ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
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To: 'usepr@areva.com'
Cc: Wheeler, Larry; Segala, John; ODriscoll, James; Jackson, Christopher; Snodderly, Michael; McCann, Edward; Radlinski, Robert; Wolfgang, Robert; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: Draft - U.S. EPR Design Certification Application RAI No. 277 (3538,3371,3372,3376,3374,3375,3399,2995)), FSAR Ch. 9
Attachments: Draft RAI_277_SBPB_3538_SPCV_3371_3372_3376_3374_3375_SBPA_3399_2995.doc

Attached please find draft RAI No. 277 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

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From: Tesfaye, Getachew

Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Wheeler, Larry" <Larry.Wheeler@nrc.gov>
Tracking Status: None
"Segala, John" <John.Segala@nrc.gov>
Tracking Status: None
"ODriscoll, James" <James.ODriscoll@nrc.gov>
Tracking Status: None
"Jackson, Christopher" <Christopher.Jackson@nrc.gov>
Tracking Status: None
"Snodderly, Michael" <Michael.Snodderly@nrc.gov>
Tracking Status: None
"McCann, Edward" <Edward.McCann@nrc.gov>
Tracking Status: None
"Radlinski, Robert" <Robert.Radlinski@nrc.gov>
Tracking Status: None
"Wolfgang, Robert" <Robert.Wolfgang@nrc.gov>
Tracking Status: None
"Hearn, Peter" <Peter.Hearn@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
Tracking Status: None
"'usepr@areva.com'" <usepr@areva.com>
Tracking Status: None

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Request for Additional Information No. 277 (3538,3371,3372,3376,3374,3375,3399,2995), Revision 0

8/17/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.05 - Ultimate Heat Sink
SRP Section: 09.04.01 - Control Room Area Ventilation System
SRP Section: 09.04.02 - Spent Fuel Pool Area Ventilation System
SRP Section: 09.04.03 - Auxiliary and Radwaste Area Ventilation System
SRP Section: 09.04.04 - Turbine Area Ventilation System
SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System
SRP Section: 09.05.01 - Fire Protection Program
SRP Section: 09.05.06 - Emergency Diesel Engine Starting System

Application Section: 9.2.9

QUESTIONS for Balance of Plant Branch 2 (ESBWR/ABWR) (SBPB)
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)
QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

09.02.05-21

Based on the staff's review of the RAI 169/09.02.05-02 response dated January 22, 2009, the applicant did not address the 10 CFR 52.47(a)(24) and (a)(25) regulations which state:

> "(24) A representative conceptual design for those portions of the plant for which the application does not seek certification, to aid the NRC in its review of the FSAR and to permit assessment of the adequacy of the interface requirements in paragraph (a)(25) of this section;
>
> (25) The interface requirements to be met by those portions of the plant for which the application does not seek certification. These requirements must be sufficiently detailed to allow completion of the FSAR;"

Since the design of the raw water supply system (RWSS) is not provided in the EPR design certification (DC) application, the RWSS is by definition a portion of the plant for which the application does not seek certification. Therefore, to comply with 10 CFR 52.47(a)(24), the FSAR needs to be revised to include a conceptual design for the RWSS. Also, to comply with 10 CFR 52.47(a)(25), the FSAR, including Chapter 4, "Interface Requirements," of Tier 1, needs to be revised to include sufficiently detailed interface requirements for the RWSS that must be satisfied by combined license applicants when they provide their plant specific RWSS design.

In regards to the safety-related ultimate heat sink (UHS) design, FSAR Section 9.2.5.5, "Safety Evaluation," states that:

"The cooling towers must operate for a nominal 30 days following a LOCA without requiring any makeup water to the source or it must be demonstrated that replenishment or use of an alternate or additional water supply can provide continuous capability of the heat sink to perform its safety-related functions. The tower basin contains a minimum 72-hour supply of water. After the initial 72 hours, the site specific makeup water system will provide sufficient flow rates of makeup water to compensate for system volume losses for the remaining 27 days."

Since the plant specific RWSS will be needed to replenish the UHS basin post 72 hours, the plant specific RWSS will need to be safety-related and the staff will need to review the EPR DC interface requirements to ensure that the plant specific RWSS design will be capable of performing its safety-related makeup function.

09.04.01-1

Discuss method by which the capability of the safety-related ventilation systems will be verified. The applicant has provided the performance requirements for the various safety-related ventilation systems (Described in FSAR sections 9.4.1,2,5,6,9,11) but has not provided detailed design information related to the sizing of the ventilation systems. Adequate sizing of the system is assured through the surveillance requirements (for example SR 3.7.11.1) which verifies the capability or the system to remove the design heat load.

The applicant did not verify the capability of the systems. For each safety related ventilation system, provide the following:

1. Provide a description in the FSAR that verifies the capability of the system to remove the design heat load. The applicant should describe the method for verification (by testing and/or analysis) as well as a description of the methods for determining the design heat loads including the limiting or bounding assumptions for all modes of operation including normal and outage, and during all anticipated occurrences including postulated accident events.
2. Include this demonstration as part of ITAAC. Existing ITAAC (e.g., Reference Section Number 6.1 in Tier 1 Table 2.6.1-3) acceptance criteria is not adequate to verify the system's capability to maintain ambient temperature conditions in the Control Room Envelope for all modes of operation.
3. The staff noted that the CRACS space heaters are non-safety augmented quality (NS-AQ) and Seismic Category II. The staff has also noted that the heaters associated with the control room air intake and iodine filtration system are safety related. Please describe the analysis that demonstrates the failure of the CRACS space heaters would not challenge the operability of MCR equipment, adversely affect human performance in the MCR, or would still allow the minimum MCR temperature of 68°F to be met, for all outside temperature ranges stated in FSAR Table 2.1-1. Alternatively, designate the heaters safety-related and include the design basis for the heaters in the FSAR.
4. This is SER/OI Open Item 9.4.1-1

09.04.02-1

Heating is defined as a safety related function in tier 1 (para 2.6.4.1)- Tier 2 has heating listed as both a safety and non safety function. Confirm that Tier 1 drawing on SFP system be revised

to include heaters. If heaters are safety related, they should be listed in Tier 1 table 2.6.4.2 I&C sheets for displays and controls. If the heaters are not safety-related, an explanation should be provided justifying the heaters non safety related status.

09.04.02-2

FSAR section 9.4.2.5 states the minimum instrumentation indication and alarms for *ESF filter Systems* are provided in Table 9.4.1-1 Per FSAR section 9.4.2.1. FBVS is not an ESF filter system. RG 1.140 applies to this system, therefore the FSAR is unclear to the instrumentation that will be supplied other than the list in Tier 1 (Tier 1 Table 2.6.4-2). This table lists fan and damper position indication and control- no requirements for other MCR instrumentation. If there is no MCR instrumentation for FBVS, the design may not be in accordance with RG 1.140 for MCR instrumentation. RG 1.140 states in para 3 3.3 that system should be instrumented IAW ASME N509-1989. Instrumentation requirements for this system needs to be described in the FSAR.

09.04.03-1

To ensure reliable in-place testing, Regulatory Guide 1.140, Position C3.2, states that the volumetric air-flow rate of a single cleanup unit should be limited to approximately 30,000 cfm. RAI No. 135, Question 09.04.05-1 (#8) requested the applicant to provide data indicating that the maximum flow rate for a single cleanup unit would not exceed 30,000 cfm or multiple units should be selected. While the low flow purge subsystem flowrate of 3,000 cfm was provided, the response did not specify that the maximum flowrates for single cleanup unit would not exceed 30,000 cfm or require multiple units for the internal filtration subsystem, the containment building cooling subsystem and the service and equipment compartment cooling subsystem. The open item can be resolved by providing a statement indicating that the volumetric air-flow rate of a single cleanup unit will not exceed 30,000 cfm or multiple units will be selected for the internal filtration subsystem, the containment building cooling subsystem and the service and equipment compartment cooling subsystem. If the applicant elects not to follow the recommendation of Regulatory Guide 1.140, Position C3.2; then an alternative approach demonstrating compliance with GDC 60 should be provided.

A normal atmosphere cleanup system housings and ductwork should be designed to exhibit, on test a maximum total leakage rate as defined in Article SA-4500 of ASME AG-1-1997 Ref. 3, Regulatory Guide 1.140, Position C3.6. The applicant did indicate in FSAR Tier 2, Section 9.4.7.2.1 that the containment purge subsystem is designed in accordance with ASME AG-1-2003. However, the applicant did not provide information indicating that the internal filtration subsystem, the containment building cooling subsystem and the service and equipment compartment cooling subsystem are designed to ASME AG-1-2003. The applicant should state that the above systems are designed in accordance with ASME AG-1-2003. If the applicant elects not to follow the recommendation of Regulatory Guide 1.140, Position C3.6; then provide an alternative approach demonstrating compliance with GDC 60.

09.04.03-2

There is an inconsistency between figure 9.4.12-1 and FSAR section 9.4.12.1 regarding the Seismic classification of the Main Steam and Feedwater Valve Room Ventilation System

(VRVS). Section 9.4.12.1 states VRVS is supplemented grade (NS-AQ), designed to Seismic Category II, the Figure 9.4.12-1 identifies the components as SSC Quality Group "E" (non safety related) and SSC Seismic class "NSC" (non-seismic). Please clarify. If non-seismic is selected, justify the non-seismic design.

09.04.03-3

Clarify the role of the CBVS in meeting GDC 41 and GDC 42

The FSAR in section 9.4.7.1 states "The containment purge subsystems remove radioactive materials via iodine filtration trains prior to release to the atmosphere (GDC 41)." However, the containment building ventilation system does not meet the requirements for General Design Criterion 41, because it is not designated as a safety system. Although these systems are designed to Seismic Category I requirements, it is not designated as a safety system. The FSAR in section 9.3.7.3 states, "The CBVS is not an engineered safety feature and has no safety-related function except the containment isolation and low-flow purge." This is inconsistent with crediting it as the system designed to meet GDC 41 which requires a safety system capable of performing the safety function assuming a single failure and loss of offsite power. The applicant needs to clarify the role of the CBVS in meeting GDC 41. The applicant needs to state how GDC 41 is met (this is typically described in FSAR section 6.2.5 and 6.5). If the CBVS system is credited the applicant needs to describe the meeting of the requirements of GDC 41.

The containment building ventilation system has not been shown to meet the requirements of GDC 41. As a result, the staff is unable to determine if the requirements for General Design Criterion 42 are met until it can determine if the requirements of GDC 41 are met.

09.04.04-1

Inconsistency between COL interface for Turbine Building and Switchgear Building in Tier 1 and Tier 2.

Tier 2 Table 1.8-2 does not list any COL Information items related to Section 9.4.4, The Turbine Building Ventilation System, yet paragraph 1.8 notes that the Switchgear Building and The Turbine Building designs are portions of the plant not submitted for certification. It is inferred that these building designs must include the TBVS design. Tier 1 Chapter 4 lists the design of the Turbine Building and the Switchgear buildings as 10 CFR 52.47(a)(25) interface requirements.

Clarify Tier 2 to provide the COL information items that are required for the design of the Turbine Building and Switchgear Buildings Ventilation Systems. As a minimum a COL applicant should provide enough design details on the TBVS, as described in Regulatory guide 1.206, such that NRC staff can come to required findings on the system detailed in NUREG 0800, Standard Review Plan chapter 9.4.4.

09.04.04-2

There is insufficient information for the staff to reach a safety finding on FSAR section 9.4.4, Turbine Building Ventilation system.

Section 9.4.4 of the EPR FSAR states that the TBVS is a non-safety related system. The system as described in the RAI 9.4.5-1 item #10 response; "maintains heating and ventilation in

the Turbine Building (UMA) and heating ventilation and cooling in the Electrical Switchgear Building (UBA)".. Without some design information on the ventilation systems, the NRC staff cannot independently verify that there are aspects of the system that are not significant to safety. NRC staff must come to a safety finding in accordance with Standard Review plan chapter 9.4.4 on General Design Criteria 2, 5, and 60 among other findings. There is insufficient information provided in the Final safety analysis report to come to safety review findings on these criteria and criteria in related Regulatory Guides by review of the paragraph in section 9.4.4 alone. For some review findings, use of drawings, failure modes and Effects Analyses, and other information that is typically supplied with a complete FSAR is required.

You state, however, that the Turbine Building and the Switchgear Buildings, which contain the TBVS are 10 CFR 50.47(a)(25) interface items in Tier 1, yet do not accompany that declaration with a Tier 2 COL information item to supply the TBVS design details sufficient such that NRC staff can make regulatory findings in accordance with SRP 9.4.4.

Add a COL information item that requires a COL applicant that references the EPR standard design to submit all TBVS design information as described in Regulatory guide 1.206 such that NRC staff can come to required findings on the system detailed in NUREG 0800, Standard Review Plan chapter 9.4.4.

Alternatively, revise FSAR chapter 9.4.4 to include enough design details on the TBVS, as described in Regulatory guide 1.206 such that NRC staff can come to required findings on the system detailed in NUREG 0800, Standard Review Plan chapter 9.4.4.

09.04.05-2

GDC 2 requires the Engineered Safety Function Ventilation System being capable of withstanding the effects of earthquakes. SRP 9.4.5 includes GDC 2 as specific acceptance criteria. FSAR Tier 2 Section 9.4.5.1 indicates that the Safeguard Building Controlled Area Ventilation system is designed to Seismic Category I except for the following:

a. Supply air ductwork which is classified as supplemented grade safety (NS-AQ) and designed to Seismic Category II requirements.

b. Electric air heating convectors which are non-safety-related and Non-Seismic.

FSAR Table 3.2.2-1 indicates that the fire dampers are supplemented grade safety (NS-AQ) and designed to Seismic Category II requirements.

Since the SBVS fire dampers are classified as Seismic Category II (FSAR Tier 2 Table 3.2.2-1), they are not expected to function after an SSE (RG 1.29 Position C.2). The fire dampers after an SSE can be assumed to fail closed, thereby isolating the SB rooms from the normal and accident exhaust trains in each of the four SBVS divisions. Additionally, Seismic Category II ductwork can be assumed to deform (restricting airflow) but not impact or cause harm to a Seismic Category I SSC. Finally any nonsafety-related active component can be assumed to fail when challenged during any accident.

The applicant is requested to either show that potential failure of these components will not reduce the safety function of the SBVS or classify the components as Seismic Category I.

09.05.01-70

Response to RAI No. 20 for Question 09.05.01-63 stated that "U.S. EPR FSAR Tier 1 provides ITAAC to verify the safety significant design features are present in the as-built design. U.S. EPR FSAR Tier 2, Table 14.3-3—Fire Protection (Safety- Significant Features), contains the list of safety-significant features for fire protection. No safety significant features are identified for the portable wireless communication system. Therefore, ITAAC are not included in U.S. EPR FSAR Tier 1, Table 2.4.21-2—Communication System ITAAC."

The NRC staff does not find this resolution acceptable since SRP 14.3, Section III, "Review Procedures" specifies Regulatory Guides as one of the procedures to review for ITAAC safety significance for which RG 1.189 guidance requires the use of portable radio communication since it is vital to safe shutdown and is, therefore considered important to safety. Include the Portable Wireless Communication System in Table 2.4.21-2.

09.05.01-71

Response to RAI No. 223 Question 09.05.01-69 Item (c.) stated that “The oil collection system, including the drainage piping and collection tank, is completely enclosed. Therefore, any lube oil leakage will remain within the lube oil collection system.” U.S. EPR FSAR, Tier 2, Section 9.5.1.6.1, states that “The RCP motors each contain an upper and lower bearing that have independent oil lubrication systems. Both lubrication systems have an internal oil supply that is cooled with water via an oil cooler. Therefore, there is no external lube oil supply or associated connection lines. In the event of a lube oil leak at a bearing, an alarm is displayed in the MCR. Additionally, the ability to confine and safely drain the lube oil leakage is provided via an RCP lube oil collection system at each pump.” However, the oil coolers are external to the RCPs as per NRC discussion with AREVA in a teleconference. These coolers are potential leakage points external to the RCPs. Update the FSAR to clarify if there are potential oil leakage points external to the pumps, such as the oil coolers; include in the FSAR description the applicable wording from the response to RAI No. 223, Question 09.05.01-69 Item (c.); and state that external piping and equipment, including the oil coolers, are enclosed by the oil collection system. Additionally, update the FSAR by adding that the RCP lube oil collection systems are designed in accordance with RG 1.189 (Rev. 1) Position 7.1 and by including Response Item (d.) since it is an alternate approach for seismic considerations.

09.05.06-12

RAI 09.05.06-4 asked the applicant to specify the type of air dryers used in the DGSAS and demonstrate its compliance with the recommendations of NUREG/CR-0660. The applicant responded by stating that today there are more moderen alternatives available for air dryers, and that they intend to take advantage of advances in design since NUREG/CR-0660 was published, and they intend to meet the intent of the recommendations in NUREG-CR-0660.

The applicant needs to specify the type of air dryers used in the DGSAS and demonstrate its compliance with the recommendations of NUREG/CR-0660.