RAS 14666

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

Docket # 50-293

November 13, 2007

PILGRIM WATCH BRIEF ON APPEAL OF LBP-07-13
MEMORANDUM AND ORDER
(Ruling of Motion to Discuss Petitioner's Contention 3
Regarding Severe Accident Mitigation Alternatives)

I. INTRODUCTION

Pursuant to § 2.341, Review of decisions and actions of a presiding officer, Intervenor Pilgrim Watch (hereafter "Petitioner") hereby petitions the Nuclear Regulatory Commission ("NRC" or "Commission") for review of the 2-1 decision of LBP-07-13, Memorandum and Order (Ruling on Motion to Dismiss Petitioner's Contention 3 regarding Severe Accident Mitigation Alternatives) (October 30, 2007) (hereafter "LBP-07-13"). The ASLB Majority (hereafter "Majority") improperly granted Entergy's Motion for Summary Disposition. The motion was supported by NRC Staff and argued that there remained no genuine issue of any material fact.

II. FACTUAL AND PROCEDURAL BACKGROUND

Matters of fact and law raised in the petition for review were previously raised before the presiding officer. Matters of Law were raised in Pilgrim Watch's Answer Opposing Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 3 (June 29, 2007) pages 1-3; Pilgrim Watch's Answer to NRC Staff Response To Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 3 (July 9, 2007), pages 3-7.

TEMPLATE=SECY-021

SECY-02

Matters of fact were raised in Pilgrim Watch's Answer Opposing Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 3 (June 29, 2007), pages 4-92 and in the attached Declarations submitted by: Jan Beyea, PhD.; Bruce Egan, ScD., CCM; Richard Rothstein, CCM, QEP; Nancy Oates, Duxbury Town Clerk; Andre Martecchini, Chairman Board of Selectmen, Town of Duxbury; Representative Matthew Patrick, State Representative, Third Barnstable; Donald Zeigler, PhD., Professor of Geography, Old Dominion University; David L. Chanin; Richard Finnegan, Assessor, Town of Duxbury; and Timothy Warren Jr., Chief Executive Officer the Warren Group. Matters of fact were raised also in Pilgrim Watch's Answer to NRC Staff Response To Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 3 (July 9, 2007), pages 5-34.

The Board's majority improperly accepted the Applicants Motion for Summary Disposition by finding the absence of any genuine issue of material fact. The Majority arrived at their decision basically in three ways. (1) The Majority essentially rewrote the October 16, 2006 Order and excluded key areas of inquiry that had been admitted in that Order. (2) The Majority made unfounded requirements of the Petitioners to provide detailed calculations in their response when no such requirement was in the Order. The Order simply called for "further analysis;" and that implied further analysis by the Applicant, not by the Petitioner. And even if the Order had required the Petitioner to perform detailed calculations, it would be an unreasonable demand at the Summary Disposition stage. (3) The Majority violated the Rules of Summary Disposition by requiring that Petitioners prove their case and by weighing evidence.

1. Although, Contention 3, as admitted by the Board, October 16, 2006 stated that, "Applicant's SAMA analysis for the Pilgrim plant is deficient in that the input data concerning (1) evacuation times, (2) economic consequences, and (3) meteorological patterns are incorrect, resulting in incorrect conclusions about the costs versus benefits of possible mitigation alternatives, such that further analysis is called for."[1]

[1] Pilgrim, LBP-06-23, 64 NRC at 341

The Majority then eliminated in the Ruling LBP-07-13, the following from consideration: "Not at issue here, as discussed below in more depth, because these matters were raised and eliminated at the contention admissibility stage, are issues related to: (1) the adequacy of the computer code... used to perform the SAMA computations; (2) the use for SAMA analyses of probabilistic (as opposed to deterministic) methodologies; and (3) the health effects of low doses of radiation."[2]

First to be eliminated was "The adequacy of the computer code... used to perform the SAMA computations" It is at the very heart of the argument and, as pointed out by the Minority, was *never* eliminated at the contention admissibility stage. Because the Majority excluded consideration of anything relating to the adequacy of the MACCS2 code *as specifically applied with regard to the Pilgrim plant's SAMA analysis,* the majority in effect excludes any meaningful challenge to what is put into the code relating to meteorological patterns, evacuation time estimates and economic consequences

Second, the Majority eliminated, "The use for SAMA analyses of probabilistic (as opposed to deterministic) methodologies." Pilgrim Watch's argument is not about probabilities per se; rather it is all about how those probabilities are derived. A probabilistic model, in essence, takes the different results of a deterministic model and assigns probabilities to the outcomes. If the deterministic model is flawed, and we demonstrated that it is, so are the probabilities derived from them. The probability of the consequences of a severe accident – how the plume travels, economic consequences, and evacuation times - depends very much on the appropriateness of the underlying plume model used and assumptions that determined what inputs were selected.

Third, the Majority eliminated "the health effects of low doses of radiation." Health costs clearly belong as part of the discussion of economic consequences. The question then becomes at what dose do health consequences and costs not occur. Petitioners correctly argue that it should not be based on 1970's research; but instead take into account recent health studies such as the National Academy of Sciences BEIR VII Report.

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[2] Majority Decision at 2

Also, the Majority limited the discussion of economic consequences to economic losses due to "loss of economic activity" or for "loss of economic infrastructure and tourism;"[3] whereas the Order admitted "economic consequences." We know that economic consequences include many more variables such as a full and fair accounting of all potential costs relating to health, interdiction, job retraining, unemployment payments, litigation, and the "good will" aspect of business.

The elimination of these central factors by the Majority essentially meant that the Petitioners could no longer argue the case.

2. The Majority created another hurdle for the Petitioners to cross and stated that Petitioners were required to provide detailed calculations in their response to the Applicant's Material Facts in order for their responses to be accepted as demonstrating a genuine dispute.[4] However, the Order simply required the Petitioners to demonstrate what was wrong with the inputs that the Applicant put into the computer code, and more fundamentally what were the shortcomings of the code itself, so that further analysis is called for, if so determined by the Board after a full and fair hearing. This did not mean that the Petitioners were required to do the actual calculations – the "further analysis" called for – and certainly never at the Summary Disposition stage.

3. Last, the Majority weighed the evidence of experts which is not appropriate in a Summary Disposition context under relevant and binding case law.

The Commission should grant review of LBP-07-13 because this is a final ruling on Contention 3; and it demands review, if only because Chair Judge Ann Marshall Young's lengthy dissenting opinion of LPB-07-13 demonstrates that the legal interpretation of the legal requirements for Summary Disposition is diametrically opposed to the opinions rendered by the majority. Pilgrim Watch wishes to have the entire content of this dissenting opinion incorporated as part of our appeal.

[3] Majority Decision at 13

[4] Majority decision at 15

III. THE COMMISSION SHOULD GRANT REVIEW OF LBP-07-13

A. Majority Decision in Conflict Relevant Legal Standards for Granting/Denying Motions Summary Disposition:

A moving party is entitled to summary disposition of a contention as a matter of law if there is no genuine dispute: The filings in the proceeding, together with statements of the parties and the affidavits, did not demonstrate that there are no genuine disputes as to material fact. Entergy set forth 58 Material facts. Pilgrim Watch disputed all 58.[5]

The opposing party did not rely on mere allegations or denials of the moving party's facts: Pilgrim Watch appreciated that a party opposing a motion for summary disposition cannot rely on mere allegations or denials of the moving party's facts;[6] rather, the non-moving party must set forth specific facts demonstrating a genuine issue of material facts. Pilgrim Watch's answer to Entergy's Motion set forth specific facts disputing Entergy's material facts; and supported Pilgrim Watch's dispute with declarations provided by experts and references to NRC and the applicant's own documents. The Majority did not deny that the experts were well-qualified, that would not have been possible; rather they improperly dismissed as not relevant what they said based on a re-writing of the Order.

A licensing board ruling on a motion for summary disposition "must view the record in the light most favorable to the party opposing such motion."[7] Pilgrim Watch was required to "set forth specific facts showing that there is a genuine issue," and may not rely on "mere allegations or denials." [8] Further Pilgrim Watch did not have to

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[5] Pilgrim Watch's Answer Opposing Entergy's Motion Summary Disposition, pages 5-49.

[6] *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel fabrication Facility), LBP-05-4, 61 NRC 71, 81 (2005) (citations omitted).

[7] *Advanced Med. Sys.* (One Factory Row, Geneva, Ohio 44041), CLI-93-22, 38 NRC 98, 102 (1993).

[8] *Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), LBP-06-5, 63 NRC 116, 122 (2006) (citing 10 C.F.R. § 2.710(b); *Advanced Med. Sys.*, CLI-93-22, 38 NRC at 102).

show that we would prevail on the issues raised, but instead "demonstrate that there is a genuine factual issue to be tried." [9]

For example: In response to the applicants material facts on economic consequences, the Petitioner went straight to the "horse's mouth" and presented an umbrella declaration by David L. Chanin, the person who coded the MACCS2. He stated the following. "Speaking as the sole individual who was responsible for writing the FORTRAN in question, which was done many years prior to my original work in SAND96-0957, I think it's foolish to think that any useful cost estimates can be obtained with the cost model built into MACCS2....The economic cost numbers produced by MACCS2 have absolutely no basis...If you want to discuss economic costs, I'd be glad to discuss SAND96-0957, but the "cost model" of MACCS2 is not worth anyone's time." [Chanin Decl]. The declaration itself essentially covers the issue and "demonstrate[s] that there is a genuine factual issue to be tried.

Likewise in response to the Applicant's statements of material facts on the "Meteorological Model and Data," Pilgrim Watch disputed Entergy's facts with declarations from highly qualified experts, including: Jan Beyea, PhD., a nuclear physicist and regular member of panels and boards of the National Research Council of the National Academy of Sciences and an advisor to the Division of Engineering and Physical Sciences, formerly a Senior Policy Scientist, Chief Scientist and Vice President of the National Audubon Society, and currently senior scientist at Consulting in the Public Interest, Princeton; Bruce Egan, ScD., CCM., CCM, air quality consultant and author of studies on coastal meteorology in Southeastern Massachusetts; Richard

[9] *Advanced Med. Sys.*, CLI-93-22, 38 NRC at 102; *see also American Mfrs. Mut. Ins.* Co. *v. American Broadcasting - Paramount Theaters, Inc.*, 388 F.2d 272, 280 (2d Cir. 1967). In addition, if a movant satisfies its initial burden and supports its motion by affidavit, "the opposing party must either proffer rebutting evidence or submit an affidavit explaining why it is impractical to do so," and "[i]f the presiding officer determines from affidavits filed by the opposing party that the opposing party cannot present by affidavit the facts essential to justify its opposition, the presiding officer may order a continuance to permit such affidavits to be obtained, or may take other appropriate action." *Advanced Med. Sys,,* CLI-93-22, 38 NRC at 103. These provisions are incorporated in the NRC rules at 10 C.F.R. § 2.710(c).

Rothstein, CCM, QEP [at 5-23]. The same quality of response was made to all other facts presented by Entergy.

The majority decision constituted weighing evidence that is not appropriate in a summary disposition context under relevant and binding case law. The Majority examined "whether there is any genuine issue of material fact...in dispute"[10] and determined that, because they do not view Intervenors as having disputed any material fact – any fact, that might affect "whether or not a particular SAMA is cost effective" and thereby affect the outcome of the proceeding, Entergy's motion should be granted. To reach this conclusion, the Majority indicates that they found it necessary to look to whether, "after expanding that support [Petitioners presented] to its logical limits, it can support a finding of fact material to the determination the Agency must make, that party's position cannot prevail."[11] They stated that it was necessary to undertake a "*thorough examination of potential materiality of the support* offered by the Parties for their positions" [and a] "*careful examination of the evidence* presented in the parties' affidavits."[12] [Emphasis added] This examination of the facts conflicts with the Board's proper function. It is not supposed to decide or resolve such issues at this stage of the proceeding.[13] In the Oyster Creek license renewal proceeding, "summary judgment is not appropriate if it would require a judge to assess the correctness of facts and conclusions that are embodied in the competing, well-founded opinions of the parties' experts."[14] Further, it is totally inappropriate at the summary disposition phase for the Board to try

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[10] Majority decision at 5.

[11] Id. at 6.

[12] Id. At 7 and n.9.

[13] Banks v. District of Columbia, 377 F. Supp. 2nd 85, 89 (D.D.C. 2005) (citations omitted); see also *More v Snow,* 480 F Supp. 2d 85, 89 (D.D. C. 2005); *Mobley v. Continental Casualty*, 405 F Supp 2d 42, 47 (D.D.C. 2005); *San Carlos Apache Tribe v United States*, 272 F. Supp. 2d 860, 880 (D. Ariz. 2003).

[14] *Amergen Energy Company, LLC* (License Renewal for Oyster Creek Generating Company), Memorandum and Order (Denying AmerGen's Motion for Summary Disposition) at 4 (June 19, 2007) (unpublished), ADAMS Accession No. ML071700768 (citing *United States v. Alcan Aluminum Corp.*,990 F. 2d 711, 722-23 (2d Cir. 1993); *Norfolk S. Corp v. Oberly*, 632 F. Supp. 1243 (D. Del. 1986), aff'd, 822 F. 2d 388 (3d Cir. 1987); *Private Fuel Storage*, LBP-01-39, 54 NRC at 509-10).

"to untangle the expert affidavits and decide 'which experts are more correct.'"[15] The Petitioners and their experts recognized that they were not required to prove their case at this juncture in the proceedings and therefore provided simply enough to demonstrate beyond reasonable doubt that a dispute clearly existed.

B. Majority Effectively Re-Writes the Order

The Order stated that Contention 3 challenged the SAMA analysis; and as admitted by the Board October 16, 2006 stated that the, "Applicant's SAMA analysis for the Pilgrim plant is deficient in that the input data concerning (1) evacuation times, (2) economic consequences, and (3) meteorological patterns are incorrect, resulting in incorrect conclusions about the costs versus benefits of possible mitigation alternatives, such that further analysis is called for."[16]

The Majority then proceeded to effectively rewrite the Order and thereby decide that all pertinent facts brought forward by the petitioner to establish a dispute now were not relevant.

1. The Majority <u>incorrectly</u> stated that, "Not at issue here...because these matters were raised and eliminated at the contention admissibility stage, are issues related to (1) the adequacy of the computer code... used to perform the SAMA computations; (2) the use for SAMA analyses of probabilistic (as opposed to deterministic) methodologies; and (3) the health effects of low doses of radiation."[17]

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[15] *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-4, 61 NRC 71, 80 (2005) (citing *Private Fuel Storage,* LBP-01-39, 54 NRC at 510); *Vermont Yankee,* LBP-06-5, 63 NRC at 122.

[16] Pilgrim, LBP-06-23, 64 NRC at 341

[17] Majority Decision at 2.

A. "The adequacy of the computer code ... used to perform the SAMA computations" was improperly eliminated.

The Majority eliminated any criticisms of the very code that was used to perform the SAMA analysis – the MACCS2 – therefore any meaningful factual discussion of the SAMA analysis performed by the applicant was improperly taken off the table.

The majority's statement that "these matters were raised and eliminated at the contention admissibility stage" is flatly wrong. The Dissenting Opinion notes, at 34, that, "...we did not actually exclude from consideration, as the majority states, "the adequacy of the computer code (MACCS2) used to perform the SAMA computations. We did state that, to the extent that any part of the contention or basis may be construed as challenging *on a generic basis* the use of probabilistic techniques that evaluate risk, we find any such portion(s) to be inadmissible. The use of probabilistic risk assessment and modeling is obviously accepted and standard practice in SAMA analyses."[18]

The adequacy of the MACCS2 code is at the very heart of the issue of whether a proper SAMA analysis was done by the Applicant. The Order admitted whether the input data was correct. If it were true that the Petitioners can not discuss the inadequacies, limitations, of the very model the data regarding meteorological patterns, economic consequences and evacuation time estimates is put into, then the majority in effect excludes any meaningful challenge to these issues - a classic Catch-22.

The Dissenting Opinion explains,

> By stating that we found "inadmissible" any part of the contention that could be construed as "challenging on a generic basis the use of probabilistic techniques that evaluate risk," we did *not* exclude *specific* challenges that might bring into question specific aspects of the SAMA analysis regarding the three types of input we admitted. Regarding meteorological patterns, what Intervenors challenge are several aspects of what is "put in" to the SAMA analysis on meteorological issues The majority, however, maintain that "the effects of variations in wind

[18] *Pilgrim,* LBP-06-23, 64 NRC at 340 (emphasis added by Minority).

speed and direction, meteorological patterns, and plume shape are fully encompassed by the stochastic/statistical methods used in [Entergy's] SAMA analysis."[19] Taking this statement at face value, there is essentially nothing of relevance that Intervenors *could* have provided regarding meteorological patterns. The upshot of this is that, although we admitted the issue of whether the input data regarding meteorological patterns were correct, by now excluding consideration of anything relating to the adequacy of the MACCS2 code *as specifically applied with regard to the Pilgrim plant's SAMA analysis,* the majority in effect excludes any meaningful challenge to what is put into the code relating to meteorological patterns, because such input is effectively predetermined by the current state of the MACCS2 code.[20] Our admission of Contention 3 is thus rendered meaningless with regard to meteorological issues." Petitioners add that the same argument applies to economic consequences and evacuation times, as explained below."

The Majority's justifications for taking the code off the table are not only wrong but also weak. They state [at 8] that, the "MACCS2 is the current standard for performing SAMA analyses." Petitioners do not dispute that it may be "standard" but that does not justify its use if, as we have demonstrated, the assumptions, such as the straight-line Gaussian plume model, do not apply to this site. There is no requirement for an applicant to use one model over another; however, they are required to do a proper analysis. The Majority goes on to say that, "MACCS2 was used to compute hundreds of scenarios which were weighted according to their probabilities and then to develop a distribution of probabilities of the consequences and risks." However repeating the same mistakes many times does not give a right answer. As Dr. Egan [Decl at 13] succinctly stated, "sensitivity studies do not add useful information if the primary model is flawed." The Majority's final justification for use of the code is that, "it is necessary for the Staff to take a uniform approach to its review of such analyses by license applications and for

[19] Majority Decision at 14;

[20] Although Intervenors could theoretically challenge the accuracy of one or more days' results from Pilgrim's one meteorological monitoring tower, this would seem to be the limit of what could be disputed in the majority's view

performance of its own analyses, and it would be imprudent for the Staff to do otherwise without sound technical justification." [Majority at 9] The NRC re-licensing regulations require that mitigation alternatives must be analyzed but they do not stipulate how the consideration of mitigation alternatives must be carried out. In order to properly analyze mitigation alternatives, a proper tool must be chosen for each site. The SAMA is a Category 2 issue. Going forward with the hearing process would provide to the Board the "sound technical justification" for requiring the Applicant to use other available and practical models that are appropriate for the Pilgrim site in doing "further analysis."

Because the Majority excluded consideration of anything relating to the adequacy of the MACCS2 code *as specifically applied with regard to the Pilgrim plant's SAMA analysis,* the majority in effect excludes any meaningful challenge to what is put into the code relating to meteorological patterns, evacuation time estimates and economic consequences. These facts belong back on the table; and once they are properly considered it will be apparent that Pilgrim Watch disputed each and every one of Entergy's Material Facts.[21]

For example:

Meteorological patterns are central to a proper SAMA analysis.[22] Radiological consequences from a severe accident are strongly dependent on meteorological conditions and these conditions are complex and particular to each individual site. The modeling by the applicant and the applicant's input to that model fail to properly characterize atmospheric dispersion processes. The MACCS2 code utilizes a standard straight-line Gaussian plume model to estimate the atmospheric dispersion of a point release of radionuclides. A variable trajectory plume model is appropriate for this site. The NRC, [23] a site specific meteorological study,[24] EPA, and creators of the software to

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[21] Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 5-49.

[22] See discussion found in Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 50-57.

[23] NRC Regulatory Guide 123 (Safety Guide 23) On Site Meteorological Programs 1972, NUREG-0737, Supplement 1

the MACCS2 code[25] point to the straight-line Gaussian Plume model's limitations for coastal locations.

Showing that the straight-line Gaussian Plume model is not an appropriate model to use in Pilgrim's SAMA analysis, Petitioners established a factual dispute. Further, no matter how many different simulations the Applicant experts put into the model the output will not reflect what will actually happen at this site. The added simulations were a waste of everybody's time [Response to Material Facts 9, 11, 15, 16, 17]. Dr. Egan summarized the point in regard to the Applicant's further sensitivity analyses in saying that "*sensitivity studies do not add useful information if the primary model is flawed*" [Egan Declaration at 5].

Not only would variable trajectory models be important for modeling the effect close in but also, as Dr. Jan Beyea [DECL at 12] noted, they would provide the capability to account for reduced turbulence over ocean water and could be used in sensitivity studies to see how important a phenomena it is for Pilgrim. The applicant incorrectly assumes that releases from Pilgrim NPS headed out to sea can be ignored, producing no consequences. However, releases headed out to sea will remain concentrated because of the reduced vertical turbulence rates over the ocean. If the wind direction then shifts toward populated areas, the contaminants will remain relatively undiluted. (Zager et al) (Angevine 2006) This can lead to hot spots of radioactivity in unexpected locations (Angevine 2004, p.11). Entergy cannot dismiss radioactivity blowing out to sea; and needs to use appropriate variable trajectory models to study how the reduced turbulence affects the concentrations of contaminants transported from the PNPS across open water to Boston and to Cape Cod that would bring more SAMAs into play.

The MACCS2 model is not used to model dispersion of the plume within one hundred meters of the source. This is a pertinent deficiency because of the predicted re-suspension

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[24] EPA's latest Guideline on Air Quality Models (Federal Register November 9, 2005 Section 7.2.8 *Inhomogeneous Local Winds*; EPA 2000 report, Meteorological Monitoring Guidance for Regulatory Model Applications, EPA-454/R-99-005, February 2000. Section 3.4

[25] RASCAL Version 1.3 User's Guide (NUREG/CR-5247)

of contaminants to off-site locations by wind and water over time, exacerbated by Pilgrim's coastal location that often experiences strong winds.

Evacuation Times:[26] The applicant's evacuation time estimates are based on research provided by KLD Associates. Their time estimates assume a straight-line Gaussian plume - they assume only a small segment of the population will evacuate, only those within the "key-hole." Because the public appreciates that winds are variable, those outside the "key hole" - both within and outside the 10-mile EPZ - will try to leave. Hence, traffic will be far heavier than predicted and time estimates will increase. This would be accounted for properly by using a variable trajectory plume distribution model. Longer evacuation times result in greater population exposures - costs.

Economic consequences must be properly assessed.[27] The basic problem is the MACCS2 is not the proper diagnostic tool to assess economic consequences, contrary to the applicant's description of it as "state of the art" [Material Fact 49]. David Chanin who coded the cost model of the MACCS and MACCS2 stated this very bluntly, "If you want to discuss economic costs ... the "cost model" of MACCS2 is not worth anyone's time. My sincere advice is to not waste anyone's time (and money) in trying to make any sense of it. [And] "I have spent many many hours pondering how MACCS2 could be used to calculate economic costs and concluded it was impossible."[28]

The model's assumption of a straight line plume severely underestimates likely costs by ignoring the wider impact from variable wind patterns that occur at this site response. In contrast, if a variable trajectory plume distribution model is used allowing for wind shifts to carry the plume over many geographic areas, and we assume that a "severe accident" is more than a small offsite release, then more SAMAs are likely to come into play – as the table below illustrates. The Petitioner demonstrated this using the Applicant's own dollar figures.

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[26] See discussion found in Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 58-71 and Chanin Declaration.

[27] See discussion found in Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 78-91.

[28] [http://maccs2support.chaninconsulting.com/?p=27

Summary Comparison- Population Multiplied by Sensitivity Case

Population within area	**1st sensitivity** $135,187.77/person	**2nd sensitivity**-$189,041/person
Population SE Sector, 950 (0-10 miles)	$128,428,382 > 128 Million	$179,588,950 >180 Million
Population SSW Sector, 23695 (0-10 miles)	$3,203,274,210 > 3 Billion	$4,479,326,495 >4 billion
Population within 10 miles, 165236	$22,337,886,364 > 22 Billion	$31,236,378,676 >31 Billion
Population within 20 miles 619601	$83,762,477,480 > 83 Billion	$117,129,992,641 >117 Billion
Population within 50 miles	$1,012,524,898,550 (1 Trillion +)	$ 1,415,873,043,447 > 1 Trillion

Health Costs[29]: The MAACS2 underestimates health costs predicted to occur in a severe accident. The MACCS2 Model, and Entergy's supplement analyses, only considers cancer mortality in their risk assessments. Cancer incidence is not considered; however, BEIR VII incidence coefficients are about 40% greater than current EPA Guidance, that is, incidence is now about 33% greater than mortality. Other health effects result from exposure – heart disease, autoimmune disease, birth defects, and reproductive disorders. They are not accounted for; yet will occur and be a real cost.

Further, the code's threshold for adoption of severe accident mitigation alternatives (SAMA) is outdated and does not take into account recent cancer studies. For example, Dr. Beyea concludes [Beyea Report at 14], "As a result of new studies, all probabilistic safety analyses prepared prior to them need to be revisited. These new studies would change the threshold for adoption of severe accident mitigation alternatives (SAMA). For instance, the current Environmental Report for Pilgrim assigns a value of $2,000 per person rem in deciding whether a proposed SAMA is cost effective. According to the results of the study by Cardis et al., $2,000 per rem implies a valuation of $2,000, 000 per

[29] See discussion found in Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 82-83; and attached Beyea Report, 12-15.

cancer death before discounting, which is way too low.[30] The same low valuation of life would arise from the use of the risk numbers derived from the Techa River cohort (Krestiniana et al., 2005). As a result, the SAMA analyses prepared for Pilgrim...needs to be redone.... Presumably, a number of additional SAMAs that were previously rejected by the applicant's methodology will now become cost effective."

Also ignored in the cancer mortality analyses, and consequent costs, are recent findings by the National Academy of Sciences BEIR VII Report [http://books.nap.edu]. BEIR VII reported the differential effect of radiation exposure on women and young children. For example: In 1990, the NAS estimated that the risks of dying from cancer due to exposure to radiation were about five percent higher for women than for men. In BEIR VII, the cancer mortality risks for females are 37.5 percent higher. The risks for all solid tumors, like lung, breast, and kidney, liver, and other solid tumors added together are almost 50 percent greater for women than men. The differential risk for children is even greater. The same radiation in the first year of life for children produces three to four times the cancer risk as exposure between the ages of 20 and 50. Female infants have almost double the risk as male infants. However, NRC radiation protection standards are based on average lifetime exposure and ignore damage at lower exposure levels.

Decontamination costs are severely underestimated in the MACCS2 model, as discussed in SAND96-0957, Appendix E at 11. Clean up estimates in the MACCS2 are based on old estimates based on what it would cost to clean up after a weapons explosion that produced large fall out particulate swept up with a broom. A severe accident at a nuclear reactor, such as Pilgrim, is very different and the contaminants could not be cleaned up with a broom. The code underestimates costs by ignoring the many lessons learned from the Chernobyl experience that are applicable here - such as the difficulty, if not impossibility, of cleaning up moist areas, wetlands, ponds, bogs and other bodies of water. Porous surfaces are much more difficult to decontaminate than smooth surfaces; here buildings are made of wood, brick, and concrete surfaces. Material deposited by rain

[30] $50,000 net present value for a cancer death occurring 20 years from now, based on the 7% per year discount rate assumed in the Pilgrim ER, which leads to a factor of 4 reduction in present value for a cancer induced 20 years from now.

is much more difficult to remove than material under dry conditions. This is a moist coastal area with abundant bogs and wetlands. And as the time lapse increases from deposition to decontamination, decontamination is rendered less effective. New Orleans and coastal Louisiana remain a disaster since the hurricane; what little has been accomplished there is instructive for predicting what would happen here.

B. The Majority improperly eliminates the "use for SAMA analyses of probabilistic (as opposed to deterministic) methodologies"

A probabilistic model, in essence, takes the different results of a deterministic model and assigns probabilities to the outcomes. If the deterministic model is flawed, and we have demonstrated that it is, so are the probabilities derived from them. The probability of the consequences of a severe accident – how the plume travels, economic consequences, and evacuation times - depends very much on the appropriateness of the underlying plume model used. To quote Dr Egan again "*sensitivity studies do not add useful information if the primary model is flawed*" [Egan Declaration at 5]. The Majority accepted as fact that the applicant's additional studies demonstrated that the Petitioner's factual disputes were not relevant; and therefore concluded that there were no material facts in dispute. It is the equivalent of relying on readings from a defective oil gauge.

The Majority explains their position, at 8, "The underlying analyses require modeling of extremely complex time and physical condition dependent phenomena, which all those familiar with the field know are generally not amenable to modeling. Specifically, for example, actual variations in wind speed and direction are not predictable, nor are actual time-dependent releases from such a hypothetical accident (as the releases are dependent upon the evolution of an accident and how the various components of a power reactor respond). Similarly, the wide seasonal variations in population density can only be treated in a generic sense, the response of the population to actual evacuation efforts may well be fundamentally unpredictable despite all due efforts of law enforcement, and long-term economic effects are dependent upon variables such as individual and mass psychological reaction. Thus, deterministic modeling of these variables, and many

others, is simply not possible, and therefore such variables are treated probabilistically. The approach taken by users of MACCS2 is to perform numerous computations with the code using a wide variation in code input to develop a set of results with statistical significance. Declaration of Kevin R. O'Kula ¶¶ 7-16 (May 16, 2007). Therefore, this Agency has wisely determined that these effects and potential benefits of mitigation be examined using probability weighted consequences."[31]

The Majority statement that deterministic modeling of complex time and physical conditions and many other variables is simply not possible, and therefore such variables are treated probabilistically is misleading. EPA, for example, relies on deterministic type modeling (e.g., with AERMOD and CALPUFF) to predict concentrations that are then compared to applicable federal and state ambient air quality standards, i.e., a "pass/fail" type of analysis for receiving permit/license approvals.

Nobody is arguing about using probabilities. But what is at issue here is the strengths and weaknesses of the model that is used to develop the probabilities and the necessity to either correct the model, if possible, or use another.

C. The Majority improperly eliminates the health effects of low doses of radiation

Health costs belong in the SAMA Analysis. The ASLB made clear to Pilgrim Watch that they considered health consequences, per se, could not be brought forward in re-licensing adjudications [LBP-06-23, 64 NRC at 341-348.] However, it is equally clear that they belong as part of the discussion of economic consequences. Illness due to radiation exposure in a severe accident entails real economic costs. We presented facts to demonstrate how the MACCS2 undervalued and ignored many health costs.[32]

In saying that "low doses of radiation are eliminated" the Majority never says how they define "low doses." We assume that they mean a dose below which a health effect would not result so that economic costs would not need to be figured. Does the Majority mean

[31] Majority at 8

[32] See discussion found in Pilgrim Watch Answer Opposing Entergy's Motion for Summary Disposition, Contention 3, pages 81-84.

"low" as defined by NRC/DOE 30 years ago or "low" according to recent studies and the National Academy of Sciences BEIR VII Report issued in 2005?

Petitioners proceeded, quite properly, on a definition of low dose as one at which health damage does not result and hence there will be no added economic consequences for the SAMA. Therefore the following facts were brought forward to establish a dispute that the SAMA analysis underestimated costs.

Cancer Mortality Underestimated: Dr. Jan Beyea explains in his declaration prepared for the Massachusetts Attorney General [Beyea report at 12-15] that there have been increases in the value of the cancer risk assigned to low doses of radiation that should be taken into account. These increases have been steady since 1972. In addition, there have been a marked increase in the value of cancer mortality risk per unit of radiation at low doses (2- to- 3 rem average) as a result of recent studies published on radiation workers (Cardis et al. 2005) and Techa River cohort (Krestinina et al. 2005). Both studies give similar values for low dose, protracted exposure, namely 1 cancer death per Sievert (100 rem). The studies are summarized in Beyea's report at 12. "These new studies would change the threshold for adoption of severe accident mitigation alternatives (SAMA). For instance, the current Environmental Report for Pilgrim assigns a value of $2,000 per person rem in deciding whether a proposed SAMA is cost effective. According to the results of the study by Cardis et al., $2,000 per rem implies a valuation of $2000,000 per cancer death before discounting, which is way to low.[33] The same low valuation of life would arise from the use of the risk numbers derived from the Techa River cohort (Krestiniana et al., 2005). As a result, the SAMA analyses prepared for Pilgrim...needs to be redone, even without inclusion of spent-fuel pool fires as a risk to be addressed. Presumably, a number of additional SAMAs that were previously rejected by the applicant's methodology will now become cost effective."

[33] $50,000 net present value for a cancer death occurring 20 years from now, based on the 7% per year discount rate assumed in the Pilgrim ER, which leads to a factor of 4 reductions in present value for a cancer induced 20 years from now.

Also ignored in the cancer mortality analyses, and consequent costs, are recent findings by the National Academy of Sciences BEIR VII Report. The MACCS2 Model, and Entergy's supplement analyses, only consider cancer mortality in their risk assessments. Cancer incidence is not considered; however, BEIR VII incidence coefficients are about 40% greater than current EPA Guidance, that is, incidence is now about 33% greater than mortality. Other health effects result for exposure – heart disease, autoimmune disease, birth defects, and reproductive disorders. They are not accounted for; yet will occur and be a real cost.

Underestimating health costs and ignoring other health impacts we assume is one of the reasons that the Majority apparently accepted the Applicant's expert statement that emergency planning was not important.

2. The Majority' ruling is incorrect in another important area – they state that the Petitioners did not provide detailed calculations in their response,[34] However, neither the Order nor the Rules of Summary Disposition required that we do so. The Order plainly states that Petitioners request "further analysis."

The Petitioner's task is to demonstrate what is wrong with the Applicant's inputs in the model, and/or with the model itself, so that further analysis will be called for by the Board if it determines it is appropriate after a full and fair hearing. This does not mean that the Petitioner is required to input the data and do all the actual calculations – perform the "further analysis."

As the minority dissent pointed out, to require the Petitioners to perform calculations would have been unreasonable given the extremely complex, expensive, and time consuming nature of the computer calculations that would be necessary to do this, which even the applicant with far greater resources, has called "impractical." And, as important, the Majority plainly judged the Applicant's experts against the Petitioner's experts that plainly is not appropriate at the Summary Disposition phase under relevant and binding case law. Intervenors are fully entitled to have the record viewed most favorably toward

[34] Majority decision at 15

them; and the Majority unfairly ignored the issues of material fact that Pilgrim Watch's experts brought forward.

The Petitioner's declarations describe specific ways in which the SAMA analysis for the Pilgrim plant might be improved through alternative approaches that could lead to more meaningful input information for a SAMA analysis. For example, Pilgrim Watch's experts in response to Material Fact 10 stated that there are appropriate complex models today that have the same kinds of meteorology/dispersion modeling attributes with respect to assessing variable trajectory wind flows and can be adapted for use at nuclear power plants. Today, they can be applied more readily and cost-effectively in a PC environment as compared to the cumbersome modeling systems that were only available 25 years ago.[35] Dr. Bruce Egan stated specifically that, "With the rapid advancement of computers and software in the past decade, computational time should not be a major factor in the choice of a dispersion model used for non real time applications. My experience is that most dispersion model runs require that multiple years of hour by hour meteorological data be used, that computations offer hundreds of receptors locations be made and that source inventories sometimes include hundreds to thousands of sources which may have to be broken down to even larger numbers of individual point or area type sources for computational reasons. Many models also use multiple runs using 'bootstrap' techniques to generate statistical bounds on the models predicted values. Other modeling groups have not found similar applications 'simply impractical.'"[36]

3. Majority limits the discussion of Economic Impact contrary to what was admitted in the Order

Majority incorrectly states that, "...the admitted arguments of Pilgrim Watch were that the estimates of economic cost impact failed to properly account for 'loss if economic activity' or for 'loss of economic infrastructure and tourism'" [Pilgrim Watch Petition at 44-5].

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[35] Petitioners Reply to Motion for Summary Disposition -Beyea at 12; Egan at 8 and 11, Rothstein at 01/26/07 email to R. Emch, NRC and 04/24/06 communication to J. Berger, at 2].

[36] Dr. Bruce Egan at 13, Item 15,

In the Motion to Intervene Pilgrim Watch stated that, "without knowing what parameters were chosen by the Applicant, it is not possible to fully evaluate the correctness of the [SAMA analysis] ... [but] we have been able to piece together some possible reasons that Entergy's described consequences of a severe accident at Pilgrim look so small."[37] Other costs mentioned in the Motion to Intervene included health costs, as an example. More to the point, the term "economic consequences" is a broad term that encompasses the costs Pilgrim Watch brought forward in the reply to Entergy's Summary Disposition.

The major reason that costs were underestimated by the Applicant can be is attributed to the fact that they incorrectly assumed that resultant damage would occur only to those within the pathway determined by a straight line plume distribution model. If they had used a variable trajectory model damage in a larger geographic area would have been recognized and projected.

The Applicant underestimated costs and totally ignored others. Pilgrim Watch provided a factual account that was properly supported for this stage of the proceeding. [See Pilgrim Watch's Answer Opposing Entergy's Motion of Summary Disposition, pages 36-49 and discussion pages 72-91]. Examples:

The MACCS2 analyzes only economic costs that are attributable – costs that can be quantified and the government will pay. However the fact that the likelihood of an economic impact may not be easily quantifiable is not an excuse for failing to address it. NRC regulations require that "to the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms" [10 CFR§51.71].

Many costs that should have been considered, but were not, included items such as: health costs other than cancer mortality, liability; job retraining; the reputation or "good will" of a business; and the historical significance of a business or property. A simple

[37] Motion to Intervene at 34

example would be that if Harvard University were destroyed, its value would far exceed simply the value of its bricks and mortar.

Underestimated costs that were discussed in the reply included, for example: the true value of farm and non-farm property; health costs due to cancer; and interdiction. Regarding clean up costs, consideration was not given to the specific characteristics of Pilgrim's coastal community that increase the difficulty, and in some cases impossibility, of decontamination – wetlands, bodies of water, rain and moisture make decontamination difficult to impossible. The full impact of the fact that the area is increasingly urbanized and the buildings are largely made of wood, concrete and brick was not fully considered – rough surfaces are difficult to clean.

4. Evacuation Times: The Majority incorrectly concluded that all facts brought forward by the Petitioner on evacuation times were not relevant.

The reason provided by the Majority was based on "...the Applicant's MACCS2 Sensitivity Case 6 assuming no evacuation at all...convincingly demonstrates that the evacuation time assumptions (input regarding evacuation time) cannot make any difference in determining whether a SAMA would be cost effective" [Majority at 12].[38] The applicant goes on to say that the, "no evacuation sensitivity analysis is far less than (by a factor of 50) the 100% increase in benefit required for the identification of any additional potentially cost-effective SAMAs."

This statement should have raised a "red flag" indicating that something is wrong with the entire analysis. In essence, they are saying emergency planning in the Emergency Planning Zone does not make any difference – citizens could all remain on the beach with no increase in consequences. The entire concept is contrary to NRC regulation. After TMI the NRC required reactors to have emergency planning in place as a condition of operations - 10 CFR 50.54(q), nuclear power plant licensees shall follow and maintain

[38] Motion Summary Disposition, Material Fact No. 43 referencing O'Kula Decl. at ¶¶ 26, 43-47; WSMS Report at 39-40.

emergency plans which meet the standards in 10 CFR 50.47 (b) and the requirements in 10 CFR 50 Appendix E.

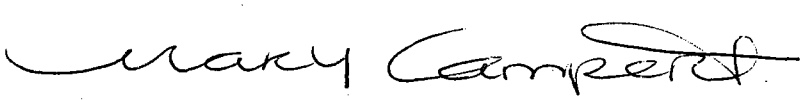
The Majority uncritically weighted the "evidence" and incorrectly concluded that, "this analysis [was] not substantively challenged by Pilgrim Watch" [Majority at 12]. The Majority failed to appreciate that the facts brought forward by the Petitioners did indeed "substantively challenge" that analysis. The Petitioners dispute stated that, "The applicant used incorrect input parameters including meteorological, emergency response, and economic data, into a software model of limited scope. Entergy also failed to use updated cancer risk coefficients and failed to consider other health effects in their estimate of "6% increase in PDR."

The foregoing illustrates where the Majority erred in their decision by effectively rewriting the Order; holding the Petitioners to a different set or rules; and by improperly weighing the evidence presented at the summary disposition stage.

IV CONCLUSION

For the foregoing reasons, the Commission should take review and reverse LBP - 07-13.

Respectfully submitted this 13 day of November, 2007,
Pilgrim Watch



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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

Docket # 50-293

November 13, 2007

CERTIFICATE OF SERVICE

I hereby certify that the foregoing Pilgrim Watch Brief On Appeal Of LBP-07-13 Memorandum And Order (Ruling of Motion to Discuss Petitioner's Contention 3 Regarding Severe Accident Mitigation Alternatives) Pilgrim Watch Reply To Entergy's Motion For Reconsideration of LPB-07-12 has been served this 13th day of November, 2007 by electronic mail and by U.S. Mail, first class to each of the following:

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