## ArevaEPRDCPEm Resource

**From:** Tesfaye, Getachew
**Sent:** Monday, August 22, 2011 1:37 PM
**To:** 'usepr@areva.com'
**Cc:** Chakravorty, Manas; Xu, Jim; Thomas, Brian; Wong, Yuken; Dixon-Herrity, Jennifer; Miernicki, Michael; Colaccino, Joseph
**Subject:** Draft - U.S. EPR Design Certification Application RAI No. 508 (6005,6000,5994), FSAR Ch. 3
**Attachments:** Draft RAI_508_SEB2_6005_6000_EMB2_5994.doc

Attached please find draft RAI No. 508 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,
Getachew Tesfaye
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**Hearing Identifier:** AREVA_EPR_DC_RAIs
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Request for Additional Information No. 508(6005, 6000, 5994), Revision 0

8/22/2011

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.