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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-346-LR
FIRSTENERGY NUCLEAR OPERATING COMPANY	)	
	)	
(Davis-Besse Nuclear Power Station, Unit 1)	)	
	)	July 26, 2012

FIRSTENERGY'S MOTION FOR SUMMARY DISPOSITION OF CONTENTION 4 (SAMA ANALYSIS SOURCE TERMS)

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I. INTRODUCTION

In accordance with 10 C.F.R. § 2.1205 and the Atomic Safety and Licensing Board's ("Board") Order dated January 30, 2012, FirstEnergy Nuclear Operating Company ("FirstEnergy") timely files[1] this Motion for Summary Disposition of Contention 4, which concerns FirstEnergy's severe accident mitigation alternatives ("SAMA") analysis under the National Environmental Policy Act ("NEPA") for Davis-Besse Nuclear Power Station, Unit 1 ("Davis-Besse").[2] Specifically, Contention 4 challenges FirstEnergy's use of the Modular Accident Analysis Program ("MAAP") computer code to determine plant-specific source terms and release fractions for use in its SAMA analysis. This Motion is based on FirstEnergy's revised SAMA analysis for Davis-Besse, which FirstEnergy submitted to the Nuclear Regulatory Commission ("NRC") on July 16,

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[1] The Board has stated that all motions in this proceeding, including motions for summary disposition and motions to dismiss, are subject to the promptness deadline specified in 10 C.F.R. § 2.323(a) and must be filed no later than ten (10) days after the occurrence or circumstance from which the motion arises. Atomic Safety and Licensing Board Order (Denying Motion for Leave to File a Motion for Reconsideration), slip op. at 5 (Jan. 30, 2012) (unpublished) ("January 30, 2012 Order"). This Motion has been timely filed within 10 days of FirstEnergy's submittal of its revised SAMA analysis on July 16, 2012. *See* n.3, *infra*. As discussed below, the revised SAMA analysis incorporates updated MAAP code runs that re-characterized the plant-specific source terms, including the radionuclide release fractions, used in the Davis-Besse SAMA analysis.

[2] This Motion is supported by FirstEnergy's Statement of Material Facts on Which There Is No Genuine Issue to be Heard (July 26, 2012) ("Statement of Material Facts") (Attach. 1) and the Joint Declaration of Kevin O'Kula and Grant Teagarden in Support of FirstEnergy's Motion for Summary Disposition of Contention 4 (SAMA Analysis Source Terms) (July 26, 2012) ("Joint Declaration" or "Joint Decl.") (Attach. 2). In accordance with ¶ G.3 of the Board's June 15, 2011, Initial Scheduling Order, FirstEnergy also has attached numerous other documents (or the relevant portions thereof) referenced in this Motion, the Statement of Material Facts, and the Joint Declaration.

2012.[3] Among other reasons, FirstEnergy prepared the revised SAMA analysis to reflect revised MAAP code runs that include plant-specific values for the masses of the relevant fission product elements instead of the isotopic activities of the elements, consistent with MAAP User's Group guidance.[4] The updated MAAP code runs updated the release characteristics and radionuclide release fractions of the 34 release categories considered in the Davis-Besse SAMA analysis and, combined with other revisions, increased the total calculated severe accident cost.

As discussed below, FirstEnergy is entitled to summary disposition as a matter of law. Summary disposition is appropriate when the record shows that there is no genuine dispute on a material issue of fact.[5] The relevant substantive law in this case—NEPA and 10 C.F.R. Part 51—defines which factual issues are material.[6] According to the Commission, the "proper question is not whether there are plausible alternative choices for use in the [SAMA] analysis, but whether the analysis that was done is reasonable under NEPA."[7] Therefore, "[t]o challenge an application, a petitioner must point with support to an asserted deficiency that renders the SAMA analysis unreasonable under NEPA."[8]

Contention 4 alleges that FirstEnergy's SAMA analysis "underestimates the true cost of a severe accident at Davis-Besse."[9] Intervenors allege that FirstEnergy has minimized the potential

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[3] Letter from John C. Dominy, Director, Site Maintenance, FirstEnergy, to Document Control Desk, U.S. N.R.C., "Correction of Errors in the Davis-Besse Nuclear Power Station, Unit No. 1, License Renewal Application (TAC No. ME4613) Environmental Report Severe Accident Mitigation Alternatives Analysis, and License Renewal Application Amendment No. 29 (July 16, 2012) ("Revised SAMA Analysis Submittal") (Attach. 5).

[4] *See id.*, Attach. 1 at 1.

[5] 10 C.F.R. § 2.710(d)(2).

[6] *See* 42 U.S.C. §§ 4321-4370 (2012); 10 C.F.R. Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions" (2012).

[7] *FirstEnergy Nuclear Operating Co.* (Davis-Besse Nuclear Power Station, Unit 1), CLI-12-08, 75 NRC __, slip op. at 17-18 (Mar. 27, 2012) (*citing NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12- 5, 75 NRC at __, slip op. at 28-29 (Mar. 8, 2012)).

[8] *Id.* at 18; *see also Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-15, 75 NRC __, slip op. at 13 (June 7, 2012) (stating that absent a "credible potential material deficiency in the [SAMA] analysis, there is no … demonstration of a material issue for hearing").

[9] *See* Beyond Nuclear, Citizens Environment Alliance of Southwestern Ontario, Don't Waste Michigan, and the Green Party of Ohio Request for Public Hearing and Petition for Leave to Intervene at 100, 104, 108 (Dec. 27, 2010) ("Petition" or "Pet.") (Errata filed Jan. 5, 2011); *FirstEnergy Nuclear Operating Co.* (Davis-Besse Nuclear Power Station, Unit 1), LBP-11-13, slip op. at 64 (Apr. 26, 2011).

amount of radioactive material released in a severe accident by using MAAP-generated source terms that are smaller for key radionuclides than the release fractions specified in NRC guidance.[10] Intervenors make three principal claims in support of their contention (which, for clarity and ease of reference, FirstEnergy refers to as Bases 1, 2 and 3):

1. The MAAP code "has not been validated by the NRC."[11] (Basis 1)

2. The radionuclide release fractions generated by MAAP "are consistently smaller for key radionuclides than the release fractions specified in NUREG-1465"[12] and result in "anomalously low" accident consequences.[13] (Basis 2)

3. It previously has been observed that MAAP generates lower release fractions than those derived and used by NRC in other severe accident studies.[14] (Basis 3)

Although the Commission allowed this aspect of admitted Contention 4 to stand on appeal, it aptly observed that Intervenors' "source term claims are weak."[15]

Section V of this Motion and the Joint Declaration demonstrate that there is no genuine issue of material fact arising from any of Intervenors' claims. FirstEnergy has retained two highly-qualified experts to perform thorough reviews of its SAMA analysis as well as Intervenors' challenge to that analysis.[16] In their Joint Declaration, these experts summarize the purpose of and methodologies required for a *site-specific*, *probabilistic* risk analysis—*i.e.*, SAMA analysis under

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[10] Pet. at 108.

[11] *Id.*

[12] *Id.* at 108, 112, 114.

[13] *Id.* at 112, 114

[14] *Id.* at 113.

[15] *Davis-Besse*, CLI-12-08, slip op. at 21.

[16] Dr. O'Kula is an Advisory Engineer with URS Safety Management Solutions LLC, a contractor to FirstEnergy. Mr. Teagarden is the Manager for Consequence Analysis for ERIN Engineering & Research, Inc., also a contractor to FirstEnergy. Dr. O'Kula's and Mr. Teagarden's professional qualifications are provided in Attachments 3 and 4, respectively, and are summarized in Section I of their Joint Declaration. Notably, in the *Pilgrim* license renewal proceeding, both the Licensing Board and the Commission relied extensively on the expert testimony of Dr. O'Kula in dismissing SAMA-related contentions both at the contention admissibility and merits stages of that proceeding. *See Entergy Nuclear Generation Co. & Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-11-18, 74 NRC __ slip op. (July 19, 2011), *aff'd*, CLI-12-01, 75 NRC __, slip op. (Feb. 9, 2012); *Entergy Nuclear Generation Co. & Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-12-01, 75 NRC __, slip op. (Jan. 11, 2012), *aff'd*, CLI-12-15 (June 7, 2012).

NEPA.[17] They further explain why Intervenors' criticisms of the MAAP code, as used in the Davis-Besse NEPA analysis, are unfounded.[18] Because Contention 4 raises no genuine issue of material fact with respect to the adequacy of FirstEnergy's SAMA analysis, including its use of the MAAP code, it should be dismissed as a matter of law.

II. PROCEDURAL BACKGROUND

On August 27, 2010, FirstEnergy submitted an application requesting that the NRC renew the operating license for Davis-Besse for 20 more years (*i.e.*, through April 22, 2037).[19] The NRC accepted the license renewal application ("LRA") for docketing and published a Hearing Notice on October 25, 2010.[20] On December 27, 2010, Beyond Nuclear, Citizens Environment Alliance of Southwestern Ontario, Don't Waste Michigan, and the Green Party of Ohio ("Intervenors") jointly filed their Petition.

Intervenors submitted four environmental contentions related to the NEPA analysis in the Davis-Besse Environmental Report ("ER"). The first three concerned the adequacy of FirstEnergy's analysis of alternatives to license renewal—specifically wind energy, photovoltaic solar energy, and the combination of compressed air energy storage with wind and/or solar energy.[21] The fourth contention challenged various aspects of FirstEnergy's SAMA analysis.[22] Both FirstEnergy and the NRC Staff filed answers opposing the admission of all four contentions in January 2011,[23] to which the Intervenors replied in February 2011.[24]

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17 *See* Joint Decl., Sections IV and V.

18 *See id.*, Section V.

19 Letter from Barry S. Allen, Vice President-Nuclear, FirstEnergy, to Document Control Desk, U.S. N.R.C., "License Renewal Application and Ohio Coastal Zone Management Program Consistency Certification" (ADAMS Accession No. ML102450565).

20 Notice of Acceptance for Docketing of the Application, Notice of Opportunity for Hearing for Facility Operating License No. NPF-003 for an Additional 20-Year Period; FirstEnergy Nuclear Operating Company, Davis-Besse Nuclear Power Station, 75 Fed. Reg. 65,528 (Oct. 25, 2010) ("Hearing Notice").

21 *See* Pet. at 10-99.

22 *See id.* at 99-151.

23 *See* FirstEnergy's Answer Opposing Request for Public Hearing and Petition for Leave to Intervene (Jan. 21, 2011); NRC Staff's Answer to Joint Petitioners' Request for a Hearing and Petition for Leave to Intervene (Jan. 21, 2011).

The Board held a prehearing conference on the intervention petition on March 1, 2011, during which it heard oral argument on standing and contention admissibility.[25] On April 26, 2011, the Board issued a Memorandum and Order (LBP-11-13), finding that all four petitioners had demonstrated standing, admitting all three "alternative energy" contentions (as reformulated and combined into one contention by the Board), and also admitting the SAMA contention (as limited by the Board to three issues and designated as Contention 4).[26]

FirstEnergy appealed LBP-11-13 pursuant to 10 C.F.R. § 2.311(d)(1), contending that the Board erred in admitting contentions that did not meet the admissibility requirements of 10 C.F.R. § 2.309(f)(1).[27] Intervenors opposed the appeal.[28] In a Memorandum and Order (CLI-12-08) issued on March 27, 2012, the Commission reversed the Board's admissibility rulings in part, dismissing Intervenors' consolidated energy alternatives contention in its entirety, and dismissing two of three parts of Contention 4.[29] The Commission majority declined at that stage to overturn the Board's admission of the remaining portion of Contention 4, which relates to the MAAP code and is the subject of this Motion.[30]

On July 16, 2012, FirstEnergy submitted an amendment to its ER that incorporates recent revisions to the Davis-Besse SAMA analysis that FirstEnergy identified as necessary earlier this year.[31] Relevant here, the revised SAMA analysis accounts for FirstEnergy's use of revised MAAP code runs that, consistent with MAAP User's Group guidance specific to the code version used by

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[24] *See* Joint Intervenors' Combined Reply in Support of Petition for Leave to Intervene (2nd, Final Corrected Version) (Feb. 24, 2011).

[25] *See* Transcript of Hearing for Oral Argument (Mar. 1, 2011).

[26] *Davis-Besse*, LBP-11-13, slip op. at 64-65.

[27] *See* FirstEnergy's Notice of Appeal of LBP-11-13 (May 6, 2011); FirstEnergy's Brief in Support of the Appeal of LBP-11-13 (May 6, 2011).

[28] *See* Joint Intervenors' Brief in Opposition to FENOC's Notice of Appeal and Brief (May 16, 2011).

[29] *Davis-Besse*, CLI-12-08, slip op. at 5-34.

[30] *Id.* at 20-21.

[31] *See* Revised SAMA Analysis Submittal at 1, Attach. 1 at 1, and Encl. (Amendment No. 29 to the Davis-Besse License Renewal Application).

FirstEnergy (MAAP 4.0.6), are based on core radionuclide masses instead of radionuclide activities.[32] Although the revised SAMA analysis did not identify any additional cost-beneficial SAMAs, the revised MAAP runs, coupled with the other corrections identified in the July 16, 2012, revised SAMA analysis, did increase the total cost of a postulated severe accident, expressed as the maximum achievable benefit (*i.e.*, the monetized benefit of eliminating all plant risk).[33] The attached Joint Declaration of Dr. O'Kula and Mr. Teagarden is based, in significant part, upon the experts' review of the revised SAMA analysis, including the underlying MAAP code runs.

On the basis of the revised SAMA analysis, and in accordance with the Board's January 30, 2012 Order, FirstEnergy timely seeks summary disposition of Contention 4.[34] The changes to the SAMA analysis relate directly to the core of the proposed contention that the MAAP code source term provides an unrealistic evaluation of SAMAs for the Davis-Besse plant.

III. REGULATORY AND TECHNICAL BACKGROUND

SAMA analysis is not part of the NRC's safety review for license renewal under the Atomic Energy Act but is instead a mitigation alternatives analysis conducted pursuant to NEPA.[35] It evaluates the degree to which additional mitigation measures (*e.g.*, new plant procedures or hardware) may reduce the risk—by reducing the frequency or the consequences—of the accident scenarios evaluated.[36] As the Commission recently emphasized: "Because the SAMA analysis is a site-specific analysis, *site-specific inputs* (*e.g.*, weather data, estimated reactor core radionuclide inventory, population data) are used in the accident modeling."[37]

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[32] *Id.*, Attach. 1 at 1.

[33] *See* ER. Attach. E at E-17, E-46. Specifically the maximum achievable benefit increased from $1,357,324 to $2,053,481 (compare original ER Table E.1-4 (ER, Attach. E at E-1-1) with revised ER Table E.4-1 (Revised SAMA Analysis Submittal, Encl. at 36).

[34] *See* January 30, 2012 Order at 4-5 ("The timing of this submission is entirely within FENOC's control, so filing a motion to dismiss within 10 days based on an action which the moving party has set in motion, is both reasonable and contemplated by the [Initial Scheduling Order].").

[35] *Pilgrim*, CLI-12-15, slip op. at 2; Joint Decl. ¶ 16.

[36] *Pilgrim*, CLI-12-15, slip op. at 2; Joint Decl. ¶ 18.

[37] *Pilgrim*, CLI-12-15, slip op. at 3 (emphasis added).

The Commission further recognized that "SAMA analysis also is a probabilistic risk assessment (PRA), which means that the probability of particular accident scenarios occurring is taken into account."[38] As such, it examines the probability of various hypothesized accident scenarios, spanning a spectrum of potential initiating events, accident sequences, and severity of consequences.[39] "As a NEPA mitigation analysis, the SAMA analysis is not based on either the best-case or the worst-case accident scenarios."[40] Rather, it estimates mean accident consequence values (both offsite population dose and economic costs), which are averaged over the many hypothetical severe accident scenarios and over the examined 50-mile radius region.[41]

Thus, the purpose of a SAMA analysis is to identify potential changes to a nuclear power plant, or its operations, that could reduce the already-low risk of a severe accident, for which the benefit of implementing the change may outweigh the cost of implementation.[42] By NRC practice to date, the SAMA analysis has been a quantitative cost-benefit analysis, assessing whether the cost of implementing a specific enhancement outweighs its benefit.[43] The SAMA cost-benefit analysis methodology is based on methods found in NRC-approved guidance.[44]

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38 *Id.*

39 *Pilgrim*, CLI-12-15, slip op. at 5; Joint Decl. ¶¶ 21, 47-48.

40 *Pilgrim*, CLI-12-15, slip op. at 5; *see also* Joint Decl. ¶ 45 (explaining that PRAs and SAMA analyses are best-estimate engineering evaluations that seek to maximize the use of plant-specific data).

41 *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-01, 75 NRC __, slip op. at 20 (Feb. 9, 2012). Specifically, the analysis uses the mean values of the accident consequence distributions for each accident category. These mean values are multiplied by the estimated frequency of the accident to determine population dose risk and offsite economic cost risk for each release category studied. *Id. See also* Joint Decl. ¶¶ 17, 22-23.

42 Joint Decl. ¶ 18. Based on the NRC's prior evaluation of severe accidents, 10 C.F.R. Part 51 concludes that the "[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." 10 C.F.R. Pt. 51, Subpt. A, App. B, Tbl. B-1 (Postulated Accidents; Severe accidents); *see also Entergy Nuclear Generation Company* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC __, slip op. at 37 (2010)("NRC SAMA analyses are not a substitute for, and do not represent, the NRC NEPA analysis of potential impacts of severe accidents."); *Pilgrim*, CLI-12-15, slip op. 5-6 ("SAMA analysis must also be understood against the backdrop of our Generic Environmental Impact Statement (GEIS), which contains a bounding, generic severe accident impacts analysis, applicable to all plants.").

43 *Pilgrim*, CLI-12-15, slip op. at 3.

44 *Id.*; Joint Decl. ¶¶18, 20. *See* NEI 05-01, Rev. A "Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document" (Nov. 2005) ("NEI 05-01") (Attach. 14) (endorsed by the NRC Staff in Final License Renewal Interim Staff Guidance LR-ISG-2006-03: Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses" (Aug. 2007) (Attach. 15); NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," Rev. 4 (Jan. 1997) (Attach. 16); NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission, Revision 4" (Aug. 2004) (Attach. 17).

Broadly speaking, a SAMA analysis involves four major sequential steps: (1) use of PRAs and other risk studies to characterize the overall plant-specific severe accident risk by identifying and characterizing the leading contributors to core damage frequency ("CDF") and offsite risk based on a plant-specific risk study; (2) identification of potential plant improvements (*i.e.*, SAMA candidates) that could reduce the risk of a severe accident; (3) quantification of the risk-reduction potential and the implementation cost for each SAMA candidate; and (4) determination of whether implementation of the SAMA candidates may be cost-effective.[45]

Three PRA steps are required to perform a SAMA analysis.[46] Various computer codes are used in support of a SAMA analysis and its underlying assessments of accident probabilities and consequences.[47] These include codes used to develop a Level 1 PRA (analysis of initiating events and ensuing accident sequences leading to core damage) and a Level 2 PRA (analysis of accident progression leading to containment failure and bypass and release of radionuclides to the environment).[48] The output of the Level 1 PRA is used as input to the Level 2 PRA.[49] The output of the Level 2 PRA, in turn, feeds the Level 3 offsite consequences portion of the analysis, which is performed using the MELCOR Accident Consequence Code System Version 2 ("MACCS2") computer code.[50] MACCS2 estimates the offsite dose and economic impacts that result from postulated releases of radioactive materials to the environment based on plant- and site-specific, regional, and standardized regulatory inputs.[51]

The MAAP code (the code at issue in Contention 4) provides certain output data that are required as direct inputs to the MACCS2 code, the use of which the NRC has "endorsed … to

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45 Joint Decl. ¶19 (*citing* NEI 05-01 at 2).

46 *Id.* ¶ 21.

47 *Id.* ¶ 20.

48 *Id.*

49 *Id.*

50 *Id.*

51 *Id.* (*citing* NEI 05-01 at 13).

calculate estimated offsite consequences." [52] Among other variables, MACCS2 requires plant-specific source term information, including the core inventory (*i.e.*, the amount of each radionuclide present in the reactor core at the time accident initiation) and characteristics of the postulated release.[53] The source term is the amount and radionuclide composition of material postulated to be released from the core of a nuclear power reactor during an accident scenario.[54] One component of the source term is the release fraction, which is the fraction of the total core fission product inventory postulated to be released to the environment during the accident scenario.[55] It defines the portion of the radionuclide inventory, by radionuclide group (*i.e.*, grouped by similar physical and chemical characteristics), in the reactor core at the start of an accident that is available to be released to the environment.[56]

The evaluation of source terms for a SAMA analysis requires a detailed plant-specific analytical model that includes numerous physical process sub-models that account for, among other things, the timing and performance of both passive and active plant safety features and human (*i.e.*, operator) actions affecting accident progression and containment conditions.[57] In the U.S., source terms usually are estimated using one of two computer codes: the Methods for Estimation of Leakages and Consequences of Releases ("MELCOR") code or the MAAP code.[58] MELCOR and MAAP have been used extensively by the NRC and its licensees, respectively, in support of Level 3

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[52] *Pilgrim*, CLI-12-15, slip op. at 3; Joint Decl. ¶¶ 23, 52.

[53] Joint Decl. ¶¶ 24, 52.

[54] *Id.* ¶ 24 (*citing* NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," Vol. 1, 2-3 tbl. 2-1 (Dec. 1990) (Attach. 10)).

[55] *Id.* ¶ 26 (*citing* NUREG-1150, Vol. 1 at 10-4 (Attach. 10)).

[56] *Id.*

[57] *Id.* ¶ 27.

[58] *Id.* ¶ 28.

PRAs (including SAMA analyses in the case of MAAP).[59] FirstEnergy used MAAP (Version 4.0.6) ("MAAP4") in connection with the Davis-Besse SAMA analysis.[60]

For the Davis-Besse SAMA analysis, FirstEnergy used the results from updated Davis-Besse Level 1 PRA and Level 2 PRA models as input to a MACCS2-based Level 3 PRA developed specifically for the NEPA site-specific SAMA analysis.[61] The Level 2 PRA defined 34 release categories that were characterized using the MAAP4 code.[62] FirstEnergy then used the MAAP4 output to generate specific source term inputs for the Level 3 PRA.[63] The Level 3 PRA included Davis-Besse-specific meteorological, demographic, land use, and emergency response data inputs.[64] The end result is a comprehensive, site-specific assessment of postulated accident sequences resulting in damage to the core and containment, radiological release, and their associated frequencies (likelihood of occurrence).[65]

IV. STATEMENT OF THE LAW

A. Law Governing Summary Disposition

In LBP-11-13, the Board ordered that this proceeding be governed by 10 C.F.R. Part 2, Subpart L.[66] As provided by Subpart L, any party may submit a motion for summary disposition.[67] The motion must be in writing and include a written explanation of the basis of the motion, and affidavits to support statements of fact.[68]

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59 *See id.* ¶¶ 34, 35, 70.

60 *Id.* ¶ 14 n.6. While MAAP Version 4.0.6 (MAAP4) was used in the Davis-Besse SAMA analysis, this Motion and the Joint Declaration frequently uses the term "MAAP" for brevity and convenience.

61 *Id.* ¶ 48.

62 *Id.*

63 *Id.* ¶¶ 48, 51-52.

64 *Id.* ¶¶ 47-48.

65 *Id.* ¶ 21.

66 *Davis-Besse*, LBP-11-13, slip op. at 63-64.

67 10 C.F.R. § 2.1205(a)

68 *Id.*

In ruling on a motion for summary disposition, a licensing board is directed to apply the standards for summary disposition set forth in 10 C.F.R. § 2.710(d)(2).[69] Pursuant to that provision, summary disposition is warranted

> if the filings in the proceeding, depositions, answers to interrogatories, and admissions on file, together with the statements of the parties and the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law.[70]

The NRC's rules "long have allowed summary disposition in cases where there is no genuine issue as to any material fact and where the moving party is entitled to a decision as a matter of law."[71]

The Commission has held that motions for summary disposition are analogous to summary judgment motions under Rule 56 of the Federal Rules of Civil Procedure, and should be evaluated under the same standards.[72] The U.S. Supreme Court has stated that summary disposition is not simply a "procedural shortcut"; rather it is designed "to secure the just, speedy and inexpensive determination of every action," and should be granted when appropriate.[73]

Citing Supreme Court precedent, the Commission recently stated as follows:

> When a motion for summary disposition is made and supported as described in our regulations, "a party opposing the motion may not rest upon [ ] mere allegations or denials," but must state "specific facts showing that there is a genuine issue of fact" for hearing. It is not sufficient, however, for there merely to be the existence of "*some* alleged factual dispute between the parties, for "the requirement is that there be no *genuine* issue of *material* fact." "Only disputes over facts that might affect the outcome" of a proceeding would preclude summary disposition. "Factual disputes that are . . . unnecessary will not be counted."

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69 *Id.* § 2.1205(c) ("In ruling on motions for summary disposition, the presiding officer shall apply the standards for summary disposition set forth in subpart G of this part.").

70 *Id.* § 2.710(d)(2).

71 *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 384 (2001) (internal quotations omitted).

72 *Pilgrim*, CLI-10-11, slip op. at 11-12 (*citing Advanced Medical Systems, Inc.* (One Factory Row, Geneva, Ohio 44041), CLI-93-22, 38 NRC 98, 102 (1993)).

73 *Celotex Corp. v. Catrett*, 477 U.S. 317, 327 (1986); *see also Tenn. Valley Auth.* (Hartsville Nuclear Plant, Units 1A, 2A, 1B & 2B), ALAB-554, 10 NRC 15, 19 (1979) (summary disposition provides a remedy for matters which have not been the subject of an evidentiary hearing, but are susceptible of final resolution on papers submitted by the parties in advance of such hearing).

> . . . . At issue is not whether evidence "unmistakably favors one side or the other," but whether "there is sufficient evidence favoring the non-moving party" for a reasonable trier of fact to find in favor of that party. If the evidence in favor of the non-moving party is "merely colorable" or "not significantly probative," summary disposition may be granted.[74]

The relevant substantive law will identify which facts are material.[75] To be considered a genuine issue of material fact, "the factual record, considered in its entirety, must be enough in doubt so that there is a reason to hold a hearing to resolve the issue."[76] As noted above, bare allegations or general denials are insufficient to oppose a motion for summary disposition,[77] as are mere "quotations from or citations to [the] published work of researchers [or experts] who have apparently reached conclusions at variances with the movant's affiants."[78] If the party opposing the motion fails to controvert any material fact, then that fact will be deemed admitted.[79]

Thus, the level of factual support necessary to withstand summary disposition is expected to be of a much "higher level" than at the contention filing stage.[80] The party seeking summary disposition must show the absence of a genuine issue as to any material fact.[81] In response, the party opposing the motion must set forth *specific facts* showing that there is a genuine issue of

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[74] *Pilgrim*, CLI-10-11, slip op. at 12-13 (*quoting* 10 C.F.R. § 2.710(b), (d)(2); *Anderson v. Liberty Lobby*, 477 U.S. 242, 247-52 (1986) (noting emphasis in original)).

[75] *Pilgrim*, CLI-10-11, slip op. at 12 (*quoting Liberty Lobby*, 477 U.S. at 248) (internal quotation marks omitted).

[76] *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 & 2), LBP-83-46, 18 NRC 218, 223 (1983). *See also Lujan v. Nat'l Wildlife Fed'n*, 497 U.S. 871, 898-99 (1990) (granting summary judgment because the plaintiff did not set forth facts specific enough to support its claim).

[77] *See* 10 C.F.R. § 2.710(b) (stating that "a party opposing the motion may not rest upon the mere allegations or denials of his answer"); *Advanced Med.*, CLI-93-22, 38 NRC at 102; *Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit No. 1), ALAB-629, 13 NRC 75, 78 (1981) (the opposition may not rest on mere allegations or denials).

[78] *Carolina Power & Light Co.* (Shearon Harris Nuclear Plant, Units 1 & 2), LBP-84-7, 19 NRC 432, 435-36 (1984); *see also United States v. Various Slot Machines on Guam*, 658 F.2d 697, 700 (9th Cir. 1981) (holding that "in the context of a motion for summary judgment, an expert must back up his opinion with specific facts" in an affidavit).

[79] 10 C.F.R. § 2.710(a); *Advanced Med. Sys.*, CLI-93-22, 38 NRC at 102-03.

[80] Final Rule, Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,171 (Aug. 11, 1989).

[81] *Adickes v. S.H. Kress & Co.*, 398 U.S. 144, 157 (1970); *Advanced Med. Sys.*, CLI-93-22, 38 NRC at 102.

material fact.[82] A party responding to a summary disposition motion may not raise "distinctly new asserted deficiencies."[83]

As another Board recently observed in a decision granting summary disposition to the applicant: "If the opposing party fails to meet this standard, *and* the moving party has successfully shown that there is no genuine dispute on a material issue of fact and that it is entitled to a decision as a matter of law, then we must grant the motion."[84]

B. <u>Law Governing Consideration of SAMAs as Part of License Renewal NEPA Analysis</u>

As stated above, the relevant substantive law determines which issues of fact are material. Here, Contention 4 raises issues related to FirstEnergy's compliance with NEPA and the NRC's NEPA-implementing regulations in 10 C.F.R. Part 51. Specifically, Part 51 requires that, if the NRC Staff has not previously considered SAMAs for a license renewal applicant's plant in a final environmental impact statement or in an environmental assessment, then the applicant must evaluate alternatives that may mitigate severe accidents.[85]

The Board's consideration of the issues raised in Contention 4 is thus "governed by NEPA and related case law, and by NEPA's 'rule of reason.'"[86] The Commission recently elaborated on the application of NEPA's reasonableness standard to SAMA-related contentions:

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[82] 10 C.F.R. § 2.710(b) (emphasis added); *see also N. States Power Co.* (Prairie Island Nuclear Generating Plants, Units 1 & 2), CLI-73-12, 6 AEC 241, 242 (1973), *aff'd sub nom. BPI v. AEC*, 502 F.2d 424 (D.C. Cir. 1974) ("It remains for [the intervenor] to establish, to the satisfaction of the Board which has been convened to conduct the hearing, that a genuine issue actually exists. If the Board is not so satisfied, it may summarily dispose of the contention on the basis of the pleadings.").

[83] *Pilgrim*, CLI-10-11, slip op. at 29.

[84] *Luminant Generation Co., LLC* (Comanche Peak Nuclear Power Plant, Units 3 and 4), LBP-11-04, 73 NRC __, slip op. at 6 (Feb. 24, 2011) (emphasis in original) (*citing Advanced Med. Sys*., 38 NRC at 102).

[85] 10 C.F.R. § 51.53(c)(3)(ii)(L); *see also id*. Part 51, Subpart A, App. B, Table B-1. NEPA, however, "neither requires nor authorizes the NRC to order implementation of mitigation measures analyzed in an environmental analysis." *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-12-10, 75 NRC __, slip op. at 11 (Mar. 30, 2012) (*citing Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989)).

[86] *Comanche Peak*, LBP-11-04, slip op. at 7; *see also* Pilgrim, CLI-12-15, slip op. at 24 n. 90 ("NEPA obligations are 'tempered by a practical rule of reason'"); *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-02-17, 56 NRC 1, 12 (2002) (citing *Vt. Yankee*, 435 U.S. at 551; *Citizens Against Burlington v. Busey*, 938 F.2d 190, 195) (D.C. Cir. 1991) (applying NEPA's rule of reason in the context of a SAMA contention).

> Given the quantitative nature of the SAMA analysis, where the analysis rests largely on selected inputs, it may always be possible to conceive of alternative and more conservative inputs, whose use in the analysis could result in greater estimated accident consequences. But 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*.[87]

The Commission has reiterated the same standard in *this* proceeding, noting that "simply because a computer model also could have been run with alternate inputs does not suggest that the inputs used were unreasonable."[88] In the same vein, NEPA does not dictate adherence to a particular analytic protocol[89] or even use of the "best scientific methodology."[90] Under NEPA's rule of reason, an agency (and, in this case, an applicant) is permitted to select its own methodology, provided that methodology is reasonable.[91]

Accordingly, "the courts have usually accepted the methodology used by an agency in analyzing environmental impacts," and "put the burden of proof on plaintiffs to prove that the methodology was unacceptable."[92] As the Commission's recent *Seabrook* decision explains, a contention proposing alternative inputs or methodologies for a SAMA analysis must present some factual or expert basis for why the proposed changes in the analysis are warranted (*e.g.*, why the inputs or methodology used is unreasonable and the proposed changes or methodology would be more appropriate).[93] Absent such a showing, "there is no genuine material dispute with the SAMA

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[87] *Seabrook*, CLI-12-05, slip op. at 28 (emphasis added); *see also Pilgrim*, CLI-12-15, slip op. at 13 ("It will always be possible to envision and propose some alternate approach, some additional detail to include, some refinement. … Contentions challenging a SAMA analysis therefore must identify a deficiency that plausibly could alter the overall result of the analysis in a material way.").

[88] *Davis-Besse*, CLI-12-08, slip op. at 17. The Commission elaborated on this point yet again in *Pilgrim* stating, "Notably, the SAMA analysis involves extensive predictive judgments, many reflected in the computer modeling inputs used in the analysis. That there may be a range of conceivable choices among inputs used in the SAMA analysis goes without saying, and many alternative inputs may be reasonable choices—reflecting reasonable predictions—even though some may be more conservative and others less so." *Pilgrim*, CLI-12-10, slip op. at 10.

[89] *Ass'n of Pub. Agency Customers, Inc. v. Bonneville Power Admin.*, 126 F.3d 1158, 1188 (9th Cir. 1997).

[90] *Pilgrim*, CLI-10-11, slip op. at 37 (citing *Hells Canyon Alliance v. U.S. Forest Serv.*, 227 F.3d 1170, 1185 (9th Cir. 2000)).

[91] *Pilgrim*, CLI-10-11, slip op. at 37 (quoting *Town of Winthrop v. FAA*, 535 F.3d 1, 13 (1st Cir. 2008)).

[92] Daniel R. Mandelker, *NEPA Law and Litigation* § 10.45 (1984 & 2011 Supp.) (case citations omitted).

[93] *Seabrook*, CLI-12-05, slip op. at 29. In CLI-12-01, the Commission similarly stated, "Ultimately, we hold adjudicatory proceedings on issues that are material to licensing decisions. With respect to a SAMA analysis in particular, unless a

analysis that was done, only a proposal for an alternate NEPA analysis that may be no more accurate or meaningful."[94] Moreover, an intervenor's "own unsupported reasoning and computations" are not sufficient to show a genuine material dispute with a SAMA analysis's overall cost-benefit conclusions.[95]

V. THERE IS NO GENUINE ISSUE OF MATERIAL FACT, AND FIRSTENERGY IS ENTITLED TO DISMISSAL OF THE CONTENTION AS A MATTER OF LAW

The following sections demonstrate that no genuine issue of material fact exists regarding FirstEnergy's use of the MAAP code to develop source term information for use in the Davis-Besse SAMA analysis. As discussed below, FirstEnergy's use of MAAP in support of its SAMA analysis—like many recipients of renewed operating licenses before it—is reasonable under NEPA. The issues raised in Contention 4 are without a basis in fact and do not provide an adequate basis for a genuine material dispute with FirstEnergy's SAMA analysis.

FirstEnergy's Joint Declaration and Statement of Material Facts support this conclusion. With respect to Basis 1 of the contention, the undisputed material facts show that the MAAP code has a strong technical basis for use in PRA and severe accident analysis. The Electric Power Research Institute ("EPRI") and the Department of Energy ("DOE"), among other entities, sponsored the development of MAAP.[96] MAAP has been developed and maintained in accordance with NRC quality assurance standards, extensively benchmarked, applied to different reactor designs throughout the world, identified as a consensus computer code suitable for use in PRA applications, and long been accepted by the NRC for use in both safety and environmental

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contention, submitted with adequate factual, documentary, or expert support, raises a potentially significant deficiency in the SAMA analysis—that is, *a deficiency that could credibly render the SAMA analysis altogether unreasonable under NEPA standards*—a SAMA-related dispute will not be material to the licensing decision, and is not appropriate for litigation in an NRC proceeding." *Pilgrim*, CLI-12-01, slip op. at 25 (emphasis added).

[94] *Id.; cf. Pilgrim*, CLI-12-15, slip op. at 20 (referring to the petitioner's "*burden* to provide support for why the further 'analyses' or new computer modeling it seeks credibly could make a material difference to the SAMA analysis conclusions, not simply that the analysis might change in some fashion") (emphasis in original); *Pilgrim*. CLI-12-10, slip op. at 10 ("There always will be myriad alternate ways a NEPA analysis could have been done.").

[95] *Pilgrim*, CLI-10-11, slip op. at 36.

[96] Joint Decl. ¶ 31.

applications, including numerous NRC-approved SAMA analyses.[97] The code's use as a basis for fission product release from the core, transport into the containment, and subsequent environmental source term prediction is consistent with industry precedent and is reasonable under NEPA and 10 C.F.R. Part 51.[98]

With respect to Basis 2, the undisputed material facts show that the *generic in-containment source terms* provided in NUREG-1465 have no applicability to the *plant-specific environmental source terms* estimated by MAAP and used in a SAMA analysis.[99] As FirstEnergy's experts explain, it should be expected that MAAP produces source terms and release fractions that are different from, and consistently smaller than, those specified in NUREG-1465. MAAP-generated source terms serve a fundamentally different regulatory purpose and reflect modeling of different, plant-specific accident phenomena.[100]

NUREG-1465 was developed to define revised, *generic* accident source terms for regulatory application for future light-water reactors ("LWRs").[101] It postulates a release of fission products from the core of an LWR *into the containment atmosphere*.[102] Further, NUREG-1465 does not specify plant-specific source terms for releases from containment into the environment following a severe accident.[103] Most importantly, it does not take into account the source term reductions that would occur as a result of fission product removal mechanisms (*i.e.*, engineered safety features and natural processes).[104] In contrast, MAAP models the release of radionuclides from the containment

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[97] *Id.* ¶ 14.

[98] *Id.* ¶¶ 30-37.

[99] *Id.* ¶¶ 14, 42, 45, 46.

[100] *Id.* ¶¶ 14, 38, 39, 56.

[101] *Id.* ¶¶ 14, 41.

[102] *Id.* ¶¶ 14, 42.

[103] *Id.* ¶¶ 14, 43.

[104] *Id.* ¶¶ 14, 43, 44.

into the environment following a postulated severe accident using *plant-specific* information and accounts for fission product removal mechanisms.[105]

Additionally, Intervenors' contention treats all releases into the containment as releases into the environment; *i.e.*, it treats containment failure sequences and containment intact sequences equivalently.[106] The assumption of not crediting the containment's presence at all, and neglecting associated passive and active plant safety features for mitigating and delaying releases, leads to a worst-case source term scenario that is not reasonable or appropriate for analysis under NEPA.[107] The release fractions specified in NUREG-1465 are PWR- or BWR-specific, and do not recognize the plant-specific features that must be accounted for in a plant-specific PRA and SAMA analysis.[108] Using the NUREG-1465 release fractions alone instead of plant-specific values from the Level 1 and Level 2 PRAs for a given plant would lead to technically unfounded conclusions about a particular plant's offsite risks and the cost-effectiveness of SAMA candidates.[109]

Finally, with respect to Basis 3, Intervenors' reliance on 10- and 20-year old comparisons of release fractions generated by MAAP to those generated by other codes or an earlier version of MAAP—and for other nuclear power plants—is misplaced.[110] Severe accident source terms depend on many plant-specific design features and operational practices.[111] The NUREG-1150 study—of which Intervenors cite a *draft* version—was completed over 20 years ago and involved an assessment of the risks from severe accidents at five U.S. commercial nuclear power plants.[112]

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[105] *Id.* ¶¶ 14, 28, 29, 43, 44, 48-52.

[106] *Id.* ¶¶ 14, 53.

[107] *Id.*; *see also Pilgrim*, CLI-12-10, slip op. at 10 ("A NEPA mitigation alternatives analysis need not reflect the most conservative—or worst case—analysis.").

[108] *Id.*

[109] *Id.*

[110] *Id.* ¶¶ 14, 59-64.

[111] *Id.* ¶¶ 14, 45-52, 59.

[112] *Id.* ¶ 59.

Davis-Besse was not one of those five plants.[113] In addition, the state of the art for source term analysis has significantly improved since the NUREG-1150 study was performed in the 1980s.[114] Intervenors' cited comparisons of MAAP-generated source terms or release fractions with those estimated over ten years earlier by different analysts for different plants—using simpler versions of other codes and different assumptions—are expected to show differences.[115]

As discussed more fully below, FirstEnergy is entitled to judgment as a matter of law based upon these undisputed facts. None of the Intervenors' claims raises a genuine issue of material fact that requires an evidentiary hearing to resolve.

A. The MAAP Code Has Been Appropriately Validated for Use in Nuclear Regulatory Applications that Include NRC-Required NEPA-SAMA Analyses (Basis 1)

Intervenors argue that FirstEnergy cannot rely on the MAAP code because it has not been "independently validated" by the NRC.[116] This argument is unsupported and patently incorrect. First, Intervenors do not explain what they mean by an "independent validation" or why such a validation by the NRC is a prerequisite to an applicant's use of the MAAP code. In general, a computer code in itself is not validated, but its use for specific applications may be found acceptable for use as a basis for estimating certain phenomena within certain defined regimes.[117] As explained in the Joint Declaration and below, the NRC accepts the use of MAAP as a tool for modeling specific severe accident phenomenology in specific reactor systems, such as a PWR's thermal-hydraulic response and fission product release characteristics under postulated accident conditions.[118]

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[113] *Id.* ¶¶ 14, 59.

[114] *Id.* ¶¶ 59, 64.

[115] *Id.* ¶ 64.

[116] Pet. at 114.

[117] Joint Decl. ¶ 30; *see also* Letter from Gary M. Holahan, Director, Division of Systems Safety and Analysis, Office of Nuclear Reactor Regulation, U.S. N.R.C., to Theodore U. Marston, Vice-President & Chief Nuclear Officer, EPRI at 1 (Dec. 4, 2001) (Attach. 22) (describing the NRC Staff's case-by-case approach to reviewing licensee design-basis submittals that rely on MAAP, and noting that this approach "will also be used for plant-specific submittals that rely on MAAP for severe accident applications").

[118] Joint Decl. ¶ 30.

The fact that the NRC neither owns nor sponsored the development of MAAP is irrelevant, and does not render the code unsuitable for use by NRC license applicants. MAAP was originally developed for the Industry Degraded Core Rulemaking ("IDCOR") program in the early 1980s, by Fauske & Associates, LLC (formerly Fauske & Associates, Inc.).[119] At the completion of IDCOR, Fauske & Associates transferred ownership of MAAP to EPRI.[120] Starting in the late 1980s, the MAAP3B version became widely used, first in the United States and then worldwide, to support success criteria determination, human action timing evaluations, and Level 2 analyses for Individual Plant Examinations ("IPEs") required by NRC.[121]

In addition, the MAAP code was developed, and is maintained under, a quality assurance program that conforms to 10 C.F.R. Part 50, Appendix B and International Organization for Standardization ("ISO") 9001 quality assurance requirements.[122] EPRI and DOE, among other organizations, sponsored the development of MAAP4.[123] During the code development process, a committee of independent experts reviewed MAAP4 to ensure that it is state-of-the-art and applicable for accident management evaluations.[124] Also, a Design Review Committee comprising senior members of the nuclear safety community reviewed the updated code software, which provides improved mechanistic modeling of severe accident phenomena.[125]

EPRI and Fauske & Associates (EPRI's current maintenance contractor for the code) have successfully benchmarked MAAP4 against major experimental studies related to severe accidents as

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[119] *Id.* ¶ 31 & n.8. The nuclear power industry created the IDCOR program in response to the 1979 accident at Three Mile Island Unit 2 (TMI-2) to independently evaluate technical issues related to potential severe accidents at LWR nuclear power plants. IDCOR's original mission was to gather and critically review existing technical work related to the severe accident issues and to perform the additional technical work required to develop a comprehensive understanding of these issues. IDCOR also served as the industry interface with the NRC on these matters. *Id.*

[120] *Id.* (*citing* EPRI Report 1020236, "MAAP4 Applications Guidance: Desktop Reference for Using MAAP4 Software, Revision 2," at 2-2 (2010) ("MAAP4 Applications Guidance") (Attach. 20)).

[121] *Id.*

[122] *Id.* ¶ 33 (*citing* MAAP4 Applications Guidance at 2-2).

[123] *Id.* ¶ 31 (*citing* MAAP4 Applications Guidance at 2-2).

[124] *Id.* (*citing* MAAP4 Applications Guidance at 2-2).

[125] *Id.* (*citing* MAAP4 Applications Guidance at 2-2).

well as against the Three Mile Island core melt accident.[126] The extensive benchmarking of the MAAP code is documented in Section 7 and Appendix F of EPRI's *MAAP4 Applications Guidance* and also in a 2007 report issued by the Nuclear Energy Agency ("NEA").[127] The code has been applied to numerous containment designs and sequences across the world for more than two decades.[128] MAAP is the most commonly used code in the U.S. for such purposes.[129] A 2006 EPRI report on PRA consensus models identifies the MAAP code (versions 4.0.5 and later) as a "consensus model" suitable for use in evaluation of PRA success criteria.[130]

Furthermore, the use of MAAP for NRC-related licensing and regulatory purposes has been reviewed and accepted by the NRC for many years.[131] Directly relevant here, numerous NRC license renewal applicants, including very recent recipients of renewed operating licenses, have used the MAAP code to support NRC-approved SAMA analyses.[132] FirstEnergy's use of MAAP4 in its SAMA analysis thus is entirely reasonable and consistent with long-standing industry precedent.[133]

In contrast, Intervenors' claim that MAAP has not been "validated" runs counter to the international nuclear community's recognition of MAAP as a state-of-the art, consensus computer

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126 *Id.* ¶ 34.

127 *Id.* (*citing* MAAP4 Applications Guidance, Sec. 7 & App. F; NEA Committee on the Safety of Nuclear Installations, NEA/CSNI/R(2007)16, *Recent Developments in Level 2 PSA and Severe Accident Management*, at 36 (Nov. 2007) (Attach. 24)).

128 *Id.* ¶¶ 31, 35.

129 *Id.* ¶ 35; *see also* Kenneth D. Kok, Ed., *Nuclear Engineering Handbook* at 539 (2009) (Attach. 25) ("The most commonly used Level-II PRA tools include CAFTA for fault tree analysis … and the modular accident analysis program (MAAP) for severe accident simulation.").

130 Joint Decl. ¶ 33 (*quoting* EPRI Report 1013492, *Probabilistic Risk Assessment Compendium of Candidate Consensus Models*, at 2-3 (2006) (Attach. 23).

131 *Id.* ¶ 35. *See*, *e.g.,* NUREG-1503, "Final Safety Evaluation Report Related to Certification of the ABWR Reactor Design," Vol. 1 at 19-53 to 19-55 (July 1994) (Attach. 47); NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," Vol. 1 at 19-61 (Sept. 2004) (Attach. 48).

132 *Id.* ¶ 36 (*citing* NUREG-1437, Supp. 47, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Columbia Generating Station – Final Report," Vol. 2, App. F at F-2, F-6 to F-7, F-27 (Apr. 2012) (Attach. 26); NUREG-1437, Supp. 45, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2," Vol. 2, App. G at G-4, G-6, G-15 to G-16 (Mar. 2011) (Attach. 27)).

133 *Id.* ¶¶ 37, 74.

code.[134] It also is at odds with the NRC's acceptance of the code for use by its licensees in safety and environmental applications, including many NRC-approved SAMA analyses.[135] Therefore, Intervenors' first claim lacks any basis in fact and fails to raise a material issue of fact whether FirstEnergy's use of MAAP is unreasonable under NEPA—the requisite showing here.[136]

B. Plant-Specific Environmental Source Terms Estimated Using MAAP Expectedly Are Smaller Than the Generic In-Containment Source Terms in NUREG-1465, And Use of the Latter in a SAMA Analysis Would Be Improper Under NEPA (Basis 2)

1. NUREG-1465 Source Terms Represent Radionuclides Released Into the Containment Atmosphere As a Result of a Core-Melt Accident, Not the Environmental Source Term That Is Used in a SAMA Analysis

Intervenors next claim that the use of MAAP-generated source terms "appears to lead to anomalously low consequences when compared to source terms" contained in NUREG-1465.[137] As Dr. O'Kula and Mr. Teagarden explain, however, there is nothing "anomalous" about the fact that MAAP produces source terms and release fractions that are different from, and smaller than, those specified in NUREG-1465.[138] In fact, the disparities in source terms and release fractions cited by the Intervenors are fully explainable and expected given fundamental differences in the (1) regulatory purposes and (2) phenomenological bases of the NUREG-1465 and MAAP tools.[139]

Reactor accident source terms generally serve two purposes in the U.S. nuclear regulatory process.[140] The first purpose is for licensing, safety analysis, and regulatory compliance, particularly in meeting 10 C.F.R. Part 100 siting requirements.[141] For this purpose, a source term

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134 *Id.* ¶ 37.

135 *Id.*

136 *See Seabrook*, CLI-12-05, slip op. at 28; *Davis-Besse*, CLI-12-08, slip op. at 18 ("To challenge an application, a petitioner must point with support to an asserted deficiency that renders the SAMA analysis unreasonable under NEPA.").

137 Pet. at 112, 114.

138 *See generally*, Joint Decl. ¶¶ 38-44.

139 *Id.* ¶¶ 43-44, 56.

140 *Id.* ¶ 38.

141 *Id.* (*citing* F. Eltawila, NRC, "NRC Source Term Research – Outstanding Issues and Future Directions," European Review Meeting on Severe Accident Research, Karlsruhe, Germany, June 12-14, 2007, Slide 2 ("Eltawila") (Attach. 28)).

representing the release of radioactive materials into the reactor containment is used to assess the adequacy of reactor containments and engineered safety systems, as well as the environmental qualification of equipment inside the containment that must function following a design-basis accident.[142] This source term also is used to show that dose criteria at the exclusion area boundary are met by assuming the maximum allowable design leak rate from the containment.[143] The NUREG-1465 source term is applicable for this purpose.[144] By its terms, NUREG-1465 purports "to define a revised accident source term for regulatory application for *future* LWRs" and states:

> In this document, a release of fission products from the core of a light-water reactor (LWR) *into the containment atmosphere* ("source term") was postulated for the purpose of calculating off-site doses in accordance with 10 CFR Part 100, "Reactor Site Criteria."[145]

The second purpose for which a reactor accident source term is developed is to simulate a *release of radioactive material to the environment* (*i.e.*, outside containment) following a hypothetical reactor accident.[146] This second source term is input to radionuclide dispersal and accident consequence models (*e.g.*, MACCS2) that are used for Level 3 PRA and SAMA evaluations, which are best-estimate analyses.[147] The use of MAAP-generated environmental source terms in the Davis-Besse PRA and SAMA analysis supports this latter purpose. That is, it is a critical element of Level 3 PRA and SAMA cost-benefit analyses.[148]

In view of the above, it is no aberration that MAAP produces source term or release fraction values that are different from, and smaller than, the values specified in NUREG-1465.[149] NUREG-1465 was developed "to provide a postulated fission product source term *released into containment*

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[142] *Id.*

[143] *Id.* (*citing* 10 C.F.R. § 50.34(a)(1)(ii)(D) & 10 C.F.R. § 100.11).

[144] *Id.*

[145] NUREG-1465 at vii (Attach. 8) (emphasis added); *see also* Joint Decl. ¶¶ 41-42.

[146] Joint Decl. ¶ 39 (*citing* Eltawila, Slide 2 (Attach. 28)).

[147] *Id.*

[148] *Id.*

[149] *Id.* ¶ 43.

that is based on current understanding of LWR accidents and fission product behavior."[150] The source term described therein solely represents radionuclides released into the containment during a core-melt accident.[151] NUREG-1465 expressly states that "the release fractions for the source terms presented in this report are intended to be representative or typical, rather than conservative or bounding values, *of those associated with a low pressure core-melt accident*."[152] This is consistent with the requirement in Part 100 that, for licensing purposes, "an accidental fission product release resulting from 'substantial meltdown' of the core into the containment be postulated to occur and that its potential radiological consequences be evaluated assuming that the containment remains intact but leaks at its maximum allowable leak rate."[153]

2. The NUREG-1465 Source Term Does Not Account for the Source-Term-Reducing Effects of Fission Product Removal Mechanisms

Although NUREG-1465 discusses in-containment fission product removal mechanisms such as engineered safety features ("ESFs") and natural processes (*e.g.*, aerosol deposition and the sorption of vapors on equipment and structural surfaces), it does *not* consider the effects of such mechanisms (*e.g.*, containment sprays, aerosol deposition) in the numerical estimates of source terms.[154] Rather, it directs the reader to use appropriate methodologies in crediting fission product removal or reduction within containment.[155] In contrast, MAAP *does* model and credit these ESFs

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[150] *Id.* ¶ 41 (*quoting* NUREG-1465 at vii (Attach. 8) (emphasis added).

[151] *Id.* ¶ 42. In their Petition, Intervenors stated that the "NUREG-1465 source term was also reviewed by an expert panel in 2002, which concluded that it was 'generally applicable for high-burnup fuel.'" Pet. at 114. This statement is irrelevant given the intended purpose of the NUREG-1465 source term, as discussed above. Indeed, the expert report to which Intervenors allude expressly recognizes that the NUREG-1465 source term is a generic in-containment source term, not a plant-specific environmental source term of the type developed for a SAMA analysis. The report states that the "representative" PWR and BWR source terms in NUREG-1465 "are characterized by the composition and magnitude of fission product release *into containment*, the timing of the release into *containment*, and the physical and chemical forms *in containment*." Energy Research, Inc., ERI/NRC 02-202, "Accident Source Terms for Light-Water Nuclear Power Plants: High Burnup and Mixed Oxide Fuels" at 5 (Nov. 2002) (Attach. 46) (emphasis added); Joint Decl. ¶ 42

[152] NUREG-1465 at 4, 13 (attach. 8) (emphasis added).

[153] NUREG-1465 at 1 (Attach. 8); Joint Decl. ¶ 42. *See also* Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors" (Jan. 2000) (Attach. 30) (stating that NUREG-1465 provides a representative source term for "the release to the containment").

[154] Joint Decl. ¶ 44 (*citing* NUREG-1465 at 17-21).

[155] *Id.* (citing NUREG-1465 at 4-5, 17-18).

and other fission product removal mechanisms.[156] As explained by MAAP's original developers (Fauske & Associates) in a technical bulletin:

> Due to the strong dependence of fission product retention of plant specific features and accident sequence progression, however, NUREG-1465 source terms do not already credit retention. This is left up to the individual licensees.
>
> …
>
> The advantage of using [MAAP4] is that, in a single integrated analysis, it will provide time dependent fission product release from the core, transport to the containment, leakage to the reactor or auxiliary buildings, credit for all major engineered safeguard features, and modeling of all active and passive fission product retention mechanisms.[157]

PRA and SAMA analyses are intended to be best-estimate engineering evaluations and, therefore, seek to maximize the use of plant-specific data.[158] In fact, in this proceeding and others, the Commission has specifically stated that "SAMA analysis is a *site-specific* mitigation alternatives analysis under NEPA."[159] This characterization is consistent with NRC studies and guidance documents that have informed countless PRAs, as well as PRA-based SAMA analyses performed in support of license renewal.[160] Among other things, those documents state that:

- "characteristics of design and operation *specific to individual plants* can have a substantial impact on the estimated risks";[161]
- the "level of detail, and technical acceptability of these risk-informed analyses [PRAs] are to "be based on the *as-built and as-operated and maintained plant*," and reflect operating experience at the plant;[162]
- license renewal applicants should make use of "site-specific" PRA models in performing their SAMA analyses.[163]

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156 *Id.*

157 *Id.* (*quoting* Fauske & Associates, Inc. Technical Bulletin No. 1295-1, "BWR MSIV Leakage Assessment: NUREG-1465 vs MAAP 4.0.2" at 1 (Attach. 31)).

158 *Id.* ¶ 45.

159 *Davis-Besse*, CLI-12-08, slip op. at 17 (emphasis added); *Pilgrim*, CLI-10-11, slip op. at 38 ("The SAMA analysis is a site-specific mitigation analysis.").

160 Joint Decl. ¶ 46.

161 NUREG-1150, at 1-3 (Attach. 10) (emphasis added).

162 Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Rev. 2, at 7 (May 2011) (Attach. 32) (emphasis added).

This guidance underscores that the specifics of environmental source terms are highly dependent upon the specifics of the analyzed accident progressions.[164] Therefore, PRA analysis uses detailed design-, plant type-, and site-specific information to identify initiating events and the likelihood that they will lead to core damage, and to establish the CDF, subsequent reactor containment release, and environmental release conditions.[165] The methodology used to develop source terms for a SAMA analysis must account for plant-unique conditions, plant design, support system dependencies, plant maintenance and operating procedures, operator training, and the interdependencies among these factors that can influence the plant-specific CDF.[166]

As noted above, MAAP—not NUREG-1465—is the appropriate tool to satisfy this important requirement, particularly in the context of a NEPA-related analysis.[167] It is an integral code that treats the full spectrum of important phenomena that could occur during an accident, simultaneously modeling those that relate to the thermal-hydraulics and to the fission product transport and deposition.[168] It also simultaneously models the primary system and the containment (including the influence of mitigative systems and the effects of operator actions).[169]

In short, because use of plant-specific inputs to the SAMA analysis allows for better resolution of data and more accurate portrayal of plant-specific responses to postulated severe accidents, it better serves the purpose of evaluating the benefit of plant improvements.[170] Further, the cited disparity between plant-specific, MAAP-based probabilistic release fractions and NUREG-

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[163] NEI 05-01 at 2 (Attach. 14).

[164] Joint Decl. ¶ 49.

[165] *Id.*

[166] *Id.*

[167] *Id.* ¶ 50.

[168] *Id.*

[169] *Id*.

[170] *Id.* ¶ 45.

1465's generic release fractions is expected and does not constitute a genuine issue of material fact or show that FirstEnergy's use of MAAP is "unreasonable under NEPA."[171]

3. Use of NUREG-1465 Release Fractions Would Be Tantamount to a Worst-Case Analysis That Is Inconsistent with Established PRA and NEPA Principles

Intervenors claim that the source terms used by FirstEnergy "result[] in lower consequences than would be obtained from NUREG-1465 release fractions and release durations."[172] However, in so asserting, Intervenors apparently do not recognize that use of NUREG-1465 source term information in a PRA-based, plant-specific SAMA analysis would be a technically unjustified and, indeed, worst-case assumption.[173] As Dr. O'Kula and Mr. Teagarden explain, NUREG-1465 presents only one set of PWR release fraction data.[174] If those NUREG-1465 data were to be applied to the Davis-Besse SAMA analysis as proposed by Intervenors, then the same release fraction data would need to be applied to *all* 34 release categories ("RC"); *i.e.*, from containment bypass—steam generator tube rupture (RC 1) source terms through no-failure, containment maintained intact with design leakage (RC 9) source terms.[175]

However, for Davis-Besse, approximately 90% of the core damage sequences involve accidents in which the containment retains its structural integrity (*i.e.*, radiological release is limited to containment leakage, as modeled in RC 9.1 and 9.2), and the remaining 10% would be the result of early containment failure and other events (*e.g.*, containment by-pass events, specifically steam generator tube rupture and interfacing system loss of coolant accidents).[176] Additionally, early containment failure and containment by-pass are different event types, with significant differences in sequence progression, timing, release pathways, and fission product deposition and removal

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[171] *Davis-Besse*, CLI-12-08, slip op. at 17-18.

[172] Pet. at 109, 112.

[173] Joint Decl. ¶ 53.

[174] *Id.*

[175] *Id.* ¶¶ 53-54.

[176] *Id.* ¶ 54.

mechanisms.[177] These different event types logically would result in different source terms and release fractions.[178]

In essence, Intervenors propose treating all releases into the containment as releases into the environment; *i.e.*, treating containment failure sequences and containment intact sequences equivalently.[179] The failure to credit the containment's presence as well as engineered safety features for mitigating and delaying releases leads to a worst-case source term scenario without any technically supported weighting by likelihood of occurrence.[180] This magnitude of release is only PWR or BWR-specific and does not quantify the effects of plant-specific features for which a SAMA analysis provides a reasonable, NEPA-compliant cost-benefit analysis evaluation.[181]

Using the NUREG-1465 source term instead of plant-specific information from the Level 1 and Level 2 PRA for a given plant would oversimplify the SAMA cost-benefit process and likely lead to technically unfounded conclusions about a particular plant's offsite risks.[182] For example, it would lead exaggerated early and long-term health effects, incorrect determination of the size of the area that might become contaminated, inflated offsite economic losses, and incorrect estimates of the dollar value of SAMA candidates.[183] The net effect would be to distort the SAMA analysis process and misrepresent the risk reduction effectiveness of plant-specific SAMA candidates.[184]

In this regard, Intervenors' contention contravenes settled NEPA and SAMA-specific principles. First, NEPA grounds an agency's duty of evaluation in credible scientific opinion.[185]

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[177] *Id.*

[178] *Id.*

[179] *Id.* ¶¶ 53-54.

[180] *Id.*

[181] *Id.* ¶ 53.

[182] *Id.* ¶¶ 53-54, 57.

[183] *Id.* ¶ 57.

[184] *Id.*

[185] *See Methow Valley*, 490 U.S. 332, 354-56 (1989).

The Supreme Court has held that NEPA does not require conjectural worst-case analysis that overemphasizes highly speculative harms.[186] So too has the Commission.[187]

Second, like the *Pilgrim* intervenor, Intervenors completely overlook the site-specific, probabilistic nature of SAMA analysis. As the Commission explained in CLI-12-15:

> [T]he accident sequences evaluated and their assessed probabilities are *specific to the features and location of the plant*, including numerous factors extending far beyond the particular design of the reactor (*e.g.*, reactor core radionuclide inventory, physical and climate features of the site, existing equipment or hardware, relevant plant procedures). *If one could simply assume that all nuclear power stations would have the same estimated radionuclide releases, caused by the same sequence of events, with the same frequency of occurrence, there would be little reason to do a site-specific probabilistic risk analysis.*[188]

In arguing that FirstEnergy should use NUREG-1465's generic release fractions, Intervenors have done precisely that—*i.e.*, they have incorrectly and unreasonably assumed that Davis-Besse would have "the same radionuclide releases" as any other PWR. As the Commission also has stated, "Substituting theoretical possibility for probability analysis amounts to a *worst-case* approach."[189]

In summary, the distinct phenomenological bases and regulatory purposes of the NUREG-1465 and MAAP-generated source terms explain the relative numerical differences in the amount of radionuclides and the timing for the release.[190] Due to containment ESFs (*e.g.*, containment air coolers, containment spray) and natural depletion processes (*e.g.*, aerosol deposition and containment holdup), the source term released from the reactor coolant system into containment

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186 *See id.*

187 *See Pilgrim*, CLI-12-10, slip op. at 10 (*citing Methow Valley*, 490 U.S. at 354-56) ("A NEPA mitigation alternatives analysis need not reflect the most conservative—or worst case—analysis."); *Pilgrim*, CLI-12-01, slip op. at 24 (*citing Private Fuel Storage* (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 352 (2002), *rev'd in part on other grounds*, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006) ("We ourselves have stated that to require worst case analyses can easily lead to limitless NEPA analyses because it is always possible to introduce yet another additional variable to a hypothetical scenario to conjure up a worse worst case." (internal quotation marks and citation omitted)).

188 *Pilgrim,* CLI-12-15, slip op. at 15-16 (emphasis added).

189 *Private Fuel Storage*, CLI-02-25, 56 NRC at 352 (emphasis added).

190 Joint Decl. ¶ 56.

expectedly is different from that of the containment into the environment.[191] Thus, the NUREG-1465 and MAAP source terms *should* differ, with the MAAP source term being the smaller of the two.[192] Use of an overstated source term from NUREG-1465 is a worst-case assumption that is inconsistent with NEPA's rule of reason.[193] It would have technically unjustified effects on the SAMA analysis and distort the analysis by likely misrepresenting the risk reduction effectiveness of plant-specific SAMA candidates.[194]

C. The Draft NUREG-1150 and Brookhaven Reports Cited by Intervenors Are Not Current and Do Not Show Any Flaw in FirstEnergy's SAMA Analysis (Basis 3)

Finally, Intervenors argue that, because it previously has been observed that MAAP generates lower release fractions than those derived and used by the NRC in other severe accident studies, MAAP is somehow unreliable.[195] In support of this argument, they cite excerpts from two documents identified and discussed below. As FirstEnergy's experts explain in their Joint Declaration (¶¶ 59-64), neither of the documents cited by Intervenors is pertinent to the use of MAAP-generated source terms in the Davis-Besse *plant-specific* SAMA analysis.[196]

1. Intervenors' Reliance on Draft NUREG-1150 Is Misplaced

The first document is a 1987 draft of the NUREG-1150 severe accident risk study that, in examining accident risk at Zion Nuclear Station ("Zion"), found that "the MAAP estimates for environmental release fractions were significantly smaller" than those obtained with the Source Term Code Package ("STCP")[197] computer code (the primary code used in the NUREG-1150

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[191] *Id.*

[192] *Id.*

[193] *See Private Fuel Storage*, CLI-02-25, 56 NRC at 352 ("NEPA does not call for a 'worst-case' inquiry, which, it is now recognized, simply creates a distorted picture of a project's impacts and wastes agency resources.") (*citing Methow Valley*, 490 U.S. at 354-55).

[194] Joint Decl. ¶ 57.

[195] Pet. at 113.

[196] *See* Joint Decl. ¶ ¶ 59-64.

[197] As noted on the Sandia MELCOR website (http://melcor.sandia.gov/), the STCP is the predecessor to MELCOR: "MELCOR is a fully integrated, engineering-level computer code that models the progression of severe accidents in light-water reactor nuclear power plants. MELCOR is being developed at Sandia National Laboratories for the U.S. Nuclear

study).[198] As discussed below, Intervenors reliance on a *draft* version of NUREG-1150 is misplaced both as a legal matter and as a technical matter.

As a legal matter, NRC precedent holds that a "draft is not a particularly useful item on which to rely" because "a draft is just that—a working document."[199] Indeed, prior NRC adjudicatory boards have held that NRC Staff working papers or draft reports have no legal significance for any NRC regulatory purpose given their draft nature.[200] Draft NUREG-1150 is no exception. Indeed, as noted below, it underwent significant revisions after its issuance in 1987.

As a technical matter, the MAAP to STCP comparison cited by Intervenors is flawed in several respects. First, the IDCOR (MAAP) to NUREG-1150 (STCP) comparison of Zion results was only one of four sets of plant results compared in the February 1987 draft of NUREG-1150 (with several other comparisons in the draft report showing reasonable agreement).[201] In addition, after extensive peer review of, and public comment on, the February 1987 draft, NUREG-1150, Volume 1 was issued as a second draft in 1989, before being published as a final report in December 1990.[202] In summary, the report and its underlying technical analyses were substantially modified in two rounds of review before the report's final publication in December 1990.[203] Significantly, one of the changes included deleting the specific discussion comparing MAAP and

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Regulatory Commission as a second-generation plant risk assessment tool and the successor to the Source Term Code package."

198 Pet. at 114 (*quoting* Office of Nuclear Regulatory Research, *Draft for Comment, Reactor Risk Reference Document*, NUREG-1150, Vol. 1, at 5-14 (Feb. 1987) ("Draft NUREG-1150")) (Attach. 9).

199 *La. Power & Light Co.* (Waterford Steam Electric Station, Unit 3), ALAB-812, 22 NRC 5, 43 n.47 (1985) (finding that a draft document did not provide particularly useful support for a motion to reopen the record because a draft is a working document which may reasonably undergo several revisions before it is finalized).

200 *See Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), ALAB-355, 4 NRC 397, 416 (1976) (finding that a licensing board did not abuse its discretion in excluding a document from evidence as irrelevant because an NRC Staff working paper or draft report that is neither adopted nor sanctioned by the Commission has no legal significance for any NRC regulatory purpose); *Consolidated Edison Co.* (Indian Point Nuclear Generating Unit 2), ALAB-209, 7 AEC 971, 973 (1974) (finding an internal working draft of a Staff paper "has no legal significance for any [NRC] regulatory purpose")).

201 Joint Decl. ¶ 59.

202 *Id.*

203 *Id.*

STCP results for Zion.[204] That comparison (*i.e.*, the one appearing on page 5-14 of Draft NUREG-1150 and cited by Intervenors in Contention 4) does not appear in the final December 1990 NUREG-1150 report.[205]

Furthermore, although final NUREG-1150 remains a seminal study, it was completed over 20 years ago and assessed the risks from severe accidents at five commercial U.S. nuclear power plants.[206] Davis-Besse was not one of those plants.[207] Therefore, the source term information contained in NUREG-1150 (draft and final) is not specific to Davis-Besse. But as the Commission recently noted, "the offsite consequence analysis (Level 3 PRA) … is inextricably linked to the underlying analyses of accident events, accident progression, and radioactive source terms"—all of which are plant-specific.[208] Intervenors overlook this critical and indisputable fact in citing outdated studies involving different plants and different computer codes.

Finally, the state of the art for source term analysis has improved significantly since the NUREG-1150 study was performed in the 1980s and published in final form in 1990.[209] As Dr. O'Kula and Mr. Teagarden explain in their Joint Declaration, the best comparison is of computer model predictions at the same point in time—with the same inputs and data available to the code analysts performing the comparison.[210]

2. Intervenors' Reliance on the Brookhaven National Laboratory Report Is Misplaced

The second document on which Intervenors rely is a 2002 Brookhaven National Laboratory ("BNL") report reviewing combustible gas control availability at ice condenser and Mark III

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[204] *Id.*

[205] *Id.*; *compare* Draft NUREG-1150, Section 5 (Zion results) (Attach. 9) *with* NUREG-1150, Section 7 (Zion results) (Attach. 10).

[206] Joint Decl. ¶ 59.

[207] *Id.*

[208] *Pilgrim*, CLI-12-15, slip op. at 18.

[209] Joint Decl. ¶¶ 59,

[210] *Id.*

containment plants.[211] The BNL report compared the Level 2 portion of the PRA results for the Catawba plant (obtained using the MAAP code) with a "typical NUREG-1150 release" for the Sequoyah plant (obtained using the STCP and MELCOR codes).[212] The BNL report states that the "NUREG-1150 release fractions for the important radionuclides are about a factor of 4 higher than the ones" in the Catawba PRA, and that the "differences in the release fractions . . . are primarily attributable to the use of the different codes in the two analyses."[213]

The cited comparison also fails to support Intervenors' contention. The comparison between the Catawba Level 2 PRA release fractions and the NUREG-1150 Sequoyah release fractions represents a difference of more than ten years in terms of severe accident modeling (~2002 versus ~1990).[214] In addition, the comparison uses a release category that represents an early containment failure in which the Catawba source term is based on an "early containment failure without ex-vessel release" assumption. As FirstEnergy's experts explain, the same assumption does not appear to have been applied in the Sequoyah source term.[215] Finally, in its 2002 Supplemental Environmental Impact Statement for Catawba license renewal, the NRC Staff compared *similar* sequences between NUREG-1150 and Revision 2b of the Catawba PRA,[216] which included the plant's IPE models, and concluded there was "reasonable agreement" for the closest corresponding release scenarios.[217]

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[211] John R. Lehner et al., Brookhaven National Laboratory, "Benefit Cost Analysis of Enhancing Combustible Gas Control Availability at Ice Condenser and Mark III Containment Plants, Final Letter Report," at 17 (Dec. 2002) ("BNL report") (Attach. 34).

[212] *Id.* As Dr. O'Kula and Mr. Teagarden note, the Catawba and Sequoyah plants both have ice condenser containments, whereas Davis-Besse has a dry, ambient pressure containment type. Joint Decl. ¶ 62.

[213] BNL report at 17 (Attach. 34).

[214] Joint Decl. ¶ 63.

[215] Joint Decl. ¶ 63.

[216] Letter from Gary R. Peterson, Vice President, Duke Energy Corporation, to Document Control Desk, U.S. N.R.C., Attach. 1, "Catawba PRA Revision 2b Summary Results" (Apr. 18, 2001).

[217] Joint Decl. ¶ 63 (*citing* NUREG-1437, Supp. 9, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Catawba Nuclear Station, Units 1 and 2 – Final Report at 5-9 to 5-10 (Dec. 2002) (Attach. 37)).

Furthermore, since the issuance of NUREG-1150, better understanding of heat transfer and removal from the reactor pressure vessel during severe accident sequences; improved insights into iodine, cesium, and other fission product group chemistry from contemporary research; and modeling improvements indicate that the early containment failure releases potentially could be smaller than previously concluded.[218] Thus, a comparison of MAAP-based source terms with those estimated over ten years earlier with the simpler STCP code and an earlier version of MELCOR—as was done in the BNL report—is expected to show differences.[219] Those differences do not suggest, much less demonstrate, any flaw in MAAP or FirstEnergy's SAMA analysis inputs.[220]

As such, Intervenors have presented no information to suggest that a genuine material dispute exists, and that such dispute must be resolved at hearing. In admitting this part of Contention 4, the Board noted "source term selection can make a large difference in dose results," such that "a change in the SAMA candidates' cost-benefit conclusions is genuinely plausible."[221] In CLI-12-08, the Commission majority chose to defer to the Board on admission of this limited aspect of the SAMA contention.[222] However, it further stated that Intervenors' challenge to the use of the MAAP code is "substantively identical" to the source term challenge raised in the pending *Seabrook* license renewal proceeding,[223] and that the Intervenors' "source term claims are weak" for the same reasons outlined by the Commission its *Seabrook* ruling:[224]

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[218] This is further borne out by the results of the NRC's recent State-of-the-Art Reactor Consequence Analyses ("SOARCA") project, the principal purpose of which was to develop updated, more realistic severe accident analyses by including significant plant changes and current reactor safety research results not reflected in earlier NRC assessments. Specifically, the NRC found that nuclear power plant severe accidents generally progress more slowly and release much smaller amounts of radioactive material than estimated in earlier studies. NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report, Draft Report for Public Comment" (Jan. 2012); NUREG/CR-7110, "State-of-the-Art Reactor Consequence Analyses Project: Volume 1: Peach Bottom Integrated Analysis" (Jan. 2012); NUREG/CR-7110, "State-of-the-Art Reactor Consequence Analyses Project: Volume 2: Surry Integrated Analysis" (Jan. 2012)).

[219] Joint Decl. ¶ 63.

[220] *Id.* ¶ 73.

[221] LBP-11-13, slip op. at 54.

[222] *Davis-Besse*, CLI-12-08, slip op. at 21.

[223] *Id.* at 20.

[224] *Id.* at 21. Commissioners Svinicki and Apostolakis dissented to the majority's decision to sustain Petitioners' challenge to the use of the MAAP code for the determination of source terms in the Davis-Besse SAMA analysis, stating: "As in

> Essentially, the challenge to the MAAP-generated release fractions rests on a thin reed—the excerpts from the draft NUREG-1150 report and the BNL report. We do not read these excerpts to necessarily suggest that MAAP-generated source terms are inaccurate, only that under the specific comparisons noted the MAAP-generated source terms were smaller than source terms obtained from the NUREG-1150 report. Further, it is not clear that these comparisons (one dating back 24 years) involved the same version of the MAAP code used in the [] SAMA analysis. Contention [4] does not compare NUREG-1150 values to the [] SAMA analysis release fractions, or otherwise discuss or even reference the [] release fractions. *And while the contention suggests that generic source term values obtained from NUREG-1150 would be larger, it does not suggest why the generic values would be more accurate for a plant-specific SAMA analysis than the MAAP-generated plant-specific release fractions*.[225]

The Commission's criticisms of the *Seabrook* intervenors' contention apply with equal force here and reinforce that, while Intervenors propose their own preferred inputs for the SAMA analysis, they do not "raise a genuine material dispute with the analysis that was done."[226]

In summary, it is the Intervenors' burden "to come forward with the support—the reason to believe—that reliance on [MAAP-derived source term] data posed a 'significant defect,' plausibly skewing the SAMA cost-benefit results. With no such factual or expert support, [Intervenors'] claims constitute speculation."[227] Neither draft NUREG-1150 nor the BNL report show that FirstEnergy's use of current, MAAP-generated *plant-specific* source terms in the Davis-Besse SAMA analysis is unreasonable under NEPA, or that the use of generic source term values from

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Seabrook, we find that Petitioners did not present the minimal factual or expert support necessary to demonstrate the existence of a genuine material dispute on this issue." *Id.* at 36. *See also*, *Seabrook*, CLI-12-05, slip op. at 32 (noting that the petitioners' contention "rests on a thin reed") & 64 (dissenting views of Commissioners Svinicki and Apostolakis); *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 187 (2008) (rejecting a nearly-identical proposed challenge to the use of MAAP in which the petitioners also cited NUREG-1465).

[225] *Seabrook*, CLI-12-05, slip op. at 32 (emphasis added).

[226] *Pilgrim*. CLI-12-10, slip op. at 10-11. ("But again, the contention contains merely [Intervenors'] own unsupported suggestions of alternate inputs or methodology for the SAMA analysis," and "does not specify or otherwise discuss the inputs, factors, or standards the [Applicant's] SAMA analysis actually considered.").

[227] *Davis-Besse*, CLI-12-08, slip op. at 29. To date, Intervenors have manifested no intention to buttress their original, tenuous claims. Significantly, although Contention 4 was admitted more than one year ago. they have yet to disclose any additional documents (beyond those cited in their Petition) as relevant to Contention 4 or to identify any expert who may testify in support of their claims.

NUREG-1465 or other sources would yield a "more accurate or meaningful" SAMA analysis.[228] Accordingly, Intervenors' third basis also fails to present a genuine issue of material fact.

VI. CONCLUSION

For the foregoing reasons, the Board should grant summary disposition of Contention 4. Intervenors have not identified any deficiency that could credibly render the SAMA analysis altogether unreasonable under NEPA standards. The expert opinions of Dr. O'Kula and Mr. Teagarden and the undisputed facts show conclusively that:

- The MAAP code has a strong technical basis for use in PRA and severe accident analysis and has been accepted for use in numerous NRC-approved analyses. Use of the MAAP code is reasonable for a SAMA analysis performed under NEPA.[229]
- The use of plant-specific source terms (*e.g.*, based on MAAP) is preferred over the use of generic source terms (*e.g.*, based on NUREG-1465) for a SAMA analysis where plant-specific design and operational changes are evaluated.[230]
- The primary purpose of NUREG-1465 source terms is for defining releases into containment, not to the environment. A SAMA analysis requires a plant-specific evaluation of releases to the environment.[231]
- NUREG-1465 provides data only for a single PWR release. A SAMA analysis evaluates the spectrum of plant-specific releases. Use of NUREG-1465 data for the entire spectrum would result in grossly-distorted SAMA results.[232]

Accordingly, there is no genuine issue of material fact related to Contention 4, and FirstEnergy is entitled to judgment as a matter of law.

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[228] *Seabrook*, CLI-12-05, slip op. at 29.

[229] Joint Decl. ¶ 74.

[230] *Id.*

[231] *Id.*

[232] *Id.*

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

In accordance with 10 C.F.R. § 2.323(b), counsel for FirstEnergy certifies that he made a sincere effort to contact counsel for the other parties in this proceeding early during the week of July 23, 2012, to explain to them the factual and legal issues raised in this Motion, and to resolve those issues, and he certifies that his efforts have been unsuccessful. Intervenors stated that they do not consent to the Motion. The NRC Staff stated that it does not oppose the filing of the Motion but will wait until the Staff reviews the Motion before taking a position on the merits.

Counsel for FirstEnergy further certifies that this Motion is not interposed for delay or another improper purpose, that counsel believes in good faith that there is no genuine issue as to any material fact relating to this Motion, and that the moving party is entitled to a decision as a matter of law, as required by 10 C.F.R. §§ 2.1205 and 2.710(d).

Executed in Accord with 10 C.F.R. § 2.304(d)

Signed (electronically) by Martin J. O'Neill

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COUNSEL FOR FIRSTENERGY

Dated in Washington, DC
this 26th day of July 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-346-LR
FIRSTENERGY NUCLEAR OPERATING COMPANY	)	
	)	
(Davis-Besse Nuclear Power Station, Unit 1)	)	July 26, 2012

CERTIFICATE OF SERVICE

I hereby certify that, on this date, a copy of "FirstEnergy's Motion for Summary Disposition of Contention 4 (SAMA Analysis Source Terms)" and all associated attachments were filed with the Electronic Information Exchange in the above-captioned proceeding on the following recipients.

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