ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Tuesday, February 24, 2009 12:05 PM
To: Getachew Tesfaye
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); SLIVA Dana (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 178, FSAR Ch 3
Attachments: RAI 178 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 178 Response US EPR DC.pdf" provides a technically correct and complete responses to all 4 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 178, Questions 03.09.03-17 and 03.09.03-20.

The following table indicates the respective pages in the response document, "RAI 178 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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This concludes the formal AREVA NP response to RAI 178, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

(Russ Wells on behalf of)
Ronda Pederson
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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, January 27, 2009 6:24 PM
To: ZZ-DL-A-USEPR-DL
Cc: Arnold Lee; Jennifer Dixon-Herrity; Michael Miernicki; Joseph Colaccino; Meena Khanna; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 178 (1937), FSARCh. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 14, 2009, and discussed with your staff on January 26, 2009. Draft RAI Question 03.09.03-18

was modified 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
Email Number: 250

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Response to

Request for Additional Information No. 178 (1937), Revision 0

01/27/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.09.03 - ASME Code Class 1, 2, and 3 Components
Application Section: 3.9.3

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

Question 03.09.03-17:

In FSAR Section 3.9.3, AREVA states that the EPR design is based on the 2004 edition of ASME Code, Section III, Division 1, with no addenda. In RAI 3.9.3-01, the staff requests AREVA to confirm that for the design of components, component supports and core support structures, the requirements of 10 CFR 50.55a(b) will be met without exception. By email letter dated December 1, 2008, in referring to its response to RAI 5.2.1.1-4, AREVA stated that the code of record for the design of the U.S. EPR is the 2004 Edition of the ASME Code. AREVA, however, did not confirm that for the design of components, component supports and core support structures, the requirements of 10 CFR 50.55a(b) will be met without exception. It should be noted that at the time of the staff's review of the Topical Report, ANP-10264NP, AREVA responded (dated November 20, 2007) to staff's RAI EPR-3 by stating that piping analysis and pipe support design for the U.S. EPR uses the 2001 ASME Code, Section III, Division 1, 2003 Addenda as the base code with limitations identified in the Code of Federal Regulations, 10 CFR 50.55a(b)(1). The staff had found the response to be acceptable and, based on that, closed RAI EPR-3, as stated in the safety evaluation of the Topical Report (Section 3.1.1), dated May 19, 2008. With the 2004 Edition of the ASME Code now being designated as the code of record for the U.S. EPR, the staff requests AREVA to: (1) discuss the rationale behind the use of this 2004 Edition for the design of components, component supports and core support structures, instead of the 2001 Edition and 2003 Addenda of the Code; (2) confirm that all limitations identified in the Code of Federal Regulations, 10 CFR 50.55a(b)(1) are met without exception; (3) discuss reconciliations, if any, performed between the use of the two code editions.

Response to Question 03.09.03-17:

1. U.S. EPR FSAR Tier 2, Section 3.9.3 states: "The U.S. EPR design is based on the 2004 ASME Code, Section III, Division 1, with no addenda except as noted in Reference 2." Reference 2 is ANP-10264NP-A, "U.S. EPR Piping Analysis and Pipe Support Design Topical Report." At the time the NRC approved this topical report (TR), NRC had not yet revised 10 CFR 50.55a to the 2004 edition of ASME Code, Section III, Division 1. This was noted by NRC in their comments on AREVA NP's response to RAI-2 of this TR (Reference 1). Accordingly, in the revised response to RAI-2 (Reference 2), AREVA NP removed the reference to the 2004 edition of the code.

   In conjunction with the submittal of the design certification application, AREVA NP also submitted an exemption request to 10 CFR 50.55a (Reference 3) for use of the 2004 Edition of the ASME Code (no addenda) as referenced in the design certification application for the U.S. EPR. As noted in Reference 3, "While AREVA NP requests approval of the exemption concurrent with the approval of the application for design certification, publication of the final rulemaking to incorporate the 2004 Edition of the ASME Code (expected in April 2008, as noted in Reference 2) will render this exemption unnecessary." Additionally, Attachment 1 to Reference 3, stated: "Until such time as an exemption is granted, reconciliation has been conducted with the latest Code edition endorsed by the NRC."

   Subsequently, on September 10, 2008, NRC published the final rule (Reference 4) revision to 10 CFR 50.55a to incorporate by reference the 2004 Edition of Section III, Division 1, and Section XI, Division 1, of the ASME Boiler and Pressure Vessel Code (BPV Code), and the 2004 Edition of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code).

2. The U.S. EPR design conforms to the 2004 ASME Code, Section III, Division 1, with no addenda, without exception, subject to the limitations and modification identified in 10 CFR 50.55a(b)(1). U.S. EPR FSAR Tier 2, Section 3.9.3 will be revised to reflect this.

3. See item 1.

References for Question 03.09.03-17:

1. E-mail, Getachew Tesfaye (NRC) to Ronda M. Daflucas (AREVA NP Inc.), "Fwd: Review of EPR Topical Report - BNL Comments," dated August 23, 2007 (Accession Number ML073110113).

2. Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Revised Response to an RAI on the Topical Report ANP-10264NP 'U.S. EPR Piping Analysis and Pipe Support Design' (TAC No. MD3128)," NRC:07:064, November 20, 2007.

3. Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "10 CFR 50.55a Exemption Request for the U.S. EPR Standard Design Certification (Project No. 733)," NRC:07:076, December 11, 2007.

4. 10 CFR Part 50, RIN 3150–AH76, [NRC–2007–0003], "Industry Codes and Standards; Amended Requirements," Federal Register, Vol. 73, No. 176, dated September 10, 2008.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 3.9.3 will be revised as described in the response and indicated on the enclosed markup.

Question 03.09.03-18:

In RAI 3.9.3-4, the staff requests that AREVA commit to provide the design specifications of risk-significant mechanical components, as a minimum, for NRC audit. This is to ensure that the components are ready for procurement, and that the DCD design methodologies and criteria are adequately reflected in the associated component design specifications. For the design reports, the staff requests that AREVA discuss in the DCD its plan and schedule of making the design reports of EPR major mechanical components available for NRC audit, e.g., through an ITTAC, to ensure that AREVA has established a procedure to verify the completion of the EPR component design. By email letter dated December 1, 2008, AREVA states that a representative sample of the design specifications will be available for NRC inspection beginning April 1, 2009. The staff found this response to be inadequate, and requires that the design specifications of all safety-related mechanical components, not just a representative sample, be available for staff on-site review prior to the approval of the U.S. EPR design certification application. If the design will not be completed, staff has accepted a COL Item to make the component design specifications and design reports available for NRC review during the COL application review in the past. If this option is taken, it is expected that the design specifications would be made available for review by the COL applicant. Staff has asked a question in Chapter 14.3.3 with regards to component Design Reports. If the ITAAC addresses component design reports, the COL Item would only have to address Design Specifications.

Response to Question 03.09.03-18:

As noted in the response to RAI 107, Question 03.09.03-4, and based on discussions with the NRC on January 26, 2009 regarding this question, AREVA NP understands that the information requested in this question pertains to the design specifications required for safety-related ASME Code Class 1, 2, and 3 components. As discussed with NRC on January 26, 2009, the design specifications for safety-related ASME Code Class 1 reactor coolant system (RCS) heavy components (e.g., reactor pressure vessel, steam generator, pressurizer), piping, and supports will be available for NRC inspection by April 1, 2009. For safety-related ASME Code Class 2 and 3 components, design specifications are prepared for the following types of components: pumps, valves, tanks, and heat exchangers. A typical design specification for the safety-related ASME Code Class 2 and 3 pumps and a typical design specification for safety-related ASME Code Class 2 and 3 valves will also be available for NRC inspection by April 1, 2009. A typical design specification for the ASME Code Class 2 and 3 heat exchangers and ASME Code Class 2 and 3 tanks will be available for NRC inspection by June 1, 2009. AREVA NP believes that this will provide NRC sufficient information to perform their review of the U.S. EPR design certification application since the design specifications for each type of safety-related component have consistent design requirements.

AREVA NP proposes that the NRC inspection of these design specifications be performed at the AREVA NP office in Rockville, Maryland.

As noted in U.S. EPR FSAR Tier 2, Section 3.9.3 and in the response to RAI 107, Question 03.09.03-4, the combined license (COL) applicant is responsible for design reports for ASME Class 1, 2, and 3 components, piping, supports, and core support structures that comply with and are certified to the requirements of Section III of the ASME Code. Inspection, test, analysis, and acceptance criteria (ITAAC) have been established to implement this COL information item (e.g., U.S. EPR FSAR Tier 1, Table 2.2.1- 5).

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.09.03-19:

In FSAR Section 3.9.3.1.7, AREVA states that Table 3.9.3-4 provides the loading combinations and corresponding stress design criteria per ASME Service Level for ASME Class 1, 2, and 3 component supports. Table NF-3131(a)-1 is referenced for providing a cross-reference to various sections of NF for stress allowables for specific types of component supports. The staff reviewed through the NF sections listed in Table NF-3131(a)-1 and was not able to identify design stress criteria which are specifically applicable to snubbers. In RAI 3.9.3-13, the staff requests AREVA to provide the design stress criteria that are specifically applicable to snubbers, and discuss where the criteria are referenced from. By email letter dated December 1, 2008, AREVA stated that snubber components are purchased from a qualified vendor to meet the design stress criteria of the ASME Code requirements, as required by snubber design specifications. AREVA also stated that snubber vendors provide a certified load data sheet that states the design of its snubber meets the requirements of ASME Code Section III, Subsections NCA and NF. In addition, ASME Code Section III, Subsection NF, Paragraph NF-1214, "Standard Supports" provides guidance on the design of snubbers. The staff found the AREVA's response on the snubber design to be unacceptable. Since Paragraph NF-1214 does not provide relevant guidance for snubber design, and since Table NF-3131(a)-1 does not contain references that pertain to snubber design, the staff requests that FSAR Section 3.9.3.1.7 be revised to include pertinent snubber design criteria, regardless of which party will be responsible for the final snubber design.

Response to Question 03.09.03-19:

ASME NF-1214 item (c) list snubbers as an example of standard supports. The last three rows in Table NF-3131(a) -1 provide cross-references to design criteria for standard supports. NF-3400 provides design rules for standard supports and NF-3412.4 specifically addresses snubbers. NF-3400 also requires that NF-3300 be met as the snubber functions as a linear type support. Also, NF-3370 and NF-3380 address the design of linear supports by experimental analysis or load rating methods.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.09.03-20:

In FSAR Section 3.9.3.4.5, AREVA discusses the snubber supports for piping systems and provides a description of functional design and IST programs for snubbers. However, sufficient information is not provided for snubber production and qualification test programs. In RAI 3.9.3-14, the staff requests AREVA to address the following: (1) provide a description of the AREVA snubber production test program and qualification test program, for both mechanical and hydraulic snubbers; (2) provide justification if the production tests do not consider all snubbers in the population; (3) explain the basis of selecting samples for qualification tests, if sampling method is used; (4) discuss the procedures taken to demonstrate the required snubber load ratings; (5) discuss the acceptance criteria used to ensure that the snubber design comply with the specific requirements of ASME Code Section III, Subsection NF; (6) discuss the specific functional parameters (activation level, release rate, drag, dead band, etc.) considered for snubber production and qualification testing; (7) provide the acceptable codes and standards (including editions) used for the snubber production and qualification testing; (8) verify that the production operability testing for large-bore hydraulic snubbers (greater than 50 kips load rating) includes (i) a full Service Level D load test to verify sufficient load capacity, (ii) testing at the full load capacity to verify proper bleed with the control valve closed, (iii) testing to verify that the control valve closes within the specified velocity range, and (iv) testing to demonstrate that breakaway and drag forces are within the acceptable design limits. By email letter dated December 1, 2008, AREVA stated that the snubber vendor is responsible for the snubber production and qualification test programs in accordance with the applicable ASME Code standards and the AREVA NP design specifications. AREVA also stated that information on the inservice testing of snubbers is provided in U.S. EPR FSAR Tier2, Section 3.9.6. The staff found this response unacceptable, noting that the RAI is addressing the design aspects of the snubbers, not snubber IST programs. The staff determined that while item (5) of this RAI regarding the required acceptance criteria for snubber design may be referred to RAI 3.9.3-13 for additional AREVA response, AREVA is requested to provide acceptable responses to the remaining issues on snubber qualification testing and production testing.

Response to Question 03.09.03-20:

(1) In accordance with Section III of the ASME Code, a design specification for snubbers is generated. This specification addresses the qualification and production testing for mechanical and hydraulic snubbers, as applicable, in accordance with the guidance of Section QDR of ASME QME-1.

(2) Production tests address all snubbers in the population.

(3) Sampling techniques, if used, are in accordance with the guidance of Section QDR of ASME QME-1.

(4) Snubber load ratings are developed by the manufacturer using testing or analysis, as described in ASME Section III, Subsection NF. Certified design report summaries are provided by the manufacturer to document these load ratings.

(5) The acceptance criteria for snubber design are discussed in the response to Question 03.09.03-19.

(6) Functional parameters to be considered for testing are in the design specification, and are based on those identified in Section QDR of ASME QME-1.

(7) The snubber qualification and production testing is based on Section QDR of ASME QME-1.

(8) For large bore snubbers of greater than 50 kip capacity, the snubber design verification testing is in accordance with the recommendations of NUREG/CR-5416. This information will be added to U.S. EPR FSAR Tier 2, Sections 3.9.3.4.5 and 3.9.3.5.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 3.9.3.4.5 and 3.9.3.5 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

components are designed to have an extremely low probability of abnormal leakage, rapidly propagating failure, and gross rupture.

03.09.03-17

This section refers to U.S. EPR Piping Analysis and Pipe Support Design Topical Report (Reference 2) for information related to the design and analysis of safety related piping. This topical report presents the U.S. EPR code requirements, acceptance criteria, analysis methods, and modeling techniques for ASME Class 1, 2, and 3 piping and pipe supports. Applicable COL action items in the topical report are identified in the applicable portions of this section. The U.S. EPR design is based on the 2004 ASME Code, Section III, Division 1, with no addenda subject to the limitations and modification identified in 10 CFR 50.55a(b)(1) and the piping analysis criteria and methods, modeling techniques, and pipe support criteria described ~~except as noted~~ in Reference 2.

A design specification is required by Section III of the ASME Code for Class 1, 2, and 3 components, piping, supports, and core support structures. In addition, the ASME Code requires design reports for all Class 1, 2, and 3 components, piping, supports and core support structures documenting that the as-designed and as-built configurations adhere to the requirements of the design specification. A COL applicant that references the U.S. EPR design certification will prepare the design specifications and design reports for ASME Class 1, 2, and 3 components, piping, supports and core support structures that comply with and are certified to the requirements of Section III of the ASME Code.

Other sections that relate to this section are described below:

- Section 3.9.6 describes the snubber inspection and test program.
- Section 3.10 describes the methods and criteria for seismic qualification testing of Seismic Category I mechanical equipment and a description of their seismic operability criteria.
- Section 3.12 describes the design of systems and components that interface with the RCS with regard to intersystem LOCAs.
- Section 3.13 describes bolting and threaded fastener adequacy and integrity.
- Section 5.2.2 describes the pressure-relieving capacity of the valves specified for RCPB.
- Section 10.3 describes the pressure-relieving capacity of the valves specified for the steam and feedwater systems.

3.9.3.1 Loading Combinations, System Operating Transients, and Stress Limits

Section 3.9.3.1.1 describes the design and service level loadings used for the design of ASME Class 1, 2, and 3 components, piping, supports, and core support structures,

The above methods demonstrate that active plant valves perform their safety-related functions during postulated events. Section 3.9.6 also provides a description of the functional design and qualification provisions and IST programs for safety-related valves.

3.9.3.4 Component Supports

Load combinations, system operating transients, stress limits, and deformation limits for component supports are described in Section 3.9.3.1. Section 3.9.3.1 also describes the design and structural integrity of Class 1 linear-type and plate-and-shell-type support structures, in accordance with the criteria in RGs 1.124 and 1.130.

3.9.3.4.1 Component, Piping and Instrumentation Line Support Design

As described in Sections 3.9.3.1.6 through 3.9.3.1.8, core support structures and ASME Code Class 1, 2, and 3 component and piping supports meet the stress criteria of the ASME Code, using the loadings and combinations outlined in the corresponding tables for each of those sections. Additional information regarding these criteria is provided in Section 6 of Reference 2.

3.9.3.4.2 Jurisdictional Boundaries

The jurisdictional boundaries for pipe supports, including piping analyzed to ANSI B31.1 (Reference 5), are described in Section 6.2 of Reference 2.

3.9.3.4.3 Pipe Support Baseplate and Anchor Bolt Design

Pipe support baseplate and anchor bolt design is described in Section 6.4 of Reference 2.

3.9.3.4.4 Use of Energy Absorbers and Limit Stops

The use of energy absorbers and gapped rigid supports (limit stops) is addressed in Section 6.5 of Reference 2.

3.9.3.4.5 Use of Snubbers

Snubber supports for piping systems are described in Section 6.6 of Reference 2. Section 3.9.6 provides a description of the functional design and qualification provisions and IST programs for snubbers. For large bore snubbers of greater than 50 kip capacity, the snubber design verification testing recommendations provided in NUREG/CR-5416 (Reference 6) are followed.

03.09.03-20

3.9.3.5 References

1. ASME Boiler and Pressure Vessel Code, Section III, "Rules for Construction of Nuclear Facility Components," The American Society of Mechanical Engineers, 2004.

2. ANP-10264NP-A, "U.S. EPR Piping Analysis and Pipe Support Design Topical Report," AREVA NP Inc., ~~September 2006~~November 2008.

3. ANSI Standard B16.34, "Valves-Flanged, Threaded, and Welding End," American National Standards Institute, 2004.

4. IEEE Standard 344-2004, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, June 2005.

5. ANSI Standard B31.1, "Power Piping," American National Standards Institute, ~~2001~~2004.

6. NUREG/CR-5416, (EGG-2571), "Technical Evaluation of Generic Issue 113: Dynamic Qualification and Testing of Large Bore Hydraulic Snubbers," U.S. Nuclear Regulatory Commission, September 1992.

03.09.03-20