UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	April 28, 2014

APPLICANT'S ANSWER OPPOSING THE STATE OF NEW YORK'S PETITION FOR REVIEW OF THE BOARD'S PARTIAL INITIAL DECISION (LBP-13-13)

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I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.341(b) and the Commission's Order dated February 28, 2014,[1] Entergy Nuclear Operations, Inc. ("Entergy") submits this Answer opposing the Petition for Review filed by the State of New York ("New York" or "NYS") on February 14, 2014.[2] The Petition seeks review of the Board's Partial Initial Decision Ruling on Track 1 Contentions (LBP-13-13), issued on November 27, 2013.[3] Specifically, New York contends that the Commission should grant review of LBP-13-13 insofar as it resolved Contention NYS-12C ("NYS-12C") in

[1] *See* Commission Order at 1-2 (Feb. 28, 2014) (unpublished). On February 24, 2014, Entergy moved to hold in abeyance further briefing on New York's petition for review of LBP-13-13 until such time as the Board ruled on New York's then-pending motion to reopen and for reconsideration of the Atomic Safety and Licensing Board's ("Board") merits decision in LBP-13-13. *See* Applicant's Unopposed Motion to Hold Appellate Proceedings on Contention NYS-12C in Abeyance and Parties' Joint Motion Seeking Time and Page Limit Enlargements for Filings Related to Contentions NYS-8, NYS-35/36, and CW-EC-3A at 1-4 (Feb. 24, 2014), *available at* ADAMS Accession ML14055A534. The Commission granted Entergy's motion by Order dated February 28, 2014, and stated therein that the time for answers and replies concerning the State's Petition will run from the date of the Board's ruling on New York's reconsideration motion. *See* Commission Order at 1-2 (Feb. 28, 2014) (unpublished). The Board denied New York's Motion on April 1, 2014. *See* Licensing Board Order (Denying New York's Motion to Reopen the Record; Setting Deadline for New or Amended Contention) at 1-3 (Apr. 1, 2014) ("April 1, 2014 Board Order") (unpublished). This Answer is timely filed within 25 days of that Board ruling.

[2] *See* State of New York Petition for Review of Atomic Safety and Licensing Board Decision LBP-13-13 With Respect to Consolidated Contention NYS-12C (Feb. 14, 2014) ("NYS Petition"), *available at* ADAMS Accession No. ML14045A412 (package).

[3] *Entergy Nuclear Operations, Inc*. (Indian Point Nuclear Generating Units 2 & 3), LBP-13-13, 78 NRC __, slip op. (Nov. 27, 2013).

favor of the Nuclear Regulatory Commission ("NRC" or "Commission") Staff.[4] NYS-12C challenged certain decontamination-related inputs to the severe accident mitigation alternatives ("SAMA") analysis submitted by Entergy as part of the license renewal application ("LRA") for Indian Point Nuclear Generating Units 2 and 3 ("IP2" and "IP3"), also referred to as the Indian Point Energy Center ("IPEC"). In this regard, NYS-12C relates solely to Entergy's and, ultimately, the NRC Staff's compliance with the National Environmental Policy Act ("NEPA"), as implemented in 10 C.F.R. Part 51.

In its Petition, New York argues that the Board's decision contains factual, legal, and procedural errors that allowed the NRC Staff to shirk its obligations under NEPA and NRC regulations.[5] It further accuses the Board of accepting speculative, unsupported statements by Entergy and Staff witnesses while ignoring its purportedly compelling testimony and evidence concerning decontamination time and cost estimates.[6] New York also asserts that the Board's decision raises substantial public policy issues, because a severe accident at Indian Point could have "devastating impacts to the New York metropolitan area."[7] As a proposed remedy, New York requests that the Commission remand the matter to NRC Staff to prepare a revised supplemental environmental impact statement ("SEIS") that is circulated for public comment.[8]

As demonstrated below, the Commission should reject New York's Petition. New York's claims of error are grossly exaggerated and contrary to the record evidence. In fact, New York fails to identify any real factual, legal, or prejudicial procedural errors in the Board's decision.

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[4] As discussed below, the Board relied extensively (and properly) on expert testimony presented by both Entergy and NRC Staff witnesses. However, as the Board correctly noted, in the environmental context, "the NRC, and not the applicant, has the overall burden of complying with NEPA." *Indian Point*, LBP-13-13, slip op. at 24 (citing *Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), CLI-83-19, 17 NRC 1041, 1049 (1983)).

[5] *See* NYS Petition at 1.

[6] *See id.* at 3-4.

[7] *Id.* at 2.

[8] *Id.* at 59.

Nor could it. The Board's decision is fully supported by the record evidence and consistent with controlling legal precedent. The Board thus correctly concluded that the NRC Staff has met its obligations under NEPA as they relate to the Staff's review and evaluation of Entergy's SAMA analysis. Accordingly, because the Petition fails to raise a substantial question warranting review under the standards in 10 C.F.R. § 2.341(b)(4), it should be summarily denied.

II. STATEMENT OF THE CASE

A. Original Contention NYS-12

As filed over six years ago, NYS-12 alleged that Entergy's SAMA analysis is deficient because the MACCS2 computer code used by Entergy (and every license renewal applicant to date) underestimates the costs associated with a severe accident due to its use of "decontamination and clean-up costs" that purportedly are based on "large-sized" radionuclides.[9] New York asserted that a severe accident at a nuclear power plant likely would result in the dispersion of "small-sized radionuclides" that are more expensive to remove and clean up than large-sized radionuclide particles.[10] As support, New York contended that Entergy's SAMA analysis should incorporate the "analytical framework" contained in a 1996 Sandia National Laboratories report concerning site restoration costs following a plutonium dispersal event as well as other studies examining the cost consequences of events involving the detonation of nuclear weapons and radiological dispersion devices (aka "RDDs" or "dirty bombs") in the New York City area.[11]

According to New York, the 1996 Site Restoration Report recognized that earlier estimates (such as those incorporated within the MACCS2 code) of decontamination costs are incorrect

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[9] *See* New York State Notice of Intention to Participate and Petition to Intervene at 140-45 (Nov. 30, 2007), *available at* ADAMS Accession No. ML073400187.

[10] *See id.* at 140-41.

[11] *Id.* at 142 (citing D. Chanin and W. Murfin, Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents, SAND96-0957, Unlimited Release, UC-502 (May 1996) ("Site Restoration Report") (NYS000249)).

because they are based on studies of nuclear weapons that produce large particles.[12] As cited by New York, the Site Restoration Report also discusses decontamination factors ("DF") (*i.e.*, estimates of the effectiveness of clean up measures) after severe reactor accidents.

Entergy opposed the admission of NYS-12, arguing that it presented a generic challenge to the MACCS2 computer code used to perform the IPEC SAMA analysis, lacked adequate factual or expert opinion support, and failed to controvert specific portions of the LRA.[13] The NRC Staff also opposed the admission of NYS-12, noting that New York had not established the relevance of the Site Restoration Report to a nuclear power plant severe accident.[14] It also argued that New York had failed to show how MACCS2 is defective, or how the Site Restoration Report presents a superior alternative or methodology.[15] Nonetheless, the Board admitted NYS-12 in July 2008 to the extent that it "challenges the cost data for decontamination and cleanup used by MACCS2."[16]

B. <u>Amended Contentions NYS-12A/12B/12C</u>

New York amended NYS-12 three separate times to "reassert" the contention and apply it to the NRC Staff's draft supplemental environmental impact statement ("DSEIS"),[17] Entergy's December 2009 revised SAMA analysis,[18] and the Staff's final SEIS ("FSEIS").[19] In the first two

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12 *See id.* at 143.

13 Answer of Entergy Nuclear Operations, Inc. Opposing New York State's Petition to Intervene and Request for Hearing at 86-91 (Jan. 22, 2008), *available at* ADAMS Accession No. ML080300149.

14 NRC Staff's Response to Petitions for Leave to Intervene Filed by (1) Connecticut Attorney General Richard Blumenthal, (2) Connecticut Residents Opposed to Relicensing of Indian Point, and Nancy Burton, (3) Hudson River Sloop Clearwater, Inc., (4) The State of New York, (5) Riverkeeper, Inc., (6) The Town of Cortlandt, and (7) Westchester County, at 50-51 (Jan. 22, 2008), *available at* ADAMS Accession No. ML080230543.

15 *Id*. at 51.

16 *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 102 (2008).

17 See NUREG-1437, Supp. 38, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment (Dec. 2008) ("DSEIS") (NYS00132A-D).

18 *See* NL-09-165, Letter from Fred Dacimo, Entergy, to NRC, License Renewal Application – SAMA Reanalysis Using Alternate Meteorological Tower Data, Indian Point Nuclear Generating Units Nos. 2 and 3 (Dec. 11, 2009) (ENT000009).

amendments, NYS-12A and NYS-12B, which Entergy did not oppose, New York sought only to apply NYS-12 to the Staff's DSEIS and Entergy's revised SAMA analysis, respectively.[20] In both cases, New York essentially repeated verbatim the supporting bases and evidence stated in its original contention. Thus, the scope of the contention did not materially change.[21] The Board admitted NYS-12A on June 16, 2009,[22] and NYS-12B on June 30, 2010, and consolidated the admitted contentions as NYS-12/12A/12B.[23]

In December 2010, the NRC Staff issued its FSEIS, which reflects the Staff's consideration and resolution of all public comments on the scope of its NEPA review and the DSEIS.[24] FSEIS Section G.2.3 documents the NRC Staff's detailed evaluation of the Indian Point SAMA analysis, including the methods used in those analyses and the results.[25] As stated in that section, the Staff utilized the relevant technical expertise of Sandia MACCS2 and decontamination specialists in performing its review.[26] The Staff concluded that Entergy's methodology "provides an acceptable basis from which to proceed with an assessment of

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19 *See* NUREG-1437, Supp. 38, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report (Dec. 2010) (NYS00133A-J) ("FSEIS").

20 *See* State of New York Contentions Concerning NRC Staff's Draft Supplemental Environmental Impact Statement (Feb. 27, 2009), *available at* ADAMS Accession No. ML090690303; State of New York's New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives (Mar. 11, 2010), *available at* ADAMS Accession No. ML100780366.

21 *See* Licensing Board Order (Ruling on New York State's New and Amended Contentions) at 3-4 (June 16, 2009) (unpublished) (admitting NYS-12A and stating that "[w]e see no issue with an intervenor proactively asking the Board to recognize that an admitted contention relative to the [Environmental Report ('ER")] challenges the same issue when included in the Draft SEIS."); *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 & 3), LBP-10-13, 71 NRC 673, 683 (2010) (noting "no material opposition … to admission of NYS-12B to the degree New York is relying on the *same analytic framework* that the Board accepted in admitting NYS-12/12A") (emphasis added).

22 *See* Licensing Board Order (Ruling on New York State's New and Amended Contentions) at 3-4 (June 16, 2009) (unpublished).

23 *Indian Point,* LBP-10-13, 71 NRC at 683-84.

24 *See* FSEIS at xix (NYS00133A) (stating that the Staff's recommendation regarding license renewals for IP2 and IP3 was based in part on "consideration of public comments received during the scoping process and in response to the draft SEIS"); *Id.*, App. A at A-2.

25 *See id.* at 5-1 to 5-13; *id.*, Vol. 3. App. G at G-1 to G-51.

26 *Id.*, Vol. 3, App. G at G-22 to G-29.

candidate SAMAs."[27] It further concluded that Entergy's decontamination cost estimates are "reasonable and acceptable," and consistent with those used in SAMA analyses performed for other nuclear power plants and previously accepted by the NRC.[28]

In FSEIS Section G.2.3, the Staff also included a new technical analysis that directly addresses allegations made in New York's contention.[29] The Staff, addressing the Site Restoration Report, stated that it does not consider the methodology for clean-up of a nuclear weapons accident relevant to the decontamination and clean-up after a nuclear power plant severe accident.[30] Nonetheless, the Staff and its Sandia analysts reviewed the inputs and assumptions regarding particle size distribution and decontamination costs used in the IPEC SAMA analysis, and compared the decontamination cost factors derived from the Site Restoration Report cited by New York to those used in the IPEC SAMA analysis.[31]

As described in the FSEIS, the NRC Staff and Sandia identified the basic considerations of nuclear weapons and a reactor accident (*e.g.*, contaminants, half life of contaminants, and health and safety risks), identified the decontamination methods required to clean up each accident type, and compared the Site Restoration Report cost values (as applied to the urban area of New York City) to those used in the IPEC SAMA analysis.[32] Based on that review, the Staff and Sandia concluded that Entergy's decontamination cost estimates are reasonable, acceptable, and

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27 *Id.* at G-21 to G-22.

28 *See id.* at G-23.

29 *See id.* at G-22 to -24.

30 *See id.* at G-23.

31 *See id.* The FSEIS states that the NRC Staff and Sandia performed a comprehensive review of relevant documents and references, including the ER, the DSEIS, the MACCS2 input decks for Indian Point and associated documentation, the New York contentions and supporting documents and references, the Board's rulings on the contentions, and other relevant filings in the adjudicatory proceeding. *See id*. at G-22.

32 *See id.* at G-23.

consistent with the estimates used from NRC-approved SAMA analyses for other nuclear plants.[33]

New York filed Amended Contention NYS-12C, the last amendment to its contention, in response to the December 2010 FSEIS.[34] In addition to "updating" its previously-admitted consolidated contentions (NYS-12/12A/12B), New York also sought to challenge the discussion in FSEIS Section G.2.3 insofar as it applies to those contentions.[35] New York and its consultant at the time, Mr. David Chanin, argued that the FSEIS: (1) incorrectly accepts and applies cost data for moderate decontamination efforts in lieu of cost data for heavy contamination events, and (2) fails to "scale up" the Site Restoration Report decontamination cost data to a "hyper-density" urban area such as New York City.[36] Notably, the *only* MACCS2 input value explicitly challenged by Mr. Chanin in his report was the per capita cost of nonfarm heavy decontamination (CDNFRM, DF = 15),[37] for which Entergy used a value of $13,824 per person.[38]

Entergy did not oppose New York's characterization of NYS-12C as an "update" to NYS-12/12A/12B, or New York's incorporation by reference of supporting evidence previously identified by New York in support of those contentions.[39] However, Entergy opposed the

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33 *Id.*

34 *See* State of New York New Contention 12-C Concerning NRC Staff's December 2010 Final Environmental Impact Statement and the Underestimation of Decontamination and Clean Up Costs Associated with a Severe Reactor Accident in the New York Metropolitan Area at 1, 3-15 (Feb. 3, 2011) ("Amended Contention NYS-12C"), *available at* ADAMS Accession No. ML110680212.

35 *See id.* at 1-2.

36 *See id. at 7; see also id.* Attach. (David I. Chanin, Errors and Omissions in NRC Staff's Economic Cost Estimates of Severe Accident Mitigation Alternatives Analysis Contained in December 2010 Indian Point Final Supplemental Environmental Impact Statement (FSEIS), NUREG-1437, Supplement 38 at 1, 3 (Feb. 2011) ("Chanin Report")). As discussed below, another consultant, Dr. François Lemay, testified for New York at the evidentiary hearings.

37 In MACCS2, decontamination/clean-up cost is entered as two parameters, CDNFRM (farmland decontamination cost-not applicable here) and CDNFRM (nonfarm decontamination cost). *See* MACCS2 User's Guide at 7-11 (NYS000243). New York did not challenge Entergy's farmland decontamination cost figure.

38 *See* Chanin Report at 3, 8, 16; Amended Contention NYS-12C at 14.

39 Applicant's Answer to New York State's Amended Contention 12C Concerning Severe Accident Mitigation Alternatives Analysis at 2-3 (Mar. 7, 2011).

admission of NYS-12C as failing to raise a genuine dispute of material fact.[40] The Staff did not oppose NYS-12C insofar as it sought to apply NYS-12/12A/12B to the FSEIS discussion of the SAMA analysis.[41] The Staff did oppose the admission of NYS-12C in all other respects.[42]

The Board admitted NYS-12C and consolidated it with NYS-12/12-A/12-B as NYS-12C.[43] The Board concluded that NYS-12C mirrored the basic allegation found in New York's original contention, and that the "overarching aspect of this contention, including its citation to the 1996 Site Restoration Report, has not differed significantly" in four years.[44] In other words, like its predecessors, NYS-12C challenged the adequacy of Entergy's *nonfarm area decontamination cost value*, principally *vis-à-vis* information contained in the 1996 Site Restoration Report and other studies cited by New York.

C. The Parties' Direct Testimony and Board's Denial of Entergy's Motion in Limine

On December 21, 2011, New York filed its statement of position, written testimony, and supporting exhibits for contention NYS-12C.[45] New York and its proffered expert, Dr. François Lemay, alleged for the first time that Entergy had underestimated the economic costs associated with a severe accident at IPEC by using certain MACCS2 "Sample Problem A" inputs from the MACCS2 User's Guide in lieu of site-specific inputs.[46] New York claimed that the Sample

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40 *See id.* at 17-24 (asserting that the contention did not meet the admissibility criteria of 10 C.F.R. § 2.309(f)(1)(v) and (vi) because New York's proffered export report suffered from major technical and factual flaws and misconstrued the nature and purpose of a SAMA analysis).

41 NRC Staff's Answer to State of New York Contention 12-C Concerning the Final SEIS Evaluation of Decontamination and Clean Up Costs in a Severe Accident at 10-25 (Mar. 7, 2011), *available at* ADAMS Accession No. ML110670302.

42 *See id.* at 8-9.

43 Licensing Board Memorandum and Order (Ruling on Pending Motions for Leave to File New and Amended Contentions) at 7-8 (July 6, 2011) (unpublished).

44 *Id.*

45 *See* State of New York Initial Statement of Position Consolidated Contention NYS-12-C (Dec. 21, 2011) ("New York Position Statement") (NYS000240); Pre-filed Written Testimony of Dr. Francois J. Lemay Regarding Consolidated NYS-12-C (NYS-12/12-A/12-B/12-C) (Dec. 21, 2011) ("New York Testimony") (NYS000241); Exhibits NYS000242-NYS000292.

46 New York Position Statement at 17-19, 33-40 (NYS000240); New York Testimony at 9:195-200, 21:466-23:511,

Problem A values were developed for the Surry plant analysis in NUREG-1150 and thus apply only to a rural site.[47] New York and Dr. Lemay proposed alternative values for a number of MACCS2 input parameters, several of which were so large that they required Dr. Lemay to modify the MACCS2 source code.[48]

On January 30, 2012, Entergy filed a motion *in limine* to exclude certain portions of Dr. Lemay's testimony, report and supporting exhibits on the ground that New York's prefiled testimony discussed issues and challenged MACCS2 parameters beyond the scope of the admitted contention.[49] Specifically, Entergy contended that Dr. Lemay's testimony improperly takes issue with numerous Entergy inputs to the MACCS2 economic cost model not previously identified in its admitted contentions.[50] Citing Commission precedent,[51] Entergy argued that intervenors are

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29:642-30:665, 63:1308-28, 70:1470-77 (NYS000241). Section 4.0 of the MACCS2 User's Guide (NUREG/CR-6613) contains six sample problems, Sample Problems A through F. The MACCS2 User's Guide uses these sample problems to compare MACCS and MACCS2 (*e.g.*, the dose algorithms) and to show different aspects of code functionality. Entergy's witnesses testified that Sample Problem A provides "one of the more complete" sample problems, and "offers a full exercise of the code in all of its modules." Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 and 3 at 2058:18-19 (Teagarden) ("Oct. 17, 2012 Tr."); *id.* at 2060:15-16 (O'Kula).

47 *See* New York Position Statement at 36-37 (NYS000240). *See also* NUREG-1150, Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants (Dec. 1990) (NYS00252A-C). NUREG-1150 is a seminal probability risk assessment ("PRA") study that presented population dose results for a 50-mile radial region around each of five representative nuclear power plants (including Surry Unit 1), as well as population dose results for a broader region (*i.e.*, greater than 50 miles) that is typically referred to as the "entire region." Testimony of Entergy Witnesses Lori Potts, Kevin O'Kula, and Grant Teagarden on Consolidated Contention NYS-12-C (Severe Accident Mitigation Alternative Analysis) at 22 (A35) (Mar. 30, 2012) ("Entergy Testimony") (ENT000450) (citing NUREG-1150, Vol. 1 at 2-3, 2-20 (NYS00252A)).

48 *See Indian Point*, LBP-13-13, slip op. at 277 n.1508; Entergy Testimony at 73-77 (A98-A101), 91 (A115-A116), 133 (A160) (ENT000450).

49 Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. Francois Lemay in Support of Consolidated Contention NYS-12C (Jan. 30, 2012), *available at* ADAMS Accession No. ML12030A216.

50 Those additional MACCS2 parameters include decontamination time (TIMDEC), value of nonfarm wealth (VALWNF), societal discount rate of property (DSRATE), fraction of nonfarm property due to improvements (FRNFIM), depreciation rate (DPRATE), and relocation costs (POPCST).

51 The Commission repeatedly has emphasized that the scope of a contention is limited to admitted issues of law and fact pled with particularity in the intervention petition, including its stated bases. *S. Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-10-5, 71 NRC 90, 100 (2010); *see also Entergy Nuclear Generating Co.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 311 (2010) ("NRC adjudicatory proceedings would prove endless if parties were free . . . to introduce entirely new claims which they either originally opted not to make or which simply did not occur to them at the outset.") (quoting *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-05-28, 62 NRC 721, 727-28 (2005).

not permitted to change the scope of a contention as admitted by the Board. The NRC Staff supported Entergy's motion, and New York opposed it.[52]

The Board denied Entergy's motion *in limine* on March 6, 2012, noting that it "admit[s] contentions, not bases," and finding that the additional contested MACCS2 inputs relate to the question of property values and how they might be affected by a radionuclide-releasing accident at IPEC and the resulting decontamination process.[53] It further stated that Dr. Lemay's MACCS2 source code modifications illustrate the effect of varying MACCS2's assumptions to address alternative inputs, as conceptualized by the original admitted contention.[54]

Entergy filed its Statement of Position, written testimony, and supporting exhibits for contention NYS-12C on March 30, 2012.[55] The NRC Staff also filed its Statement of Position, written testimony, and supporting exhibits for contention NYS-12C on March 30, 2012.[56]

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[52] *See* NRC Staff's Answer to Applicant's Motion in Limine to Exclude Portions of the Prefiled Testimony, Report, and Exhibits Filed by New York State and Dr. Francois Lemay in Support of Consolidated Contention NYS-12C (Feb. 9, 2012), *available at* ADAMS Accession No. ML12040A239; State of New York's Answer to Entergy's Motion in Limine to Exclude Portions of Pre-Filed Testimony and Exhibits for Consolidated Contention NYS-12C (Feb. 17, 2012), *available at* ADAMS Accession No. ML12048B478.

[53] Licensing Board Order (Granting in Part and Denying in Part Applicant's Motions in Limine) at 6-7 (Mar. 6, 2012) (unpublished). Shortly after the Board denied Entergy's Motion in Limine, the Commission issued an order in the Seabrook license renewal proceeding rejecting several admitted contentions—including a portion of a SAMA contention that raised MACCS2 decontamination cost issues very similar to those raised in NYS-12C. See *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-05, 75 NRC 301, 329-37 (2012); see also FirstEnergy Nuclear Operating Co. (Davis-Besse Nuclear Power Station, Unit 1), CLI-12-08, 393, 417-18 (2012) (citing CLI-12-05 and reversing the Board's admission of a similar MACCS2 decontamination cost-related contention). The Seabrook Board had similarly stated that it "admits contentions . . . and not their supporting bases." *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), LBP-11-02, 73 NRC 28, 56 (2011). Consistent with Entergy's arguments in its motion, the Commission rejected this statement, because "an admitted contention is defined by its bases." *Seabrook*, CLI-12-05, 75 NRC at 310 n.50. The Commission also reminded Boards "of the need to specify each basis relied upon for admitting a contention." *Id.*

[54] Board Order (Granting in Part and Denying in Part Applicant's Motions in Limine) at 7 (Mar. 6, 2012) (unpublished). Although Energy respectfully disagreed with the Board's denial of its motion *in limine*, it nevertheless filed testimony addressing New York's arguments related to the additional contested MACCS2 inputs discussed above.

[55] *See* Entergy's Statement of Position Regarding Consolidated Contention NYS-12C (Severe Accident Mitigation Alternatives Analysis) (Mar. 30, 2012) (ENT000449); Entergy Testimony (ENT000450); Exhibits ENT000451-ENT000477.

[56] *See* NRC Staff's Initial Statement of Position on Consolidated Contention NYS-12C (Mar. 30, 2012) (NRC000039); NRC Staff Testimony of Nathan E. Bixler, S. Tina Ghosh, Joseph A. Jones and Donald G. Harrison Concerning NYS' Contentions NYS 12/16 (Mar. 30, 2012) ("NRC Staff Testimony") (NRC000041); Exhibits NRC000042-NRC000061.

D. The Parties' Rebuttal Testimony and the Board's Denial of Related Motions

On June 29, 2012, New York filed its Revised Statement of Position,[57] written rebuttal testimony,[58] and several new exhibits referenced therein.[59] New York and Dr. Lemay asserted, in principal part, that the "central issue" raised by NYS-12C is whether it was reasonable for Entergy and NRC Staff to rely upon "Sample Problem A" inputs instead of developing site-specific inputs for IPEC.[60] They argued that NUREG-1150's technical "pedigree" does not justify the use of the MACCS inputs contested by New York, and that the NUREG-1150 values appear to be based on a draft document that was never published.[61] New York and Dr. Lemay further claimed, also for the first time, that in the 1980s the NRC commissioned a "site-specific case study" (*i.e.*, Chapter 5 of Draft NUREG/CR-5148) to estimate the costs associated with a severe accident at Indian Point.[62] According to New York, a site-specific analysis had been completed in conjunction with Draft NUREG/CR-5148.[63]

Entergy sought leave from the Board to file written surrebuttal testimony and a revised position statement on NYS-12C.[64] In support of its Motion, Entergy argued that it was prejudiced by New York's presentation of new arguments and evidence that exceeded the scope of rebuttal

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57 State of New York Revised Statement of Position [on] Consolidated Contention NYS-12C (June 29, 2012) ("New York Rebuttal Position Statement") (NYS000419).

58 Pre-Filed Written Rebuttal Testimony of Dr. François J. Lemay Regarding Consolidated Contention NYS-12C (NYS-12/12A/12B/12C) (June 29, 2012) ("New York Rebuttal Testimony") (NYS000420).

59 *See* Exhibits NYS000421-NYS000432.

60 New York Rebuttal Position Statement at 7 (NYS000419); *see also* New York Rebuttal Testimony at 17:5-20:15 (NYS000420).

61 *See* New York Rebuttal Testimony at 19:16-25:4 (NYS000420).

62 *See id.* at 25:7-30:9 (citing Draft NUREG/CR-5148 (PNL-6350), Property-Related Costs of Radiological Accidents (Feb. 1990) ("Draft NUREG/CR-5148") (NYS00424A to BB)). New York and Dr. Lemay acknowledged that Draft NUREG/CR-5148 was "never published" as a final document.

63 New York Rebuttal Position Statement at 15 (NYS000419).

64 *See* Applicant's Motion for Leave to File Surrebuttal Testimony on Consolidated Contention NYS-12C (July 12, 2012), *available at* ADAMS Accession No. ML12194A724. Entergy, nonetheless, reserved the right to file a motion in *limine* to strike the New York rebuttal testimony and evidence in question and, as discussed below, filed such a motion on July 30, 2012.

testimony, and to which Entergy did not have a fair opportunity to respond.[65] In particular, Entergy objected to New York's reliance on Draft NUREG/CR-5148, and its related new argument that the draft report documented an Indian Point-specific "case study."[66] The Board denied Entergy's motion for leave to file surrebuttal testimony on contention NYS-12C,[67] ruling that the issues raised in the motion could be handled at the evidentiary hearing.[68]

In the interim, on July 30, 2012, Entergy and the NRC Staff filed separate motions *in limine* seeking to exclude portions of Dr. Lemay's rebuttal testimony (NYS000420), Exhibits NYS000424[69] and NYS000426,[70] and related portions of New York's Revised Position Statement (NYS000419).[71] They argued that the testimony and exhibits in question belatedly advanced new arguments that Entergy and the Staff could not have reasonably anticipated when they prepared their prefiled direct testimony.[72] The Board later denied both *in limine* motions in a bench ruling issued on October 15, 2012, the first day of the hearings, opting instead to accord the challenged testimony and evidence its due weight after the hearing on the merits.[73] Thus, as the foregoing reflects, the Board gave New York ample opportunity to present all of its arguments, including many arguments on issues that Entergy believes New York raised for the first time in its prefiled

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65 *Id*. at 1.

66 *Id*. at 4.

67 Licensing Board Order (Denying Applicant's Motion for Leave to File Surrebuttal Testimony on NYS-12C) at 4 (Aug. 2, 2012) (unpublished).

68 *See id.*

69 Draft NUREG/CR-5148 (NYS00424A-BB).

70 E-mail from J. Tawil, Research Enter., Inc., to M. Labriola, Indep. Safety Research, Inc., Re: The DECON Code from PNL (May 2, 2012) (NYS000426).

71 Entergy's Motion in Limine to Exclude Portions of New York State's Rebuttal Filings on Contention NYS-12C (July 30, 2012) ("Entergy Rebuttal Motion in Limine"), *available at* ADAMS Accession No. ML12212A416; NRC Staff's Motion in Limine to Exclude Portions of the Prefiled Rebuttal Testimony and Rebuttal Exhibits Filed by the State of New York Concerning Consolidated Contention NYS-12C (SAMAS) (July 30, 2012) ("NRC Staff Rebuttal Motion in Limine"), *available at* ADAMS Accession NO. ML12212A403.

72 Entergy Rebuttal Motion in Limine at 5-8; NRC Staff Rebuttal Motion in Limine at 5-7.

73 Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 & 3 at 1265-66 (Oct. 15, 2012) (Judge McDade).

direct and rebuttal testimony. The Board ultimately found New York's arguments unpersuasive.

E. The October 2012 Evidentiary Hearings and Post-Hearing Filings

The Board held evidentiary hearings on Contention NYS-12C on October 17-18, 2012 at in Tarrytown, NY, during which it thoroughly interrogated the parties' witnesses and permitted limited cross-examination and redirect examination of those witnesses by the parties.[74] On March 22, 2013, the parties submitted proposed findings of fact and conclusions of law in the form of a proposed Initial Decision by the Board.[75] On May 3, 2013, the parties filed replies to those proposed findings of fact and conclusions of law.[76]

F. The Board's November 2013 Partial Initial Decision (LBP-13-13)

On November 27, 2013, the Board issued LBP-13-13, in which it ruled on the merits of nine "Track 1" contentions. Relevant here, the Board resolved NYS-12C in favor of the NRC Staff. Specifically, the Board found that a preponderance of the evidence supported the following three overarching conclusions: (1) the Indian Point SAMA analysis is sufficiently site-specific; (2) the TIMDEC values used in the Indian Point SAMA analysis are reasonable and appropriate for the IPEC site and satisfy the applicable requirements of NEPA and 10 C.F.R. Part 51; and (3) the

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[74] After the conclusion of the hearing, the parties jointly submitted proposed corrections to the hearing transcripts on December 5, 2012. The Board issued an Order on December 27, 2012, adopting the parties' proposed transcript corrections with some minor revisions. Licensing Board Order (Adopting Proposed Transcript Corrections with Minor Edits) (Dec. 27, 2012) (unpublished).

[75] *See* Entergy's Proposed Findings of Fact and Conclusions of Law for Consolidated Contention NYS-12C (Severe Accident Mitigation Alternatives Analysis) (Mar. 22, 2013) ("Entergy Proposed Findings"), *available at* ADAMS Accession No. ML13081A743; NRC Staff's Proposed Findings of Fact and Conclusions of Law Part 5: NYS-12C (Severe Accident Mitigation Alternatives Analysis Decontamination and Cleanup Costs) (Mar. 22, 2013) ("NRC Staff Proposed Findings"), *available at* ADAMS Accession No. ML13081A698; State of New York's Proposed Findings of Fact and Conclusions of Law for Contention NYS-12/12A/12B/12C (NYS-12C") (Mar. 22, 2013), *available at* ADAMS Accession No. ML13081A757.

[76] *See* Entergy's Reply to New York State's Proposed Findings of Fact and Conclusions of Law For Contention NYS-12C (Severe Accident Mitigation Alternatives Analysis Decontamination Costs (May 3, 2013) ("Entergy Reply to NYS Proposed Findings"), *available at* ADAMS Accession No. ML13123A461; NRC Staff's Reply to State of New York's Proposed Findings of Fact and Conclusions of Law for Contention NYS-12/12A/12B12C ("NYS-12C") (May 3, 2013), *available at* ADAMS Accession No. ML13123A352; State of New York's Reply to NRC Staff's and Entergy's Proposed Findings of Fact and Conclusions of Law for Contentions NYS-12/12A/12B/12C ("NYS-12C") ("NYS Reply to Entergy/Staff Findings") (May 3, 2013), *available at* ADAMS Accession No. ML13123A467.

CDNFRM values used in the Indian Point SAMA analysis are reasonable and appropriate for the IPEC site and similarly meet NEPA and 10 C.F.R. Part 51 requirements.[77] The Board emphasized that it reached these conclusions by evaluating the evidence consistent with NEPA's "rule of reason" and Commission case law applying that rule in the context of a SAMA analysis.[78]

In reaching the above conclusions, the Board found that, because the decontamination cost input parameter is a per capita number, the ultimate decontamination cost estimate (obtained by multiplying the per capita input values by Entergy's Staff- and Board-approved 2035 population estimate for the Indian Point region) results in a site-specific decontamination cost estimate.[79] Thus, large population centers (including the New York City metropolitan area) within the Indian Point SAMA analysis region were accounted for in the MACCS2 decontamination cost estimates.[80] In that regard, the Board emphasized "the important distinction between [its] conclusion that the ultimate decontamination cost estimate (or the SAMA analysis) is site specific and New York's argument that the decontamination cost input parameters are not site specific."[81]

With regard to the TIMDEC input values to MACCS2, the Board correctly noted that in MACCS2, "TIMDEC represents an average time period during which people are temporarily interdicted while decontamination activities are completed to reduce the dose by the specified dose reduction factor."[82] As such, it is not intended to be representative of any specific accident scenario, including a worst-case scenario.[83] The Board accordingly found that Entergy's NRC-approved TIMDEC values are reasonable given: (1) the legitimate goal of a SAMA analysis (*i.e.*,

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77 *Indian* Point, LBP-13-13, slip op. at 293.

78 *Id.* at 292.

79 *See id.* at 283.

80 *See id.* at 282-83.

81 *Id.* at 283.

82 *Id.* at 284.

83 *See id.*

to estimate annual average impacts for the entire 50-mile radius study area), and (2) the MACCS2 code's requirement for a single average decontamination time as an input value.[84]

Finally, with regard to the CDNFRM input values to MACCS2, the Board found that the values used by Entergy and approved by the NRC Staff are standard, best-estimate values for SAMA analyses and were vetted via robust public and peer review processes before their inclusion in NUREG-1150.[85] In that regard, the Board found that the present unavailability of one particular source document (*i.e.*, the Ostmeyer Report referenced in NUREG/CR-3673) did not render the NRC Staff's or Entergy's reliance on the NUREG-1150 decontamination cost values "altogether unreasonable under NEPA."[86] The Board further found that Entergy's and the Staff's technical reviewers had specifically considered the applicability of the NUREG-1150 values and concluded that they were reasonable for Indian Point.[87]

G. New York's Reconsideration Motion and Petition for Review

On December 7, 2013, New York moved the Board to reopen the hearing record on Contention NYS-12C to consider purportedly new information presented by New York related to one of the input parameters challenged in NYS-12C, and to reconsider its merits decision on that contention in light of the new information.[88] Pursuant to an extension of time granted by the Commission,[89] New York filed its Petition for Review of the Board's NYS-12C decision on

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84 *See id.* at 287-88.

85 *See id.* at 289.

86 *Id.* at 290 (quoting *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-1, 75 NRC 39, 57 (2012)).

87 *See id.* at 291.

88 *See* State of New York Motion to Reopen the Record and For Reconsideration on Contention NYS-12C (Dec. 7, 2013), *available at* ADAMS Accession No. ML13341A002 (package).

89 *See* Commission Order (Granting Joint Motion for an Extension of Time to File Petitions for Review of LBP-13 13) (Dec. 18, 2013).

February 14, 2014.[90]

By Order dated April 1, 2014, the Board denied New York's motion to reopen the record and for reconsideration of the Board's merits decision on NYS-12C.[91] On April 4, 2014, New York informed the Commission and the parties in writing that it would not amend or withdraw its Petition, but instead would file a separate petition for review of the Board's April 1, 2014 Order pursuant to 10 C.F.R. § 2.341.[92] Accordingly, Energy files this Answer to New York's Petition.

III. STANDARD OF REVIEW

A petition for review is granted only at the discretion of the Commission, giving due weight to the existence of a "substantial question" with respect to the following relevant considerations: (i) a finding of material fact that is "clearly erroneous" or conflicts with a finding as to the same fact in a different proceeding; (ii) a necessary legal conclusion that is without governing precedent or contrary to established law; (iii) the raising of a substantial and important question of law, policy, or discretion; (iv) the conduct of the proceeding involved a prejudicial procedural error; or (v) the raising of any other consideration which the Commission may deem to be in the public interest.[93] An appeal that does not point to an error of law or an abuse of discretion by the Board, but simply restates the contention with additional support, will not meet the requirements for a valid appeal.[94]

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90 *See* NYS Petition.

91 *See* April 1, 2014 Board Order at 1-3. The Board found that "New York did not provide sufficient information to establish that a different result would have been likely had the Board considered the new information proffered by New York when assessing the reasonableness of the TIMDEC input values accepted by the Staff in the Indian Point SAMA analysis." *Id.* at 2.

92 *See* State of New York's Notice Pursuant to the Secretary's February 28, 2014 Order at 1 (Apr. 4, 2014), *available at* ADAMS Accession No. ML14094A330. New York's separate petition for review of the Board's April 1, 2014 Order is due on April 28, 2014.

93 10 C.F.R. § 2.341(b)(4); *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-03-8, 58 NRC 11, 17 (2003).

94 *Shieldalloy Metallurgical Corp.* (License Amendment Request for Decommissioning of the Newfield, New Jersey Facility), CLI-07-20, 65 NRC 499, 503-05 (2007).

When considering a petition for review, the Commission is free to affirm a Board decision on any ground finding support in the record, whether or not relied on by the Board.[95] The Commission generally will defer to the Board on its fact findings absent a showing that the Board's findings were "clearly erroneous," meaning that, in light of the record viewed in its entirety, the findings were not even plausible.[96] Where the Board has reviewed an extensive record in detail, the Commission is generally disinclined to upset its findings, particularly on matters involving fact-specific issues or where the affidavits or submissions of experts must be weighed.[97] The Commission reviews legal or policy questions *de novo*,[98] and will reverse a board's legal rulings only if they are "'a departure from, or contrary to, established law.'"[99]

IV. THE COMMISSION SHOULD DENY THE PETITION FOR REVIEW

Pursuant to 10 C.F.R. § 2.341, the Commission should deny the Petition because, as set forth below, New York has failed to identify any clear error of fact, error of law, procedural error, or abuse of discretion by the Board. Indeed, New York essentially repeats arguments that the Board fully considered but rejected in reaching its decision on NYS-12C. As demonstrated below, the Board correctly concluded based on a preponderance of the evidence that: (1) the Indian Point SAMA analysis is site-specific: (2) the challenged TIMDEC values are reasonable under NEPA; and (3) the challenged CDNFRM values are reasonable under NEPA. In doing so, the Board properly rejected New York's contrary arguments concerning the origin, purpose, and scientific integrity of the contested MACCS2 input values and their applicability to the Indian Point site.

On appeal, New York makes the following principal arguments in asserting that the

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95 *Private Fuel Storage, LLC* (Indep. Spent Fuel Storage Installation), CLI-05-1, 61 NRC 160, 166 (2005) (redacted public version of decision) (citing federal court precedent).

96 *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-05-16, 62 NRC 1, 3 (2005).

97 *Hydro Res., Inc.* (P.O. Box 777, Crownpoint, NM 87313), CLI-06-1, 63 NRC 1, 2 (2006).

98 *AmerGen Energy Co.* (Oyster Creek Nuclear Generating Station), CLI-09-7, 69 NRC 235, 259 (2009).

99 *See id.* (citation omitted).

Board's decision is clearly erroneous:

- Indian Point is unique because it operates in the most densely-populated and densely-developed area of any U.S. nuclear power plant, such that a severe accident at Indian Point could have a devastating impact on New York State, its citizens, communities, reservoirs, and natural resources—a possibility that "raises substantial public policy issues."[100]

- Entergy and the NRC Staff have not provided a documented, rational basis for the use of MACCS2 User Guide "Sample Problem A" inputs to the SAMA analysis.[101]

- Data from the severe nuclear power reactor accidents at Fukushima and Chernobyl render the 60- and 120-day decontamination time (*i.e.*, TIMDEC) values applied in Sample Problem A and in the Indian Point SAMA analysis untenable.[102]

- The ultimate source of the nonfarm area decontamination cost (*i.e.*, CDNFRM) inputs in Sample Problem A is not NUREG-1150, but a reference that was neither published nor peer-reviewed, and no longer exists.[103]

- The Board's decision relies upon an incorrect understanding of how "averaging" is used in the MACCS2 code and SAMA analysis.[104]

As further demonstrated below, none these arguments has merit, especially when viewed in light of the record evidence. Accordingly, New York's arguments fail to raise a substantial question requiring Commission review pursuant to 10 C.F.R. § 2.341.

A. New York's Petition Does Not Raise Substantial Public Policy Issues

As a threshold matter, Entergy addresses New York's claim that its Petition raises substantial public policy issues. In particular, New York asserts that Commission review of the Board's decision is warranted given the potential environmental impacts of a severe accident at Indian Point and the purported need for the NRC Staff to perform a "reanalysis" of those impacts. Relatedly, New York also cites alleged "concerns that NRC and the federal government might not provide funding for the restoration and remediation of contaminated areas under the Price

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100 NYS Petition at 1-2.

101 *Id.* at 43.

102 *Id.* at 23.

103 *Id.* at 30-32.

104 *Id.* at 27.

Anderson Act or other programs."[105] Based on these claims, New York argues that NRC must consider the "real costs" of a severe accident and the alternatives for mitigating such harm.[106] All of these New York arguments are contrary to established law.

First, the Commission has held expressly that "although [NRC] rules require that potential severe accident mitigation alternatives be considered for license renewal, no site-specific severe accident impacts analysis need be done."[107] No such impacts analysis is required because the NRC's GEIS provides an evaluation of severe accident impacts that applies to *all* U.S. nuclear power plants—including IPEC.[108] Further, the Commission has noted that the GEIS analyses represent *plant-specific* estimates of the impacts from severe accidents that would generally over-predict, rather than under-predict, environmental consequences.[109] Based on the GEIS evaluation, 10 C.F.R. Part 51 concludes that "[t]he probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are *small for all plants*."[110] Thus, there is no need or even a legal basis for a "reanalysis" of site-specific severe accident impacts at Indian Point.[111]

In addition, alleged concerns about post-accident funding of remediation and restoration costs lack relevance to NYS-12C and the Board decision under appeal. The Commission made

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105 *Id.* at 2. In support of this statement, New York references a letter that it submitted to the NRC in August 2013. That letter is not part of the evidentiary record. New York's argument should be rejected on that basis alone.

106 *Id.*

107 *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-15, 75 NRC 704, 709 (2012) (citations omitted).

108 *See* NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Vol. 1 at 5-12 to 5-116 (May 1996) ("GEIS") (NYS00131C); *Pilgrim*, CLI-10-11, 71 NRC at 316 ("Because the GEIS provides a severe accident impacts analysis that envelopes the potential impacts at all existing plants, the environmental impacts of severe accidents during the license renewal term already have been addressed generically in bounding fashion."); *see also* GEIS at 5-17, 5-22, 5-29, 5-34, 5-36, 5-38, 5-40, 5-45, 5-47, 5-85 to -88, 5-97 (NYS00131C).

109 Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467, 28,480 (June 5, 1996).

110 FSEIS at 5-3 (NYS00133B) (quoting 10 C.F.R. Pt. 51, Subpt. A, App. B, Tbl. B-1 (Postulated Accidents; Severe Accidents)) (emphasis added).

111 *Pilgrim*, CLI-10-11, 71 NRC at 315-16.

this fact clear in the *Pilgrim* license renewal proceeding. In CLI-12-10, it affirmed the Board's rejection of a proposed SAMA-related "cleanup contention" that raised issues similar to those raised by New York in its Petition. The Commission stated that "[d]eterminations regarding the precise role and relative authority of each relevant agency in the event of a severe reactor accident, and statutory interpretations going to sources of funding for decontamination efforts, do not fall within the scope of an individual license renewal proceeding."[112]

Further, insofar as New York arguably suggests that the NRC must or should require implementation of potentially cost-beneficial SAMAs as part of license renewal, it again ignores settled law.[113] The Commission has stated in this proceeding that "NEPA is a procedural statute—although it requires a 'hard look' at mitigation measures, it does not, in and of itself, provide the statutory basis for their implementation."[114] And, even more recently, the Commission rejected an intervenor's claim that NRC must "require" Entergy to implement "all possible" mitigation alternatives.[115] It correctly noted that such a demand is inconsistent with NEPA, "which neither requires nor authorizes the NRC to order implementation of mitigation measures analyzed in an environmental analysis."[116] Those Commission statements are consistent with a long line of judicial opinions—including the Supreme Court's *Robertson* decision—holding that NEPA

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[112] *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-10, 75 NRC 479, 485-86 (2012); *see also id*. at 486 ("The [SAMA] analysis is not directed to, and does not rely upon, the relative roles different agencies may take following a potential actual accident, or the funding sources for any actual decontamination effort. Indeed, in the event of an actual accident, many inter-agency determinations may need to be based on the nature of the specific accident or on other real-time information and considerations.").

[113] *See*, *e.g.*, NYS Petition at 9-10 (citing 10 C.F.R. § 51.103(a)(4) ("[T]he SAMA analysis and NRC Staff's review of the SAMA analysis is crucial to determining 'whether the Commission has taken all practical measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected, and if not, to explain why those measures were not adopted.'").

[114] *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2& 3), CLI-11-14, 74 NRC 801, 813 (2011) (citing *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 n.16 (1989)). Entergy discussed the relevant NEPA legal principles and precedent in its petition for review of the Board's summary disposition ruling on NYS-35/36. *See* 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) at 50-58 (Feb. 14, 2014).

[115] *Pilgrim,* CLI-12-10, 75 NRC at 488.

[116] *Id.* (citing *Robertson*, 490 U.S. at 353).

imposes no substantive requirement that mitigation measures actually be taken.[117]

Finally, relevant to this issue, the Commission has noted that the mitigation measures assessed in a NEPA SAMA analysis are "supplemental" to those it already requires under its safety regulations for reasonable assurance of safe operation, and also supplemental to those that it may require under its ongoing regulatory oversight over reactor safety, pursuant to the Atomic Energy Act.[118] That oversight includes the NRC's post-Fukushima comprehensive safety review that involves, among other things, a review of the requirements and guidance associated with accident mitigation measures.[119] However, those ongoing safety reviews "do not imply that [the Commission] now consider[s] severe accidents significantly more likely or potentially more damaging than suggested in the GEIS, [its] bounding impacts analysis for license renewal."[120] These Commission statements further underscore New York's failure to raise a substantial policy question in its Petition with respect to the Indian Point SAMA analysis.

B. The Board Correctly Concluded That the IPEC SAMA Analysis Is Site-Specific

1. The Board's Findings and Conclusion Are Fully Supported by the Record

New York argues that the Board committed factual and legal errors in finding that the "use

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[117] *See*, *e.g.*, *Robertson*, 490 U.S. at 333 ("[I]t would be inconsistent with NEPA's reliance on procedural mechanisms—as opposed to substantive, result-based standards—to demand the presence of a fully developed plan that will mitigate environmental harm before an agency can act."); *Mass. v. NRC*, 708 F.3d 63, 81 n.27 (1st Cir. 2013) ("To the extent [the petitioner] seeks to impose a substantive requirement that the NRC must require certain mitigation measures under NEPA, that is foreclosed by the fact that NEPA is not outcome driven."); *Nat'l Parks & Conservation Ass'n v. U.S. Dep't of Trans.*, 222 F.3d 677, 681 n.4 (9th Cir. 2000) (stating that "a mitigation plan need not be legally enforceable, funded or even in final form to comply with NEPA's procedural requirements"); *Cnty. of Rockland v. FAA*, 335 Fed.Appx. 52, 55 (DC. Cir. 2009) ("NEPA does not impose 'substantive requirement that a complete mitigation plan be actually formulated and adopted' before agency can act.") (quoting *Robertson*, 490 U.S. at 352). Notably, the Third Circuit's 1989 *Limerick* decision, which New York cites frequently in its proposed findings, similarly states that "NEPA's procedural requirement cannot be expanded upon by the courts either by requiring additional procedures or by requiring substantive outcomes." *Limerick Ecology Action, Inc. v. NRC,* 869 F.2d 719, 730 n.9 (3d Cir. 1989).

[118] *Pilgrim*, CLI-12-1, 75 NRC at 57.

[119] *Id.*

[120] *Pilgrim*, CLI-12-15, 75 NRC at 728. *See also S. Nuclear Operating Co.* (Vogtle Electric Generating Plant, Units 3 & 4), CLI-12-11, 75 NRC 523, 534 (2012) ("Petitioners simply have not shown, from a NEPA perspective, that the Fukushima events or our potential regulatory responses to those events reveal environmental impacts that differ significantly from those the NRC has already studied.").

of one site-specific input—population—renders the SAMA analysis site-specific," particularly given the allegedly "unique 50 mile area surrounding Indian Point."[121] That argument fails under the weight of the evidentiary record and the Board's review thereof, as fully reflected in its decision on NYS-12C. The record shows that Entergy applied numerous site-specific inputs (not one) in its SAMA analysis—a fact confirmed by New York's own expert.[122] The relevant site-specific inputs included, for example, IPEC-specific meteorological data (obtained from the IPEC meteorological tower), the projected year 2035 population distribution within the 50-mile SAMA analysis region surrounding Indian Point (based on year 2000 census data and state and county-level population projections), the IP2 and IP3 core radionuclide inventories, IP2 and IP3 source term and release characteristics, and region-specific economic data (*i.e.*, value of farm and nonfarm wealth).[123] The Board expressly acknowledged this fact in its decision.[124] As discussed further below, the Board also correctly found that because the nonfarm decontamination cost (CDNFRM) input parameter is a per capita number, the "ultimate decontamination cost estimate (that results from multiplying the per capita input values by the site-specific IPEC region population) results in a site-specific decontamination cost estimate."[125]

2. New York's Claims of Error Lack Merit

a. Use of the Per Capita Nonfarm Decontamination Input Parameter

New York takes issue with the Board's finding that because MACCS2 applied Entergy's CDNFRM input values on a per person basis, it yielded site-specific cost estimates for the SAMA

[121] NYS Petition at 44, 52.

[122] *See* Oct. 17, 2012 Tr. at 1945:6-1947:1 (Lemay).

[123] *See id*. at 1947:15-1950:8, 2064:12-2066:23 (Teagarden).

[124] *See Indian* Point, LBP-13-13, slip op. at 271.

[125] *Id.* at 283.

analysis region.[126] It argues—as it did at hearing—that Entergy's SAMA analysis fails to adequately estimate decontamination costs for the New York City area's "uniquely high population and building density."[127] New York further claims that the Board relied on conclusory statements and unsupported allegations by Entergy's and the Staff's experts.[128]

The record and the Board's decision, however, paint a very different picture, and confirm that the Board reached the correct conclusion after carefully weighing all parties' testimony and evidence. At hearing, Entergy's and the Staff's witnesses fully explained why New York's position lacks merit. In short, the NUREG-1150 decontamination cost values are based upon levels of contamination and population rather than upon the region in which the contamination occurs.[129] MACCS2 applies the nonfarm economic inputs, including the nonfarm decontamination cost (CDNFRM) input value, on a *per person* basis.[130] This approach inherently accounts for areas with high population densities and low population densities within the 50-mile IPEC SAMA analysis region.[131] Accordingly, in MACCS2, the populations within the IPEC SAMA analysis region were multiplied by these per-person decontamination cost values, as appropriate, making the resulting decontamination cost estimate site-specific.[132] For the IPEC SAMA analysis, Entergy developed a conservative year 2035 population estimate based on census data and population projections that are specific to the IPEC SAMA analysis region.[133] Therefore,

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126 *See* NYS Petition at 30-31.

127 *Id*. at 47

128 *Id*. at 53.

129 *See* Letter from Fred Dacimo, Vice President, Entergy, to NRC, Reply to Request for Additional Information Regarding [LRA – SAMA] Analysis, Attach. 1 at 38 (ENT000460).

130 *See*, *e.g.*, NRC Staff Testimony at 41 (A35) (NRC00041); Entergy Testimony at 55-58 (A72) (ENT000450); Oct. 17, 2012 Tr. at 1949:23-1950:8 (Teagarden).

131 *See*, *e.g.*, Entergy Testimony at 58 (A72) (ENT000450).

132 *See* Oct. 17, 2012 Tr. at 1949:23-1950:8, 2040:8-14 (Teagarden); Entergy Testimony at 55-58 (A72) (ENT000450).

133 *See* Entergy Testimony at 48 (A65) (ENT000450); Official Transcript of Proceedings, Indian Point Nuclear Generating Units 2 and 3 at 2139:18-2140:15 (Teagarden) (Oct. 18, 2012) ("Oct. 18, 2012 Tr."). In its ruling on Contention NYS-

the large population centers (including the New York City metropolitan area) were specifically accounted for in the Indian Point SAMA analysis region.[134]

In its decision, the Board cited extensively to the testimony of Entergy's and the NRC Staff's witnesses, ultimately agreeing that, "[b]y using a per-person basis, this approach takes into account the site-specific high population density of New York City and the correspondingly high density of buildings."[135] In this instance, there is no basis for concluding that the Board overlooked or misunderstood important evidence, or that the Board's findings are not plausible in light of the full evidentiary record.[136] Accordingly, New York has provided no compelling justification for disturbing the Board's factual findings with respect to this issue.

b. Consistency with NRC-Endorsed Guidance in NEI 05-01

According to New York, the Board failed to recognize that Entergy's use of the same MACCS2 input values used in Sample Problem A is inconsistent with NRC-endorsed industry guidance. Specifically, New York claims that Entergy incorrectly read NEI 05-01 as only requiring the escalation of MACCS2 User Guide Sample Problem A values to current year dollars using the Consumer Price Index.[137] Consequently, New York argues, Entergy did not follow NEI 05-01 or the MACCS2 User Guidance.

New York's argument clearly runs counter to the record evidence. Entergy's experts

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16B, the Board concluded that that Entergy's estimate of the 2035 projected population estimate and NRC Staff's approval thereof are reasonable and satisfy the requirements of NEPA and 10 C.F.R. § 51.53(c)(3)(ii)(L). *See Indian Point*, LBP-13-13, slip op. at 306, 313.

134 NRC Staff Testimony at 69 (A61) (NRC00041); Oct. 17, 2012 Tr. at 1950:4-8 (Teagarden).

135 *Indian Point*, LBP-13-13, slip op. at 282-83.

136 *See* NYS Petition at 52-55. The Board noted that "Dr. Lemay agreed that the application of decontamination costs on a per person basis, as is done in MACCS2, is a valid approach." *Indian Point*, LBP-13-13, slip op. at 283. New York accuses Entergy and the Board of misrepresenting Dr. Lemay's testimony. It is true that Dr. Lemay sought to qualify this statement by arguing that this approach is somehow invalid for the New York City area. However, the fact remains that he described the "decontamination cost per person" concept as a "brilliant insight."

137 *See* NYS Petition at 55; NEI 05-01, Rev. A, Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document (Nov. 2005) ("NEI 05-01") (NYS000287).

testified that Entergy did, in fact, follow the NRC-approved guidance in NEI 05-01 to perform the SAMA analysis and appropriately used the NRC and industry standard code (MACCS2) in the analysis.[138] Notably, the MACCS2 nonfarm area decontamination cost (*i.e.*, CDNFRM) values used by Entergy are consistent with the sample values contained in NEI 05-01.[139] Even assuming NEI 05-01 imposed binding requirements on an applicant or licensee (which, as a guidance document, it does not),[140] there is no evidence of any material deviation from NEI 05-01 guidance.

Furthermore, as the Board noted in its decision, Ms. Potts (who co-authored NEI 05-01 and helped prepare the IPEC SAMA analysis), testified that she and other Entergy technical reviewers considered the applicability of the Sample Problem A values (which, as noted previously, are derived from NUREG-1150), and concluded that they are reasonable values for IPEC.[141] As the Board further noted, the basis for that conclusion is reflected in a February 2008 Entergy response to an NRC request for additional information.[142]

Importantly, Entergy's witnesses thoroughly explained *why* the MACCS2 decontamination cost and time values applied in the Indian Point SAMA analysis (as derived from NUREG-1150) are reasonable and appropriate for use in a NEPA analysis.[143] And, in doing so, they effectively refuted New York's present claim that no one has examined those values for the past thirty years.[144] Specifically, they explained that Entergy's source values, while coinciding with Sample

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138 *See* Entergy Testimony at 17-19 (A29-30), 46 (A61) (ENT000450).

139 *See* NEI 05-01 (NYS000287) at 37 (Table 5, "Sample MACCS2 Economic Parameters").

140 *See Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-05-15, 61 NRC 365, 375 n.26 (2005) ("We recognize, of course, that guidance documents do not have the force and effect of law.").

141 *Indian Point*, LBP-13-13, slip op. at 291 (citing Oct. 17, 2012 Tr. 2067–69, 2080 (Potts)).

142 *Id.* (citing Oct. 17, 2013 Tr. at 2080). *See also* NL-08-028, Letter from Fred Dacimo, Vice President, Entergy, to NRC, Reply to Request for Additional Information Regarding License Renewal Application – Severe Accident Mitigation Alternatives Analysis, Attach. 1 at 37-38 (Feb. 5, 2008) ("February 2008 RAI Response") (ENT000460) (explaining why the economic risk cost parameters adjusted to 2005 dollars using the CPI ratio are reasonable for the Indian Point region, and are considered to be the most reasonable estimates available based on industry reviewed studies).

143 *See* Entergy Testimony at 48-58 (A64-73), 72-88 (A93-109) (ENT000450).

144 *See* NYS Petition at 20.

Problem A values, actually are: (1) based on peer-reviewed NUREG-1150 values that have been well-vetted by the nuclear industry, the national laboratories, and the NRC since their inception;[145] (2) used in all NRC-approved SAMA analyses to date;[146] and (3) applied in the NRC's recent State-of-the-Art Reactor Consequence Analyses ("SOARCA") project, which was completed in November 2012.[147] The Board did not err in finding this expert testimony persuasive.

c. Lack of Weight Accorded to Draft NUREG/CR-5148 (Tawil 1990)

New York further contends that the Board erred by not discussing Draft NUREG/CR-5148 (NYS00424A to BB) in its decision.[148] New York's argument stems from its belief that Draft NUREG/CR-5148 "shows that the NRC has actually conducted a site-specific analysis of the decontamination costs associated with a severe accident at Indian Point, without using NUREG-1150 values, and therefore, without relying upon Sample Problem A."[149] As the record shows, New York's belief is groundless, and the Board rightly accorded it no weight.

Draft NUREG/CR-5148 plainly states that the report is not the Indian Point site-specific analysis New York claims it to be:

> The results that are reported *should not be considered as representative of reactor accident consequences either for pressurized water reactors (PWR) in general or for the Indian Point reactors*, since the plume direction was selected to maximize the offsite consequences in an area having a particularly high population density.[150]

There is no debate that a SAMA analysis estimates the mean (not maximum) annual offsite population dose and economic costs over the entire SAMA analysis region based on plant-specific

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145 *See* Entergy Testimony at 52-58 (A71-72), 59 -62 (A76-78) (ENT000450).

146 *See id.* at 14 (A26).

147 *See id.* at 14 (A26), 85-86 (A106). The NRC initiated the SOARCA project in 2006 to develop revised best estimates of the offsite radiological health consequences of severe reactor accidents by including significant plant improvements and updates not reflected in earlier NRC assessments. *Id*. at 26 (A41).

148 *See* NYS Petition at 56-57.

149 *Id.* at 56.

150 Draft NUREG/CR-5148 at 1.11 (NYS00424B) (emphasis added).

information to identify potentially cost-beneficial mitigation alternatives.[151] Draft NUREG/CR-5148 makes clear that its analyses are not specific to, or representative of, the Indian Point site.[152] Significantly, Dr. Lemay conceded this fact, stating that "many of the parameters that are in [Draft NUREG/CR-5148] are wrong," and that "I'm *not* advocating this particular example as a NEPA-type and site-specific analysis for Indian Point."[153] Further, Entergy's and the NRC Staff's experts highlighted numerous critical differences between Draft NUREG/CR-5148 and an NRC-compliant SAMA analysis like the one performed for Indian Point license renewal.[154] Thus, the Board did not err in declining to discuss a draft report that lacks relevance to the Indian Point SAMA analysis, and which was discounted by New York's own witness.

C. The Board Correctly Concluded That the Decontamination Time Values Used in the Indian Point SAMA Analysis Are Reasonable Under NEPA

The Board also correctly concluded, based on a preponderance of the evidence, that the decontamination time (TIMDEC) values used in Entergy's SAMA analysis are reasonable under NEPA.[155] In challenging that conclusion, New York again accuses the Board of giving undue weight to allegedly vague, unsupported statements by Entergy and Staff witnesses, and ignoring testimony proffered by New York's witness.[156] As shown below, those assertions are incorrect.

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[151] *See Pilgrim*, CLI-12-15, 75 NRC at 708,716 (stating that a SAMA analysis is a site-specific "mitigation analysis").

[152] Mr. Teagarden described Draft NUREG/CR-5148 as a "stylized assessment" performed to demonstrate the functionality of a code (DECON) that, to his knowledge, is no longer available or operable. Oct. 18, 2012 Tr. at 2258:9-12 (Teagarden); *see also* Draft NUREG/CR-5148 at 1.11 (NYS00424B) ("The purpose of this chapter is to illustrate the uses of DECON and the interpretation of its output.").

[153] Oct. 18, 2012 Tr. at 2257:8-14 (Lemay) (emphasis added). Notably, Dr. Lemay did not explain how this "example" study or the since-retired DECON code described therein could be used to develop a site-specific decontamination cost estimate that is suitable for use in MACCS2.

[154] *See* Oct. 18, 2012 Tr. at 2253-55 (Jones), 2258 (Teagarden); Entergy Reply to NYS Proposed Findings at 42-43.

[155] *See Indian Point*, LBP-13-13, slip op. at 283-88.

[156] *See* NYS Petition at 20-21.

1. The Board's Findings and Conclusion Are Fully Supported by the Record

The Board's conclusion on this issue rests on carefully rendered factual findings as well as consideration of New York's various opposing arguments and evidence. Indeed, the Board explained that "[d]espite New York's argument that the TIMDEC input values are not realistic, the record shows that Entergy's use of these TIMDEC values is reasonable for three reasons."[157] In brief, the Board cited the following three principal considerations:

1) The Chernobyl event cited by New York is a "single scenario of an extreme case" that, if somehow included in a SAMA analysis, "would require weighting its low probability of occurrence."[158]

2) The dose reduction factors (3 and 15) and corresponding TIMDEC values (60 days and 120 days) used by Entergy in its SAMA analysis are reasonable given that the NRC has examined decontamination times for more than 37 years, and the origin of the decontamination time values "is known and reviewable and based upon an average over a wide spectrum of severe accident scenarios."[159]

3) Entergy's selected TIMDEC values are reasonable given that the decontamination times represent the average over all the modeled severe accidents, not solely worst case scenarios.[160]

The Board's findings are expressly based on the expert testimony of Entergy's and Staff's highly-experienced witnesses—testimony that the Board reasonably found to be persuasive.

2. New York's Claims of Error Lack Merit

In its Petition, New York challenges the foregoing Board findings, but fails to identify any clear factual or legal errors. Instead, it repeats arguments rejected by the Board based on its weighing of the parties' competing testimony and evidence.

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157 *Indian Point*, LBP-13-13, slip op. at 285.

158 *Id*. *See also City of New York v. Dep't of Transp.*, 715 F.2d 732, 738 (2d Cir. 1983) ("The concept of overall risk incorporates the significance of possible adverse consequences discounted by the improbability of their occurrence.").

159 *Id*. at 286.

160 *Id*. at 286-87.

a. Historical and Technical Bases for Decontamination Time Values

New York criticizes the Board for its reliance on Staff testimony that the NRC has examined decontamination times for more than 37 years, and its conclusion that the origin of the decontamination time values is known and reviewable and based upon an average over a wide spectrum of severe accident scenarios.[161] New York suggests that the Board relied on vague, unsubstantiated conclusions that should be accorded no weight.[162] That decidedly is not the case here, where ample record evidence, including expert opinion, supports the Board's findings.

In brief, Entergy's and the NRC Staff's experts discussed at length the historical and technical bases for the dose reduction factors and TIMDEC values used in NUREG-1150 as well as in Entergy's SAMA analysis.[163] Mr. Harrison and Dr. Ghosh testified that the NRC has been examining the decontamination times for nearly four decades, beginning in 1975 with the Reactor Safety Study, which discussed decontamination activities that are capable of restoring areas to habitability quickly given sufficient resources.[164] They further stated (as did Entergy's experts) that the genesis of the values used by Entergy can be traced back to NUREG/CR-3673.[165]

As Staff witnesses explained, NUREG/CR-3673 identified an *average* effort required to restore habitability to an area after the most severe type of reactor accident; *i.e.*, an "SST1" accident source term as defined in the 1982 Sandia Siting Study (ENT000453).[166] It states that an average clean-up was expected to take ninety days with approximately 46,000 workers (11,000

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161 NYS Petition at 27 (referencing *Indian Point*, LBP-13-13, slip op. at 286).

162 *Id*. at 20-21.

163 *See* Entergy Testimony at 80-88 (A105-A109); NRC Staff Testimony at 89-90 (A81) (NRC000041).

164 NRC Staff Testimony at 89 (A81) (NRC000041).

165 *Id.* at 90 (A81); Entergy Testimony at 80 (A105) (ENT000450).

166 NRC Staff Testimony at 90 (A81) (NRC000041) (citing NUREG/CR-3673, Economic Risk of Nuclear Power Reactor Accidents at 6-24 to 6-25 (May 1984) (NRC000058)).

person-years of effort) for this most severe type of reactor accident.[167] Thus, the report cites this period as an *average* time to complete decontamination efforts following the most severe type of reactor accident.[168] Less severe accidents, including ones that may result in little cleanup being required, may take less time or involve fewer resources.[169] In either situation, NUREG/CR-3673 identified the average time to complete decontamination efforts to be about 90 days or less for severe reactor accidents.[170] NUREG-1150 adopted 60-day and 120-day values for DF = 3 and DF = 15, respectively.[171] Those are the values used in the Indian Point SAMA analysis.

New York's witness, Dr. Lemay, claimed that applying the NUREG/CR-3673 methodology to the decontamination cost calculated by Entergy for the "Early High" release category at IP2 led him to conclude that 1.5 million workers (363,000 worker-years) would be required to decontaminate the affected area in 90 days.[172] Dr. Lemay further asserted that even assuming decontamination occurred over a full year, 363,000 workers would still be required to complete decontamination within that period.[173]

As Entergy's experts explained, however, a SAMA analysis considers a broad spectrum of release categories, including those that involve minimal or no failure of the containment (and thus

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167 *Id.*

168 *Id.* Dr. Lemay agreed that the TIMDEC value is intended to be average value. *See* Oct. 18, 2012 Tr. at 2181:8-9 (Lemay) ("At the end of this average decontamination period, people are allowed back to their homes.").

169 NRC Staff Testimony at 90 (A81) (NRC000041).

170 *Id.* In a related vein, New York claims that "internal inconsistencies in the decontamination timelines in NUREG/CR-3673 and NUREG-1150 render them unreliable." NYS Petition at 22 (citing New York Rebuttal Testimony at 21-23 (NYS000420)). Specifically, it claims that decontamination begins thirty days after the severe accident in NUREG/CR-3673, and seven days after the accident in NUREG-1150. However, New York never explained how that purported inconsistency plausibly could alter the overall results of the SAMA analysis (*i.e.*, the conclusions as to which SAMAs may be cost-beneficial) in a material way. *See Pilgrim*, CLI-12-15, 75 NRC at 714.

171 *See* Entergy Testimony at 80-85 (A105) (ENT000450). New York incorrectly states that "real world experience" indicates that achieving a dose reduction factor greater than ten (10) "may not be possible or realistic." NYS Petition at 50. Entergy's and the Staff's experts fully refuted that claim in their testimony. *See* Entergy Testimony at 67-72 (A89-A93 (ENT000450); NRC Staff Testimony at 42-44 (A38), 57-62 (A51-A53), 86-88 (A78-A79) (NRC000041).

172 *See* New York Rebuttal Testimony at 22:17-21 (NYS000420); *see also* Oct. 18, 2012 Tr. at 2112:19-2114:14, 2186:4-12 (Lemay).

173 *See* New York Rebuttal Testimony at 23:4-7 (NYS000420); *see also* Oct. 18, 2012 Tr. at 2112:19-2113:15 (Lemay).

lower accident source terms).[174] It is does not focus solely on the most severe release category (*i.e.*, the "Early High" release category singled out by Dr. Lemay).[175] Moreover, each release category has an associated frequency, with the lower release categories making up a significant portion of the overall release frequency.[176] Entergy's experts explained that by focusing on the "Early High" release category in his decontamination worker calculation, Dr. Lemay applied a worst-case assumption.[177] Accounting for the full spectrum of release categories and frequencies considered in the Indian Point SAMA analysis, Entergy's experts estimated that the "average" number of decontamination workers would be about 60,000 to 80,000 people, the number of people "that would fill Yankee Stadium on any given Sunday."[178]

Persuaded by Entergy's and the Staff's testimony, the Board reasonably concluded that the TIMDEC values used in Entergy's SAMA analysis have an established technical basis that can be traced back to NUREG/CR-3673.[179] It also agreed that "to be able to provide a reliable and reasonable analysis, the decontamination times must represent all the modeled severe accidents including ones that require little decontamination."[180] Thus, the Board's findings on this issue have a strong foundation in the evidentiary record.

b. Relevance of the Chernobyl and Fukushima Accidents

On appeal, New York claims that the Fukushima and Chernobyl accidents render the 60-day and 120-day decontamination times used by Entergy "untenable."[181] The Board, however,

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174 *See* Oct 18, 2012 Tr. at 2153:24-2155:3 (O'Kula).

175 *See id*. at 2196:21-24 (Lemay).

176 *Id.* at 2190:23-2191:2 (Teagarden).

177 *See id*. at 2184:23-24 (Lemay).

178 *Id.* at 2191:2-6 (Teagarden).

179 *Indian Point*, LBP-13-13, slip op. at 285-86.

180 *Id*. at 287 (citing NRC Staff Testimony at 90 (A81) (NRC000041)).

181 NYS Petition at 23.

rejected that argument after weighing the evidence, correctly noting that "the decontamination times selected by Entergy are appropriate given the need to develop a decontamination time representative of all possible severe accident scenarios."[182] The TIMDEC values posited by Dr. Lemay, in contrast, purportedly are based on the Chernobyl and Fukushima events and represent single, extreme accident scenarios.[183] As the Board noted, using such scenarios in a MACCS2-based *SAMA analysis* "would require weighting them by their low probability of occurrence."[184]

New York claims that it submitted "uncontroverted" evidence that Fukushima is within the range of severe accidents that Entergy chose to model for the SAMA analysis. [185] New York's argument misses the point. Entergy's and the Staff's experts testified (and the Board agreed) that a SAMA analysis necessarily considers a broad spectrum of accident scenarios and release categories, including those that involve minimal or no failure of the containment (and thus lower accident source terms).[186] Therefore, the TIMDEC inputs to the MACCS2 code must be representative of all of the modeled accidents; *i.e.*, accidents with Fukushima-like source terms as well as accidents with much smaller source terms (*e.g.*, the TMI-2 partial core meltdown).[187] New York's focus on the "more severe end of the release spectrum" is inconsistent with the goals of a best-estimate SAMA analysis and established NEPA principles.[188]

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182 *Indian Point*, LBP-13-13, slip op. at 287.

183 *See* NYS Petition at 23.

184 *Indian Point*, LBP-13-13, slip op. at 285. *See also* Entergy Reply to NYS Proposed Findings at 55-56.

185 NYS Petition at 23.

186 *See* Oct. 18, 2012 Tr. at 2153:24-2155:3 (O'Kula); NRC Staff Testimony at 90 (A81) (NRC000041). In other words, the Indian Point SAMA analysis is not a worst-case analysis. Nor is it, as New York wrongly suggests, a "best case scenario for environmental harm." NYS Petition at 30.

187 *See* Oct. 18, 2012 Tr. at 2153:24-2155:3 (O'Kula); NRC Staff Testimony at 90 (A81) (NRC000041).

188 *See Pilgrim*, CLI-12-1, 75 NRC at 56-57 (rejecting intervenor's argument that NEPA requires a cost-benefit mitigation analysis to be based on the 95th percentile accident consequence level, and stating that at NEPA does not require a "worst case" inquiry). It bears emphasis that the Fukushima accident was an extraordinary event that resulted from one of the largest earthquakes ever recorded and a resultant tsunami that impacted a large region; *i.e.*, it a severe reactor accident caused by an unprecedented external event. *See* Oct. 18, 2012 Tr. at 2210:1-5 (Teagarden).

c. Use of "Averaging" in the SAMA Analysis

New York also argues that the Board misunderstood how averaging is used in the SAMA analysis.[189] It claims that because the more severe release categories make the largest contribution to the total offsite economic cost risk for Indian Point, the values for input parameters should more closely align with the accidents that are relatively more severe.[190] Contrary to New York's claim, Entergy's and Staff's experts fully refuted that argument to the Board's satisfaction.

It is New York—not the Board—that has misunderstood the relevant concepts. Relying on Entergy's expert testimony, the Board correctly stated that "a SAMA analysis 'models numerous accident release conditions that could, based on probabilistic analysis, occur at any time under varying weather conditions during a one-year period. The goal is to estimate annual average impacts for the entire 50-mile radius study area.'"[191] As the Board further noted, a SAMA analysis "takes into account the probabilities of accident scenarios"; *i.e.*, it is a *frequency-weighted* analysis.[192] Accordingly, the SAMA analysis is not intended to skew the results in favor of the most severe (but least likely) accident scenarios, as New York advocates.

Further, a SAMA analysis makes use of "averaging" techniques insofar as it computes *mean annual* risk metrics that represent the mean cumulative impacts from postulated severe accidents (*i.e.*, dose and economic costs) to all individuals and land within a 50-mile radius of the plant.[193] In other words, the SAMA analysis is a time- and spatially-averaged analysis. Importantly, the Commission has endorsed the use of both probabilistic (*i.e.*, frequency-weighting) and averaging methods in a SAMA analysis:

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189 *See* NYS Petition at 27.

190 *Id*. at 30

191 *Indian Point*, LBP-13-13, slip op. at 287-88 (citing Entergy Testimony at 18 (ENT000450)).

192 *Id*. at 33.

193 *See id*.

> As a mitigation analysis, NRC SAMA analysis is neither a worst-case nor a best-case impacts analysis. It is NRC practice to utilize the *mean values of the consequence distributions* for each postulated release scenario or category—the mean estimated value for predicted total population dose and predicted off-site economic costs. These mean consequence values are multiplied by the *estimated frequency of occurrence of specific accident scenarios* to determine population dose risk and offsite economic cost risk for each type of accident sequence studied. There is in SAMA analysis, therefore, an averaging of potential consequences.[194]

The Board's decision thus reflects a correct understanding of these established methods, as previously approved by the Commission and properly applied in the Indian Point SAMA analysis.

D. The Board Correctly Concluded That the Nonfarm Area Decontamination Cost Values Used in the Indian Point SAMA Analysis Are Reasonable Under NEPA

The Board also correctly concluded, based on a preponderance of the evidence, that the nonfarm area decontamination cost (CDNFRM) values used in Entergy's SAMA analysis are reasonable under NEPA.[195] New York claims that the Board committed factual and legal errors by accepting the argument that the "pedigree" of Sample Problem A supports its continued use because the values were sourced from NUREG-1150.[196] As shown below, the Board's ruling, which is based on extensive expert testimony, is both technically and legally sound.

1. The Board's Findings and Conclusions Are Fully Supported by the Record and Consistent with Established NEPA Jurisprudence

Like its other findings, the Board's determination that Entergy's use of CDNFRM values derived from NUREG-1150 was reasonable under NEPA is based on the record evidence, including the expert opinions of Entergy and NRC Staff witnesses. Indeed, in summarizing its findings, the Board explained that because "NUREG-1150 was made available for public comment and was subjected to peer review, and based upon the . . . the witnesses' testimony, we

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[194] *Pilgrim,* CLI-10-11, 71 NRC at 316 (emphasis added).

[195] *Indian Point*, LBP-13-13, slip op. at 280-81.

[196] NYS Petition at 3.

find that the use of the NUREG-1150 CDNFRM values was not unreasonable."[197] The Board's ruling also reflects its application of established NEPA principles. Specifically, the Board found that, consistent with NEPA's rule of reason, Entergy and the NRC Staff "acted 'based on the best available information and analysis' in completing the SAMA evaluation."[198]

2. New York's Claims of Error Lack Merit

New York presents no information to suggest that the Board committed any clear factual or legal error in finding that the CDNFRM values applied in the Indian Point SAMA analysis are reasonable under NEPA. In fact, the arguments set forth in its Petition were fully addressed by Entergy and the NRC Staff at hearing and ultimately rejected by the Board after its careful review of the evidence. Accordingly, there is no need for Commission review of the Board's ruling.

a. Alleged Lack of Primary Source, Peer Review, and Scientific Integrity With Respect to NUREG-1150 Decontamination Cost Values

New York claims that the Board erred by deferring to the NRC Staff's acceptance of decontamination cost values that are based on a study that is unavailable and cannot be verified.[199] It also asserts that the Board relied on unsupported assumptions and speculation by Entergy and Staff experts in concluding that the NUREG-1150 values were peer reviewed.[200] As discussed below, New York has not accurately characterized the record or the Board's decision.

First, rather than merely "deferring" to the NRC Staff, the Board clearly described the factual bases for its ruling, including the testimony and evidence on which that ruling is based. In particular, the Board found that:

- The NUREG-1150 CDNFRM values can be traced to NUREG/CR-3673, which estimated the offsite costs of post-accident population protective measures and public

197 *Indian Point*, LBP-13-13, slip op. at 291.

198 *Id*. (citing *Balt. Gas & Elec. Co. v. Nat. Res. Def. Council*, 462 U.S. 87, 102 (1983)).

199 NYS Petition at 32.

200 *Id*. at 39

health impacts for severe light-water reactor accidents, including non-farm area decontamination costs (*i.e.*, CDNFRM).[201]

- NUREG/CR-3673 states that the decontamination cost estimates used therein for various levels of decontamination effort in an area "are taken from a detailed review of decontamination effectiveness and costs performed at Sandia National Laboratories (SNL)." That detailed review apparently was documented in an unpublished report by Dr. Robert Ostmeyer and Dr. Gene Runkle.[202]

- The key economic input parameters, including CDNFRM, were reviewed and a best-estimate was recommended during the NUREG-1150 peer review process. Entergy's reliance on the input values obtained from NUREG-1150 is justified by the peer reviews conducted on documents using the same CDNFRM value.[203]

- The use of the challenged NUREG-1150 CDNFRM values (as appropriately escalated) is standard, as evidenced by their use in all prior NRC-approved SAMA analyses.[204]

- Entergy and the NRC Staff witnesses testified that they considered the appropriateness of the NUREG-1150 numbers to the IPEC SAMA analysis, and concluded that they are reasonable values.[205]

Second, in its decision, the Board squarely addressed and rejected New York's assertion that the Ostmeyer Report's present unavailability renders the CDNFRM values in NUREG-1150 scientifically unreliable:

> [T]he Board does not find that the document's unavailability renders the NRC Staff's or Entergy's reliance on the NUREG-1150 decontamination cost values "altogether unreasonable" under NEPA. The NUREG/CR-3673 authors had access to the Ostmeyer report when they prepared NUREG/CR-3673. Moreover, NUREG/CR-3673 expressly states that Dr. Ostmeyer provided technical assistance and advice during the preparation of NUREG/CR-3673. Thus, we do not agree with New York that NUREG/CR-3673 is necessarily an unreliable source.[206]

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201 *Indian Point*, LBP-13-13, slip op. at 285-86. Contrary to New York's claim, NRC Staff witnesses did not "change" their testimony and "admit" that the NUREG-1150 nonfarm area decontamination cost values may be based on data for nuclear weapons releases and test sites. NYS Petition at 35. Mr. Jones and Dr. Ghosh testified that they had no reason to believe that NUREG/CR-3673 authors had considered anything other than nuclear power plant severe accident source terms in their report. *See* Oct. 17, 2012 Tr. at 2011:11-17 (Jones); *id.* at 2011:18-25 (Ghosh). Dr. O'Kula agreed with them. *See id*. at 2015:7-10 (O'Kula).

202 *Id*. at 290.

203 *Id*. at 289.

204 *Id*.

205 *Id*. at 291.

206 *Id*. at 290 (internal citations omitted).

As the Board noted, "NEPA does not require agencies to resolve all uncertainties," including, in this case, uncertainties related to the Ostmeyer Report.[207] In fact, NEPA imposes "no legal requirement that a methodology be 'peer-reviewed and published in a credible source.'"[208]

Finally, the Board did not rely on speculation in concluding that "Entergy's reliance on the input values obtained from NUREG-1150 is justified by the peer reviews conducted on documents using the same CDNFRM value."[209] The Board's finding is based on considerable record evidence and reflects the shared views of Entergy's and the NRC Staff's experts. For example, Entergy witness Mr. Teagarden testified that standard MACCS2 modeling for NRC assessments (including SAMA analysis) uses NUREG-1150 input values due to their well-established pedigree within the PRA community.[210] Dr. O'Kula noted that NUREG-1150 was made available for public comment, and that it was subjected to multiple peer reviews that involved an "unprecedented" level of technical scrutiny.[211] Entergy's experts further testified that the NUREG-1150 values relied on by Entergy and other applicants "represent the best values that are available for a SAMA analysis," and that they "know of no technically superior values to use for the MACCS code input for these [parameters]."[212]

Notably, Dr. O'Kula and Mr. Teagarden also cited the NRC's use of the NUREG-1150 values in the recently-completed SOARCA project as further evidence of their continued

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207 *Id*. at 291 (citing *Izaak Walton League of Am. v. Marsh*, 655 F.2d 346, 377 (D.C. Cir. 1981)).

208 *Lands Council v. Martin*, 529 F.3d 1219, 1226 (9th Cir. 2008) ("We find no legal requirement that a methodology be 'peer-reviewed or published in a credible source.' Plaintiffs cite 40 C.F.R. §§ 1500.1(b) and 1502.24, but those regulations contain no such requirements and do not even mention peer review or publication.").

209 *Indian Point,* LBP-13-13, slip op. at 289.

210 Entergy Testimony at 72 (A95) (ENT000450); Oct. 17, 2012 Tr. at 1951:21-1952:1 (Teagarden).

211 Oct. 18, 2012 Tr. at 2370:2-2372:9 (O'Kula); *see also* Entergy Testimony at 21-22 (A35), 55 (A72) (ENT000450); NRC Staff Testimony at 46 (A39) (NRC000041) ("NUREG-1150 included an economic analysis and was subjected to an extensive peer review and public comment. Two peer reviews were conducted on the second version of NUREG-1150, one of which was NRC sponsored, and the second was sponsored by the American Nuclear Society."); NUREG-1150, Vol. 1 at 1-2 (NYS000252A) (summarizing the public comment and peer review processes for NUREG-1150).

212 Oct. 17, 2012 Tr. at 2040:2-5 (Teagarden); *id*. at 2043:24-2044:4 (Ms. Potts).

applicability and suitability for use in SAMA analyses.[213] Similar testimony was provided by the Staff's experts, one of whom stated that "the exercise of reviewing [New York's] alternative input parameters has given [the Staff] a great degree of confidence that the original [NUREG-1150] values are reasonable"[214] Thus, New York's criticisms of the Board's findings regarding the reasonableness of NUREG-1150 values are unfounded. Moreover, as the Commission has noted, "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts."[215]

b. Rational Basis for Use of NUREG-1150/Sample Problem A Values

New York also states that neither Entergy nor the NRC Staff provided a "documented, rational basis" for the use of CDNFRM values derived from NUREG-1150/Sample Problem A in the SAMA analysis.[216] That statement is incorrect and overlooks the record evidence. As the Board noted, Entergy and the NRC Staff witnesses testified that they considered the applicability of the NUREG-1150 CDNFRM values (as appropriately escalated) for use in the Indian Point SAMA analysis.[217] In fact, the Staff sought additional written justification, which Entergy provided in the form of the February 2008 RAI response mentioned above.[218]

As discussed in the RAI response and by Entergy's experts, NUREG-1150's supporting technical documentation (NUREG/CR-3673) indicates that the CDNFRM values reflect

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213 Entergy Testimony at 62 (A78) (ENT000450) (citing NUREG-1935, State-of-the-Art Reactor Consequence Analyses (SOARCA) Report, Draft Report for Public Comment, at 61, 63 (Jan. 2012) (ENT000455)); Oct. 17, 2012 Tr. at 1951:17-21 (Teagarden). The final version of NUREG-1935 was published in November 2012, after the hearing on NYS-12C was held. The final report does not reflect any significant substantive changes from the draft report. *See* NUREG-1935, State-of-the-Art Reactor Consequence Analyses (SOARCA) Report (Nov. 2012), *available at* ADAMS Accession Nos. ML12332A057 and ML12332A058.

214 Oct. 18, 2012 Tr. at 2158:13-2161:25 (Harrison); *id.* at 2251:13-24 (Jones).

215 *Pac. Gas & Elec. Co.* (Diablo Canyon Power Plant Indep. Spent Fuel Storage Installation), CLI-08-26, 68 NRC 509, 518 n.50 (2008) (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)).

216 NYS Petition at 43.

217 *Indian Point*, LBP-13-13, slip op. at 291.

218 *Id*. (citing Oct 17 Tr. at 2080:13–2081:3 (Potts)).

consideration of different decontamination methods, land uses, and accident magnitudes.[219] Mr. Teagarden noted that the NUREG-1150 nonfarm decontamination cost values were applied universally across the five different sites examined in the NUREG-1150 study (including the Zion site with its urban environs),[220] suggesting that "in the developer's minds, those values were sufficiently applicable to each of the sites."[221] He also testified that, in his expert opinion, the CDNFRM value was intended to be a "global value" because the NUREG-1150 study, like a SAMA analysis, examined regions encompassing approximately 7,800 square miles and multiple land uses.[222]

NRC Staff witnesses Mr. Harrison provided consistent testimony on this issue. Specifically, he testified that NUREG/CR-3673 recognizes that the use of standardized decontamination cost values is reasonable when evaluating the potential decontamination costs for non-farm areas impacted by a postulated severe accident, as is done in a SAMA analysis, especially given the uncertainties inherent in such estimates.[223] But, as discussed above, because the CDNFRM values are applied on a per-person basis by MACCS2, they allow for site-specific decontamination cost estimates that account for high-population areas within the SAMA analysis

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219 *See* Entergy Proposed Findings at 80-81.

220 In its Petition, New York refers repeatedly to the "urban" and "hyper-urban" areas within the Indian SAMA analysis region, and their "uniquely high population and building density." Other nuclear power plants, including the now-decommissioned Zion plant examined in NUREG-1150, are located in proximity to major urban centers. As Staff witness Mr. Jones testified, Zion is located north of Chicago and had an emergency planning zone population density comparable to that of IPEC. Specifically, Zion had half of the total population but similar density to Indian Point due to its location on the shores of Lake Michigan. *See* Oct. 17, 2012 Tr. at 1968:19-21 (Jones); Oct. 18, 2012 Tr. at 2379:11-20 (Jones).

221 Oct. 18 Tr. at 2246:13-14 (Teagarden).

222 *Id*. at 2246:17-20 (Teagarden).

223 NUREG/CR-3673 states that detailed decontamination cost estimates based on land usage mapping or specific area types is not justified for risk models "because areas requiring decontamination are large enough that *average values provide reasonable cost estimates*." NUREG/CR-3673 at 4-17 (ENT000466) (emphasis added). It also notes that the large uncertainties inherent in estimates of reactor accident radionuclide release processes (*e.g.*, source terms), atmospheric transport and deposition, decontamination effectiveness, and decontamination costs limit the usefulness of more detailed analyses. *Id.* Thus, more detailed or localized decontamination cost estimates (even assuming they could be developed) are not necessarily better suited for use in a time-averaged and spatially-averaged SAMA analysis.

region. Thus, contrary to New York's claim, they are "rationally related" to the Indian Point site.

c. Alleged Failure to Consider New York's Alternative CDNFRM Values

New York further asserts that Board erred because it did not consider Dr. Lemay's proposed alternative CDNFRM values (referred to as "ISR Approaches A through D"), which, as discussed below, are based on data that have no demonstrated applicability to nuclear power plant severe accidents and/or unsupported technical assumptions.[224] However, in its decision, the Board discussed Dr. Lemay's alternative CDNFRM values, and explained why they did not alter the Board's ultimate conclusion; *i.e.*, that Entergy's CDNFRM values are reasonable under NEPA.[225] The Board emphasized that New York had not proposed the alternate CDNFRM values as "replacement" values.[226] Instead, New York claimed only that Dr. Lemay's proposed CDNFRM values undermined the reasonableness of Entergy's values. Based on its review of the evidence, the Board disagreed, and found that none of New York's arguments rendered Entergy's selected CDNFRM values "altogether unreasonable under NEPA."[227] In reaching this conclusion, the Board correctly applied controlling Commission precedent:

> Dr. Lemay merely offered an alternative approach to developing an appropriate CDNFRM value …. But we are mindful that this is a NEPA-based contention, and that all NEPA requirements are governed by a rule of reason. We are further guided by the Commission's holdings that "the proper question is not whether there are plausible alternative choices for use in the analysis, but whether the analysis that was done is reasonable under NEPA"; and therefore, "the question is not whether more or different analysis can be done" since "it may always be possible to

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224 NYS Petition at 46-50.

225 *Indian Point*, LBP-13-13, slip op. at 276-279 (briefly describing Dr. Lemay's methodology to calculate purportedly site-specific CDNFRM values for the IPEC SAMA analysis region, and noting that "Dr. Lemay made clear that his approach to calculate site-specific CDNFRM values was not an independent SAMA analysis and was not intended to be used as a substitute analysis to satisfy NEPA"); *see also id.* at 291-92 (noting that "Dr. Lemay merely offered an alternative approach to developing an appropriate CDNFRM value," and finding that "the use of the NUREG- 1150 CDNFRM values was not unreasonable").

226 *Id*. at 292.

227 *Id*. at 290.

> conceive of alternative and more conservative inputs, whose use in the analysis could result in greater estimated accident consequences."[228]

Thus, because the Board found Entergy's CDNFRM values to be reasonable, it found no need to delve into the details of Dr. Lemay's various approaches within the four corners of its decision.[229]

In any case, Entergy's and the Staff's experts amply demonstrated that Dr. Lemay's proposed CDNFRM values are based on inapplicable data and flawed assumptions.[230] Thus, his values do not provide viable alternatives or reasonable comparison points, or bear the imprimatur of NRC review and approval. In fact, the information sources on which Dr. Lemay based his ISR Approach A and B decontamination cost estimates are inapplicable to nuclear power plant severe accidents. Those sources focus on cleanup and decontamination following (1) a plutonium dispersal event (*e.g.*, detonation of a nuclear weapon) and (2) detonation of a radiological dispersion device, both of which differ in major respects from cleanup of fission products from a severe reactor accident.[231] Indeed, Dr. Lemay himself described them as "not ideal."[232]

With regard to the ISR Approach C and D decontamination cost estimates, the Staff's and Entergy's witnesses demonstrated that those estimates also are unreliable because, among other things, they fail to account for mass conservation principles, as applied in MACCS2, as well as the non-uniform nature of contamination within a building.[233] Staff witness Mr. Jones explained that

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228 *Id*. at 291 (citing *Seabrook*, CLI-12-05, 75 NRC at 323; *Pilgrim*, CLI-12-15, 75 NRC at 714).

229 As reflected in the transcript of the October 18, 2012 hearing, the Board and parties' witnesses discussed Dr. Lemay's various approaches and associated assumptions at length. *See*, *e.g.*, Oct. 18, 2012 Tr. at 2105-170, 2352-369.

230 *See generally* Entergy Testimony at 89-123 (A110-A151), 129-32 (A160) (ENT000450); NRC Staff Testimony at 69-94 (A62-A84) (NRC000041).

231 *See* Entergy Testimony at 25 (A40), 68-69 (A90) (ENT000450); NRC Staff Testimony at 13 (A6a), 77-78 (A69) (NRC000041).

232 Oct. 17, 2012 Tr. at 2012:11-13 (Lemay). Dr. Lemay also made unsupported technical assumptions that are integral to his cost estimates, including the assumption that cesium decontamination costs always equal or exceed plutonium decontamination costs. *See* Entergy Proposed Findings at 92-94 (¶¶ 180-83); NRC Staff Proposed Findings at 29-30 (¶ 5.53).

233 NRC Staff Testimony at 78 (A69), 83 (A74) (NRC000041); Oct. 18, 2012 Tr. at 2143:19-2145:2, 2147:8-12 (Bixler); *id*. at 2152:14-2156:15 (O'Kula); *id*. at 2167:19-2169:3 (Teagarden).

mass balance is important because MACCS2 calculates an amount of contamination per unit area as if the contamination is being deposited on a flat plane, such as a perfectly horizontal surface.[234] He further explained that applying additional multipliers that effectively increase the base areas used in MACCS2—without equally reducing the amount of contamination in this area—results in artificially high decontamination cost estimates.[235] Dr. Bixler, Dr. O'Kula, and Mr. Teagarden, all of whom are MACCS2 experts, fully agreed with Mr. Jones on these points.[236] Dr. Lemay ultimately conceded that MACCS2 accounts for mass balance of contamination.[237]

Furthermore, Entergy's and the Staff's witnesses testified that Dr. Lemay incorrectly assumed uniform distribution of contamination on the inside of a building, such that all surfaces would be decontaminated equally (*i.e.*, in bulk).[238] By using this assumption, and also selecting the highest labor-cost procedure for decontamination activities from the CONDO database, Dr. Lemay subjectively and artificially inflated the estimated decontamination costs.[239] Mr. Jones, who has actual decontamination experience, testified that there is no technical basis for assuming uniform distribution of contamination on either the interior or exterior surfaces of a building.[240] In short, he explained that a severe accident (as modeled in MACCS2) would release a finite amount of radioactive contamination that cannot be deposited in equal quantities on *all* interior and exterior surfaces; to assume so would violate conservation of mass principles.[241] Rather, as both

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234 NRC Staff Testimony at 79-80 (A71); *see also* Oct. 18, 2012 Tr. at 2117:25-2118:12 (Jones).

235 NRC Staff Testimony at 78 (A69) (NRC000041).

236 *See* Oct. 18, 2012 Tr. at 2143:19-2145:2, 2147:8-12 (Bixler); *id*. at 2152:14-2156:15 (O'Kula); *id*. at 2167:19-2169:3 (Teagarden).

237 Oct. 18, 2012 Tr. at 2176:24-2177:3 (Lemay) ("I would like to concede to Dr. Bixler that indeed MACCS has mass conservation between the plume and the contamination deposited on the ground. So what goes on the ground is taken off from the plume. That is absolutely correct.").

238 *See* NRC Staff Testimony at 79-81 (A71) (NRC000041); Entergy Testimony at 118-20 (A143-44) (ENT000450).

239 *See* Entergy Testimony at 119-20 (A144) (ENT000450).

240 *See* NRC Staff Testimony at 83-84 (A74-75) (NRC000041).

241 *See id.* at 78 (A69) (NRC000041); Oct. 18, 2012 Tr. at 2116:20-2117:1, 2117:25-2118:12 (Jones).

Entergy and Staff witnesses explained, decontamination efforts necessarily focus on the most contaminated surfaces (*e.g.,* on the ground floor of a building and near ventilation systems, where contamination is more likely to enter the building) with the goal of restoring habitability.[242]

Mr. Jones and Dr. O'Kula testified that if appropriate corrections are made to Dr. Lemay's ISR Approach C decontamination cost estimates (*i.e.*, Dr. Lemay's values are "renormalized" to account for mass conservation and the non-uniform nature of contamination within a building), then the resulting CDNFRM values are comparable to those used in the IPEC SAMA analysis.[243] This fact further undermines New York's claim that the Board erred by purportedly failing to more fully consider Dr. Lemay's alternative approaches or associated values.

Finally, Entergy's and the Staff's experts explained that Dr. Lemay's alternative CDNFRM and TIMDEC values are so inordinately large that they are inconsistent with the MACCS2 code's internal logic and fall outside the code's accepted input range.[244] Indeed, only by modifying the MACCS2 source code could Dr. Lemay use his alternative values as inputs to the MACCS2 software.[245] Importantly, the Commission has deemed such fundamental code alterations as "far beyond NEPA requirements."[246]

In summary, contrary to its assertions, New York did not provide "realistic and readily-available" economic cost inputs that are supported by "corroborating scientific evidence" and can be applied in a site-specific SAMA analysis.[247] As such, it failed to propose reasonable alternative

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242 *See*, *e.g.*, NRC Staff Testimony at 83 (A74).

243 *See* NRC Staff Testimony at 82-83 (A73) (NRC000041); Oct. 18, 2012 Tr. at 2365:4-16, 2366:4-12 (O'Kula).

244 *See* Entergy Testimony at 77-80 (A102-03) (ENT000450); NRC Staff Testimony at 89-90 (A81) (NRC000041).

245 *See* Entergy Testimony at 73-75 (A98-A99) (ENT000450); Oct. 18, 2012 Tr. at 2199:25-2202:5, 2273:3-2274:4 (Bixler).

246 *See Pilgrim*, CLI-12-1, 75 NRC at 60 (rejecting an intervenor's demand that the MACCS2 code be rewritten to contain an alternative atmospheric transport and dispersion plume model as "far beyond NEPA requirements" and explicitly noting that "NEPA does not require the NRC [or its licensees] to engage in an extensive revision of the MACCS2 code").

247 NYS Petition at 15.

inputs or methodologies that, if adopted, would lead to a "more accurate or meaningful" SAMA analysis.[248] NEPA, moreover, does not require that licensees engage in an extensive, world-wide research project to find alternate MACCS2 input values not previously reviewed or approved by the NRC.[249] Thus, there no factual or legal grounds on which New York can claim Board error.

d. Alleged Significance of NRC Response to Comments on Draft NUREG-1150

In its Petition, New York cites two NRC responses to public comments on *draft* versions of NUREG-1150 as purported evidence that NUREG-1150 economic values are unreliable.[250] In the first case, the NRC Staff stated as follows in response to a public comment:

> The present version of NUREG-1150 provides a limited set of risk-reduction calculations, principally related to the potential benefits of accident management strategies in reducing core damage frequency. It does not assess the cost of these or other improvements. Such analyses are more properly considered in the context of specific regulatory action.

In the second case, the Staff responded to another public comment as follows:

> The draft NUREG-1150 cost/benefit analyses reflected the conventional NRC methods for assessing costs and benefits. Because cost/benefit analyses are more properly considered in the context of specific regulatory activities, they are not provided in this version of NUREG-1150.[251]

New York inexplicably asserts that these NRC responses to comments on drafts of NUREG-1150 indicate that site-specific estimates of decontamination costs would be developed in the future.[252] It further claims that "[t]he fact that the final version of NUREG-1150 removed the calculation of economic costs actually supports the State's argument—that economic costs should be calculated

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248 *Seabrook*, CLI-12-5, 75 NRC at 324.

249 *See Pilgrim*, CLI-10-11, 71 NRC at 315-16 ("There is no NEPA requirement to use the best scientific methodology, and NEPA should be construed in the light of reason if it is not to demand virtually infinite study and resources. Nor is an environmental impact statement intended to be a research document.") (internal citations and quotation marks omitted).

250 *See* NYS Petition at 36-38.

251 *See* NUREG-1150, Vol. 3, App. D at at D-31 - D-32 (NYS00252D); *see also* Oct 17, 2012 at 2023:15-2024:13, 2025:3-19 (Lemay)

252 NYS Petition at 37.

on a site-specific basis."[253]

New York's arguments are baseless. First, for the reasons discussed above and in LBP-13-13, the Board correctly found that Entergy's SAMA analysis did include "a site-specific decontamination cost estimate."[254] Second, New York takes the NRC Staff statements quoted above completely out of their proper factual contexts. As Dr. O'Kula explained, the first NRC response cited by Dr. Lemay relates to a comment on the first (February 1987) draft of NUREG-1150.[255] In stating that the 1987 draft "does not assess the costs of these or other improvements," the Staff was referring specifically to "potential benefits of accident management strategies in reducing core damage frequency;" *viz.*, the effects of plant *operational procedures* to provide water and cooling to a reactor core to prevent damage.[256] The response, therefore, does not speak to the adequacy of the NUREG-1150 economic or decontamination cost values or their applicability to a site-specific SAMA analysis, which was not even an NRC requirement when NUREG-1150 was prepared and published.[257]

The second comment response cited by New York has no apparent relevance to the final NUREG-1150 report's assessment of severe reactor accident economic costs. It refers only vaguely to cost/benefit analyses performed in the context of "specific regulatory activities" (presumably such as rulemaking or backfit proceedings). Thus, the cited NRC statements do not support New York's claim that the NUREG-1150 CDNFRM values are unreliable.

e. Alleged Failure to Address Internal NRC E-mail

New York contends that the Board erred because its decision does not mention an internal

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253 *Id.* at 38.

254 *Indian Point*, LBP-13-13, slip op. at 283.

255 *See* Oct. 17, 2012 Tr. at 2034:8-13 (O'Kula).

256 *See id.* at 2034:24-2035:5 (O'Kula); NUREG-1150, Vol. 3, App. D at D-6 (NYS00252C).

257 Oct. 17, 2012 Tr. at 2034:20-23 (O'Kula).

NRC e-mail chain "that expresses views contrary to the positions taken by NRC Staff and Entergy that the NUREG-1150 values are reasonable due to their pedigree."[258] Specifically, the e-mail contains a statement by an NRC Staff member that the pedigree of some Sample Problem A inputs values "is not known."[259] As explained below, New York's argument does not raise a "substantial question" or identify any clear error, as required by 10 C.F.R. § 2.341(b)(4).

As an initial matter, "the Board was not required to address every piece of record evidence. Its decision not to do so here does not constitute clear error, nor does it indicate that the Board did not take that evidence into account."[260] Nonetheless, the Board fully explained the bases for its conclusion that Entergy's reliance on the input values obtained from NUREG-1150 was reasonable under NEPA.[261] In doing so, the Board rejected New York's argument that the NUREG-1150 values lack a sufficient pedigree.

In any event, the e-mail string in question should be accorded no weight. As NRC Staff witness Dr. Ghosh explained, the referenced e-mail related to a research proposal submitted by a now-deceased NRC Staff member in late 2010 as part of the NRC's FY 13 Long-Term Research Program ("LTRP").[262] A review committee comprising senior NRC Staff members evaluated the proposal and excluded it from the FY 13 LTRP. The committee assigned one of the lowest score in the "technical gap" element, indicating the members' expert judgment that the proposal identified no important technical gap in NRC's existing regulatory tools and practices.[263] The

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258 *See* NYS Petition at 41-42.

259 *See* E-mail from C. Ader, Office of New Reactors ("NRO") to M. Johnson, NRO: Subject: FW: Action YT-2011-0003: Request Parallel Concurrence on Document: Agency Long-Term Research Activities for Fiscal Year 2013 (Jan. 19, 2011) (NYS000441).

260 *See Honeywell Int'l, Inc.* (Metropolis Works Uranium Conversion Facility), CLI-13-1, 77 NRC 1, 27 (2013).

261 *See Indian Point*, LBP-13-13, slip op. at 288-92.

262 See Affidavit of S. Tina Ghosh Concerning State Of New York Motion For Leave To File An Additional Exhibit And Additional Cross-Examination Questions Concerning Consolidated Contention NYS-12C (Sept. 28, 2012) ("Ghosh Affidavit") (NRC000164); Oct. 18, 2012 Tr. at 2328:11-24 (Ghosh).

263 Ghosh Affidavit at 4 (NRC000164).

document at issue thus does not support New York's claim that use of the NUREG-1150 values is unreasonable, or that the Board committed factual, legal, or prejudicial procedural error.

f. Severe Accident Costs Accounted for by MACCS2

Throughout this proceeding, New York has maintained that its contention does not challenge Entergy's use of the MACCS2 code *per se*.[264] Yet, in its Petition, New York also criticizes the Board's decision for not recognizing that there are categories of costs associated with a severe accident that are not included in the MACCS2 code calculations.[265] In particular, it cites costs associated with the loss of natural resources, including contaminated drinking water.[266] New York also states that "[t]here is no requirement, regulatory or otherwise, that the MACCS2 code be used in a SAMA analysis," thereby implying that Entergy and the NRC Staff should have used some (unidentified) alternate methodology.[267]

Again, New York fails to identify any clear, material error by the Board that warrants Commission review. The argument that MACCS2 does not account for costs associated with cleaning bodies of contaminated drinking water is factually incorrect. As Staff witness Dr. Bixler explained at the hearing, although MACCS2 does not incur such costs as a clean-up expense, it models the contaminated water as being consumed and thus accounts for the costs of the contaminated water through the dose imposed on the population.[268]

Moreover, the hearing record establishes that use of the MACCS2 code in a SAMA analysis is entirely reasonable. Both Entergy's and the Staff's experts testified that MACCS2 is the standard tool used in the U.S. to perform the offsite consequence analysis in the Level 3

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264 *See*, *e.g.,* NYS Reply to Entergy/Staff Findings at 14.

265 *See* NYS Petition at 51-52.

266 *See id.* at 51.

267 *Id*.

268 Oct. 18, 2012 Tr. at 2278:21- 2279:2 (Bixler).

portion of the PRA (as performed in a SAMA analysis).[269] New York's expert did not disagree and, in fact, explicitly endorsed use of the MACCS2 code at the hearing.[270] Notably, the Commission itself has described MACCS2 as the "most current, established code for NRC SAMA analysis" and an NRC-endorsed tool.[271] Thus, there is no basis for any claim that Entergy's MACCS2-based SAMA analysis improperly excludes or underestimates relevant severe accident costs, especially as they relate to decontamination (the focus of New York's contention) and in view of the numerous significant conservatisms undergirding the SAMA analysis.[272]

E. The Board Did Not Err By Limiting Its Consideration to the Decontamination Time and Nonfarm Area Decontamination Cost Values Used in the SAMA Analysis

Contrary to New York's claim, the Board did not commit any error, factual or procedural, in focusing its decision on the reasonableness of the TIMDEC and CDNFRM inputs to Entergy's SAMA analysis. This fact is self-evident from the Board's decision, wherein the Board clearly explained the reason for its focus on those MACCS2 parameters: "It was uncontested that the TIMDEC and CDNFRM input values have the most significant impact among the MACCS2 parameters at issue here, with the others being essentially irrelevant to the MACCS2 model's

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269 NRC Staff Testimony at 21 (A12) (NRC00041); Entergy Testimony at 24 (A39), 77 (A101) (ENT000450). In fact, Entergy's experts testified that,a mong the U.S. consequence codes that are publicly available, MACCS2 is unique in its capability for modeling the relevant atmospheric transport and dispersion phenomenology and quantifying the consequences of interest needed for nuclear power plant severe accident risk studies, including SAMA analyses. *See* Entergy Testimony at 12-13 (A26) (ENT000450). Although other U.S. codes are available to assess dose and dose pathways, recovery options and strategies, only MACCS2 can evaluate these consequences and potential economic impacts in the context of a PRA-based, SAMA cost-benefit analysis. *See id.*

270 Oct. 18, 2012 Tr. at 2175:10-16 (Lemay). ("[T]he use of the MACCS2 code is not in question. I'm quite fond of the MACCS2 code. I think it's the right tool for doing this job. And all the statements relating to the use of the MACCS2 code in the NUREG-1150 just reinforced the fact that it's a good tool for these type of studies.").

271 *See Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 208 (2010); *Pilgrim*, CLI-12-15, 75 NRC 707 ("The NRC has endorsed use of the MACCS2 Accident Consequence Analysis (MACCS2) code to calculate estimated offsite consequences."); *see also* Pilgrim, CLI-12-1, 75 NRC at 41 ("The NRC uses MACCS2 to evaluate the potential offsite consequences of severe nuclear reactor accidents, and NRC-endorsed guidance on SAMA analysis endorses use of the MACCS2 code.").

272 *See* Entergy's Proposed Findings at 119-122 (summarizing the significant conservatisms in the IPEC SAMA analysis, as identified and discussed by the NRC Staff's and Entergy's experts in their testimony).

economic cost results. Therefore, the Board limits its consideration to these two values."[273]

As the Board noted, New York's expert, Dr. Lemay, stated that "[i]t was our assessment that CDNFRM and TIMDEC were the most important ones, and the rest had minimal impact on the calculation of the offsite economic cost."[274] Entergy's and the Staff's experts agreed.[275] Thus, there was full consensus that the Board should focus its inquiry on the TIMDEC and CDNFRM parameters.[276] New York has no basis to claim error now.

F. There Is No Need for the NRC Staff to Supplement the FSEIS

There is no factual or legal basis for New York's claim that the Board erred by not requiring the NRC Staff to prepare a revised SEIS to be circulated for public comment.[277] As shown above, New York has identified no material deficiency in the Indian Point SAMA analysis or the Staff's review thereof, as documented in the FSEIS.

In contrast, the NRC Staff clearly has met its NEPA obligations insofar as they pertain to Entergy's SAMA analysis. As documented in the Staff's FSEIS, hearing testimony, and proposed findings, the Staff has fully considered the information offered by the other parties and their experts as part of the LRA review and adjudicatory processes. The Staff has explained why Entergy's SAMA analysis inputs are reasonable and acceptable, discussed both uncertainties and conservatisms associated with the SAMA analysis, directly responded to the criticisms raised by New York and its consultants, and provided a reasoned explanation as to why those criticisms do not credibly alter the SAMA analysis conclusions.[278] "NEPA requires no more."[279]

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[273] *Indian Point*, LBP-13-13, slip op. at 272-73.

[274] *Id.* at 273 n. 1480 (citing Oct. 17, 2012 Tr. at 2054-55 (Lemay)).

[275] *See* Oct. 17, 2012 Tr. at 2053:18-2056:21 (Teagarden, Lemay, Bixler).

[276] In any event, Entergy's and the NRC Staff's experts testified as the bases and reasonableness of the other MACCS2 parameters cited by New York. Thus, nothing in the evidentiary record supports New York's claim of error.

[277] *See* NYS Petition at 59-60.

[278] *See generally* FSEIS, App. G (NYS00133I); NRC Staff Testimony (NRC00041); NRC Staff Proposed Findings.

Finally, as Entergy and the NRC Staff explained in their hearing submissions, the FSEIS is "deemed supplemented" by the Board's decisions on NEPA contentions and by any subsequent Commission decision.[280] Further, the NRC's record of decision ultimately will include the Board and Commission decisions, which are based on the adjudicatory record.[281] As it relates to Entergy's SAMA analysis, the environmental record already is sufficiently robust and fully consistent with NEPA's requirements

V. CONCLUSION

For the foregoing reasons, New York's Petition fails to raise a substantial question warranting review under the standards set forth in 10 C.F.R. § 2.341(b)(4). The Board correctly concluded that the NRC Staff met its obligations under NEPA and Part 51 as they relate to the Staff's review and evaluation of Entergy's SAMA analysis. Accordingly, New York's Petition should be denied, and LBP-13-13 should be affirmed.

Respectfully submitted,

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Dated at Washington, D.C. this 28th day of April 2014

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279 *Duke Energy Corp. (*McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003) (holding that NRC meets its obligations under NEPA when, based upon the available technical information, the mitigation analysis outlines relevant factors, discloses opposing viewpoints, and indicates particular assumptions under which the Staff ultimately concludes that specific SAMAs are potentially cost-beneficial).

280 *Pilgrim,* CLI-12-1, 75 NRC at 61 (citing *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-05-28, 62 NRC 721, 731 (2005)).

281 *See La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-06-15, 63 NRC 687, 707 n.91 ("Adjudicatory findings on NEPA issues, including our own in this decision, become part of the environmental 'record of decision' and in effect supplement the FEIS."); *La. Energy Servs., L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 89 (1998).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.	)	
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	
	)	April 28, 2014

CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305 (as revised), I certify that, on this date, copies of "Applicant's Answer Opposing the State of New York's Petition for Review of the Board's Partial Initial Decision (LBP-13-13)" were served upon the Electronic Information Exchange (the NRC's E-Filing System) in the above-captioned proceeding.

Signed (electronically) by Lance A. Escher

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