ArevaEPRDCPEm Resource

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Sent: Friday, December 09, 2011 3:37 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 535 (6229), FSAR Ch. 6
Attachments: Draft RAI_535_SPCV_6229.doc

Attached please find draft RAI No. 535 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
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Request for Additional Information No. 535(6229), Revision 0

12/9/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
Application Section: 6.2.2

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

06.02.02-128

Based on GDC 16, 38 and 50, the purpose of this RAI is to ensure that the containment design and containment heat removal system will function properly following any postulated accident conditions. The following are follow-up questions of RAI No. 266 Question 06.02.02-33 and RAI No. 82 Question 06.02.02-1a after the calculation notes audit held in Twinbrook, MD in October and November, 2011.

1. Calculation 32-9020299-003, "One-Node GOTHIC Model of the U.S. EPR Containment"

   In Sec. 4.0, it describes that the LHSI/RHR heat exchanger tube plugging level is expected to be made when to perform the LBLOCA containment response analysis as part of the DC effort for the U. S. EPR. In the Section of Areas of Review, the Standard Review Plan (SRP) 6.2.2 specifies that the potential for flow blockage of heat exchangers and the effect on heat exchanger performance should be reviewed. Provide information for tube plugging level assumed during the LBLOCA containment response analysis.

2. Calculation 32-9020299-003, "One-Node GOTHIC Model of the U.S. EPR Containment"

   In Sec. 7.1.2 (heat exchanger input), it uses 0.4 for Prandtl number exponent in the Dittus-Boelter correlation. According to GOTHIC technical manual (Sec. 9.1.1.2), it should be 0.3 instead of 0.4 for the heat exchanger tube (primary) flow that is being cooled. Evaluate the impact of the difference on all currently existing GOTHIC analysis results.

3. Calculation 32-9020299-003, "One-Node GOTHIC Model of the U.S. EPR Containment" and Calculation 32-9036040-003, "Multi-node GOTHIC Model of the U. S. EPR Containment"

   In Sec. 7.1.1.2 of Calculation 32-9020299-003, it states that the Tagami/Uchida correlation is selected for the direct condensation calculation in the LBLOCA containment response analysis based on the approved FANP GOTHIC containment methodology. In Sec. 2.2 of Calculation 32-9036040-003, the multi-node GOTHIC model also uses the Tagami/Uchida correlation. However, the multi-node GOTHIC model (clps_np_s_sd3.gth) for LBLOCA employs DLM for direct condensation calculation. Provide justification for this change and the selection of DLM out of the diffusion layer model options (DLM, DLM-M, DLM-F and DLM-FM).

4. Calculation 32-9020299-003, “One-Node GOTHIC Model of the U.S. EPR Containment”

   There are pre-cautions in blackened wordings cited in this calculation note. For example:

   On page 49, it notes that the MHSI (& LHSI) injection flow used for DC will be made consistent with that used by the system analysis code.

   On page 52, it notes that the lower and upper bound containment initial temperatures need to be considered via sensitivities to determine the initial containment condition yielding the more conservative pressure and temperature responses.

   On page 72, it notes that the duration of droplet discharge should be formulated such that the worst containment response is obtained.

   On pages 77 and 78, it states that an arbitrary non-zero value for the spillage flow is input for demonstration use only. What is the actual value used in the final DC LOCA analysis? And how is it determined?

   On page 87, it states that a set of sample values for primary system passive material stored energy, steam generator energy and sensible heat loads etc. are used for demonstration purpose. What are the actual values used in the final DC LOCA analysis? And how are they determined?

   Provide their dispositions for the above identified pre-cautions. If they have been addressed in some other calculation notes, it would be acceptable to have them being available for audit without any specific written responses required.

5. Calculation 32-9036040-003, “Multi-node GOTHIC Model of the U. S. EPR Containment”

   As mentioned in this calculation note, a one-node MSLB GOTHIC model was developed to determine the EQ. Provide this GOTHIC model file as well as the multi-node MSLB GOTHIC model file and the associated EQ analysis calculation notes for staff to perform confirmatory analysis.

6. Calculation 32-0113080-003, “Suction Break for U. S. EPR Containment Analysis Using Multi-Node model”

   The multi-node model GOTHIC file (clps_np_s_sd3) has been sent to staff for review. Provide the calculation note (assumed it is 32-0113080-003, “Suction Break for U. S. EPR Containment Analysis Using Multi-Node model”) that documents the GOTHIC input data and analysis results for audit.