ArevaEPRDCPEm Resource

From: Getachew Tesfaye
Sent: Wednesday, January 28, 2009 8:17 PM
To: 'usepr@areva.com'
Cc: Cheng-Ih Wu; Anthony Hsia; Jennifer Dixon-Herrity; Michael Miernicki; Joseph Colaccino; Meena Khanna; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 179 (1938), FSAR Ch. 3
Attachments: RAI_179_EMB1_1938.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 19, 2009, and discussed with your staff on January 27, 2009. No changes were made to the Draft RAI Questions 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
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
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Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Cheng-Ih Wu" <Cheng-Ih.Wu@nrc.gov>
Tracking Status: None
"Anthony Hsia" <Anthony.Hsia@nrc.gov>
Tracking Status: None
"Jennifer Dixon-Herrity" <Jennifer.Dixon-Herrity@nrc.gov>
Tracking Status: None
"Michael Miernicki" <Michael.Miernicki@nrc.gov>
Tracking Status: None
"Joseph Colaccino" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"Meena Khanna" <Meena.Khanna@nrc.gov>
Tracking Status: None
"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
Tracking Status: None
"'usepr@areva.com'" <usepr@areva.com>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

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Request for Additional Information No. 179 (1938), Revision 0

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U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.09.01 - Special Topics for Mechanical Components
Application Section: 3.9.1

QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)

03.09.01-1

1) FSAR Tier 2, Section 3.9.1.1, "Design Transients," provides a list of the design transients and the number of cycles for the transients in FSAR Tier 2, Table 3.9.1-1. The applicant stated that the number of cycles is a conservative estimate of the magnitude and frequency of the temperature and pressure transients that may occur during plant operation. The number of design transients is based on a plant life of 60 years. The transients are defined for equipment design purposes and are not intended to represent actual operating experience. However, the applicant did not provide description of the transients. SRP 3.9.1 states that the method for determining the number of occurrences for each event is compared to the same information on similar and previously licensed applications. Any deviations from previous accepted practice are noted and the applicant should justify them. Previous accepted application defines the magnitude of these transients including temperature and pressure variations and duration. Areva is requested to:

a. Provide a description for each the listed transient regarding the event background, involved systems, operating conditions (pressure, temperature and flow), including heat-up and cool-down rate limits,
b. Discuss the basis for the Plant Operating Events and corresponding "number of events" listed in Table 3.9.1-1,
c. Provide confirmation that the transients in Table 3.9.1-1 are for 60 years.
d. Provide a summary for events relating to the unscheduled power variation, the unscheduled fluctuations at hot shutdown and the external induced transient,
e. Discuss the basis for selecting 1 cycle for External Induced Transient, Control Rod Ejection, MFW Line Break and Main Steam Line Break,
f. Provide the number of occurrences for each of the emergency transients.

2) Appendix S to 10CFR50 specifies that applicants include seismic events in the design basis. The applicant is requested to provide the basis to justify that the earthquakes dynamic events at the rated operating power conditions are not included in Table 3.9.1-1.

3) The dynamic fluid loads due to the turbine stop valve closure are more severe than the main steam isolation valve closure induced loads that are listed in Table 3.9.1-1. Discuss the basis for not including the turbine stop valve closure induced loads in FSAR Section 3.9.1.

4) NRC Bulletin 79-13 addressed the fatigue loading due to thermal stratification and high cycle thermal striping during low flow emergency feedwater injection. Bulletin 88-08 and its supplements indicates that during low feed water flow stratification flow conditions can result in significant differences in thermal fatigue cycles that have resulted in failures of the feedwater piping pressure boundary in PWR. Bulletin 88-11 requires consideration of the effects of thermal stratification on the pressurizer surge line dynamic loads. Discuss the basis for not considering the thermal stratification in Section 3.9.1.1, which is an important design transient in design of piping.

5) Discuss the vibration effects on the components and piping due to Acoustic Resonance in accordance with the NRC Regulatory Guide 1.20, Revision 3. Provide the basis for not including this acoustic cyclic loading in the design transients for EPR FSAR.

03.09.01-2

1) In accordance with SRP 3.9.1, provide a list of all computer programs used for generating hydraulic forcing functions and performing structural analyses including preprocessors and postprocessors which are listed in FSAR Section 3.9.1, Appendix 3C, and in the Topical Report ANP-10264NP Section 5.1. The information should contain: 1) The author, source, dated version and facility, 2) The extent and limitation of its application, and 3) The method used to demonstrate its applicability and validity. Confirm that the analyses of pipe supports were performed using the computer code GT STRUDL, which is not found in the EPR FSAR.

2) 10 CFR Part 50, Appendix B requires provisions to assure that appropriate standards are specified and included in design documents including design methods and computer programs for the design and analysis of Seismic Category I, ASME Code Class 1, 2, 3, and core support structures and non-Code structures. Areva is requested to confirm that the computer programs used for EPR design and listed in FSAR Section 3.9.1.1, Appendix 3C and Topical Report ANP-10264NP Section 5.1, Computer Codes, are in compliance with requirements of Appendix B to 10CFR50 and ASME NQA-1. Confirm that the documentation of these computer programs is available for staff review. The information should include the author, source code, dated version, and facility; the program users manual and theoretical description, the extent and limitation of the program application; and the benchmarking problems, the QA control and maintenance of the program.

3) For applicability of the computer code BWSPAN, the applicant stated that the use of BWSPAN for Class 1 RCL analysis has previously been approved by the NRC, see letter David E. LaBarge (NRC) to W.R. McCollum, Jr. (Duke Energy Corporation), Oconee Nuclear Station, Units 1, 2 and 3 Re: Reactor Coolant Loop Analysis Methodology for Steam Generator Replacement, dated September 6, 2001. This reference letter contains an SE in which the staff evaluated the Steam Generator

replacement analysis for Oconee, but did not review the BWSPAN computer code. The applicant is requested to provide a summary of the verification and validation for this program including benchmark problems.

4) Regarding the qualification of the SUPERPIPE computer program, the applicant indicated that the previous versions were approved by the NRC as shown in previous license applications including the Catawba Nuclear Station (CNS UFSAR, Rev. 12, Table 3-68) and the System 80+ Design Certification (NUREG-1462, Section 3.12.3). The applicant is requested to provide the dates and version number of the current version which was used for the design of EPR components and piping.

5) In EPR DC Appendix 3C, there are computer codes requiring the verification against the results from the analysis of a sample problem to the classical solution of the sample problem, each time they are executed. Explain the reason why it is required to run a sample problem each time the computer code is used. Confirm whether the results of the sample problem runs are documented in the calculation. Also, discuss how the quality assurance requirements will be satisfied for not using an executable file.

6) Identify the computer programs which were used to perform the fatigue analysis. Confirm that the analyses for ASME Section III Class 1 components and piping for the fatigue evaluation include environmental effects in accordance with Regulatory Guide 1.207. .

7) Verify that all computer programs used for EPR design of piping that use the Independent Support Motion Response Spectrum analysis method comply with the staff position for combining mode, group (absolute sum) and direction responses, as stated in NUREG-1061, Volume 4.

03.09.01-3

EPR FSAR Tier 2, Section 3.9.1.3, “Experimental Stress Analysis,” indicates that experimental stress analysis is not used to evaluate stresses for Seismic Category I components and supports. The applicant is requested to discuss the stress analysis methods used to verify the design adequacy for the design of EPR components consisting of piping seismic snubbers, pipe whip restraints, and the prototype fine motion control rod drive.

03.09.01-4

1) For each of the components, supports, core support structures, and RPV vessel listed in Section 3.9.3, describe the computer program that was used to evaluate the stresses for determining that the ASME Section III, Appendix F, limits were met.

2) Identify the components evaluated in Section 3.9.3 where the inelastic Service Level D limits were met under the faulted condition loads and load combinations in Table 3.9.3-1.