

January 10, 2003

MEMORANDUM TO: Marsha Gamberoni, Deputy Director  
New Reactor Licensing Project Office  
Office of Nuclear Reactor Regulation

FROM: Lawrence J. Burkhart, AP1000 Project Manager /RA/  
New Reactor Licensing Project Office  
Office of Nuclear Reactor Regulation

SUBJECT: DECEMBER 17, 2002, TELEPHONE CONFERENCE CALL SUMMARY

On Tuesday, December 17, 2002, a telephone conference call was held with Westinghouse Electric Company (Westinghouse) representatives and Nuclear Regulatory Commission (NRC) staff to discuss responses to requests for additional information (RAIs) 280.001, 280.005, 280.006, 280.008, 280.010, and 280.011 which pertain to the fire protection portion of the AP1000 design. Westinghouse submitted its response to RAI 280.001 on October 18, 2002 (ADAMS Accession No. ML022980577). Westinghouse submitted its responses to 280.005, 280.006, 280.008, 280.010, and 280.011 on November 1, 2002 (ADAMS Accession No. ML023110249). The purpose of the telephone conference call was to discuss with Westinghouse representatives those RAIs that may require further clarification. A list of participants is included in Attachment 1. Attachment 2 contains NRC staff comments regarding the subject RAIs that were sent to Mr. Mike Corletti of Westinghouse via e-mail on December 16, 2002. These comments were used to facilitate discussions during the telephone conference call.

With respect to RAI 280.001, Westinghouse agreed to provide additional clarifying information that would address the first two bullets of Attachment 2. With respect to the third bullet, the staff stated that Position C.5.a.6 of CMEB 9.5-1 does not state that only those portions above-grade should be enclosed and that consequently, the entire stairwell may need to be enclosed in concrete or masonry. Also, the staff stated that Position C.5.a.6 does not address taking credit for existing buildings to prevent against external missile hazards such as an airplane crash. Westinghouse representatives conveyed that the current AP1000 design reflects Westinghouse's interpretation of the CMEB. It was agreed that the staff would discuss this issue further internally and engage Westinghouse in the near future about this issue.

Due to the staff's further review of the information already docketed for the AP1000 design certification, the staff has determined that additional docketed information is not necessary (beyond that supplied in Westinghouse's RAI responses) to resolve the issues raised in RAIs 280.005, 280.006, and 280.010.

With respect to RAI 280.008, Westinghouse offered that EPRI Report No. 1006961, "Spurious Actuation of Electrical Circuits Due to Cable Fires, Results of an Expert Elicitation," dated May 2002, was used as a basis for its RAI response. The staff stated that it would review the EPRI report and that another call or meeting would be arranged to discuss any issues that result from the staff's review.

With respect to RAI 280.011, it was agreed that the staff and Westinghouse would review the referenced EPRI Report No. TR-100370, "Fire-Induced Vulnerability Evaluation (FIVE)," to investigate the basis for the 20,000 BTU screening criteria and that another call or meeting would be arranged to discuss any issues that result from the staff's review.

Docket No. 52-006

Attachment: As stated

With respect to RAI 280.011, it was agreed that the staff and Westinghouse would review the referenced EPRI Report No. TR-100370, "Fire-Induced Vulnerability Evaluation (FIVE)," to investigate the basis for the 20,000 BTU screening criteria and that another call or meeting would be arranged to discuss any issues that result from the staff's review.

Docket No. 52-006

Attachment: As stated

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December 17, 2002  
TELEPHONE CONFERENCE CALL SUMMARY  
LIST OF PARTICIPANTS

Nuclear Regulatory Commission

Larry Burkhart  
Tanya Mensah  
Naeem Iqbal  
Nicholas Saltos

Westinghouse

Mike Corletti  
Ed Cummins  
Jim Winters  
Don Hutchings  
Ray O'Rourke  
Tom Hayes

## Talking Points For Fire Protection AP1000 RAI Responses

### \*RAI #280.001:

Stairwells. The RAI stated that stairwells could be subject to external missile hazards such as an airplane crash. The Westinghouse response provides an analysis of the following stairwells: S02, SO1, SO5, S03, S04, and SO6. The staff had the following comments regarding their response:

- Westinghouse failed to address the stairwells, if they were used as escape routes or access for firefighting in accordance with Position C.5.a.6 of CMEB 9.5-1.
- Westinghouse did not provide an analysis of stairwells in buildings without any safety-related equipment (if they are used as escape routes or access for firefighting, they meet the CMEB).
- Position C.5.a.6 of CMEB 9.5-1 does not state that only those portions above-grade should be enclosed. The entire stairwell should be enclosed. Also, Position C.5.a.6 does not address taking credit for existing buildings to prevent against external missile hazards such as an airplane crash.

### \*RAI #280.005:

Item 198 SR Battery Rooms: The staff needs further clarification for this RAI. Westinghouse notes that there has been no change from the AP600 to the AP1000 design. It is the staff's understanding of the RAI response, that the electrical room directly above the battery room has a one-hour rated barrier between them. However, the electrical battery room is in the same division of equipment as the battery room. Therefore, the staff interprets Westinghouse response to mean that since it is the same division of equipment, they are not required to provide a 3-hour rated barrier. The staff will clarify this in a teleconference with Westinghouse.

### \*RAI #280.006:

Associated Circuits: The staff needs further clarification. The RAI question discusses the occurrence of "multiple spurious actuations resulting from a fire." The staff needs to clarify if the Westinghouse AP1000 design is consistent with staff position which considers multiple spurious actuations resulting from a fire.

### \*RAI #280.008:

AP1000 Fire Risk Assessment: The staff understands that this issue was an open item in the AP600 draft safety evaluation report (DSER) and that the staff took issue with assumptions regarding the probability of a spurious signal impacting the automatic depressurization system (ADS) inside containment as an independent failure. The Sandia Report, "Circuit Failure Mode and Likelihood Analysis" states that the assumption that a given failure mode's conditional probability is actually independent remains a questionable practice." On this basis, the RAI asked Westinghouse to provide a technical basis for the assumption that the probability of a spurious signal that has the potential to impact safe shutdown capability is independent. The Westinghouse response stated that:

- The Sandia National Laboratory (SNL) report did not comment on the dependence of hot shorts in multiple cables. However, when the staff reviewed page 60 of the report, it states that, "If the hot short or spurious actuation probability is established in such a way that all of the potential dependency questions are accounted for, then it may well be appropriate to assume failure independence of one cable versus another." Westinghouse did not address whether they had accounted for all potential dependency issues in their analysis. This question was not asked in the RAI. It resulted from a review of the Westinghouse RAI response.
- Under the section "Spurious Opening of Stage 1, 2, or 3 Valves" Westinghouse states that the cables for the two motor-operated valves (MOVs) are routed in the same tray. They further state that the SNL report states that a "hot short of a second conductor in the same cable tray cannot be considered to be independent; however the report had no conclusion regarding separate cables." The SNL report does address the potential for separate cables that are routed in the same cable tray, (share a common enclosure), to provide a combustible pathway. For example, a conductor-to-conductor short in one cable could lead to a fire, which could ignite adjacent cables (Section 3.2.2 of SNL report).
- Under the section "Spurious Actuation of the "Arm" and "Fire Circuits," Westinghouse states that "because the arm and fire circuits use separate cables, there is independence between arm and fire circuits." They did not address if the cables are routed together in a common enclosure or if they share a common power supply which could take out both cables in the event of a fire. This question was not asked in the RAI. It resulted from a review of the Westinghouse RAI response.

\*RAI #280.010:

Fire Probabilistic Risk Assessment (PRA): The staff's concern was that the fire PRA does not evaluate spurious actuations, other than those associated with ADS. Question: For the "passive containment cooling system valve actuation" it appears that Westinghouse analyzed a case which was limited to only one valve in series spuriously actuating. Did Westinghouse analyze a case where both valves spuriously operate to address all possible spurious actuations?

\*RAI #280.011:

Fire PRA: 41 percent of total fire induced core damage frequency (CDF) is assigned to containment. Westinghouse used the FIVE methodology to screen out containment. The RAI asked that for areas in containment which exist where redundant safe shutdown components required following an area that has not been separated by complete fire barriers, that Westinghouse should perform a mathematical fire model in accordance with National Fire Protection Association (NFPA) 805 to demonstrate that a fire will be confined to the zone of origin such that redundant components will remain free of fire damage. Westinghouse states that NFPA 805 does not preclude the use of FIVE. The staff noted several issues with respect to the fire PRA:

- Section 57.4.2.2. "In Containment," states that the combustible loading in containment zones are generally very low. The design philosophy is to avoid propagation by having a certain distance between combustible materials. Therefore, it was assumed that no propagation to another zone resulted if the combustible loading was under 20,000 Btu; and that propagation resulted to another zone if the loading was above 20,000 Btu. Btu's are units of energy and unless expressed in Btu/sec, do not provide any useful information to make a sufficient determination that propagation will or will not occur. Furthermore, the basis for using 20,000 Btu does not appear to be stated in the fire risk assessment.
- Fire growth and propagation are dependent on a number of factors such as ventilation rates, surface area, material properties. The staff was unable to determine if any of those factors were discussed or analyzed in the criteria outlined in Section 57.4.2.2 to screen out a zone in containment. Therefore, without the benefit of a quantitative fire model, it does not appear that Westinghouse has presented a basis for determining that the current configuration provides an adequate level of safety to that required by the regulation for those areas in containment that do not have adequate separation between redundant trains of equipment.