ArevaEPRDCPEm Resource

From: Miernicki, Michael
Sent: Thursday, March 06, 2014 2:07 PM
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Cc: Xu, Jim; Segala, John; Wunder, George; Park, Sunwoo; ArevaEPRDCPEm Resource
Subject: US EPR DC FINAL RAI 629 (7429), SEB2, Chapter 3, Section 03.07.02, Seismic System Analysis
Attachments: Final RAI 629 _SEB2_7429.docx

Attached please find subject request for additional information (RAI). A draft RAI was provided to you on February 12, 2014. On March 6,, 2014 a clarification teleconference was conducted with AREVA. AREVA informed us that, the RAI is clear and does not contain proprietary information and that no further clarification is needed.

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 a response 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.

Thank you,

Mike

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Request for Additional Information 629

Issue Date: 03/06/2014
Application Title: U. S. EPR Standard Design Certification - Docket Number 52-020
Operating Company: AREVA NP Inc.
Docket No. 52-020
Review Section: 03.07.02 - Seismic System Analysis
Application Section: 3.7.2

QUESTIONS

03.07.02-80

Follow-up Question to RAI 201, Question 03.07.02-35, Supplement 7 Response

In RAI 201, Question 03.07.02-35, the staff asked the applicant to provide information that demonstrates consistency of seismic demands at key interface points of the reactor coolant system (RCS) and internal structure obtained from the SSI analysis of the NI common basemat structures and from the seismic analysis of the Reactor Building Internal Structures (RBIS)/RCS coupled model used for RCS seismic design.

In its response dated July 17, 2013, the applicant provided a comparison between the seismic response of the RCS from an SSI analysis of the NI structures using the SASSI computer code and that from a coupled RBIS/RCS analysis using the BWSPAN computer code. Comparisons are provided for the support loads of major RCS equipment and for ISRS at different RBIS elevations for each of the four RCS loops. In addition, a load summary is provided which compares the reactions for the RPV, SG supports, and RC pump.

The representation of the RCS in SASSI analysis is a simplified lumped-mass stick model, while in BWSPAN analysis the RCS is a detailed finite element model used for RCS seismic design. In the SASSI analysis, the RBIS which supports the RCS is represented by a detailed finite element model, while in the BWSPAN analysis the RBIS is represented by a stick model. In reviewing the RAI response, the staff noticed that some of the SASSI loads and in-structure response spectra (ISRS) are significantly higher than the corresponding BWSPAN results. Since these loads and ISRS are used in the design of RCS supports and in the design and qualifications of the equipment and components attached to the primary structure, the staff has concerns about the potential lack of conservatism in the design basis for the RCS and thus requests the applicant to address the following items:

(1) The individual load comparisons in Tables 3.7.2-35-1b through 3.7.2-35-1e are inconsistent with the summary comparisons in Table 3.7.2-35-1a. A comparison in the summary table indicates that BWSPAN results are greater than SASSI results except for the SG supports. However, in individual comparison tables, SASSI results exceed those of BWSPAN in a number of cases including the RC pump. Therefore, the applicant is requested to explain how the summary results are derived and why they contradict the comparisons from the individual load tables. Further, since many of the individual loop results from SASSI are significantly larger than the BWSPAN results, the applicant is requested to indicate whether the SASSI results for these individual RC pump and SG supports will be considered in the design of RCS supports.

(2) The applicant provided individual load comparisons for the SG supports and RC pump in Tables 3.7.2-35-1b through 3.7.2-35-1e for each of the four RCS loops, but not for RPV. Since the RPV is important equipment, the applicant is requested to provide individual loads for RPV from SASSI and BWSPAN analyses and their comparison.

(3) In the support load comparison for the RCS, the applicant should include the pressurizer supports loads and also provide a comparison of ISRS consistent with the pressurizer support elevations. Any differences in the results where the SASSI result exceeds that of the BWSPAN result should be explained by the applicant along with the implications for the design of the pressurizer and its supports.

(4) A review of the ISRS comparison indicates, at elevation 19.5 meters in the E-W direction, there is a significant difference at 10 Hz between the SASSI and BWSPAN results, the SASSI result being much higher than BWSPAN result. The applicant indicates that this difference does not have a significant impact on the BWSPAN results because the SG has a fundamental frequency of approximately 6.5 Hz. The applicant further indicates that there is good agreement in the load comparison of the upper SG supports at this elevation. However, a significant difference in the upper steam generator horizontal load is observed for Loops 2 through 4. Since it appears that the amplified response of the RBIS as determined from BWSPAN analysis has been reduced at certain frequencies over that of SASSI analysis, the applicant is requested to address the implications this may have on other aspects of the RCS design including the detailed analysis of the RPV and the analysis of RCS branch piping.

In addition, the applicant provided a comparison of BWSPAN seismic responses of RCS to ground motions at the Bell Bend high-frequency site and Case 5ae EUR rock site to demonstrate that Case 5ae envelopes Bell Bend in seismic demand. The applicant also indicated that Case 5ae results will be used as design basis for RCS components. Although the results for the SG and RC pump indicate that Case 5ae results are higher than the Bell Bend results, the staff noticed that the vertical RPV loads from the Bell Bend analysis are higher than those from Case 5ae analysis. The applicant is requested to address implications of the Bell Bend case exceeding Case 5ae in vertical RPV load and indicate whether the Bell Bend case will be used for RPV vertical support

design. The staff also noticed that BWSPAN Case 5ae results in both the horizontal and vertical directions for the RPV in Table 3.7.2-35-2 do not agree with those provided in Table 3.7.2-35-1a. The applicant should explain why the Case 5ae loads for the RPV are not consistent between the two tables and identify the correct loads to be used.