June 25, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR GENERATION CO.	)	
ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-293-LR
	)	
	)	
(Pilgrim Nuclear Power Station)	)	
	)	
	)	
	)	ASLBP No. 05-848-02-LR
	)	

AFFIDAVIT OF JOSEPH A. JONES AND DR. NATHAN BIXLER
CONCERNING ENTERGY'S MOTION FOR
SUMMARY DISPOSITION OF PILGRIM WATCH CONTENTION 3

Joseph Jones (JAJ) and Nathan Bixler (NEB),[1] do hereby state as follows:

1(a). (JAJ) I am a Principal Member of the Technical Staff in Sandia National Laboratories' (SNL) Radiological Consequence Management and Response Technologies Department and have over 23 years experience, 18 of which was at SNL. I have been primarily involved in emergency preparedness and consequence management activities as well as radioactive materials management and cleanup activities both nationally and internationally. I perform evacuation time estimate reviews in support of NRC Early Site Permits and was the lead author on NUREG/CR 6863 "Development of Evacuation Time Estimate Studies for Nuclear Power Plants," published in January 2005. I am also the project manager on the NRC project "Review of NUREG 0654, Supplement 3, Criteria for Protective Action Recommendations for Severe Accidents," which includes analysis of protective actions under

[1] In this Affidavit, the identity of the affiant who supports each numbered paragraph is indicated by the notation of his initials in parentheses. Where both affiants support a numbered paragraph, no parenthetical notation of initials is provided.

varying evacuation time estimates. A statement of my professional qualifications is attached hereto.

1b. (NEB) I am a Principal Member of the Technical Staff in SNL's Analysis and Modeling Department and have been at SNL for 25 years; the past 15 years have involved work for the NRC. I have a Ph. D. in Chemical Engineering and have been primarily involved in computer modeling of fluid dynamics and nuclear accidents and consequences. I have led the development and application efforts on a variety of NRC codes, including VICTORIA, RADTRAD, MACCS2, MELMACCS, and SECPOP2000. I am the project manager for development and application of the WinMACCS code suite, which are NRC's consequence analysis tools for supporting level-3 PRAs and other risk informed regulation activities. I am also currently working on consequence analyses for safety documentation of the Mars Science Laboratory Mission scheduled for 2009. A statement of my professional qualifications is attached hereto.

2. This affidavit is prepared in response to Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 3 (Motion), filed May 17, 2007, by Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (collectively, Entergy).

3. We have reviewed Entergy's Motion and the attachments thereto, in which Entergy seeks summary disposition of Pilgrim Watch Contention 3. We have also performed a comprehensive review of the relevant portions of: Entergy's license renewal application, including the Severe Accident Mitigation Alternative (SAMA) analysis; the relevant portions of the references identified in Pilgrim Watch's disclosure filings and in Entergy's disclosure filings, including the 1998 and 2004 ETE studies,[2] and the Washington Safety Management Solutions

[2] KLD Associates, Inc, "Pilgrim Evacuation Time Estimates and Traffic Management Plan Update," (1998); KLD Associates, Inc, "Pilgrim Evacuation Time Estimates and Traffic Management Plan Estimates," (2004).

and Enercon Services, Inc. (WSMS) reports;[3] the NRC staff's evaluation of the SAMA analysis, relevant answers to Requests for Additional Information (RAI), pleadings filed in this matter, NRC guidance documents, and other reference materials concerning the matters raised in Contention 3.

4. In this declaration, we present our views with respect to the issues addressed in Entergy's Motion and the Statement of Material Facts.

5. Contention 3 states:

> 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.

6. On the basis of our review of Entergy's Motion, the documents attached thereto, and our knowledge of the processes and modeling that is utilized in developing the supporting documents, we are satisfied that the additional analysis done by WSMS and others in support of Entergy's motion, adequately resolve the issues set forth in Pilgrim Watch's Contention 3. Based upon our review of all the documentation relating to this matter, we conclude that the issues related to Contention 3 are bounded by sensitivity analyses or have been addressed with factual responses by Entergy. Further, we are satisfied that the Statement of Facts is correct, except as noted below.

7. (NEB) Material fact number 10 states that it is impracticable to use computer codes that accommodate multi-station data. The effort needed to perform a multi-weather station consequence analysis is significantly greater than the effort required to perform a similar analysis with MACCS2. But, such multi-station analyses have been and continue to be performed in support of Final Safety Analysis Report (FSAR) documentation for space launches

[3] Washington Safety Management Solutions, "Radiological Dispersion and Consequence Analysis Supporting Pilgrim Nuclear Power Station Severe Accident Mitigation Alternative Analysis," WSMS-TR-07-0005, Rev. 0, (May 2007) (WSMS Report); Enercon Services, Inc. "Site Specific MACCS2 Input Data for Pilgrim Nuclear Power Station, VNFRM Estimates Including Economic Loss," (Mar. 9, 2007).

that involve significant quantities of radioactive materials. I agree, however, that multi-station analyses are beyond what is needed to support the Pilgrim SAMA process. The MACCS2 Gaussian plume model is generally in agreement with more sophisticated codes for distances such as between the site boundary and 50 miles.[4] Therefore, in my judgment, use of a multi-weather station analysis would not change the conclusions of the SAMA analysis.

8. (NEB) Material fact number 12 states that the MACCS2 Gaussian plume model results are in good agreement with, and generally more conservative than those obtained by more sophisticated models. If the word conservative implies that calculated plumes with the MACCS2 code are generally more focused and more concentrated than would be the case if the calculations had been performed with more sophisticated models, then the statement is accurate. However, a more focused, more concentrated plume does not always correspond to a smaller number of person-rem, depending on the trajectory of the plume compared with population centers. On the other hand, economic consequences are generally smaller when plumes are broader and more dilute. Thus, in the context of a SAMA analysis, the statement is reasonable.

9. (NEB) Material fact number 16 states that Sensitivity Case 2 estimated the effects of changing wind direction trajectory and was conservative because it used conditions at the beginning of a plume release, when the release has larger dose quantity and less decay has occurred. The MACCS2 value modified in Sensitivity Case 2 appears to have been REFTIM (Representative Time Point for Dispersion and Radioactive Decay). REFTIM affects the way in which dispersion, deposition, and radioactive decay are calculated. It does not affect the manner in which "wind direction trajectory" is calculated. This statement appears to be erroneous; however, within the context of the observed Pilgrim weather data, changes in the wind trajectory would not be expected to change the results of the SAMA analysis.

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[4] *See* NUREG/CR 6853, “Comparison of Average Transport and Dispersion Among a Gaussian, a Two-Dimensional and a Three-Dimensional Model,” (Oct.2004).

10. (NEB) Material fact number 19 states that the effect of sea breeze is taken into account in the Pilgrim site meteorological data. 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. The effect that is not taken into account is that the complex flow pattern under sea breeze conditions differs substantially from the straight-line pattern used in the MACCS2 analyses. The sea breeze occurrences are typically diurnal events, occurring during daylight hours and during warmer seasons. Thus they occur a small percentage of the total weather time assessed. The effects are averaged out in the MACCS2 analysis for the annual period assessed. The sea breeze effect was discussed in detail in the WSMS report. Except as noted here and in paragraph 11 of this affidavit, I agree with the analysis and with the conclusion in the WSMS report that sea breeze would not have an effect that would change the conclusions to the SAMA analysis.

11. (NEB) Material fact number 21 states that any adverse effect of sea breeze conditions would only likely affect populations that are relatively close to PNPS (within about one mile). It appears that this statement may be taken out of context from the WSMS analysis. In reviewing the WSMA analysis, I only found one reference to a one-mile distance, and that was with respect to the fumigation effect of a sea breeze. I agree that fumigation occurs more locally – within the general distance of one mile. I also agree that any adverse impact of sea breeze would only likely affect populations that are relatively close to Pilgrim; however, it is difficult to quantify the distance of about one mile as indicated in material fact number 21. A greater distance is possible, but as indicated above, it is not likely that a sea breeze would persist long enough to reach the Boston area.

12. (NEB) Material fact number 29 states that the MACCS2 models evacuation employing two parameters including evacuation delay time and evacuation speed. Technically, there are three parameters that affect the timing of evacuation: the delay to warning (OALARM), the delay to sheltering (DLTSHL), and the delay to evacuation

(DTLEVA). However, since sheltering is not considered in the PNPS SAMA analyses (with the exception of one sensitivity case), the statement is correct as to the specific PNPS analyses.

13. (NEB) Material fact number 30 references the 10-mile EPZ. The material fact is correct in principal; however, the actual modeling performed for the SAMA, as reflected in the license renewal application, included evacuation of the population within 9 miles of the plant and did not include the full 10 mile EPZ. This approach was likely an error, and does present a conservative result because the individuals between 9 and 10 miles would receive a greater dose if they do not evacuate. This difference will not change the conclusions of the SAMA analysis.

14. (JAJ) Material fact number 40 states that 1.54 mph was slower than any of the evacuation speeds derived from the 1998 and 2004 ETEs. This is in error as 1.54 mph equates to a 6 hour and 30 minute evacuation and there are longer evacuation times in both ETE studies. The 1998 ETE study includes a 6 hour, 50 minute time for the midweek, midday, snow condition and the 2004 ETE study identifies a 6 hour, 45 minute evacuation time under the same conditions. Both studies include longer times – up to 7 hours, 20 minutes, for evacuation of transit dependent individuals. Although the material fact is incorrect, sensitivity analyses have been provided (WSMS report) that demonstrate that the difference in speed would not change the conclusions of the SAMA analysis.

15. (JAJ) The WSMS analysis presents an itemized listing of ETE issues, provides supporting facts, and includes sensitivity analyses to demonstrate that changes in the ETE would not affect the conclusions of the SAMA analysis.[5] The WSMS analysis provides a detailed discussion that fully supports the conclusion that the ETE issues in Contention 3 would not change the conclusions of the SAMA analysis

[5] The sensitivity analyses included a case where everyone within the 10 mile EPZ shelters in place, and an analysis where no one shelters or evacuates, which would bound the July 4th scenario raised by Pilgrim Watch.

16. (NEB) Material fact number 46 states that the MACCS2 model accounts for losses associated with economic activity such as loss of income, loss of value of crops not grown and loss of use and return on property, including commercial and business property. Loss of business income is estimated during periods of interdiction through the expected rate of return parameter (DSRATE). Furthermore, the daily evacuation and relocation cost parameters (EVACST and RELCST) can include lost personal income. However, these losses do not apply to people relocated from property that has been condemned. For condemned property, the model simply accounts for the value of the condemned property and the cost to permanently relocate individuals from the condemned property. However, since most of the contaminated property is restored to use in the Pilgrim MACCS2 analyses, the effect of lost income from condemned property is likely to be small compared with the other costs and in my judgment would not change the conclusions of the SAMA analysis.

17. (NEB) Material fact number 47 states that that the SAMA analysis for PNPS allows for a return of 12% on the actual fair market value of all business property, including land, buildings, equipment and inventory and as such does account for loss of economic activity. Again, this statement is true for land that is interdicted and returned to use. It does not apply to land that is condemned. However, the Pilgrim MACCS2 analysis results show that most land is restored to use and not condemned; thus, this statement is true in context.

18. (NEB) Material fact number 49 states that no other code exists that performs similar analyses for severe accidents at nuclear power plants. There is at least one other code that is similar to MACCS2, and that code is COSYMA. However, COSYMA is no longer supported and has probably fallen into disuse. There are other codes for computing consequences, but these codes have significant limitations and differences, such as they can only model single weather scenarios or they do not have economic analyses capabilities. Thus, the statement is correct in context as the MACCS2 code is the current standard for performing SAMA analyses.

19. (NEB) The sensitivity case to which material fact number 50 refers added one year's gross county product per person (GCP/person) to the value of the land. This does not fully account for business losses. During periods of decontamination and interdiction, the costs accounted for in the model are the cost of decontamination, the cost to temporarily relocate people from the land, and costs associated with depreciation of improvements to the property and loss of use of the land and improvements. Loss of use is based on an expected rate of return and on the value of the property. For this SAMA analysis, the expected rate of return is 12% and the depreciation rate is 20%. What this means is that only a fraction of the actual GCP/person (less than 28% in the first year) is accounted for in the costs assigned during decontamination and interdiction. Furthermore, only one year's GCP/person is accounted for in areas where the property is condemned even though the income associated with the land is lost permanently. Thus, this sensitivity case does not fully address the issue of loss of income. But the MACCS2 analyses show that most of the contaminated land is recovered and tourism would be calculated to return to the area. Because conservative costs were used for the regional value of non-farm wealth (VALWNF) and the sensitivity analysis results demonstrate that differences in the economic costs have minimal effects in the total cost, further adjustments to more precisely account for tourism would not be expected to change the conclusions of the SAMA.

20. None of the differences cited above would have an effect that would change the conclusions of the SAMA analysis provided for the Pilgrim license renewal application. Further, the issues related to Contention 3 are bounded by the sensitivity analyses or have been addressed with factual responses in Entergy's Motion.

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21a. (JAJ) I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief.

Jones

21b. (NEB) I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief.

Nita Bickle

Executed in
this 25th day of June, 2007.

State of New Mexico
County of Bernalillo

Notary Public Rebecca J. Horton
My commission expires 8/14/2008

Rebecca J. Horton
06/25/2007