

## ArevaEPRDCPEm Resource

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**From:** WELLS Russell D (AREVA US) [Russell.Wells@areva.com]  
**Sent:** Monday, December 15, 2008 3:02 PM  
**To:** Getachew Tesfaye  
**Cc:** John Rycyna; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 114, FSAR Ch 9  
**Attachments:** RAI 114 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 114 Response US EPR DC.pdf" provides technically correct and complete responses to all of the 3 questions.

Appended to this file is the affected page of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 114 Question 09.05.03-20.

The following table indicates the respective pages in the response document, "RAI 114 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question #         | Start Page | End Page |
|--------------------|------------|----------|
| RAI 114 — 9.5.3-18 | 2          | 3        |
| RAI 114 — 9.5.3-19 | 4          | 8        |
| RAI 114 — 9.5.3-20 | 9          | 9        |

This concludes the formal AREVA NP response to RAI 114, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

(Russ Wells on behalf of)

*Ronda Pederson*

[ronda.pederson@areva.com](mailto:ronda.pederson@areva.com)

Licensing Manager, U.S. EPR Design Certification

New Plants Deployment

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**From:** Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]  
**Sent:** Friday, November 14, 2008 10:15 AM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Amar Pal; Ronaldo Jenkins; Peter Hearn; Joseph Colaccino; John Rycyna  
**Subject:** U.S. EPR Design Certification Application RAI No. 114 (1277), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 21, 2008, and discussed with your staff on October 31, 2008. No change was made to the draft RAI as a result of that discussion. The schedule we have established for review of your application

assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

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

**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 46

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9  
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| RAI 114 Response US EPR DC.pdf |             | 59559                  |

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**Response to**

**Request for Additional Information No. 114 (1277), Revision 0**

**11/14/2008**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 09.05.03 - Lighting Systems**

**Application Section: 9.5.3**

**QUESTIONS for Electrical Engineering Branch (EEB)**

**Question 09.05.03-18:**

RAI 9.5.3-10 S1

In response to RAI 9.5.3-10, you stated that single Class 1E circuit breaker or fuse located at the motor control center is used as the isolation device. The isolation device meets the requirements of RG 1.75. RG 1.75, Position C (1) requires analysis and periodic testing. FSAR Tier 1, Table 2.5.1-3 and 2.5.2-3 includes ITAAC of the item (Table 2.5.1-3, item 5.2 and Table 2.5.2-3, item 5.2). However, the ITAAC (Table 2.5.1-3, item 5.2 and Table 2.5.2-3, item 5.2) states that an inspection will be performed. Describe the process for verifying by inspection that RG 1.75, Position C (1) will be satisfied.

Modify Table 2.5.1-3, item 5.2 and Table 2.5.2-3, item 5.2 to include testing (“... periodic testing of circuit breakers ... during every refueling must demonstrate that the overall coordination scheme under multiple faults of non-safety-related loads remains within the limits specified in the design criteria for the nuclear power plant,”) to verify that recommendations of RG 1.75 are met.

Modify Table 2.5.1-3, item 5.2 and Table 2.5.2-3, item 5.2 to include analysis (the breaker time-current trip characteristics, for circuit faults “under bolted or arcing fault conditions [assuming multiple faults of all non-safety-related loads and load current of all safety-related circuits] will cause the nearest circuit breaker ... to interrupt the fault current prior to initiation of a trip of any upstream protective device,”) to verify that recommendations of RG 1.75 are met.

**Response to Question 09.05.03-18:**

U.S. EPR FSAR Tier 1, Table 2.5.1-3—Class 1E Emergency Power Supply System Inspections, Tests, Analyses, and Acceptance Criteria, Item 5.2 has been revised as indicated in the response to RAI 116, Question 14.03.06-5. The revised text indicates type tests, analyses, or a combination of type tests and analyses of the isolation devices are performed to verify the isolation device between the emergency power supply system (EPSS) Class 1E components and non-Class 1E circuits prevent credible faults from propagating into the EPSS.

U.S. EPR FSAR Tier 1, Table 2.5.2-3—Class 1E Uninterruptible Power Supply Inspections, Tests, Analyses, and Acceptance Criteria, Item 5.2 has been revised as indicated in the response to RAI 116, Question 14.03.06-5. The revised text indicates type tests, analyses or a combination of type tests and analyses of the isolation devices are performed to verify the isolation device between the Class 1E uninterruptible power supply system (EUPS) Class 1E components and non-Class 1E circuits prevent credible faults from propagating into the EUPS.

U.S. EPR FSAR Tier 1, Table 2.5.1-3 has been revised as indicated in the response to RAI 116, Question 14.03.06-3 to add Item 5.13 to verify EPSS interrupting devices (e.g., circuit breakers and fuses) are coordinated so that the circuit interrupting device closest to the fault is designed to open before other devices.

U.S. EPR FSAR Tier 1, Table 2.5.2-3 has been revised as indicated in the response to RAI 116, Question 14.03.06-3 to add Item 5.18 to verify EUPS interrupting devices (e.g., circuit breakers and fuses) are coordinated so that the circuit interrupting device closest to the fault is designed to open before other devices.

The question indicates to “Modify Table 2.5.1-3, item 5.2 and Table 2.5.2-3, item 5.2 to include testing (... periodic testing of circuit breakers ...)”. U.S. EPR FSAR Tier 1, Table 2.5.1-3 and Table 2.5.2-3 list the ITAAC for the EPSS and EUPS, respectively. Information related to periodic testing is inappropriate for these tables since ITAAC must be performed prior to fuel loading (per 10 CFR 52.99 part (c)). Therefore, periodic testing during every refueling should not be located in U.S. EPR FSAR Tier 1, Table 2.5.1-3 or Table 2.5.2-3.

U.S. EPR FSAR Tier 2, Section 8.3.1.1.9 indicates that, “Circuit breakers or fuses that are automatically opened by fault current meet the guidelines provided in RG 1.75.” This information was further clarified in the response to RAI 116, Question 8.01-4 that, “periodic testing of circuit breakers...” was confirmed to be applicable and considered in the U.S. EPR electrical design. Further commitment to the guidance of RG 1.75 is provided in Tier 2, Section 8.3.1.2.4. Therefore, the commitment to perform the periodic testing of circuit breakers during every refueling to demonstrate that the overall coordination scheme under multiple faults of non-safety-related loads remains within the limits specified in the design criteria is appropriately located in the referenced U.S. EPR FSAR Tier 2, Chapter 8 and no change is necessary.

**FSAR Impact:**

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

**Question 09.05.03-19:**

RAI 9.5.3-4 S1

The response to RAI 9.5.3-4, states that rooms containing safety-related equipment, for which routine access is expected for normal operations, surveillance and maintenance activities (e.g., emergency core cooling systems pump rooms, switchgear rooms, I&C rooms and emergency power generating buildings), will have approximately one-third of the area lighting supplied by the emergency lighting system. Additionally, emergency lighting will be provided for access to the Safeguard Buildings, Reactor Building, Fuel Building, and Emergency Power Generating Buildings. Emergency lighting is provided in other areas of Nuclear Island that have limited or no safety-related equipment. On the basis of its review, the staff finds that you did not identify all areas/rooms where emergency lighting is provided (e.g., Class 1E DC equipment rooms, UPS rooms, operational support centers, and technical support centers, etc.). Identify areas/rooms where emergency lighting will be provided.

**Response to Question 09.05.03-19:**

Table 09.05.03-19-1—Emergency Lighting Areas, lists typical plant areas where emergency lighting is provided. These areas are determined by the safety significance of the equipment in the area illuminated. The areas listed in Table 09.05.03-19-1 have safety-significant equipment, therefore emergency lighting is provided. Additional areas or rooms with emergency lighting may be identified later in the design process. Emergency lighting will be assigned based on the safety significance of the equipment in the area.

**Table 09.05.03-19-1—Emergency Lighting Areas**

| <b>Building / Elevation</b>           | <b>Equipment / Area</b>                           | <b>Emergency Lighting</b> |
|---------------------------------------|---|---------------------------|
| Fuel Building / -31 Feet              | Fuel Pool Cooling Pump Rooms                      | EDG Backed                |
|                                       | Extra Borating System Pump Rooms                  | EDG Backed                |
| Safeguard Building 1 / -31 Feet       | Medium Head Safety Injection Pump Room            | EDG Backed                |
|                                       | Low Head Safety Injection Pump Room               | EDG Backed                |
|                                       | Emergency Feedwater Pump Area                     | EDG Backed                |
|                                       | Component Cooling Water Pump Area                 | EDG Backed                |
| Safeguard Building 1 / +15 Feet       | EUPS Battery Room                                 | EDG Backed                |
|                                       | EUPS Equipment Room (Inverter & Battery Chargers) | EDG Backed                |
| Safeguard Building 1 / +27 Feet       | I&C Cabinet Rooms                                 | EDG Backed                |
|                                       | EPSS Switchgear Rooms                             | EDG Backed                |
| Safeguard Building 1 / +39 Feet       | Safety Chilled Water Pump Area                    | EDG Backed                |
|                                       | Safeguard Building Ventilation System Fan Rooms   | EDG Backed                |
| Safeguard Building 1 / +81 Feet       | Safety Chilled Water Chiller Room                 | EDG Backed                |
| Safeguard Building 2 and 3 / -31 Feet | Medium Head Safety Injection Pump Rooms           | EDG Backed                |
|                                       | Low Head Safety Injection Pump Rooms              | EDG Backed                |
|                                       | Emergency Feedwater Pump Areas                    | EDG Backed                |
|                                       | Component Cooling Water Pump Areas                | EDG Backed                |
| Safeguard Building 2 and 3 / -16 Feet | Safety Chilled Water Pump Rooms                   | EDG Backed                |
| Safeguard Building 2 and 3 / 0 Feet   | Safety Chilled Water HVAC Rooms                   | EDG Backed                |
| Safeguard Building 2 and 3 / +27 Feet | EPSS Switchgear Rooms                             | EDG Backed                |
|                                       | I&C Cabinet Rooms                                 | EDG Backed                |
| Safeguard Building 2 and 3 / +39 Feet | EUPS Battery Rooms                                | EDG Backed                |



**Table 09.05.03-19-1—Emergency Lighting Areas**

| <b>Building / Elevation</b>           | <b>Equipment / Area</b>                               | <b>Emergency Lighting</b> |
|---------------------------------------|---|---------------------------|
| Safeguard Building 2 and 3 / +39 Feet | EUPS Equipment Rooms (Inverter & Battery Chargers)    | EDG Backed                |
|                                       | Remote Shutdown Station                               | EDG Backed                |
| Safeguard Building 2 and 3 / +53 Feet | Main Control Room                                     | EDG Backed                |
|                                       | I&C Service Area                                      | EDG Backed                |
|                                       | Computer Room   | EDG Backed                |
|                                       | Integrated Operations Area (TSC) <sup>1</sup>         | EDG Backed                |
| Safeguard Building 2 and 3 / +69 Feet | Main Control Room HVAC Equipment Area                 | EDG Backed                |
| Safeguard Building 2 and 3 / +79 Feet | Main Control Room HVAC Equipment Area                 | EDG Backed                |
| Safeguard Building 4 / -31 Feet       | Medium Head Safety Injection Pump Room                | EDG Backed                |
|                                       | Low Head Safety Injection Pump Room                   | EDG Backed                |
|                                       | Emergency Feedwater Pump Area                         | EDG Backed                |
|                                       | Component Cooling Water Pump Area                     | EDG Backed                |
| Safeguard Building 4 / +15 Feet       | EUPS Battery Room                                     | EDG Backed                |
|                                       | EUPS Equipment Room (Inverter & Battery Chargers)     | EDG Backed                |
| Safeguard Building 4 / +27 Feet       | I&C Cabinet Rooms                                     | EDG Backed                |
|                                       | EPSS Switchgear Rooms                                 | EDG Backed                |
| Safeguard Building 4 / +39 Feet       | Safety Chilled Water Pump Area                        | EDG Backed                |
|                                       | Safeguard Building Ventilation System Compressor Room | EDG Backed                |
| Emergency Power Generating Building 1 | Diesel Engine Hall                                    | EDG Backed                |
|                                       | Control Room and Electrical Room                      | EDG Backed                |
| Emergency Power Generating Building 2 | Diesel Engine Hall                                    | EDG Backed                |
|                                       | Control Room and Electrical Room                      | EDG Backed                |

**Table 09.05.03-19-1—Emergency Lighting Areas**

| <b>Building / Elevation</b>           | <b>Equipment / Area</b>                | <b>Emergency Lighting</b> |
|---------------------------------------|--|---------------------------|
| Emergency Power Generating Building 3 | Diesel Engine Hall                     | EDG Backed                |
|                                       | Control Room and Electrical Room       | EDG Backed                |
| Emergency Power Generating Building 4 | Diesel Engine Hall                     | EDG Backed                |
|                                       | Control Room and Electrical Room       | EDG Backed                |
| Essential Service Water Building 1    | Essential Service Water Pump Room      | EDG Backed                |
| Essential Service Water Building 2    | Essential Service Water Pump Room      | EDG Backed                |
| Essential Service Water Building 3    | Essential Service Water Pump Room      | EDG Backed                |
| Essential Service Water Building 4    | Essential Service Water Pump Room      | EDG Backed                |
| Switchgear Building                   | NPSS Switchgear Area                   | SBODG Backed              |
|                                       | SBODG 1 Area                           | SBODG Backed              |
|                                       | SBODG 2 Area                           | SBODG Backed              |
| Access Building                       | Operations Support Center <sup>2</sup> | SBODG Backed              |

## Table 09.05.03-19-1 Notes:

1. Space suitable for a Technical Support Center is provided within the integrated operations area adjacent to the Main Control Room.
2. Space suitable for an Operational Support Center is provided within the Access Building.

**FSAR Impact:**

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

**Question 09.05.03-20:**

RAI 9.5.3-16 S1

The response to RAI 9.5.3-16, states that FSAR Tier 2, section 9.5.3.2.2 will be revised to indicate reference to Section 9.5.1 for use and location of emergency lighting for fire fighting and operator actions. Modify Section 9.5.3.2.2 as follows: "Battery pack emergency lighting fixtures are fixed, self-contained sealed beam units with eight hour battery packs. The batteries are charged from the NPSS during normal operation. The egress route from the MCR to the RSS is illuminated by independent fixed, self-contained eight-hour rated battery powered lighting units. Other post-fire safe shutdown activities performed by operators outside the MCR and RSS are supported by independent fixed, self-contained eight-hour rated battery powered lighting units at the task location and in access and egress routes. Refer to Section 9.5.1 for additional information regarding fire fighting and operator action."

**Response to Question 09.05.03-20:**

U.S. EPR FSAR Tier 2, Section 9.5.3.2.2 will be revised to add, "Battery pack emergency lighting fixtures are fixed, self-contained sealed beam units with eight hour battery packs. The batteries are charged from the NPSS during normal operation."

The information related to the egress route from the Main Control Room to the Remote Shutdown Station being illuminated by the battery pack emergency lighting fixtures, and the use of the eight-hour battery powered lighting units for post-fire safe shutdown activities, is already contained in the referenced Section 9.5.1. The U.S. EPR FSAR will not be revised to add this information to Tier 2, Section 9.5.3.2.2 as this information is already in Section 9.5.1.

The statement, "Refer to Section 9.5.1 for use and location of emergency lighting for fire fighting and operation actions" was added in response to RAI 19, Question 09.05.03-16, and is currently located in Tier 2, Section 9.5.3.2.2 of U.S. EPR FSAR interim Revision 1. Therefore, no further change is necessary.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Section 9.5.3.2.2 will be revised as described in the response and as indicated in the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

**9.5.3.2.1 Normal Lighting**

The normal lighting system provides lighting in plant buildings and site areas to support normal operation and plant maintenance activities. The system lighting distribution panels are supplied from the non-Class 1E normal power supply system (NPSS). The NPSS provides a source of interruptible power during normal plant operation. In the event power is lost from the NPSS, normal lighting is lost until NPSS power is restored. The normal lighting fixtures are distributed with the emergency lighting system fixtures in areas served.

**9.5.3.2.2 Emergency Lighting**

The emergency lighting system provides lighting in plant areas primarily containing safety-related equipment. The system is supplied with interruptible power from the EPSS and the NPSS. EPSS supply to emergency lighting is emergency diesel generator (EDG) backed. SBODG alignment to EPSS buses will also restore emergency lighting. Emergency lighting fixtures powered from the EPSS are normally illuminated and provide lighting for normal operation, control and maintenance of safety-related equipment used for implementing plant safe shutdown, and ~~firefighting~~ fire fighting.

Emergency lighting fixtures powered by the NPSS provide SBODG backed lighting in the switchgear building to support station blackout operations.

The emergency lighting system combines with the normal lighting to provide illumination levels that support operation and maintenance activities during normal operation. The amount of lighting provided by the emergency lighting system is determined by the amount of safety-related equipment in the area being served, with a higher percentage of lighting being supplied by the emergency lighting system in areas that have safety-related equipment.

EPSS Division 2 and Division 3 power the emergency lighting system to provide approximately 67 percent of the MCR and RSS lighting. During abnormal conditions that result in a loss of offsite power to the EPSS buses, MCR lighting from the emergency lighting system is interrupted until power is restored by the EDGs or SBODGs.

09.05.03-20  
(Removed prior deletion)

Battery pack emergency lighting fixtures are fixed, self-contained sealed-beam units with eight hour battery packs. The batteries are charged from the NPSS during normal operation. ~~The lighting fixtures provide lighting for operation of safety-related equipment for implementing plant safe shutdown, firefighting, and access routes to the MCR and RSS. Refer to Section 9.5.1 for use and location of emergency lighting for fire fighting and operator actions.~~