ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA US) [Russell.Wells@areva.com]
Sent: Wednesday, December 17, 2008 1:42 PM
To: Getachew Tesfaye
Cc: John Rycyna; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US); SLIVA Dana (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 135, FSAR Ch 9
Attachments: RAI 135 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 135 Response US EPR DC.pdf" provides technically correct and complete responses to 5 of the 14 parts of the single question, Question 09.04.05-1.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI Question 09.04.05-1, Parts 11, 12 and 14.

The following table indicates the respective pages in the response document, "RAI 135 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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A complete answer is not provided for 9 of the 14 parts of Question 09.04.05-1. The schedule for a technically correct and complete response to these parts is provided below.

Question #	Response Date
RAI 135 — 09.04.05-1 (# 1)	February 27, 2009
RAI 135 — 09.04.05-1 (# 2)	February 27, 2009
RAI 135 — 09.04.05-1 (# 3)	February 27, 2009
RAI 135 — 09.04.05-1 (# 4)	February 27, 2009
RAI 135 — 09.04.05-1 (# 5)	February 27, 2009
RAI 135 — 09.04.05-1 (# 6)	February 27, 2009
RAI 135 — 09.04.05-1 (# 7)	March 27, 2009
RAI 135 — 09.04.05-1 (# 10)	February 27, 2009
RAI 135 — 09.04.05-1 (# 13)	February 27, 2009

Sincerely,

(Russ Wells on behalf of)

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To: ZZ-DL-A-USEPR-DL
Cc: Nan Chien; Christopher Jackson; Peter Hearn; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 135 (1183), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on November 6, 2008, and on November 17, 2008, 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,
Getachew Tesfaye
Sr. Project Manager
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Response to

Request for Additional Information No. 135 (1183), Revision 0

11/17/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System
Application Section: SRP 9.4

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

Question 09.04.05-1:

1. CRACS figures discrepancies

A review of the main control room air conditioning system (CRACS) P&IDs in FSAR Tier 2 Figures 9.4.1-1 and 9.4.1-2 shows that figure numbers and titles are incorrect.

Tier 2 FSAR Section 9.4.1.1 states that all components of the CRACS, are classified Seismic Category I. However, the FSAR Tier 2 Tables 3.2.2-1 and 3.11-1 and Figures 9.4.1-1 through 9.4.1-3 contradict this statement.

Tier 2 FSAR Figures 9.4.1-1, 9.4.1-2, and 9.4.1-3 show that many of the fire dampers and their associated ductwork are classified as Seismic Category II and electric heaters classified as non-seismic. This is contrary to the statement in Tier 2 FSAR Section 9.4.1.1 that all components of the CRACS are safety-related and designed to Seismic Category I. Additionally, Tier 2 FSAR Table 3.2.2-1 and 3.11-1 list some components NSC, NS-AQ and Seismic Category II.

Tier 1 FSAR Table 2.6.1-2 and Tier 2 Tables 3.2.2-1 and 3.11-1 lists two motorized dampers in the Division 2 – Air Intake Train 2 and Division 3 – Air Intake Train 3, but FSAR Tier 1, Figure 2.6.1-1 shows only one motorized damper in trains 2 and 3 as does FSAR Tier 2, Figure 9.4.1-2.

Figure numbers and titles in Tier 2 FSAR Figures 9.4.1-1 and 9.4.1-2 should be corrected.

Statements regarding the seismic classification of CRACS components shown in Tier 2 FSAR Figures 9.4.1-1, 9.4.1-2 and 9.4.1-3 and Tables 3.2.2-1 and 3.2.11-1 with Tier 2 FSAR Section 9.4.1.1 should be reconciled.

Reconcile the equipment listed in Tier 2 FSAR Tables 3.2.2-1 and 3.11-1 with Figures 9.4.1-1 through 9.4.1-3.

Response to Question 09.04.05-1 (#1):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

2. CRACS capacity

GDC-4 requires the CRACS to be appropriately protected against dynamic effects of missiles and pipe break and be designed to accommodate the effects of, and to be compatible with, the environmental conditions of normal operation, maintenance, testing, and postulated accidents.

FSAR Tier 2 Section 9.4.1.1 states that the CRACS components are appropriately protected against dynamic effects and designed to accommodate the effects of, and be compatible with, the environmental conditions of normal operation, maintenance, testing, and postulated accidents.

In regard to physical separation of system trains, FSAR Tier 2 Section 9.4.1.2.1 provides the following:

- The air intake subsystem consists of two identical fresh air intake trains for each division which are physically separated.
- The two iodine filtration trains located separately in the SB divisions two and three (one train in each division) are in parallel with the associated air intake trains.
- The four recirculation air handling units are located in the SB divisions two and three (two trains in each division).

From the description, it is not clear if the two individual trains in a division are physically separated.

FSAR Tier 2 Section 9.4.1.2.3 indicates that during normal operation two of the four trains are in operation. This would seem to indicate that each train has a capacity of 50%; however, FSAR Tier 2 Section 16 Technical Specification B3.7.10 indicates the capacity of each train is 75%.

The applicant states in Tier 2 FSAR Section 16, Technical specification B 3.7.11, with one division out of service for maintenance and second lost to single failure, the two operable CRACS trains maintain the MCR temperature. However, if both trains in a division are lost, the P&ID (Tier 2 FSAR Figure 9.4.1-3) shows no supply air flow to half the CRE areas.

In view of the above, please respond to the following:

1) Confirm that the recirculation air handling units in each division are physically separated.
2) Confirm that the iodine filtration train are physically separated from the parallel associated intake train.
3) Include the capacity of the individual air recirculation trains in to FSAR Tier 2 Section 9.4.1.
4) Verify that the design temperature is maintained through out the MCR with both trains in a division out of service.

Response to Question 09.04.05-1 (#2):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

3. Abnormal conditions in CRM

GDC 19 requires adequate protection to permit access to and occupancy of the control room under accident conditions. GDC 60 requires capability to suitably control release of gaseous radioactive effluents to the environment.

Tier 2 FSAR Section 9.4.1.1 states the CRACS outside air intake is capable of detecting radiation, smoke, and toxic chemicals; however, no smoke detectors are identified in the P&IDs.

Tier 2 FSAR Section 9.4.1.2 states in the event of an external fire, external toxic gas release, smoke, or excessive concentration of CO and CO2, outside air to the CRACS is isolated manually or automatically and the system operates in full recirculation mode without fresh air. The stated method of isolation is not clear.

The applicant states in Tier 2 FSAR Section 16 Technical Specification B 3.7.10 that one CREF operating at a flow rate of < 4000 cfm will pressurize the CRE to ≥ 0.125 inches water gauge relative to all external areas adjacent to the CRE boundary. This statement is misleading in several aspects: 1) in order to maintain the CRE pressurized some amount of outside air must be supplied, and 2) the total flow rate has little to do with the ability to pressurize the CRE.

With respect to SRP 9.4.1, a failure modes and effects analysis (FMEA) of the U.S. EPR Main Control Room Air Conditioning System was performed to determine if the safety-related portion of the system is capable of functioning in spite of the loss of any active component. The FMEA reviewed Tier 2 FSAR Figures 9.4.1-1 through 9.4.1-3. The review identified that the loss of a fan in either of the Division 2 or 3 iodine filter trains following a design basis accident will severely limit the ability to clean up any airborne contamination that occurs in the rooms serviced by that train. Although the opposite train is assumed to function, the airflows in and out of each room are balanced, thereby minimizing any mixing between rooms.

The review also identified that there is only a single exhaust path from each of the rooms within the Control Room Envelope (CRE), except the Computer Room. Assuming a single active failure causes an exhaust damper to fail closed, that room would experience a significant reduction of supplied conditioned air. After some period, it would be expected the room design temperature would be exceeded.

The review identified that there is only a single isolation damper between the potentially contaminated inlet air and the recirculation train. When the CRACS system realigns for high radiation in the air inlet, a single failure of damper 30SAB01AA003 or 30SAB04AA003 to close provides a potential path for airborne contamination around the iodine filtration train.

In view of the above, please respond to the following:

a. Identify the locations of smoke detectors on the P&IDs (Tier 2 FSAR Figures 9.4.1-1 through 9.4.1-3).

b. Clarify the reaction of the system to each of the following: external fire, external toxic gas release, smoke, or excessive concentration of CO and CO2.

c. Clarify the Tier 2 Section 16 Technical Specification B 3.7.10 statement regarding pressurization of the CRE by the CREF.

d. Demonstrate that adequate atmospheric cleanup of all CRE rooms when one iodine filtration train is out of service.

e. Demonstrate that there is adequate temperature and humidity control in the CRE rooms when an exhaust path is out of service.

f. Assure that the system does not require modification to eliminate the potential bypass of the iodine filtration train.

Response to Question 09.04.05-1 (#3):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

4. Two CRACS air conditioning trains fail in the same SB division

There are two CRACS trains in SB division 2, and another two CRACS trains in SB division 3. If both CRACS trains in the same SB division fail, no supply air flow to half the CRE areas. The air flows in and out of each Control Room area are prebalanced, thereby minimizing any mixing between areas.

Tech. Spec. B 3.7.11 Control Room Air Conditioning System, Applicable Safety Analysis: ……During emergency operation, one train is assumed to be out for maintenance and a second train is assumed lost to single failure. The two OPEABLE CRACS trains maintain the MCR temperature between 65°F to 75° F.

Tech. Spec. 3.7.11 Control Room Air Conditioning System, ACTIONS:

One or two CRACS trains inoperable – Restore the inoperable CRACS train(s) to OPERABLE status in 30 days;

Three or more CRACS trains inoperable in MODE 5 or 6 or during movement of irradiated fuel assemblies – Suspend movement of irradiated fuel assemblies;

Three or more CRACS trains inoperable – Enter LCO 3.0.3.

Justify not addressing in the Tech. Spec. the situation of two CRACS trains in the same SB division are inoperable.

Propose Tech. Spec. as appropriate, or justify that Tech. Spec. are not required.

Response to Question 09.04.05-1 (#4):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

5. <u>FBVS drawing discrepancies</u>

   1. There are discrepancies in equipment listed in FSAR Tier 1, Table 2.6.4-1 and FSAR Tier 2, Table 3.2.2-1 as follows:

      FSAR Tier 1, Table 2.6.4-1 (on 3rd sheet) lists the following equipment tag numbers as Seismic I and ASME AG-1, but they are not in FSAR Tier 2, Table 3.2.2-1;

      - Air Cooling Coils; 30KLL61/64AC001-003
      - Moisture Separators; 30KLL61/64AT001-002

   2. There are drawing discrepancies between Tier 1 FSAR Figure 2.6.4.1 and Tier 2 FSAR Figure 9.4.2-1.

      a. In Tier 1 FSAR Figure 2.6.4-1, the Recirculation Cooling Units, Extra Borated Pump Room Cell 4 (lower right of drawing), and Cell 5 (lower left of drawing) indicate SCW as the cooling water interface. For the same equipment depicted in Tier 2 FSAR Figure 9.4.2-1, it indicates QKF as cooling water interface.

      b. Tier 1 FSAR Figure 2.6.4-1, the Recirculation Cooling Units, Fuel Pool Pump Room Cell 4 (lower right of drawing) indicates CCW as the cooling water interface. For the same equipment depicted in Tier 2 FSAR Figure 9.4.2-1, it indicates KAB as cooling water interface.

      c. For the exhaust ductwork connected to SBVS (vertical run on drawings) Tier 1 FSAR Figure 2.6.4-1 indicates ductwork between valve group 30KLL21/24AA004 as seismic class N/A, but Tier 2 FSAR Figure 9.4.2-1 indicates this same ductwork as seismic class I.

   Justify or correct these discrepancies.

Response to Question 09.04.05-1 (#5):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

6. FBVS pool boiling

RG 1.13, Rev 2, Position C.4, Confinement and Filtering Systems recommends that a controlled-leakage building should enclose the fuel to limit the potential release of radioactive iodine and other radioactive materials. If necessary to limit offsite dose consequences from a fuel handling accident or spent fuel pool boiling, the building should include an engineered safety feature filtration system that meets the guidelines outlined in Regulatory Guide 1.52. Additionally, this guide presents the conditions necessary to allow coolant boiling, including the ability of the pool structure and liner to withstand coolant boiling and the ability of the ventilation system to keep safety-related components safe from the effects of high temperatures and moisture.

There is no statement in Tier 1 FSAR or Tier 2 FSAR that FBVS is designed for pool boiling. Provide the impact of pool boiling on the FBVS.

Moisture Removal: There was no evidence of the capability to remove moisture in the ESF Filter Systems as required by RG 1.52. For example, HVAC diagrams do not show moisture removal components such demisters or moisture separators and drains. This is especially important for the FBVS supply to the ESF filters in the Safeguard Building Ventilation System (SBVS) diagrams (e.g., Tier 2 FSAR Figure 9.4.5-2). The FBVS is the ventilation system for the area of the spent fuel pool which is designed for bulk pool boiling. Justify no showing the moisture removal components for the ESF Filters in the SBVS that support FBVS (and the capability for bulk pool boiling) show.

Response to Question 09.04.05-1 (#6):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

7. NABVS & RWBVS clean up system design

Tier 2 FSAR Sections 9.4.3.1 and 9.4.8 did not include the air-flow rates for the cleanup units and system leakage rates. This information is recommended in Regulatory Guide 1.140.

Provide the maximum air flow rates for the cleanup units (NABVS & RWBVS).

Regulatory Guide 1.140 recommends the monitoring of pertinent pressure drops and flow rates. The P&ID's do show differential pressure measurements across filters for the NABVS and RWBVS. There is very little instrumentation shown with regards to measuring flow rates. Also, there appears to be no system pressure monitoring for the NABVS. Confirm that the pressure and flow indication currently shown on the P&ID's for the NABVS and RWBVS is correct. If this indication is correct, justify that you meet RG 1.140, Position C3.3.

To maintain the radiation exposure to operating and maintenance personnel as low as is reasonably achievable (ALARA), normal atmosphere cleanup systems and components should be designed to control leakage and facilitate maintenance, inspection and testing, RG 1.140, Position C3.4. This information was not provided for the NABVS and RWBVS; therefore, compliance with RG 1.140, Position C3.4 can not be determined. Provide the information required to meet Regulatory Guide 1.140, Position C3.4.

Tier 2 FSAR Section 9.4.8.2.1 on the Radioactive Waste Building Ventilation System did not provide evidence that protective devices such as louvers, grills and screens are used to minimize the infiltration of contaminants from outdoor air intake openings. Provide the information required to meet Regulatory Guide 1.140, Position C3.5.

Response to Question 09.04.05-1 (#7):

A response to this question will be provided by March 27, 2009.

Question 09.04.05-1:

8. CBVS clean up system design

Tier 2 FSAR Section 9.4.7.1 did not include the air-flow rates for the cleanup units and system leakage rates. This information is required to comply with General Design Criteria 60. Provide the maximum air flow rates for the cleanup units (Containment Building Ventilation System)

To ensure reliable in-place testing, the volumetric air-flow rate of a single cleanup unit should be limited to approximately 30,000 CFM. If a total system air flow in excess of this rate is required, multiple units should be used per Regulatory Guide 1.140, Position C3.2. The applicant did not provide data on the air flow rates for the containment building ventilation system cleanup units. This information should be provided to demonstrate conformance with Regulatory Guide 1.140, Position C3.2.

To maintain the radiation exposure to operating and maintenance personnel as low as is reasonably achievable (ALARA), normal atmosphere cleanup systems and components should be designed to control leakage and facilitate maintenance, inspection and testing per Regulatory Guide 1.140, Position C3.4. This information was not provided for the containment building ventilation system; therefore, compliance with Regulatory Guide 1.140, Position C3.4 cannot be determined. Provide the information required to meet Regulatory Guide 1.140, Position C3.4.

Confirm that an alternative approach selected to meet the requirements of General Design Criteria 60. If an alternative method was selected, then provide the methodology and data used.

Response to Question 09.04.05-1 (#8):

As stated in U.S. EPR FSAR Tier 2, Section 9.4.7.3, the containment building ventilation system (CBVS) is not an engineered safety-related feature and has no safety-related function except the containment isolation and low-flow purge. Therefore, the system is not required to meet GDC 60. Note, however, that it does meet GDC 41 “Containment Atmosphere Cleanup”. The internal filtration cleanup system is a non-safety-related system designed to the requirements of RG 1.140. U.S. EPR FSAR Tier 2, Section 9.4.7.2.1 contains information on the internal filtration cleanup system.

The internal filtration cleanup system and components are designed in accordance with ASME AG-1 for leak-tightness and will be leak tested in accordance with ASME/ANSI N510 for in-place testing efficiency as specified in U.S. EPR FSAR Tier 2, Section 9.4.7.2.1 and 9.4.7.2.2. This testing provides reasonable assurance that the radiation exposure to operating and maintenance personnel will be maintained ALARA, and control leakage, facilitate maintenance, inspection, and testing per RG 1.140, Position C3.4.

The containment building low flow purge subsystem is a safety-related atmospheric cleanup system and is designed to meet the requirements of RG 1.52. The engineered safety feature filter systems are described in U.S. EPR FSAR Tier 2, Section 6.5.1, with a nominal filter system design flow rate of 3,000 cfm for the low flow purge subsystem.

FSAR Impact:

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

Question 09.04.05-1:

9. SCS drawing missing dampers

Tier 2 Section 9.4.13.2.1 ……Staircases Supply Air Subsystem (on page 9.4-121) ……A pressure control damper and motor-operated isolation damper installed on the exhaust ductwork provide pressure control in the staircase.

Tier 2 Section 9.4.13.2.1 ……Supply and Exhaust Air Subsystem for the Interconnecting Passageway between Safeguard Building Division 2 and Division 3 …….(on page 9.4-122) ……A pressure control damper and motor-operated isolation damper installed on the exhaust ductwork provide pressure control in the interconnecting passageway and associated rooms.

Tier 2 Section 9.4.13.2.1 …… Supply and Exhaust Air Subsystem for the Nuclear Island Interconnecting Passageway (on page 9.4-122) ……An outside bypass connection with a pressure control damper and an electric isolation damper is connected to the intake duct to control pressure in the rooms.

All these pressure control dampers described above can not be located on Tier 2 Figure 9.4.13-1 & 2. Provide the location of these pressure control dampers in the Figures.

Response to Question 09.04.05-1 (#9):

The pressure control dampers and motor operated isolation dampers located on the U.S. EPR FSAR Tier 2, Figures 9.4.13-1 and 9.4.13-2 are shown as simplified symbols. U.S. EPR FSAR Tier 2 Figure symbols for dampers and HVAC equipment were simplified into a few symbols due to the large variety of components in HVAC systems. The symbols shown on the figures are the pressure control dampers and motor operated dampers for the staircase supply air subsystem, supply and exhaust air subsystem for interconnecting passageway between Safeguard Building Division 2 and Division 3, and the supply and exhaust air subsystem for the Nuclear Island interconnecting passageway.

FSAR Impact:

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

Question 09.04.05-1:

10. TBVS design information

NUREG 0800 identifies general design criteria applicable to safety related portions of the turbine building ventilation system (such as GDC-60 on controlled release of radioactive material to the environment). However, the FSAR does not provide sufficient detail to make an independent judgment that the system is not safety related.

Regulatory Guide 1.206, page C.IV.1-3, Item 2, with respect to Chapter 9, Auxiliary Systems, states that it is expected that reactors will reflect through their design, construction, and operation an extremely low probability for accidents that could result in the release of significant quantities of radioactive fission products. The descriptions shall be sufficient to permit understanding of the system designs and their relationship to safety evaluations.

Tier 2 FSAR Section 9.4.4, Turbine Building Ventilation System provides a single paragraph description of the TBVS stating what the system does. However, no design information (e.g., number of fans, use of filters or charcoal) or design criteria (redundancy, diverse power supplies, design temperatures of the building equipment) is provided. This section concludes that the TBVS is classified as a non-safety related system, and it does not provide accident response nor radioactive effluent control functions for the U.S. EPR. Sufficient information to confirm this statement is not provided. Also, no interface requirements have been provided to assure an acceptable TBVS will be designed to meet minimum building and component requirements.

Provide the basis for concluding the TBVS is not safety related. For example, reference evaluations that have been performed to conclude that the system is not needed to filter radioactive materials following a steam generator tube rupture. Also, provide the interface requirements for the COL applicants to assure that Turbine Building temperatures will adequately support equipment operations to preclude challenges to reactor safety systems (such as caused by trips of main feedwater pumps on high turbine building temperatures). Interface requirements are also needed to assure that COL applicants submit sufficient design information to confirm minimum TBVS capabilities.

Response to Question 09.04.05-1 (#10):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

11. SBVSE design information

FSAR Tier 2 Sections 9.4.5.1, 9.4.9.1 and 9.4.11.1 define the design temperature and humidity parameters that the SBVS, EPGBVS and ESWPBVS can maintain. FSAR Tier 2 Section 9.4.6 does not provide any design temperature and humidity values for the SBVSE.

Provide the design room temperature and humidity ranges for the SBVSE.

Response to Question 09.04.05-1 (#11):

With outside air ambient design temperature conditions of -40°F to 115°F, the safeguard building ventilation system electrical (SBVSE) maintains the following temperature and humidity ranges for the areas serviced.

ROOM	TEMPERATURE	HUMIDITY
Sanitary installations, changing rooms	68°F - 77°F	35 – 70%
I&C and Computer Room, RSS	68°F - 82°F	35 – 70%
Switchboard Rooms	59°F – 86°F	35 – 70%
Cable Floor	41°F – 95°F	20 – 80%
Battery Rooms	68°F – 77°F	35 – 70%
HVAC Rooms	50°F – 95°F	20 – 80%
Cold Mechanical Areas, Emergency Feedwater Pump Rooms, and Component Cooling Water Pump Rooms	65°F – 86°F	30 – 70%
Corridors	65°F – 86°F	30 – 70%

Additional text will be added to U.S. EPR FSAR Tier 2, Section 9.4.6 to provide the design room temperature and humidity ranges for the SBVSE.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.4.6.1 will be revised as described in the response and indicated on the enclosed markup.

Question 09.04.05-1:

12. SBVSE seismic definition

The applicant states in FSAR Tier 2 Section 9.4.6.1 the non-safety-related portion of the SBSVE is designated as Non-Seismic. This conflicts with the applicant's statement that the system meets the guidance of RG 1.29 position C.2 for the non-safety-related portions (i.e., Seismic Category II). FSAR Tier 2 Section 3.2.1.5 defines non-seismic as an SSC that does not fall into the RG 1.29 criteria for classification as Seismic Category I or II.

Clarify the seismic classification of the non-safety-related portion of the SBVSE.

Response to Question 09.04.05-1 (#12):

RG 1.29, position C.2 applies to non-safety-related structures, systems, and components (SSCs) whose failure could reduce the functioning of any safety-related SSC or Seismic Category I SSC. The non-safety-related portions of the U.S. EPR are evaluated for the potential to interact with any safety-related SSC or Seismic Category I SSC.

Non-safety-related SSCs whose failure could reduce the functioning of any safety-related SSC or Seismic Category I SSC, or result in an incapacitating injury to occupants in the control room are classified as Seismic Category II.

Non-seismic lines and associated equipment are routed, to the extent possible, outside of safety-related structures and areas to avoid potentially adverse interactions. In the event that this routing is not possible and non-seismic lines must be routed in safety-related areas, the non-seismic items are evaluated for seismic interactions (refer to U.S. EPR Tier 2, Section 3.7.3.8).

Clarification will be added to U.S. EPR FSAR Tier 2, Section 9.4.6.1 to reflect the guidance in RG 1.29 for non-safety-related portions of the system.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.4.6.1 will be revised as described in the response and indicated on the enclosed markup.

Question 09.04.05-1:

13. SBVS moisture separator

GDC 60 requires the Engineered Safety Function Ventilation System (ESFVS) to be capable to suitably control release of gaseous radioactive effluents to the environment.

FSAR Tier 2 Section 9.4.5.1 states that the release of radioactive materials to the environment is controlled by meeting the guidance of RG 1.52 (position C.3). RG 1.52 paragraph C3.1 recommends the installation of a moisture separator prior to the heater to remove entrained water droplets from the inlet air stream, thereby protecting HEPA filters and iodine absorbers from water damage and plugging.

FSAR Tier 2 Chapter 16 Section B 3.7.12 states the pre-filters remove any large particles in the air and any entrained water droplets present to prevent excessive loading of the HEPA filters and carbon absorbers. Installing the heaters upstream of the pre-filters essentially negates the moisture removal function of the pre-filters.

a. Justify the omission of a moisture separator in the SBVS accident exhaust iodine filtration trains.
b. Justify installing a heater upstream of the SBVS pre-filter with the intent to remove entrained moisture.

Response to Question 09.04.05-1 (#13):

A response to this question will be provided by February 27, 2009.

Question 09.04.05-1:

14. SBVS missiles protection

GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and be compatible with, environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

Tier 2 FSAR Section 9.4.5.1 indicates the Safeguard Building Controlled-Area Ventilation System (SBVS) vents and louvers are supplied by the SBVSE for supply and the NABVS for exhaust air and are protected from missiles by locating these components within the safety enclosure areas as described in Section 9.4.3 and Section 9.4.6.

Tier 2 FSAR Sections 9.4.3 and 9.4.6 do not provide any discussion of missile protection for SBVS vents and louvers.

Describe missile protection for the SBVS vents and louvers.

Response to Question 09.04.05-1 (#14):

The SBVS vents and louvers are located in the Safeguard Building (SB), including the safety-related isolation dampers between the SBVS and the SBVSE supply and NABVS exhaust. The missile protection for the SBVS is described in U.S. EPR FSAR Tier 2, Sections 3.5.1.1, 3.5.1.4, 3.5.2 and 3.6.1.

Clarification will be added to U.S. EPR FSAR Tier 2, Section 9.4.5.1 to reference Sections 3.5.1.1, 3.5.1.4, 3.5.2 and 3.6.1 for information on missile protection and to delete the references to Sections 9.4.3 and 9.4.6 for details of missile protection for SBVS louvers and vents.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.4.5.1 will be revised as described in the response and indicated on the enclosed markup.

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- 10CFR 50.63, as it relates to the SBSVE because during a station blackout (SBO), two of the four SBs are backed up by the SBO diesel generators alternate AC (AAC) power. An analysis to determine capability for withstanding or coping with a station blackout event as described by RG 1.155, position C.3.2.4, will be performed. The safety chilled water system (SCWS) chillers which provide cooling to the division 1 and 4 SBVSE air coolers and recirculation units are also powered by the SBO diesels and are available.

The SBVSE maintains acceptable ambient conditions in the SB during SBO conditions. It also ventilates the battery rooms and SCWS rooms in the SB during SBO conditions to maintain the hydrogen concentration and refrigerant concentration below the maximum allowable limits.

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The SCWS chillers which provide cooling to the division 1 and 4 SBVSE air coolers and recirculation units are also powered by the SBO diesels and are available.

With outside air ambient design temperature conditions of -40°F to 115°F, the SBVSE maintains the following temperature and humidity ranges for the areas serviced.

Room	Temperature	Humidity
Sanitary installations, changing rooms	68°F - 77°F	35 - 70%
I&C and Computer Room, RSS	68°F - 82°F	35 - 70%
Switchboard Rooms	59°F - 86°F	35 - 70%
Cable Floor	41°F - 95°F	20 - 80%
Battery Rooms	68°F - 77°F	35 - 70%
HVAC Rooms	50°F - 95°F	20 - 80%
Cold Mechanical Areas, Emergency Feedwater Pump Rooms, and Component Cooling Water Pump Rooms	65°F - 86°F	30 - 70%
Corridors	65°F - 86°F	30 - 70%

The SBVSE performs the following safety-related system functions:

- Maintains acceptable ambient conditions for the safety-related components in the electrical and instrumentation and controls (I&C) rooms in the SB during accident conditions, taking into account internal and external heat loads.

9.4.6 Electrical Division of Safeguard Building Ventilation System (SBVSE)

The electrical division of the Safeguard Building (SB) ventilation system (SBVSE) is designed to maintain the ambient conditions for the safety-related electrical equipment, emergency feedwater pump rooms and component cooling water system component rooms in the SB during normal plant operation and accident conditions. The SBVSE also maintains the ambient conditions in the SB during maintenance operations and provides ventilation for the remote shutdown station (RSS) which is located in division 3 of the SB. Ventilation of the RSS can be provided by the SBVSE of the SB division 2 or division 3.

9.4.6.1 Design Bases

The SBVSE is primarily a safety-related system with portions serving non-safety-related functions. The safety-related portion is designed to Seismic Category I criteria. The non-safety-related portion of the SBVSE is designated as Non-Seismic category.

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The U.S. EPR meets:

- GDC 2, as it relates to meeting the guidance of RG 1.29~~,~~ (position C.1 for the safety-related portions of the SBVSE and position C.2 for those non-safety-related portions of which failure could reduce the functioning of any safety-related or Seismic Category I system components to an unacceptable safety level).
- GDC 3, as it relates to the SBVSE remaining functional following the postulated hazards of a fire. The SBVSE accomplishes this by the design and location of the system components to minimize the effect of fires and explosions. Noncombustible and heat-resistant materials are used wherever practical.
- GDC 4, as it relates to the SBVSE, by design, to protect against adverse environmental conditions and dynamic effects. The SBVSE accommodates the effects of, and is compatible with, the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents.
- GDC 5, as it relates to the SBSVE system because safety-related components are not shared with any other nuclear power units.
- GDC 17, as it relates to the SBVSE because the U.S. EPR design has an onsite electric power system and an offsite electric power system to permit functioning of structures, systems, and components important to safety in the event of postulated accidents and anticipated operational occurrences. In addition, the SBVSE maintains a minimum of 20 feet from the bottom of all fresh air intakes to grade elevation and the electrical cabinets are provided with suitable seals or gaskets. This is provided to maintain the proper functioning of the essential electric power system by meeting the guidelines of NUREG-CR/0660 (Reference 1) as related to the accumulation of dust and particulate material.

9.4.5 Safeguard Building Controlled-Area Ventilation System

Each of the four safeguard divisions is separated into two functional areas:

- Hot mechanical area serviced by the safeguard building controlled-area ventilation system (SBVS).
- Electrical, instrumentation and control (I&C) and heating, ventilation and air conditioning (HVAC) area serviced by the electrical division of the safeguard building ventilation system (SBVSE). Refer to Section 9.4.6.

The SBVS provides a suitable and controlled environment, in the mechanical areas of the Safeguard Buildings (SB) where engineered safety feature components are located, for personnel access and to allow safe operation of the equipment during normal plant operation, outages, under anticipated operational occurrences, and postulated accidental events.

The SBVS, through its interconnections to the SBVSE and the nuclear auxiliary building ventilation system (NABVS), provides conditioned air for ventilation to the mechanical part of the SBs. The conditioned air supply to all four divisions of SB is provided independently for each division by the SBVSE (refer to Section 9.4.6). The exhaust air (normal exhaust) from the four divisions of the SB is processed by the NABVS (refer to Section 9.4.3).

9.4.5.1 Design Bases

The SBVS is safety-related and designed to Seismic Category I requirements, except the following:

- Supply air ductwork which is classified as supplemented grade safety (NS-AQ) and designed to Seismic Category II requirements.
- Electric air heating convectors which are non-safety related and Non-Seismic.

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The safety-related components of the SBVS are located inside the SB that is designed to withstand the effect of natural phenomena, such as earthquake, tornados, hurricanes, floods and external missiles (GDC 2). The SBVS vents and louvers are supplied by the SBVSE for supply and the NABVS for exhaust air. ~~and are protected from missiles by locating these components within the safety enclosure areas as described in Section 9.4.3 and Section 9.4.6.~~

The safety-related components of the SBVS are appropriately protected against dynamic effects and designed to accommodate the effects of, and to be compatible with, the environmental conditions associated with normal operation, maintenance, testing and postulated accidents. The safety-related components of the SBVS remain

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functional and perform their intended safety function after anticipated operational occurrences and design basis accidents, such as a fire, internal missiles, or pipe break (GDC 4). Refer to Section 3.5.1.1, Section 3.5.1.4, Section 3.5.2, and Section 3.6.1 for information on compliance with GDC 4 as it relates to protection from missiles and postulated piping failures.

The safety-related components and systems of the SBVS are not shared among nuclear power units (GDC 5).

The essential onsite electrical power systems meet the guidance of NUREG-CR/0660 (subsection A–item 2, and subsection C-item 1) (Reference 1) for protection of essential electrical components (such as contactors, relays, circuit breakers) from failure due to the accumulation of dust and particulate materials (GDC 17). This is accomplished by the roughing prefilters and filters of the supply air units of the SBVSE as described in Section 9.4.6.

The release of radioactive materials to the environment is controlled by meeting the guidance of RG 1.52 (position C.3) (GDC 60). Upon receipt of a high radiation alarm in the mechanical areas of the SBs, the SBVS will direct the exhaust air (accident exhaust) through activated charcoal filtration beds located in the Fuel Building (FB) prior to release through the plant stack. As a backup, the contaminated air also can be processed through activated charcoal filtration beds of the NABVS.

Filtration during normal operation is provided by the NABVS by meeting the guidance of RG 1.140 (positions C.2 and C.3). Refer to Section 9.4.3.

Capability for withstanding or coping with a station blackout (SBO) event is provided to comply with the requirements of 10 CFR 50.63. Acceptance is based on meeting the applicable guidance of RG 1.155, including position C.3.2.4. Refer to Section 8.4 for a description of the design features to cope with the SBO event.

The SBVS provides isolation and confinement of the hot mechanical areas of the SBs. The system also provides reduction of a possible radioactive release into the environment.

In case of fuel handling accident in the FB, or fuel handling accident in the Reactor Building (RB), the exhaust air (accident air) from these buildings is directed through the SBVS activated charcoal filtration beds located in the FB prior to release through the plant stack.

On receipt of containment isolation signal or high radiation signal in the RB, the volume of the FB is isolated to limit leakage out of the FB. The SBVS maintains negative pressure in the FB and air from the FB is directed to the SBVS iodine filtration trains (refer to Section 9.4.2).