

ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Monday, July 26, 2010 7:20 AM
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Subject: U.S. EPR Design Certification Application RAI No. 420 (4687,4661), FSAR Ch. 3, OPEN ITEM
Attachments: RAI_420_EMB2_4687_4661.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 15, 2010, and on July 19, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. 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,
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Request for Additional Information No. 420(4687, 4661), Revision 0

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U. S. EPR Standard Design Certification
AREVA NP Inc.

Docket No. 52-020

SRP Section: 03.02.01 - Seismic Classification

SRP Section: 03.02.02 - System Quality Group Classification

Application Section: 3.2.1

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

03.02.01-12

OPEN ITEM

FSAR Subsection 3.2.1.1 in combination with Subsection 3.1.1.2.1 identify that safety-related SSCs are designed either to withstand the effects of natural phenomena, including the SSE, without loss of capability to perform their safety-functions, or to fail in a safe condition. GDC 2 actually applies to all important to safety SSCs and not only SSCs that are considered safety related. In RAI 03.02.01-1, the staff requested the applicant to expand FSAR Subsections 3.2 and 3.1.1.2.1 to clarify how GDC 2 is satisfied relative to SSCs that are not identified as safety-related, but are considered important to safety and have augmented seismic requirements, such as the nonsafety-related fire protection system or any SSC that is classified as Seismic Category II. The RAI response gave several examples from earlier NRC documents that definitions of safety-related and important to safety are the same. The applicant also stated that U.S. EPR conforms to the RGs (1.29, 1.143, 1.151 and 1.189) listed in the SRP 3.2.1; therefore, the U.S. EPR SSCs are designed to the requirements of GDC 2.

Based on the applicant's RAI response, the applicant's process to apply the terms safety-related and important to safety to the classification of SSCs is considered unclear and unresolved such that additional information is needed to clarify how these terms are applied and to explain the process to develop supplemental quality requirements (special treatment) for nonsafety-related risk-significant SSCs considered important to safety to satisfy GDC 2. To comply with GDC 2 for seismic classification, further clarify how these terms are applied to satisfy GDC 2, revise the FSAR subsection 3.1.1.2.1 stated conformance to GDC 1 to replace the term "safety related" with the more comprehensive term "important to safety" and factor risk significance into quality group classification, based on the definition of the term important to safety in 10 CFR 50.

In regard to risk significance, the Staff is concerned that the applicant has not adequately identified risk-significant SSCs in the FSAR that may be important to safety or defined supplemental design and quality requirements to ensure their availability after an earthquake and reliability assumed in the PRA. Portions of nonsafety-related systems that are risk-significant may be important to safety and require special treatment and appropriate seismic classification so that they are designed to withstand earthquakes consistent with assumptions in the PRA. The complete list of risk-

significant SSCs is developed in phases and SRP 17.4 indicates that, during the first phase, SSCs are identified for inclusion in the program. The response to RAI 17.4-1 includes a component list as PRA input to the RAP component identification process and the response to RAI 17.04-2 identifies that the full scope RAP will include passive components and the COL applicant is to provide the final list. The response to RAI 17.04-16 further identified that the FSAR will be revised to include a list of risk-significant SSCs. Since risk-significant SSCs are to be included in Section 17.4 of the DCD, the scope of risk-significant SSCs is to be evaluated in that subsection in combination with the Chapter 19 evaluation. The supplemental seismic requirements needed to satisfy GDC 2 for risk-significant SSCs are unclear and the applicant should either identify these specific requirements or explain the process, such as D-RAP and the NS-AQ classification process, used to develop and apply these requirements. For example, the basis for concluding that all risk-significant SSCs important to safety are designed to withstand earthquakes should be identified.

03.02.01-13

OPEN ITEM

The seismic classification of each SSC depends on the safety function and classification as safety-related or nonsafety-related. FSAR Subsection 3.2 does not clearly define the safety function of SSCs that are important to safety, but are classified as nonsafety-related. For example, certain components considered nonsafety-related that are internal to the reactor vessel, or part of the control rod drive system, accident monitoring functions, severe accident instrumentation and control and the core melt stabilization system appear to be important to safety, but are not specifically identified as safety-related and seismic category I. It is presumed that these SSCs do not perform one of the three specific safety-functions defined as safety-related, but it is not clear if these SSCs are required to be or are credited to be functional during or following a seismic event.

For those SSCs that are important to safety and are classified as nonsafety-related in FSAR Table 3.2.2-1, the applicant was requested in RAI 03.02.01-3 to clarify the technical basis for each nonsafety-related classification and identify if the seismic classification as seismic category II or other seismic classification is consistent with the PRA assumptions.

The RAI response iterated that the terms safety-related and important to safety are synonymous. The staff disagrees that these terms are synonymous and this is addressed in RAI 03.02.01-1. The applicant also referred to Chapter 19 RAI responses that provided a list of SSCs modeled in the PRA-based seismic margin assessment. However, Table 19.1-107 provided in the responses does not list specific equipment with component numbers, and it is still not clear if the specific SSCs discussed in RAI 03.02.01-03 are credited to be functional during or following a seismic event. As indicated in the Chapter 19 RAI responses, the seismic margin assessment does not credit SSCs that are not seismically qualified, but the applicant should establish the basis for post earthquake functionality of any important to safety SSCs that are currently classified as nonseismic. If there are no important to safety SSCs that are classified as non-seismic, the applicant should so clarify.

03.02.01-14

OPEN ITEM

On the basis of FSAR Table 1.9-4 and Subsection 19.1.7.5, it is understood that the RTNSS process is not applicable to the US EPR design. However, risk insights can provide useful information in determining the safety significance and seismic classification of important to safety SSCs that are either considered safety-related or nonsafety-related. The Staff Requirement Memorandum (SRM) on SECY-95-132 approved that applications for new reactors would include a list of risk-significant SSCs. The list of risk-significant SSCs that are part of the reliability assurance program could not be located in either Subsection 17.4 or Section 19 of the FSAR, but the subsequent response to RAI 17.4-1 includes a component list as PRA input to the RAP component identification process and the response to RAI 17.04-2 identifies that the full scope RAP will include passive components and the COL applicant is to provide the final list. The response to RAI 17.04-16 further identified that the FSAR will be revised to include a list of risk-significant SSCs.

In RAI 03.02.01-4, the applicant was requested to advise if the PRA or other design documents identify the safety significance of each important to safety SSC when subjected to an SSE so that the seismic classification can be evaluated based on the specific safety function. If this design information and list of risk-significant SSCs is in a topical report or other auditable form, reference the appropriate documents.

The RAI response referred to Chapter 17 RAI responses that provided several lists of important SSCs based on the Fussell-Vesely value, risk achievement value or common cause. The response to Chapter 17 RAI also provided a list of systems that were added to the reliability assurance program. In Table 17.04-1-1 attached to RAI response 17.04-1, components such as the station black out diesel generators XKA50 and XKA80 are identified as risk significant components; however, in Table 3.2.2-1 of the FSAR, the station black out generators are designated as non-seismic. As stated previously, the nonseismic SSCs are not credited in the seismic margin assessment, so the applicant should clarify the basis for the non-seismic classification of any risk-significant SSC such as the station blackout diesel generators.

03.02.01-15

OPEN ITEM

10 CFR Part 52.47 identifies that the Commission will require prior to design certification, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit. FSAR Tier 1 Chapter 2 includes system based design descriptions including structures. This Chapter identifies that specifications exist for components, piping and supports shown as ASME Section III. It is understood that this information is based on the information included in FSAR Tier 2 and design specifications are required for ASME Section III systems and components, but it is not clear if specifications exist for structures and non-ASME systems and components. In RAI 03.02.01-5, the applicant was requested to clarify if the design information on seismic classification for all important to safety SSCs within the scope of the certified design, including structures, is included in specifications and if this information is now available for audit.

The RAI response stated that the design information contained in the Tier 2 portion of the design certification application is provided in system design requirements documents, system description documents and P&IDs. The design information on the seismic classification for SSCs within the scope of the certified design, including structures, is included in these design documents which are available for NRC inspection. The applicant also clarifies that the statements in Tier 1 are written in the present tense as they would exist at the time that a closeout letter is submitted. The Tier 1 statement that specifications exist does not imply that they currently exist. The staff will schedule the audit when the design information is available, and the applicant is requested to identify when such design information will be available.

03.02.01-16

OPEN ITEM

FSAR Tier 1 Chapter 2 and FSAR Tier 2 Subsection 14.3 describe various ITAAC to confirm that systems designated as ASME Section III have been designed and tested in accordance with Code requirements. It is not clear if there is a proposed ITAAC or DAC to address the design and testing of other systems that may be important to safety that are not constructed to ASME Section III. In RAI 03.02.01-6, the applicant was requested to identify if there is an ITAAC or DAC to address the design and analysis of other important to safety systems that are not designated as ASME Section III or explain why an ITAAC or DAC is not required.

In its response, the applicant clarified that ITAAC are also provided in the U.S. EPR FSAR Tier 1 for safety-significant systems that are not specified as ASME Code Section III. For example, ITAAC are provided in the U.S. EPR FSAR Tier 1, Section 2.3.3 for portions of the severe accident heat removal system (SAHRS), such as the SAHRS pump, SAHRS heat exchanger, and spray header that are not specified as ASME Code Section III.

Tier 1 Table 2.2.8-2 lists ITAAC for Seismic Category II equipment 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 review all ITAAC tables to include Seismic Category II SSCs. If ITAAC do not include all Seismic Category II SSCs, state the basis. The applicant stated in its response that safety significant design features are included in U.S. EPR FSAR Tier 1, and the associated Seismic Category II entries in FSAR Tier 1 tables will be deleted. Regulatory Position C.2 of RG 1.29 states that non-safety related SSCs that can reduce the function of safety-related SSCs should be designed and constructed to withstand the effect of an SSE. If the applicant decides not to have Seismic Category II ITAAC on an SSC level, at a minimum, there should be a generic ITAAC to ensure that the as-built nonsafety-related SSCs in the plant will not reduce the function of safety-related SSCs during and after an SSE. The applicant is requested to clarify if a generic ITAAC exists to verify classifications and if Tier 1 ITAAC are consistent with Tier 2 ITAAC.

03.02.01-17

OPEN ITEM

GDC 2 identifies that SSCs that are important to safety are to be designed to withstand the effects of earthquakes. Certain electrical systems that are considered risk-significant

are identified in Table 3.2.2-1 as nonsafety-related and NSC (non-seismic). For example, portions of the PAS, PPS, NPSS, 12UPS and AAC electrical systems are identified as having a high review level in the NRC's risk insights document that is based on the applicant's Chapter 19 information, but these systems are identified as nonsafety-related and are classified as NSC. In RAI 03.02.01-7, the applicant was requested to identify the basis for the NSC classification for these potentially risk-significant and important to safety electrical systems.

The RAI response referred to the response to RAI 03.02.01-3. The response to RAI 03.02.01-3 iterated that the terms safety-related and important to safety are synonymous. The staff disagrees with the applicant that these two terms are synonymous. The response also referred to Chapter 19 RAI responses that provided a list of SSCs modeled in the PRA-based seismic margin assessment. However, Table 19.1-107 provided in the responses does not list specific equipments with component numbers, and it is still not clear the basis for classifying the PAS PPS, NPSS, 12UPS and AAC electrical systems as NSC. The applicant is requested to justify the seismic classification of risk-significant electrical systems that may be important to safety. Alternatively, if the seismic classification of electrical systems is addressed in Chapter 8, the applicant should so indicate.

03.02.02-7

OPEN ITEM

General Design Criterion 1 identifies, in part, that structures systems and components important to safety shall be designed, fabricated, erected and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. The QA Plan described in Topical Report ANP-10266A, Revision 1 applies to both safety-related and nonsafety-related SSCs, but this report does not identify a specific list of important to safety SSCs that require application of the 10 CFR 50 Appendix B QA Program or the list of nonsafety-related SSCs that apply the QA program that is not consistent with Appendix B. Table 3.2.2-1 of the DCD does include a list of safety-related and nonsafety-related SSCs defined as NS-AQ that require the application of an Appendix B Program, but the list of specific nonsafety-related SSCs that apply the quality assurance program that is not consistent with Appendix B is not clearly defined. In RAI 03.02.02-2, the applicant was requested to clarify which nonsafety-related SSCs apply the QA Program for nonsafety-related SSCs and identify if these SSCs have a unique quality classification.

The RAI response identifies that SSCs classified as supplemental grade (NS-AQ) are included in the 10 CFR 50 Appendix B QA Program, if inclusion is explicitly invoked by the relevant significant licensing requirement or commitment. The response references the response to RAI 03.02.01-1 for further discussion of the NS-AQ classification. The Staff is concerned that SSCs with a Safety Classification of NS-AQ that may be important to safety do not consistently invoke the 10 CFR 50 Appendix B program or elements of a similar program. For example, the Station Blackout Diesel Generator Set is considered risk-significant and is classified as NS-AQ, but there is no 10 CFR 50 Appendix B program or similar special treatment identified in the Classification Table 3.2.2-1. The applicant is requested to review classification Table 3.2.2-1 and identify

those additional risk-significant SSCs that should apply the 10 CFR 50 Appendix B program or similar special treatment provisions.

03.02.02-8

OPEN ITEM

FSAR Subsection 3.2 describes supplemented grade as those SSCs deemed to be important by NRC staff. Important to safety SSCs are not deemed important by NRC staff, but are identified as important to safety by the applicant's evaluation process such as the PRA, expert panel or other RTNSS process. FSAR Table 3.2.2-1 identifies those SSCs that are defined as NS-AQ. In RAI 03.02.02-3, the applicant was requested to revise the Subsection 3.2 wording to clarify the applicant's process to determine SSCs that are important to safety and, for those SSCs classified as NS-AQ, identify the supplemental design and quality requirements to ensure the reliability assumed in the PRA. If this information is not currently available and will be determined later, the applicant was requested to advise accordingly.

The RAI response stated that the FSAR will not be revised and refers to RAI questions 03.02.01-1 and 03.02.01-4 and FSAR Tier 2 Section 17.4 for a description of the reliability assurance program. The responses to the referenced RAIs and the description of the reliability assurance program in Chapter 17.4 do not currently identify the list of risk-significant SSCs or define the supplemental design and quality requirements for each nonsafety-related SSC classified in Table 3.2.2-1, such as NS-AQ, that may be important to safety. However, the response to RAI 17.04-16 identified that the FSAR will be revised to include a list of risk-significant SSCs. Identify or reference the list of nonsafety-related SSCs requiring special treatment in the FSAR, such as NS-AQ or other list of risk-significant SSCs and confirm that all nonsafety-related SSCs are or will be included in Table 3.2.2-1 with an appropriate classification based on its risk significance. Also identify the special treatment applied or, if not yet developed, revise FSAR subsection 3.2.2 to reference the D-RAP or other process to ensure the integrity and reliability assumed in the PRA and identify when the special treatment requirements are to be identified.

03.02.02-9

OPEN ITEM

FSAR subsections 3.2.1.1 and 3.2.1.2 identify that Seismic Category I and II SSCs are subject to the quality assurance program requirements of 10 CFR Part 50, Appendix B. FSAR Table 3.2.2-1 typically identifies that the 10 CFR 50 Appendix B QA Program applies to SSCs classified as Seismic Category I or II. However, in FSAR Table 3.2.2-1, a limited number of nonsafety-related SSCs classified as Seismic Category I and Seismic Category II are not required to apply the 10 CFR 50 Appendix B Program. For example, certain nonsafety-related monitors supporting the leak detection system are identified as Seismic Category I with no 10 CFR 50 Appendix B Program applied. In RAI 03.02.02-4, the applicant was requested to correct this apparent discrepancy or justify the basis for not applying pertinent requirements of the 10 CFR 50 Appendix B Program to SSCs that are classified as Seismic Category I and II.

The RAI response identified that a review of Table 3.2.2-1 determined that the 10 CFR 50 Appendix B program was not applied to certain Seismic Category I items including KLC system mechanical components and radioactivity monitors used to support the leak detection system. The applicant identified that Table 3.2.2-1 will be revised to apply the 10 CFR 50 Appendix B program to these mechanical components. However, the response did not address Seismic Category II SSCs, such as the KLC system Fire Dampers. Clarify if all Category II SSCs, such as the KLC system fire protection dampers, apply pertinent requirements of the 10 CFR 50 Appendix B program and update FSAR Table 3.2.2-1 to be consistent.

03.02.02-10

OPEN ITEM

10 CFR Part 52.47 identifies that the Commission will require prior to design certification, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit. FSAR Tier 1 Chapter 2 includes system based design descriptions. This chapter identifies that specifications exist for components, piping and supports shown as ASME Section III. It is understood that this information is based on the information included in FSAR Tier 2 and design specifications are required for ASME Section III systems and components, but it is not clear if specifications exist for non-ASME systems and components. In RAI 03.02.02-6, the applicant was requested to clarify if the design information on quality group classification for all important to safety systems and components within the scope of the FSAR is included in specifications and if this information is now available for audit. The RAI response referenced the response to RAI 03.02.01-5. The response to RAI 03.02.01-5 identified that the design information on the seismic classification of SSCs within the scope of the FSAR, including structures, is included in design documents which are available for NRC inspection. The NRC Staff plans to audit this information to determine if the design is essentially complete in scope regarding quality group classifications of important to safety SSCs. Staff is concerned that P&IDs included in Tier 1 may not be consistent with P&IDs in Tier 2 concerning classification level of detail. The staff will schedule an audit based on availability of the documentation. The applicant is requested to correct any discrepancies between Tier 1 and Tier 2 and identify when the design information will be available.

03.02.02-11

OPEN ITEM

FSAR Tier 1 subsection 1.0 identifies that Tier 1 information is derived from Tier 2 and SRP 14.3 states that safety findings are based on Tier 2, not Tier 1, information because Tier 1 information is derived from Tier 2. SRP 14.3 further identifies that Tier 1 is to be clear and consistent with Tier 2 information. In regard to the FSAR Tier 1 ASME Code Class information included in the Chapter 2 system based design descriptions and ITAAC, update the figures included in Tier 1 to be consistent with Tier 2 figures in terms of level of detail for ASME classifications.