2010

NEPA at the Limits of Risk Assessment: Whether to Discuss a Potential Terrorist Attack on a Nuclear Power Plant Under the National Environment Policy Act

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Recommended Citation
Available at: http://ir.lawnet.fordham.edu/flr/vol78/iss6/10
NEPA AT THE LIMITS OF RISK ASSESSMENT: WHETHER TO DISCUSS A POTENTIAL TERRORIST ATTACK ON A NUCLEAR POWER PLANT UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT

Michael Hill*

This Note explores the question of whether to address the environmental impacts of a potential terrorist attack on a nuclear power plant under the National Environmental Policy Act (NEPA). The Nuclear Regulatory Commission (NRC) and the U.S. Court of Appeals for the Third Circuit assert that the risk of terrorism is unquantifiable and too remote to warrant consideration under NEPA. In contrast, the U.S. Court of Appeals for the Ninth Circuit concludes that the risk is foreseeable enough that it cannot be disregarded as a matter of law and that a qualitative discussion of a range of potential impacts is possible. This Note argues that discussion of this risk under NEPA is consistent with the statute, which calls for discussion of both indirect impacts and potentially catastrophic impacts even if they are low probability or uncertain. This Note also argues that some scholarship on risk assessment and risk management, particularly one recent theory of catastrophic risk management, supports regulation of highly uncertain, potentially catastrophic risks, such as terrorism, and discussion of this risk under NEPA is an important step toward ensuring the public that the NRC is seriously addressing it.

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INTRODUCTION

If there ever were a time that seemed ripe for nuclear energy, it’s now.1

While the nuclear power industry has been criticized for decades over issues such as cost, safety, nuclear waste, and high-profile accidents such as Chernobyl and Three Mile Island, more environmentalists, and Americans in general, have recently gravitated toward the industry’s side.2 Concerns over climate change have fueled much of this change of heart: while traditional coal-based power plants emit large amounts of carbon dioxide, nuclear plants emit virtually none.3 The nuclear industry has responded to this opportunity by emphasizing ongoing improvements of existing plants, as well as vastly improved designs for new plants.4 Nuclear energy has also become an important bargaining chip in the debate over climate legislation, as congressional advocates seek to obtain supporters by emphasizing nuclear power as a green, efficient substitute for carbon dioxide producing coal plants.5

Despite this optimism, there has also been an ongoing parallel debate. After the terrorist attacks of September 11, 2001, critics contended that nuclear plants were insufficiently prepared for a potential attack.6 Significantly, the government’s 9/11 Commission Report suggests that al-Qaeda terrorists contemplated attacking a nuclear power plant on September 11.7 The Nuclear Regulatory Commission (NRC), on the other hand, emphasizes that it has undertaken intensive security measures to guard against an attack and that, in any case, the probability of a successful attack is low.8 The NRC cites several reasons for this conclusion, including higher security, military readiness, protective barriers, and the fact that a plant is a difficult target to hit from the air.9 However, critics contend that the government is “overly optimistic.”10 Critics also emphasize the

4. See id. (noting that the industry plans to enhance safety by using automated safety features, minimizing the amount of hardware needed to shut down the reactor in an emergency, cutting costs (by “squeez[ing] more power out of uranium,” for example), and finding ways to minimize waste).
9. Id.
10. Id.; see also Posting of Joe Romm to Climate Progress, http://climateprogress.org/2009/03/27/three-mile-island-anniversary-meltdown-nuclear-power-problems/ (Mar. 27,
problem of spent fuel pools, on-site pools of unusable but extremely hazardous nuclear waste, which are generally much more vulnerable and less protected than the reactor core. They argue that in light of the significant populations surrounding many nuclear plants, the NRC should do everything in its power to guard against an attack.

In light of this controversy, citizen groups and states have challenged the NRC’s refusal to consider the risk of a terrorist attack under the National Environmental Policy Act of 1969 (NEPA). Under NEPA, a federal agency completing a major federal action must complete a detailed statement considering the potential environmental impacts of its action, including a discussion of alternatives to the action that might mitigate these impacts. NRC actions such as relicensing or adding a storage facility to a plant, which were at issue in the cases discussed in this Note, undoubtedly require an Environmental Impact Statement (EIS), the most detailed review required under NEPA.

However, it is often unclear when environmental impacts are significant enough to warrant discussion. For instance, it is unclear how agencies and courts should weigh both the probability of a particular impact occurring and the severity of the consequences if it were to occur in deciding whether it must be considered under NEPA. In San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission and New Jersey Department of Environmental Protection v. U.S. Nuclear Regulatory Commission, two U.S. circuit courts addressed this issue in the context of potential terrorist attacks on a nuclear facility, yet they came to very different conclusions. The U.S. Court of Appeals for the Ninth Circuit concluded that the risk of a terrorist attack was reasonably foreseeable and

2009, 14:46 EST) (noting the opinion of Ed Lyman, senior staff scientist at the Union of Concerned Scientists, that “there is overconfidence on the part of the industry and NRC that has led to complacency”); Cindy Skrzycki, Terror-Plane Risk Jars Faith in Nuclear Safety, BLOOMBERG, Jan. 15, 2008, http://www.bloomberg.com/apps/news?pid=20601039&refer=columnist_skrzycki&sid=aPC14tlGDl_c (describing the NRC’s proposal to assess only some new plant designs for risk of an air attack and critics’ contention that all current nuclear power plants should have to undergo this assessment).

11. At many plants, spent fuel pools are located several stories above ground, intensifying the concern that a terrorist might have access to them. See Hargreaves, supra note 6; see also Wald, supra note 6 (noting that the security of spent fuel casks “against attack with an antitank weapon or other armorment is less certain”).

12. See Hargreaves, supra note 6 (citing opinion of a former security expert at the Department of Energy, who noted that “‘[i]f you get a fire at Indian Point [Energy Center in Buchanan, New York] in the spent fuel pool, it’s going to take out New York City’”).

13. See, e.g., infra Parts I.B.3, II.
14. See infra notes 41–52 and accompanying text.
15. See infra notes 46–49 and accompanying text.
16. See, e.g., infra Part I.B.
17. See infra Part I.C (discussing different methodologies to examine and assess environmental risks).
18. 449 F.3d 1016 (9th Cir. 2006).
19. 561 F.3d 132 (3d Cir. 2009).
20. See infra Part II.
not "remote and highly speculative," and thus the environmental effects of an attack warranted discussion under NEPA. The U.S. Court of Appeals for the Third Circuit, on the other hand, concluded there was not a sufficient "reasonably close causal relationship" between the agency action of relicensing a nuclear plant and the effects of a terrorist attack, and thus an analysis of these effects in the NEPA context was outside the "rule of reason."

This Note argues that the language of NEPA and its corresponding regulations anticipate discussion of the environmental impacts associated with terrorist attacks. NEPA mandates discussion of a range of environmental impacts, including indirect impacts; does not require quantification; and calls for discussion of catastrophic impacts, even if they are of low probability, as long as they are foreseeable and within a rule of reason. Courts have largely abandoned these requirements. Lacking a clear framework for analyzing highly uncertain "new" risks such as terrorism, courts have instead reached for bits and pieces of methods and principles used by agencies to assess risk, each of which comes with its own assumptions and limitations. This Note argues that courts that abide by the relatively broad language of NEPA should mandate that agencies qualitatively consider a range of environmental impacts resulting from a potential terrorist attack. This Note also argues that one framework, the Catastrophic Harm Precautionary Principle—which calls for a presumption in favor of regulating plausible yet uncertain risks with the potential for catastrophic harm—can help courts make sense of NEPA's requirements in the context of terrorism.

Part I of this Note discusses NEPA generally, including relevant legislative background, the language of the statute and regulations themselves, the policies underlying the statute, and jurisprudential interpretation. Part I then discusses courts' and the NRC's traditional treatment of remote risks and impacts under NEPA, including the risk of terrorist attacks. Finally, Part I surveys the literature on risk assessment and risk management in the federal government, including traditional approaches, newer theoretical approaches such as the Precautionary
Principle, and an approach specifically addressing potentially catastrophic risks such as terrorism.

Part II analyzes the circuit split and addresses arguments for and against mandating that the NRC analyze the risk of a terrorist attack under NEPA. Finally, Part III argues that the NRC should analyze the risk of a terrorist attack on a nuclear facility under NEPA. Part III first argues that analysis of the environmental effects of a terrorist attack is consistent with NEPA's statutory and regulatory language, the jurisprudence interpreting the statute, and the underlying policies envisioned by the NEPA framers. It also contends that, as a normative matter, contemporary scholarship on catastrophic risk management provides a strong methodological basis for analyzing these risks in substantive detail in an EIS.32

I. NEPA, ENVIRONMENTAL RISKS, TERRORISM, AND METHODOLOGIES AVAILABLE TO FEDERAL AGENCIES AND COURTS

Part I introduces NEPA, agency and judicial approaches toward assessing environmental risks, including remote risks in the NEPA context, and the literature on risk assessment in general. Part I.A looks at the statutory and regulatory text of NEPA, as well as the ways in which courts have implemented the statute's requirements. Part I.B discusses the U.S. Supreme Court's treatment of remote risks under NEPA. It then discusses how some courts and, most importantly, the NRC have treated the risk of terrorist attacks or sabotage on nuclear facilities under NEPA. Part I.C surveys the risk assessment literature. It first looks at traditional notions of probabilistic risk assessment and risk management in the federal government, as well as common criticism of these notions. It then discusses a common approach that rebuts many of the tenets of traditional risk assessment and risk management, the Precautionary Principle. Finally, it looks at recent literature on assessing and regulating catastrophic risks.

A. The National Environmental Policy Act: A General History

1. Background and Purposes

NEPA33 is a foundational statute that established a national policy to promote and protect the environment.34 NEPA stems from the polity's

32. One student commentator has addressed this issue in the past. See Amanda Mott, Comment, Should the Threat of a Terrorist Attack on a Nuclear Power Plant Be Considered Under NEPA Review?, 12 UCLA J. INT'L L. & FOREIGN AFF. 333 (2007). However, that comment was published before the Third Circuit issued its decision in New Jersey Department of Environmental Conservation v. U.S. Nuclear Regulatory Commission, 561 F.3d 132 (2009). In addition, the comment focuses more heavily on the specific factual vulnerabilities of various nuclear plants in its argument that the risk of a terrorist attack should be considered under NEPA. In contrast, this Note takes a more theoretical approach, discussing various methods for assessing and managing risk and applying these concepts to both NEPA and terrorism. Moreover, this Note explicitly analyzes the implicit methodologies and assumptions underlying both circuit courts' approaches.

growing awareness of the country’s unchecked impact on the environment, including the risks associated with increasing air and water pollution, nuclear power plants, and toxic waste. Senator Henry Jackson, the chairman of the Senate Interior and Insular Affairs Committee—who introduced the original bill to Congress on February 18, 1969—wanted to control federal mission agencies, which at that time pursued their particular mandates with little ability to take environmental factors into account. When agency actions were challenged, the agencies either replied that they had no authority to consider environmental factors or had discretion to disregard them in favor of developmental, economically advantageous objectives. While the original bill only included authorization for the Secretary of the Interior to conduct ecological studies and the creation of a Council on Environmental Quality (CEQ), testimony in committee hearings soon led to the addition of “action-forcing” provisions, which would require federal agencies to consider the environmental impacts of their actions.

The final version of NEPA expands upon this by proclaiming that every agency recommendation and report on proposals for legislation or “major Federal actions significantly affecting the quality of the human environment” should be accompanied by a “detailed statement” addressing the environmental impact of the proposed action, unavoidable adverse environmental effects, alternatives to the proposed action, and irreversible commitments of resources. While the Act declares a national environmental policy and includes some substantive goals, the action-
forcing provision, supervised by the CEQ, lies at the heart of the Act. Importantly, the proposing agency should request comments from the public between the draft and final versions of the statement and should make the final statement available to the public.

While CEQ only mandates less detailed documents for some actions, an EIS is required for those proposed actions that are federal, major, and significantly affect the environment. Along with providing a “full and fair discussion of significant environmental impacts,” an EIS should provide a reasonable set of alternatives which would minimize adverse environmental impacts; thus, an EIS should be used actually to plan the agency’s course of action, rather than merely to disclose information after a decision has already been made.

EISs should also include discussion of both “direct” and “indirect” effects. While CEQ regulations once mandated discussion of a worst-case scenario, 1986 amendments now only require discussion of “reasonably foreseeable significant adverse impacts,” including impacts on which there

43. See id. §§ 4342–4347 (outlining responsibilities of Council on Environmental Quality (CEQ), such as implementing regulations, reviewing federal programs, and developing environmental policies).
46. See, e.g., 40 C.F.R. § 1508.4 (discussing when certain actions can be categorically excluded from NEPA’s requirements); id. § 1508.9 (discussing Environmental Assessment, a briefer document intended to help decide whether or not a more detailed Environmental Impact Statement is required).
47. The NEPA regulations state that the term “major” “reinforces but does not have a meaning independent of significantly.” See id. § 1508.18. The term “action” is also broadly construed, encompassing adoption of official policy, rules, regulations, formal plans, programs, and specific projects by federal agencies. See id.
48. In addressing the significance of a proposed action, the NEPA regulations require consideration of both (a) context, including whether the effects will be short-term or long-term and whether they will affect a wide region of interests or a relatively narrow area, and (b) intensity, including the degree to which proposed actions affect public health and unique geographic features and the degree to which possible effects are highly uncertain or controversial. See id. § 1508.27. One court has suggested that the extent to which an action will cause effects in excess of currently existing uses, as well as the absolute quantitative effects of an action, including cumulative harm, should be considered in an assessment of the term “significantly.” See Hanly v. Kleindienst, 471 F.2d 823, 830–31 (2d Cir. 1972).
49. See 40 C.F.R. § 1502.3.
50. Id. § 1502.1.
51. Id. § 1502.14 (noting that discussion of alternatives is the “heart” of an EIS).
52. Id. § 1502.1; see also id. § 1502.5 (indicating that agencies should prepare an EIS at the same time as development of the proposal, so it can “serve practically as an important contribution to the decision-making process and will not be used to rationalize or justify decisions already made”).
53. Id. § 1508.8. Direct effects include those “caused by the action and occurring at the same time and place,” and indirect effects include those that are “later in time or farther removed in distance, but are still reasonably foreseeable.” Id.
is incomplete or unavailable information. The phrase “reasonably foreseeable,” though, still includes low-probability impacts with catastrophic consequences, provided the risk of the particular impact is “supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.”

2. Implementation Among Courts and Agencies

While NEPA’s legislative history and regulations indicate some intent to foster substantive policy goals, over the years agencies and courts have essentially fashioned NEPA as a formal, procedural statute. For instance, the Supreme Court has never overturned an agency’s EIS as inadequate. A short discussion of the Supreme Court’s treatment of NEPA will be helpful to understand the broad latitude traditionally given to agencies interpreting the statute.

While the Court has stated that NEPA requires agencies to take a “hard look” at environmental impacts, it has also left the formulation of specific procedures within the discretion of agencies. The Court has cited administrative efficiency, consistency, and the scientific expertise of agencies as reasons for this agency deference. The Court has also implied that the substantive policy goals of NEPA have little effect; instead, the “detailed statement” is the “outward sign” that substantive environmental values have been taken into consideration.

55. 40 C.F.R. § 1502.22(a)-(b).
56. Id. § 1502.22(b)(4). If the means to obtain the information relevant to reasonably foreseeable significant adverse impacts are not known, the agency shall still include a summary of existing relevant scientific evidence, a statement of the relevance of the incomplete information to reasonably foreseeable adverse impacts, and an evaluation of the “impacts based upon theoretical approaches or research methods generally accepted in the scientific community.” Id. § 1502.22(b).
57. See generally David C. Shilton, Is the Supreme Court Hostile to NEPA? Some Possible Explanations for a 12-0 Record, 20 ENVTL. L. 551 (1990) (arguing that the Court’s treatment of NEPA is consistent with ordinary principles of statutory construction); Nicholas C. Yost, NEPA’s Promise—Partially Fulfilled, 20 ENVTL. L. 533 (1990) (arguing that the Court has disregarded the substantive aspects of NEPA).
58. See Shilton, supra note 57, at 551.
61. See Balt. Gas & Elec. Co. v. Natural Res. Def. Council, 462 U.S. 87, 101, 103 (1983). However, while “courts continue to accord significant deference to lead agency determinations,” the standard of high deference employed by the Court in Chevron U.S.A. Inc. v. Natural Resources Defense Council, 467 U.S. 837 (1984), does not apply to NEPA. Wendy B. Davis, The Fox Is Guarding the Henhouse: Enhancing the Role of the EPA in FONSI Determinations Pursuant to NEPA, 39 AKRON L. REV. 35, 38-39 (2006). While Chevron purported to give considerable weight to an executive agency’s construction of a statute it was entrusted to administer, no single agency is entrusted to administer NEPA; thus, agencies such as the Nuclear Regulatory Commission (NRC) do not meet the Chevron standard. See id. at 39.
63. Id.
In *Weinberger v. Catholic Action of Hawaii/Peace Education Project*, the Court elucidated the “twin aims” of NEPA: (1) to ensure that an agency takes environmental considerations into account in its decision making process and (2) to inform the public that the agency has considered these environmental factors in its decision. The Court then noted that these two aims, while compatible in many cases, “are not necessarily coextensive in every case.”

In essence, the Court has determined that NEPA is a disclosure document—as long as foreseeable adverse effects and potential mitigation measures are identified and evaluated, for example, NEPA does not require that substantive environmental concerns be given preference or that mitigation measures are actually adopted. Agencies need only follow a “‘rule of reason’” in detailing substantive environmental concerns, and a “worst case analysis” is clearly not required.

B. NEPA, Remote Risks, and the Risk of Terrorism

While Part I.A discussed NEPA generally, Part I.B addresses how courts have decided which effects or impacts are significant enough to warrant consideration under NEPA. The Supreme Court’s “reasonably close causal relationship” test is a foundational means of addressing these concerns. This section then discusses the relatively brief references to the risk of terrorism and sabotage in two NEPA circuit court cases. Finally, this section discusses an NRC administrative opinion that addresses the risk of terrorism in detail and has provided the foundation for the NRC’s stance on the issue in subsequent proceedings.

1. The Supreme Court’s “Reasonably Close Causal Relationship Test”:

   *Metropolitan Edison Co. v. People Against Nuclear Energy*

   Although it did not address terrorism directly, the Supreme Court first considered remote environmental risks and effects under NEPA in *Metropolitan Edison Co. v. People Against Nuclear Energy*. This case involved the reopening of Three Mile Island Nuclear Generating Station after a partial meltdown caused the plant to close temporarily. The Court determined that the NRC need not consider the potential psychological

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64. 454 U.S. 139 (1981).
65. Id. at 143.
66. Id. The Court noted that since NEPA disclosure is subject to the Freedom of Information Act (FOIA), an agency may have to prepare an Environmental Impact Statement (EIS) yet have authority to withhold sensitive national security information from the public due to the FOIA national security exemption. See id. at 143–45.
69. Robertson, 490 U.S. at 354.
71. Id. at 768–69.
harm on the community surrounding the plant when completing an EIS in conjunction with the reopening.\textsuperscript{72}

The Court first noted that NEPA does not require consideration of every impact or effect of the action, but only the impacts or effects on the physical environment.\textsuperscript{73} The Court further stated that there must be a "reasonably close causal relationship between a change in the physical environment" caused by the federal action (here the reopening) "and the effect at issue."\textsuperscript{74} Thus, while some potential effects, especially indirect ones such as psychological stress, can technically be caused by the federal action, they will nonetheless fall outside the scope of NEPA because "the causal chain is too attenuated."\textsuperscript{75}

The element of risk weighed heavily in the Court's decision. The Court stated that the risk of an accident is not a direct effect on the physical environment because it is "by definition, unrealized in the physical world."\textsuperscript{76} It also noted that the psychological effects at issue were effects caused by the mere risk of an accident, rather than the actual concrete changes in the physical environment.\textsuperscript{77} NEPA is generally concerned with more direct, reasonably foreseeable alterations to the physical environment,\textsuperscript{78} such as "low-level radiation, increased fog . . . and the release of warm water."\textsuperscript{79} The Court thus reasoned that the element of risk and the perception of risk within the community are "middle links" that stretch the causal chain beyond the scope of NEPA.\textsuperscript{80} The Court did not
explicitly address whether its holding would change if it were only considering the environmental effects arising from a nuclear accident, rather than the psychological effects caused by the mere risk of an attack.


A few U.S. courts of appeals have briefly addressed the risk of terrorism or reactor sabotage under NEPA. In Limerick Ecology Action, Inc. v. U.S. Nuclear Regulatory Commission, a citizen group challenged NRC orders granting a license to operate a power plant in the Philadelphia area. The NRC refused to consider the risk of sabotage in an EIS because it had already conducted probabilistic assessments of severe accidents and concluded that sabotage risks were both sufficiently similar to the risks of severe accidents and beyond the state of the art of probabilistic risk assessment. The court deferred to the NRC's contention that it could not meaningfully address the uncertain risk of sabotage with available risk assessment techniques and held that the plaintiffs did not advance a specific method or theory by which the NRC could have meaningfully addressed the risk of sabotage. The court did note that "the mere assertion of unquantifiability" does not immunize the NRC from consideration of the issue under NEPA; nonetheless, unless the plaintiffs could propose a specific method by which to analyze this risk, the NRC was entitled to deference.

The dissenting opinion disagreed, noting that just because the NRC deemed the risk of sabotage "unquantifiable" did not mean the NRC could
ignore it. It also argued that the NRC had used other methods to analyze uncertain risks when quantitative, probabilistic risk assessment would be unhelpful. Thus, since the NRC itself considered sabotage a realistic possibility and had not illustrated that the risk was "remote and highly speculative," the risk could not be disregarded under NEPA.

In *New York v. U.S. Department of Transportation*, the City of New York challenged a Department of Transportation (DOT) rule allowing motor vehicles carrying large quantities of radioactive material on routes near the city, thereby preempting the City's own regulations. The City challenged the DOT's Environmental Assessment—which conceded that trucking large quantities of radioactive material through urban centers creates some potential for serious consequences but ultimately determined that this possibility did not have a "significant impact on the environment"—and claimed that a more extensive EIS was necessary for this project. The City argued that the rise of terrorist activities throughout the world and a government report concluding that "the sabotage of a shipment of spent fuel is a possibility" mandated a discussion of this risk under NEPA.

The court first noted that unlike ordinary NEPA reviews, the "certain consequences" in this case were not significant; rather, "[i]t is only the risk of accident that might render the proposed action environmentally significant." After agreeing that it is the NRC and not the DOT that is responsible for preventing sabotage and terrorist attacks, the court cited an NRC report indicating that the human motivations involved in sabotage cannot be quantified as a probability. In light of the agency's conclusion that the risks of sabotage "were too far afield" and "added nothing to the risk of high-consequence accidents," the court deferred to the DOT's decision not to discuss the matter further in its NEPA review.

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88. *Id.* at 755.
89. *Id.* at 757.
90. *See id.*
91. 715 F.2d at 732 (2d Cir. 1983).
92. *See id.* at 736–38.
93. *Id.* at 738–39.
95. *New York*, 715 F.2d at 746; *see also* Valerie M. Fogleman, *Threshold Determinations Under the National Environmental Policy Act*, 15 B.C. ENVTL. AFF. L. REV. 59, 92–93 (1987) (noting that because the effects of sabotage were scientifically uncertain, the issue turned upon the Agency's determination of whether the risk was sufficiently probable).
96. *New York*, 715 F.2d at 749–50; *see also* Fogleman, *supra* note 95, at 93 (concluding that "[b]ecause the issue involved a threshold decision . . . [t]he agency could select its own methodology for risk assessment as long as it was justified in light of current scientific opinion").
97. *New York*, 715 F.2d at 750.
Although the aforementioned court decisions show that the NRC did not believe it had to consider the risk of terrorism in its NEPA reviews, the NRC explicitly addressed the issue in detail in *Private Fuel Storage, L.L.C. (PFS).*

In this case, Utah asserted that the terrorist attacks of September 11 had "materially changed" the circumstances under which the NRC had previously rejected analyses of terrorism under NEPA by showing that a terrorist attack is more likely and more dangerous than previously thought. The Commission ruled that the risk of terrorism, unlike foreseeable environmental effects such as changes in local air quality, water quality, and wildlife (and even rare but fairly predictable events such as hurricanes and earthquakes), is unquantifiable and thus beyond NEPA analysis. It listed four primary rationales in support of its ruling.

The Commission first analyzed NEPA's goals, indicating that NEPA only requires a discussion of "reasonably foreseeable" impacts, which courts have interpreted as a "rule of reason." It then concluded that the possibility of a terrorist attack is speculative and causally remote from the expected consequences of agency action. It favorably cited Metropolitan Edison's attenuated causal chain language. The Commission thus thought it sensible to draw a line in the sand before the risk of a terrorist attack, limiting NEPA's scope so the process would not become "truly bottomless."

Second, the Commission noted that the events of September 11 have not changed the fact that the probability of a terrorist attack directed at any given facility would still be extremely speculative, both quantitatively and qualitatively.
Third, the Commission stated that examining the risk of a terrorist attack would amount to a worst-case analysis, which NEPA does not require.\textsuperscript{108} It noted that a September 11-like terrorist scenario merely amounts to a theoretical possibility and that “[s]ubstituting theoretical possibility for probability analysis amounts to a worst-case approach.”\textsuperscript{109} It also rebuffed Utah’s reliance on \textit{Sierra Club v. Marsh},\textsuperscript{110} which held that an EIS should take into account impacts that are “sufficiently likely to occur that a person of ordinary prudence would take [them] into account in reaching a decision.”\textsuperscript{111} The Commission distinguished between the foreseeable impacts assuming a successful attack and the foreseeable impacts of simply licensing the facility.\textsuperscript{112} In the latter case, a terrorist attack is unlikely to occur, and thus the environmental effects of this hypothetical attack are even further along the causal chain and thus outside the scope of NEPA.\textsuperscript{113}

Finally, the Commission reasoned that analysis of a terrorist attack is a sensitive national security issue, and thus not compatible with NEPA’s public process.\textsuperscript{114} While the NRC already reviews the risk of terrorism to ensure the safety of nuclear facilities,\textsuperscript{115} publicizing information as to vulnerabilities and security measures at nuclear power plants could ultimately assist terrorists seeking effective attack methods.\textsuperscript{116} The Commission distinguished the Supreme Court’s decision in \textit{Weinberger},\textsuperscript{117} concluding that the potential for a similar attack on a nuclear facility exists should lead to the conclusion that this risk “must be at least as great—or greater—than the risk of accidental reactor mishap,” which the NRC does analyze under NEPA.

\textsuperscript{108} \textit{PFS}, 56 N.R.C. at 352 (noting that worst-case analysis distorts and exaggerates the risks of a terrorist attack and ultimately wastes agency resources); \textit{see also} Farber, \textit{supra} note 54, at 23 (noting that the original NEPA worst-case requirement was replaced because it “was criticized as being excessively pessimistic and too intrusive on agency discretion”).

\textsuperscript{109} \textit{PFS}, 56 N.R.C. at 352. \textit{But see} Farber, \textit{supra} note 54, at 24 (noting that the amended regulation still calls for discussion of low-probability catastrophes, and thus it “defines ‘worst case’ in terms of the rule of reason rather than completely eliminating the worst case requirement”).

\textsuperscript{110} 976 F.2d 763 (1st Cir. 1992).

\textsuperscript{111} \textit{PFS}, 56 N.R.C. at 353 (quoting \textit{Marsh}, 976 F.2d at 767).

\textsuperscript{112} \textit{Id}.

\textsuperscript{113} \textit{See id.} at 353–54. \textit{But see} Farber, \textit{supra} note 54, at 27 (noting that the current regulation is still designed to address situations “where a risk is poorly understood but potentially serious”).

\textsuperscript{114} \textit{See PFS}, 56 N.R.C. at 354–57.

\textsuperscript{115} \textit{Id.} at 343–44 (detailing some of the security and safeguard measures being examined and improved).

\textsuperscript{116} \textit{See id.} at 354–55; \textit{see also} Frye, \textit{supra} note 99, at 659 (noting that the apparent conflict between the protection of sensitive security information under the Atomic Energy Act (AEA) and the public’s right to know under NEPA is illusory because “NEPA’s own language makes clear that an agency’s duty to implement NEPA’s policies is qualified, not absolute, and must be trumped where there is an otherwise unavoidable conflict between NEPA and an agency’s authorizing legislation”). Roland M. Frye, Jr., notes that NEPA should only be implemented “consistent with other essential considerations of national policy” and is subject to restraints based on “‘risk to health and safety, or other undesirable and unintended consequences,’ ” and thus the AEA’s mandate to protect the public health and safety trumps NEPA. \textit{Id.} (quoting 42 U.S.C. § 4331(b) (2000)).

\textsuperscript{117} \textit{See supra} notes 64–66 and accompanying text.
in which the Court indicated that agencies in certain circumstances can perform a NEPA review while limiting public disclosure of sensitive security information, by noting that the NRC was already considering terrorism outside the NEPA context in this case, and thus the formal NEPA process would not meaningfully add to its decision-making process.

C. Methodologies Available to Federal Agencies and Courts

While the courts mentioned in Part I.B and the NRC have offered varying rationales for their hesitation to require NEPA review of remote environmental impacts, including the effects of a terrorist attack, the theoretical and methodological criteria underlying these rulings often go unstated. This section discusses risk assessment and risk management, which have been the prevailing methods available to federal agencies, such as the NRC, when analyzing environmental risks. This section first describes a traditional, probabilistic conception of risk assessment in the federal government, informed mostly by a highly influential 1983 National Academy of Sciences (NAS) study, and goes on to examine some of the criticism of this traditional approach. This section also considers risk assessment in the context of both NEPA and terrorism. This section then discusses the Precautionary Principle, a theoretical approach that has gained some support among the academic community for situations involving uncertain yet potentially very harmful risks. The risk of terrorism, which is highly uncertain and potentially catastrophic, is a type of risk that the Precautionary Principle is designed to address. Finally, this section discusses scholarship addressing risks of catastrophic harm, specifically focusing on an approach that Professor Cass Sunstein has deemed the “Catastrophic Harm Precautionary Principle.”

118. Weinberger v. Catholic Action of Haw./Peace Educ. Project, 454 U.S. 139, 143 (1981); see also Frye, supra note 99, at 665–67 (discussing two prominent FOIA exemptions, an exemption based on a conflicting statute (here the AEA) and a national defense exemption based on an executive order, which Frye argues permits the exclusion of terrorism information from public EISs).

119. PFS, 56 N.R.C. at 356–57.


122. See generally Cass R. Sunstein, Irreversible and Catastrophic, 91 CORNELL L. REV. 841 (2006). For a similar approach to addressing risks of catastrophic harm, see Gardiner, supra note 121, at 47–49 (formulating the “Core Precautionary Principle”).
1. Risk Assessment
   
a. The Traditional Account

   i. Generally

   In 1983, the National Academy of Sciences, in response to a directive from Congress and a contract with the Food and Drug Administration, published a foundational text concerning the practice of probabilistic risk assessment in the federal government. First, the NAS distinguished between risk assessment and risk management: risk assessment is the factual inquiry into “the health effects of exposure of individuals or populations to hazardous materials and situations,” while risk management involves “weighing policy alternatives and selecting the most appropriate regulatory action.” Thus, while risk assessment is mostly based upon scientific fact, judgment, and consensus, risk management necessarily involves “value judgments on such issues as the acceptability of risk and the reasonableness of the costs of control,” which are informed by political, economic, and social considerations.

   The NAS divides risk assessment into four steps, but for purposes of simplicity, this Note will discuss Professor K. S. Shrader-Frechette’s three step formulation: “(1) identification of some public or societal hazard; (2) estimation of the level and extent of potential harm associated with it; and (3) evaluation of the acceptability of the danger, relative to other hazards.” This formula was largely adopted to evaluate the risk of carcinogens and other hazards already found in the environment, especially...
at such contaminated areas as Superfund sites. Professor Richard Wilson and Dr. Edmund A. C. Crouch label these “historical risks,” meaning risks where adverse events associated with the risk have occurred and are occurring at a sufficient rate for reasonable data to have accumulated.

In contrast, some risks, either those associated with an event that has not occurred sufficiently often to obtain reasonable data or those arising from events that have not yet occurred, do not fit as well into the standard framework. Wilson and Crouch label these “new risks,” and they explicitly detail the “risk of death from a U.S. nuclear plant accident” as an example of this type of risk. New risks are thus inherently more uncertain; while we can speculate about the worst case, or the “upper limit” of this type of risk, it is much more difficult to show a lower limit to this risk or clearly show that the risk is insignificant. However, high uncertainty does not mean that risk assessment is impossible, for “absence of certainty is not absence of risk.” Indeed, simply because the existence of a hazard is uncertain or unproven does not make the actual risk of its occurrence small.

In the context of the easier-to-study historical risks that form the background of traditional risk assessment, however, regulators generally follow an expected value analysis, in which they multiply the probability of a particular impact by its consequences, set up a probability distribution, and “proceed with regulatory decision making as if the harm caused by an activity were determinate and equal to the expected value.” Thus, in most risk assessments, the overall estimation of the risk may not reflect an outcome that is in and of itself probable; instead, this estimate is simply an average of a variety of potential outcomes, adjusted for their probability.

ii. The NEPA Context

Risk assessment, expected value analysis, and cost-benefit analysis also play significant roles in the NEPA context; although the text of NEPA itself does not explicitly use these terms of art, it is clear that EISs must include a discussion of the environmental risks, costs, and benefits of a proposed

132. Id. at 26.
133. See id.
134. Id.
135. Id. at 58.
136. Id.
137. Id. at 81.
139. See Wilson & Crouch, supra note 131, at 82–83. For example, if there is a ninety-nine percent chance that zero lives will be lost and a one percent chance that 1000 lives will be lost, the expected value for loss of life is ten lives, despite the fact that ten lives is not among the possible outcomes.
agency action and various alternatives. The NEPA regulations provide that EISs should "[r]igorously explore and objectively evaluate all reasonable alternatives" and discuss both direct and indirect environmental consequences of the various alternatives. They also explicitly allow the use of cost-benefit analysis in the decision regarding an alternative. However, the regulations also make clear that the "weighing of the merits and drawbacks" in a cost-benefit analysis need not be monetarily based, especially when there are important nonquantitative or qualitative considerations. Also important is the provision that any cost-benefit analysis discussion in an EIS must be made in accordance with analyses of "unquantified environmental impacts, values, and amenities." EISs often contain elements of traditional risk assessment and cost-benefit analysis, though no single methodology is required, perhaps due to the fact that EISs are performed by many federal agencies with different bureaucratic and methodological frameworks.

b. Criticism

i. Generally

While the above section details the most widespread conception of risk assessment and risk management in the federal government, it is by no means the only way for agencies to address risk. Moreover, while agencies such as the NRC may subscribe to many of the principles underlying this conception of risk assessment, NEPA itself does not mandate a specific risk assessment methodology. Thus, it is useful to discuss some criticism of traditional risk assessment, addressing the potential problems, flaws, and assumptions of the prevailing methodology.

One potential problem of the NAS’s conception of risk assessment is its treatment of uncertainty. For purposes of this discussion, “risk” refers to situations where all possible outcomes and their corresponding probabilities are known, while “uncertainty” refers to situations where potential outcomes may be known, but the probabilities of various outcomes are

140. See SCHRADER-FRECHETTE, supra note 130, at 171; see also 42 U.S.C. § 4332(2)(C) (2006) (stating that an EIS must include a discussion of environmental impacts of the proposed action, including adverse impacts that cannot be avoided, alternatives to the proposed action, and any irreversible or irretrievable commitments of resources resulting from the proposed action); 40 C.F.R. § 1502.1 (2009) (noting that alternatives analysis should include those alternatives that “minimize adverse impacts or enhance the quality of the human environment”).
142. Id. § 1502.16.
143. Id. § 1502.23.
144. Id.
145. Id.; see also Farber, supra note 54, at 13 (noting that nothing in NEPA requires quantification of risks).
146. See 40 C.F.R. § 1502.24 (stating that an agency must specify what methodology it uses in conducting an EIS without mandating or recommending a particular methodology).
147. See id.
partially or wholly unknown. The federal government’s reliance on assessing risks that are readily measurable and of well-defined magnitude, such as carcinogens in the atmosphere, may serve to neglect those dangers that hold strong implications for public health, but are much more uncertain. For these types of uncertain dangers, critics argue that the risk assessor should attempt to use the best available information and be as precise as possible, but should also include an estimate of the imprecision or uncertainty into the assessment. As Wilson and Crouch note, “[T]he statement ‘we do not know’ can be viewed only as procrastination, and not responsive to the request for a risk estimate.”

Moreover, even if certain instances of catastrophic harm are deemed to be low probability rather than merely uncertain, critics still have reason to question traditional risk assessment. One critic notes that although a high-probability, low-consequence event and a low-probability, high-consequence event may have the same expected value under traditional risk assessment, reasonable people are typically more risk averse to the latter situation, for reasons of catastrophic potential, unfamiliarity, and the secondary ripple effects were the catastrophic event to occur. Accordingly, several critics have “proposed that n lives lost simultaneously in a catastrophic accident should be assessed as a loss of n² lives.” One critic has also proposed that risk assessments should employ a weighting system that gives weight to harder-to-quantify, but nonetheless important, factors, such as lack of informed consent and catastrophic potential. However, agencies such as the NRC have consistently accorded more weight to more easily quantifiable probabilities rather than qualitative uncertainties.

148. See, e.g., Gardiner, supra note 121, at 50; Stewart, supra note 138, at 73–74; Sunstein, supra note 122, at 876.
149. See Wilson & Crouch, supra note 131, at 81; see also Shrader-Frechette, supra note 130, at 102 (noting that “[m]ost technology-related decisionmaking probably takes place in situations of uncertainty”).
150. Wilson & Crouch, supra note 131, at 84; see also Shrader-Frechette, supra note 130, at 95–96 (noting that there is often a great deal of uncertainty in the context of risk assessment of nuclear power plants, and stating that many of these risks, such as a terrorist attack on a nuclear facility, “are difficult to handle in probabilistic risk assessment”).
151. Wilson & Crouch, supra note 131, at 84.
152. Shrader-Frechette, supra note 130, at 90; see also id. at 95 (noting, in analogy to Russian Roulette, that “[e]ven with such a small probability, a person could still be rational in her refusal to play the game . . . . Any probability of fatality might be too high if the benefits deriving from taking the risk were not great enough”); Wilson & Crouch, supra note 131, at 41 (“Society legitimately demands that accidents with large consequences be ruled out, or demonstrated to have a very low probability before the technology is allowed to proceed.”); John S. Applegate, A Beginning and Not an End in Itself: The Role of Risk Assessment in Environmental Decision-Making, 63 U.CIN.L.REV. 1643, 1659 (1995) (“[I]t is hardly irrational to fear and to protect against catastrophic injury.”).
153. Shrader-Frechette, supra note 130, at 94; see also Applegate, supra note 152, at 1656 (noting that the goals of environmental legislation “has at its heart the prevention of harm before it occurs,” which “certainly implies erring on the side of safety when uncertainty exists”).
154. See Shrader-Frechette, supra note 130, at 183.
factors and consequences (especially catastrophic consequences) in their risk assessments.\textsuperscript{155} In addition, the NAS-recommended form has been criticized as inflexible. For example, the sharp distinction between hazard identification and other steps of risk assessment may cause regulators simply to ignore risks that have not been identified or measured with a requisite amount of certainty.\textsuperscript{156} One critic thus notes that risk assessment “set[s] the burden of proof for regulation too high and in the wrong place[s].”\textsuperscript{157} In addition, the NAS approach was designed to address very specific risks—chemicals or carcinogens already present in the environment—and may not apply to other types of risks, such as industrial or nuclear accidents, which are inherently more uncertain and less measurable.\textsuperscript{158}

Critics have also claimed that risk assessment proponents incorrectly assume that analysis of environmental risks is technical, scientific, and objective, while in reality there are many policy judgments, assumptions, and significant modeling uncertainties involved.\textsuperscript{159} The final step of Professor Shrader-Frechette’s formulation of risk assessment—evaluation—is particularly open to criticism, for “[t]here are many ways to answer the question ‘How much risk . . . is socially, politically, economically, and ethically acceptable?’”\textsuperscript{160} Since evaluation of the risk necessarily requires comparing it with other risks, the evaluation can be affected by what criteria are used in the comparisons.\textsuperscript{161} Even the initial steps of risk assessment, although largely scientific, rely on a large number of methodological value judgments.\textsuperscript{162} Two critics have noted that despite agencies’ arguments that risk assessment “remains primarily a scientific undertaking,” the distinction between risk assessment and risk management is not so clear cut, and “policy considerations almost invariably underlie,

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\textsuperscript{155} Id. at 94. Professor Shrader-Frechette notes that nuclear risk assessments have often adopted the “nuisance rule” that emphasizes probabilities when considering risk, “probably because of society’s interest in technological development.” Id.

\textsuperscript{156} \textsc{Wilson \\ & Crouch}, supra note 131, at 150.

\textsuperscript{157} Gardiner, supra note 121, at 35.

\textsuperscript{158} \textsc{Wilson \\ & Crouch}, supra note 131, at 151; \textit{see also} \textsc{Shrader-Frechette}, supra note 130, at 6 (noting that “some hazards, such as carcinogens, were being monitored and regulated very stringently, whereas others, equally dangerous, were evaluated more leniently”); id. at 96 (noting that nuclear probabilities are “especially resistant to accurate estimation”).

\textsuperscript{159} \textit{See} Gardiner, \textit{supra} note 121, at 35–36.

\textsuperscript{160} \textsc{Shrader-Frechette}, supra note 130, at 7. Professor Shrader-Frechette criticizes experts’ assumptions that quantification alone can evaluate the acceptability of a risk. She notes that many people’s responses to hazards stem from certain aspects, such as a risk being imposed without consent, the uncertainty surrounding a risk, or potentially catastrophic consequences, that are either not amenable to quantification or are unrelated to quantification. \textit{See} id. at 81–83.

\textsuperscript{161} Id. at 56 (listing various criteria that regulators can take into account when deciding the acceptability of a given risk, such as probability, average consequences, worst-case consequences, benefits, and whether the populace consents to the risk or it is imposed on them unilaterally).

\textsuperscript{162} Id.; \textit{see also} Applegate, \textit{supra} note 152, at 1655 (“[T]he results of risk assessments usually depend on the way that the uncertainties are resolved.”).
and may even dominate, many of the choices made in conducting a risk assessment.\(^\text{163}\)

Another critic notes that certain questions cannot even be answered by scientific risk assessments in the first place because there are “trans-scientific” gaps in knowledge upon which scientists cannot even perform experiments.\(^\text{164}\) Where measuring the health effects of risks with highly uncertain lower limits, “policy considerations must fill in the gaps that science cannot inform.”\(^\text{165}\) While these policy assumptions can strongly affect the agency’s final decision, agencies often cloak their decisions in science, “leaving no trace of the policy compromise that formed the basis for the standard.”\(^\text{166}\) “Science has considerable rhetorical appeal” and is considered to be “objective” by the public, so expressing policy judgments as scientific conclusions can make the agency look “highly credible if not even infallible.”\(^\text{167}\) Thus, an agency’s lack of explicitness regarding the uncertainties involved in a decision and the policy decisions that helped resolve those uncertainties into a decision may prevent the public from reviewing the true bases for the agency’s action.\(^\text{168}\)

ii. The NEPA Context

In the NEPA context, critics have pointed out that instead of producing EISs of high scientific quality in the form of nuanced risk assessments and cost-benefit analysis, federal agencies often turn in EISs with inadequate, incomplete, and often misinterpreted data.\(^\text{169}\) In addition, each agency is permitted to structure its EIS how it sees fit, leading to a mix of different methodologies rather than one formal methodology, such as the Ecological Risk Assessments championed by the EPA.\(^\text{170}\) Moreover, studies have


\(^{165}\) Id. at 1622.

\(^{166}\) Id. at 1640.

\(^{167}\) Coglianese & Marchant, supra note 163, at 1264.

\(^{168}\) See Wagner, supra note 164, at 1686.


\(^{170}\) See Klopff, Culver & Morton, supra note 169, at 38–39. These authors note that ecological risk assessment provides a methodological framework that is conceptually built to deal with uncertainty and risk when analyzing environmental impacts. Id. at 39. In addition, they note that the steps of an ecological risk assessment, including problem formulation and risk characterization, closely mirror the requirements of an EIS. See id. at 39–40; see also Bartell, supra note 169, at 845, 848 (noting that ecological risk assessment “moves uncertainty explicitly to the forefront and makes every attempt to quantify such uncertainties,” but is also designed to include qualitative aspects in the decision-making
shown that EIS predictions are often too vague to be tested at all, and when they can be verified, “fewer than one out of three [are] substantially accurate.”\(^{171}\)

Due to the fact that NEPA does not require agencies to perform later checks on their predictions, agencies are likely to be averse to discussing the shortcomings of the proposed action.\(^{172}\) Professor Daniel Farber recommends that agencies avoid using flat probabilities without a discussion of the uncertainties involved provide more explicit discussion of the methodologies or models used, the reasons for choosing a particular model, and attendant assumptions in using a model.\(^{173}\) Due to the inherent assumptions and uncertainties involved in making predictions based on models, Professor Farber argues that “there can be no clear dichotomy between cases of quantifiable risks and non-quantifiable uncertainty” because there is always the possibility that the model does not apply or that previous empirical assumptions are incorrect.\(^{174}\) Finally, Professor Farber argues that even if the agency believes the probability of a catastrophic outcome to be very low, the potential for such outcomes should at least be noted in the EIS.\(^{175}\)

c. The Problem of Terrorism

Terrorism presents certain unique problems in risk assessment and risk management. First, terrorist activity is largely stochastic, or random; unlike many other risks, it is thus extremely hard to model, making probability estimates very difficult, if not impossible.\(^{176}\) In addition, the obvious secrecy of terrorist plans and the extremely “wide range of potential means and targets to choose among” are devastating to attempts at risk assessment.\(^{177}\) Thus, “all that experts on terrorism are able to do, and even then only with a large error term, is to rank . . . threats by relative context). Of course, ecological risk assessments may still be subject to many of the criticisms of risk assessment listed above.

171. Farber, supra note 54, at 28.

172. Id.

173. Id. at 29.

174. Id. at 30.

175. Id. at 31. Professor Daniel Farber concludes that for purposes of analyzing catastrophic risk under NEPA, “[t]he quantifiability of the risk should not be relevant.” Id.


177. Posner, supra note 176, at 174; see Spent Fuel Storage Report, supra note 176, at 26 (noting that experts have not been able to apply probabilistic risk assessment to terrorist attacks because the probability of any given attack depends upon “impossible-to-quantify factors such as terrorist motivations, expertise, and access to technical means [and] . . . on the effectiveness of measures that might prevent or mitigate such attacks”).
likelihood” rather than absolute probabilities. Thus, risk assessors face an extremely large degree of uncertainty when attempting to express the risk of terrorism in the form of probabilities.

Terrorism is also dramatic, unfamiliar, clustered (a large number of deaths occurring in one place at one time), and extremely hard to control. In conjunction, these factors tend to produce among the populace strong emotions—most notably fear—which are likely to produce “a range of other costs, in the form of countless ripple effects.” The costs of these secondary ripple effects may not easily be weighed in a standard cost-benefit analysis that assesses lives lost or physical damage done. Terrorism is thus best categorized as a “new risk” rather than a “historical risk” and is likely to cause citizens to demand a high degree of risk aversion. Even if one were to categorize terrorist attacks as a low-probability risk, public reaction (or overreaction) to these risks is a cost in and of itself, and it is plausible to argue that the government should overregulate terrorist risks in an attempt to lower these secondary costs.

2. The Precautionary Principle

a. General Approaches

Stemming from the perceived failure of traditional risk assessment or cost-benefit analysis to deal with risk of events that have rarely, if ever, occurred and with which we have little or no experience, it has become popular among policymakers to invoke the Precautionary Principle.

178. POSNER, supra note 176, at 174–75.
180. Sunstein, supra note 179, at 24; see also SPENT FUEL STORAGE REPORT, supra note 176, at 12 (noting that concerns about nuclear power plants have “added stakes” because many people fear radiation more than they do other serious risks, “amplifying] the concern over a potential terrorist attack . . . beyond the physical injuries it might cause, and beyond the economic costs of the cleanup”).
181. See Sunstein, supra note 179, at 23–24.
182. See id. at 24 (“The purpose and effect of terrorism are to make people fear that ‘they cannot be safe anywhere.’”).
183. Id.
184. See id. at 34–35. Professor Sunstein notes that the secondary costs of terrorist attacks, or merely the fear of terrorism, warrant an “emotion premium” beyond the discounted value of the risk. See id. at 28–30. It is important to note the distinction between this point and the Metropolitan Edison Court’s point that secondary, nonenvironmental effects should not be discussed under NEPA. See supra notes 73–75 and accompanying text. Professor Sunstein’s point may help emphasize that the effects of a terrorist attack are sufficiently severe to fall within the “reasonably close causal relationship” framework, but the NEPA document itself need not contain a detailed assessment of these secondary costs; it may only discuss the environmental effects of a terrorist attack. See supra notes 74–75 and accompanying text.
(Principle) in instances of uncertainty. This approach is potentially useful for assessing the risk of terrorism, which is inherently uncertain but potentially serious, under NEPA. Weaker versions of the Principle hold that uncertainty regarding adverse environmental impacts of an activity should be taken into account when deciding whether to prohibit or regulate the activity, while stronger versions assert that uncertainty “provides an affirmative justification for regulating an activity or regulating it more stringently than in the absence of uncertainty.” The three main components of the Principle are a threat of harm, uncertainty of impacts and causality, and a precautionary response. However, these components raise several interpretative issues, such as what kind of harm counts as a sufficient “threat,” what level of uncertainty is needed to trigger the Principle, and what constitutes a sufficient precautionary measure.

Professor Richard B. Stewart describes four main versions of the Principle. First, the “Non-Preclusion” version holds that scientific uncertainty should not automatically preclude regulation of activities that pose a significant risk of harm. This version of the Principle more closely resembles traditional risk management, in that it would not restrict the risk factors (including economic risks) that regulators can take into account. It would also merely be one option for regulators to consider on a case-by-case basis. Second, the “Margin of Safety” version posits that regulatory controls should contain a margin of safety to account for large margins of error and uncertainty in evaluating the probability and severity of a specific risk.

Third, under the “Best Available Technology” version, activities with a large degree of uncertainty and the potential for a significant amount of harm should be subject to the best technology available to minimize the risks of this harm. Fourth, the “Prohibitory,” or strong, version, states that an activity with an uncertain potential for significant harm should be

185. Wilson & Crouch, supra note 131, at 159; see also Stewart, supra note 138, at 75 (noting that advocates of the Principle criticize prevailing methods that require regulators to prove a high probability of serious harm before regulatory controls are adopted). See generally Gardiner, supra note 121 (discussing the strengths and weaknesses of different versions of the Precautionary Principle).
187. Gardiner, supra note 121, at 36.
188. Id.
189. See infra notes 190–95 and accompanying text.
190. Stewart, supra note 138, at 76; see also Gardiner, supra note 121, at 43 (engaging in a similar analysis).
191. Gardiner, supra note 121, at 43–44 (emphasizing that the practical importance of the Non-Preclusion version would be to provide some authoritative, rhetorical, ex post justification when environmental risks happen to be weighed heavily).
192. Id.
194. Id. at 76.
flatly prohibited unless the proponent of the activity can show that it "presents no appreciable risk of harm." 195

b. Criticism

There is often a double-edged criticism of the Principle. 196 On one hand, the weak versions of the Principle can be vacuous. 197 While these versions of the Principle may sound desirable in theory, they would have little independent power as decision-making tools in practice. 198 If regulators were permitted to juggle nonenvironmental costs and benefits any way they pleased, the process would look extremely similar to risk management, and the Principle would just be an unnecessary flourish. 199 Thus, the weaker versions “offer[] us no reasons to believe that they will actually do anything to protect the environment.” 200

However, a stronger Principle is often criticized on the grounds of being extreme and excessively narrow. 201 Critics are not comfortable with environmental effects being given determinative preference over other variables, such as economic factors. 202 In addition, a stronger Principle can lead to unnecessary worst-case presumptions and “a disproportionate allocation of limited regulatory resources.” 203 It may also have the perverse effect of encouraging regulators to understate uncertainty for fear of triggering the Principle. 204 In addition, a stringent focus on regulating activities with a higher degree of environmental uncertainty may cause a shift away from regulating more obvious, known environmental risks. 205 Thus, the Principle cannot be so weak that it has no independent power over decision making, yet it cannot be so strong that it takes precedence in nearly every situation with environmental risks. 206

195. Id.; see also Sunstein, supra note 122, at 849 (noting that the strong version effectively shifts the regulatory burden of proof from the public to the regulators).
197. See id. at 44.
198. See id. at 43.
199. See id.; see also Stewart, supra note 138, at 77 (noting that weak versions “do not represent or justify any basic change in the preventive approach to regulation that has generally prevailed over the past 30 years”).
200. Gardiner, supra note 121, at 42.
201. Id. at 45.
202. See id.
203. See Stewart, supra note 138, at 97.
204. Id. at 98.
205. See id. at 97; see also Sunstein, supra note 122, at 852 (noting that regulation based upon the Principle can sometimes give rise to “‘substitute risks’”).
206. See Gardiner, supra note 121, at 38–39 (indicating the need for a more concrete Precautionary Principle that sharply defines the threats and types of uncertainty that should trigger the precautionary response).
3. The Catastrophic Harm Precautionary Principle

Thus, while many scholars think traditional risk assessment undervalues uncertain but potentially catastrophic harms by categorizing them as mere low-probability harms, the Principle's attempt to fix this problem has also been criticized, either because it is too vague or too stringent. Nonetheless, under circumstances with the potential for catastrophic harm, people are especially risk averse.\textsuperscript{207} In these cases, the argument goes, the traditional expected value formulation is insufficient because it undervalues the extra costs that come with catastrophic harm.\textsuperscript{208}

Professor Cass Sunstein argues that there is a tendency among human beings to treat uncertain risks as if they were low-probability risks, and in risk assessment, to treat low-probability risks as if they were essentially zero.\textsuperscript{209} However, the concept of uncertainty presupposes that one cannot assign probabilities, so an assumption that uncertain risks are low probability is unwarranted.\textsuperscript{210} In addition, there are often "secondary" costs of catastrophe, such as social losses or disruption "that can greatly outrun the initial effect of that event."\textsuperscript{211} Without a built-in risk premium, traditional risk assessment and expected utility analysis may be insufficient to account for the magnitude of danger associated with catastrophic harm.\textsuperscript{212}

With these concerns in mind, Professor Sunstein formulated the Catastrophic Harm Precautionary Principle, "a form of risk aversion for the most dangerous risks."\textsuperscript{213} The Principle holds that in situations involving uncertain dangers of catastrophe, regulators should act to prevent the worst-case scenario when the costs of reducing these dangers are not huge and incurring costs does not substantially divert resources from extremely pressing problems.\textsuperscript{214} Under this more limited conception of the Principle, where there is a real possibility of catastrophe and little reliable information about its likelihood, regulating might be more prudent than simply running

\textsuperscript{207} See Sunstein, supra note 122, at 843.

\textsuperscript{208} See id. at 870; see also Daniel A. Farber, Probabilities Behaving Badly: Complexity Theory and Environmental Uncertainty, 37 U.C. DAVIS L. REV. 145, 146 (2003) (arguing that "it is reasonably foreseeable that non-reasonably foreseeable events will occur from time to time" and "[a] planning process that ignores this reality will work satisfactorily nearly all of the time but when failures occur they may be catastrophic").

\textsuperscript{209} Sunstein, supra note 122, at 870–71. Professor Sunstein notes that "human beings often neglect low-probability, high-harm risks, especially if the costs would be incurred immediately and if the benefits would not be realized until the distant future." Id. at 872.

\textsuperscript{210} See id. at 876.

\textsuperscript{211} Id. at 873; see also SHRADER-FRECHETTE, supra note 130, at 94.

\textsuperscript{212} See Sunstein, supra note 122, at 874.

\textsuperscript{213} Id. at 893.

\textsuperscript{214} Id. Professor Sunstein borrows much of his formulation from John Rawls's "maximin principle," which holds that regulators should choose the policy with the best worst-case outcome if (a) outcomes are potentially catastrophic, (b) probabilities cannot be assigned, and (c) regulating this way is a relative matter of cost indifference. See id. at 880 (citing JOHN RAWLS, A THEORY OF JUSTICE 134–35 (rev. ed. 1999)); Gardiner, supra note 121, at 47.
the risk.\(^{215}\) Professor Sunstein and Professor Stephen M. Gardiner both qualify this statement by noting that the mere possibility of catastrophic harm should not be sufficient to trigger the Principle; instead, there must be some minimum standard of realistic plausibility concerning the catastrophic outcome.\(^{216}\) Thus, the questions to ask in deciding whether the Catastrophic Harm Precautionary Principle should apply to a given situation are as follows: "(a) How bad is the worst case scenario, compared to other bad outcomes? (b) What, exactly, is lost by choosing maximin?"\(^{217}\) If the worst-case scenario is much worse than other bad outcomes and it costs relatively little to choose a specific regulatory approach to minimize the possibility of this outcome under the maximin principle, then the case for applying this version of the Principle is presumably strengthened.\(^{218}\) Thus, if one were to consider the risk of a terrorist attack on a nuclear plant uncertain yet plausible and potentially catastrophic, the Catastrophic Harm Precautionary Principle would mandate taking all reasonable regulatory steps to mitigate the chance of the worst possible consequences or effects of an attack.\(^{219}\)

II. DOES THE RISK OF TERRORISM FALL WITHIN THE SCOPE OF NEPA?

As Part I indicated, courts have not dealt extensively with terrorism under NEPA until relatively recently.\(^{220}\) In addition, as discussed in Part I, courts that have considered the issue of reactor sabotage have generally been one-sided, dismissing the possibility that the risk of a terrorist attack should be considered under NEPA.\(^{221}\) Part II dissects the major arguments in favor of, and in opposition to, analyzing the risk of a terrorist attack under NEPA. This part includes arguments made by the parties to the major cases, scholars, and commentators, but will focus on the circuit court opinions. Part II.A discusses the Ninth Circuit opinion, which held that the NRC could not dismiss the possibility of a terrorist attack under NEPA review as a matter of law. Part II.B discusses the Third Circuit opinion, which agreed with the NRC's position that the risk of an attack is too attenuated to warrant consideration under NEPA.

\(^{215}\) Gardiner, supra note 121, at 49.

\(^{216}\) Id. at 51; Sunstein, supra note 122, at 880. Professor Sunstein lists global warming, genetic modification of food, and, importantly, nuclear power and terrorism as examples of instances when the Catastrophic Harm Precautionary Principle can be plausibly and realistically justified. See id. at 874, 880, 892.

\(^{217}\) Sunstein, supra note 122, at 889; see supra note 214 (discussing maximin principle).

\(^{218}\) See Sunstein, supra note 122, at 890.

\(^{219}\) See id. at 876–77 (noting that the Catastrophic Harm Precautionary Principle can be applied to the risks of terrorism and nuclear energy).

\(^{220}\) See Farber, supra note 54, at 12 (noting that courts have begun to address this issue in detail after the terrorist attacks of September 11).

\(^{221}\) See, e.g., supra Part I.B.2.
A. The Ninth Circuit Departs from the Prevailing Wisdom: San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission

In 2006, the Ninth Circuit rejected the NRC’s approach to addressing terrorism in the NEPA context in *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Commission*. In this case, the court considered whether the NRC had to take into account the possibility of a terrorist attack in a NEPA review of a proposal for additional spent fuel storage space at a nuclear power plant. The petitioners argued that the terrorist attacks of September 11 resulted in increased concern that reactors and spent fuel pools would not be able to withstand aircraft attacks. They were especially worried in light of the vulnerabilities of nuclear plants and the fact that terrorist groups consider nuclear plants desirable targets. They concluded that the NRC’s assertion that it has enhanced security at nuclear plants after September 11 essentially concedes that the agency considers the risk of an attack foreseeable and is able to analyze it, at least qualitatively.

In addition, they made clear that they did not merely seek a discussion of a speculative worst-case scenario, but “a full discussion of the potential consequences of a range of credible events involving destructive acts of malice or insanity against the proposed [installation].” The petitioners also rebutted the NRC’s assertion that the NEPA process is an inappropriate forum for discussion of terrorism. They noted that the NRC can still “solicit public comment” while limiting public access to sensitive information in the final document, and, in any case, other agencies have often prepared EISs containing some information inaccessible to the general public.

Finally, the petitioners noted that the NRC’s duty to protect the public health and safety under the Atomic Energy Act (AEA) is distinct from the requirement to publicly “consider and attempt to avoid or mitigate the environmental impacts” under NEPA, and thus “compliance with the AEA does not excuse compliance with NEPA.” Thus, the petitioners sought an EIS that contained evidence of the plant’s vulnerabilities, the potential consequences of an attack, and design features implemented to avoid or mitigate the vulnerabilities.

222. 449 F.3d 1016, 1035 (9th Cir. 2006).
223. Id. at 1019–21.
225. Id.
226. Id. at 41–42, 45.
227. Id. at 48 (quoting Contentions at 28, *Mothers for Peace*, 449 F.3d 1016 (No. 03-74628)).
228. Id. at 51–52.
229. Id.
230. Id. at 54–55.
231. See id. at 55.
The NRC and the nuclear plant operator Pacific Gas & Electric Company (PG&E) relied heavily on the reasoning in *PFS*\(^{232}\) to support their argument. Besides the *PFS* four-part analysis, the respondents also noted that the AEA was the proper place for the NRC to generally assess "security threats" such as terrorism.\(^{233}\) They also argued that it would stretch the scope of NEPA to address these threats again in individual licensing actions under NEPA.\(^{234}\) They emphasized that the NRC's treatment of terrorism under the AEA does not necessarily compel a NEPA analysis because the agency's actions under the AEA, such as plant security improvements, essentially make the risk of actual harm from an attack "remote and speculative."\(^{235}\)

They also noted that nothing in NEPA or its legislative history indicates an intention to address issues such as terrorism.\(^{236}\) Moreover, they argued that a NEPA analysis of terrorism could paralyze agency decision making "to the limits of the imagination."\(^{237}\) This is because it would be unclear how to assess the risk outside the context of probabilistic risk assessment and how to determine the number of potential mitigation measures that would need to be reviewed.\(^{238}\) Finally, they concluded that the addition of storage space does not trigger a NEPA responsibility because the risk of terrorism is caused by uncertain terrorist motivations that already exist, not the NRC's licensing decision.\(^{239}\)

Since the respondents based many of their arguments on *PFS*, the court took pains to rebut all four rationales relied upon by the NRC in this decision.\(^{240}\) First, the court addressed the Commission's reliance on *Metropolitan Edison* by distinguishing between that case and the case before it.\(^{241}\) It noted that there was a chain of three events in *Metropolitan Edison*: "(1) a major federal action; (2) a change in the physical environment; and (3) an effect."\(^{242}\) The court concluded that *Metropolitan Edison* was dealing with the relationship between events two and three: the change in the physical environment (the increased risk of nuclear accident) and a secondary, indirect effect (psychological harm on the community).\(^{243}\)

\(^{232}\) 56 N.R.C. 340 (2002); see supra notes 98–119 and accompanying text.


\(^{234}\) Id.

\(^{235}\) Id. at 43–44.

\(^{236}\) Id. at 25–26.

\(^{237}\) Id. at 32.

\(^{238}\) See id. at 31–32.

\(^{239}\) See id. at 37.

\(^{240}\) For a discussion of these four rationales, see supra notes 103–19 and accompanying text.

\(^{241}\) See *Mothers for Peace*, 449 F.3d at 1029.

\(^{242}\) Id. For purposes of this case, event one would be the addition of storage space, event two would be a terrorist attack resulting from this additional storage space (discounted by the element of risk), and event three would be secondary, indirect effects of this increased risk, such as the psychological fears at issue in *Metropolitan Edison*.

\(^{243}\) Id.
In contrast, the challenge before the *Mothers for Peace* court concerned the relationship between events one and two: the major federal action (the addition of storage space) and the change in the physical environment (the risk of a terrorist attack). Thus, the question was whether a terrorist attack itself (and its attendant environmental impacts), not indirect effects resulting from the mere risk of this attack, was "remote and highly speculative." The court then concluded that the NRC's contention that the risk is remote and highly speculative is inconsistent with the government's extensive efforts to combat terrorism after the terrorist attacks of September 11, especially at nuclear power plants. Given these efforts, it concluded that the risk cannot be determined "remote and highly speculative" as a matter of law.

Second, the court held that the NRC's assertion that the risk of a terrorist attack is unquantifiable is not determinative because NEPA does not require numeric quantification. Instead of addressing probability, an EIS can

244. Id. at 1030. The *Mothers for Peace* court based its reasoning on *No Gwen Alliance v. Aldridge*, 855 F.2d 1380 (9th Cir. 1988).

245. *Mothers for Peace*, 449 F.3d at 1029–30 (quoting *Warm Springs Dam Task Force v. Gribble*, 621 F.2d 1017, 1026 (9th Cir. 1980)). The court also finds a quote from *Metropolitan Edison* itself to support this proposition: "[W]e are considering effects caused by the risk of accident. The situation where an agency is asked to consider effects that will occur if a risk is realized, for example, if an accident occurs . . . is an entirely different case." *Id.* at 1029 (quoting *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 775 n.9 (1983)). Thus, according to this reasoning, while there may not be a "reasonably close causal relationship" between a major federal action and the psychological effects caused by the perception of a risk of an accident, there certainly is a reasonably close causal relationship between a major federal action and a terrorist attack itself. *See supra* notes 74–75 and accompanying text. Since the causal relationship is reasonably close, the NRC is required to analyze the potential environmental effects of an attack. *See* Farber, *supra* note 54, at 24 (noting that CEQ's NEPA regulations define "reasonably foreseeable" to include impacts that are catastrophic in nature, even if their probability of occurrence is low, as long as the analysis of the impacts is within a "rule of reason"); Doremus, *supra* note 80 (arguing that *Metropolitan Edison* cannot stand for the proposition that "environmental risks, that is environmental impacts that are not certain to occur, are beyond the scope of NEPA analysis").

246. *Mothers for Peace*, 449 F.3d at 1030–31 (detailing some aspects of the NRC's "top to bottom" security review against the risk of a terrorist attack); *see also* Mott, *supra* note 32, at 350 (noting that after the terrorist attacks of September 11, the NRC has required nuclear power plants to "operate at the highest level of security, as well as to implement numerous security measures"). The court also noted that even before September 11, the agency "required analysis of means and methods of hypothetical attacks against specific facilities, with the goal of establishing effective counter-measures." *Mothers for Peace*, 449 F.3d at 1031 n.8.

247. *Mothers for Peace*, 449 F.3d at 1031; *see also* *Spent Fuel Storage Report*, *supra* note 176, at 6 (noting that "attacks by knowledgeable terrorists with access to appropriate technical means are possible"); *id.* at 30 (stating that the proven ability of terrorists to recruit or train attackers and bring them to the United States combined with the willingness of terrorists to carry out suicide attacks "greatly expands the scenarios that need to be considered when analyzing potential threats"); Mott, *supra* note 32, at 352 (noting that there are "numerous feasible scenarios" for an attack and that the probability of such an attack has increased since the terrorist attacks of September 11).

248. *Mothers for Peace*, 449 F.3d at 1031; *see also* Farber, *supra* note 54, at 12 (agreeing that NEPA does not require quantification and noting that many environmental impacts are
address qualitative factors, such as likely modes of attack, particular vulnerabilities of the specific plant, and a range of consequences. The court also noted that the NRC’s insistence that it has performed a “‘top to bottom’” terrorism review outside of the NEPA context is at odds with its assertion that precise quantification is impossible; thus, the Commission has not established that the risk actually is unquantifiable.

Third, while the NRC is correct in determining that it does not have to perform a worst-case analysis, considering the risk of a terrorist attack does not necessarily amount to a worst-case analysis. The court cited the amended CEQ regulations, which still require agencies to address uncertainties by detailing reasonably foreseeable significant adverse impacts, including low-probability but potentially catastrophic events.

It then noted that the petitioners were not calling for a worst-case analysis, but instead an analysis of a range of environmental impacts likely to occur in the event of a terrorist attack. The National Research Council, in a report prepared for Congress on the safety of spent fuel storage, also noted that since the behavior and motivations of terrorists are inherently uncertain and since terrorists view nuclear power plants as “desirable targets,” the risk of such an attack cannot be dismissed. The report also referenced the “well known public dread of radiation” as another reason why the threat cannot be dismissed. Id.

249. Mothers for Peace, 449 F.3d at 1031; see also Spent Fuel Storage Report, supra note 176, at 6. Significantly, the report also referenced the “well known public dread of radiation” as another reason why the threat cannot be dismissed. Id.

250. Mothers for Peace, 449 F.3d at 1032. But see Farber, supra note 54, at 13 (noting that the small sample size of major terrorist attacks would probably make attempts at quantification too subjective, thus making a more qualitative discussion more useful to the public). Nonetheless, Professor Farber later goes on to recommend that agencies consider catastrophic outcomes “whenever there is a credible argument that they are possible.” Id. at 31. Professor Farber also argues that the fact that “quantifiability” is difficult should not preclude a discussion of the potential for such outcomes, nor should it preclude “the possibility of including higher margins of safety or other precautions” for catastrophic possibilities. Id.; see also Petitioners’ Brief and Special Appendix at 47-48, New York v. U.S. Nuclear Regulatory Comm’n, 589 F.3d 551 (2d Cir. 2009) (No. 08-3903-ag(L)) [hereinafter N.Y. Brief] (noting incongruity between the NRC’s insistence on its extensive mitigation measures to combat terrorist attacks and its stance that the risk of an attack is too remote for NEPA purposes).

251. Mothers for Peace, 449 F.3d at 1032–33; see also Mott, supra note 32, at 354 (noting that while prior to the terrorist attacks of September 11 a major terrorist attack on a nuclear power plant might have been considered a speculative worst-case scenario, we now know that terrorist camps, including those involved in the September 11 attacks, consider nuclear power plants primary targets).

252. See Mothers for Peace, 449 F.3d at 1033 (citing 40 C.F.R. § 1502.22); see also Farber, supra note 54, at 21–27 (discussing the “rise and fall” of the worst-case scenario in the NEPA regulations).

253. Mothers for Peace, 449 F.3d at 1034.
Finally, in addressing the national security issue, the court determined that Weinberger could only stand for the proposition that while NEPA procedures can be limited or modified when dealing with sensitive security issues, there is no basis for the claim that an agency can simply avoid NEPA altogether.\(^{254}\) It noted that while the public participation aim of NEPA may be limited when the public cannot access the EIS, this does not necessarily foreclose all aspects of public involvement, such as the public "contributing information to the decisionmaking process."\(^{255}\) The court thus bluntly stated that "[t]here is no 'national defense' exception to NEPA."\(^{256}\) However, the court did not prescribe a method by which NEPA could be modified to strike a balance between the protection of sensitive national security information and the policies behind the statute, including ensuring that agencies take a hard look at environmental impacts and involve the public in the decision.\(^{257}\) Several scholars have advocated methods by which NEPA's goals can be fulfilled while sensitive information is shielded from the public, such as in camera judicial review, congressional oversight, and EISs that disclose the potential effects of contemplated actions but not the specific details of the project.\(^{258}\)

B. The Third Circuit Reaffirms the Traditional Approach: New Jersey Department of Environmental Protection v. U.S. Nuclear Regulatory Commission

The Third Circuit recently came to the opposite conclusion in New Jersey Department of Environmental Protection v. U.S. Nuclear Regulatory Commission.\(^{259}\) This case involved relicensing proceedings for Oyster Creek Nuclear Generating Station.\(^{260}\) The NRC, as part of its license renewal policy, concluded that some environmental impacts, such as the risk of sabotage, could be analyzed in a Generic Environmental Impact Statement (GEIS), a document that addresses issues "common to all nuclear

\(^{254}\) Id.; see Lucinda Low Swartz, NEPA in an Age of Terrorism, 5 ENVTL. PRAC. 346, 347–48 (2003), available at http://lucindalowswartz.com/images/NEPA_Age_Terrorism.pdf (noting that while EIS preparers should be sensitive to the fact that EISs should not be published with exacting detail about facilities and precise methods in which facilities could be destroyed, affected members of the public still have a right to know whether they can be affected and the extent of environmental impacts that may occur). Swartz also notes that "[t]he consequences of a potential event are important to understanding the extent of environmental impacts; the causes of such events are not." Id. at 348.

\(^{255}\) Id. at 1034–35 (quoting No Gwen Alliance v. Aldridge, 855 F.2d 1380, 1384 (9th Cir. 1988)); see also 40 C.F.R. § 1507.3(c) (2009) (stating that EISs can be safeguarded from public dissemination through the use of classified annexes, but that unclassified portions should still be made available to the public); Swartz, supra note 254, at 347 (noting that although there are NEPA provisions for reacting in an emergency and preparing classified annexes, there is no general national security exemption).

\(^{256}\) See Joseph Farris, Note, Mothers for Peace and the Need To Develop Classified NEPA Procedures, 34 ECOLOGY L.Q. 955, 965 (2007).

\(^{257}\) See id. at 969–73 (summarizing methods advocated by various scholars).

\(^{258}\) 561 F.3d 132 (3d Cir. 2009).

\(^{259}\) Id. at 135.
In the GEIS, the NRC noted that the risk of sabotage was small and no worse than the effects of severe accidents; thus, it did not address the risk of sabotage in detail and on a site-specific basis. The NRC's arguments for failing to discuss terrorism in detail in a site-specific EIS were similar to the reasoning employed in PFS and Mothers for Peace, but it also introduced some additional arguments. It concluded that there was no proximate-cause link between the relicensing action and third-party criminal activity; "[i]nstead, the level of risk depends upon political, social, and economic factors external to the NRC licensing process." It also noted that this proximate cause link was especially weak when the proposed action was the mere relicensing of an existing plant, rather than the addition of new storage space, as was the case in Mothers for Peace. Finally, it argued that the conclusion in the GEIS that the potential damage from terrorism would be no worse than that of a severe accident was sufficient for NEPA purposes.

The petitioners contended that the risk of a terrorist attack should have been addressed in detail in a site-specific EIS and that the risk required consideration distinct from consideration of severe accidents. The petitioners emphasized that the risk was foreseeable given the September 11 attacks and the plant's proximity to urban centers.

The petitioners argued that compliance with the AEA is distinct from compliance with NEPA, but that the NRC's focus on combating terrorism under the AEA did lend credence to the idea that the agency considers the risk foreseeable. They contended that compliance with NEPA was not "superfluous" after compliance with the AEA because NEPA addresses environmental impacts in a public setting, which the AEA does not. In addition, a generic review in a GEIS does not take into...
account the particular design of the plant and its location to nearby population centers; thus, they argued that a site-specific NEPA review would be more appropriate.273

The petitioners also rebutted the NRC’s proximate-cause argument by arguing that the NRC is charged with ensuring the environmental safety of its facilities,274 and thus its decision to relicense a plant or implement a given mitigation measure will affect the risk of terrorism and its attendant environmental impacts.275 Moreover, they argued that intentional acts of third parties do not break the causal chain if they are sufficiently foreseeable.276 They thus concluded that the risk of terrorism on a nuclear facility, especially given “the potentially devastating effects of an attack,”277 was sufficiently foreseeable to warrant discussion under NEPA.278 Finally, they noted that the purposes of NEPA could be served even when some of the EIS contains sensitive, nonpublic information.279

In its opinion, the court first favorably cited the court’s assertions in Metropolitan Edison that a “‘manageable line’”280 needs to be drawn to limit an agency’s responsibility under NEPA and that this line should correspond with the agency’s area of control.281 In Metropolitan Edison, the NRC could only control construction of the plant, not the public’s reaction; likewise, in this case, the NRC could not control the airspace above its facility or the intervening conduct of a terrorist.282 Therefore, the intervening events that would need to occur between relicensing and sabotage, including third-party criminal conduct and the failure of another agency to prevent an attack, lengthen the causal chain beyond a “‘reasonably close causal relationship.’”283

273. Id. at 47.
274. Id. at 33.
275. See id. at 42–43.
276. Id. at 34.
277. See Reply Brief on Behalf of Petitioner at 10, N.J. Dep’t of Envtl. Prot., 561 F.3d 132 (No. 07-2271).
278. See Brief and Appendix on Behalf of Petitioner, supra note 270, at 35.
279. Id. at 50.
281. N.J. Dep’t of Envtl. Prot., 561 F.3d at 139.
282. Id. at 139–40 (noting that the threat of an airborne terrorist attack is within the jurisdiction of the Federal Aviation Administration and that NEPA does not authorize one agency to usurp the nonenvironmental regulatory burdens of another agency). The court also cited Department of Transportation v. Public Citizen, 541 U.S. 752 (2004), which stands for the proposition that an agency need not discuss a particular environmental effect in an EIS when it does not have the administrative power to stop the precipitating cause of this effect. See N.J. Dep’t of Envtl. Prot., 561 F.3d at 138–39. But see N.Y. Brief, supra note 250, at 51 (noting that regardless of the NRC’s authority to prevent an attack, it certainly has authority to prevent or mitigate the effects of an attack); Doremus, supra note 80 (arguing that where the NRC “allows nuclear plants to operate, and under what conditions, can affect the extent to which terrorists target a particular location and the consequences should a terrorist strike succeed”).
283. N.J. Dep’t of Envtl. Prot., 561 F.3d at 140.
In supporting this conclusion, the court likened the "reasonably close causal relationship" test to the tort doctrine of proximate cause.\textsuperscript{284} According to the court, intervening criminal conduct is a superseding cause unless the original actor realized or should have realized the likelihood of both the opportunity for and occurrence of criminal conduct.\textsuperscript{285} The court stated that a terrorist attack "would certainly be 'extraordinary,' . . . any terrorist would be operating independently of the NRC, the intervening force would be due to a third-party terrorist, a terrorist attack is wrongful, and the degree of culpability of the terrorist would far exceed that of the NRC."\textsuperscript{286} Thus, the rare, extraordinarily wrongful criminal conduct of a terrorist attack would supersede any responsibility or liability on the part of the NRC.\textsuperscript{287}

The court also noted that agency time and resources could be wasted or spread too thin if it were required to consider security risks over which it had limited control.\textsuperscript{288} Instead, to ensure that "a fully informed and well considered decision is to be accomplished," the agency should focus its resources on matters closer to its area of expertise.\textsuperscript{289} Thus, many matters, such as security assessments, can be centralized within a GEIS for reasons of administrative efficiency rather than conducted on a site-specific basis under NEPA.\textsuperscript{289}

In a second section, the court held that even if NEPA required review of a terrorist risk, the GEIS sufficiently covered this risk by indicating that the risk was small but impossible to quantify, and the effects of sabotage would

\textsuperscript{284} Id. at 140–42.

\textsuperscript{285} Id. at 140. The court listed several factors that weigh in favor of intervening terrorist conduct superseding the original relicensing conduct, including when the intervening conduct is independent of the original actor's negligence, caused by a third person's act, of an extraordinary nature, and extremely wrongful or culpable. Id. at 140–41. However, the court admitted that one factor, "whether the third party causes harm 'different in kind from that which would otherwise have resulted from the actor's negligence,'" cuts against the NRC due to the conclusion that the effects of a terrorist attack would be similar to those of a severe accident. Id. at 140 (quoting Restatement (Second) of Torts § 442 (1965)).

\textsuperscript{286} Id. at 140–41.

\textsuperscript{287} Id. at 141. But see N.Y. Brief, supra note 250, at 50 (noting that the actions the NRC has taken to prevent and mitigate the effects of a terrorist attack make the possibility that an attack could occur reasonably foreseeable); Doremus, supra note 80 (arguing that the analogy to tort law is inapplicable because "[t]ort liability looks backward to ask who should have taken what actions to prevent a harm," while NEPA "looks forward to ask what the consequences might be for human and environmental health if a federal agency takes, authorizes, or funds an action").

\textsuperscript{288} N.J. Dep't of Envtl. Prot., 561 F.3d at 141.

\textsuperscript{289} Id. (quoting Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 774 n.7 (2004)). The court noted that the NRC has broad discretion over managing the safety and security of nuclear facilities, and it has used this discretion to implement substantial changes after the terrorist attacks of September 11; nonetheless, Metropolitan Edison indicated that NEPA obligations should be more limited and manageable. Id. at 142 n.9 (citing Metro. Edison Co. v. People Against Nuclear Energy, 460 U.S. 766, 776 (1983)).

\textsuperscript{290} Id. at 141–42.
be no worse than the effects of a severe accident. The court thus rejected petitioners' contention that there were specific risks at Oyster Creek that made the risk of an attack larger than the NRC indicated in its GEIS. The court noted that while the "mere assertion of unquantifiability" did not necessarily foreclose a NEPA analysis, the burden was on the petitioners to demonstrate specifically a more meaningful way to analyze and evaluate the risk of an attack.

While the Third Circuit did not explicitly address the issue of national security, some scholars have focused on the balance between "the public's right to know and the need to protect sensitive information," both in the context of terrorism and in general. Supporters of the NRC's position in PFS note that there is a very real risk that public disclosure of the safeguards and vulnerabilities of a nuclear power plant can provide terrorists with useful information on the best ways to attack a plant. One scholar notes that an agency's duty to comply with NEPA is inherently limited by the agency's own authorizing legislation under the language of NEPA itself. Thus, the AEA, which provides for protection of the "public health and safety" and promotion of the "common defense and security," could arguably limit the NRC's duties under NEPA insofar as the NEPA analysis conflicted with the NRC's duties under the AEA. Moreover, since public disclosure of NEPA documents are always subject to the provisions of the Freedom of Information Act (FOIA), which has a national security exemption, it follows that agencies can at least limit public

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291. Id. at 143. But see Doremus, supra note 80 ("[T]he NRC should not be allowed to say as a blanket matter that it need never consider the risks of terrorism in the environmental analysis of its licensing decisions.").

292. N.J. Dep't of Envtl. Prot., 561 F.3d at 143. But see SPENT FUEL STORAGE REPORT, supra note 176, at 8 ("The potential vulnerabilities of spent fuel pools to terrorist attacks are plant-design specific. Therefore, specific vulnerabilities can be understood only by examining the characteristics of . . . each plant.").

293. N.J. Dep't of Envtl. Prot., 561 F.3d at 144 (quoting Limerick Ecology Action, Inc. v. U.S. Nuclear Regulatory Comm'n, 869 F.2d 719, 744 n.31 (3d Cir. 1989)). But see Farber, supra note 54, at 14 (criticizing this approach as a "stubborn refusal to address the issue on the merits [that] will only serve to undermine [the NRC's] credibility as a guardian of public safety").


296. See id. at 659. Frye notes that the language of NEPA explicitly reads that it should be implemented using "'all practicable means, consistent with other essential considerations of national policy,'" and that the requirements are limited based on "'risk to health and safety, or other undesirable or unintended consequences.'" Id. (quoting 42 U.S.C. § 4331(b) (2000)).

297. See id. (citing 42 U.S.C. §§ 2133(b), (d), 2134(d), 2201(b), 2232(a), 2239(a)(1)(B)(ii)–(iii)).
disclosure of portions of EISs that include sensitive national security information. Some commentators conclude that any discussion of terrorism is subject to this FOIA national security exemption, and thus can be rightly withheld from a public EIS.

III. WHY THE RISK OF A TERRORIST ATTACK SHOULD BE CONSIDERED UNDER NEPA REVIEW

Part III synthesizes the concepts discussed in Parts I and II to resolve the conflict. Part III.A focuses on NEPA’s statutory and regulatory text, its implementation among courts, especially the foundational Metropolitan Edison case, and the policies underlying the statute. It argues that analysis of the risk of terrorism is consistent with NEPA both in how it was designed and how it has been interpreted. It also situates this argument within the context of the foundational Metropolitan Edison decision, which the Third Circuit used to rule that the risk of terrorism must be considered under NEPA.

Part III.B focuses on the risk assessment literature and makes a normative argument for considering the risk of terrorism under NEPA in light of this literature. Part III.B.1 first attempts to dissect the methodologies underlying the circuit courts’ decisions. It argues that the two courts, while they do not explicitly endorse a specific risk assessment methodology, nonetheless implicitly use principles gleaned from available methodologies to decide which environmental risks fall within the scope of NEPA. It also criticizes some of the methodological assumptions about risk inherent in these decisions. Part III.B.2 then attempts to resolve the methodological impasse by advocating a specific approach, the Catastrophic Harm Precautionary Principle, for analyzing uncertain risks of catastrophic harm under NEPA. It argues that this approach, in conjunction with the policies behind NEPA, provides a strong rationale for considering the risk of terrorism under NEPA.

A. The Legal Context: Why NEPA’s History and Implementation Is Consistent with Considering the Risk of a Terrorist Attack

Courts have generally abided by the “twin aims” of NEPA: (1) to ensure that an agency takes a “hard look” at significant environmental impacts in its decision-making process and (2) to inform the public that the agency has considered these impacts in its decision. Thus, as the NEPA regulations also make clear, the NEPA process should actually inform the agency’s decision-making process, not merely serve as an after-the-fact disclosure document. With that in mind, this Note posits that several of the

298. See, e.g., Babcock, supra note 294, at 115; Farris, supra note 257, at 959.
300. See supra notes 64–65 and accompanying text.
301. See supra note 52 and accompanying text.
arguments that the risk of a terrorist attack should not be considered under NEPA are flawed.

First, the NRC’s argument that it has taken the risk of terrorism into account outside of the NEPA context when improving the security and mitigation plans of nuclear plants\(^\text{302}\) is irrelevant for the purposes of NEPA itself. The point of an EIS is to assure the public, as well as other government actors, that the agency did indeed take significant environmental effects into account.\(^\text{303}\) If courts blindly accept at face value the NRC’s position that it has considered the risk of terrorism outside of NEPA yet concluded that it is not significant enough to warrant discussion under NEPA, then the aims of NEPA are undermined. NEPA requires agencies to take significant environmental impacts into account in the particular form of a public EIS. Thus, regardless of the NRC’s terrorism analyses outside of the NEPA context, its job is not finished until the public is assured through the public NEPA process that the agency has considered all significant environmental impacts.

Moreover, the NRC’s blanket statement that the effects of a terrorist attack are sufficiently similar to the effects of a severe accident\(^\text{304}\) is a gross simplification. As the NAS has stated, there are numerous potential modes of terrorist attacks.\(^\text{305}\) In addition, particular nuclear plants have their own specific vulnerabilities, and, more importantly, concerns about the environmental effects of a terrorist attack on the nearby population vary greatly from plant to plant. For instance, the effects of a terrorist attack on Indian Point Energy Center, which is located just twenty-four miles from New York City, would be much different than the effects on a more isolated plant.\(^\text{306}\)

Since the modes of attack, vulnerabilities of a given plant, and effects on the nearby population can vary greatly given the particulars of each plant, the NEPA process is the ideal place to undertake a detailed analysis of these possibilities. Since the NEPA process mandates a “detailed statement” with an analysis of alternatives at the “heart” of the decision-making process,\(^\text{307}\) it is a potentially fruitful forum to discuss, for each particular plant, potential modes of attack, alternative security measures to guard against the risk of an attack, and, most importantly, the range of environmental consequences that could result from an attack, including the effect on the nearby population.

However, critics will note that national security concerns should preclude significant discussion of the relative likelihood of success of different modes of attack, as well as the particular vulnerabilities of each plant.\(^\text{308}\)

\(^{302}\) See supra note 115 and accompanying text.
\(^{303}\) See supra notes 37–40 and accompanying text.
\(^{304}\) See supra note 83 and accompanying text.
\(^{305}\) See supra note 249.
\(^{306}\) See, e.g., supra notes 7, 12 and accompanying text.
\(^{307}\) See supra notes 41, 51 and accompanying text.
\(^{308}\) See, e.g., supra notes 114–19, 294–99 and accompanying text.
This is a valid concern, and it is supported by NEPA's language that its requirements should be consistent with other essential considerations of national policy. Preventing terrorists from accessing information about the vulnerabilities of a nuclear plant is a top consideration of national policy. However, Weinberger has made clear that sensitive national security matters can be separated into nonpublic portions of an EIS. Moreover, NEPA itself allows the addition of "classified annexes" for sensitive national security information. FOIA exemptions provide another mechanism by which portions of an EIS can be withheld from public view.

Importantly, though, there is no general national security exemption within NEPA that allows an agency to forego the NEPA process entirely. In the context of terrorism, while certain portions of an EIS might be withheld from public view, the issue of terrorism cannot be completely excluded from a public EIS. An analysis of the specific vulnerabilities of a given plant may arguably be too sensitive to release to the public, but the range of consequences and effects arising from terrorist attacks should not be excluded. The NRC's internal process is the best place to analyze vulnerabilities and implement security measures, but the NEPA process is the best place to detail the environmental effects of a variety of terrorist scenarios. Moreover, while the public may be shielded from certain portions of an EIS, the public nonetheless still has the opportunity to contribute to the EIS during a public comment period, which is a vital part of the NEPA process.

A qualitative analysis of the potential modes and consequences of an attack on a specific nuclear plant is thus desirable when quantification is highly uncertain or impossible. In addition, the NRC should not just be able to claim as a blanket matter that quantification is impossible without any proof that it has attempted to quantify the risk. The agency should also detail the data, methodologies, and models it has used to come to this conclusion. Taking these measures will ensure that the NRC complies with NEPA's mandates to consider significant environmental effects and inform the public that it has done so. As Professor Daniel Farber notes, "decision-makers, legislators, and members of the public are entitled to a

309. See supra note 296 and accompanying text.
310. See supra notes 66, 254 and accompanying text.
311. See supra note 256 and accompanying text.
312. See supra note 298 and accompanying text.
313. See supra notes 254–56 and accompanying text.
314. See supra notes 253–54 and accompanying text.
315. See supra note 255 and accompanying text. Although the issue is outside the scope of this inquiry, it is the view of the author that Congress should take action to establish a procedure whereby an independent governmental body reviews the classified portions of a NEPA document to ensure compliance with the statute.
316. See supra notes 173–75 and accompanying text.
317. See supra notes 41–45 and accompanying text.
candid discussion of the limits of the agency's ability to predict the future."

Of course, none of these arguments are significant unless NEPA requires an analysis of the environmental effects of a terrorist attack in the first place. This Note argues that it does. The NRC’s difficulty in quantifying the probability of a terrorist attack is irrelevant for NEPA purposes, for NEPA does not require quantification, nor does it require a particular model, methodology, or mode of decision making. NEPA is mostly concerned with qualitatively assessing environmental impacts, and while there should of course be a limit to the impacts an agency is required to consider under NEPA, the statute and regulations draw this boundary liberally. For instance, NEPA requires discussion of indirect effects, defined as those effects “caused by the action and . . . later in time or farther removed in distance, but . . . still reasonably foreseeable.”

In addition, the presence of uncertainty does not absolve the agency of its responsibility to discuss indirect impacts. Agencies should instead note the presence of uncertain information and state its relevance to reasonably foreseeable significant adverse impacts. Significantly, under NEPA the term “reasonably foreseeable” includes low-probability impacts that have catastrophic consequences, as long as the analysis of the impacts is “not based on pure conjecture, and . . . within the rule of reason.” This Note concludes that an analysis of the risk of a terrorist attack falls within this statutory and regulatory language. After the terrorist attacks of September 11 and given our knowledge that terrorist groups consider nuclear power plants possible targets, the threat of a terrorist attack, and the potential for devastating environmental consequences, can no longer be considered beyond NEPA’s scope. While it may be impossible to quantify the risk, the fact that the government and general public know that terrorist organizations—such as al-Qaeda, which has already successfully initiated a major attack on the United States—target nuclear plants is sufficient to place the risk within the rule of reason and outside the realm of “pure conjecture.” Thus, because building or relicensing a nuclear facility contributes to the possibility of a terrorist attack with catastrophic consequences through the facility’s mere existence, and since the possibility of an attack is outside the realm of “pure conjecture,” an analysis of the risk of a terrorist attack should be included in an EIS.

Although this conclusion seems to be at odds with the logic of Metropolitan Edison, the facts of Metropolitan Edison do not apply to the

318. Farber, supra note 54, at 32.
319. See supra note 248.
320. See supra notes 146, 170 and accompanying text.
321. See supra notes 53–56 and accompanying text.
322. 40 C.F.R. § 1508.8(b) (2009); see supra note 53.
323. 40 C.F.R. § 1502.22(b)(2); see supra note 55 and accompanying text.
324. 40 C.F.R. § 1502.22(b)(4); see supra note 56 and accompanying text.
325. See supra note 7 and accompanying text.
326. 40 C.F.R. § 1502.22(b)(4).
risk of terrorism, and its attendant environmental effects, in the twenty-first century. The Metropolitan Edison Court specifically addressed the nonenvironmental (psychological) impacts caused by the mere perception within the community of the risk of an accident.\footnote{327} This Note, however, addresses the possibility of a terrorist attack itself and its attendant environmental impacts. NEPA requires analysis of nonenvironmental impacts only insofar as they are related to environmental impacts.\footnote{328} In Metropolitan Edison, the nonenvironmental effects at issue were not related to any environmental changes; rather, they were related to the perception of the risk of an accident itself.\footnote{329} This Note only analyzes environmental impacts. A quote from Metropolitan Edison itself further clears up this distinction: “[W]e are considering effects caused by the risk of an accident. The situation where an agency is asked to consider effects that will occur if a risk is realized, for example, if an accident occurs . . . is an entirely different case.”\footnote{330}

Finally, the Third Circuit’s discussion in New Jersey Department of Environmental Protection of control and proximate cause\footnote{331} misses the point. The doctrine of proximate cause addresses ex post liability; NEPA addresses ex ante consideration of environmental effects.\footnote{332} NEPA does not contain any ex post provisions penalizing an agency if its predictions turn out to be incorrect.\footnote{333} Thus, this is an inapplicable analogy; the real question is whether the environmental effects of a terrorist attack are sufficiently foreseeable to warrant consideration under NEPA.\footnote{334} Moreover, the court’s discussion of the NRC’s limited control over terrorist attacks may be correct, but it lies outside the scope of NEPA. NEPA requires a discussion of the foreseeable environmental effects of an agency action for use in the agency’s decision-making process;\footnote{335} whether the agency has control over those environmental effects is irrelevant. If an effect is foreseeable and within the rule of reason, the agency must assess and evaluate it under NEPA.

\footnote{327}{See supra notes 70–77 and accompanying text.}
\footnote{328}{See supra notes 242–45 and accompanying text.}
\footnote{329}{See supra notes 76–77 and accompanying text.}
\footnote{330}{Metro. Edison Co. v. People Against Nuclear Energy, 460 U.S. 766, 775 n.9 (1983); see also supra note 245.}
\footnote{331}{See supra notes 281–87 and accompanying text.}
\footnote{332}{See supra note 287.}
\footnote{333}{See supra note 172 and accompanying text.}
\footnote{334}{See supra note 287.}
\footnote{335}{See supra note 52 and accompanying text.}

1. Analysis of the Methodologies Underlying the Circuit Split

Both circuit courts, while they cloak their opinions in jurisprudential terms of art such as "reasonably close causal relationship" and "remote and speculative" are really performing different types of risk assessment and risk management. The concept of agency deference might lead one to believe that courts are merely reviewing the risk analyses performed by the agencies. In reality, however, the courts are also both assessing and managing risk themselves by deciding whether the risk of a terrorist attack is sufficiently probable or consequential to warrant regulatory action (in this case, discussion and disclosure in an EIS). While the NAS insists that objective risk assessment and value-laden risk management ought to be separate processes, this Note argues that the choice of a particular risk assessment methodology is itself inherently value laden, since the choice of one analytical framework (such as one that is primarily designed to assess historical risks with a large sample size) necessarily precludes the choice of others. This Note also argues that each risk assessment methodology has built-in assumptions concerning what risks should be studied or taken more seriously. Thus, while the litigating parties and agencies provide many of the factual and scientific findings, courts both assess this data by favoring a particular methodology to understand the data and manage risk by ultimately deciding whether additional regulatory action is required or not.

The Third Circuit's approach to risk assessment/management under NEPA can be characterized in the following ways: (1) a preference for quantitative cost-benefit analysis and probabilistic risk assessment over qualitative discussion, (2) a belief in the primacy of probability over...
consequences, (3) an aversion to uncertainty, and (4) a belief in the agency’s ability to perform scientifically objective analyses. First, in its emphasis on maintaining a reasonably close causal relationship between the agency action and the environmental effects at issue, and its corresponding discussion of the intervening events that would need to occur before a successful terrorist attack on a plant, the court is foregrounding the issue of probability. The more steps in between the relicensing and an attack, the less probable an attack seems. Indeed, the logic of proximate cause is to absolve an original actor of responsibility when intervening conduct is sufficiently improbable.

Moreover, in its emphasis on the extraordinary nature of terrorist attacks, the court seems to infer that the lack of historical data on terrorist attacks at nuclear power plants in effect proves the low probability of the risk. This approach illustrates an aversion to uncertainty. However, simply because the probability of a risk cannot be estimated using historical data does not mean that the probability of the risk is low. Rather, the risk of a terrorist attack is a new risk, whereby the level of uncertainty is high and the ability to show the low probability or insignificance of the risk is limited.

The court also shows an aversion to discussing the potentially catastrophic consequences of a terrorist attack. As noted above, the discussion focuses mostly on probability, but risk is not just a matter of probability; it is a matter of the severity of the consequences of an event discounted by the probability. The court’s focus on the NRC’s level of control somewhat obscures the fact that it had just blindly accepted the agency’s conclusion that the risk of an attack is (1) low probability rather than uncertain and (2) sufficiently low probability that a discussion of the potentially catastrophic consequences is irrelevant. This is problematic for several reasons.

First, the public is extremely averse to risks with potentially catastrophic consequences. Catastrophic risks also tend to have huge ex ante and ex post secondary ripple effects. Moreover, terrorism is inherently uncertain, unexpected, dramatic, and clustered, which causes a great deal of

342. N.J. Dep’t of Envtl. Prot. v. U.S. Nuclear Regulatory Comm’n, 561 F.3d 132, 139–140 (3d Cir. 2009); see supra notes 281–83 and accompanying text.
343. See, e.g., supra note 285 and accompanying text.
344. N.J. Dep’t of Envtl. Prot., 561 F.3d at 140–41; see supra notes 285–87 and accompanying text.
345. See supra notes 133–37, 176–82 and accompanying text. The U.S. Court of Appeals for the Third Circuit’s approach also does not take into account the fact that the notion of what constitutes a plausible terrorist attack has changed drastically since the terrorist attacks of September 11. While this does not allow one to conclude definitively that the probability of a major terrorist attack is now higher than it once was (due to a sample size problem), it does foreground the notion that terrorist attacks can be unexpected, unforeseen, and severe, despite the prognostications of those who claim they are low-probability events.
346. See supra note 138 and accompanying text.
347. See supra notes 152, 182, 207 and accompanying text.
348. See supra notes 152, 180–81 and accompanying text.
Thus, the costs associated with catastrophic terrorist attacks are potentially enormous, and they should not be ignored simply because a definite probability cannot be assigned.

In addition, the NEPA regulations themselves require a discussion of reasonably foreseeable, low-probability impacts with catastrophic consequences, provided that analysis is not based on pure conjecture and is within the rule of reason. Events such as the terrorist attacks of September 11 and the knowledge that terrorists select nuclear plants as potential targets should not automatically lead one to believe that a terrorist attack on a nuclear plant is probable, but they do demonstrate the possibility of an attack and that it is at least outside the realm of pure conjecture.

The court’s deference to the NRC, as well as its discussion of the agency’s limited resources, shows a great deal of confidence in the agency’s internal risk assessment procedures and its conclusion that the risk of terrorism is too improbable to be included in a site-specific EIS. By simply accepting the agency’s conclusion that the hard-to-quantify nature of the risk forecloses a site-specific NEPA review, the court assumes that the agency experts have used objective and value-free data to come to its conclusion, despite the fact that the public is not privy to the agency’s reasoning. Instead, the public only gets the conclusion itself. Without the ability to analyze the reasoning behind this conclusion, it is especially hard to see why the NRC decided that its decision is “politically, economically, and ethically acceptable.” Moreover, the NRC is not the sole agency entrusted to implement NEPA; thus, courts should be more wary about deferring to the NRC’s interpretation of the statute. In addition, the court’s emphasis on the limited resources of the agency echoes some of the Precautionary Principle criticism, which holds that an emphasis on worst-case presumptions for uncertain harms can have the effect of reallocating agency resources from more obvious, known environmental risks to highly uncertain risks.

The Ninth Circuit takes a wholly different methodological approach to assessing the risk of terrorism. First, it distinguished Metropolitan Edison as a case dealing primarily with the connection between direct, nonenvironmental effects of a federal action (in that case the perception of a risk of an accident) and secondary, indirect effects (psychological health of the community). In contrast, the Ninth Circuit was assessing the

349. See supra notes 179–80 and accompanying text.
350. See supra notes 55–56 and accompanying text.
351. N.J. Dep’t of Envtl. Prot. v. U.S. Nuclear Regulatory Comm’n, 561 F.3d 132, 141–42 (3d Cir. 2009); see supra notes 288–90 and accompanying text.
352. See supra notes 261–62 and accompanying text.
353. SHRADER-FRECHETTE, supra note 130, at 7; see also supra note 160 and accompanying text.
354. See supra note 61 (explaining that Chevron deference does not apply to NEPA).
355. See supra notes 203–05 and accompanying text.
356. San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm’n, 449 F.3d 1016, 1029 (9th Cir. 2006); see supra notes 241–43 and accompanying text.
connection between the federal action itself (the addition of spent fuel storage space) and a direct effect (the environmental effects of the terrorist attack itself, discounted by the probability).

In doing this, the court essentially tightened the "causal chain" between the federal action and the effect to be discussed. While the Third Circuit emphasized the intervening steps between the action and the consequences, the Ninth Circuit disregarded some of these same steps. One can argue whether and to what extent the risk of a terrorist attack is a "direct" consequence of a major federal action, but the important point is that the Ninth Circuit questioned the NRC's conclusion that a terrorist attack is an attenuated, low-probability event.

By placing the burden on the NRC to show that the risk of an attack is remote and speculative as a matter of law, the court showed a healthy skepticism of the reasoning and value judgments behind the agency's risk assessment and management. Specifically, the terrorist attacks of September 11—and the fact that the NRC claims to have significantly increased its security since then—led the court to question whether an attack, with all its inherent uncertainties, can simply be categorized as low-probability as a matter of law.

The court also accepted the idea that uncertainty in quantification does not foreclose discussion under NEPA, especially when the potential consequences are catastrophic. A quantitative discussion, while potentially helpful if possible, is not necessary. The court thus understood, perhaps subconsciously, the distinction between the NAS form of risk assessment, which emphasizes testing of easier-to-measure historical risks, such as the level of carcinogens in the atmosphere, and the more qualitative discussion of new risks. New risks are particularly amenable to qualitative discussion because while the range of consequences, including a worst-case scenario, is often known, a probability distribution is inherently difficult, if not impossible, to formulate. Thus, under NEPA, where quantification is not required, a qualitative discussion of likely modes of attack and potential environmental consequences of an attack is warranted for new risks such as terrorism.

Both circuit courts to some degree accept the problem of quantifying the risk of terrorism. While the Third Circuit defers to the NRC's conclusion that the risk is low probability, the Ninth Circuit, understanding the problem of quantifying probabilities, shifts its focus to the consequences of

357. *Mothers for Peace*, 449 F.3d at 1030; see supra notes 244–45 and accompanying text.
358. See supra note 247 and accompanying text.
359. See supra notes 246–47 and accompanying text.
360. See supra notes 248–49, 252 and accompanying text.
361. *Mothers for Peace*, 449 F.3d at 1031; see supra notes 248–49 and accompanying text.
362. See supra notes 133–37 and accompanying text.
363. N.J. Dep't of Envtl. Prot. v. U.S. Nuclear Regulatory Comm'n, 561 F.3d 132, 143 (3d Cir. 2009); see supra note 291 and accompanying text.
terrorism. In its emphasis on the events of September 11, the NRC’s claim that it has greatly improved its security against terrorist threats, and the variety of methods by which terrorists could target a nuclear power plant, the Ninth Circuit in effect takes a precautionary approach to this particular risk. Consistent with NEPA, of course, the court does not use one of the stronger versions of the Precautionary Principle, for NEPA does not mandate certain results. It merely mandates that certain effects be considered in the decision-making process. Thus, the court clearly could not tell the agency not to build the power plant at all, nor could it mandate the use of “Best Available Technology.” On the other hand, the court does not merely use the “Non-Preclusion” version of the Principle, for this would just amount to the court permitting the NRC to take the risk of a terrorist attack into account, but not requiring it to do so.

The closest the court comes to a version of the Principle is the “Margin of Safety” version. In effect, the court, by ruling that the risk of a terrorist attack cannot be withheld from NEPA review as a matter of law, agrees with the NEPA framers that requiring a detailed statement that takes into account a range of environmental effects of a proposed action will encourage better decision making. Mandatory consideration of environmental impacts in an EIS could thus act as a margin of safety that ensures that agencies do not plan actions without an eye toward the environmental consequences of these actions.

In putting the burden of proof on the NRC to show that the risk of a terrorist attack is not remote and speculative, the court also agrees with critics of risk assessment that in areas of uncertainty, regulators should not just be able to disregard a risk. Rather, they should disclose their methodologies, models, and reasoning to the public, accounting for attendant uncertainty. This will at least reassure the public that the issue has been analyzed honestly and thoroughly, and if it has not, it can theoretically lead to democratic opposition to the agency’s treatment of the risk.

2. The Catastrophic Harm Precautionary Principle: A Call to Action

Addressing the risk of a terrorist attack in the NEPA context is an ideal place to implement the Catastrophic Harm Precautionary Principle. There are obvious problems in analyzing this type of risk under traditional methodologies. For example, the NAS methodology tends to favor

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364. Mothers for Peace, 449 F.3d at 1030–31; see supra notes 246–49 and accompanying text.

365. See supra notes 194–95 and accompanying text.

366. See supra note 194 and accompanying text.

367. See supra notes 190–92 and accompanying text.

368. See supra note 193 and accompanying text.

369. See supra notes 33–40 and accompanying text.

370. See supra notes 150–51 and accompanying text.

371. See supra notes 150, 173–74 and accompanying text.
historical risks that can be tested and measured, whereas the risk of a terrorist attack on a nuclear plant is a new risk that is not easily amenable to quantification. Moreover, if we conceive of risk as probability multiplied by consequences, risk assessors who favor a finding of a significant probability of harm before acting on the risk will tend to devalue the risk of terrorism. Despite the severity of its consequences, the uncertainty of terrorism may lead regulators to disregard the risk as one of low probability. Risk assessment in the federal government also often does not account for the public’s risk aversion to catastrophic harm, especially terrorism, due to its secondary costs.

There are also problems with applying traditional conceptions of the Precautionary Principle in the NEPA context. First, NEPA does not require particular substantive action. So, stronger versions of the Principle, which call for prohibition or “Best Available Technology” for activities posing an uncertain potential for great harm, will fall outside NEPA’s scope: a federal judge cannot require an agency to shut down a nuclear power plant or implement specific security measures just because there is the possibility of catastrophic harm. In addition, weaker versions of the Principle probably will not add anything to the NEPA process. If discussing particular environmental effects is optional rather than mandatory, as the weak version holds, nothing will have changed—the agency, in its discretion, can decide that the risk of terrorism is not significant enough to warrant NEPA review.

The Catastrophic Harm Precautionary Principle provides the most appealing methodological basis to support NEPA analysis of the risk of terrorist attacks on nuclear facilities. It is inappropriate to wait to regulate “new” catastrophic risks, such as the risk of terrorism, until we learn more about them or can quantify their probabilities, assuming there comes a time when they are quantifiable. The problem with catastrophic risks is that it is not desirable for society to reach a point where it could confidently assess the probabilities associated with catastrophic risk—for this would mean that a sufficiently large sample of catastrophes existed. The almost unthinkable societal costs of a successful terrorist attack on a nuclear facility, both direct and secondary, should be something to avoid at all costs. Thus, in the context of catastrophic harm, there should be a general preference for overregulating to ensure that the risks, with their enormous potential for societal damage, remain hypothetical.

This is where the Catastrophic Harm Precautionary Principle steps in. The risk of a terrorist attack on a nuclear facility is inherently uncertain.

372. See supra notes 131-37 and accompanying text.
373. See supra notes 209-10 and accompanying text.
374. See supra notes 152-55, 179-84 and accompanying text.
375. See supra notes 62, 67 and accompanying text.
376. See supra notes 194-95 and accompanying text.
377. See supra notes 190-93 and accompanying text.
378. See supra Part I.C.3.
The outcome of a successful attack has the potential to be catastrophic. The events of September 11 and the knowledge that terrorists consider nuclear plants desirable targets make the possibility of such an attack foreseeable or plausible, not mere conjecture. Thus, according to the Catastrophic Harm Precautionary Principle, under these circumstances, if the costs of regulating this catastrophic possibility are not prohibitive and do not substantially divert resources from extremely pressing problems, there should be a presumption in favor of regulation.379

This Note argues that costs of considering the risks of terrorism in detail in an EIS are not prohibitive and do not substantially divert resources from extremely pressing problems. The NRC is accustomed to a lengthy, detailed NEPA process. It already discusses numerous risks, including extremely dangerous risks. Asking the agency to consider another type of risk—one that is foreseeable and could potentially cause catastrophic harm—in this same process is appropriate. In addition, the costs of requiring the agency to detail and consider various terrorism scenarios in an EIS do not approach the costs of substantively mandating certain security measures or ordering that a plant be shut down.

Incurring the costs of requiring the NRC to consider terrorism under NEPA is a more sensible, prudent approach than ignoring the potentially devastating environmental and societal costs of a terrorist attack. The NRC’s position that it has considered the costs of a terrorist attack outside of the NEPA context is insufficient, for the framers of NEPA intended the statute to be a method by which the public is assured that the agency has substantially considered these costs in detail.380

In addition, judicial use of the Catastrophic Harm Precautionary Principle would be consistent with prevailing judicial interpretations of NEPA. Applying this Principle to NEPA would only mandate that an agency consider the environmental impacts related to terrorism in its decision-making process.381 If it turned out that a particular alternative to preventing terrorism at a nuclear plant was prohibitively expensive, such as the extreme example of shutting down a plant altogether, the NRC would not need to actually implement it, at least under NEPA. Thus, NEPA’s requirements would remain procedural.

In addition, applying the Catastrophic Harm Precautionary Principle under NEPA would assuage the fears of those who believe that this Principle would encourage overly costly regulatory measures. The only mandatory costs would be the costs of compiling various alternatives that could be used to address the risk and researching potential methods of

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379. See supra notes 214–15 and accompanying text. Interestingly, the NEPA regulations themselves contain language that mandates a similar approach. If “incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant,” then the agency should discuss the information in an EIS. 40 C.F.R. § 1502.22(a) (2009).

380. See supra notes 44–45 and accompanying text.

381. See supra notes 59–62, 67 and accompanying text.
attack and a range of environmental impacts for the specific plant. Incuring these costs would be consistent with NEPA’s requirement that agencies take a “hard look” at environmental impacts, as well as its mandate to consider reasonably foreseeable impacts with the potential for catastrophic harm. 382

Some might argue that merely detailing the risks of terrorism in an EIS will not truly reduce the risk of an attack, and thus the Catastrophic Harm Precautionary Principle, which advocates regulating a catastrophic risk only when the regulation will actually reduce the risk of the worst-case scenario, 383 is inapplicable. Proponents of this view might contend that the NRC’s internal security measures are the proper place to reduce the risk of terrorism. They might also contend that detailing the risk of terrorism in an EIS could potentially help terrorists by giving them access to the vulnerabilities of a specific plant.

The NRC’s internal security measures are of course invaluable in combating the risk of terrorism. 384 However, the NEPA process is invaluable as well. The framers of the statute, as well as the courts interpreting it, considered the NEPA process inherently beneficial in and of itself in reducing harmful environmental impacts. 385 An agency that complies with the letter of NEPA should be taking important environmental considerations into account during its decision-making process. 386 Thus, the idea is that an agency that is forced to publicly consider environmental risks will be forced to make better decisions regarding the environmental consequences of its actions. This is the thrust of NEPA.

If one considers the ideas behind the Catastrophic Harm Precautionary Principle in conjunction with the polices behind NEPA, completion of an EIS will lead to better, more transparent agency decision making and is thus a regulatory measure that could reduce the worst consequences of a successful terrorist attack. The NRC should thus consider the realistic possibility of catastrophic harm that could result from a terrorist attack on a nuclear plant.

CONCLUSION

The concern over global climate change, with its potential for extremely wide reaching catastrophic harm, is contributing to a level of support for nuclear power not seen in its history. 387 Undoubtedly, nuclear power can be an extremely important means of reducing our country’s dependence on

382. See supra notes 55–56, 59 and accompanying text.
383. See supra notes 218–19 and accompanying text.
384. In fact, an argument can be made that there should be a presumption toward overregulating the catastrophic risks of a terrorist attack outside the NEPA process as well, for instance by mandating “Best Available Technology” for a nuclear plant’s security apparatuses and mitigation plans. However, this argument is outside the scope of this Note.
386. See supra note 52 and accompanying text.
387. See supra notes 2–3 and accompanying text.
greenhouse gases, while still meeting our energy needs, especially as the technology for reliable renewable sources of energy is still highly uncertain. However, the optimism about the role of nuclear power in the climate change context should not blind us to the potential problems of nuclear power, especially in the age of terrorism. After the terrorist attacks of September 11, agencies and courts should no longer consider major terrorist acts causing large numbers of fatalities and massive societal disruption beyond the realm of possibility. In addition, the fact that extremely dangerous terrorist groups such as al-Qaeda considered attacking a nuclear plant should lead us to perform significant due diligence in considering terrorist attacks on nuclear facilities.

While this Note certainly acknowledges the NRC’s assertion that it has made numerous security improvements after the terrorist attacks of September 11, it argues that this assertion is not sufficient to comply with the letter of the law. NEPA was enacted to ensure the public that agencies take environmental impacts and general human welfare into account when making major decisions. Before NEPA, agencies could simply assert that they have considered environmental impacts, but there was no way for the public to confirm this. NEPA has provided this check. The catastrophic possibilities associated with a terrorist attack on a nuclear facility should not be taken lightly. It is not sufficient to simply disregard them as low probability. It only takes one successful attack on a nuclear facility to cause massive societal harm, and agencies should take every reasonable measure to ensure the public that they are substantively taking the risk of such an attack into account.

388. See supra notes 36–38 and accompanying text.