

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of
Entergy Corporation
Pilgrim Nuclear Power Station
License Renewal Application

Docket # 50-293

August 3, 2011

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

Pursuant to 10 C.F.R. §2.341, Pilgrim Watch ("PW") requests the Commission to review, reverse, and remand the Partial Initial Decision dated July 19, 2011 (the "Decision") of the Atomic Safety and Licensing Board (the "Board"). This request includes Board's Orders of September 2, 2010, September 23, 2010, October 26, 2010, November 23, 2010, February 23, 2011 and March 3, 2011 that restricted the scope of the remand and on which the Decision was largely based,¹ the manner in which the Board conducted the remand hearing, and the bases of the Decision. Fundamentally, the Board failed to follow both the Commission's and their own Orders. Providing unfair advantage to the Applicant.

A. The Decision Of Which Review Is Sought

In the Decision, a majority of the Board² concluded that:

¹ In its September 23, 2010 Order, the Board "advised that Pilgrim Watch may seek further clarification with the Commission." Pilgrim Watch did so, and "the Commission denied Pilgrim's request, concluding the Pilgrim Watch's questions were answered by the Board or were premature." (Order, p. 5, fn. 24) The questions are no longer "premature."

² In a separate statement, Judge Young said she agreed "that the preponderance of evidence ... is to the effect that accounting for Pilgrim Watch's meteorological analysis would not on its own effect the severe accident mitigation alternatives (SAMA) for the Pilgrim Plant sufficiently to alter the conclusions on which SAMAs would be cost-beneficial to implement," but said also that "Pilgrim Watch's expert, Dr. Bruce Egan, raised significant questions regarding meteorological modeling for the purpose of emergency

the Pilgrim SAMA analysis cost-benefit conclusions cannot be credibly altered by the use of more sophisticated modeling or use of additional or different sources of meteorological data respecting the sea breeze or the hot spot effect” (Decision, 32)

the meteorological modeling and the transport dispersion modeling performed, by Entergy, and the data it employed in the Pilgrim SAMA analysis, were reasonable and adequate ...” (Decision, 33)

the Entergy Pilgrim SAMA analysis adequately accounts for uncertainties in the two meteorological patterns at issue to enable the development, for NEPA purposes, of reasonable estimates supporting the Pilgrim SAMA analysis conclusions on which SAMAs are cost beneficial to implement” (Decision, 33)

the Pilgrim SAMA analysis meteorological data and straight line Gaussian plume dispersion model are sufficient, and that further refinements to those inputs would not change the cost-benefit conclusions for the SAMA candidates evaluated. Therefore, no consideration need be given to “the economic cost and evacuation time portions of Contention 3. Accordingly, 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. (Decision 33)

These conclusions are incorrect.

B. WHY THE DECISION IS ERRONEOUS

As discussed in more detail below, the Decision is erroneous for a number of different, but often interrelated, reasons:

planning – a not insignificant issue.” (Statement 1) Dr. Egan said that advanced meteorological models are applicable to both emergency planning and SAMAs. “Each of these applications requires that appropriate meteorological data be used. The meteorology at a site does not vary by application and one should apply the best science that is reasonably available for all these applications.” (Egan, PWA00023.pgs., 1-2, emphasis added).

Judge Young also said that she would “have allowed the issue whether substituting the 95th percentile for the mean in the consequence values analysis would make a significant difference....” (Statement, 2-3). She also noted that there was new information arising out of the Fukushima accident in Japan; that the “Board Majority’s Initial Decision does not terminate this proceeding or constitute a final licensing decision” and that she would “address the preceding [Fukushima-related] matters greater detail, as appropriate, in the context of later Board rulings on several pending new contentions and other filings submitted by Pilgrim Watch and the Commonwealth of Massachusetts.” (Statement, 3-4)

1. Bifurcated Hearing:³ The Board bifurcated the hearing in a way that failed to follow the Commissions Order (CL1-10-11), and was wrong. The Board limited the first phase to “whether accounting for the meteorological patterns/issues of concern to Pilgrim Watch (hereinafter “PW”) could, on its own, credibly alter the SAMA analysis conclusions on which SAMA are cost [] beneficial to implement.” (Referencing Sept 23, 2010 Order at 1) (Emphasis added). This was irrational, and set a standard that no one could meet. Contrary to the Commission’s Order, and common sense, the Board majority denied PW the right to present in phase one any evidence of “economic costs” to show that “the [in]adequacy of the meteorological differences may have a material impact...” (CLI-10-11, 35-37)

After the Board issued its Bifurcation Order, Pilgrim Watch asked for clarification, pointing out that “unless the Board is prepared to consider evidence of the real cost of offsite consequences, ... it is difficult to see what this further hearing might accomplish.” PW also said that it should not be required to expend its limited “time and resources on a fool’s errand.” See PW’s September 9, 2011 Motion for Clarification. The Board refused to consider PW’s motion to clarify, and, on appeal, the Commission said that the motion was “premature.” It is not “premature” now.

Then, in the Decision, the Board ignored the limits it set by the bifurcation order, and based its Decision on economic cost evidence submitted by the Staff and Entergy.

2. Excluding Averaging Concerns:⁴ The Board majority improperly excluded averaging from the scope of the remand hearing. Pilgrim Watch’s originally filed request

³ Board Orders of September 2, 2010 and September 23, 2010

⁴ Board Order (Confirming Matters Addresses at September 15, 2010 Order), September 23, 2010 at 2; Board Order (Questions from the Board majority Regarding the Mechanics of Computing Mean Consequences in SAMA Analyses), October 26, 2010; Board Order (Ruling on Timeliness of Mean

encompassed this issue. The Board also improperly excluded from the scope of the hearing whether substituting the 95th percentile for the mean in the consequence values analysis would make a difference in the SAMA analysis.

3. Using Entergy's Economic Analysis: The Board said that “the Pilgrim SAMA analysis meteorological data and straight- line Gaussian plume dispersion model are sufficient, and that further refinements to those inputs would not change the cost-benefit conclusions for the SAMA candidates evaluated.” (Decision, pg., 33) In reaching this conclusion, the Board went far beyond what was permitted by its orders limiting the scope of phase one. The Board did not base the Decision on whether meteorology on its own could alter the SAMA analysis, Rather, it relied on what it called “uncontroverted expert testimony ... that more accurate modeling of the meteorology would not result in differences of more than a factor of two. ” This “uncontroverted evidence” was economic testimony from Entergy experts. This “evidence” belonged in phase two, and was “uncontroverted” at the remand hearing only because PW had been told that it could **not** present economic cost evidence in phase one. ⁵

4. Information Improperly Admitted at Hearing: The procedure followed at the hearing contradicted the Board's Revised Notice and Order (Regarding Hearing and Oral Argument), ASLBP No. 06-848-02-LR, February 23, 2011.⁶ The Board took testimony,

Consequence issue), Nov 23, 2010, pg., 1-2; Board Memorandum and Order (Ruling on Timeliness of Mean Consequence Values Issue), mar 3, 2011, pg.,1 and Statement Judge Young. Also see references in: Decision 5, Fn 23; 9 Fn 46; 12; 15; 24; 25; 26; 28; 31; Decision Statement 2-3, Fn 11

⁵ Decision, pgs., 13, 22-3, 25, 26, 28. The decision also ignores controverted evidence to the contrary submitted by PW at earlier stages of this proceeding.

⁶ Revised NOTICE and ORDER (Regarding Hearing and Oral Argument), ASLBP No. 06-848-02-LR, February 23, 2011, pg.,1: The Licensing Board has granted a Joint Motion of the parties Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc. (Entergy), the NRC Staff, and Pilgrim Watch, requesting that we “resolve with no oral evidentiary hearing, based solely on the parties’ submitted prefiled testimony and exhibits,” the following threshold issue of Contention 3: *Whether the meteorological modeling in the Pilgrim SAMA analysis is adequate and reasonable to satisfy NEPA, and whether*

including economic, from Entergy and the Staff, and placed PW at unfair advantage. (Transcript of Hearing Regarding Pilgrim Nuclear Power Station in Plymouth, Massachusetts on 03/09/3011). It then used that evidence to support its Decision.

5. Substituting Arithmetic For Judgment: In making an economic analysis that was not supposed to occur as part of phase one, the Board based the Decision on simplistic, elementary math in an effort to reduce the imponderable uncertainties to a number, substituting arithmetic for judgment or common sense.⁷

6. Improperly Limiting Meteorological Issues: The Decision considered only whether “sea breezes and “hot spots” could, in of themselves, cause additional SAMAs to become cost effective. The Board failed to consider or “account[] for the (other and significant) meteorological patterns/issues of concern to Pilgrim Watch.” (Decision, pgs., 1, 6, 12, 22, 28, 33)

7. Misapplied NEPA’s Rule of Reason: Misunderstanding NEPA’s Rule of Reason as defined by the Commission (CLI-10-11 37-39), the Board incorrectly concluded 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.” (Decision 33)

7. Failed to Consider New, Significant and Material Information from Fukushima: NEPA requires the Board to consider new information, most importantly information and evidence contrary to the Decision, arising out of occurrences at Fukushima. The new

accounting for the meteorological patterns and issues of concern to Pilgrim Watch could, on its own, credibly alter the Pilgrim SAMA analysis conclusions on which SAMAs are cost-beneficial to implement. Therefore, there will not be an evidentiary hearing on this issue, but the Board will, on March 9, 2011, conduct oral argument relating to new contentions filed by Pilgrim Watch, and closing argument on the threshold issue of Contention 3.

⁷ Decision, pgs., 13, 22-3, 25, 26, 28

evidence and information the Board did not consider is inconsistent with both the Board's assumptions underlying Entergy's SAMA analysis, and several critical conclusions relied on by the majority in the Decision. (Decision, Statement 2-3)

8. Excluding PW's Expert Evidence: The Board improperly excluded meteorological evidence presented by PW's experts, such as that provided by Dr. Beyea (Decision 28, 29). It also failed to consider a long list of uncontroverted PW Exhibits. (See NRC Electronic Hearing Docket, Adjudication Proceedings, Pilgrim 50-293-LR, Pilgrim Exhibits, Intervenor Exhibits).

9. Incorrect Assumptions and Methodology, and Misreading Evidence: The Decision is based on incorrect and out-dated assumptions that the methodology used by Entergy and approved by the NRC failing to provide reasonable assurance. The Board based its decision on incomplete and incorrect readings of evidence. (Decision, pgs., 15-17, 22-23, 32)

10. The Decision Failed To Set Forth the Bases for Its Findings and Conclusions: The Board was required to state the bases for its Decision, particularly the reasons that it rejected PW evidence. The Board Decision does not do so. This failure cannot be overcome by a perfunctory statement that it "fully considered all record evidence" (Decision, 1), particularly given its conclusory footnote admitting that much was "not addressed herein."

The Board hereby adopts and incorporates by reference in this order all of the findings of fact proposed by Entergy and the NRC Staff not otherwise addressed herein [and that a]ll other issues, motions, arguments, or proposed findings presented by the parties concerning Contention 3 and not addressed herein have been found without merit or otherwise unnecessary for the decision. (Decision, pg., 33, Fn 141, emphasis added)

The pre-hearing matters outlined above were previously raised before the Board, and in some cases the Commission. The other matters are directed to the hearing and the Decision, and could not have been raised previously.

C. THE COMMISSION SHOULD REVIEW THE DECISION

Fundamental principles and fairness require the Commission to review the Decision, the ASLB's prehearing orders, and the manner in which the ASLB conducted the remand hearing and reached the Decision.

The two-stage remand hearing ordered by the Board misread the Commission Order as to the scope of the remand. The Board limited the remand hearing in ways that were improper and not required by the Commission Remand Order (CLI-10-11). The Board required PW to prove the impossible.

In contravention of fundamental fairness, both during the hearing and in the Decision, the Board relied on evidence that properly had no relevance to phase one, having ordered that such evidence would only be part of phase two. The Board applied one evidentiary standard to Entergy, and a far more restricted one to PW. In reaching not a few of its critical factual findings, the Board majority sliced and diced the evidence before it in ways that favored Entergy, essentially ignored any evidence that favored PW, while saying nothing to explain on what justifiable basis it did so.

ARGUMENT- WHY THE DECISION IS ERRONEOUS

1. The Board Improperly Bifurcated the Remand Hearing

The Commission Remand Order (CLI-10-11) was clear that whether deficiencies in meteorologic modeling may have a material impact on Entergy's SAMA cost-benefit

conclusions necessarily requires considering economic cost and evacuation matters. (Id., at 35-37) The economic issues included in the Commission order are “economic infrastructure,” business activity,” and “tourism.” Id at 31.

Consistent with the Remand Order, the Board might properly have ordered a bifurcated hearing in which the first phase 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. Any change in either could, as said in Pilgrim Watch’s admitted contention, call Entergy’s SAMA analysis into question and show “that further analysis is required.” (See PW September 9, 2010, Motion for Clarification, pg., 3)

That, however, is not what the Board did. In a September 2, 2010 Order, the Board indicated that phase one would be limited to whether “there is [a] significant meteorological modeling deficiency calling into question the Pilgrim SAMA cost-benefit conclusions.” The order also said that, if the Board found any such deficiencies, “at that point the Board “would consider whether and to the extent to which certain issues the Commission indicted (in CLI-10-11 might be open for adjudication should adjudicated.” September 2 Order, p. 2, emphasis added.

On September 9, PW asked the Board to clarify its order. During a September 15, 2010 telephone conference, the Board said it would not do so. During that telephone conference, Judge Abramson said that the first phase would require PW to show that changing the meteorological modeling would result in a significant difference in the SAMA cost benefit outcome, and also said that PW could not discuss deficiencies

regarding costs during first phase placing PW in a Catch-22. Prohibited from showing “deficiencies regarding costs,” it was impossible for PW to show that modeling deficiencies would “result in a significant difference in the cost benefit outcome.”

In its September 23, 2010 Order, the Board adopted Judge Abramson’s approach. It ruled that threshold Phase One issue would be

whether accounting for the meteorological patterns/issues of concern to Pilgrim Watch could, *on its own*, credibly alter the Pilgrim SAMA analysis conclusions on which SAMAS are cost-beneficial to implement. (Sept 15, 2010 Order, p. 1)

and went on to say that even if PW somehow met this impossible burden, the Board then would only move to “briefing by the parties on whether and the extent to which the admitted evacuation and economic cost issues should thereafter be adjudicated.” Id, p. 30

This is contrary to what the Commission had ordered. This also ignores that accepted Contention 3 only requires PW to show that “further analysis is required; it does not require PW to conduct such analysis or show what such a further analysis might conclude.

The Commission (CLI-10-11, “Commission Order,” pg. 37) recognized that “the issue here is whether the Pilgrim SAMA analysis resulted in erroneous conclusions on the SAMAs found to be cost-beneficial to implement.”

The “further analysis [that] is required” by contention 3 would, at minimum, include determining the size and location of the potentially affected areas and the population doses within those areas by running an alternative site-appropriate meteorological model (e.g., CALPUFF and MM5) with PNPS’ site specific data, and to compare these results to Entergy’s straight-line Gaussian model. Then, and only after Entergy has made such an analysis, could the remand turn to the cost-benefit analysis.

The Board's September 15 Order improperly tied Pilgrim Watch's hands and placed PW in a no-win position. The Board's and the Commission's refusals to decide Pilgrim Watch's Motion for Clarification led to where we are today.

2. The Board Improperly Found that PW had Not Timely Raised Averaging

PW's September 9, 2010 Motion for Clarification asked "Will the Board consider evidence relating to the NRC practice of averaging consequences?" (Motion, p. 1). The Board's response was to order the parties to file briefs to "address whether Pilgrim Watch, *either explicitly or implicitly*, timely raised its averaging practice concerns in its original Contention 3; and, if not, when such concerns were first raised." (September 23 Order, p. 2). Two months later, the Board issued a brief order saying that a "majority of the Board finds that the mean consequences values issue was not timely raised, and therefore the issue will not be entertained by the Board during the evidentiary hearing on Contention 3." (November 23 Order).

Not until a "Memorandum and Order Ruling of Timeliness" was finally issued on March 3, 2011, only six days before the remand hearing, did PW learn that Judge Young disagreed with the majority, and said that she "would find that Intervenor did implicitly, on a timely basis, raise this issue – an issue which, I note would seem to be integral to the ultimate outcome of the analysis that is central to Contention 3...." (Separate Statement of Judge Young, p. 1)

Judge Young's conclusion was right.⁸ The majority of the Board incorrectly held that the issue had not been timely raised.

⁸ Judge Young correctly found that PW had timely raised the issue in response to Entergy's Motion for Summary Disposition. PW does not agree with her that it was not raised with sufficient specificity in Original Contention 3. Perhaps because the issue was not addressed in the majority's decision, Judge

The test whether a contention raises an issue is not “that pleadings or contentions be technically perfect.” (NRC Practice Digest, Prehearing Matters 100). The purpose of the contention requirement is “to help assure that other parties are sufficiently put on notice so that they will know at least generally what they have to defend against or oppose” (Id, Prehearing Matters 101)

PW’s Request for Hearing and Petition to Intervene (May 26, 2006) “sufficiently put [Entergy] on notice.” See PW Request for Hearing 29: “Entergy has used incorrect input parameters, including meteorology, emergency response, and economic data into a software model of limited scope” and 34: “Without knowing what parameters were chosen by the Applicant, it is not possible to fully evaluate the correctness of [Entergy’s] conclusions about Severe Accident Mitigation Alternatives”.

The term “parameters” encompasses “averaging.” (see The Free Dictionary, Answers.com, Wikipedia, all quoted at pp., 3-4 of PW’s Timeliness Brief)

The record shows that PW’s original contention put “the other parties sufficiently ...on notice.” Early on, the Board, NRC Staff and Entergy all recognized that Contention 3 included the “averaging issue.” For the Board to say otherwise would ignore, and be inconsistent with, what the Board said on October 16, 2006, and what both the Staff and Entergy have admitted.

The Board’s October 16, 2006 Order said that PW contended that “By using probabilistic modeling and incorrectly inputting certain parameters into the modeling software, Entergy has downplayed the consequences of a severe accident at Pilgrim” (LBP-06-23, 79, citing PW’s Petition at 26); and that “PW points to, among other things

Young’s separate statement does not address that PW’s original Request plainly put Entergy on notice that averaging was an issue it had to defend against.

... user's 'ability to affect the output from the code by manipulating the inputs and choosing parameters.'" (Id at 33; see also 31-34 and fn 13; emphasis added)

The Staff also recognized that the "averaging" issue had been raised. In its Response to PW's Petition, the Staff referred to PW's contention that Entergy uses "an outdated version of the MACCS2 Code" (Response, 27-28); and in its Answer to PW's Petition for Interlocutory Review of LB-07-13 acknowledged that "Pilgrim stated in its Reply to Entergy's Answer to Request for Hearing ... that Contention 3 'focuses mainly on the input parameters raised in the accident modeling software.'" (Answer, p. 13) The Staff submitted an Affidavit in response to Entergy's Motion for Disposition, that said one issue involved is that "[t]he effects are averaged out in the MACCS2 analysis." (Affidavit of Joseph A. Jones and Dr. Nathan Bixler, item 10, emphasis added)

Entergy's recognition that the "averaging issues" were on the table is shown by Entergy's Statement of Material Facts 2, 29, 44 and 50. For example, Entergy said that issues raised by Contention 3 include that "MACCS2 models evacuation from the EPZ employing two parameters. (Material Fact, 29)

And, as Judge Young correctly found (Separate Statement, Memorandum and Order (Ruling on Timeliness of Mean Consequence Values Issue, March 3,2011, pgs., 4-5),

Specifically, Intervenor disputed Entergy's Statement of Material Fact 2, in which Applicant states that '[t]he SAMA cost-benefit evaluation looks at whether a SAMA is potentially effective by measuring the mean of the total costs avoided vrs the cost of implementing the SAMA.' Intervenor stated *inter alia* in disputing this statement that Entergy 'should make a comparison to the sum of the total costs avoided, not the mean.

* * *

I would thus find that, in at least *challenging* Entergy’s reference to the use of a ‘mean,’ which I determine to be encompassed within the ‘mean consequence values’⁹] concept, Intervenor clearly placed it in issue, or ‘raised’ the issue, at a time appropriate for such a response.

The Board majority’s decision that the issue was not timely raised was wrong; and not only for the reasons stated by Judge Young. The majority nowhere considers, or indeed even mentions, that the proper test and standard is where the other parties “sufficiently put on notice so that they will know at least generally what they have to defend against or oppose.” The Board decision ignores the plain evidence that PW met this standard, and that earlier decisions of the Board recognized that PW had raised the averaging issue.

The Board’s decision not to consider averaging is significant. Sea breeze, for example, was rendered meaningless by Entergy’s use of the mean. A sea breeze can cause a plume to penetrate further inland, to an approximate 30 miles or more (PWA00010, Jennifer Thorpe, pg., 5; ENT00001, A.74)), impacting densely populated areas such as Metropolitan Boston, Cape Cod and smaller cities such as Brockton and Quincy that are within 30 miles. However because sea breezes occur, on average, 45 days a year; i.e., 12 percent of the 365 days in a year and typically extend to an approximate 10 miles inland, this impact is not reflected by Entergy’s use of a mean average. Its impact would be reflected if Entergy had used the 95% percentile. The same

⁹ The MACCS2 code provides a cumulative distribution frequency that includes the mean, 90th and 95th percentiles. The user chooses what average to use. There is no NRC regulation driving the choice. NRC’s policy or practice is not a requirement. The majority’s argument (Decision, pg., 9, FN 46) that the “mean is consistent with Commission precedent” is irrelevant. (Decision, pg., 9, FN 46)

is true with storms that will continue to increase in frequency and severity, due to climate change, over the license renewal period.

3. The Board Improperly Rested Its Decision on Economic Evidence That Its Order Excluded from Phase One¹⁰

As discussed earlier, the Board's September 23 Order said that the first stage was limited to "whether accounting for the meteorological patterns/issues of concern to PilgrimWatch could, on its, own, credibly alter the SAMA analysis conclusions on which SAMA are cost [] beneficial to implement." The Board's Revised NOTICE and ORDER of February 23, 2011 made even clearer clear that economic evidence would be excluded. It repeated the September 23 Order, and added that there would be "no oral evidentiary hearing."

Contradicting the Orders, the majority Decision is based time and time again on what it called "uncontroverted expert testimony ... that more accurate modeling of the meteorology would not result in differences of more than a factor of two." In other words, the Board made its Decision by going far beyond the ordered scope of phase one of the remand hearing, and relied entirely on economic evidence that Entergy had presented while denying PW the right to present economic consequence/cost evidence showing that large "differences" in consequences could result from more accurate modeling.¹¹ One standard was accorded to the Applicant and another, a "gag order" assuring that the Applicant would prevail, to PW.

The economic dispute was supposed to be settled in the later phase two of the

¹⁰Decision, pgs., 13, 22-3, 25, 26, 28

¹¹ The only reason that the Board could say that the evidence on which it relied was "uncontroverted" is that PW was not allowed to "controvert" it.

remand hearing, not as part of phase one.¹²

4. At the Remand Hearing, the Board Improperly Accepted Entergy and Staff Evidence, Including Substantial Economic Evidence

As noted above, the Board's Order of February 23, 2011 specifically said that there would be "no oral evidentiary hearing."¹³ This was also plain to Judge Abramson who objected to questioning of experts early in the March 9 hearing saying that "[He did] not support the concept of asking for expert or asking the lawyers to comment on expert issues, at this process, in this process" and "If indeed [Judge Young is] interested in additional information, [he] would support sending out questions like we did in the last situation." (Tr., pg., 815) Likewise, PW objected, explaining that experts were there solely for "consultation." (Ibid., Lns., 24-25). Despite this, the March 9 hearing allowed extensive testimony by Entergy's witnesses (Dr. O'Kula and Dr. Hanna) and NRC's witnesses (Dr. Bixler and Dr. Tina Gosh). This placed PW at unfair disadvantage.

¹² The economic analysis that was not supposed to occur in phase one resulted in the Board basing decisions on elementary math in an effort to reduce the imponderable uncertainties to a number, substituting arithmetic for judgment or common sense. Kamiar Jamali's (DOE Project Manager for Code Manual for MACCS2) *Use of Risk Measures in Design and Licensing Future Reactors*,¹² is explicit that "PRA" uncertainties are so large and so unknowable that it is a huge mistake to use a single number coming from them for any decision regarding adequate protection. "Examples of these uncertainties include... radionuclide release and transport, atmospheric dispersion, ... and many others." (Jamali, Pg., 935) (Emphasis added)

The Board's arithmetic – " $04 \times A + 0.96 \times B = 2.0 \times B$. Where: A is the mean of the consequences computed to occur when the sea breeze is active B is the mean of the consequences computed to occur during all other meteorological conditions" (Decision, 27) – is rife with unsupported, incorrect, and outdated assumptions, as are other arithmetic examples throughout the decision. (Decision, pgs., 22-3, 25, 26, 27 FN 123; 28)

¹³ Revised Notice and Order (Regarding Hearing and Oral Argument), ASLBP No. 06-848-02-LR, February 23, 2011, pg.1: The Licensing Board has granted a Joint Motion of the parties Entergy Nuclear Generation Company and Entergy Nuclear Operations, Inc. (Entergy), the NRC Staff, and Pilgrim Watch, requesting that we "resolve with no oral evidentiary hearing, based solely on the parties' submitted prefiled testimony and exhibits," the following threshold issue of Contention 3: *Whether the meteorological modeling in the Pilgrim SAMA analysis is adequate and reasonable to satisfy NEPA, and whether accounting for the meteorological patterns and issues of concern to Pilgrim Watch could, on its own, credibly alter the Pilgrim SAMA analysis conclusions on which SAMAs are cost-beneficial to implement.* Therefore, there will not be an evidentiary hearing on this issue, but the Board will, on March 9, 2011, conduct oral argument relating to new contentions filed by Pilgrim Watch, and closing argument on the threshold issue of Contention 3.

Relying on the Board's Orders, PW did not go to the expense of bringing witnesses that the Board had said would not be allowed to testify or respond to questioning. On these grounds alone, the Commission should reverse the Board's finding and remand.

5. The Board Did Not Consider Important Meteorological Issues.

The Board also erred by limiting its meteorological inquiry to "sea breezes and "hot spots" (concentration of plumes over water). The Decision utterly fails to consider or "account[] for the (other and significant) meteorological patterns/issues of concern to Pilgrim Watch." (Decision, pgs., 1, 6, 12, 22, 28, 33). Even after Fukushima, there was no consideration of PW's evidence relating to storms. The decision ignored and never discussed PW's uncontroverted evidence that Massachusetts is susceptible to high wind from several types of weather events, including, hurricanes and tropical storms, tornados, and Nor'easters. The decision never mentions this, ignoring evidence that high winds move the plume more quickly over an area and to more densely populated areas, and that higher concentrations of deposition can be expected at greater distances because there is a shorter time frame for radioactive decay to occur (Egan Statement, PWA00023, pg., 6) Also ignored is evidence that high winds will result in re-suspension of contaminants, increasing the area of impact. Precipitation and fog that affects dispersion (concentration) were ignored, also.

Also the Decision nowhere accounted for the uncontroverted fact, made clear in the MACCS2 Guidance Report, June 2004,¹⁴ that Entergy's inputs to the code do not account for variations resulting from *site-specific* conditions such as variations in terrain ("Gaussian models are inherently flat-earth models, and perform best over regions where

¹⁴ MACCS2 Guidance Report June 2004 Final Report page 3-8:3.2 Phenomenological Regimes of Applicability

there is minimal variation in terrain”); or that Entergy’s own topographical and land maps show that the area within 50 miles is *not* simple flat terrain; nor one devoid of cluster of buildings to change the direction of a plume. (ENT00004, pg., 19). And, in relying on the Molenkamp Report (Decision, 17), the Board ignored the uncontroverted fact that the NRC itself says Oklahoma and Kansas, studied by Molenkamp, do not have “topography that would interact with the large-scale flow producing local modification of wind speed and direction, or “changes in surface properties that could affect local flow, such as a coastal site with a land-sea breeze (NUREG 6853, 3, emphasis added). The NRC also said that it “would have preferred a site with greater topological and diurnal homogeneity.” (Id, xi and 2.)

The Decision ignored evidence that Entergy’s straight-line, steady-state Gaussian plume model does not allow consideration for the fact that the winds for a given time period may be spatially varying. (PWA00023, pg.,2) Also ignored is uncontroverted evidence that a systematic bias in the ATMOS application at PNPS, that is especially important at large distances from the PNPS, is the use of only the seasonally averaged afternoon mixing depths. Because the afternoon mixing depths are generally much larger than morning mixing depths, and because at large distances from a source, ground level concentrations will be lower with increased mixing depth, this is not a conservative. (Egan, PWA00023, pg., 6)

6. The Board Improperly Excluded PW’s Meteorological Evidence

The Board didn’t simply ignore Entergy’s own maps and NRC statements about the Molenkamp Report. It also ignored uncontroverted PW evidence about storms and fog; and flatly refused even to look at evidence provided by Dr. Beyea, saying that he

was “not a meteorologist.” (Decision, pp 28, 29) Here again, the Board provided sauce for Entergy, but no sauce for PW. Some of Entergy’s and the NRC Legal Staff’s experts (on whom the Board did rely) aren’t meteorologists either.

In reaching their erroneous conclusions that “‘hot spots’ as hypothesized by Pilgrim Watch, do not exist and therefore do not impact deposition or cost differentials, and ultimately have no impact on Pilgrim’s SAMA analysis.” (Decision 30). PW provided expert testimony from Wayne Angevine (NOAA) and Dr. Egan, that is ignored, in the decision; despite the requirement that “A licensing Board must clearly state the basis for its decision and, in particular, state reasons for rejecting certain evidence in reaching the decision.” (NRC Rules Practice, Jan 2010, Hearings 114, citing Public Service Co., of N.H. Seabrook Station, Units 1 and 2), ASLB-422, 6 NRC 33(1977)). The ignored evidence showed that a plume over water, rather than being rapidly dispersed, will remain tightly concentrated due to the lack of turbulence. The marine atmospheric boundary layer provides for efficient transport. Because of the relatively cold water, offshore transport occurs in stable layers. Wayne Angevine’s research of the transport of pollutants on New England’s coast concluded that major pollution episodes along the coast are caused by efficient transport of pollutants from distant sources. “The transport is efficient because the stable marine boundary layer allows the polluted air masses or plumes to travel long distances with little dilution or chemical modification. The sea-breeze or diurnal modulation of the wind, and thermally driven convergence along the coast, modify the transport trajectories.” Therefore a plume will remain concentrated

until winds blow it onto land. (Zager et al.; Angevine et al. 2006¹⁵) (Angevine, PWA00006) This meteorological phenomena would be the same for radionuclides. The only difference would be the much longer effect of released radionuclides, many of which are long lived.(Egan Statement, Jan 30, 2011, PWA00023, pg., 6)

So far as can be told from the Decision, the majority also gave no consideration to uncontroverted NRC and DOE documents that PW submitted as Exhibits, including: Revised Chapter 4, *Meteorological Monitoring*, of Guide DOE/EH-0173T (PWA00021) that explains that the joint-frequency distribution and choices of meteorological conditions for the accident analyses should be based on a minimum of 5 years of hourly-averaged data; and, Stephen LaVie, NRC, slides saying that a sea breeze can cause a plume to penetrate farther inland, or to different locations, and that because the air below the TIBL is unstable, there is turbulence and mixing and the plume is drawn to ground level thereby increasing dose. (PWA00019, NRC, slides 2, 44)

The Board also never mentioned the uncontroverted testimony of the Staff's own expert, Dr. Bixler, that "*although the wind speed and direction of a sea breeze may be included in the actual PNPS meteorological data, the effect of sea breeze is not taken into account.*" (PWA00017,§10; emphasis added).

Evidence presented by PW's witnesses may not coincide with what Entergy wanted to have found, but that provides no basis for excluding or not considering it. Neither is there any excuse for ignoring uncontroverted evidence in government documents or presented by the Staff's own witness. Further many of the conclusions the majority reached are not supported by the Decision and thus are clearly erroneous.

¹⁵ Angevine, Wayne; Tjernström, Michael; Žagar, Mark, Modeling of the Coastal Boundary Layer and Pollutant Transport in New England, Journal of Applied Meteorology and Climatology 2006; 45: 137-154, Exhibit 6

7. Board Failed to Address NEPA Requirements

A. The Decision Misapplied NEPA's Rule of Reason

Apparently misunderstanding NEPA's Rule of Reason as defined by the Commission (CLI-10-11 37-39), the Board incorrectly concluded 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" (Decision, pg., 33).

Under NRC Regulations, SAMAs are a Category 2 (site specific), and not a Category 1 (generic), issue. Table 9.1 of NUREG 1437. The Gaussian plume model found adequate by the Board did not take the complex site specific conditions at PNPS into account. NEPA's Rule of Reason provides no reasonable excuse for not using a readily-available, site-appropriate, variable plume model. Relevant or necessary meteorological data and modeling methodology are available, reliable, and applicable, and are readily adaptable for evaluating the SAMA analysis cost-benefit conclusions. (PW Findings Fact, Conclusions Law, pgs., 45-55)

Before deciding that Entergy met its burden of proof, NEPA's Rule of Reason requires that the Board order Entergy to conduct analyses that compare variable trajectory models to straight-line gaussian plume models, using Pilgrim's site specific data, to see what difference a variable model would make. The Rule of Reason does not permit the Board simply to rely on Entergy's analyses that are based only on repeated uses of the simplistic and outdated straight-line Gaussian plume model.

B. The Decision Failed To Consider New, Significant and Material Information From Fukushima.

As the U.S. Supreme Court made clear in *Robertson v Methow Valley Citizens Council*, 490 U.S. 332,349 (1989), NEPA requires an agency to consider the

environmental impacts *before* decisions are made to ensure that “important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.” “Regardless of its eventual assessment of the significance of the information, the [agency] ha[s] a duty to take a hard look at the proffered evidence.” *Marsh v Oregon Natural Resources Council*, 490 U.S. 360, 385 (1989)

The Board did not do so. 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 on when making its Decision.

Judge Young made clear that (1) these matters have been raised, and (2) they have not been considered (Decision, Separate Statement 3-4):

Additionally, there have been matters raised, relating to how new information arising out of the Fukushima accident in Japan (which occurred only days after the March oral argument in this proceeding) should affect the environmental analysis (including the SAMA analysis) on the application under NEPA, as well as matters relating to the sought license renewal in certain other particulars. And it has been argued in various post-Fukushima filings that any final licensing decision on the renewal application should be postponed until significant further analysis is done concerning the ability of the Pilgrim plant to perform safely in the renewal period, taking into account information arising out of the Fukushima situation and the fact that the Pilgrim plant is of the same type as the Fukushima reactors. Preliminarily, I would tend to find that some of these arguments do warrant greater scrutiny of the plant and application in light of Fukushima-related information prior to any decision whether to renew the license for another 20 years. any decision whether to renew the license for another 20 years. However, because the ~~Board Majority’s Initial Decision~~ does not terminate this proceeding or constitute a final licensing decision, I will address the preceding matters in greater detail, as appropriate, in the context of later Board rulings on several pending new contentions and other filings submitted by Pilgrim Watch and the Commonwealth of Massachusetts.

The unconsidered new and significant material information brought forward to date includes:

Increased Core Damage Frequency, and probability of an accident: The Massachusetts Attorney General's June 2, 2011 filing showed that of the twelve core-damage accidents at nuclear reactors, five occurred at reactors with pressure-suppression containments and involved substantial fuel melting (TMI, Chernobyl, and Fukushima Units 1-3). The occurrence of five core-damage events over a worldwide experience base of 14,500 reactor years (RY) translates to CDF of 3.4E-04 per RY, an order of magnitude higher than the baseline CDF estimate of 3.2E-05 per RY (1 event per 31,000 RY) that the Pilgrim licensee developed using PRA techniques.¹⁶

Longer, Not Modeled, Duration Releases: On-going releases at Fukushima demonstrated that accidents in reactors designed like Pilgrim can extend for days, weeks, and months. However Entergy in its SAMA analysis did not model releases beyond 24 hours. The computer code used by Entergy (MACCS2) is only capable of modeling 24 hours or four days, if the Applicant chooses to use four plumes occurring sequentially over a four day period.¹⁷

Meteorological Variability at Coastal Sites: Fukushima, like Pilgrim, is on the coast with a complex terrain. Fukushima's plumes changed direction during the extended period of continued releases increasing both the area of impact and the concentration of contamination in those areas. A map¹⁸ of citizen measured radiation levels shows radioactivity distributed in a complex pattern reflecting the mountainous terrain and the shifting winds across a broad area of Japan, including one wide belt of radiation reaching 225 kilometers south from the stricken reactors to Tokyo, and another extending to the southwest. A wide geographic area is pockmarked with hot spots. Showing the significance of the impact of plumes traveling across water, data

¹⁶ New and Significant Information from the Fukushima Daiichi Accident in the Context of Future Operation of the Pilgrim Nuclear Power Station, Dr. Gordon Thompson, June 1, 2011, pg. 16-17, filed June 2, 2011.

¹⁷ Pilgrim Watch Request for Hearing on Post-Fukushima SAMA Contention, May 12, 2011, pg.,3

¹⁸ Asia-Pacific: *Global Research* - [Radiation and Nuclear Powers Stations](#), Referencing Science magazine

from the USA EPA seems to confirm that uranium particulates from Fukushima are travelling at least as far as the Hawaii, and probably across the USA.¹⁹ Cape Cod is less than 20 miles from Cape Cod directly across the Bay and densely populated, especially in summer.

When circumstances have changed so as to significantly alter the evidentiary basis of a decision, that decision should be vacated and remanded. (NRC Practice and Procedure Digest, Hearings 114, *Kerr-Mcgee Chemical Corp.*, 33 NRC 115-117 (1991))

8. The Board’s Decision Does Not Sufficiently Set Forth the Bases for It.

A licensing Board must clearly state the basis for its decision and, in particular, state reasons for rejecting certain evidence in reaching the decision. (See NRC Practice and Procedure Digest, Hearings 114, *Public Service Co of N.H.*, 6 NRC 33 (1977)). The bases for decisions must be set forth in detail; and to carry out its NEPA responsibilities, a Board decision must go beyond conclusory assertions “and indicate its basis for them so that the end product is” an informed and adequately explained judgment. (Id at 115, *Public Service Co. of N.H.* 7 NRC 477, 492 (1978)).

As shown above, particularly in sections 4-7, the Decision here does not approach meeting this standard. Most of PW’s evidence was excluded or ignored. Even where the Board said that it disagreed with PW, it failed to say “why.”

The Board’s statement, at the outset of the Decision, that it “fully considered all record evidence” (Decision pg. 1), is not supported by the Decision itself.

¹⁹ First evidence of global contamination from alpha-emitting particulates from Fukushima. Elevated Uranium in air filters in Hawaii and Marianas islands, Chris Busby, European Committee on Radiation Risk, 18th April 2011 at <http://www.llrc.org/fukushima/subtopic/fukuepauran.pdf>

Indeed, the Board recognized that many findings, proposed arguments and arguments were not addressed by the Decision. Had it actually “fully considered all record evidence” and properly addressed it, there would have been no need for its conclusory footnote “adopt[ing] and incorporat[ing] in this order all of the findings of fact proposed by Entergy and the NRC Staff not otherwise addressed herein,” and asserting that “[a]ll other issues, motions, arguments, or proposed findings presented by the parties concerning Contention 3 and not addressed herein have been found without merit or otherwise unnecessary for the decision.” (Decision, pg., 33, Fn 141, emphasis added.)

The Board Decision should be remanded for reconsideration, and a full explication of whatever result the Board might reach upon reconsideration. (Id., *Pacific Gas and Electric Co.*, 8 NRC 406, 410-412).

D. CONCLUSION

The Commission should review and reverse the July 19, 2011 Partial Initial Decision decision and remand contention 3 back to the Board.

Respectfully Submitted,

(Signed Electronically)

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