ArevaEPRDCPEm Resource

From: McLellan, Judith
Sent: Friday, September 07, 2012 2:41 PM
To: ArevaEPRDCPEm Resource
Subject: FW: U.S. EPR Design Certification Application RAI No. 503 (5961,5929,5444), FSAR Ch. 3
Attachments: RAI_503_SBPA_5961_EMB2_5929_5444.doc

From: Tesfaye, Getachew
Sent: Tuesday, August 16, 2011 4:48 PM
To: 'usepr@areva.com'
Cc: Hernandez, Raul; Segala, John; Lee, Samuel; Wong, Yuken; Le, Tuan; Dixon-Herrity, Jennifer; Miernicki, Michael; Clark, Phyllis; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 503 (5961,5929,5444), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on July 29, 2011, and discussed with your staff on August 16, 2011. No change is made to the draft RAI as a result of that discussion. 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
Sr. Project Manager
NRO/DNRL/NARP
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Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 4029

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From: McLellan, Judith

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"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
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Request for Additional Information No. 503(5961, 5929, 5444), Revision 0

8/16/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.06.01 - Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment
SRP Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components
SRP Section: 03.09.03 - ASME Code Class 1, 2, and 3 Components

Application Section: FSAR Chapter 3

QUESTIONS for Balance of Plant Branch 1 (SBPA)
QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

03.06.01-11

In response to RAIs 3.6.2-17, 3.6.2-31 and 3.6.2-42, the applicant proposed a new FSAR Tier 1 Section 3.8. This new ITAAC requires the completion of the as designed pipe break hazards analyses summary. The applicant also proposed to modify FSAR Tier 2 COL Item 3.6-1 to instruct the COL applicant to reconcile the deviations between the as-built configuration and the as-designed analysis.

In the proposed wording for the FSAR Tier 1 Section 3.8, Table 3.8-1, "Piping Hazard Analysis ITAAC," the applicant makes reference to the completion of the pipe break hazards analyses summary. The staff found the proposed wording unacceptable. In order to demonstrate that all SSCs, that are needed to perform a safety related function or are needed to safely shutdown the plant, are protected against or qualified to withstand the dynamic and environmental effects associated with postulated pipe breaks, the applicant needs to complete the pipe break hazards analyses report, as described in FSAR Tier 2 Section 3.6.1 and Section 3.6.2, not a summary.

Therefore, the staff requests the applicant to modify FSAR Tier 1 Section 3.8, Table 3.8-1, "Piping Hazard Analysis ITAAC," to require the completion of a pipe break hazards analyses report.

03.06.01-12

In response to RAIs 3.6.2-17, 3.6.2-31 and 3.6.2-42, the applicant proposed to add the description of the content of the pipe break hazards analyses report in FSAR Tier 2, Section 3.6.2. This summary does not explicitly include the evaluation non-mechanistic longitudinal pipe break of one square foot cross-sectional area within the pipe break exclusion zone, as recommended in SRP Section 3.6.1, and as discussed in FSAR Tier 2, Section 3.6.1.1.6.

The staff requests the applicant to update FSAR Tier 2 Section 3.6.2.1 to include the evaluation of the impact of a 1 square foot break on the main steam and main feed lines, within the pipe break exclusion zone.

03.09.02-168

Standard Review Plan, Section 3.9.2.I.5, states that dynamic system analyses should confirm the structural design adequacy and ability, with no loss of function, of the reactor internals and unbroken loops of the reactor coolant piping to withstand the loads from a loss-of-coolant accident (LOCA) in combination with the safe-shutdown earthquake (SSE).

The applicant stated in US EPR FSAR, Section 3.9.2 that the forcing functions obtained from hydraulic analysis of the safety injection line breaks are defined at points in the RPV internals where changes in cross-section or direction of flow occur, such that differential loads are generated during the blowdown transient. Additional details of the structural analysis of the RPV isolated model for LOCA loading are given in Appendix 3C.

The staff reviewed Appendix 3C, Section 3C.2.2, “Reactor Pressure Vessel Isolated Structural Model,” and determined that the RPV isolated structural model consists of representations of the RPV pressure boundary, CRDMs, CRDM nozzles, closure head equipment (CHE), lower internals, upper internals, and fuel assemblies.

In view of the foregoing, the NRC staff requests that the applicant provide the following additional information:

a. List all components that the applicant has included in their definition of “reactor internals”.

b. Does the list of #1 above include all components within the reactor vessel or have any components been excluded?

c. Do the developed forcing functions, the analysis and the interpretation of result by the applicant’s thermal-hydraulic modeling and analysis correctly determine the necessary dynamic parameters (such as forces, accelerations, velocities, displacements, mass, stiffness, damping, amplitudes, frequencies, frequency ranges, time, duration and other relevant parameters) to confirm the structural design adequacy and the ability to perform the function of all reactor vessel internal components?

d. Do the developed forcing functions, the analysis and the interpretation of results by the applicant’s SSE structural modeling and analysis correctly determine the necessary dynamic parameters (such as forces, accelerations, velocities, displacements, mass, stiffness, damping, amplitudes, frequencies, frequency ranges, time, duration and other relevant parameters) to confirm the structural design adequacy and the ability to perform the function of all reactor vessel internal components?

03.09.03-26

OPEN ITEM

Follow-up to RAI 107, Question No. 03.09.03-3.

In EPR FSAR Rev. 2, Section 3.9.3.1.1 "Loads for Components, Component Supports, and Core Support Structures", under Pipe Break subject heading, both Service Levels C and D were identified for design basis pipe breaks (DBPBs). However, FSAR Rev.2, Section 3.9.3, Table 3.9.3-1 and Topical Report ANP-1026NP-A, Rev. 0 identified only Service Level D to be used for design basis pipe breaks, but not Service Level C.

FSAR Rev. 2, Section 3.9.3, Table 3.9.3-1 and Topical Report ANP-1026NP-A, Rev. 0 did not correctly identify DBPBs in service load combination for both Service Levels C and D. The staff requests a clarification of inconsistent information and update to the following documents:

a. EPR FSAR, Section 3.9.3, Table 3.9.3-1

   Revise Table 3.9.3-1 “Load Combinations and Acceptance Criteria for ASME Class 1 Components” to include the DBPBs to be in service load combination of both Service Levels C and D.

b. Topical Report ANP-10264NP-A, “U.S. EPR Piping Analysis and Pipe Support Design Topical Report”

   Revise Table 3-1, “Design Conditions, Load Combination and Stress Criteria for ASME Class 1 Piping” to include the DBPBs to be in service load combination of both Service Levels C and D.