April 22, 2003

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

FROM: Joelle L. Starefos, Project Manager ***/RA/***
New Reactor Licensing Project Office
Office of Nuclear Reactor Regulation

SUBJECT: APRIL 3, 2003, AP1000 TELEPHONE CONFERENCE CALL SUMMARY

On Thursday, April 3, 2003, a telephone conference call was held with Westinghouse Electric Company (Westinghouse) representatives and Nuclear Regulatory Commission (NRC) staff to discuss the following AP1000 Requests for Additional Information (RAIs): 650.001, 650.003, 650.004, 650.005, and 650.006. Westinghouse submitted responses to these RAIs on February 21, 2003 (ADAMS Accession No. ML030560120). A list of call participants is included in Attachment 1. Attachment 2 contains NRC staff comments regarding the subject RAIs that were sent to Mr. Michael Corletti of Westinghouse via electronic mail on April 1, 2003, and were used to facilitate discussions during the telephone conference call.

The following is a brief summary of the discussions regarding the identified RAIs (see comments in Attachment 2):

RAI 650.001
Westinghouse agreed to revise the RAI response.

RAI 650.003
Westinghouse agreed to revise the RAI response and design control document (DCD).

RAI 650.004
Westinghouse agreed to revise the RAI response.

RAI 650.005
Westinghouse agreed to revise the RAI response.

RAI 650.006
Westinghouse agreed to revise the RAI response.

Docket No. 52-006

Attachment: As stated

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Docket No. 52-006
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DATE	4/16/03	4/16/03	4/17/03

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APRIL 3, 2003
TELEPHONE CONFERENCE CALL SUMMARY
LIST OF PARTICIPANTS

Nuclear Regulatory Commission	Westinghouse
Joelle Starefos	Mike Corletti
John Lehning	Tim Andreychek
	Terry Schulz

Attachment 1

NUCLEAR REGULATORY COMMISSION STAFF
COMMENTS THAT WERE SENT TO WESTINGHOUSE TO
FACILITATE DISCUSSIONS OF THE RAI RESPONSES
FOR CALL HELD ON APRIL 3, 2003

RAI 650.001

The applicant's response primarily addressed the potential for reflective metallic insulation (RMI) to bypass the in-containment refueling water storage tank (IRWST) and containment recirculation screens by entering the reactor vessel through the opening created by a ruptured pipe. Although the applicant's analysis concerning RMI partially addresses the staff's concern, the staff considers that other debris may also be of concern with respect to screen bypass.

For instance, in RAI 650.002, the staff identified a potential concern with resident fibrous material. The applicant's response does not provided a justification to conclude that detrimental quantities of fibrous material would not enter the reactor coolant system through the break location or that resident fiber would settle in the lower plenum of the AP1000 reactor vessel. What is the justification for concluding that resident fibrous material could not collect at the fuel assembly inlet debris screens and lead to inadequate core cooling?

Another potential concern not addressed in the applicant's response is floatable or neutrally buoyant debris, possibly from foreign material or debris generated from material used in containment. During the time that the water level in containment is between the lower elevation of the breach in the ruptured pipe, and the breach's upper elevation, flow into the reactor coolant system would tend to draw in any debris floating on the surface of the containment pool, which could apparently result in a blockage concern in the core cooling flowpath.

Unqualified coatings outside the zone affected by the jet impingement from the pipe rupture would not necessarily be expected to fail immediately after an accident, but would apparently degrade and fail over a more extended time period. For this reason, the staff is unable to conclude that there would be ample time for all particulate debris of concern to settle to the containment floor, and that there would not be particulate debris in suspension at the time that the break location is submerged.

RAI 650.003

The AP1000 design depends heavily upon debris source control measures because its recirculation and IRWST screens do not have a large carrying capacity for debris. The DCD states in Section 6.3.2.2.7.1 that fibrous debris will not be generated by loss of coolant accidents (LOCAs) because fibrous insulation will not be used in damage zones in the AP1000 containment. However, as the staff's RAI pointed out, there are typically other materials in pressurized water reactor (PWR) containments that could become fibrous debris. Is there a more general prohibition in the design documentation that would encompass other potential sources of fibrous material in jet impingement damage zones and the flood-up region, such as fire barriers or ventilation filters, etc.?

RAI 650.004

What is the basis for the conclusion in the RAI response that ". . . any resident debris that might have settled on the IRWST floor prior to an accident is not likely to be stirred up by the ADS . . . ?" That is, what sort of analysis has been done to demonstrate that the turbulence conditions within the IRWST are sufficiently low at the floor of the tank during an ADS actuation?

RAIs 650.004 & 650.005

As part of the review of the applicant's response, the staff consulted NUREG/CR-6224, and the head loss code BLOCKAGE. Based on the review, the staff questions the applicant's analyses of debris blockage for the IRWST and containment recirculation screens, particularly the assumptions made for the density of the fibrous and particulate debris, and the calculation of the subsequently derived parameters (e.g., theoretical bed thickness and head loss). The applicant stated that the assumptions made concerning the fibrous and particulate debris were not intended to provide representative accuracy, but to allow a bounding calculation. However, the staff questions whether a basis exists for the applicant to use the data in NUREG/CR-6224 to make conclusions about such a material, considering that the applicant's assumptions do not appear to be conservative when they are carried through the entire calculation. Similarly, considering the data in NUREG/CR-6224 is based on sludge rather than a particulate more applicable to PWRs, there are concerns related to the use of this data in converting fibrous head losses to mixed bed head losses for the AP1000.

RAI 650.006

What is the basis for using 200 mils as the diameter for postulated coating debris? Experience shows that much smaller flakes are possible, and smaller flakes would tend to settle more slowly than would the larger diameter flakes assumed in the calculation, presenting a potentially greater challenge to the sump screen. When potential resident fiber loadings are considered, flakes significantly smaller in diameter than 200 mils are presumably large enough to become trapped at the interstitial locations of the lattice formed by a fibrous debris bed. Although they presumably represent particles smaller than 200 mils, it is not clear exactly what flake sizes correspond to the bounding settling calculations (i.e., B.E. x 4.3, B.E. x 14), and thus it is not clear what degree of conservatism is being employed when considering the sizes of flakes that can be generated through known failure mechanisms.