

March 1, 2000

Mr. J. H. Swailes  
Vice President of Nuclear Energy  
Nebraska Public Power District  
P. O. Box 98  
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - SUPPLEMENTAL REQUEST FOR  
ADDITIONAL INFORMATION REGARDING IPEEE FIRE ANALYSIS  
(TAC NO. M83611)

Dear Mr. Swailes:

Based on the staff's ongoing review of the Cooper Nuclear Station's (CNS's) Individual Plant Examination of External Events (IPEEE) submittal dated October 30, 1996, and Nebraska Public Power District's (NPPD's) January 28, 1999, response to the staff's request for additional information (RAI), the staff has developed the enclosed supplemental RAI. The enclosed RAI is related to the fire analysis portion of the CNS IPEEE.

The staff's review of the CNS IPEEE in the areas of seismic, high winds, floods, and other external events is still ongoing. Supplemental information may be necessary in these areas as well.

The enclosed RAI was discussed with NPPD staff in a telephone conference on February 9, 2000, and it was agreed that your response would be provided within 120 days of the date of this letter. If circumstances result in the need to revise this date, please contact me at the earliest opportunity.

If there are any questions concerning this issue, please contact me at 301-415-3053 or [ljb@nrc.gov](mailto:ljb@nrc.gov).

Sincerely,

**/RA/**

Lawrence J. Burkhart, Project Manager, Section 1  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: As stated

cc w/encl: See next page

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Cooper Nuclear Station  
IPEEE Supplemental Request for Additional Information  
Related to Postulated Fire Events

Additional information is needed to allow the staff to conclude that Cooper Nuclear Station (CNS) has met the intent of Supplement 4 to Generic Letter 88-20, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities - 10 CFR 50.54 (f)". Responses to the following questions (follow-up to previous requests for additional information (RAIs)) are necessary in order to complete our review.

Supplemental RAI 1:

Additional information addressing the concerns cited in question A.13 (see original RAI dated June 3, 1998, and NPPD response dated January 28, 1999) should include consideration of the concerns raised in the original RAI questions A.2 and A.3. Additional information regarding the impact of fires in main control room (MCR) "control panel 9-3" and MCR "Board C" is requested.

The fire assessment of the control room indicates that the analysis of fires in two panels were treated uniquely. Control panel 9-3 has no internal barriers and it was postulated that fires would only impact portions of the panel. Board C contains partial internal barriers that were assumed effective in preventing fire propagation from one section to another. Crediting partial barriers and separation for inhibiting fire growth is questionable and resulted in RAI question A.13.

The response to RAI question A.13 assumed that fires will remain limited to only a subsection of each panel, per the original analysis. While the most likely fires may involve only a subsection of the panel, a less likely, but potentially more risk-significant fire involving the full panel, cannot be dismissed. The objective of this supplemental RAI is to obtain an assessment of the potential risk implications of fires involving these two panels that considers the impact of more severe fires than those identified thus far.

In reexamining scenarios associated with these panels, the licensee should also address the specific concerns identified in the original RAI question A.3 - the treatment of control systems interactions. That is, in assessing the core damage frequency (CDF) contribution of fires in these two MCR panels, the licensee should verify that (1) the alternate shutdown capability is electrically independent of the MCR assuming a severe fire engulfs either of these two panels, (2) the loss of equipment before transfer will not compromise the operator's ability to control the plant from outside of the control room, and (3) spurious actuations that might result from a severe fire in either of the two cited panels will not compromise the safe shutdown capability. If these cannot be verified, they should be considered in the reanalysis discussed below.

In quantifying the risk contribution, use of a conditional probability of control room abandonment of  $3.4E-3$  given a fire is acceptable practice (per the Electric Power Research Institute (EPRI) revised guidance [1] associated with resolution of generic questions arising from the EPRI Fire PRA Implementation Guide). However, the response to RAI question A.2 indicated that an additional factor of 0.1 was applied to reflect the fraction of control room fires considered to be severe fires (sufficient to impact control room visibility). The application of this factor for general control room abandonment scenarios is inappropriate because the  $3.4E-3$  conditional probability value already reflects the probability that a small fire will remain unsuppressed and

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will grow into a severe fire. Using additional severity factors in combination with the 3.4E-3 conditional abandonment probability in quantifying the fire-induced CDF for these two panels is not appropriate. This assessment should include the human actions required for safe plant shut down in the event the postulated fires occur.

The requantification of these scenarios, if required based on the results of the reexamination, should be based on the following factors: (1) the overall frequency of control room fires (values are cited in the fire-induced vulnerability evaluation (FIVE) methodology), (2) partitioning of the overall fire frequency to the specific panels of interest (guidance is available in the FIVE methodology), (3) a conditional probability of control room abandonment of 3.4E-3 (per the revised EPRI guidance), and (4) the reliability of the capability to shut down the plant from outside of the control room including consideration of the control systems interactions concerns and human action assessment discussed above. Other factors should not be included in the requantification unless their applicability is fully justified.

- (A) Please provide the results of a reexamination and a requantification, if necessary, of the CDF contribution for fires involving either the MCR “control panel 9-3” and MCR “Board C.”
- (B) Please provide the results of a reexamination of the fire risk associated with fires in these panels assuming that a fire might propagate to involve the entire panel.
- (C) Please provide a detailed description of the functions, instrumentation, and control capabilities that are provided outside of the control room.
- (D) Please provide the results of an assessment of the features identified in (C) above for adequacy and reliability in the specific context of a severe fire in either of the two cited panels and specify identified vulnerabilities, if any.

#### Supplemental RAI 2:

Additional information is needed with respect to the response to the original RAI question A.5. The fire analysis for the cable spreading room (CSR) apparently assumed that fires in closed electrical panels cannot escape the panel of origin. Further, the response to the original RAI question A.5 would also be impacted by the concerns identified in the original RAI question A.4 (cabinet fire heat release rates) and the original RAI question A.10 (cable thermal damage limits).

Assessments of fire propagation from closed electrical cabinets should include consideration of the revised EPRI guidance [1]. In particular, EPRI has provided revised guidance in the areas of electrical panel fires that might escape from the panels, and in the selection of cabinet fire heat release rates. Both factors will impact the assessment of CSR fires for CNS. The current assessments are not consistent with the revised guidance. The assessment should include consideration of the concerns raised in Supplemental RAI 3 below (relating to cable thermal damage limits) in the response, namely the use of appropriate cable thermal damage limits.

- (A) Please provide the results of a reassessment of the CDF contribution of fires in the CSR, including electrical panel fires.

Supplemental RAI 3:

Additional information is needed with respect to the response to the original RAI question A.10. The concern is associated with the assumption that the cables at CNS are as good or better than IEEE-383 qualified cables. The licensee cited previous tests and NRC licensing documents as supporting this assumption. A review of the licensing documents indicates that the only tests performed were associated with cable flammability. The IEEE-383 standard includes both a flammability test and aging and thermal performance tests associated with loss-of-coolant accidents. The flammability tests are acceptable in the context of dismissing self-ignited cable fires (this was one part of the question). However, flammability tests alone do not demonstrate that a given cable has the same thermal damage thresholds that one normally associates with fully qualified cables (this was the second part of the question).

The selection of thermal damage temperatures should consider the specific cable insulation materials associated with the cables at CNS or should bound the lower limit of thermal damage for unqualified cables.

- (A) It is not clear that cables are qualified equivalent to IEEE-383 (including thermal damage threshold criteria). Demonstrate that cables are qualified to a standard equivalent to IEEE-383 or provide the results of an assessment of the impact of using thermal damage limits associated with unqualified cables (i.e., lower damage threshold than used in the original assessment) on quantitative screening of fire areas.
- (B) If any damage scenarios in quantitatively screened compartments are impacted, please provide a reassessment of the CDF contribution for those compartments.

Reference

1. "Guidance for Development of Response to Generic Request for Additional Information on Fire Individual Plant Examination for External Events (IPEEE)," prepared by Data Systems & Solutions, LLC for the Electric Power Research Institute, Final Report, May 1999.

Cooper Nuclear Station

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