ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Friday, January 29, 2010 12:21 PM
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Cc: Forsaty, Fred; Lu, Shanlai; Donoghue, Joseph; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 362 (4117), FSAR Ch. 15
Attachments: RAI_362_SRSB_4117.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 26, 2010, and on January 29, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Request for Additional Information No. 362(4117), Revision 0

1/29/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 15.06.05 - Loss of Coolant Accidents Resulting From Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary
Application Section: Chapter 15

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

15.06.05-56

The U.S. EPR fuel assembly uses 10 spacer grids, including one top HMP end spacer grid, one bottom HMP end spacer grid and 8 HTP intermediate spacer grids. Both HMP end spacer grids are similar to the remaining HTP intermediate spacer grids, except for the material of construction and the fact that the flow channels created by the doublets are straight and do not produce swirling flow around the fuel rods.

The CDI Test Loop apparatus fuel assembly had 4 spacer grids. The third grid from the bottom featured mixing vanes. All spacer grids in the CDI Test Loop apparatus fuel assembly were not prototypical for the U.S. EPR design. Debris blockage and associated head loss data produced with non-prototypical fuel assembly spacer grids will not be directly representative for the U.S. EPR reactor design fuel assembly performance.

Given the important role of spacer grids in formation of debris beds that can cause coolant blockage, the staff finds the use of non-prototypical spacer grids in the U.S. EPR fuel assembly testing difficult to substantiate. Explain the approach to resolve this discrepancy.

15.06.05-57

The U.S. EPR fuel assembly design features an overall fuel rod length ~3.6 times greater than the CDI Test Loop apparatus fuel simulators length and employs 10 spacer grids. The CDI Test Loop apparatus fuel assembly had 4 spacer grids one of which featured mixing vanes.

Assuming other test conditions being equal, a partial-length fuel assembly with a fewer number of spacer grids will produce a debris distribution across spacer grids and debris bed structure that are different compared to a prototypical full-length U.S. EPR fuel assembly. The staff requests a demonstration that debris blockage and associated head loss data obtained with a partial-length fuel assembly with a fewer number of spacer grids are applicable to the U.S. EPR fuel assembly design.

15.06.05-58

The CDI Test Loop apparatus employs a lower core support plate simulator with an L/D ratio for the plate holes of ~1/3. Even considering only the upper part of the holes with a larger opening diameter in the U.S. EPR lower core support plate design, the corresponding ratio is ~15 times larger in comparison to the model plate. In addition, an inverted right circular cone is located beneath the test apparatus lower core support plate to agitate flow and minimize possible debris settling at the test chamber bottom.

Demonstrate that the combined effects of flow agitation and thin lower core support plate in the test apparatus will not change the debris flow blocking behavior at the fuel bottom nozzle and within the fuel bundle that results in non-conservative test data.

15.06.05-59

As the debris are introduced into the CDI Test Loop apparatus through the mixing tank, opportunities exist so that portion of the debris settle in the mixing tank, reside in tank liquid volume or remain floating on the liquid surface in the mixing tank. In addition, air can be entrained into the test loop flow when adding debris into the tank.

Describe measures taken during testing at the CDI Test Loop apparatus to ensure that the processes identified above are prevented or have negligible effect on test data.

15.06.05-60

Provide substantiation for the test procedure (protocol) as implemented in the CDI Test Loop fuel assembly blockage testing for the U.S. EPR fuel design. In particular, address areas related to debris material selection and preparation, debris introduction, test matrix sufficiency and adequacy, test data repeatability, and test data applicability to prototypical reactor conditions.