

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Stephen G. Burns, Chairman
Kristine L. Svinicki
William C. Ostendorff
Jeff Baran

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In the Matter of)	
ENTERGY NUCLEAR OPERATIONS, INC.)	Docket Nos. 50-247-LR
(Indian Point Nuclear Generating Units 2 and 3))	50-286-LR
_____)	

CLI-16-10

MEMORANDUM AND ORDER

This long-pending proceeding concerns the application of Entergy Nuclear Operations, Inc. to renew the operating licenses for Indian Point Nuclear Generating Units 2 and 3. Today we address appeals of Atomic Safety and Licensing Board decisions regarding contention NYS-35/36, which challenged the Indian Point severe accident mitigation alternatives (SAMA) analysis. In CLI-15-3, we granted Entergy's and the Staff's petitions for review of LBP-11-17, in which the Board found the Staff's SAMA analysis deficient as a matter of law and dismissed NYS-35/36 on summary disposition.¹ We address here the questions regarding LBP-11-17. As

¹ CLI-15-3, 81 NRC 217 (2015); LBP-11-17, 74 NRC 11 (2011); see also *Applicant's Petition for Review of Board Decisions Regarding Contentions NYS-8 (Electrical Transformers), CW-EC-3A (Environmental Justice), and NYS-35/36 (SAMA Cost Estimates)* (Feb. 14, 2014), at 43-60 (Entergy Petition); *NRC Staff's Petition for Commission Review of LBP-13-13 in Part (Contentions NYS-8 and CW-EC-3A), and LBP-11-17 (Contention NYS-35/36)* (Feb. 14, 2014), at 41-59 (Staff Petition). We also granted Entergy's petition for review of LBP-10-13, which admitted Contentions 35 and 36 for litigation; as discussed *infra*, we do not reach this appeal. LBP-10-13, 71 NRC 673 (2010).

discussed below, we reverse the Board's decision granting summary disposition of NYS-35/36 in favor of New York, find that summary disposition was appropriate in favor of the Staff and Entergy, and dismiss the contention. We additionally direct the Staff to refer the pending potentially cost-beneficial SAMAs to the Office of Nuclear Reactor Regulation for follow-up and disposition as appropriate.

I. BACKGROUND

A. License Renewal and the Severe Accident Mitigation Alternatives Analysis

We have described the nature of the SAMA analysis in several other decisions, including a separate decision we recently issued regarding Contention NYS-12C, another of New York's contentions that challenged the SAMA analysis.² Our decision here does not address the technical aspects of the SAMA analysis, but focuses on the legal and policy questions relevant to the appeals before us.

In brief, the SAMA analysis is an environmental mitigation analysis conducted pursuant to the National Environmental Policy Act (NEPA). Our NEPA regulations require a SAMA analysis for license renewal if one was not previously performed.³ As we often have stressed, however, the SAMA analysis is not an NRC safety review conducted under the Atomic Energy Act of 1954, as amended (AEA). The AEA requires the NRC to ensure the "adequate protection" of public health and safety.⁴ Safety measures to prevent and mitigate accidents are established, maintained, and continuously assessed through the agency's regulatory oversight of reactor operations, which includes plant inspections, enforcement actions, severe accident research, analyses of generic safety issues (common to all or a subset of plants), and other communications with licensees on emerging issues. An "evolving set of requirements and

² CLI-16-7, 83 NRC __ (May 4, 2016) (slip op.).

³ See 10 C.F.R. § 51.53(c)(3)(ii)(L).

⁴ 42 U.S.C. § 2232(a).

commitments for a specific plant” are “modified as necessary over the life of the plant to ensure continuation of an adequate level of safety.”⁵ For example, following the 2011 Fukushima accident in Japan, the NRC issued to power reactor licensees orders modifying licenses, and we continue to assess the lessons learned from the Fukushima accident to determine all appropriate regulatory action.⁶

The NRC safety review conducted for a license renewal application, therefore, is not intended to address ongoing plant safety concerns, but instead focuses on those matters that may not be sufficiently addressed through our reactor oversight activities. Specifically, the review examines whether licensees will have in place during the period of extended operation adequate programs to detect and manage the effects of aging on particular safety-related systems, structures, and components. Our regulations in 10 C.F.R. Part 54 set forth the requirements and limited scope of the license renewal safety review.⁷ By design, the Part 54 safety review does not require a severe accident mitigation analysis.

Separate from the Part 54 safety review, the NRC’s environmental review for license renewal encompasses the issue of potential severe reactor accidents. The NEPA look at beyond-design-basis reactor accidents consists of two separate analyses: (1) a generic severe accident impacts analysis; and (2) a site-specific severe accident mitigation analysis—the SAMA analysis. The NRC’s Generic Environmental Impact Statement (GEIS) for license

⁵ See Nuclear Power Plant License Renewal; Revisions, Final Rule, 60 Fed. Reg. 22,461, 22,473 (May 8, 1995) (Final License Renewal Rule, Safety).

⁶ See, e.g., “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” EA-12-049 (Mar. 12, 2012) (ML12056A045) (regarding capability to maintain or restore core cooling, containment, and spent fuel pool safety); “Order Modifying Licenses with Regard to Reliable Hardened Containment Vents,” EA-12-050 (Mar. 12, 2012) (ADAMS accession no. ML12054A696); see also Proposed Rule, Mitigation of Beyond-Design-Basis Events, 80 Fed. Reg. 70,610 (Nov. 13, 2015).

⁷ See, e.g., 10 C.F.R. §§ 54.4, 54.21; see also *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-14, 71 NRC 449, 453-56 (2010) (outlining scope of Part 54).

renewal contains an extensive analysis of the potential environmental impacts of severe accidents.⁸ This generic bounding analysis is applicable to all reactor sites. The Indian Point environmental impacts analysis references the severe accident impacts analysis contained in the GEIS.⁹

The SAMA analysis represents the NRC's site-specific severe accident mitigation analysis for the Indian Point license renewal application. It is performed solely pursuant to NEPA and the NRC's NEPA-related environmental regulations.¹⁰ The analysis identifies and evaluates mitigation measures—either new hardware or plant procedures, or both—that could be installed or implemented to further reduce severe accident risk beyond that necessary to provide adequate protection of public health and safety. SAMAs therefore “represent only a minor portion of the Commission's overall regulatory regime—separate and apart from its safety requirements.”¹¹

Pursuant to NRC-endorsed guidance, the SAMA analysis typically has been performed as a cost-benefit analysis. The analysis identifies the main contributors to plant risk and then identifies potential measures to reduce those risks. It goes on to evaluate the risk reduction

⁸ The entire GEIS is included in the record as Exs. NYS00131A-I, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437 (May 1996) (GEIS). The severe accident environmental impacts analysis appears at *id.*, vol. 1, Main Report, Final Report, at 5-12 to 5-116. In June 2013, the NRC issued a revised GEIS. See “Generic Environmental Impact Statement for License Renewal of Nuclear Plants” (Final Report), NUREG-1437, vols. 1-3, rev. 1 (June 2013) (ML13107A023 (package)).

⁹ See “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3” (Final Report), NUREG-1437, supp. 38, vol.1—Main Report (Dec. 2010), at 5-3 (ML102990043) (Final SEIS); see also 10 C.F.R. pt. 51, subpt. A, app. B, Table B-1, “Summary of Findings on NEPA Issues for License Renewal of Nuclear Plants” (codifying the GEIS conclusion that “the probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants”).

¹⁰ See 10 C.F.R. § 51.53(c)(3)(ii)(L).

¹¹ See *NRDC v. NRC*, No. 14-1225, slip op. at 16 (D.C. Cir. Apr. 26, 2016).

potential of specific mitigation measures—e.g., to what extent population dose risk or offsite economic cost risk might be reduced by implementation of the mitigation measure. Ultimately, a monetary value is calculated representing the estimated “benefit” associated with an evaluated mitigation measure. The estimated cost of implementing a mitigation measure is weighed against the estimated benefit associated with the measure. Any mitigation measures found potentially cost-beneficial to implement are identified.

B. Procedural History of Contention NYS-35/36

Entergy provided a SAMA analysis in its Environmental Report, in which it identified mitigation measures found potentially cost-beneficial to implement at Indian Point to further reduce severe accident risk.¹² The Staff conducted an independent review of Entergy’s analysis, which led to the identification of additional potentially cost-beneficial mitigation measures; in the Draft SEIS the Staff set forth its conclusions.¹³ The Staff concurred with Entergy’s “identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset” of the identified potentially cost-beneficial SAMAs.¹⁴ The Staff went on to state that because of the “potential for cost-beneficial risk reduction . . . further evaluation of these SAMAs by Entergy is warranted.”¹⁵ Because “none of the potentially cost-beneficial SAMAs relate to adequately managing the effects of aging during the period of extended operation,” the Staff concluded that none “need be implemented as part

¹² Indian Point Energy Center, License Renewal Application, app. E, Environmental Report, at 4-72 to 4-78.

¹³ See “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3” (Draft Report for Comment), NUREG-1437, supp. 38, vol. 2, app. G, at G-35 to G-36 (Dec. 2008) (ML083540594) (Draft SEIS).

¹⁴ *Id.*, Main Report, at 5-10.

¹⁵ *Id.* at 5-10; *see also id.*, app. G, at G-36.

of the license renewal pursuant to 10 CFR Part 54.”¹⁶ Nonetheless, the Staff noted Entergy’s intention to “consider further for implementation” the identified potentially cost-beneficial SAMAs.¹⁷

After issuance of the Draft Supplemental Environmental Impact Statement (SEIS), additional Staff inquiries led Entergy to submit a revised SAMA analysis to the NRC in December 2009.¹⁸ Entergy’s reanalysis contained corrected (and more conservative) meteorological input data.¹⁹ The Revised SAMA Analysis depicted larger estimated benefits for evaluated SAMAs and identified additional potentially cost-beneficial SAMAs.²⁰

As part of the reanalysis, Entergy also revised its estimate of the costs to implement certain SAMAs.²¹ Citing to NRC-endorsed guidance on conducting SAMA analyses, Entergy stated that it is often unnecessary to conduct a detailed implementation cost review to judge whether a particular SAMA is potentially cost-beneficial.²² Entergy stated that for its original SAMA analysis (in its Environmental Report) the implementation costs were only “conceptually estimated to the point where conclusions regarding the economic viability of the proposed modification could be adequately gauged.”²³ But later, for the Revised SAMA Analysis, those SAMAs that “appeared to be cost-beneficial” in light of the reanalysis’s new larger estimated

¹⁶ *Id.*, Main Report, at 5-10; *see also id.* at 5-5; app. G, at G-36.

¹⁷ *Id.*, app. G at G-35.

¹⁸ *See* Letter NL-09-165, from Fred Dacimo, Entergy, to NRC Document Control Desk (Dec. 11, 2009), attach. 1, License Renewal Application—SAMA Reanalysis Using Alternate Meteorological Tower Data (ML093580089) (Revised SAMA Analysis).

¹⁹ *See id.*, attach. 1, at 3.

²⁰ *See id.* at 31-32.

²¹ *See id.* at 7-8; 10-28.

²² *See id.* at 7-9.

²³ *See id.* at 7.

benefits were then “subjected to more comprehensive and precise cost estimating techniques to determine if they [were] indeed potentially cost-beneficial.”²⁴ Entergy explained that the “new, more comprehensive SAMA implementation cost estimates” captured more of the “anticipated expenses by identifying all parts of the organization that must support the proposed SAMA modification.”²⁵ In some cases, the revised implementation cost estimate rendered a SAMA no longer potentially cost-beneficial, and in other cases, even with the updated cost estimate, a SAMA remained potentially cost-beneficial.²⁶ Overall, Entergy’s Revised SAMA Analysis rendered an additional six SAMAs potentially cost-beneficial (three for Unit 2 and three for Unit 3), raising the total number of potentially cost-beneficial SAMAs to twenty-two.²⁷

Entergy stated that these newly identified potentially cost-beneficial measures as well as “those SAMAs identified previously as cost beneficial” had “been submitted for engineering project cost benefit analysis” to further evaluate their cost-effectiveness.²⁸ Entergy also reiterated that none of the potentially cost-beneficial SAMAs identified to date were necessary for “managing aging effects for components within the scope of license renewal” and therefore none of the potentially cost-beneficial SAMAs needed to be “implemented as part of license renewal pursuant to 10 CFR Part 54.”²⁹

In response to Entergy’s Revised SAMA Analysis, New York submitted new and amended contentions.³⁰ Relevant here are two of those contentions: NYS-35 and NYS-36. In

²⁴ *Id.* at 8.

²⁵ *Id.* at 9.

²⁶ *See id.* at 8-9, 10-28.

²⁷ *Id.* at 31-32.

²⁸ *See id.* at 32.

²⁹ *Id.*

³⁰ *State of New York’s New and Amended Contentions Concerning the December 2009 Severe Accident Mitigation Alternative Reanalysis* (Mar. 11, 2010) (Contention NYS-35/36).

NYS-35, New York claimed that the analysis was incomplete because Entergy planned to review further—by performing an “engineering project” cost analysis—the implementation costs of various SAMAs newly identified as potentially cost-beneficial.³¹ New York claimed that this additional implementation cost analysis “deprived the NRC and [the] Board of the ability to evaluate, and render a rational decision regarding which mitigation measures, if any, are sufficiently cost-effective,” such that “their inclusion as a condition for an extended operating license period and a new operating license is warranted.”³² NYS-35 focused on nine mitigation measures that “had not yet been finally determined to be cost-effective,” and which, New York claimed, if ultimately found “sufficiently cost effective, must be added as license conditions” prior to issuance of a renewed license.³³

A related contention, NYS-36, focused on a different set of nine SAMAs. New York claimed that the Revised SAMA Analysis had shown these measures, “for the first time, to have substantially greater benefits in excess of their costs.”³⁴ Entergy stated that for these nine SAMAs “the gap between the benefit and the cost is so great that it is extremely unlikely that further engineering cost work could tilt the balance” against cost-effectiveness.³⁵

New York went on to argue that Entergy in its reanalysis did not “justify” not committing to implement “clearly cost effective” SAMAs that New York claimed “would, if implemented, substantially increase human health and safety and environmental protection.”³⁶ Similarly, New York argued that the NRC in its Draft SEIS did not “justify its position that clearly cost effective

³¹ *Id.* at 15.

³² *Id.*

³³ *Id.* at 13.

³⁴ *Id.* at 36.

³⁵ *Id.* at 37.

³⁶ *Id.* at 40-41.

SAMAs need not be implemented as a condition of license renewal simply because they do not relate to aging management.”³⁷ In sum, New York argued that the Revised SAMA Analysis lacked a “rational basis” for not including a commitment to implement mitigation measures that were “clearly cost effective.”³⁸ New York claimed that implementation of the measures should be imposed as a license condition.³⁹ The Staff and Entergy opposed the admission of both contentions, claiming that they were untimely and failed to meet the NRC’s contention admissibility standards.⁴⁰

In LBP-10-13, the Board admitted both new contentions in part and consolidated them as NYS-35/36. The Board first found the contentions timely, stating that they were based on “new, materially different information,” given that both contentions pointed to new cost-benefit determinations and “different cost-benefit calculations than before,” due to Entergy’s use of different inputs in the reanalysis.⁴¹ The Board rejected the portions of the contentions that could be read to “demand implementation” of cost-beneficial SAMAs, reasoning that the Part 54 license renewal safety review did not “directly require[]” the “implementation of non-aging-related SAMAs.”⁴² But it went on to state that the Staff nonetheless had the authority to impose

³⁷ *Id.* at 41.

³⁸ *Id.*

³⁹ *Id.* at 42.

⁴⁰ See, e.g., *NRC Staff’s Answer to State of New York’s New and Amended Contentions Concerning the December 2009 Severe Accident Mitigation Alternative Reanalysis* (Apr. 5, 2010), at 13-35; *Applicant’s Answer to New York State’s New and Amended Contentions Concerning Entergy’s December 2009 Revised SAMA Analysis* (Apr. 5, 2010), at 21-31. The State of Connecticut, which is participating in this proceeding as an interested state under 10 C.F.R. § 2.315(c), supported admission of the contentions. See *Answer of the Attorney General of the State of Connecticut to State of New York’s Motion for Leave to File New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives* (Apr. 1, 2010).

⁴¹ LBP-10-13, 71 NRC at 696, 702.

⁴² See *id.* at 697.

such license “conditions that are necessary to protect the environment . . . under a Part 50 backfit procedure.”⁴³ The Board admitted the “portion of NYS-35 calling for completion of the cost-benefit analysis to determine which SAMAs are cost-beneficial to implement.”⁴⁴

Regarding NYS-36, the Board stated that the specific SAMAs referenced in the contention had become, following Entergy’s reanalysis, “dramatically more cost-beneficial in both the baseline and sensitivity analyses.”⁴⁵ As outlined by the Board, the admitted “triable issue of fact” was whether the Staff had explained in its record of decision “why it would allow the license to be renewed without requiring”—as a license condition—the implementation of “plainly cost-beneficial” SAMAs.⁴⁶ Addressing NYS-35/36, the Board summarized its reasoning as follows:

We hold that in order to meet its obligations under NEPA, once a SAMA has been identified as plainly cost-effective, the NRC Staff must either require implementation or, in the alternative, explain why it has decided not to require implementation prior to license renewal. Likewise, the applicant must supply information that is sufficiently complete for the Commission to be able to explain its decision.⁴⁷

Entergy and the Staff sought interlocutory review of LBP-10-13.⁴⁸ While we denied their petitions for not meeting the interlocutory review standards, we stated that the Board’s decision appeared “problematic” and could “warrant our review later in the proceeding.”⁴⁹

⁴³ *Id.*

⁴⁴ *Id.* at 698.

⁴⁵ *Id.* at 702.

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ See generally *Applicant’s Petition for Interlocutory Review of LBP-10-13* (July 15, 2010); *NRC Staff’s Petition for Interlocutory Review of the Atomic Safety and Licensing Board’s Decision Admitting New York State Contentions 35 and 36 on Severe Accident Mitigation Alternatives (LBP-10-13)* (July 15, 2010).

⁴⁹ See CLI-10-30, 72 NRC 564, 568 (2010).

C. Dismissal of NYS-35/36 on Summary Disposition

Subsequently, the Staff issued its Final Supplemental Environmental Impact Statement (Final SEIS) for the Indian Point license renewal application. In the Final SEIS, the Staff took into account Entergy's Revised SAMA Analysis and other information, concluded that the SAMA analysis was complete and otherwise acceptable, and identified the SAMAs found to be potentially cost-beneficial. Again, the Staff concurred with Entergy's "identification of areas in which risk can be further reduced in a cost-beneficial manner through the implementation of all or a subset of potentially cost-beneficial SAMAs."⁵⁰ Because of the "potential for cost-beneficial risk reduction," the Staff stated that "further evaluation of these SAMAs by Entergy is appropriate," and noted that Entergy would be considering "further for implementation" all of the potentially cost-beneficial SAMAs, whether identified in the baseline analysis or in the supplemental analyses (sensitivity studies or uncertainty analyses).⁵¹

The Staff re-emphasized, however, that none of the potentially cost-beneficial SAMAs related "to adequately managing the effects of aging during the period of extended operation," and that therefore none of the measures needed to be "implemented as part of [Indian Point's] license renewal" under Part 54.⁵² Addressing the Board's decision in LBP-10-13, the Staff again stated that regardless of whether any of the SAMAs ultimately were determined to be cost-beneficial, none needed to be imposed as a "condition for license renewal."⁵³

Following issuance of the Final SEIS, New York moved for summary disposition of NYS-35/36.⁵⁴ Entergy and the Staff each filed a cross-motion for summary disposition. Both

⁵⁰ Final SEIS, at 5-11.

⁵¹ See *id.*; see also *id.*, app. G, at G-48.

⁵² *Id.*, Main Report at 5-11.

⁵³ *Id.* at 5-12.

⁵⁴ *State of New York's Motion for Summary Disposition of Consolidated Contention NYS-35/36* (Jan. 14, 2011). Connecticut supported the motion. *Response of Attorney General of*

claimed that the SAMA analysis was complete as a matter of law and that no legal basis existed for ordering the implementation of SAMAs as part of the license renewal process.⁵⁵ In LBP-11-17, the Board granted New York's motion, concluding that no material factual dispute remained and that New York was entitled to judgment as a matter of law.⁵⁶ Because Entergy intended to consider further whether to implement the potentially cost-beneficial SAMAs (and also would further consider the SAMAs' implementation costs), the Board concluded that the Staff had inappropriately permitted "Entergy to complete its SAMA review outside of the license renewal process."⁵⁷ Finding the analysis incomplete, the Board then stated that the NRC lacked "an adequate record" on which to "make its decision on the impacts of relicensing" the Indian Point units.⁵⁸ The Board held that the Final SEIS failed to provide a "rational basis" both "for not requiring Entergy to complete its SAMA review" and "for not requiring the implementation of cost-beneficial SAMAs prior to the relicensing of Indian Point."⁵⁹ The Board found the Final SEIS deficient "under NRC regulations, the [Administrative Procedure Act], and NEPA."⁶⁰

In granting New York's motion, the Board stressed that it was not "directing the implementation of any SAMA."⁶¹ But it ruled that the Indian Point licenses could not be renewed

Connecticut in Support of New York's Motion for Summary Disposition of Consolidated Contention NYS-35/36 (Feb. 3, 2011).

⁵⁵ *Applicant's Consolidated Memorandum in Opposition to New York State's Motion for Summary Disposition of Contention NYS-35/36 and in Support of Its Cross-Motion for Summary Disposition* (Feb. 3, 2011); *NRC Staff's (1) Cross-Motion for Summary Disposition, and (2) Response to New York State's Motion for Summary Disposition, of Contention NYS-35/36* (Feb. 7, 2011).

⁵⁶ See LBP-11-17, 74 NRC at 25-27.

⁵⁷ *Id.* at 25.

⁵⁸ *Id.*

⁵⁹ *Id.* at 27.

⁶⁰ See *id.*

⁶¹ *Id.*

unless and until the Staff “reviews Entergy’s completed SAMA analyses”—that is, a SAMA analysis containing Entergy’s intended additional “engineering project” cost analyses—and the Staff either “incorporates the result of these reviews into the [Final SEIS],” or, alternatively “modifies its [Final SEIS] to provide a valid reason for recommending” license renewal before “the analysis of potentially cost-effective SAMAs is complete.”⁶² The Board further stated that the licenses could not be renewed without the Staff either modifying the Final SEIS to provide a “valid reason . . . for not requiring the implementation of cost-beneficial SAMAs,” or alternatively, modifying the Final SEIS to show that the Staff would, after all, require “the implementation of cost-effective SAMAs.”⁶³

Entergy sought interlocutory review of LBP-11-17.⁶⁴ In CLI-11-14, we denied Entergy’s petition for review for failure to meet the interlocutory review standards, additionally noting the large number of contentions still pending before the Board (including at that time other SAMA contentions) and our interest in avoiding piecemeal appeals.⁶⁵

D. Entergy’s Revised Implementation Cost Estimates

In view of the Board’s decision, and pursuant to internal processes for evaluating potential plant modifications, Entergy chose to prepare and submit to the NRC refined implementation cost estimates for all of the SAMAs that had been identified in its 2009 Revised SAMA Analysis (and similarly the subsequently-issued Final SEIS) as potentially cost-

⁶² *Id.*

⁶³ *Id.*

⁶⁴ See *Applicant’s Petition for Review of LBP-11-17 Granting Summary Disposition of Consolidated Contention NYS-35/36* (July 29, 2011). The Staff supported Entergy’s request; New York and Connecticut opposed review. *NRC Staff’s Answer to Applicant’s Petition for Review of LBP-11-17 Granting Summary Disposition of Consolidated Contention NYS-35/36* (Aug. 11, 2011); *The State of New York and the State of Connecticut’s Combined Motion for Leave to File a Brief Reply to NRC Staff’s Answer to Applicant’s Petition for Interlocutory Review of LBP-11-17* (Aug. 16, 2011).

⁶⁵ CLI-11-14, 74 NRC 801, 811 (2014).

beneficial.⁶⁶ Entergy on its own initiative, therefore, provided the “refined engineering project cost estimates” that the Board had determined in LBP-11-17 to be a necessary component for a complete SAMA analysis.⁶⁷ Based on these refined and more comprehensive implementation cost estimates, Entergy stated that six out of the twenty-two SAMAs that had been previously identified as potentially cost-beneficial “no longer” were considered cost-beneficial, while sixteen continued to be cost-beneficial.⁶⁸

Having completed its detailed look at SAMA implementation costs, Entergy stated that “to *further reduce* the already very small severe accident risk” it planned to implement four of the SAMAs found to be cost-beneficial, “though it is not required to do so as part of license renewal.”⁶⁹ Entergy went on to state that it would defer reaching a decision on whether to implement any of the other cost-beneficial SAMAs “until after implementation of the Commission’s numerous, ongoing Fukushima action items which, by themselves, are intended and expected to substantially mitigate the risks of certain beyond-design-basis accidents.”⁷⁰ Entergy stated that after implementing the four SAMAs as well as mitigation measures and other actions relating to Fukushima, the severe accident risk at Indian Point may be so reduced that “many, if not all, of the remaining SAMAs will no longer be cost-beneficial.”⁷¹ Entergy therefore stated that it would defer any final decisions on whether to implement additional SAMAs, and later consider, on a case-by-case basis, the “potential costs and *remaining risk*

⁶⁶ See Letter NL-13-075 from Fred Dacimo, Entergy, to NRC Document Control Desk (May 6, 2013), “License Renewal Application—Completed Engineering Project Cost Estimates for SAMAs Previously Identified as Potentially Cost Beneficial,” & attach. 1 (Refined Cost Estimates).

⁶⁷ Refined Cost Estimates at 2.

⁶⁸ See *id.*; see also attach. 1, at 4-5.

⁶⁹ Refined Cost Estimates at 2, attach. 1, at 9.

⁷⁰ *Id.*, attach. 1, at 10.

⁷¹ *Id.*

benefits” of the SAMAs, as well as “other regulatory obligations, and available company resources.”⁷²

In addressing Entergy’s refined implementation cost analysis, the Board clarified that the NEPA issues involving NYS-35/36 could not “be resolved” until the Staff either (1) issued a documented review of “Entergy’s completed SAMA analysis” or (2) notified the parties that it would not issue an evaluation of Entergy’s revised cost estimates.⁷³

After the Board, following a merits hearing, resolved all other pending SAMA contentions in LBP-13-13, the Staff and Entergy again sought review of the Board’s ruling on NYS-35/36.⁷⁴ The State of New York supports the two Board decisions.⁷⁵ We granted review in CLI-15-3, and additionally posed several questions to the Staff.⁷⁶ The Board’s decision in LBP-11-17 raises substantial and important questions of law and policy warranting our review, and we consider the issues sufficiently ripe to address them at this time.⁷⁷ Further, as we note below, New York has filed a new contention before the Board involving similar arguments as those raised in NYS-35/36. Our decision today therefore aids in clarifying a significant legal and policy issue regarding the license renewal SAMA analysis.

⁷² *Id.*, attach. 1, at 12 (emphasis added).

⁷³ See Licensing Board Order (Granting Entergy’s Motion for Clarification) (July 9, 2013) (unpublished) (ML13190A068). The Board also provided that adjudicatory submissions addressing Entergy’s refined cost analysis would be due within sixty days of the Staff either issuing a draft SEIS (or an equivalent document discussing the refined cost estimates) or its notification that it would not issue any further review of Entergy’s analysis. *Id.* at 3.

⁷⁴ LBP-13-13, 78 NRC 246 (2013).

⁷⁵ *State of New York’s Answer to Entergy and Staff Petitions for Review of Atomic Safety and Licensing Board Decisions LBP-08-13 and LBP-13-13 with Respect to Contention NYS-8 and for Interlocutory Review of LBP-10-13 and LBP-11-17 with Respect to Contention NYS-35/36* (Mar. 25, 2014), at 37-64 (New York Answer).

⁷⁶ See CLI-15-3, 81 NRC 217.

⁷⁷ The legal and policy matters associated with the Final SEIS and at issue here are laid out in LBP-11-17.

E. NRC Staff's Draft FSEIS Supplement 2

In December 2015, the Staff completed a review of Entergy's refined implementation cost estimates, outlining its conclusions in a draft second supplement to the Final SEIS.⁷⁸ In Draft FSEIS Supplement 2, the Staff found the revised cost estimates and related conclusions on the SAMAs to be reasonable.⁷⁹ The Staff noted that Entergy has now implemented the following four SAMAs: IP3-052: to open the city water supply valve for alternative auxiliary feedwater pump suction; IP3-053: to install an excess flow valve to reduce the risk associated with hydrogen explosions; and IP2-GAG and IP3-GAG: to install steam generator safety valve gagging devices.⁸⁰ The Staff also concurred with Entergy's decision to defer resolving whether to implement the other potentially cost-beneficial SAMAs.

The Staff explained that such implementation decisions "should be viewed as a dynamic process" because when a SAMA "previously determined to be potentially cost-beneficial is implemented, the risk profile from which the SAMA analysis is derived will necessarily change."⁸¹ As the Staff outlined, the implementation of the four SAMAs, and Entergy's implementation (either voluntary or per NRC requirement) of "plant improvements" associated with post-Fukushima orders and actions "will lower the plant's risk profile and, therefore, will tend to lower the benefits" associated with the remaining potentially cost-beneficial SAMAs.⁸²

⁷⁸ "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3" (Draft Report for Comment), NUREG-1437, supp. 38, vol. 5 (Dec. 2015) (Draft FSEIS Supplement 2).

⁷⁹ *Id.* at 19. The Staff did determine, however, that two of the SAMAs that Entergy had found to be no longer cost-beneficial ought to be retained for further consideration by Entergy because "the incremental difference by which the SAMAs are not cost beneficial, when viewed in the context of uncertainties in the cost estimates, is too small to exclude them from further consideration." *Id.*

⁸⁰ *Id.* at 20.

⁸¹ *Id.*

⁸² *Id.* at 20-21.

The Staff noted, for example, that in response to the Fukushima accident, the NRC issued to power reactor licensees Order EA-12-049, “Order to Modify Licenses with Regard to Mitigation Strategies for Beyond-Design Basis External Events,” which relates to improving the ability to maintain or restore core cooling and containment (as well as spent fuel pool cooling). The Staff went on to specify the potentially cost-beneficial SAMAs that involve actions to maintain reactor core cooling, and whose “potential accident mitigation improvement . . . may be addressed, at least in part” by mitigation measures currently being considered as part of the NRC’s review of “all plants’ current licensing bases.”⁸³ The Staff agreed that the “risk reduction achieved” by the four already-implemented SAMAs, along with further measures that Entergy will take to respond to Order EA-12-049, likely will “substantially” reduce the benefits of pending potentially cost-beneficial SAMAs.⁸⁴

The Staff therefore found it reasonable for Entergy to defer any action on pending cost-beneficial SAMAs until the “risk profile for each plant” at Indian Point “is reevaluated following the completion of both voluntary and required plant improvements.”⁸⁵ And the Staff again stressed that none of the SAMA measures pending for possible later implementation involved adequately managing the effects of aging under Part 54 and that therefore none needed to be implemented as part of the license renewal proceeding.

New York has challenged the Staff’s SAMA analysis conclusions in Draft FSEIS Supplement 2 in a newly filed contention currently before the Board.⁸⁶

⁸³ *Id.* at 20.

⁸⁴ *Id.*

⁸⁵ *Id.* at 22.

⁸⁶ *State of New York Contention NYS-40* (Feb. 22, 2016) (Contention NYS-40); *State of New York Motion for Leave Contention NYS-40* (Feb. 22, 2016) (New York Motion for Leave); see *NRC Staff’s Answer to State of New York’s Motion for Leave to File Contention NYS-40* (Mar. 18, 2016); *Entergy’s Opposition to Proposed New York State Contention NYS-40 Regarding Severe Accident Mitigation Alternatives* (Mar. 18, 2016).

II. ANALYSIS

We review legal issues de novo. Following a careful review of the parties' briefs, the challenged Board decisions, and the Staff's Final SEIS, we conclude that the Board erred in finding the Indian Point SAMA analysis deficient as a matter of law and dismissing NYS-35/36 on summary disposition in favor of New York.⁸⁷ While we share the Board's dissatisfaction with aspects of the Staff's responses (a matter we address below), the Staff has adequately—albeit minimally—explained why it chose not to pursue SAMA implementation in this license renewal proceeding. At bottom, the Board demands resolution of SAMA implementation questions now, as part of this license renewal proceeding. For the reasons we explain in greater detail below, we agree with the Staff that it need not mandate SAMA implementation nor resolve SAMA implementation issues in this proceeding.

Admittedly, standard cursory references by the Staff to identified SAMAs not “relating to managing the effects of aging” can be confusing or unsatisfying if considered in isolation, and ideally more explanation would have been provided. Yet, when set in the context of a reactor license renewal proceeding, the statement should be understood as a shorthand reference to the basic, longstanding parameters of the NRC's license renewal process that have been reflected in our regulations for decades. Further, the Staff ultimately went beyond its initial cursory explanation, providing an expanded discussion of the topic in the Final SEIS. Here, we provide additional background and observations regarding the SAMA analysis and NRC regulations to help clarify the role of the SAMA analysis in the license renewal proceeding. Our decision today also refers the Indian Point potentially cost-beneficial SAMAs to the Office of Nuclear Reactor Regulation (NRR) for follow-up and appropriate action, separate from this proceeding.

⁸⁷ As discussed *infra*, we need not reach the issue of the need for refined implementation costs, as we find that the issue is moot.

A. Potential Effects of SAMA Implementation on Plant Risk Profile

We begin with a few overarching observations about SAMAs. The SAMA analysis evaluates each mitigation measure *independently* of the others, as if each were the only measure contemplated. But if—and as—one or more measures ultimately are implemented, the plant's configuration changes, affecting its baseline risk profile (e.g., core damage frequency), in turn potentially rendering other mitigation measures less cost-beneficial or even no longer cost-beneficial. Similarly, two or more potentially cost-beneficial SAMAs may act on the same risk contributor (e.g., internal flooding, station blackout, or loss of offsite power); in such cases, the implementation of one measure could reduce residual risk to a point that renders another measure less marginally beneficial in preventing or mitigating the specific accident concern. Depending on the kinds of SAMAs identified and their inter-relationship, therefore, the implementation of a subset of SAMAs may achieve much of the potential risk reduction and might do so in an overall more cost-effective way than implementing all identified SAMAs.

In short, when a SAMA analysis identifies numerous cost-beneficial measures, it should not be assumed that all measures would continue to afford the same level of risk reduction, and would remain cost-beneficial (or cost-beneficial to the same degree) regardless of the risk reduction achievable by implementing some of the SAMAs. As SAMAs are implemented, the “relative benefits of adopting additional mitigation alternatives diminish.”⁸⁸ In principle, therefore, once specific SAMAs have been implemented, implementation decisions regarding other potentially cost-beneficial SAMAs would justifiably take into account the plant's new configuration and risk profile.

B. The License Renewal NEPA Analysis

As a NEPA mitigation analysis, the SAMA analysis need not conclusively resolve exactly which mitigation measures (if any) will be implemented. The NRC has previously stated that the

⁸⁸ See *NRDC*, slip op. at 17.

SAMA rule is intended to satisfy NEPA-related responsibilities and purposes—to identify, consider, and disclose mitigation measures that may be cost-beneficial to further reduce plant risk, “whether or not mitigation ultimately will be implemented by the licensee.”⁸⁹ That does not mean that the analysis results are not considered or have no practical import. On the contrary, over the past decades license renewal applicants have voluntarily implemented one or more of the SAMAs identified as potentially cost-beneficial (here, Entergy already has implemented four).⁹⁰

But no statute or regulation requires the NRC to impose the implementation of a specific SAMA *in this license renewal proceeding*. Nor must the Staff in its NEPA review reach a final determination regarding SAMA implementation.

NEPA “seeks to guarantee process, not specific outcomes.”⁹¹ The NRC need not “require certain mitigation measures under NEPA” because “NEPA is not outcome-driven.”⁹²

⁸⁹ See Nuclear Energy Institute; Denial of Petition for Rulemaking, 66 Fed. Reg. 10,834, 10,836 (Feb. 20, 2001). In denying a petition for rulemaking seeking to delete the SAMA analysis requirement, the NRC reiterated that “[t]here is no requirement in 10 CFR part 54 for analysis of SAMAs,” but declined to delete the rule because (1) the risks of severe accidents are not so remote “as to warrant their elimination [altogether from] our NEPA reviews,” and (2) the NRC lacked a generic severe accident NEPA mitigation analysis. See *id.* at 10,834, 10,838-39.

⁹⁰ See, e.g., “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Monticello Nuclear Generation Plant” (Final Report), NUREG-1437, supp. 26 (Aug. 2006), at 5-5 (ML062490078) (six SAMAs implemented); “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Fort Calhoun Station, Unit 1” (Final Report), NUREG-1437, supp. 12 (Aug. 2003), at 5-5, 5-26 (ML032110214) (seven SAMAs planned for implementation).

⁹¹ *Massachusetts v. NRC*, 708 F.3d 63, 67 (1st Cir. 2013); see also *id.* at 78 (rejecting argument mandating implementation of SAMA as outside of scope of renewal proceeding because NEPA “does not mandate particular results”) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989)). In *Methow Valley*, the Supreme Court drew a “fundamental distinction between a requirement that mitigation be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated,” and “a substantive requirement that a complete mitigation plan be actually formulated and adopted.” *Methow Valley*, 490 U.S. at 352.

⁹² *Massachusetts*, 708 F.3d at 81 n.27.

Nor must the agency have a mitigation “plan” before it can issue a license.⁹³ NEPA’s purpose is to help assure that the agency and the public will have relevant information on the potential impacts of a proposed action. As such, NEPA calls for the disclosure of potential adverse effects and a discussion of potential mitigation measures. But NEPA does not require the elimination of all potential impacts and risks. It “does not require agencies to discuss any particular mitigation plans that they might put in place, nor does it require agencies—or third parties—to effect any.”⁹⁴ “Substantive issues like . . . what mitigation conditions to adopt are irrelevant to NEPA compliance.”⁹⁵ To satisfy NEPA, therefore, the NRC need not “obtain an assurance that third parties will implement particular measures.”⁹⁶ The Staff had no obligation to impose, in this license renewal proceeding, license conditions requiring the implementation of mitigation measures examined in the NEPA analysis.

Notably, there is no claim here that any of the measures at issue are necessary for the adequate protection of public health and safety.⁹⁷ A measure that is necessary for adequate protection of public health and safety is a matter for immediate action as a current operating issue.⁹⁸ We are addressing, then, whether the potential implementation of mitigation measures that may be or are cost-justifiable to reduce plant risk to levels lower than what the NRC considers adequate must be resolved in this proceeding and tied to issuance of the renewed licenses. We agree with the Staff that it need not.

⁹³ *Id.*

⁹⁴ See *Theodore Roosevelt Conservation P’ship v. Salazar*, 616 F.3d 497, 503 (D.C. Cir. 2010) (internal quotation omitted).

⁹⁵ *Sierra Club v. Van Antwerp*, 526 F.3d 1353, 1362 (11th Cir. 2008).

⁹⁶ *Methow Valley*, 490 U.S. at 353 n.16.

⁹⁷ If New York believes that any are, it may seek enforcement action under 10 C.F.R. § 2.206.

⁹⁸ See 10 C.F.R. § 50.109(a)(5).

In its Final SEIS, the Staff explained why it does not view SAMA implementation as a matter that must be resolved in this license renewal proceeding and made a condition of license renewal. First, in regard to the scope of the safety review, the Staff discerned no need to impose SAMAs as license conditions because the examined mitigation measures are neither necessary for adequate protection of public health and safety nor among the aging management-related safety issues that must be resolved in the license renewal safety review.

Second, in regard to the environmental review and the GEIS impacts analysis findings, the Staff stated that the SAMA analysis results do not call into question the GEIS's overall conclusions regarding the probability-weighted consequences of potential severe accidents.⁹⁹ In other words, the Staff concluded that existing plant risk levels do not pose an unacceptable or undue risk to the environment, so as to warrant denial of the license. The Staff stated, for example, that "the [core damage frequencies] for [Indian Point, Units 2 and 3]" are "quite low."¹⁰⁰ The Staff also re-emphasized in the Final SEIS that NEPA itself does not require the Staff to

⁹⁹ Final SEIS, Main Report, at 5-11 to 5-12 (citing *id.* § 5.2.2, at 5-5 to 5-6) (specifying the core damage frequency per year for each of the Indian Point plants, for the various evaluated accident initiating events); see Staff Petition at 51 n.187 ("regardless of the question of the agency's authority to impose SAMAs as a condition for license renewal, the [Final SEIS] concluded there is no reason to require such SAMAs for environmental protection purposes"). Pursuant to the SAMA rule, the Staff evaluated the major severe accident risk contributors at Indian Point and identified measures that can be taken to further reduce risk; the separate issue of whether and which SAMAs ultimately will be implemented was not necessary to the Staff's current NEPA conclusion in the Final SEIS that "the adverse environmental impacts of license renewal for [Units 2 and 3] are not so great that preserving the option of license renewal for energy planning decision makers would be unreasonable." See Final SEIS, Main Report, at 9-8.

¹⁰⁰ See Staff Petition at 55-56 & n.198. As New York notes, "despite the low probability" of the accidents evaluated in the SAMA analysis, the NRC still has a NEPA obligation to "evaluate mitigation measures." See *State of New York Reply to NRC Staff's Response to Commission Order CLI-15-3 Requesting Further Briefing on Contention NYS-35/36* (May 11, 2015), at 16 (New York Reply Before Commission). The SAMA analysis is that mitigation evaluation. That the analysis searches for and may identify cost-justifiable ways to further reduce risk does not suggest that current plant risk levels provide inadequate protection to public safety or to the environment or are unacceptably high; by the same token, that cost-beneficial SAMAs may be identified to improve the plants' safety profile does not mean that implementation decisions must be resolved prior to license renewal.

impose mitigation measures. The Staff, therefore, discerned no necessity (and no clear regulatory basis, given the deliberately narrow scope of the renewal safety review, the SAMA analysis results, and NEPA's focus on procedures) to withhold issuance of the license based solely on the ground that potentially cost-beneficial SAMAs were not implemented.

The Staff nonetheless acknowledged in the Final SEIS that the analysis identified various ways "in which risk can be further reduced" in a potentially justifiable or cost-beneficial manner through the implementation of "all or a subset" of potentially cost-beneficial SAMAs.¹⁰¹ And the Final SEIS indicated that Entergy would "consider further for implementation" the identified potentially cost-beneficial SAMAs.¹⁰²

The Staff went on to state that although no SAMAs would be imposed as conditions in this proceeding, they would nonetheless be considered "to the extent necessary or appropriate, under the agency's oversight of a facility's current operating license" under 10 C.F.R. Part 50 requirements.¹⁰³ As such, the Staff has maintained throughout this proceeding that it may, under the authority of the Atomic Energy Act, impose a backfit modifying the Indian Point's current licensing basis if, following appropriate analysis pursuant to section 50.109, a determination is made that a backfit should be mandated. Although the SAMA analysis conclusions in the Final SEIS are not extensive, we do not find them insufficient as a matter of law.

C. Potential Cost-Beneficial Enhancements and the Backfit Rule

Because both the Staff and the Board refer to Part 50 backfits, a few points about backfits should be made clear. The NRC's backfit rule outlines the circumstances under which

¹⁰¹ Final SEIS, Main Report, at 5-11.

¹⁰² *Id.*, app. G, at G-48.

¹⁰³ *Id.*, Main Report, at 5-11.

the NRC may order a plant modification (“backfit”),¹⁰⁴ including what kind of evaluation or analysis and findings would be required, which in turn depends on the NRC’s basis for considering the modification.¹⁰⁵

New York suggests that the Staff may dispense with the backfit rule requirements and instead simply mandate SAMA implementation as an environmental license condition.¹⁰⁶ Although Part 54 refers to license conditions “to protect the environment,” such conditions relate to the monitoring, recording, and reporting of environmental data, as a means for the NRC to keep abreast of the environmental impacts of current operating reactors.¹⁰⁷ For the Staff to impose SAMA plant modifications unrelated to the license renewal safety review would require the Part 50 backfit rule requirements to be satisfied.

Under the backfit rule, plant modifications determined to be necessary for adequate protection are imposed regardless of cost, and without need of a full backfit analysis under 10 C.F.R. § 50.109(a)(3).¹⁰⁸ Decisions regarding whether to require a licensee to modify plant structures, components, systems, design, or procedures for reasons that go beyond assuring

¹⁰⁴ See 10 C.F.R. § 50.109(a)(1) (defining “backfitting,” which encompasses a modification of or addition to structures, systems, components, or the design of a facility; or of the procedures or organization required to operate or design a facility).

¹⁰⁵ See 10 C.F.R. § 50.109(a)(3)-(4).

¹⁰⁶ See New York Reply Before Commission at 9 (the “backfit process is only one source of Staff’s authority to implement plant changes”).

¹⁰⁷ See 10 C.F.R. § 54.33(c) (referencing 10 C.F.R. § 50.36b); see also Environmental Review for Renewal of Operating Licenses, Proposed Rule, 56 Fed. Reg. 47,016, 47,018 (Sept. 17, 1991) (“[l]icensees submit the information from monitoring of these conditions to the NRC on a routine basis”). Further, section 54.33(c) refers to “those conditions that are part of the [current licensing basis] at the time of issuance of the renewed license,” and their supplementation or amendment for the renewal term.

¹⁰⁸ 10 C.F.R. § 50.109(a)(5) (the “Commission shall always require the backfitting of a facility if it determines that such regulatory action is necessary to ensure that the facility provides adequate protection to the health and safety of the public and is in accord with the common defense and security”); see also *id.* § 50.109(a)(4)(ii).

adequate protection or compliance with NRC rules involve multiple considerations, including how proposed measures may relate to existing or proposed NRC rules, practices, and initiatives, and to other plant modifications and activities that may be planned or under consideration.¹⁰⁹

In the circumstance, here, where a SAMA is not necessary to protect public health and safety but nonetheless may be warranted as an incremental safety improvement, the NRC may impose a plant modification “*only* when it determines,” based on a section 50.109(c) backfit analysis, that (1) there is a *substantial increase* in the overall protection of the public health and safety or the common defense and security, and (2) that the direct and indirect costs of implementation for that facility are justified in view of this increased protection.¹¹⁰

D. Implementation Decisions and the Scope of the License Renewal Review

The Board in LBP-11-17 makes the issue of SAMA implementation—including potential Part 50 backfit analysis findings—one that must be resolved in the renewal proceeding, as a prerequisite for agency action on the license renewal application. Although noting that NEPA “does not mandate the particular decisions that an agency must reach,” the Board stated that the Staff had “the option and the duty . . . to pursue modifications” to Indian Point’s current licensing basis through the backfit process.¹¹¹ Moreover, the Board described the Staff as “refusing to require implementation of SAMAs whose benefits, at this juncture and on this

¹⁰⁹ In the specific case of SAMAs, for example, it would be insufficient simply to rank measures by how cost-beneficial they may be. A SAMA with a lower net benefit might afford greater overall risk reduction. And, as we earlier described, the implementation of one or more SAMAs may render others less or no longer cost-beneficial.

¹¹⁰ See 10 C.F.R. § 50.109(a)(3) (emphasis added). No backfit analysis under 10 C.F.R. § 50.109(a)(3) is required if a plant modification is (1) necessary for adequate protection of public health and safety; or (2) necessary to bring the facility into compliance with a license, written licensee commitments, or NRC rules or orders. See 10 C.F.R. § 50.109(a)(4). No party here claims that any of the Indian Point SAMAs would fall into one of these categories.

¹¹¹ LBP-11-17, 74 NRC at 26-27 & n.76 (citing 10 C.F.R. § 50.109(a)(3)).

record, clearly outweigh their costs.”¹¹² The Board further stated that the Staff had not provided any explanation for not “directing a backfit” requirement for license renewal or “setting conditions for license renewal” to require implementation of “these cost-beneficial SAMAs.”¹¹³

But the NRC has stressed—specifically addressing the applicability of the backfit rule—that for license renewal it did “not intend to impose requirements on a licensee that go beyond what is necessary to adequately manage aging effects.”¹¹⁴ Nor does any part of the license renewal rules or their history or associated Staff guidance refer to license conditions for cost-beneficial SAMAs. And since the earliest license renewals, in practice it has been understood that follow-up actions regarding cost-beneficial SAMAs identified in the NEPA analysis would occur outside of the renewal proceeding, as a current operating issue.¹¹⁵ While the SAMA rule

¹¹² *Id.* at 26.

¹¹³ *Id.*

¹¹⁴ See Final License Renewal Rule, Safety, 60 Fed. Reg. at 22,490; see also Nuclear Power Plant License Renewal, Proposed Rule, 55 Fed. Reg. 29,043, 29,047 (July 17, 1990) (“[i]f the staff or the licensee seeks to make changes in a plant’s licensing basis for reasons other than age-related degradation, they should be pursued either in the existing operating license or the renewed license, *once issued*. Staff-initiated changes would be evaluated in accordance with the backfit rule, 10 C.F.R. 50.109.” (emphasis added)).

¹¹⁵ For example, in his notation vote approving the renewal of the Calvert Cliffs licenses (the first to be approved under Part 54), Commissioner McGaffigan encouraged the Staff, “[s]eparate from license renewal,” to “continue to engage [the licensee] on the merits of implementing” four apparently cost-beneficial SAMAs that would “offer a significant level of risk reduction.” Notation Vote, Commissioner McGaffigan, “SECY-00-0010—Calvert Cliffs Nuclear Power Plant, Units 1 and 2—Renewal of Full-Power Operating License” (Mar. 13, 2000), at 2 (ML003695350) (emphasis added); see note 125, *infra*.

Relatedly, in LBP-11-17, the Board misconstrued our decision in *Catawba/McGuire*, which did not involve the same type of claims New York makes here. The Board suggested that we held that SAMA implementation need not be required as part of a plant’s license renewal review in the limited instance when they are already the subject of a generic safety review. See LBP-11-17, 74 NRC at 25. On the contrary, we emphasized that NEPA did not demand “a detailed explanation of specific measures which *will* be employed,” and further noted that whether the NRC “ultimately will require ice condenser plants like McGuire and Catawba to implement a hydrogen control SAMA” (that had already been found to be cost-beneficial in the SAMA review) would be determined as part of a then-ongoing generic safety review, outside of license renewal. See *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-03-17, 58 NRC 419, 430-31 & n.60 (2003) (citation

history and guidance envisioned that cost-beneficial SAMAs would be considered for implementation to further reduce plant risk, our license renewal rules do not require SAMA implementation as a condition for license issuance.

Moreover, by implying that the Staff has a duty to impose cost-beneficial SAMAs as backfits, the Board mistakenly suggested that SAMA analysis conclusions are the equivalent of backfit analysis determinations made under 10 C.F.R. § 50.109. Although the SAMA cost-benefit analysis in practice has been guided by the same methodology used for performing the cost-benefit portion of a backfit analysis, ultimately the SAMA and backfit analyses are not the same.¹¹⁶ They are performed for different purposes under different governing legal standards—one performed to satisfy NEPA and the other pursuant to the Atomic Energy Act.

By its own terms, a backfit analysis under section 50.109(a)(3) encompasses significant considerations beyond those considered in a SAMA analysis.¹¹⁷ Further, even if a proposed modification is cost-beneficial, the NRC may not impose a backfit unless the modification at issue would provide a “substantial increase” in protection of public health and safety or the common defense and security.¹¹⁸ This proceeding never established (nor did the Board

omitted); see also “Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding McGuire Nuclear Station, Units 1 and 2” (Final Report), NUREG-1437, supp. 8 (Dec. 2002), at 5-30 (ML030020238 (package)) (the identified SAMA “is cost-beneficial under certain assumptions,” but would be resolved “as a current operating license issue”). Our decision in *Catawba/McGuire* nowhere suggested that SAMA implementation must be resolved in a license renewal proceeding.

¹¹⁶ See Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document, NEI 05-01, rev. A (Nov. 2005), at 1 (NEI SAMA Guidance) (referencing “Regulatory Analysis Technical Handbook,” NUREG/BR-0184 (Jan. 1997) (ML042820192)); see also “Regulatory Analysis Guidelines,” NUREG/BR-0058, rev. 4 (Sept. 2004) (ML042820192).

¹¹⁷ A backfit analysis may consider any relevant and material information, and must consider, for example, the “potential safety impact of changes in plant and operational complexity, including the relationship to proposed and existing regulatory requirements,” the “resource burden on the NRC . . . and the availability of such resources,” and the continuing costs associated with the backfit. See 10 C.F.R. § 50.109(c).

¹¹⁸ See 10 C.F.R. § 50.109(a)(3).

address) which of the pending cost-beneficial SAMAs might provide a “substantial” increase in public safety protection because such findings are not made in SAMA analyses. In short, the conclusions in a NEPA SAMA analysis are not ready-made backfit analysis determinations under Part 50.

It is far from the case, therefore, that “once the SAMA analysis is completed Staff is prepared to order implementation of SAMAs as a backfit,” although the analysis may serve to prompt a backfit review for one or more SAMAs.¹¹⁹ And notably, because the SAMAs do not relate to aging management, the Part 50 backfit process and its necessary determinations would need to be satisfied for *each* SAMA in question. These are all additional reasons why further evaluation of SAMAs in regard to the possible pursuit of backfitting, if called for, is a matter appropriately considered separate from the license renewal review.

The NRC deliberately narrowed the scope of the license renewal safety review to aging management because it viewed—and continues to view—the agency’s Part 50 regulatory processes an adequate and appropriate means for addressing ongoing safety concerns. We therefore agree with the Staff that the Board erred in ordering the Staff either to impose SAMA implementation as a *license renewal* requirement or provide other, different reasons for why it was not doing so. The Staff has provided adequate justification for not requiring the implementation of the potentially cost-beneficial SAMAs as part of this license renewal proceeding: (1) the Staff did not need to resolve all implementation questions as a prerequisite

¹¹⁹ See New York Answer at 60 n.271; see *also id.* at 64. And although backfit analysts presumably might choose to adopt all or a portion of the values used in the SAMA cost-benefit calculations, it is not clear that all of the values and considerations (including sensitivity and uncertainty analyses) chosen for a SAMA cost-benefit analysis would necessarily be used in the same fashion in a backfit analysis. Indeed, guidance specific to the SAMA analysis suggests that some cost-benefit considerations in the analysis, particularly those involving the calculation of implementation costs, may have distinctions. See *NRC Staff’s Response to the Commission’s Memorandum and Order of February 18, 2015 (CLI-15-3) Regarding Contention NYS-35/36* (Mar. 30, 2015), at 14 (Staff Response to Commission) (“the SAMA analysis is not intended to determine whether an identified SAMA is *actually* cost beneficial” (emphasis added) (citing NEI SAMA Guidance)).

for license renewal; (2) Entergy continues to consider whether it will voluntarily implement additional mitigation measures beyond those four it already has implemented; and (3) the Staff nonetheless retains the authority and discretion, separate from this proceeding, to pursue implementation of cost-justifiable SAMAs that may provide substantial additional protection to the overall public health and safety.

Further, as we earlier described, the Staff in its draft second Final SEIS supplement amplifies its earlier explanations with specific examples of how particular SAMAs still under consideration relate to Fukushima-related measures that Entergy may implement either voluntarily or per NRC requirement. The Staff accordingly notes that the implementation of Fukushima-related severe accident mitigation measures, together with the implementation of the SAMAs Entergy already has completed, may change the Indian Point plant's baseline risk and affect the risk reduction and cost-benefit conclusions for the remaining SAMAs. The Staff therefore considers the deferral of implementation decisions on the pending twelve SAMAs to be appropriate.¹²⁰

In short, no statute or NRC regulation requires SAMAs analyzed in a license renewal NEPA review to be imposed (or a decision on SAMA implementation to be finalized) as a prerequisite to license renewal. None of New York's arguments suggest otherwise.¹²¹ The Staff

¹²⁰ See Draft FSEIS Supplement 2, at 19-23. Quoting section 51.103(a)(4), New York also stresses that the Staff's record of decision must "explain" why mitigation measures "were not adopted." See New York Reply Before Commission at 9. Here, as we outlined, the Staff provided practical, technical, and policy grounds for not imposing SAMAs in this proceeding. Given this explanation, the Staff has met the plain language of the rule, which requires the Staff to either state whether it has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm, or to "explain why those measures were not adopted." 10 C.F.R. § 51.103(a)(4). The Staff's explanation was sufficient to explain why it did not impose SAMAs in this license renewal proceeding.

¹²¹ New York emphasizes that Part 54 requires compliance with Part 51, citing 10 C.F.R. § 54.29(b). But the rule simply requires "all applicable" Part 51 rules to have been satisfied. Part 51 is satisfied through sufficient environmental analyses and adequate environmental record of decision. New York, moreover, was able to challenge the adequacy of the SAMA analysis in this proceeding, including litigating other SAMA contentions admitted for hearing.

identified potentially cost-beneficial SAMAs, along with their risk reduction potential. That final decisions have not been reached regarding implementation of the Indian Point SAMAs does not render the mitigation analysis incomplete. Nor does the analysis reflect a “generalized, conceptual exercise”¹²²—to date four SAMAs already have been implemented at Indian Point, based on the analysis, and more may still be implemented. And while the scope of the NRC’s environmental review for license renewal appropriately extends beyond aging management and includes the requirement to consider and identify SAMAs, neither the environmental nor the safety review contains any SAMA implementation requirements that must be met for license issuance.

In sum, the Staff’s SAMA analysis conclusions for Indian Point were not deficient as a matter of law. The Staff provided sufficient grounds for why in this license renewal proceeding it will not impose SAMA implementation requirements. We conclude, therefore, that the Board erred in granting summary disposition in favor of New York and prohibiting the issuance of renewed licenses for Indian Point on that ground. Instead, for the reasons outlined in this decision summary disposition of NYS-35/36 in favor of the Staff and Entergy was appropriate.¹²³

E. Referral to the Office of Nuclear Reactor Regulation

One matter regarding the Indian Point SAMAs warrants additional discussion. The Staff states that it may reach potential SAMA implementation decisions outside of the proceeding, a choice our decision finds permissible under our rules. But while the Staff sufficiently outlined why it need not take action on implementation in this proceeding, it leaves vague, in practical terms, how a Staff determination on SAMA implementation might be made outside of the

¹²² See New York Answer at 62.

¹²³ In opposing the Staff’s and Entergy’s petitions for review, New York requests that we allow oral argument on the merits of the appeals prior to ruling on them. See New York Answer at 65; 10 C.F.R. § 2.343. We decline to hold oral argument. The record before us provides sufficient information on which to base our decision. See *Southern Nuclear Operating Co. (Vogtle Electric Generating Plant, Units 3 and 4)*, CLI-11-8, 74 NRC 214, 219-20 (2011).

proceeding.¹²⁴ We know only that Entergy will further evaluate the identified SAMAs for implementation and that the Staff retains the means to pursue a backfit in accordance with 10 C.F.R. § 50.109. But unless the Staff itself also intends to further evaluate the pending potentially cost-beneficial SAMAs (and the Final SEIS is silent on whether that is the case), then conceivably a significant SAMA whose implementation ought to be pursued by the NRC could be overlooked. Typical SAMA analysis conclusions, including those in this case, have not indicated whether and which potentially cost-beneficial SAMAs may provide a substantial increase in the overall protection of the public health and safety or the common defense and security such that additional consideration by the Staff may be warranted.

In this regard, Staff practice in the early years of license renewal included a customary internal referral of identified cost-beneficial (or potentially cost-beneficial) SAMAs—that licensees had not yet voluntarily agreed to implement—for review and action as appropriate, as a current operating issue.¹²⁵ This strikes us as an appropriate way to assure that mitigation measures that may substantially increase the overall protection of public health and safety in a cost-justifiable manner are not overlooked, but are reviewed for potential implementation to the extent appropriate. Of course, in instances where it is clear to the Staff that none of the

¹²⁴ We have sought more explanation from the Staff in regard to the “ultimate resolution of cost-beneficial SAMAs.” See CLI-11-14, 74 NRC at 813 n.70; CLI-15-3, 81 NRC at 219. The Staff outlined factors it might consider, including specific “screening criteria,” to determine if a SAMA should be pursued “as a cost-justified ‘substantial increase in safety’ backfit.” See Staff Response to Commission at 6-10. The Staff did not indicate whether any of the Indian Point SAMAs might be appropriate candidates. Nor did the Staff suggest whether or when it might reach any of these considerations.

¹²⁵ See, e.g., Memorandum from P.T. Kuo, NRC, to W. Ruland, NRC, “Results of the Severe Accident Mitigation Alternative (SAMA) Analysis Review for Donald C. Cook Nuclear Plant, Units 1 and 2” (May 12, 2005) (ML051320165); Memorandum from P.T. Kuo, NRC, to H. Berkow, NRC, “Results of the Severe Accident Mitigation Alternative (SAMA) Review for Arkansas Nuclear One, Unit 2” (May 4, 2005) (ML051250309); Memorandum from P.T. Kuo, NRC, to E. Hackett, NRC, “Cost-Beneficial Severe Accident Mitigation Alternatives (SAMA) Identified During the License Renewal Review for H.B. Robinson Steam Elec. Plant, Unit 2” (Dec. 30, 2003) (ML040050412).

identified cost-beneficial measures would afford a substantial increase in overall safety, it would be sufficient to so note in the Final SEIS conclusion.¹²⁶ Here, however, the Staff has not provided such a conclusion.

We therefore direct the NRC license renewal Staff to refer the pending potentially cost-beneficial SAMAs to appropriate NRR staff for review and disposition, as appropriate, in the context of current plant operation.¹²⁷ The Staff should make available to New York its conclusions regarding whether any of the pending identified SAMAs warrant a backfit analysis or other further NRC action. Upon completion of this review, New York may seek to require implementation of any specific SAMA by filing a petition pursuant to 10 C.F.R. § 2.206 to modify the license.

III. ADDITIONAL MATTERS

A. LBP-10-13: Admissibility of NYS-35/36

Although we also granted review of LBP-10-13, the Board's decision admitting NYS-35/36, we need not reach the contention admissibility question. The contentions originally were based on Entergy's Revised SAMA Analysis, which incorporated new meteorological data. Since then, the Staff issued its Final SEIS, upon which the Board's summary disposition decision was based, and recently issued a draft second supplement to the Final SEIS. In addition, Entergy has since provided and the Staff reviewed the augmented implementation cost analysis containing the "engineering project" costs, one of the key issues in NYS-35/36. Given these events and our decision today, we discern no need to review the admissibility of NYS-35/36. To the extent, however, that NYS-35/36 demanded the implementation of SAMAs

¹²⁶ The Staff's general conclusions in SAMA analyses would be significantly more informative if it provided some indication of what degree of significance it attaches to the individually identified cost-beneficial SAMAs—e.g., whether in the Staff's view a SAMA reflects a minor incremental safety improvement or may accord a substantial increase in public health and safety.

¹²⁷ In our decision on Contention 12C, we directed the Staff to perform a sensitivity analysis. The Staff may, if it chooses, wait to make its referral until that analysis is complete, to the extent that the sensitivity analysis may affect the cost-benefit analysis results and related conclusions.

or demanded final decisions regarding SAMA implementation, as prerequisites to license renewal, we would consider the contention inadmissible for the same reasons we provide here.

A comment on the contention's timeliness is warranted, however. Simply stated, the Board's reasoning on timeliness in LBP-10-13 appears problematic. New York's contentions challenged the legal sufficiency of explanations regarding why SAMA implementation was not required for license renewal. But these same explanations had appeared earlier in the Staff's Draft SEIS, well before the Revised SAMA Analysis that was used as the basis for Contentions NYS-35 and NYS-36. The Board based its timeliness ruling, though, merely on the fact that in the Revised SAMA Analysis Entergy "utilized different inputs in its analysis," which led to "a new cost-benefit picture."¹²⁸ But nearly every license renewal proceeding involves revisions of the SAMA analysis, whether in response to staff requests for additional information, additional sensitivity analyses, or for other reasons. Notably, in NYS-35/36 New York did not challenge the selection or adequacy of any of the new "inputs" used in the Revised SAMA Analysis. The mere use of new inputs, which often leads to a new "cost-benefit picture," does not serve to restart the clock for arguments that could have—and therefore under our contention admissibility requirements should have—been raised at the outset.

B. Implementation Costs

As we noted earlier, part of NYS-35/36 challenged Entergy's intention to further refine its SAMA implementation costs to include "engineering project" costs. In other words, New York challenged the "costs" portion of the SAMA analysis, claiming that the implementation cost estimates were incomplete without inclusion of the "engineering costs" that Entergy had not yet considered but planned to consider. That dispute appears resolved and therefore moot, now that Entergy conducted the additional "engineering project" costs review and revised its SAMA

¹²⁸ LBP-10-13, 71 NRC at 696.

implementation costs accordingly, the Staff has reviewed and accepted those implementation cost revisions, and New York has not challenged the implementation costs further.

Although we need not reach the issue, we nonetheless note the possibility that the issue could re-emerge in this case. That is, in our separate decision regarding Contention NYS-12C, we directed that sensitivity analyses for certain economic cost inputs be performed.¹²⁹ Pursuant to those sensitivity analyses, the Staff may identify new potentially cost-beneficial SAMAs for which Entergy may not yet have provided the “engineering project” costs. In that instance, there may again be a challenge regarding the adequacy of Entergy’s implementation costs.

Entergy may choose to provide the engineering project cost estimates at the outset for any such newly-identified SAMAs. Applicable SAMA cost-benefit guidance may prove helpful in determining the cost categories that should be included in the implementation costs. As the Staff noted in its response to our questions on NYS-35/36, SAMA cost-benefit guidance calls for the implementation cost estimate to contain “*all costs associated with the SAMA . . . including design, engineering, safety analysis, installation, and long-term maintenance, calibrations, training, etc. that will be required as a result of the change.*”¹³⁰ In short, while guidance does not bind Entergy or any applicant, available SAMA or NRC cost-benefit guidance serves as a useful guide to the kinds of costs for which estimates are expected to be included as part of the overall implementation cost estimates.

¹²⁹ See CLI-16-7, 83 NRC at __, __ (slip op. at 35-40).

¹³⁰ See Staff Response to Commission at 14 (emphasis added). Guidance also provides that the implementation cost estimate should be sufficiently detailed to permit the “economic viability of the proposed modification [to] be adequately gauged.” See NEI SAMA Guidance at 28. If there are known categories of significant expected costs, it would seem that these should be included, at least as estimates, in the implementation costs. Otherwise the “economic viability” of a measure may become an ever-fluctuating judgment, depending on potential subsequent sensitivity analyses and other SAMA reanalyses that may be performed.

C. Contention NYS-40

As we previously indicated, pending before the Board is NYS-40, a new contention New York filed in February 2016 challenging the SAMA analysis in the Staff's Draft FSEIS Supplement 2. Because NYS-40 raises similar arguments to those raised in NYS-35/36, the Board was directed to hold the contention in abeyance pending our further direction.¹³¹ Contention NYS-40 asserts that "even with Entergy and NRC Staff's revised" implementation costs, the SAMA analysis "identifies a number of mitigation alternatives" that have "benefits in excess of their costs but which are not being included as conditions of the proposed new operating licenses . . . in this proceeding."¹³² New York challenges the Staff's draft supplement because it "fails to commit to implementing any cost-effective SAMAs . . . as part of this licensing proceeding."¹³³ New York argues that now "that NRC Staff has accepted the engineering cost estimates as 'complete,' there is even less reason to defer and avoid implementing cost-effective site-specific SAMAs in this licensing proceeding."¹³⁴

NYS-40 does not challenge, however, any new substantive information in the draft supplement; it challenges neither the Staff's evaluation of the SAMA implementation costs nor the Staff's explanation of why it is reasonable for Entergy to defer future action on the pending cost-beneficial SAMAs. As New York describes, NYS-40 raises "similar issues" to those raised in the appeals regarding NYS-35/36.¹³⁵ Our decision today effectively encompasses—and rejects—the legal arguments New York raises in NYS-40. NYS-40 does not raise a genuine

¹³¹ See Order of the Secretary (Apr. 5, 2016) (unpublished).

¹³² See Contention NYS-40 at 1.

¹³³ See *id.* at 9; see also *id.* at 17.

¹³⁴ See New York Motion for Leave at 4.

¹³⁵ See Contention NYS-40 at 2; see also *State of New York Reply in Support of Contention NYS-40* (Mar. 25, 2016), at 4 (noting that the arguments on NYS-40 "revisit earlier disputes among the parties").

dispute for hearing on a material issue of fact or law.¹³⁶ We therefore direct the Board to dismiss NYS-40.

IV. CONCLUSION

For the reasons provided above, we *reverse* LBP-11-17 and *dismiss* Contention NYS-35/36. We find that summary disposition was appropriate in favor of the Staff and Entergy. We also *direct* the Board to dismiss Contention NYS-40. Our decision today becomes part of, and serves to supplement, the environmental record of decision for this matter.¹³⁷

IT IS SO ORDERED.¹³⁸

For the Commission

NRC SEAL

 /RA/
Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 2nd day of June, 2016.

¹³⁶ We note, additionally, that New York in its NYS-40 filings failed to address, as our rules require, the NRC’s contention admissibility standards in 10 C.F.R. § 2.309(f)(1). New York subsequently submitted a late filing addressing the criteria, in which it described the earlier omission as inadvertent. See *New York’s Supplemental Submission* (Feb. 29, 2016), at S-1. We agree with Entergy that “oversight by counsel” does not establish “good cause” for an untimely submission. See *Entergy’s Opposition to Proposed New York State Contention NYS-40 Regarding Severe Accident Mitigation Alternatives* (Mar. 18, 2016), at 12-13. Even considering the supplemental filing, however, New York’s arguments do not alter our reasoning or conclusions.

¹³⁷ See *Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-06-15, 63 NRC 687, 707 n. 91 (2006).

¹³⁸ Chairman Burns did not participate in this matter.

Additional Views of Commissioner Baran

I concur with the memorandum and order, but write separately to express my views on the Commission's direction to the NRC license renewal Staff to refer the potentially cost-beneficial SAMAs for Indian Point to the responsible staff in the Office of Nuclear Reactor Regulation (NRR) for appropriate action. I agree with my colleagues that referral in this case is a reasonable way to ensure that mitigation measures that may substantially increase safety are not overlooked and are reviewed for potential implementation. In fact, I think the NRC license renewal Staff should establish a regular practice of referring potentially cost-beneficial SAMAs to NRR, which then should expeditiously review them to determine if additional regulatory action should be taken. SAMAs represent a significant technical effort, and NRC should capitalize on the insights they provide about potential safety enhancements at nuclear power plants.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
ENTERGY NUCLEAR OPERATIONS, INC.) Docket Nos. 50-247-LR
) and 50-286-LR
(Indian Point Nuclear Generating,)
Units 2 and 3))

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **COMMISSION MEMORANDUM AND ORDER CLI-16-10** have been served upon the following persons by Electronic Information Exchange and e-mail.

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