

ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Friday, August 26, 2011 8:45 AM
To: 'usepr@areva.com'
Cc: Chakravorty, Manas; Xu, Jim; Thomas, Brian; Wong, Yuken; Dixon-Herrity, Jennifer; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 508 (6005,6000,5994), FSAR Ch. 3
Attachments: RAI_508_SEB2_6005_6000_EMB2_5994.doc

Attached please find the subject request for additional information (RAI). A draft of the RAI was provided to you on August 22, 2011, and on August 24, 2011, 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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Ch. 3
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Request for Additional Information No. 508(6005, 6000, 5994), Revision 0

8/26/2011

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 03.03.01 - Wind Loading

SRP Section: 03.07.03 - Seismic Subsystem Analysis

SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components

Application Section: 03.03.01

QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

03.03.01-5

Design loads for structures are identified in Tier 1, Section 2.1 design descriptions and their associated ITAAC. Design loads for external events identified in ITAAC Tables do not include wind loads. Per GDC 2, SSCs important to safety should be designed to withstand the effects of natural phenomena including hurricane wind loads. As such, the applicant is requested to add wind loads to the list of external event design basis loads for Seismic Category I structures to the ITAAC tables of Tier 1, Section 2.1 and include it in its evaluation of the design capacity of the structure or justify why it should be excluded.

03.07.03-41

Included in FSAR Tier 2, Section 3.7.3.12, Revision 2, are criteria related to the limitation of tensile strains for buried carbon steel and stainless steel pipe. Also discussed are limits on compressive strains, although no compressive limits are provided. No reference is given for this information. As discussed in FSAR Tier 2, Section 03.07.03.12, Revision 2, it is up to the COL applicant to provide the design requirements for buried pipe. Therefore, it is not clear why this information was included in the FSAR. As a result, the staff requests that the applicant supply additional information providing the basis for this criteria and why it was included in the FSAR.

03.09.02-169

Follow up to RAI 422, Question 03.09.02-131:

The FIV analysis of the RPV upper internals reported by the applicant in CVAP Report Rev. 0 (see Section 4.5.3) utilized thermal hydraulic conditions determined from one dimensional analysis. The results of this analysis indicate that several of the components would fail both the high cycle fatigue criteria (2800 psi, rms) and the vortex shedding stress criteria (13,600 psi, 0-peak) as reported in the markup accompanying the May 3, 2011 response to RAI 422 Question 03.09.02-131 (see Table 4-20). The applicant has, since the issuance of CVAP Report Rev. 0, performed a three dimensional CFD analysis of the U.S. EPR and has used the results to

update the thermal hydraulic conditions employed in the RPV upper internals FIV analysis. The applicant has stated in both CVAP Report Rev. 0 Section 4.5 and in the mark up accompanying the response to RAI 422 Question 03.09.02-131 (see Section 4.5.3) that the CFD approach has been benchmarked against the ROMEO 1/5 scale flow testing, but the applicant has provided no information from that analysis. Further, the updated predictions substantially reduce the predicted stress for the RPV upper internals, in some cases by more than an order of magnitude, resulting in all of the upper internals meeting the stress criteria by wide margins. The applicant is requested to provide the discussion of the CFD models and the ROMEO tests which addresses the following points.

- a. The applicant is requested to address the procedure used to validate the CFD model on a system reflecting the degree of complexity of the RPV upper internals, including the metrics and reference planes or locations used.
- b. The applicant is requested to address the sensitivity analysis performed to ensure that the grid size of the model is sufficiently small such that further grid refinement would not affect the CFD results.

The information should be included in the CVAP Report.