to NEPA Regulations

The NRC finalized revised NEPA regulations in 2013. The updated regulations reorganize the analysis but largely retain the heavy reliance on generic determinations.[268] The NRC continues to assert that relicensing will cause only generic impacts—regardless of reactor type, location, operating history, site specific external hazards—for numerous issues, including both design-basis accidents and severe accidents.[269] It continues to assert that the impact of reactor accidents is "small."[270]

Public comments and NRC responses reflect conflict over how the NEPA analysis should address hazards and accident risk. After noting that "many commentators wanted seismic issues to be included in the rule and pointed out the importance of reassessing seismic conditions in determining the safety of operating nuclear power plants,"[271] the agency rejected these requests:

266. *See* 10 C.F.R. § 51.22.

267. *Id.*

268. 78 Fed. Reg. 37,282, 37,285 (2013). *See* Nuclear Regulatory Comm'n, *NUREG-1437 Generic Environmental Impact Statement for License Renewal of Nuclear Plants* 7.2.2 (June 2013). The new regulations shifted a few impacts from Categories 1 and 2. One important change now requires site-specific analysis of groundwater impacts given discovery of leaked radioactive contamination at several sites.

269. NUREG-1437, *supra* note 175, at 2-15 tbl.2.1-1.

270. *Id.*

271. 78 Fed. Reg. 37,282, 37,287 (2013).

> The NRC agrees with the industry commenters that consideration of seismic conditions is an ongoing safety issue . . . seismology was not identified as a separate issue in the revised GEIS because the NRC considered historical risk rate data for each of their power plants when the plant was first licensed. The NRC requires all licensees to take seismic hazards into account in order to maintain safe operating conditions at all nuclear power plants. When new seismic hazard information becomes available, the NRC evaluates the new data and models to determine if any changes are needed at existing plants. This continuous oversight process, which includes seismic safety, remains separate from license renewal and takes place on an ongoing basis at all licensed nuclear facilities.[272]

The statement that ongoing oversight sufficiently addresses seismic risk rings hollow in light of the post-Fukushima review. According to the NRC, it is unnecessary to evaluate the earthquake risk upon relicensing because the Commission already concluded that the risk is small. Notably, this determination was based on analysis at forty-four nuclear plants without consideration of the unique circumstances at the other fifty-six operating plants.[273] Moreover, it misses the chance to integrate earthquake risk with other issues, such as the aging of plant components.

The Revised GEIS continues to treat design-basis accidents generically. The NRC presumes that the initial analysis of design-basis accidents combined with ongoing aging management sufficiently ensures that relicensing creates no environmental impacts beyond those analyzed several decades earlier for initial licensing.[274] The agency therefore dismissed a broad range of comments as outside the scope of license renewal, including concerns with emergency preparedness, evacuation, and safety and security at nuclear power plants.

Commentators criticized the agency's analysis of both design-basis and severe accidents. In particular, challengers questioned the agency's generic treatment of accidents and its conclusion that the environmental impact of design-

272. *Id.* ("The revised GEIS explain[s] that geologic and seismic conditions were considered in the original design of nuclear power plants and a part of the licensing bases for operating plants. Seismic conditions are attributes of the geologic environment that are not affected by continued plant operations and refurbishment and are not expected to change appreciably during the license renewal term for all nuclear plants.").

273. NUREG-1437, *supra* note 175, at 5-2.

274. *Id.* at 5-1 ("Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for the period of extended operation the environmental impacts, as calculated in that DBAs, should not differ significantly from initial licensing assessments over the life of the plant, including the period of extended operation. Accordingly, the design of the plant relative to the DBAs during the period of extended operation is considered to remain acceptable and the environmental impacts of those accidents were not examined further in the GEIS.").

basis accidents and severe accidents would be "small." The 2013 revised rule stated that earlier analysis used in the 1996 rulemaking to identify accident impacts as "small" remained valid.[275] Thus, the agency did not update the analysis and instead merely incorporated the 1996 information by reference.[276] By using generic analysis in NEPA documents, the agency significantly limits the potential to gather and assemble potentially interrelated information in an EA or EIS for a specific plant licensing or relicensing proceeding. It also forgoes an opportunity to assemble analysis and incorporate multiple issues.

Given the reactor omissions identified after Fukushima, why would the agency continue to avoid NEPA analysis? Analysis by the Government Accountability Office (GAO) suggests that the NRC's overriding concern for licensing continued to trump other concerns. Assessing the NRC's conformity with its NEPA regulations in a May 2013 report to Congress, the GAO critiqued the NRC for delay in updating environmental review regulations and guidance.[277] The Report only evaluated the NRC's compliance with its own procedures, expressly excluding from analysis the substantive quality of environmental review documents as well as the adequacy of the procedures themselves.[278] Nonetheless, the GAO Report provides insight into aspects of the agency's culture that shape its approach to NEPA.

The GAO identified staff's sense of pressure to expeditiously process licenses. Although the NRC initially began complying with its own temporal goals for revising generic findings and updating relevant regulations and guidance by seeking comments in 2003, it soon shelved the process for four years "due to . . . competing demands on staff resources."[279] NRC officials explained to GAO interviewers that "the agency postponed the [NEPA] revision process because it decided that completing the large number of licensing actions under considerations at that time—including 16 license renewal reviews—was a higher priority than updating the license renewal environmental review regulations."[280]

275. 10 C.F.R. § 51 ("The 1996 GEIS . . . discusses the impacts of potential accidents. It contains a discussion of plant accidents and consequences. This discussion addresses general characteristics of design basis (and severe) accidents, characteristics of fission products, meteorological considerations, possible exposure pathways, potential adverse health effects, avoiding adverse health effects, accident experience and observed impacts, and emergency preparedness. The revised GEIS reexamined the information from the 1996 GEIS and concluded that it is still valid. Because the information on DBAs has not changed, the revised GEIS does not repeat the information.").

276. *Id.*

277. GOV'T ACCOUNTABILITY OFFICE, 13-493, *supra* note 168.

278. *Id.* ("GAO did not evaluate the adequacy or substance of NRC reviews or the quality of the agency's license renewal procedures.").

279. *Id.* at 16.

280. *Id.* at 15-16.

The agency published proposed regulations revising its NEPA regulations for license renewal in 2009. As the GAO explained, "[a]ccording to NRC officials, it took the agency 4 years to prepare the proposed revisions due to the unusually large number of technical issues that needed review as part of the rulemaking process, the large number of industry and public comments, the number of guidance documents that needed to be updated, and competing demands on staff resources from additional license renewal reviews."[281] Subsequently, the agency spent several more years re-evaluating its proposal and ultimately sent a rulemaking package to Commissioners in 2012.[282] "According to NRC officials, license renewals were priority work because of the importance of maintaining a stable and predictable regulatory process for reactor owners seeking timely review and processing of their license renewal applications."[283] The report did not indicate whether staff recognized the irony of postponing revisions to license renewal regulations in order to finalize licenses—without the benefit of the completed review of technical issues or updated guidance documents.

B. The Emperor's Clothes: Waste Storage Confidence Update

As discussed above, managing nuclear waste has proven to be one of the greater challenges in the commercial nuclear program. One third of a nuclear reactor's fuel must be replaced every two years, leaving highly radioactive spent nuclear fuel (SNF) that must be safely contained for thousands of years.[284] Before it can be safely moved off site, this spent nuclear fuel must first be cooled for several years in pools of water that absorb heat and block radiation.[285] Maintaining water levels in these pools is critical to prevent the spent fuel from overheating and combusting, as happened during the Fukushima accident. Although spent fuel pools adjacent to U.S. reactors were initially designed to temporarily store spent nuclear fuel for cooling before transport to a permanent repository, the United States' failure to develop and construct a permanent storage repository has pressed these pools into use as long-term storage.[286]

In NEPA review for licensing proceedings, the NRC has approached unresolved waste disposal questions by employing optimistic predictions about de-

281. *Id.*

282. *Id.*

283. *Id.* at 16.

284. *See* de Sailan, *supra* note 127.

285. *Id.*

286. *See* New York v. Nuclear Regulatory Comm'n, 681 F.3d 471, 474 (D.C. Cir. 2012) ("Due to the government's failure to establish a final resting place for spent fuel, SNF is currently stored on site at nuclear plants. This type of storage, optimistically labeled 'temporary storage,' has been used for decades longer than originally anticipated.").

velopment of a long-term repository to dismiss impacts from on-site pool storage. A year after the Supreme Court's *Baltimore Gas* decision, the agency adopted the Waste Confidence Decision rule,[287] which generically determines environmental impacts from storing spent nuclear fuel in these pools. By predetermining impacts for all plants through rulemaking, the Commission precluded individual licensing boards from considering plant-specific information about on-site storage impacts at dozens of different plants. The 1984 Waste Confidence Decision relied on findings that combined technical conclusions with political predictions:

> 1) safe disposal in a mined geologic repository is technically feasible, 2) such a repository will be available by 2007-2009, 3) waste will be managed safely until the repository is available, 4) SNF can be stored safely at nuclear plants for at least thirty years beyond the licensed life of each plant, and 5) safe, independent storage will be made available if needed.[288]

The Rule explicitly built upon the Table S-3 at issue in *Baltimore Gas*. Like that earlier rulemaking, the Waste Confidence Decision relied heavily on the NRC's predictions regarding political, institutional, and legal outcomes amongst multiple agencies and governments. The decision identified numerous institutional issues that could affect the availability of a common federal long-term repository, including disputes between the federal and state governments, as well as with Indian tribes.[289] Success would also require "an assured funding mechanism" over the time span of repository development.[290] In addition, completion would require "an organizational capability for managing the high-level waste program" either within the DOE or a successor organizations and clear "establishment of responsibilities" sufficient to develop the repository "in a reasonable period of time."[291] The NRC's "expert" judgment regarding storage safety relied upon the agency's forecasted resolution of these and other institutional and political challenges.[292]

The NRC updated its Waste Confidence Decision in 1990, revising its predicted date for repository availability to 2025.[293] In its 2010 Waste Confidence Update, the NRC further revised its findings, this time avoiding prediction of a

287. 49 Fed. Reg. 34,658 (1984).

288. New York v. Nuclear Regulatory Comm'n, 681 F.3d at 475 (summarizing the Waste Confidence Decision findings).

289. 49 Fed. Reg. 34,658, 34,675 (1984).

290. *Id.*

291. *Id.*

292. The agency also predicted that a presidential proposal to dismantle the DOE would not disrupt "sound management and continuity" of the federal waste repository program because "uncertainties regarding the continuity of Federal management" were reduced by passage of the Nuclear Waste Policy Act." *Id.* at 34,677.

293. *See* 681 F.3d at 475.

specific date.[294] Instead, the agency concluded that a long-term storage repository would be available "when necessary."[295] It also revised upwards its original finding regarding the period of safe on-site waste storage from thirty to sixty years.[296] The subordinate conclusion that pool fires were "sufficiently unlikely as to pose no significant environmental threat"[297] has been shown to be mistaken in light of Fukushima.

In summer 2012, the NRC had a rare legal defeat regarding its use of generic analysis. In *New York v. Nuclear Regulatory Comm'n,* the D.C. Circuit rejected the NRC's generic determination that waste storage impacts in spent fuel pools would be insignificant because a federal long-term repository would be available "when necessary."[298] Judge Sentelle contrasted the decades-old assumption of long-term storage with the on-the-ground reality that efforts to develop an underground repository had thus far failed: "At this time, there is not even a prospective site for a repository, let alone progress towards construction of one."[299]

The opinion held that NRC's 2010 update to its Waste Confidence Decision violated NEPA by failing to sufficiently evaluate the rulemaking's environmental impacts.[300] The Court rejected the NRC's initial argument that the rulemaking did not even trigger NEPA because it did not approve specific licenses and consequently was not a major federal action. Rather, the Waste Confidence Decision provided the basis for licensing actions; indeed, it was a "pre-determined 'stage' of each licensing decision" because its generic findings would have a preclusive effect in future licensing decisions.[301] Significantly, Judge Sentelle recognized that accepting NRC's contrary view would insulate the Update from NEPA review because generic determinations preclude further analysis in individual licensing proceedings. (Indeed, this is the very purpose of the generic rulemaking.)

Alternatively, the NRC contended that supporting documents could substitute for a NEPA environmental assessment and contained sufficient analysis to support a finding of no significant impact.[302] The Court held that even if the documents substituted for an EA, they failed to include essential analysis. Specifically, they did not consider the potential U.S. failure to develop a permanent

294. *Id.*

295. *Id.*

296. *Id.*

297. *Id.*

298. *Id.* at 475.

299. *Id.* at 474.

300. *Id.* at 483.

301. *Id.* at 476.

302. *Id.* at 476.

repository and consequent risks from long-term storage of spent nuclear fuel in temporary pools,[303] such as the increased potential for fires and fuel leaks.[304]

This decision represents a rare judicial recognition that the NRC's generic approach to NEPA insulates future discretionary decisions from information and that such lost information could undermine agency understanding of substantive safety issues. Critically, the court did not need to second-guess any complex expert scientific analysis to conclude that the NEPA consideration was insufficient. Rather, it merely observed the practical reality that a waste repository has not been built and that the most recent plans had dissolved amidst legal and political conflict.

While cynics may not be surprised to learn that the Commission did not embrace the opportunity to scientifically reevaluate the issue on remand, this disconnect between the law and actual practice should affect our thinking about the need for more rigorous judicial review. Unfortunately, the Commission's response rejected the central purpose of performing NEPA analysis: to inform decision-makers so that they can better analyze the merits of discretionary actions.

Instead, the Commissioners largely treated the ruling as an impediment to what they saw as the NRC's core function: licensing. The Commissioners ordered staff to review the Waste Confidence Decision on a timeframe no longer than 24 months and produce an EIS "*to support* an updated Waste Confidence Decision and temporary storage rule."[305] Thus, the Commission had predetermined the result of the expert analysis. As it saw the problem, the Commission needed to produce an EIS that satisfied the court's requirements. Instead of using scientific expertise to better analyze and understand environmental impacts, the Commission deployed legal resources, including "the most accomplished NEPA practitioners,"[306] to support confidence in waste storage.

The Commission's determination of an overriding goal to promote efficient licensing is apparent in its admonition to staff to avoid getting bogged down in site-specific analysis for individual licenses while developing the generic EIS. Instead, staff should use site-specific analysis only where it finds "an exceptional or compelling need to proceed . . . with the site-specific review [and where it] would not delay *or create inconsistencies* with development of the generic EIS."[307] While an agency's preference for efficient regulatory tools makes sense, predetermination of the outcome of studies undermines the very purpose

303. *Id.* at 473.

304. *Id.* at 479.

305. *See* Commission Memorandum to R.W. Borchardt, Executive Director for Operations, Comsecy-12-0016, Approach For Addressing Policy Issues Resulting From Court Decision To Vacate Waste Confidence Decision And Rule (Sept. 6, 2012) (emphasis added).

306. *Id.*

307. *Id.* (emphasis added).

of deferring to expertise. Similarly, the admonition to avoid individualized analysis constrains the experts in service of a foregone conclusion.

C. Reconsidering Deference to Expertise

This Article contends that in the NRC's case, judicial deference has not improved reliance on scientific expertise, but rather has allowed the agency to limit the information available to decision-makers, exclude the public, and shift the balance between competing demands. While two cases discussed here, *New York* and *Limerick*, show rare courtroom defeats for the agency, this more searching review will likely be required on a repeated basis for sustained change to occur.

At first blush, the NRC appears to be the paradigmatic candidate for extremely deferential review. First, the agency's authorizing statute gives it wide latitude to fill in general congressional mandates; the AEA explicitly prohibits private enforcement of regulations against licensees.[308] Moreover, public participation is limited by statute; the Act allows some forms of public participation,[309] but within narrow parameters.[310] Finally, because the NRC regulates technically complex nuclear power plants, its decisions may be presumed to require technical expertise of the kind that generalist judges would not be expected to possess.[311]

Generally speaking, well-recognized and seemingly sensible arguments support judicial deference to agency expertise on policymaking matters. Congress lacks the time and knowledge to perform the functions provided by mod-

308. *See* 42 U.S.C. § 2271(c) (2012) ("No action shall be brought against any individual or person for any violation under this chapter . . . except by the Attorney General of the United States: *Provided, however,* that nothing in this subsection shall be construed as applying to administrative action taken by the Commission."); *see also* Simmons v. Ark. Power Light Co., 655 F.2d 131, 134 (8th Cir. 1981) (holding that the Atomic Energy Act "preclude[s] private judicial enforcement of the Act"). In *Simmons*, the Eighth Circuit affirmed the district court's dismissal of an action brought by residents living near a reactor in Pope County, Arkansas who had sued the plant operators for venting from the containment building radioactive gases created by a malfunction. The operators acted with NRC approval but contrary to a request for a 48-hour delay from the Director of the Arkansas Department of Health to assess health impacts. 655 F.2d at 133.

309. *See* Atomic Energy Act, 42 U.S.C. § 2239(a)(1)(A) (2012) (requiring the NRC to provide a hearing "upon the request of any person whose interest may be affected by the proceeding").

310. *See supra* Section III.A.

311. *See, e.g.,* Clark, *supra* note 25, at 230 ("Courts' deference to these decisions rests in large part on the assumption that agencies are much better positioned to exercise judgment in their area of specialty than are generalist (and unaccountable) federal judges.").

ern administrative agencies.[312] In particular, nuclear power oversight requires highly technical expert knowledge to create appropriate technical standards. The complex nature of hazards associated with modern technology also provides a reasonable rationale for leaving policy judgments regarding risk to experts; lay members of the public often poorly understand risk generally and overestimate certain types of risks.[313] At the same time, if courts habitually defer to particular agencies, this "super-deference"[314] can habituate those agencies to lax review, thereby undermining the potential decision-making benefits that modern process can provide.

While the authorizing statute's structure and agency expertise support deference to the NRC, consideration of potential decision-making errors pushes in the opposite direction and counsels for caution. Some of the very reasons that the courts defer so heavily to the NRC warrant more rigorous scrutiny. The highly technical basis of NRC decision-making limits staff to parties with specific training and further limits the range of public entities that can meaningfully comment on NRC activities. This latter limitation is exacerbated by statutory limits on participation in proceedings (as opposed to environmental statutes with private attorney general provisions) and reliance on one agency to enforce regulatory limits. Moreover, the range of perspectives is further limited because the NRC regulates a specific industry with a single predominant representative, the Nuclear Energy Institute. Finally, as an independent agency, the NRC is subject to less official oversight than executive agencies, a fact that may warrant heightened judicial scrutiny of decisions in and of itself.[315] To the extent agency staff and policymakers suffer from expert overconfidence and tunnel vision, the limited range of viewpoints stemming from this structural insularity can compound the impact on decision-making. In light of these concerns, comparative institutional expertise becomes far less important for assessing the merits of deference. Judicial review can improve decision-making not because of judges'

312. Stewart, *supra* note 56, at 1695-96 ("Detailed legislative specification of policy would require intensive and continuous investigation, decision, and revision of specialized and complex issues. Such a task would require resources that Congress has, in most instances, been unable or unwilling to muster. . . . Moreover, . . . one may question whether a legislature is likely in many instances to generate more responsible decisions on questions of policy than agencies.").

313. *See* Timur Kuran & Cass Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683, 736 (1999) (describing how the lay public understanding of risk can be distorted and urging policymakers to "to discount regulatory demands rooted in availability cascades based on false information, [and] to pay special attention to trained experts who have had time to put claims in perspective").

314. *See* Meazell, *supra* note 136.

315. Catherine M. Sharkey, State Farm *with Teeth: Heightened Judicial Review in The Absence of Executive Oversight*, 89 N.Y.U. L. REV. 1589, 1606 (2014) (arguing that certain types of fact-based independent agency actions should be subjected to more stringent review because they have not been vetted by executive oversight").

substantive knowledge but rather because the very process of being observed and having to explain itself improves the agency's understanding.[316]

NEPA offers potential antidotes with procedures that integrate analysis of multiple areas into one document (reducing the risk of issue segregation), require analysis of alternatives, and incorporate public participation. Participation introduces new perspectives, lowers the risk that cognitive biases will undermine agency decisions, and can provide technical support as well as information about local conditions. While scholars tout the democracy-enhancing quality of public participation,[317] this Article focuses on its capacity to improve expert analysis. In addition to counteracting cultural and cognitive biases, public participation can highlight omissions in scientific and engineering analysis, remind the agency of the limits of prediction under uncertainty, and in some cases even provide valuable technical information. This latter benefit is particularly evident in participation by sophisticated parties—such as state attorneys general, the Union of Concerned Scientists, local governments, or nuclear engineers themselves—who support their claims with scientific documents and expert analysis. In the NRC's case, public participation and judicial review are valuable because they can actually make the agency work better.

No doubt there is a point of diminishing return with public participation. It can be inefficient, particularly when it bogs agencies down with low-quality information or requires time-consuming public meetings, hearings, or other processes. Nonetheless, general rules of administrative law and the NEPA have embraced a model of decision-making that envisions public participation. While the legal rules give agencies some flexibility to design public participation rules in a manner that balances competing demands, the NRC has struck the balance heavily against participation. This approach violates the spirit, if not the letter, of NEPA and undermines NRC decision-making.

Critically, while NEPA analysis can be time consuming, it does not substantively limit agency choice; thus, increased judicial enforcement of its decision-making mechanism does not require judges to substitute their analysis for that of the experts, but rather only to ensure that the experts have considered the matter. Judicial review is no doubt an imperfect oversight method, subject to numerous flaws, including the potential for causing ossification. Moreover, because courts review agency actions individually (e.g., a challenge to a specific hearing procedure or regulation), courts will likely overlook synergies between different agency procedures, such as the interaction between the NRC's hearing procedures and NEPA rules. An agency's conformity with theoretical goals of administrative law (public participation, reasoned analysis, efficiency) may be undermined by the interaction between rules that individually pass judicial muster.

316. *See* Rachlinski & Farina, *supra* note 70.

317. *See, e.g.*, Mark Seidenfeld, *A Civic Republican Justification of the Administrative State*, 105 HARV. L. REV. 1511, 1575 (1992).

While to some extent the Commission's response to the D.C. Circuit shows the limits of judicial oversight, the NRC's unresponsiveness may stem in part from years of extreme deference. Moreover, the end of the Waste Confidence story has yet to unfold. Even if the Commission's outcome-oriented analysis prevails in this instance, some judicial checking function is certainly better than none.

Yet this example also suggests that correcting agency pathologies may require more than changing standards of review, an issue to be taken up in subsequent work.[318] One could certainly imagine more dramatic suggestions: a new agency, a new statute, or even a new Congress. But one starting place for thinking about this could be to ask: should we solve the tension between competing societal goals by giving an agency conflicting mandates and then turning a blind eye while it jettisons some statutory requirements in favor of others? Does it make a difference if the risks are substantial and one of the slighted policies affects public safety? If actually doing thorough analysis to support nuclear power plant licensing and relicensing would take so long as to make it unappealing to private investors, that does not necessarily mean that the right answer is to simply tell the agency to hurry up.

While hard look review cannot answer these questions, it can serve a gap-filling function while they are analyzed. As Richard Stewart explained forty-years ago in his comments on *Vermont Yankee*: "Until Congress comes to grips with problems it has delegated to administrators or until some alternative mechanism for oversight of administrative discretion is developed, we must continue to rely upon judicial review to ensure that agency decisions adequately deal with the societal impacts of alternative choices and have a sound evidentiary and analytic basis."[319]

Conclusion

318. At the same time that this Article identifies regulatory failures, it is also worth noticing aspects of NRC governance that appear to be going right and can aid further efforts to understand and improve the agency. The NRC does engage in an internal regulatory learning process—through such mechanisms as the Task Force and review of the effectiveness of prior rules—that creates internal momentum for improvement. The candidness of the Task Force members, all managers from within the agency, demonstrates serious commitment to improve the agency. Finally, the availability of sources for this research illustrates transparency that can facilitate further understanding of agency processes. Nonetheless, these positive factors do not diminish the need for more reform.

319. Stewart, *supra* note 56, at 1810.

While courts recognize that agencies make value-laden policy choices that differ from a neutral form of "pure" science,[320] legal doctrine nonetheless presumes that these values will stem from statutory directives[321] and that decision-making will follow an informed, reasoned, and participatory process. Judicial deference to agencies presumes that scientific expertise implies procedural wisdom. Besides overlooking their lack of administrative training, transsubstantive visions of administrative law ignore the culture and structure of the institutions in which agency experts perform their work. In the NRC's case, the deference stance intended to allow scientifically-informed judgment has in fact undermined the process. If they merely glance at administrative decisions and presume (rather than ensure) that agencies rely upon relevant analysis, courts will fail to check overly optimistic, pressured, or outcome-oriented administrators. To the extent judicial deference relies on a vision of expertise-informed agency judgment that is not in fact occurring, this mismatch requires our attention.

This study of the NRC has examined some of the substantive consequences of the NRC's policy judgments and procedural choices. While the agency warrants much further research, my hope is that this Article can contribute to a process—proposed by Professor Jerry Mashaw—of interrogating agencies' internal workings with the aim of ultimately proposing improvements in this "invisible" aspect of administrative law:

> To the extent that we are interested in the reform of administrative law in the United States, we might do better to operate on the internal law of administration. My hope is that administrative lawyers can be convinced to look beyond judicial doctrine and the transsubstantive requirements of the external administrative law to see how administrative law really functions at the agency level and how it might be improved.[322]

Even at this initial phase, however, this study has revealed that what we thought we knew about administrative law—that searching judicial review necessarily undermines agency expertise—might need to be substantially revised.

320. *See generally* SHEILA JASANOFF, DESIGNS ON NATURE: SCIENCE AND DEMOCRACY IN EUROPE AND THE UNITED STATES (2005) (distinguishing "pure" science from the science used in administrative decisions).

321. *See* Mass. v. Envtl. Protection Agency, 549 U.S. 497, 532-33 (2007) (rejecting the EPA's reasons for refusing to regulate greenhouse gases as "divorced from the statutory text" of the Clean Air Act and stating that the Act's requirement that a judgment of harm precede standard setting "is not a roving license to ignore the statutory text" but rather "a direction to exercise discretion within defined statutory limits").

322. Mashaw, *supra* note 19, at 992.