ArevaEPRDCPEm Resource

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Subject: Draft - U.S. EPR Design Certification Application RAI No. 461(5223, 5292, 5293), FSAR Ch. 9
Attachments: Draft RAI_461_SPLA_SPCV_5223_5292_5293.doc

Attached please find draft RAI No. 461 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,
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Request for Additional Information No. 461 (5223, 5292, 5293), Revision 0

12/8/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.04.01 - Control Room Area Ventilation System
SRP Section: 09.04.03 - Auxiliary and Radwaste Area Ventilation System
SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System

Application Section: 9.4.

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

09.04.01-3

One of the safety-related functions of the SBVSE described in FSAR Tier 2, Section 9.4.6 is to maintain hydrogen concentration below allowable limits. EPR Tier 1 states that the Electrical Division of the Safeguards Building Ventilation System (SBVSE) provides the safety-related function of providing ventilation for the battery rooms, and Hydrogen concentrations are to remain below “allowable limits during accident conditions”. Existing ITACC Tables have line items solely for battery room temperature alarms, displays controls. There exists an ITAAC requirement to 1) verify battery room coil size via inspection and 2) Perform a test to verify room is maintained between specified limits, verify outside air supply fan flow rate and recirculation flow rate are at specified values.

There is no proposed ITAAC for the tier 1 design commitment to maintain hydrogen control below any numerical criteria. In addition, the Tier 2 section 9.4.6 does not describe methods by which this safety-related design basis function is achieved, nor reference associated NRC guidance such as RG 1.128. The NRC staff considers that hydrogen concentration should be maintained below allowable limits both during normal and accident conditions. Therefore, discuss:

a. Controlling the hydrogen concentrations during both normal and during accident conditions.

b. Provide the design basis allowable limits are for the battery rooms, and justify these limits. Discuss the use of the applicable regulatory guidance (RG 1.128) in establishing these limits. and

c. Describe the verification program that will assure the system’s capability to control hydrogen concentration. Also,

d. Propose an ITAAC to demonstrate, via test or analysis, that the exhaust ventilation from the battery rooms is sufficient to assure that acceptable hydrogen concentrations are maintained. Define specific acceptance criteria.

e. Revise Tier 1 and 2 as appropriate.

09.04.01-4

During review of FSAR Tier 2 revision 2, the staff noted that FSAR Tier 2 Paragraph 9.4.13.2.1 refers to FSAR drawings that have been deleted. The paragraph discusses the SCS Supply and Exhaust Air Subsystem for the Interconnecting Passageway between Safeguards Building Division 2 and Division 3. Therefore:

a. Clarify the paragraph to delete references to deleted drawings.

b. Provide drawings or further illustration that clarifies the arrangement that you describe.

09.04.01-5

During review of FSAR Tier 2 revision 2, the staff noted that the third paragraph in FSAR Tier 2 9.4.1.2.3, “Abnormal operating conditions” section has been changed. The described response of the CRACS to a toxic gas event is different from that described in the previous revision of the FSAR and your previous response to RAI No. 135 Question 09.04.05-1 part 3b.

Notwithstanding COL Item 6.4-1, which requires a COL applicant that references the U.S. EPR design certification to identify any Seismic Category I Class IE toxic gas sensors necessary for control room operator protection and COL Item 6.4-3, to evaluate the results of a site specific toxic gas analysis and the impact on the control room habitability in accordance with RG 1.78, the FSAR describes the response of the CRACS design to a toxic gas event. This description includes details of toxic gas monitoring equipment, and visual audible MCR alarms. Similarly FSAR Section 6.4 describes control room habitability systems that detect toxic gases, specifically carbon monoxide and carbon dioxide. Tier 2 Section 6.4.6, Instrumentation Requirements, refers to Section 9.4.1 for details on these instruments. Tier 2 Section 9.4.1.5, Instrumentation Requirements only discusses CREF instrumentation. This list does not include any instrumentation, alarms displays and controls used to detect and respond to a toxic gas event, yet FSAR section 9.4.1.2.3 describes automatic actuation of CRACS components by such instruments. In FSAR section 9.4.1, Table 9.4.1-1 includes a list of minimum instrumentation, indication and alarm features for that portion of the CRACS that functions to respond to a toxic gas event. Alternatively, include a new COL Item for section 9.4 to ensure that a COL applicant that references the EPR standard design provides details of the toxic gas instrumentation in the COL FSAR, to include not only the types of toxic gas sensors, but also the details of automatic actuation of CRACS SSCs, the minimum inventory of required MCR alarms displays and controls for such instrumentation.

09.04.03-4

In FSAR revision 2 Tier 2, Section 9.4.3., you state the following:

> “The exhaust air from the NAB, FB, Safeguard Building (SB), Containment Building and the annulus is processed through the NABVS filtration trains prior to release to the environment via the vent stack.”

In FSAR revision 2 Tier 2, Section 9.4.3.1, you state the following:

> "The NABVS performs no safety-related functions and the system is not required to operate during a design basis accident."

A review of Figure 9.4.3-3 apparently shows the FB and vent stack as non seismic and non safety related structures. This conflicts with Table 3.2.2.1-1 for those structures. Since the plant stack is used by safety related ventilation systems such as the AVS, this structure should be correctly designated on this figure as safety-related and Seismic Category 1. Since the vent stack is part of the AVS, which is relied upon to establish a negative pressure in the annulus and fission product removal after a design basis accident, the Quality group for the vent stack should be Quality Group B.

1. Clarify Figure 9.4.3-3 to indicate that the plant stack, which serves as the exhaust path of the FBVS, is SSC seismic Class 1 and SSC Quality Group B,and a safety-related portion of the system.
2. Clarify the Seismic and Quality Classification breaks for the vent stack as they are shown in the FSAR in the same manner for the following Systems/ P&IDs:
    a. Safeguard Building Controlled-Area Ventilation System Figure 9.4.5-2
    b. Radioactive Waste Exhaust/ Figure 9.4.8-2
    c. Reactor Building Exhaust/ Figure 9.4.7-2
    d. Annulus Accident Filtration Train Exhaust/ Figure 6.2.3-2

09.04.03-5

Follow-up to RAI 135, Question 09.04.05-1

In RAI 135, Question 09.04.05-1, item #7, the staff requested you to clarify the testing requirements for the NABVS and the RWBVS as they relate to guidance contained in RG 1.140 regulatory position C3.6, which states:
"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). Duct and housing leak tests should be performed in accordance with Section TA of ASME AG-1-1997"

In a response supplement #1 to RAI 135, dated February 27, 2009, you provided a response to question number 09.04.05-1, item #7 that included FSAR Tier 1 and Tier 2 mark ups. The staff has reviewed the response and FSAR revision 2 and the following information is required:

1. The FSAR is still unclear as to timing and method of the performance of the duct and housing leak tests on the NABVS and RWBVS. The applicable criteria, of AG-1 as written only applies to the components listed in section 9.4.3.2.2 for the NABVS and section 9.4.8.2.2 for the RWBVS of the FSAR. The system startup tests in chapter 14 of the FSAR do not list acceptance criteria for system leakage; therefore,
    a. Revise the FSAR to add a "Ductwork and accessories section for the RWBVS" to Tier 2 section 9.4.8.2.2, in order to clarify that the testing requirements are also applicable to RWBVS ductwork.
    b. Add total system leakage acceptance criterion to the respective startup test acceptance criteria section.

2. Item 1.b also applies to all ventilation system startup tests for those systems that are subject to either RG 1.52 or RG 1.140. These systems include the FBVS, CBVS, CRACS, SBVS,SBVSE, and the ABVS. Clarify the FSAR for these systems as it applies to item 1.b.

09.04.03-6

The Tier 2 FSAR section 9.4.14 and Figure 9.4.14-2 describes the Access Building Ventilation System as servicing an Access Building that is divided into a radiological controlled area, which presumably has the potential to become contaminated. Both the controlled area of this building and a supervisory area are serviced by the ABVS. The ABVS as shown in the FSAR has two different exhaust subsystems. The subsystem that services the controlled areas exhausts through HEPA filters and is monitored for radioactivity. The exhaust subsystem that services the supervisory area releases directly to the environment with no devices to filter radioactivity or monitor for radioactivity. Based on the review of this system the staff requests the following information:

1. Provide justification for not subjecting the Supervisory area of the Access Building to GDC 60. i.e., provide the location in the FSAR for the for the description of the controls that separate the contaminated areas from clean areas in the Access Building.
    a. The description should include a general discussion of the controls that prevent the migration of contamination from contaminated areas to clean areas of the Access Building. Also identify the monitoring devices that are used in the supervisory areas to ensure the potential for an unmonitored release of radioactivity does not occur.
    b. The description should specifically address the ABVS functions in the event of an indication, via plant stack radiation monitor or other means, of radioactive contamination downstream of the ABVS HEPA filtration units.
2. Alternatively, since the Access Building is a EPR Standard Design Interface item, Include a COL information item that requires a COL applicant that references the U.S. EPR standard design to provide details on the site specific access building and ABVS design that:
    a. Prevent the migration of gaseous or particulate radioactive contamination from controlled areas of the building to clean areas of the building.
    b. Describe the monitoring devices that are needed in the supervisory area to ensure that radioactivity in the access building would not leave the building through the ABVS supervisory area exhaust subsystem.
    c. Describe the SSCs that are required to clean up the Access Building atmosphere in the event of indication, via plant stack radiation monitor or other means, of radioactive contamination downstream of the ABVS HEPA filtration units.

09.04.05-3

The FSAR describes the Safeguard Buildings as being divided into controlled areas, which are potentially contaminated. These controlled areas are serviced by the SBVS. The balance of the SB, is serviced by the SBVSE. The Tier 2 FSAR section 9.4.6.1 does not state that that SBVSE is subject to GDC 60. FSAR section 9.4.6.2.1 states that the SBVSE contains connections providing air to the mechanical controlled areas. FSAR section 3.8.4.1.3 states that the lower levels of the SBs, which contain the mechanical equipment, and the upper levels

of the SBs contain electrical equipment. Cable pipe and duct shafts are located within the SBs for routing distribution between the various elevations of the buildings. Based on this review the staff requests the following information:

1. Justify not subjecting the SBVSE to GDC 60. i.e., identify in the FSAR, the controls that separate contaminated areas from clean areas in the safeguards buildings.
    a. The justification should include a general discussion of controls that exist to prevent the migration of contamination from contaminated areas to clean areas of the SB. (Areas serviced by the SBVS to areas serviced by the SBVSE).
    b. The justification should specifically address the function of the SBVSE in the event of a RCP thermal barrier failure, or the escape of contamination contained within the CCW system.
    c. Alternatively, clarify that the SBVSE is subject to GDC 60, and provide appropriate justification.
    d. Alternatively, clarify the utilization of the NABVS or the SBVS or other atmosphere cleanup system with the SBVSE to clean up the SBVSE atmosphere if required.
2. Figure 9.4.6.1 Safeguards Building Electrical Divisions 1 and 4 air intake is missing the supply air fan. Add the symbol to the drawing.

09.04.05-4

FSAR section 9.4.9.1 “Design Basis” states “The EPGBVS maintains acceptable temperatures and air renewals in each of the four divisions to support operation of the emergency diesel generators (EDG) and electrical control panels”. Based on this statement, the staff considers the EPGBVS an Engineered Safety Feature Ventilation System. NUREG-0800 section 9.4.5 is used by the staff to review such systems. Section II of this SRP “Acceptance Criteria” states that such systems are subject to GDC 17. Part III “Review Procedures states the following:

> “The ESFVS is reviewed to ensure that adequate means is provided in the system design for control of airborne particulate material (dust) accumulation. The system arrangement is reviewed to verify that a minimum of seven meters (20 feet) exists from the bottom of all fresh air intakes to grade elevation, or that electrical cabinets are provided with suitable seals or gaskets”.

There is currently sufficient information in the FSAR for the staff to review this criterion and make a finding with respect to GDC 17, however the design basis section of the EPGBVS description does not declare GDC 17 as a design criterion.

The following clarification is needed in the FSAR:

> In Section 9.4.9.1 of the FSAR, declare that the EPGBVS is subject to GDC 17. Justify that the EPGBVS complies with GDC 17.