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Your ref. Docket No. 52-006
Our ref. DCP/NRC1569

April 9, 2003

SUBJECT: Transmittal of Westinghouse Responses to US NRC Requests for Additional Information on the AP1000 Application for Design Certification

This letter transmits the Westinghouse responses to NRC Requests for Additional Information (RAI) regarding our application for Design Certification of the AP1000 Standard Plant. A list of the RAI responses that are transmitted with this letter is provided in Attachment 1. Attachment 2 provides the RAI responses.

Please contact me if you have questions regarding this submittal.

Very truly yours,

M. M. Corletti
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/Attachments

1. Table 1, "List of Westinghouse's Responses to RAIs Transmitted in DCP/NRC1569"
2. Westinghouse Non-Proprietary Response to US Nuclear Regulatory Commission Requests for Additional Information dated April 2003

D063

Attachment

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April 9, 2003

Attachment 1

"List of Westinghouse's Responses to RAIs Transmitted in DCP/NRC1569"

Attachment 1

Table 1 "List of Westinghouse's Responses to RAIs Transmitted in DCP/NRC1569"
650.003, Rev. 1

Attachment 2

Westinghouse Non-Proprietary Response to US Nuclear Regulatory Commission
Requests for Additional Information dated March 2003

AP1000 DESIGN CERTIFICATION REVIEW

Response to Request For Additional Information

RAI Number: 650.003 (Revision 1)

Question:

Although the NRC's GSI-191 research program has indicated that fire barriers consisting of fibrous material may generally contribute a smaller volume of LOCA-generated debris than fibrous insulation materials, for the AP1000 (which does not employ fibrous insulation in destruction zones), fire barriers could conceivably contribute a significant fraction of the overall quantity of fibrous material generated by a LOCA. In Section 9.5.1.2.1.1, entitled Plant Fire Prevention and Control Features, the DCD states that [c]omplete fire barrier separation necessary to define a fire area is not provided throughout the primary containment fire area...,and that [s]elected cables of a safety-related division which pass through a fire zone of an unrelated division are protected by fire barriers. The staff could not determine from the DCD (a) whether the fire barriers referred to in Section 9.5.1.2.1.1 would consist of fibrous material, and (b) whether these fire barriers would be located in a zone of destruction for a postulated pipe rupture. Please provide this additional information.

Westinghouse Response:

(a) The AP1000 fire barriers in containment are made of steel plates or of "Durasystem" barriers or equivalent. "Durasystem" barriers are composite panels of fiber cement mechanically bonded to punched steel plates on both outer surfaces. Fibrous materials in the panels are bonded to and within Portland cement and any pieces of this material will be captured by the outer steel plates or be sufficiently dense to sink rapidly in water.

(b) DCD Tier 2 Section 9A.3.1.1.8 describes the fire barrier separation necessary for the selected cables of safety-related divisions that pass through a fire zone of an unrelated division. In all cases they are described as barriers of steel or steel-composite materials. Thus, there is no fibrous fire barrier material located in a zone of destruction for a postulated pipe rupture.

Design Control Document (DCD) Revision:

None

PRA Revision:

None

AP1000 DESIGN CERTIFICATION REVIEW

Response to Request For Additional Information

Additional NRC Question:

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 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 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.?

Additional Westinghouse Response:

There are no fibrous materials in the design in jet impingement damage zones in the flood-up region. As stated above, fire barriers in containment are steel or steel composite materials and there are no ventilation filters inside containment. To reinforce this commitment, Section 6.3.2.2.7.1 of the DCD will be changed as shown.

Design Control Document (DCD) Revision:

6.3.2.2.7.1 General Screen Design Criteria

1. Screens are designed to Regulatory Guide 1.82, including:
   - Redundant screens are provided for each function
   - Separate locations are used for redundant screens
   - Screens are located well below containment floodup level. Each screen has a coarse and a fine screen, and a debris curb
   - Floors slope away from screens (not required for AP1000)
   - Drains do not impinge on screens
   - Screens can withstand accident loads and credible missiles
   - Screens have conservative flow areas to account for plugging. Operation of the non-safety-related normal residual heat removal pumps with suction from the IRWST and the containment recirculation lines is considered in sizing screens.
   - System and screen performance are evaluated

- Screens have solid top cover. Containment recirculation screens have protective plates that are located no more than 1 feet above the top of the screens and extend at least 10 feet in front and 7 feet to the side of the screens. The plate dimensions are relative to the portion of the screens where water flows through the trash rack.

- Screens are seismically qualified

- Screen openings are sized to prevent blockage of core cooling

- Screens are designed for adequate pump performance. AP1000 has no safety-related pumps.

- Corrosion resistant materials are used for screens

- Access openings in screens are provided for screen inspection

- Screens are inspected each refueling

2. Low screen approach velocities limit the transport of heavy debris even with operation of normal residual heat removal pumps.

3. Metal reflective insulation is used on ASME class 1 lines because they are subject to loss-of-coolant accidents. Metal reflective insulation is also used on the reactor vessel, the reactor coolant pumps, the steam generators, and on the pressurizer because they have relatively large insulation surface areas and they are located close to large ASME class 1 lines. As a result, they are subject to jet impingement during loss-of-coolant accidents. A suitable equivalent insulation to metal reflective may be used. A suitable equivalent insulation is one that is enclosed such that LOCA jet impingement does not damage the insulation and generate debris or one that may be damaged by LOCA jet impingement as long as the resulting insulation debris are not transported to the containment recirculation screens.

   In order to provide additional margin, metal reflective insulation is used on lines that are subject to jet impingement during loss-of-coolant accidents that are not otherwise shielded from the blowdown jet. As a result, fibrous debris is not generated by loss-of-coolant accidents. Insulation located in a spherical region within a distance equal to 12 inside diameters of the LOCA pipe break is assumed to be affected by the LOCA when there are intervening components, supports, structures, or other objects. In the absence of intervening components, supports, structures, or other objects insulation in a cylindrical area extending out a distance equal to 45 inside diameters from the break along an axis that is a continuation of the pipe axis and up to 5 inside diameters in the radial direction from the axis is assumed to be affected by the LOCA.

4. Coatings are not used on surfaces located close to the containment recirculation screens. The surfaces considered close to the screens are defined in subsection 6.3.2.2.7.3. Refer to subsection 6.1.2.1.6. These surfaces are constructed of materials that do not require coatings.

5. The IRWST is enclosed which limits debris egress to the IRWST screens.

6. Containment recirculation screens are located above lowest levels of containment.

7. Long settling times are provided before initiation of containment recirculation.

8. Air ingestion by safety-related pumps is not an issue in the AP1000 because there are no safety-related pumps. The normal residual heat removal system pumps are evaluated to show that they can operate with minimum water levels in the IRWST and in the containment.

9. A COL commitment for cleanliness program to limit debris in containment is provided.

10. **Other potential sources of fibrous material, such as ventilation filters or fiber producing fire barriers, are not located in jet impingement damage zones or in the flood-up region,**

PRA Revision:

None