ArevaEPRDCPEm Resource

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Sent: Thursday, March 12, 2009 7:25 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 201 (2123, 2206, 2207), FSAR Ch. 3
Attachments: Draft RAI_201_EMB2_2123_SEB2_2206-2207.doc

Attached please find draft RAI No. 201 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. 201 (2123, 2206, 2207), Revision 0

3/12/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.02.01 - Seismic Classification
SRP Section: 03.07.01 - Seismic Design Parameters
SRP Section: 03.07.02 - Seismic System Analysis
Application FSAR Ch.: 3

QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)
QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)

03.02.01-8

(Follow-up to RAI Question 03.02.01-3) FSAR Tier 2 Table 1.9-2 indicates that U.S. EPR conforms to Regulatory Guide (RG) 1.29. Position C.1.b of RG 1.29 states that reactor vessel internals are designated as Seismic Category I and must be designed to withstand the effects of the SSE and remain functional. However, in Table 3.2.2-1, some reactor internal components (e.g., dome spray nozzle, flow distribution device, control rod drive mechanism adaptor thermal sleeves, etc.) are designed as Seismic Category II.

Clarify whether the Seismic Category II classification for reactor internals is an exception to RG 1.29 and, if so, identify this as an exception in FSAR Table 1.9-2 with the technical justification for the exception. Also, if the reactor internal components that are designed as Seismic Category II are not required to be functional during or after an SSE, state the basis.

03.02.01-9

(Follow-up to RAI Question 03.02.01-1) 10 CFR Part 50, Appendix S, IV(a)(2)(I) states that SSCs necessary for continued operation without undue risk to the health and safety of the public must remain functional and within applicable stress, strain, and deformation limits when subject to the effects of the Operating Basis Earthquake Ground Motion. SRP 3.2.1 states that, if the applicant has set the OBE Ground Motion to the value one-third of the SSE Ground Motion, then the applicant should also provide a list of SSCs necessary for continued operation that must remain functional without undue risk of the health and safety of the public and within applicable stress, strain and deformation, during and following the OBE. FSAR Section 3.7 states that the U.S. EPR standard plant design is defined as one-third of the standard plant SSE.

Provide this list of SSCs necessary for continued operation. If FSAR Table 3.2.2-1 serves this purpose, clearly state in the FSAR that the table contains the list of SSCs necessary for continued operation. Also explain how the nonsafety-related SSCs are classified such that they will be seismically qualified for OBE to remain functional.

03.02.01-10

(Follow-up to RAI Question 03.02.01-6) Tier 1 Table 2.2.8-2 lists ITAAC for Seismic Category II equipments to ensure that they can withstand design basis seismic event without losing their structural stability. However, in other sections of Tier 1, there are no ITAAC for Seismic Category II SSCs (e.g., reactor coolant system, liquid radwaste system, etc.) The applicant is requested to clarify whether ITAAC include all Seismic Category II SSCs. If ITAAC do not include all Seismic Category II SSCs, state the basis.

03.07.01-19

(Audit follow-up) In Section 3.7.1.1.1 (Design Ground Motion Response Spectra) it indicates that the SSI model of the NI Common Basemat Structure is considered as a surface founded model in the SASSI calculations even though it is embedded to a depth of 41.3 feet. The acceptance criteria of SRP 3.7.2 states that the effect of embedment of the structure should be accounted for in the SSI analysis. Please provide justification for neglecting the depth of embedment on SSI results and quantify the impact on structural design loads as well as on the computation of in-structure response spectra.

03.07.02-35

(Audit follow-up) Within the U.S. EPR standard design organization, one group is responsible for the seismic analysis of the NI common basemat structures and another group is responsible for the seismic analysis of the reactor coolant system (RCS). The NI seismic model contains a simplified model of the RCS provided by the group responsible for RCS seismic analysis. In a similar way, the seismic analysis of the RCS includes, in addition to a detailed model of the RCS, a seismic model of the Reactor Containment Building internal structure which supports the RCS. The seismic input for this coupled model consists of the time histories at the foundation mat determined from the NI seismic analysis. What are the methods used to verify that similar results are obtained in each of these analyses so as to verify that the interface forces are correct and that the coupled seismic model used in the analysis of the RCS is providing results consistent with the results obtained in the analysis of the NI common basemat structure? Include in your response a comparison of displacements and forces at key interface points of the RCS and internal structure from each of the models that document the adequacy of the results and methodology.

03.07.02-36

(Audit follow-up) In the Structural Stick Model Development for the U.S. EPR Design Certification (Document 32-5062562-004), it states on page 20 that the variable area live loads are not taken from Reference 17 as they may not be representative of loads to be used for seismic analysis. Instead a live load value of 200 psf is used for the Fuel Building and Reactor Containment Building which is determined to be more appropriate for use in seismic analysis. On page 56 of the System Design Requirements Document for EPR Standard Plant Structures (Document 115-9005678-005), it states that for the Fuel Building and Reactor Containment

Building a live load of 400 psf shall be used for design. What is the basis for each of these values and why was a lower value selected for seismic analysis of these structures? What is the impact if, instead of 200 psf live load, a value of 400 psf live load had been used in the seismic analysis of these structures?

03.07.02-37

(Audit follow-up) In the seismic analyses of the EPR Seismic Category I structures, a number of assumptions regarding the elevation of the building foundations and the properties of the supporting subgrade under each are made. In the EPR certified design, the SSI analyses of the NI common basemat structures assumes the top of the generic soil profiles are at an elevation corresponding to the bottom of the NI basemat foundation. This is 40 feet below the actual plant grade for this structure. The SSI analyses of EPGB and ESWB assume the top of the generic soil profiles are located at grade elevation. Thus there is an inconsistency in the application of those generic soil profiles that assume the soil properties are variable with depth between the NI common basemat structures and the other two structures. In determining SSSI effects, it is assumed that the foundations of the EPGB and ESWB are at the same elevation as the foundation of the NI common basemat structures when in reality the foundations of all three are at different elevations. EPR FSAR Section 2.5.2.6 provides evaluation guidelines for the COL applicant to follow in verifying the site specific seismic response of structures, systems and components is enveloped by the US EPR Certified Design seismic response. Step five of these guidelines states that the applicant will demonstrate that the idealized site soil profile is bounded by the 10 generic soil profiles used for the EPR design. Step eight of these guidelines states that site specific evaluations will use methodologies described in EPR FSAR Section 3.7.1 and 3.7.2. The staff believes the guidelines are inadequate for the COL applicant to make a site specific comparison of seismic response to the U.S. EPR design and requests that the following be addressed:

a. For the NI SSI analysis, the EPR generic soil profile was assumed to start at the foundation elevation, whereas for a site the soil properties are normally defined starting at plant grade. Therefore, additional guidance should be provided regarding how to compare the site specific soil profiles with the U.S. EPR soil profiles.

b. The site-specific EPGB and ESWB may be founded on structural fill. How this is accounted for in the comparison of soil profiles or in the calculation of site specific FIRS for these structures needs to be addressed in the guidelines.

c. The SSSI effects determined for the EPGB and ESWB of the U.S. EPR design do not account for the difference in elevations of these structures with the NI common basemat structures. Additional guidance should be provided to COL applicant regarding how this issue should be addressed.