UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Gregory B. Jaczko, Chairman
Kristine L. Svinicki
George Apostolakis
William D. Magwood, IV
William C. Ostendorff

In the Matter of	)	
ENTERGY NUCLEAR GENERATION COMPANY and ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-293-LR
(Pilgrim Nuclear Power Station)	)	

CLI-12-01

MEMORANDUM AND ORDER

Before us is Intervenor Pilgrim Watch's petition for review of Atomic Safety and Licensing Board decision LBP-11-18 and several related interlocutory Board orders.[1]

[1] *See Pilgrim Watch Request for Review of the Partial Initial Decision (Rejecting Upon Remand, Pilgrim Watch's Challenge to Meteorological Modeling in SAMA Analysis in Entergy's License Renewal Application) July 19, 2011* (Aug. 3, 2011) (Petition); LBP-11-18, 74 NRC __ (July 19, 2011) (slip op.); Order (Scheduling Telephone Conference) (Sept. 2, 2010) (unpublished); Order (Confirming Matters Addressed at September 15, 2010 Telephone Conference) (Sept. 23, 2010) (unpublished); Order (Questions from Board Majority Regarding the Mechanics of Computing "Mean Consequences" in SAMA Analyses) (Oct. 26, 2010) (unpublished); Order (Ruling on Timeliness of Mean Consequence Issue) (Nov. 23, 2010) (unpublished) (November 23 Ruling on Mean Consequences Issue); Order (Addressing Joint Motion in Limine, Proposed Findings of Fact and Conclusions of Law/Concluding Statements of Position, and Argument to be held March 9, 2011) (Feb. 22, 2011) (unpublished); Revised Notice and Order (Regarding Hearing and Oral Argument) (Feb. 23, 2011) (unpublished); Memorandum and Order (Ruling on Timeliness of Mean Consequence Value Issue) (Mar. 3, 2011) (unpublished) (March 3 Ruling on Mean Consequences Issue).

In LBP-11-18, the Board on remand rejected Pilgrim Watch's challenge to the Severe Accident Mitigation Alternatives (SAMA) analysis associated with the license renewal application for the Pilgrim Nuclear Power Station (Pilgrim). Both the NRC Staff and the applicants, Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc. (together, Entergy) oppose the petition for review.[2] For the reasons outlined below, we deny the petition.

I. BACKGROUND

The Board's decision in LBP-11-18 addresses and rejects Pilgrim Watch's challenge to the Pilgrim SAMA analysis. A SAMA analysis is part of the NRC's license renewal review under the National Environmental Policy Act (NEPA).[3] It is a NEPA mitigation alternatives analysis, and to date has been conducted as a quantitative analysis to identify if there are additional mitigation measures—procedures or hardware—that may be cost-beneficial to implement at a nuclear power plant to further reduce severe accident risk (probability or consequences). To better understand the issues discussed in LBP-11-18 and our decision today, it is helpful to understand the methodology used to perform the SAMA analysis. We therefore begin by outlining briefly below some of the relevant aspects of that approach.

The SAMA analysis is a probability-weighted assessment of the benefits and costs of mitigation alternatives that can be used to reduce the risks (probability or consequences or both) of potential severe accidents at nuclear power plants. Various computer codes are used to calculate the probabilities and consequences. These include codes that perform a Level 1 probabilistic risk assessment (PRA) (PRA of accident sequences leading to core damage), and a Level 2 PRA (PRA of accident progression leading to containment failure and release of radionuclides to the environment). The output of the Level 1 PRA is used in the Level 2 PRA,

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[2] *See Entergy's Answer Opposing Pilgrim Watch's Request for Review* (Aug. 15, 2011) (Entergy Brief); *NRC Staff's Answer to Pilgrim Watch's Request for Review of the Licensing Board's July 19, 2011 Partial Initial Decision (LBP-11-18)* (Aug. 15, 2011) (Staff Brief).

[3] 10 C.F.R. § 51.53(c)(3)(ii)(L).

and the output of the Level 2 PRA is, in turn, used in the Level 3 offsite consequence calculation portion of the analysis that is performed in the MACCS2 Accident Consequence Analysis (MACCS2) code. The MACCS2 code calculates estimated offsite consequences (doses, economic losses due to protective actions such as evacuation, banning of contaminated food, etc.) over all different kinds of weather at the site.

A. MACCS2 Computer Code

The computer code used for the Pilgrim SAMA analysis is the MACCS2 code. 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.[4] The code includes three separate computer "modules" used at sequential stages of the SAMA analysis.

The first module is the atmospheric transport and dispersion module, called ATMOS. ATMOS models how radioactive material would be transported and dispersed during a severe accident, predicting the concentration of material that would be in the air and deposited on the ground. ATMOS includes both wet and dry deposition of aerosols and particulate material in the plume. Embedded in the ATMOS module is a straight-line Gaussian plume model. A straight-line atmospheric model implies that the plume centerline of the released material travels in straight lines determined by the prevailing wind direction at the time from the point of radiological release. In contrast to the straight-line Gaussian plume model, a variable wind trajectory model can depict potential shifts in plume direction, and therefore can more precisely depict effects of terrain (e.g., mountains) or other phenomena that can affect the trajectory of a plume.

[4] *See* CLI-10-11, 71 NRC 287, 291 & n.11 (2010), *reconsideration denied*, CLI-10-15, 71 NRC 479 (2010).

ATMOS calculates the plume size and location, and further calculates the concentration of each released isotope—both in air and deposited on the ground—for a user-defined distance from the release point (the usual NRC practice in a SAMA analysis is a 50-mile radius area surrounding the nuclear power plant). Data inputs used include the following: (1) the amount of each radionuclide in the reactor core at the time of reactor scram as determined by the core burnup; (2) in each accidental release, the amount of each radionuclide released and its release height, release duration, and energy of release; (3) one representative year of hourly weather data (8,760 hours) including wind direction, wind velocity, precipitation intensity, and atmospheric stability class; and (4) a polar coordinate grid depicting a 50-mile radius around the nuclear power plant. The 50-mile radius grid map is divided into sixteen compass wind directions, and further divided by radial rings specifying incremental distances from the plant. ATMOS calculates the concentration of each isotope for each sector or "spatial grid cell" of the 50-mile radius map.[5]

The Board's decision in LBP-11-18 focuses on the adequacy, for the Pilgrim SAMA analysis, of the initial portion of the analysis—the plume modeling performed with the ATMOS module. The other two MACCS2 modules, named EARLY and CHRONC, are used in subsequent stages of the SAMA analysis.

The EARLY module uses the radioactivity concentrations determined earlier in the plume modeling stage, and additional inputs (e.g., population data, protective action criteria, evacuation or sheltering inputs) to predict the offsite population dose that would occur during the first seven days after an accident, the emergency phase, calculated from the time of initial accident release.

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[5] *See, e.g.*, Affidavit of Dr. Nathan Bixler Concerning the Board's Questioning from Board Majority Regarding the Mechanics of Computing "Mean Consequences" in SAMA Analyses (Nov. 18, 2010), at 3.

The last module, CHRONC, calculates the estimated long-term population dose and the offsite economic consequences of a severe accident. The offsite economic consequences largely arise from the protective actions taken (such as evacuation and relocation of people away from contaminated areas) to limit radiation exposure of the public during and after plume passage. The CHRONC module uses the radioactivity concentrations determined in the initial ATMOS module, as well as extensive economic cost data inputs and parameters, to determine long-term off-site population dose and long-term economic costs. Long-term consequences are calculated for the period from after the end of the seven-day emergency phase to up to thirty years after a severe accident. In addition to population data, numerous economic cost inputs are used, including, for example, average county-wide value of farm wealth and of non-farm wealth, average cost of labor to perform decontamination, population relocation costs, daily cost for an evacuated person, and a monetary factor (a monetary value for converting radiological dose to an economic cost).[6] The numerous economic cost parameters and inputs later added to the SAMA analysis in the CHRONC module phase help to translate the plume modeling results into the estimated long-term monetary costs of a severe accident.

B. Procedural Background

The Board in LBP-11-18 provides a detailed procedural history of this long-pending license renewal proceeding, involving numerous Board and Commission decisions.[7] We provide here only the background most relevant to our decision today.

Pilgrim Watch became a party to this proceeding after the Board admitted two Pilgrim Watch contentions, a safety contention (Contention 1) challenging Entergy's aging management

[6] *See* Ex. NRC000001, Entergy License Renewal Application, Environmental Report, Attachment E at E.-61 to E.1-63 (Jan. 2006) (Environmental Report).

[7] *See* LBP-11-18, 74 NRC at __ (slip op. at 2-8).

program for buried piping, and an environmental contention (Contention 3) challenging Entergy's SAMA analysis.[8]

Entergy sought summary disposition of both contentions. While the Board declined to dismiss Contention 1, a Board majority dismissed Contention 3.[9] As admitted, Contention 3 challenged three aspects of the SAMA analysis: plume modeling, evacuation inputs, and economic cost inputs.[10] The Board concluded that, based on additional analyses Entergy had performed, no genuine material dispute remained on any of the three SAMA challenges.

In CLI-10-11, we affirmed in part and reversed in part the dismissal of Contention 3. We agreed with the majority that most of Pilgrim Watch's arguments failed to raise a genuine material dispute for hearing, including its claims regarding the evacuation inputs and economic cost inputs in the analysis.[11] We stressed that Pilgrim Watch's challenges regarding evacuation inputs and economic costs "were unsupported by significantly probative evidence, go well beyond the scope of Contention 3 as admitted, or raise issues beyond the intent and scope of a SAMA analysis."[12] We further described Pilgrim Watch's economic cost arguments as "largely based on its own unsupported reasoning and computations," and plainly insufficient to raise a dispute with the Supplemental Environmental Impact Statement's conclusion that "further adjustments to more precisely account for business and tourism would not change the overall

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[8] *See* LBP-06-23, 64 NRC 257, 348-49 (2006).

[9] *See* LBP-07-13, 66 NRC 131, 154 (2007) (dismissing Contention 3) (Young, J., dissenting); LBP-07-12, 66 NRC 113 (2007) (denying summary disposition of Contention 1). The Board ultimately held an evidentiary hearing on Contention 1 and found in favor of Entergy. *See* LBP-08-22, 68 NRC 590 (2008), *petition for review denied*, CLI-10-14, 71 NRC 449 (2010).

[10] CLI-10-11, 71 NRC at 293 (quoting LBP-06-23, 64 NRC at 341).

[11] *See id.* at 309-16. *See also* CLI-10-15, 71 NRC at 480-85.

[12] CLI-10-11, 71 NRC at 308.

conclusions of the SAMA analysis."[13] We therefore affirmed the Board majority's dismissal of Pilgrim Watch's specific challenges going to the evacuation inputs and the adequacy of the economic costs calculation portion of the SAMA analysis.

We reversed the Board only to the extent that it had inappropriately dismissed one issue: a challenge to the Pilgrim SAMA analysis atmospheric transport and dispersion—or "plume"—modeling.[14] We found that Pilgrim Watch sufficiently raised a genuine material dispute on whether limitations of the plume modeling led to significantly under-predicted radiological doses. Pilgrim Watch claimed that use of a straight-line Gaussian plume model under-predicted dose, which in turn had skewed the SAMA analysis cost-benefit results. Pilgrim Watch argued that more mitigation alternatives would have been found cost-beneficial if a variable wind trajectory model had been used.[15]

In sum, the limited threshold matter we remanded to the Board for hearing involved the ATMOS module portion of the analysis—Pilgrim Watch's challenge to the "adequacy of the meteorological patterns/air dispersion modeling" in the SAMA analysis.[16] We stressed that Pilgrim Watch had failed to raise any genuine material dispute for hearing on any of its other

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[13] *See id.* at 314-15 (quoting Ex. NRC000002, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 29, Regarding Pilgrim Nuclear Power Station" (Final Report), NUREG-1437 (July 2007), Vol. 2 at G-18 (Pilgrim SEIS)).

[14] *See id.* at 301-08.

[15] *See, e.g.*, *Pilgrim Watch Petition for Review of LBP-06-48, LBP-07-13, LBP-06-23 and the Interlocutory Decisions in the Pilgrim Nuclear Power Station Proceeding* (Nov. 12, 2008), at 15 (use of straight-line Gaussian model "leads to a non-conservative geographical distribution of dose" that can "materially affect the costs of mitigation alternatives"); *Pilgrim Watch Brief in Response to Entergy's Response to CLI-09-11* (July 6, 2009) at 8 ("use of a variable trajectory model and MACCS2 code modified to accept site specific [meteorologic] conditions could raise the costs of a potential accident to levels orders of magnitude higher than those projected by Entergy").

[16] CLI-10-11, 71 NRC at 307.

discrete "challenges that *extend beyond* its meteorological modeling concerns."[17] We made clear, therefore, that if the Board were to conclude that the initial plume modeling phase of the Pilgrim SAMA analysis was sufficiently conservative or otherwise reasonable, no further issue would remain before the Board.[18]

We acknowledged, however, that the Board on remand might conclude that deficiencies in the plume modeling were significant (e.g., could have significantly under-predicted doses). We went on to explain that if the Board found the plume modeling deficient or otherwise in need of significant re-assessment, then ultimately the economic cost calculation portion of the SAMA analysis could also warrant re-examination, insofar as any of the later calculations or assumptions regarding evacuation or economic costs were directly based on the plume modeling results.[19] Since the Board had yet to reach a merits decision on the adequacy of the plume modeling, we did not "dismiss entirely" the possibility that the economic costs calculation might also need to be re-evaluated.[20] But we made clear that there was no pending genuine material dispute with the *current* Pilgrim SAMA analysis on the "economic costs" input claims Pilgrim Watch had raised.[21]

On remand, the Board in LBP-11-18 rejected Pilgrim Watch's plume modeling challenge. The Board concluded that by "an overwhelming preponderance of the evidence," Entergy and the Staff had demonstrated that the meteorological data used in the analysis and the use of the straight-line Gaussian plume model were both "reasonable and adequate," and that use of a

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[17] *Id.* at 308 (emphasis added).

[18] *Id.* at 308, 315.

[19] *Id.* at 307-08, 315.

[20] *Id.* at 308.

[21] *Id.* at 315.

variable trajectory plume model would not materially "change the cost-benefit conclusions for the SAMA candidates evaluated."[22]

We turn now to Pilgrim Watch's petition for review of LBP-11-18.

II. ANALYSIS

We will review a full or partial initial decision by a Presiding Officer as a matter of discretion. In determining whether to grant review, we consider whether a petition raises a "substantial question" in regard to any of the following:

(i) A finding of material fact is clearly erroneous or in conflict with a finding as to the same fact in a different proceeding;

(ii) A necessary legal conclusion is without governing precedent or is a departure from or contrary to established law;

(iii) A substantial and important question of law, policy, or discretion has been raised;

(iv) The conduct of the proceeding involved a prejudicial error; or

(v) Any other consideration [we deem] to be in the public interest.[23]

While we have the authority to undertake a *de novo* factual review, where a Board's decision rests on a weighing of extensive fact-specific evidence presented by technical experts, we generally will defer to the Board's factual findings, unless there appears to be a "clearly erroneous" factual finding or related oversight.[24] We gave careful consideration to Pilgrim Watch's claims, but, as discussed below, the petition does not identify any substantial question warranting plenary review.

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[22] LBP-11-18, 74 NRC at __ (slip op. at 33).

[23] 10 C.F.R. § 2.341(b)(4).

[24] *See, e.g.*, *Hydro Resources, Inc.* (P.O. Box 777, Crownpoint, New Mexico 87313), CLI-06-1, 63 NRC 1, 2 (2006); *Southern Nuclear Operating Co.* (Early Site Permit for Vogtle ESP Site), CLI-10-5, 71 NRC 90, 98-99 (2010).

A. The Board Appropriately Addressed Matters Within the Scope of the Remand

Pilgrim Watch claims that the Board improperly "bifurcated the hearing" to consider first whether the asserted plume modeling deficiencies could, "*on [their] own,* credibly alter the SAMA analysis conclusions."[25] Pilgrim Watch argues that the Board's approach was "irrational," and that the Board "denied" it "the right to present . . . evidence of 'economic costs' to show that 'the [in]adequacy of the meteorological differences may have a material impact.'"[26]

Pilgrim Watch fails to point to any clear or prejudicial error in the Board's approach. Following Entergy's motion for summary disposition, the only existing genuine material dispute was the adequacy of the plume modeling. The plume modeling is a separate, initial stage in the SAMA analysis, as we have explained. It was not "irrational" to consider whether a plume model and particular meteorological inputs used in it were appropriate and sufficiently conservative for the purpose of the analysis. As noted in the Board's decision and later here, an NRC-sponsored study examined exactly the issue whether the MACCS2 code's straight-line Gaussian plume model is an adequate atmospheric transport and dispersion model for probabilistic offsite consequence assessments, such as the SAMA analysis. The Board in LBP-11-18 reviewed extensive evidence on challenged meteorological inputs, and on whether use of a variable trajectory plume model credibly would have made a significant difference to the Pilgrim SAMA cost-benefit conclusions—evidence that Pilgrim Watch had the opportunity to contest.

Pilgrim Watch goes on to claim that the Board applied a "double standard," allowing Entergy to present evidence going to the "economic costs" aspects of the SAMA analysis, yet

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[25] Petition at 3 (emphasis in original). *See also id.* at 4-5, 7-10.

[26] *Id.* at 3.

barring Pilgrim Watch from doing so.[27] But Pilgrim Watch mischaracterizes the Board's actions. The purpose of the SAMA analysis is to evaluate and identify potential cost-beneficial mitigation measures to reduce severe accident risk and consequences. The Pilgrim analysis identifies seven specific potentially cost-beneficial mitigation measures.[28] Other mitigation measures examined in the analysis were found to have implementation costs that exceeded the benefit (e.g., the accident risk reduction) that would result from the mitigation alternative. To judge whether any imprecision or inaccuracy in the plume modeling analysis could affect the Pilgrim SAMA analysis conclusions, the Board appropriately considered *how much change* there would need to be in the analysis results to make a difference to the overall conclusions on cost-beneficial SAMAs. The Board unanimously found that the degree of error that Pilgrim Watch's asserted plume modeling deficiencies credibly might have caused would not reach the level of error necessary to have a material impact on the overall SAMA analysis conclusions.[29]

The Board's decision does not rest on evidence of the adequacy of any particular "economic cost" inputs, parameters, or calculations. It takes the cost-benefit analysis results as they are, and merely considers what degree of error in the existing cost-benefit analysis could change the overall cost-benefit conclusions. The decision concludes, based on extensive plume modeling and meteorological evidence, that any potential error in the plume modeling from deficiencies Pilgrim Watch asserted would not be great enough to affect the cost-benefit conclusions. It bears noting that the SAMA analysis takes into account numerous factors: accident progression scenarios, source terms (including reactor core inventory and duration of releases), exposure pathways, short-term and long-term mitigative measures, and many others.

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[27] *Id.* at 3-5, 14-15.

[28] *See* Ex. NRC000002, Pilgrim SEIS, Vol. 1, at 5-9 to 5-10.

[29] *See* LBP-11-18, 74 NRC ___ (slip op. at 32-33; Separate Statement by Judge Young at 1-2).

The plume modeling has an important, but nevertheless limited effect on the overall SAMA analysis conclusions.

The decision suggests no "double standard" applied to Pilgrim Watch in regard to issues or evidence allowed on remand. Instead, as Entergy describes, Pilgrim Watch "conflates its rejected economic inputs claims" (e.g., whether cost calculations accounted for lost tourism income) with the immediate issue on remand—whether asserted deficiencies in the plume modeling might themselves be significant enough to materially alter the existing Pilgrim SAMA cost-benefit conclusions.[30]

Pilgrim Watch fails to identify any evidence focused on the adequacy of the plume modeling that the Board excluded. Nor does it identify any Entergy or Staff evidence relied upon by the Board that is not directly related to the adequacy of the SAMA analysis plume modeling. In our view, Pilgrim Watch's generalized complaints fail to raise any substantial question of error by the Board. Moreover, as the Staff correctly states, Pilgrim Watch "never objected, moved to strike, or filed a *motion in limine* regarding any of the evidence presented in Entergy's or the Staff's pre-filed testimony or exhibits," thereby waiving any objections to the evidence presented by the Staff and Entergy.[31]

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[30] *See* Entergy Brief at 16. Moreover, the bulk of "economic cost" issues that Pilgrim Watch seeks to litigate fall well beyond the scope of the admitted contention, and therefore would not have been part of the remand even if the Board had concluded that the plume modeling results were in question. *See, e.g.*, *Pilgrim Watch SAMA Remand Pre-Filed Testimony* (Jan. 3, 2011) (admitted by Board as the "Pilgrim Watch Statement of Position") at 38, 43-44, 56-65, 67-80 (e.g., challenging source terms, "clean up" standards, health cost parameters, decontamination cost parameters). *See infra* note 49 and associated text.

[31] Staff Brief at 16. Among its arguments regarding "economic costs," Pilgrim Watch challenges the Board's use of an "arithematic [sic] example[]," a mathematical formula that the Board used to demonstrate the limited impact of the "sea breeze" phenomenon on the overall Pilgrim SAMA analysis. *See* Petition at 15 n.12. Because the Board provided this formula simply as "an additional view of the evidence," not necessary to the rest of the decision, we need not address the validity or accuracy of the formula. *See* LBP-11-18, 74 NRC at __ (slip op. at 26-27 & n.123). The Board's example, in any case, does not go to the economic cost calculation portions of the SAMA analysis, as Pilgrim Watch suggests.

Pilgrim Watch argues that the Board should have "asked simply whether meteorological modeling deficiencies (e.g., a straight-line Gaussian Plume model, and failure to consider sea breeze, hot spots, storms, fog, and topography) could call into question Entergy's assumptions about (i) the size and location of the affected area and (ii) the population doses within that area."[32] But that is effectively what the Board did when it considered whether use of a more sophisticated, more precise, variable trajectory plume model would materially change the conclusions in the Pilgrim SAMA analysis. The Board focused, however, not on whether more advanced modeling would capture greater detail, or might depict some different radiological dose in a particular location, but on whether potential differences could be significant enough to be material.

Among other evidence, the Board considered a "model-to-model comparison between MACCS2 and more complex atmospheric transport and dispersion models."[33] The Board considered the results of a 2004 NRC-funded comparative study—referred to as the "Molenkamp Report"—designed precisely to evaluate the adequacy of the MACCS2 code's straight-line Gaussian plume model for predicting offsite severe accident consequences, such as those evaluated in a SAMA analysis.[34] Using the same meteorological and source term inputs, the study compared the results of the MACCS2 code's Gaussian plume model with more advanced models (two two-dimensional models, RASCAL and RATCHET, and a three-dimensional model, LODI).[35] More specifically, the study compared average radiological dose

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[32] Petition at 8.

[33] LBP-11-18, 74 NRC at __ (slip op. at 23).

[34] *See* Ex. JNT000001, "Comparison of Average Transport and Dispersion Among a Gaussian, a Two-Dimensional, and a Three-Dimensional Model," NUREG/CR-6853 (Oct. 2004), at xi, xv, 1-2, 4 (Molenkamp Report).

[35] *Id.* at xv-xvi A two-dimensional model "allows the plume to bend and change direction." *Id.* at xv. The two-dimensional model, RASCAL, is used "by the NRC's Incident Response Center, for (continued . . .)

predictions produced by the different plume models, calculated at various distances—up to 100 miles—from the postulated point of release.

Based on the study's results, additional evidence, and extensive expert opinion, the Board concluded that "results calculated by the various models are generally within a factor of two and that MACCS2 is within plus or minus 10% of a state-of-the-art three dimensional model [LODI] when averaged over a series of radial arcs out to fifty miles."[36] Again, based on the comparison study and considerable expert evidence, the Board went on to conclude that "asserted inadequacies in the modeling of meteorology and the use of the meteorological data in the Pilgrim SAMA analysis . . . cannot be so large as to credibly alter the Pilgrim SAMA analysis conclusions regarding which SAMAs are cost beneficial to implement."[37]

In rendering its conclusions, the Board considered evidence directly relevant to the adequacy of the Pilgrim SAMA analysis plume modeling, the issue on remand. Pilgrim Watch was not prevented from rebutting the evidence Entergy and the Staff presented, or from presenting its own expert or other factual evidence in support of its view that the plume modeling significantly underestimated radiological dose.

Five experts in the proceeding presented reasoning to support their conclusion that use of a variable trajectory plume model would not significantly alter the Pilgrim SAMA analysis conclusions.[38] Notably, Pilgrim Watch's expert, Dr. Bruce Egan, did not directly contest this conclusion. He instead suggested that this was a "site-specific" opinion that "would not

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use in responding to radiological accidents." *Id.* A three-dimensional model "allows individual particles (making up the plume) to move in any direction," and therefore the "plume can split into two plumes as it encounters a hill, a canyon, or another complex wind pattern." *Id.*

[36] LBP-11-18, 74 NRC at __ (slip op. at 23).

[37] *Id.* at __ (slip op. at 25).

[38] *See, e.g.*, *id.* at __ (slip op. at 6 n.30) (citing pre-filed testimony of Entergy experts Dr. Kevin O'Kula and Dr. Steven Hanna, and Staff experts Nathan E. Bixler, S. Tina Ghosh, and James V. Ramsdell, Jr.).

necessarily be applicable to other power plants."[39] Dr. Egan offered his view that potentially, at "*another site,*" where the degree of change in projected radiological dose and related consequences may not need to be large to materially affect the analysis conclusions, "improvements to the modeling code could change the identification of cost effective SAMAs."[40] But the issue in this proceeding is the adequacy of the *Pilgrim* SAMA analysis.

In addition to the Molenkamp Report, the Board considered another comparison study involving a variable trajectory model.[41] This was a study of the wind trajectory "roses"[42] in the 50-mile radius region surrounding the Pilgrim station. The study was performed with CALMET, an Environmental Protection Agency (EPA) wind field model that is the meteorological model in CALPUFF, a plume model recommended by Pilgrim Watch.[43] Entergy expert Dr. Steven Hanna used CALMET to examine the "potential wind trajectories (paths) over the entire 50 mile-radius geographic domain" surrounding the Pilgrim station.[44] For this study, Dr. Hanna obtained site-specific meteorological data from approximately thirty weather sites located at varying points in the 50-mile radius area surrounding the Pilgrim station.[45]

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[39] *See* Ex. PWA000023, Statement by Bruce A. Egan, Sc.D, CCM (Jan. 30, 2011), at 3 (Egan Testimony) (referring to conclusion of Dr. O'Kula on the limited impact of asserted deficiencies).

[40] *Id.* (emphasis added).

[41] *See* LBP-11-18, 74 NRC at __ (slip op. at 15-17, 30) (citing Ex. ENT000004, S. Hanna & E. Hendrick, Analysis of Annual Wind Roses and Precipitation Within About 50 Miles of the Pilgrim Nuclear Power Station, and Use of CALMET to Calculate the Annual Distribution of Trajectories from the Pilgrim Station) (Dec. 2010) (Hanna CALMET Report).

[42] "[W]ind roses . . . show the frequency that the wind is blowing in each of 16 directional sectors." LBP-11-18, 74 NRC __ (slip op. at 15). *See also* Ex. JNT000001, Molenkamp Report at 47 ("one of the best ways to summarize winds at a location is with a wind rose that shows that relative frequency of winds with particular directions and speeds at a given site").

[43] *See* Petition at 9.

[44] *See* Ex. ENT000004, Hanna CALMET Report at 3.

[45] *See Id.* at 3-8.

The Hanna CALMET Report investigated whether the 2001 observed hourly meteorological data used in the Pilgrim SAMA analysis were representative of other locations in the 50-mile radius, representative of other years, and significantly, whether there was likely to be any material change to the SAMA analysis if variable wind fields in the 50-mile radius were modeled by a variable trajectory model. In LBP-11-18, the Board found that the Hanna CALMET Report confirmed the representativeness of the meteorological data used in the Pilgrim SAMA analysis, and further demonstrated that use of a variable wind trajectory model would "show no dramatic differences that would affect the long term and broad area impacts produced by a SAMA analysis."[46]

Notably, the Hanna CALMET study encompassed the terrain variability in the Pilgrim area. Dr. O'Kula and Dr. Hanna described that, at the 50-mile radius, the modeled wind trajectories "traversed the entire area and have been affected by any sea and terrain impacts to the extent they exist and are accounted for by the wind observations throughout the Pilgrim SAMA domain and by the CALMET model."[47] Dr. Hanna and Dr. O'Kula concluded from the study that "for the Pilgrim SAMA analysis, the Gaussian plume segment model with constant wind direction for a plume released at a given hour used in ATMOS and the three-dimensional CALMET trajectory model produce similar results."[48]

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[46] LBP-11-18, 74 NRC at __ (slip op. at 15) (quoting Ex. ENT000001, Testimony of Dr. Kevin O'Kula and Dr. Steven Hanna on Meteorological Matters Pertaining to Pilgrim Watch Contention 3 (Jan. 3, 2011), at 76 (O'Kula/Hanna Testimony)). In explaining the Hanna CALMET Report's conclusions, Dr. O'Kula explained that the "ability to account for short-term time and space variations of meteorology" did not "significantly enhance the accuracy of the SAMA analysis" because a SAMA analysis is based upon "annual distributions summed over time and over the Pilgrim SAMA domain." *See* Ex. ENT000001, O'Kula/Hanna Testimony at 97.

[47] Ex. ENT000001, O'Kula/Hanna Testimony at 97. *See also id.* at 103-04 (describing terrain as "relatively flat," with generally "no rugged terrain or narrow valley features," but specifying the "most notable, but isolated, terrain features surrounding the Pilgrim site").

[48] *Id.* at 97. *See also id.* at 9-10. Dr. O'Kula conducted an additional analysis with the CALMET wind roses study results, by considering the calculated CALMET wind trajectories in light of the population distribution surrounding the Pilgrim plant. His additional analysis concluded that use (continued . . .)

Pilgrim Watch's expert, Dr. Egan, did not address the Hanna CALMET Report. Nor does Pilgrim Watch's petition for review. Pilgrim Watch points to no clear error in the Board's reasoning, which was based on extensive expert evidence, including two studies with variable trajectory wind modeling, both intended to assess the adequacy of the MACCS2 plume model for purposes of a SAMA form of analysis.

B. Pilgrim Watch's Claims of "Ignored" Evidence

Pilgrim Watch repeatedly claims that the Board "ignored" Pilgrim Watch's evidence. Pilgrim Watch does not, however, identify any unaddressed evidence pointing to clear error in the Board's findings. In fact, Pilgrim Watch's pre-hearing submission, titled "Pre-Filed Testimony," did not include any expert testimony, and otherwise was not supported by any expert witness. The Board nevertheless admitted the document as a "Statement of Position," and further admitted all of Pilgrim Watch's attached exhibits. The Board advised that it would accord each exhibit persuasive weight to the extent it was "relevant, material, and reliable, pursuant to 10 C.F.R. [§] 2.337(a)."[49]

Pilgrim Watch claims that the Board "ignored" that the location selected for the Molenkamp Report's comparison study of the MACCS2 plume model to more advanced plume models was a relatively flat terrain site, not a coastal site.[50] But the Board expressly addressed this aspect of the study. It found "uncontroverted evidence indicating adequate similarity" between the location of the Molenkamp Report's study and "the Pilgrim coastal domain, in terms of wind variations and topography."[51] The Board further concluded that the data used in the

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of an alternate plume model that depicts time and spatially varying winds would not have any significant effect on the Pilgrim SAMA cost-benefit conclusions. *See id.* at 10,100-03.

[49] LBP-11-18, 74 NRC at __ (slip op. at 6-8) (referencing "Pilgrim Watch Statement of Position").

[50] *See* Petition at 17.

[51] LBP-11-18, 74 NRC at __ (slip op. 16-17).

SAMA analysis "to represent the sea breeze and other meteorological phenomena *as well as topographical effects* are sufficiently representative of the conditions at Pilgrim for SAMA analyses use."[52] Pilgrim Watch fails to indicate any clear error in these conclusions.

Pilgrim Watch also argues that the Board "flatly refused even to look at evidence provided" by Dr. Jan Beyea, on the asserted issue of "hot spots"[53] because Dr. Beyea is not a meteorologist.[54] But the Board's decision spends nearly five pages discussing the "hot spot" issue, making clear that it evaluated Dr. Beyea's comments, but found his "brief[] mention" of "hot spots" to be unpersuasive for lack of any "scientific rationale or discussion of his concern."[55] The Board went on to describe that "on the other side of the evidentiary balance," the Staff and Entergy provided extensive expert testimony that the asserted "hot spots" phenomenon, even if it could be modeled in a transport and dispersion model, would not change the overall Pilgrim SAMA cost-benefit analysis. Pilgrim Watch points to no clear error in this assessment.[56]

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[52] *Id.* at __ (slip op. at 17) (emphasis added). The Molenkamp Report acknowledges that although a site with "greater topographical and diurnal heterogeneity" would have been preferable, there was "sufficient variability" for purposes of the study because the wind fields in Oklahoma and Kansas "are frequently affected by low-level nocturnal jets and occasional severe storms." *See* Ex. JNT000001, Molenkamp Report at xi, 3. The report notes that there may be "some special locations" where the adequacy of the MACCS2 atmospheric dispersion and transport model "might still be unresolved." *Id.* at 3. But based on the Pilgrim site-specific evidence provided, the Board did not find any such special distinction for the Pilgrim location.

[53] Pilgrim Watch claimed that "hot spots" of radioactivity would result because "a plume over water, rather than being rapidly dispersed, will remain tightly concentrated due to the lack of turbulence, and will remain concentrated until winds blow it onto land." *Id.* at __ (slip op. at 28) (quoting Pilgrim Watch Statement of Position at 30)).

[54] Petition at 17.

[55] LBP-11-18, 74 NRC at __ (slip op. at 28-29, 32). Dr. Beyea was not a Pilgrim Watch expert.

[56] *Id.* at __ (slip op. at 29-32). The Board also took into account Pilgrim Watch's proffered article by Wayne Angevine on ozone transport. Mr. Angevine did not sponsor the article, and was not a Pilgrim Watch witness. *See id.* at __ (slip op. at 28) (quoting Angevine article—which did not address SAMAs or radiological transport—and then going on to find Pilgrim Watch's "hot spots" claim without merit based on other expert evidence). *See also* Ex. PW000006, Wayne M. Angevine et al., *Modeling of the Coastal Boundary Layer and Pollutant Transport in New England*, J. OF APPL. METEOROLOGY & CLIMATE (Jan. 2006).

Similarly, the Board did not "ignore" that a straight-line Gaussian plume model does not depict "spatially varying" winds.[57] The decision reflects the Board's conclusion that a more sophisticated model depicting spatially varying winds may be more detailed or precise, but ultimately would not make a material difference to the overall SAMA analysis conclusions. The Board explains that a SAMA analysis is a "probabilistic analysis focused on long-term and spatially-averaged impacts from severe accident events."[58] The "effects are averaged both over the area within 50 miles of the site and over the expected variations in meteorological patterns."[59]

Unlike for emergency planning, in which an actual plume must be tracked in real time, a SAMA analysis examines a spectrum of representative types of accidents (with different source terms and release characteristics), and further factors in potential weather scenarios (based on one representative year's worth of hourly weather data). The Pilgrim SAMA analysis examined nineteen different types of representative severe accident scenarios.[60] For each of these nineteen categories of accidents, 2,336 potential meteorological conditions were modeled.[61] The SAMA analysis therefore computed 2,336 separate accident consequence results for predicted population dose and 2,336 separate accident consequence results for predicted offsite economic costs for each accident category.[62]

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[57] Petition at 17.

[58] LBP-11-18, 74 NRC at __ (slip op. at 12-13).

[59] *Id.* at __ (slip op. at 13).

[60] *See* Ex. NRC000002, Pilgrim SEIS, Vol. 2, at G-3; Ex. ENT000006, Environmental Report, Attachment E, at E.1-44 to E.1-48.

[61] *See* Ex. NRC000014, NRC Staff Testimony of Nathan E. Bixler and S. Tina Ghosh Concerning the Impact of Alternative Meteorological Models on the Severe Accident Mitigation Alternatives Analysis (Feb. 2, 2011), at 13.

[62] *Id. See also* Ex. ENT000001, O'Kula/Hanna Testimony at 36.

As we explained in CLI-10-11, the SAMA analysis, as a NEPA mitigation alternatives analysis, is by practice "neither a worst-case nor a best-case impacts analysis."[63] It focuses ultimately on the mean annual consequences (both off-site population dose and economic costs) over the examined 50-mile region. The analysis uses the "*mean* values" of the accident consequence distributions for each accident category.[64] These mean values "are multiplied by the estimated frequency" of the accident "to determine population dose risk and offsite economic cost risk for each type of accidence sequence studied."[65] This results in "an averaging of potential consequences."[66] While the potential worst-case consequences are factored into, and therefore help comprise the mean values, they are not used as the baseline for the cost-benefit comparisons.

The Board's decision takes into account the nature of the SAMA analysis. For example, the Board cited to extensive testimony indicating that, while "a hypothetically simulated plume during one or two hours could be redirected onshore by an individual sea breeze, thereby increasing impacts," another "plume during another hour could be redirected offshore by an individual land breeze," thereby "yielding no [net change in] impacts."[67] The Board found persuasive the conclusion, shared by all the Staff and Entergy experts, that for the Pilgrim SAMA analysis, any potential under-estimations and over-estimations of accident consequences caused by the asserted deficiencies in the plume modeling essentially "cancel

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[63] *See* CLI-10-11, 71 NRC at 316.

[64] *Id.* (emphasis in original).

[65] *Id.*

[66] *Id.*

[67] LBP-11-18, 74 NRC at __ (slip op. at 20 n.99) (quoting Entergy expert Dr. Hanna). *See also* Ex. ENT000001, O'Kula/Hanna Testimony at 46.

each other," and therefore more detailed plume modeling would not materially change the Pilgrim SAMA analysis conclusions.[68]

C. Pilgrim Watch's Challenge to the Use of "Mean Values"

This brings us to Pilgrim Watch's arguments regarding the practice of using mean consequence values. Pilgrim Watch seeks to challenge the practice, and argues that the Board erred in excluding the issue from the scope of the remand hearing.[69] Pilgrim Watch argues that the SAMA cost-benefit analysis should be based directly on the 95th percentile level of projected severe accident consequences, the "worst" five percent of the consequence scenarios evaluated. Pilgrim Watch claims that the hearing on remand should have considered "whether substituting the 95th percentile for the mean in the consequence values analysis would make a difference in the analysis."[70]

An interlocutory Board decision ruled that Pilgrim Watch had never raised these particular methodology challenges in Contention 3. The Board found that Pilgrim Watch improperly sought, years into the hearing process, to recast its contention to include wholly new SAMA challenges never fairly raised or admitted in Contention 3, nor ever submitted in an

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[68] *See* LBP-11-18, 74 NRC at __ (slip op. at 21). Pilgrim Watch additionally claims that the Board focused only on Pilgrim Watch's claims regarding "sea breezes" and "hot spots," and "failed to consider" other "important meteorological issues" of concern to Pilgrim Watch. *See* Petition at 5, 16. Pilgrim claims that the Board did not address uncontroverted evidence it presented on storms, high winds, precipitation, and fog." *See id.* at 16-17. Pilgrim Watch nowhere identifies this evidence in the record, and we have no obligation to sift through a copious record before the Board for arguments never specifically identified or described on appeal. We nevertheless examined Pilgrim Watch's Statement of Position, and find that Pilgrim Watch's references to fog, precipitation, and storms are either unsupported, or otherwise do not suggest any clear error in the Board's finding that asserted deficiencies in the plume modeling would not make a difference in the overall Pilgrim SAMA analysis conclusions. *See* Pilgrim Watch Statement of Position at 9, 21-23. Further, Pilgrim Watch incorrectly argues that its claims were not challenged. *See, e.g.*, Ex. ENT000013, Rebuttal Testimony of Dr. Kevin R. O'Kula and Dr. Steven R. Hanna on Meteorological Matters Pertaining to Pilgrim Watch Contention 3 (Feb. 1, 2011), at 7-8.

[69] *See* Petition at 3-4, 10-14.

[70] *Id.* at 4.

amended contention.[71] Pilgrim Watch argues that it properly challenged the SAMA methodology of using mean consequence values in Contention 3, as proffered in its initial intervention petition.

Pilgrim Watch identifies no substantial question warranting review of the majority's decision on this issue. First, Entergy's Environmental Report made clear that mean values were used for the cost-benefit analysis.[72] Nor is the practice of using mean values for cost-benefit risk analyses new. NRC-endorsed guidance on SAMA analysis methodology specifies use of the "mean annual off-site dose and economic impact," which is consistent with NRC regulatory analysis guidelines.[73] Second, Pilgrim Watch's proffered SAMA contention never suggested any challenge to use of mean or averaged accident consequence values. All three judges concurred that a challenge to use of "mean" consequence values—a fundamental aspect of SAMA analysis methodology—was not fairly identified in the petition for intervention. We agree.

We have long required contention claims to be set forth "with particularity,"[74] stressing that it "should not be necessary to speculate about what a pleading is supposed to mean."[75]

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[71] *See generally* March 3 Ruling on Mean Consequences Issue. Judge Young provided a Separate Statement we address on p. 22, *infra*. The Board originally ruled on the issue in November 2010, but the first decision did not contain the Board's full reasoning. *See* November 23 Ruling on Mean Consequence Issue.

[72] *See* Ex. ENT000006, Environmental Report, Attachment E, at E.1-66 to E.1-68.

[73] *See* NEI 05-01, Rev. A, "Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document" (Nov. 2005) at 15; *see also id.* at 2, 16; "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," NUREG/BR-0058, Rev. 4, (Sept. 2004) (ADAMS Accession No. ML042820192) at 23 ("[w]hen possible, best estimates should be made in terms of the 'mean' or 'expected value'"); "Regulatory Analysis Technical Evaluation Handbook," Final Report, NUREG/BR-0184, (Jan. 1997) (ML050190193). The Board noted that both the ER and the EIS specified that the SAMA analysis methodology was based upon that in NUREG/BR-0184. *See* March 3 Ruling on Mean Consequences Issue at 16 nn.67-68 (citing Environmental Report and SEIS).

[74] *See, e.g.*, 10 C.F.R. § 2.309(f)(1); *Vogtle*, CLI-10-5, 70 NRC at 100-01.

[75] CLI-10-15, 71 NRC at 482 (citation omitted).

Our proceedings would prove unmanageable—and unfair to the other parties—if an intervenor could freely change an admitted contention "at will as litigation progresses,"[76] "stretching the scope of admitted contentions beyond their reasonably inferred bounds."[77] "Petitioners must raise and reasonably specify at the outset their objections to a license application."[78]

Our rules allow for amendment of contentions and the submission of new contentions when good cause is shown.[79] But Pilgrim Watch here does not suggest that new information was introduced that it could not have known about earlier, and it never has sought to amend its contention. It instead insists that Contention 3 as proffered was intended, all along, to include this challenge to use of mean accident consequence values. We are not persuaded by Pilgrim Watch's arguments, which are inconsistent with our contention admissibility standards, and do not point to any Board factual or legal error warranting plenary review.[80]

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[76] *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 386 (2002).

[77] *See* CLI-10-11, 71 NRC at 309.

[78] *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-03-17, 58 NRC 419, 427 (2003).

[79] *See* 10 C.F.R. § 2.309(f)(2).

[80] Judge Young, in a Separate Statement, concluded that while Pilgrim Watch did not raise the challenge to use of mean consequences in the originally proffered contention, it later raised the issue, "at a[n] appropriate time," in opposing Entergy's motion for summary disposition of Contention 3. *See* March 3 Ruling On Mean Consequences Issue, Separate Statement at 6. We disagree. The use of mean values was apparent from the Environmental Report. That Entergy in its motion for summary disposition referred to the practice of using mean consequence values—as part of its explanation for why Pilgrim Watch's claims would not make a material difference to the SAMA analysis—did not make the issue new. Nor did it suggest that Entergy considered the practice one of the challenged issues in the contention (in which case Entergy would have presented arguments in support of the practice). In any event, we agree with the majority that Pilgrim Watch's response to the summary disposition motion also did not properly raise a genuine material dispute over the methodology of using mean consequence values, nor did it suggest that 95th percentile accident consequence values be used. *See id.* at 15.

Further, we see no indication that Pilgrim Watch ever provided any basis or support for its challenge to the SAMA methodology. Pilgrim Watch provides no legal or other argument indicating that use of mean accident values for a mitigation analysis is an unreasonable practice under NEPA standards, or that NEPA requires a cost-benefit mitigation analysis to be based on the 95th percentile accident consequence level. Not only was the challenge to the SAMA methodology not timely raised, it also was not supported.

As the Board in LBP-11-18 states, "the 95[th] percentile is akin to a worst-case scenario analysis."[81] And the Supreme Court expressly has held that NEPA does not require a "worst case" inquiry.[82] 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.'"[83]

The same can be said for SAMA analyses. It always will be possible to conceive of yet another input or methodology that could have been used in the SAMA computer modeling, and many different inputs and approaches may all be reasonable choices. But our "adjudicatory hearings are not EIS editing sessions."[84] The SAMA analysis is not a safety review performed under the Atomic Energy Act. The mitigation measures examined are supplemental to those we already require under our safety regulations for reasonable assurance of safe operation. Through our reactor oversight process, including generic safety issue reviews, we revisit whether additional mitigation measures should be imposed as a safety matter under 10 C.F.R. Part 50. And in response to the Fukushima accident in Japan, we currently are

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[81] LBP-11-18, 74 NRC at __ (slip op. at 9 n.46).

[82] *See Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 354-56 (1989).

[83] *See 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).

[84] *See Catawba/McGuire*, CLI-03-17, 58 NRC at 431.

conducting a comprehensive safety review that involves, among other things, a review of the requirements and guidance associated with accident mitigation measures.[85]

There is questionable benefit to spending considerable agency resources in an attempt to fine-tune a NEPA mitigation analysis. Ultimately, we hold adjudicatory proceedings on issues that are material to licensing decisions. With respect to a SAMA analysis in particular, unless a 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.

We further note that in a highly predictive analysis such as a SAMA analysis, there are bound to be significant uncertainties, and therefore an uncertainty analysis is performed. Baseline analysis results therefore are multiplied by an uncertainty factor.[86] The final cost-benefit comparisons are based not on the baseline analysis results, but on revised results that take into account an uncertainty factor. Pilgrim Watch does not address the additional uncertainty analysis.

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[85] *See generally Union Electric Co. d/b/a Ameren Missouri* (Callaway Plant, Unit 2), CLI-11-5, 74 NRC __ , __(Sept. 9, 2011) (slip op. at 4-8) (discussing the NRC's regulatory response to the events in Japan). Most recently, the Staff provided for our consideration a proposed prioritization of the Fukushima Near-Term Task Force recommendations, including the strengthening and integration of severe accident management guidelines and extensive damage mitigation guidelines. *See* Staff Requirements—SECY-11-0137—Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned (Dec. 15, 2011) (ML113490055); "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," Commission Paper SECY-11-0137 (Oct. 3, 2011) (ML11269A204), at 2-5, 36-39; Staff Requirements—SECY-11-0124—Recommended Actions to be Taken Without Delay From the Near-Term Task Force Report (Oct. 18, 2011) (ML112911571).

[86] *See* Ex. NRC000002, Pilgrim SEIS, Vol. 2, at G-41 (revised baseline benefits were increased by a factor of 1.62, the ratio of the 95th percentile core damage frequency (CDF) to the mean CDF).

D. Pilgrim Watch's Additional Asserted Board Errors

Pilgrim Watch raises a laundry list of various other asserted Board errors. Again, Pilgrim Watch does not demonstrate any clear factual error, improper legal conclusion, prejudicial error, or any other substantial question warranting plenary review.

Pilgrim Watch argues that the Board did not "set forth the bases for its findings and conclusions," and did not give "the reasons that it rejected" Pilgrim Watch's evidence.[87] Pilgrim Watch apparently takes issue with the Board's statement that it "fully considered all record evidence," and that any argument not specifically addressed was found "without merit or otherwise unnecessary for the decision."[88] We find the Board's decision sufficiently detailed and supported. The Board sets forth its reasoning and Pilgrim Watch gives us no compelling reason to question its conclusions.

Pilgrim Watch further claims that the Board erred in not considering "new, significant and material information from Fukushima."[89] Pilgrim Watch argues that the "Board did not consider evidence arising out of occurrences at Fukushima, even when such evidence was contrary to both the Board's assumptions underlying Entergy's SAMA analysis, and critical conclusions that the Board majority relied upon when making its Decision."[90] But Pilgrim Watch does not identify any specific Board "assumptions" or "critical conclusions" regarding the Pilgrim SAMA analysis plume modeling that are incorrect. It provides no supported argument linking the events at Fukushima to the Board's conclusions in LBP-11-18. Pilgrim Watch's Fukushima-based claims do not suggest any basis warranting plenary review of the Pilgrim SAMA analysis plume modeling decision.

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[87] Petition at 6.

[88] *Id.* (quoting LBP-11-18, 74 NRC at 33 n.141).

[89] *Id.* at 20.

[90] *Id* at 21.

To the extent that Pilgrim Watch suggests *other* SAMA analysis challenges based on the Fukushima accident, Pilgrim Watch has availed itself of the opportunity to file new contentions. It filed two new SAMA contentions assertedly based on new information stemming from the Fukushima accident.[91] The Board, in LBP-11-23, found both contentions inadmissible.[92] Pilgrim Watch refers in its petition to one of these new contentions, involving a challenge to the length of radiological releases modeled in the MACCS2 code.[93] We will consider Pilgrim Watch's Fukushima-based contentions when we address its separate petition for review of LBP-11-23.[94] We note, additionally, however, that Pilgrim Watch also appears to raise arguments involving the Fukushima accident that it did not raise before the Board in its new contentions.[95] New claims cannot be raised for the first time on appeal.[96]

Pilgrim Watch also asserts a procedural error involving the Board's decision not to hold an oral evidentiary hearing.[97] The Board granted a Joint Motion of the parties, requesting that the Board resolve Contention 3 "with no oral evidentiary hearing, based solely on the parties'

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[91] *Pilgrim Watch Request for Hearing on Post-Fukushima SAMA Contention* (May 12, 2011); *Pilgrim Watch Request for Hearing on a New Contention Regarding Inadequacy of Environmental Report, Post-Fukushima* (June 1, 2011).

[92] LBP-11-23, 74 NRC __ (Sept. 8, 2011) (slip op.). Judge Young concurred in part and dissented in part. Pilgrim Watch recently filed a third proposed new contention based on the Fukushima accident. *See Pilgrim Watch Request for Hearing On a New Contention Regarding Inadequacy of Environmental Report, Post Fukushima* (Nov. 18, 2011). The Board denied Pilgrim's request early this year. LBP-12-1, 75 NRC __ (Jan. 11, 2012) (slip op.) (appeal pending).

[93] Petition at 22.

[94] *See generally Pilgrim Watch's Petition for Review of Memorandum and Order (Denying Pilgrim Watch's Requests for Hearing On New Contentions Relating to Fukushima Accident)* (Sept. 8, 2011).

[95] *See* Petition at 22-23.

[96] *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124, 132-33 & n.38 (2007), *aff'd*, *N.J. Dep't of Envtl. Prot. v. NRC*, 561 F.3d 132 (3d Cir. 2009) (citing *USEC Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 458 (2006)).

[97] Petition at 4-5, 15-16.

submitted prefiled testimony and exhibits."[98] While the Board granted the joint motion, it directed the parties to make short "closing arguments" on Contention 3.[99] It also indicated that it might have some questions in the nature of seeking "clarification" of the "parties' proposed findings of fact and conclusions of law," and that "any party that wishes to do so may have its witnesses present and available" to assist in providing answers to the Board's questions.[100] The record reflects that Pilgrim Watch agreed to this arrangement.[101]

Pilgrim Watch now claims that the Board, when it asked for clarification of different points, improperly "took testimony" from the Entergy and Staff experts, and then "used that evidence to support its Decision."[102] The Board's decision, however, relies on the parties' written presentations, pre-filed expert testimony and exhibits. There is only one reference (in a footnote) to the pertinent transcript, and it does not refer to any new argument, reasoning, or data that was not already presented in the written filings.[103] We cannot discern, and Pilgrim Watch does not identify, any Board finding that rests on any of the experts' responses to Board

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[98] *See* Order (Addressing Joint Motion, Motion in Limine, Proposed Findings of Fact and Conclusions of Law/Concluding Statements of Position, and Argument to be held March 9, 2011) (Feb. 22, 2011), at 1 (unpublished) (also addressing oral argument to be held on Pilgrim Watch's proposed new contentions based on Fukushima accident).

[99] *Id.* at 3.

[100] *Id.* Entergy and the Staff brought their experts to the session; Pilgrim Watch did not.

[101] *See* Transcript, Pre-Hearing Conference (Feb. 18, 2011) at 771. In its petition, Pilgrim Watch claims that it did object to other parties' being able to bring experts to answer Board questions. *See* Petition at 15 (citing oral argument on late-filed contentions, Hearing Transcript (Mar. 9, 2011) at 815)). But Pilgrim Watch cites to its objection to experts addressing the Board at the oral argument on admissibility of Pilgrim Watch's new Fukushima-related contentions, a different matter altogether than the Board's consideration of the remanded plume issue. Moreover, Pilgrim Watch's representative participated vigorously during the questioning, frequently herself asking questions of the experts. *See, e.g.*, Transcript, Oral Argument on New Contentions and Closing Statements on Contention 3 (Mar. 9, 2011), at 901, 904-05, 907, 910-12, 927, 919-20, 923-24, 938-40, 945-46, 955-57, 983-84, 990.

[102] Petition at 4-5.

[103] *See* LBP-11-18, 74 NRC at __ (slip op. at 28 n.125).

questions at the March 9 session. Therefore, if the Board committed any error related to the questioning, it amounted to harmless error and does not warrant any further review of LBP-11-18.

Pilgrim Watch additionally argues that the Board "misunderstood NEPA's Rule of Reason," and that it should have required that the SAMA analysis be performed with a variable trajectory plume model, and then the results compared "to see what difference a variable model would make."[104] Pilgrim Watch's demand that the MACCS2 code be rewritten to contain a variable wind trajectory plume model goes far beyond NEPA requirements.[105] The issue in this case has never been what precise differences a variable wind trajectory model would make, but rather, whether the plume modeling was sufficiently conservative for purposes of the Pilgrim SAMA analysis. The Board found that it was, based on evidence that included comparisons of the straight-line Gaussian plume model to more complex models. NEPA does not require the NRC to engage in an extensive revision of the MACCS2 code, particularly when the Board concluded—based on considerable expert evidence—that a different plume model would not change the overall results. Simply put, no need for a different plume model was shown.

We close with the final observation that, ultimately, Entergy's Environmental Report serves to inform the SAMA analysis in the final SEIS prepared for the Pilgrim license renewal application. While the Board's decision focuses on the adequacy of Entergy's Environmental Report,[106] NEPA compliance is determined by the adequacy of the SEIS, not the applicant's

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[104] *See* Petition at 20.

[105] Testimony in the proceeding included description of the effort that would be necessary to rewrite the MACCS2 code to include another atmospheric transport and dispersion model. *See, e.g.*, Ex. ENT000001, O'Kula/Hanna Testimony at 58-59; Ex. PWA000023, Egan Testimony at 4-5.

[106] *See, e.g.*, LBP-11-18, 74 NRC at __ (slip op. at 33) ("we conclude that the modeling and data used in the Pilgrim SAMA analysis by Entergy are reasonable and adequate for use by the NRC in satisfaction of its obligations under NEPA"). *See also id.* at 2 n.4, 10. Our decision (continued . . .)

Environmental Report. Therefore, the ultimate issue in determining NEPA compliance is the adequacy of the Staff's environmental review, not the applicant's Environmental Report.[107] The Board's focus on the Environmental Report does not present any significant error, however. While it is more comprehensive and identifies two additional potentially cost-beneficial SAMAs (seven instead of five), the final SEIS does not represent any significant change to the analysis in the Environmental Report. Accordingly, the Board's decision essentially confirms and endorses the reasoning in the final SEIS, which addressed Pilgrim Watch's SAMA claims.[108]

In an NRC adjudicatory proceeding, the adjudicatory record, Board decision, and any Commission decision become effectively part of the environmental review document (here, a final supplemental EIS).[109] Therefore, the SEIS is deemed supplemented by the Board's decision, and by this decision.

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remanding Contention 3 included references to the final SEIS. *See, e.g.*, CLI-10-11, 71 NRC at 314-15.

[107] The Board stated at the outset that it would consider "whether the meteorological modeling in the Pilgrim SAMA analysis is adequate and reasonable to satisfy NEPA . . ." Board Order (Scheduling Telephone Conference) (Sept. 2, 2010) (unpublished). We have observed that a contention, like the one here, challenging an Environmental Report "may be viewed as a challenge to the NRC Staff's subsequent" draft or final environmental impact statement. *Catawba/McGuire*, CLI-02-28, 56 NRC at 382. If the intervenor seeks to raise "*new* claims," based on the Staff documents, then the intervenor can file a new or amended contention. *See id.* (emphasis in original).

[108] *See, e.g.*, Ex. NRC000002, Pilgrim SEIS, Vol. 2, at G-14 to G-21.

[109] *See Louisiana Energy Services, L.P.* (National Enrichment Facility), CLI-05-28, 62 NRC 721, 731 (2005) (citations omitted).

III. CONCLUSION

For reasons given in this decision, we *deny* Pilgrim Watch's petition for review of LBP-11-18.

IT IS SO ORDERED.[110]

For the Commission

[NRC SEAL]

/RA/

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 9th day of February, 2012.

[110] Commissioner Apostolakis did not participate in this matter.