April 15, 1996

Mr. Robert E. Link, Vice President
Nuclear Power Department
Wisconsin Electric Power Company
231 West Michigan Street, Room P379
Milwaukee, Wisconsin 53201

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SUBJECT: POINT BEACH NUCLEAR PLANT, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION, IPEEE SUBMITTAL (TACS M83661 AND M83662)

Dear Mr. Link:

By letter dated June 30, 1995, you submitted a summary report in response to Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events for Severe Accident Vulnerabilities." Based on the staff's ongoing review of this submittal and its associated documentation, the attached request for additional information (RAI) has been developed.

The RAI is related to the external event analyses in the IPEEE, including the seismic analysis, the fire analysis, and the analyses on effects of high winds, floods, and others. The RAI was developed by an NRC contractor, Energy Research, Inc., and reviewed by NRC staff and consultants (Sandia National Laboratory) with probabilistic risk assessment expertise for external events.

You are requested to provide your response within 60 days of receipt of this letter. Please notify me if you believe that additional time will be required to provide an adequate response.

Sincerely,

(original signed by)

Allen G. Hansen, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-266
and 50-301

Enclosure: Request for Additional Information

cc w/encl: See next page

DOCUMENT NAME: G:\PTBEACH\PTB83661.RAI
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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 15, 1996

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Wisconsin Electric Power Company
231 West Michigan Street, Room P379
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cc w/encl: See next page

Mr. Robert E. Link, Vice President
Wisconsin Electric Power Company

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Unit Nos. 1 and 2

cc:

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO IPEEE FOR SEVERE ACCIDENT VULNERABILITIES

FACILITY OPERATING LICENSE NOS. DPR-24 AND DPR-27

WISCONSIN ELECTRIC POWER COMPANY

POINT BEACH NUCLEAR PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-266 AND 50-301

Seismic

1. Please report the seismic CDF for the case where surrogate-element modeling is incorporated at the systems level (i.e., for every SPSA system containing a screened-out component, model a separate failure event in series with the systems logic, and model the failure of each such series element by means of the surrogate-element fragility).

2. Please report the dominant contributors to seismic CDF for the following combined case: infinite surrogate-element capacity, and zero rates for random and human failures.

3. Please describe how the time history was generated for obtaining input for the SSI analyses. Please provide the following: (a) a plot of the acceleration time history; (b) a plot of the power spectrum of the time history; and (c) a plot of the response spectrum of the time history as compared to the target response spectrum.

4. For all human actions modeled in the SPSA, please indicate when and precisely where each action is required. Also, identify the number and locations of remote shutdown panels, and identify the equipment that are available from the remote shutdown panels. Discuss the capabilities available from the remote shutdown panels to adequately mitigate the important transient and small LOCA initiators, as credited in the SPRA.

5. Please provide fragility calculations, completed screening evaluation work sheets (SEWSs), walkdown notes/checklists and photographs for the following components:

   - 120 VAC Instrument Bus 1Y01-1Y04 (Block Wall failure)
   - CST Level Transmitters (Block Wall failure)
   - 480V Safeguards Load Center
   - Safeguards Relay Cabinet
   - RWST
   - CST
   - Cable Trays inside Cable Spreading Room
   - Cable Trays outside Cable Spreading Room
   - CCW Heat Exchanger

ENCLOSURE

- RHR Pump Area Cooling Coil
- Remote Shutdown Panels
- 4 kV Emergency Switchgear

6. Discussions in the seismic-fire interactions assessment, pertaining to inadvertent seismic actuation of fire suppression systems and to seismic degradation of fire suppression systems, do not adequately address all relevant concerns. For spurious actuations, the potential for relay chatter and dust effects on Cardox, fire water, and Halon systems needs to be discussed. The discussion of seismic degradation of fire protection systems (FPSs) focuses only on potential interactions of FPS components with essential equipment. The evaluation should also include an examination of potential loss of FPS capability itself, due to a seismic event. Examples of related items found in past studies include (but are not limited to):

   - Unanchored CO_2 tanks or bottles
   - Sprinkler standoffs penetrating suspended ceilings
   - Weak or unanchored 480V or 600V (non-safety related) electrical cabinets (as potential fire sources) in close proximity to essential safety equipment (e.g., cables in cable spreading room)
   - Fire pumps unanchored or on vibration isolation mounts
   - Mercury or "bad-actors" relays in fire protection system (FPS) actuation circuitry
   - Use of cast iron fire mains to provide fire water to fire pumps

   NUREG-1407 suggests a walkdown as a means of identifying any such items.

   Please provide the results of your seismic-fire interaction study pertaining specifically to seismic degradation of FPS capability and the guidelines given to walkdown personnel for evaluating the foregoing issues (if they exist).

7. Please provide a plot of the plant HCLPF spectrum; also plot the plant SSE spectrum and the RLE spectrum (i.e., the NUREG/CR-0098 median spectrum for soil, anchored to a PGA value of 0.3g) on the same graph. Use the same value of damping for all plots.

<u>Fire</u>

1. In Section 4.1.1 of the submittal it can be inferred that the results of internal flood analysis are utilized to arrive at the first screening of the fire areas. In a typical flood analysis, it is assumed that cables are not susceptible to flood effects. Since the most susceptible item to fire in a power plant is electrical cabling, how could the results of flooding analysis be useful to the fire analysis? Please provide a discussion clarifying how the flood analysis results were utilized and demonstrating that the results are indeed applicable to fire conditions.

2. Offsite power is allowed to remain available during a fire if the associated electrical equipment and cables are unaffected. This is a valid method. However, the submittal does not indicate that indeed the equipment (i.e., electrical cabinets, transformers, etc.) and cables associated with offsite power have been identified in a systematic fashion, and whether the possibility of this initiating event has been established for some of the compartments. Please provide information regarding the possibility of loss of offsite power from a fire within the plant.

3. From the submittal it can be inferred that the licensee has not considered hot shorts as a failure mode for control or instrumentation cables. Please provide a discussion regarding the treatment of hot shorts in the fire analysis portion of the IPEEE.

4. The submittal does not include a separate discussion regarding the possibility of occurrence of initiating events (those defined as part of the internal events model of the PSA) from a fire within the plant. From the discussions provided in the submittal it may be inferred that reactor trip has been considered as the only viable initiating event in case of a fire. Power-operated relief valve (PORV) or steam dump valve opening from a hot short in its control cable has not been addressed in the IPEEE submittal. Please provide a discussion regarding the treatment of initiating events other than reactor trip in the fire analysis, and the possibility of their occurrence from a fire.

5. From the discussions provided in the submittal it is not clear how the list of safe shutdown equipment have been established. From the discussions in Section 4.1.1 it can be inferred that Appendix R equipment and cables have been used to establish the safe shutdown equipment and cables for various compartments. Loss of offsite power, LOCA, and containment cooling and isolation are not included in Appendix R. However, these elements of a power plant are addressed in a PSA model. Please provide a discussion as to whether or not Appendix R equipment and cables were augmented, which components have been added to the list, and what was the basis for omitting some of the components and equipment included in the PSA internal events model.

6. On page 2 of 110 of Section 4.0 of the submittal the term "acceptable" is used for compartment boundaries and no definition is provided as to what constitutes an acceptable boundary. Please provide a definition of this term.

7. Active fire barriers (e.g., fire dampers and normally open doors) have not been addressed in the submittal. Please provide sets of adjacent fire compartments linked with active fire barriers that contain cables and equipment from multiple safety trains. It should be noted that the failure rate of such devices can be as high as 0.2 per demand.

8. FCIA should consider fire brigade accessing the fire area through adjacent fire zones that contain cables and equipment from an opposite safety train. Please provide fire scenarios that involve this situation, and describe how they have been considered in the IPEEE submittal.

9. The results of Step 5 of Phase I (page 2 of 110 of Section 4.0) are not presented. The submittal wrongly refers to Table 4.1.1-1, which apparently presents the results of Step 4 of the analysis. Please provide a tabulation of the results of Step 5.

10. From the information provided in Table 4.6.4-8 and statements made in Section 4.6.4.8, it is concluded that transient fuels have not been considered in the analysis (e.g., it is stated that "Only fixed source/combustible configurations are modeled"), and optimistic measures have been taken to model the possibility of cable damage in the cable spreading room (e.g., damage time from transformer oil fire is 1,871 seconds). Please provide a drawing that shows the locations of critical cables, the transformers and the electrical cabinets in the cable spreading room. Also, provide further information supporting the P2 and Pccl values used for the cable spreading room.

11. The control room is not discussed as part of the important fire scenarios in Section 4.6.4. However, as part of containment isolation discussions and in Section 4.6.5.14, the possibility of control room fire is mentioned, and a core damage frequency of 4.58×10^{-6} per year has been presented. This core damage frequency is not supported by the information provided in Tables 4.1.2-1 through 4.1.2-3. Please provide details of the analysis arriving at the reported core damage frequency, as well as supporting information including a layout of the control room showing the location of various panels, and especially those panels that contain safety-related controls and instrumentation.

12. Related to the preceding RAI, several compartments have been addressed in Sections 4.6.5 and 4.7, that have not been analyzed in Section 4.6.4. The core damage frequencies provided in Section 4.6.5 cannot be traced back to the frequencies and probabilities provided in Tables 4.1.2-1 through 4.1.2-3. Please provide a discussion regarding the relationship between the frequencies provided in Tables 4.1.2-1 through 4.1.2-3 and the frequencies used in Tables 4.6.4-1 through 4.6.4-8. Similarly, provide a discussion regarding the relationship between the frequencies provided in Tables 4.1.2-1 through 4.1.2-3 and the core damage frequencies provided in Section 4.6.5.

13. It is difficult to follow the results of the FCIA as presented in the submittal. Table 4.1.1-2 presents combined frequency compartments. For example, compartments 101 and 109 are shown as combined frequency compartments. However, in Table 4.1.2-2, separate frequencies are presented for these two compartments. Also, in Table 4.1.1-2, compartments 101 and 109 are shown as combined frequency compartments, and compartments 101, 104 and 109 are shown as combined frequency

compartments. It is not clear what is being represented by these groups of compartments. In addition, the combined frequency groups are not used in the later stages of the analysis. Please provide an explanation regarding the interpretation of the combined frequency compartments and how they have been used in later stages of the analysis.

14. When the frequencies F3 (Table 4.1.2-3) and F2 (Table 4.1.2-2) are compared, for several cases, a Pccl much smaller than 0.01 is obtained. This value is acceptable only if redundant trains of cables and equipment are sufficiently far apart. The submittal does not provide any justification regarding these small numbers. Also, it is not clear whether the licensee has multiplied several suppression unavailabilities to obtain the small numbers. It should be noted that if redundant trains are located close to one another, critical damage may occur before successful suppression. Under such conditions, suppression system effectiveness is minimized and diverse suppression activities may not increase the likelihood of successful suppression before critical damage has occurred. Please provide some discussion regarding the basis for using small Pccl values and whether those areas where redundant trains are in close proximity have been screened out based on small F3.

15. In Section 4.6.2 it is stated that "The cable spreading room fire and vital switchgear room fires have alternate shutdown as the only power supply." Please provide a description of this alternate shutdown capability. Is it a power supply or a control point? What functions are supported from these alternate shutdown points?

16. From the discussions in the submittal it can only be inferred that both units share the same cable spreading room, control room and vital switchgear room (i.e., 4160 VAC power supply). Please provide a brief description of these rooms and describe any other areas or compartments that contain safety-related equipment and cables (e.g., cable tunnels) that are shared between the two units. For each of these rooms or areas, provide either the justification for screening, or an analysis of dual unit fire-induced core damage scenarios, including core damage frequency contribution.

17. From the submittal, it is not clear which areas contain cables or equipment associated with both trains of safety systems. Specifically, there is no mention of cable tunnels or cable shafts. Please provide a description of such areas, and a discussion on the significance level that was assigned to these areas.

18. In Section 4.6.3 a discussion is provided regarding dominant contributors. However, there is no discussion regarding which fire scenario leads to the dominant contributors. Please provide a discussion relating the dominant contributors and fire scenarios.

19. From the discussions in the IPEEE submittal it is concluded that only secondary side cooling via the Auxiliary Feedwater System has been credited to prevent core damage after a fire event. It appears that no

credit is given to bleed and feed or safety injection. Please provide clarification as to which event trees, and which functions for modeling core damage sequences resulting from a fire event, have been used.

20. For inter-zone fire propagation, it is argued that the fire barriers are adequate and that fire compartment interaction analysis screening criteria are, therefore, satisfied. This line of thinking may be acceptable if there are no active fire barriers (e.g., dampers, louvers, or normally open doors). It should be noted that the failure rate of such devices can be as high as 0.2 per demand. Please identify if any adjacent fire compartments linked with active fire barriers that contain cables and equipment from multiple safety trains exist. Also, assuming a failure rate of 0.2 per demand, how will the conclusion that inter-zone fire propagation and its effects are of minimal risk significance be affected?

21. Please provide an analysis of the effect on fire-induced CDF if the potential for cross zone fire propagation is considered for high hazard areas such as the turbine building, diesel generator room, switchgear rooms, and lube oil storage areas. In addition to these general areas, also analyze Compartments 245, 246, and 318 for cross zone fire propagation.

22. In Table 4.1.1-2 it is not clear what is represented by the entries in the third column (i.e., "Potential PTI and SSD"). Please provide an explanation on how to interpret the compartment numbers listed for each compartment in the third column.

23. In Table 4.1.2-1, why are fire frequencies not assigned to some of the compartments?

24. In Table 4.1.2-3, for compartments 308 and 309, F3 is equal to 0.000E+00. Please provide an explanation for how this value was obtained.

25. In Section 4.2.1.2, it is stated that "Fire compartments which had initiators that would not damage other equipment had the initiators removed from the database." This may lead to optimistic results. What were the criteria and analytical basis for such action?

26. In Section 4.2.5, it is stated that "Discrepancies between CHAMPS and general location drawings were resolved by the plant walkdown." From a simple interpretation of this statement, it is not clear how one can verify the location of a specific cable without hand-over-hand tracing of specific cables in the field. Please provide further explanation on how CHAMPS data was verified during the walkdown.

27. In applying the criteria provided in Section 4.3.2, did the analysts include the possibility of presence of transient fuels? If yes, how was transient fuels loading determined? If transient fuels have not been included, please provide an assessment of the change in IPEEE submittal results when transient fuels are included.

28. Table 4.3.2-1 is difficult to interpret. Also, there are references to numbered comments in the last column that have not been provided. Please provide an explanation of the entries in Table 4.3.2-1.

29. It is not clear what is represented by Table 4.6.1-1. Please provide an explanation of the entries in this table, and their relationship with the fire events/compartments presented in the preceding tables.

30. The statement is made in Section 4.6.2 that "Long-term local actions required in less than 4 hours also used the IPE screening values for HEPs." Please provide a detailed description of how fire event recovery actions were assessed, including how factors such as sequence timing and elevated environmental stressors (e.g., reduced visibility, impaired communications, and impaired accessibility) were accounted for. If IPE values were assumed, were they adjusted to reflect reduced reliability during a fire event and, if so, how were they adjusted? If IPE values were used directly, please provide a justification for not having adjusted the values.

31. On pages 32, 62 and 75 of Section 4 of the submittal, it is stated that EPRI's Fire PRA Procedures Guide has been used. It should be noted that the FIVE methodology has been approved by the NRC, whereas EPRI's Fire PRA Procedures Guide has not yet been approved. The following specific issues have been mentioned in the submittal:

- Heat release rate
- Equipment damage
- "Certain FIVE conservatisms"

For these issues, please specify what information, different from FIVE, has been used in the IPEEE submittal. How do these modifications impact the CDF and final analysis results?

32. On page 66 of the submittal a value of 0.02 is specified for wet-pipe sprinkler system failure probability. Such high system reliability is acceptable for systems that have been designed, installed and maintained in accordance with the appropriate industry standards, such as those published by the NFPA. Please provide the basis for the assumed failure probabilities for the automatic detection and suppression systems (other than Halon) at Point Beach.

33. On page 74 of the submittal it is stated that "For short term actions where more than 1 hour but less than 4 hours is available, . . . " It is not clear if the operators can be 90% reliable in conducting plant

control duties while fighting the fire. Please provide the rationale for using the probability values across all fire scenarios.

34. Both fire-induced damage and automatic suppression system activation times for one of the fire scenarios are so short as to be physically unrealistic. While it can be reasonably assumed that predicted short times to fire damage are bounding, the combined effect of short times for both critical damage and automatic suppression system activation may not be bounding. For example, in Table 4.6.4-1 time to cable damage and time to automatic detection and suppression are 35 and 9 seconds, respectively. Based on the uncertainties associated with the time for automatic suppression system activation, please provide a sensitivity analysis for fire induced core damage frequency if automatic suppression system activation times are uniformly increased.

35. Unrealistic manual suppression times have been used. Time to suppress must include detection time, brigade assembly time and the time that it takes to effectively suppress the fire. For those areas where manual suppression prior to critical damage is credited, please provide a sensitivity analysis for the fire induced core damage frequency using more realistic manual suppression times.

High Winds, Floods, and Others (HFOs)

HFOs

1. Please provide a list of any significant changes, with respect to plant design against flooding and transportation and nearby facility accidents, that have taken place since the time the plant Operating License (OL) was issued.

2. Please provide the details of the quantification (and explanation of scenarios) for arriving at your CDF for a tornado-induced loss of offsite power. Include in your response the identification of any recovery actions considered in the analysis.

3. Please provide the results/findings of the walkdown effort, as they relate to flood events and transportation and nearby facility accidents.

4. Please provide a discussion of the effects of flooding the Turbine Building given that a substantial amount of water enters the building. Please include in your discussion a description of the possible effects that such a flood might have on the ability to remove decay heat via feed and bleed cooling.