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Your ref: Docket No. 52-006
Our ref: DCP/NRC2474

May 13, 2009

Subject: AP1000 Response to Proposed Open Item (Chapter 4)

Westinghouse is submitting a response to the NRC open item (OI) on Chapter 4. This proposed open item response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following proposed Open Item(s):

OI-SRP4.5.1-CIB1-01

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

D. C. Lindgren / FOR

Robert Sisk, Manager
Licensing and Customer Interface
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/Enclosure

1. Response to Request for Additional Information on SRP Section 19

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ENCLOSURE 1

Response to Request for Additional Information on Chapter 4

AP1000 DCD SER Open Item REVIEW

Open Item Resolution

OI Response Number: OI-SRP4.5.1-CIB1-01
Revision: 0

Question:

The NRC staff agrees that using the guidance in RG 1.44 and proper cleaning techniques limits the amount of sensitization of Types 304 and 316 SS, which in turn reduces the susceptibility to SCC. In addition, the redesign of the CRDM reduces the stresses and adverse environment (vent and drainlines to minimize the presence of an oxygenated environment) that has a major contribution to the susceptibility of the SS to SCC.

Therefore, the staff finds that Types 304 and 316 SS can be used, in addition to Types 304L, 304LN, 316L, and 316LN (which are less susceptible to sensitization) previously approved by the staff in NUREG-1793, "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design," issued September 2004, because the Westinghouse design changes will reduce the number of canopy seal welds to one per CRDM, reduce the stresses in the canopy seal weld, eliminate the presence of an oxygenated environment using vent and drainlines, and follow the guidance in RG 1.44. However, these design changes (reduced number of welds, reduced stresses, and use of vent and drainlines) and the use of RG 1.44 are critical in preventing the occurrence of SCC in these components.

Therefore, Westinghouse should add these design changes and the use of RG 1.44 for the CRDM components, including the canopy seal welds, to the DCD. It should be noted that DCD Section 4.5.1.2 applies the controls on preventing SCC, including the guidance in RG 1.44 for the austenitic SS pressure-housing components of the CRDM. The canopy seal welds may not be considered a pressure-housing component since they only provide a leakage barrier.

Westinghouse Response:

The DCD will be modified as indicated in the following section to incorporate these comments. Section 3.9.4 will include more information about the design improvements made on the AP1000 CRDM over past designs, and Section 4.5.1 will include more information about the specific use of RG 1.44 for the AP1000 CRDMs.

In past CRDM designs there were three canopy seal welds (one at the top of the rod travel housing, one at the interface between the rod travel housing and the latch housing, and one between the latch housing and the latch housing nozzle). The bottom canopy seal weld historically had higher, but acceptable, stress levels. To mitigate the risk of leakage the AP1000 design eliminated both the upper and lower canopy welds, resulting in a single canopy seal weld with reduced stresses.

Design Control Document (DCD) Revision:

Section 3.9.4.2.2 of Rev. 17 of the DCD will be modified as follows:

3.9.4.2.2 Pressure Housing Requirements

The pressure housing portion of the control rod drive mechanism, the latch housing and rod travel housing, comprises a portion of the reactor coolant pressure boundary. The design pressure and temperature for the control rod drive mechanism pressure housing are the same as for the reactor vessel.

As part of the reactor coolant pressure boundary, the pressure housing is constructed in conformance with requirements in 10 CFR 50.55a. The conformance of the reactor coolant pressure boundary with applicable code and standards is discussed in Section 5.2. The pressure housing meets design, material, fabrication, analysis, quality assurance, and other requirements for Class 1 components in ASME Code, Section III. The pressure housing is required to meet stress requirements for design and transient conditions. The AP1000 control rod drive mechanism pressure housing uses only one canopy seal weld, which is between the latch housing and the rod travel housing. The rod travel housing includes a vent hole to allow water to drain from the canopy seal weld area, thus eliminating the presence of an oxygenated environment near the weld. The single AP1000 canopy seal weld has reduced stresses compared to the lower seal weld in past designs. These design improvements over past control rod drive mechanisms aid to prevent the occurrence of stress corrosion cracking.

Section 4.5.1.2 of Rev. 17 of the DCD will be modified as follows:

4.5.1.2 Fabrication and Processing of Austenitic Stainless Steel Components

The discussions provided in subsection 5.2.3.4 concerning the processes, inspections, and tests on austenitic stainless steel components to prevent increased susceptibility to intergranular corrosion caused by sensitization are applicable to the austenitic stainless steel pressure-housing components of the control rod drive mechanism. The discussions provided in subsection 5.2.3.4, concerning the control of welding of austenitic stainless steels especially control of delta ferrite are also applicable. Subsection 5.2.3.4 discusses the compliance with the guidelines of Regulatory Guides 1.31, 1.34, and 1.44. The welded control rod drive mechanism austenitic stainless steels that come into contact with the primary reactor coolant meet the requirements of Regulatory Guide 1.44.

PRA Revision:
None

Technical Report (TR) Revision:
None