ArevaEPRDCPEm Resource

From: WELLS Russell (AREVA) [Russell.Wells@areva.com]
Sent: Monday, April 11, 2011 4:19 PM
To: Tesfaye, Getachew
Cc: Miernicki, Michael; NOXON David (AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 459, FSAR Ch. 12, New Phase 4 RAI, Supplement 1
Attachments: RAI 459 Supplement 1 Response US EPR DC - PUBLIC.pdf

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to RAI No. 459 on January 26, 2011.

The attached file, "RAI 459 Supplement 1 Response US EPR DC - PUBLIC.pdf" provides technically correct and a complete FINAL response to Questions 12.03-12.04-25 and 12.03-12.04-26, as committed. Because the response file contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email and attached file do not contain any security-related information. An unredacted security-related version is provided under separate email.

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 459, Questions 2.03-12.04-25 and 2.03-12.04-26.

The following table indicates the respective pages in the response document, RAI 459 Supplement 1 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 459 — 12.03-12.04-25	2	8
RAI 459 — 12.03-12.04-26	9	10

This concludes the formal AREVA NP response to RAI 459, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Russ Wells
U.S. EPR Design Certification Licensing Manager
AREVA NP, Inc.
3315 Old Forest Road, P.O. Box 10935
Mail Stop OF-57
Lynchburg, VA 24506-0935
Phone: 434-832-3884 (work)
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Russell.Wells@Areva.com

From: BRYAN Martin (External RS/NB)
Sent: Wednesday, January 26, 2011 11:01 AM

To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 459, FSAR Ch. 12, New Phase 4 RAI

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 459 Response US EPR DC.pdf," provides the schedule for technically correct and complete responses to these questions.

The following table indicates the respective pages in the response document, "RAI 459 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 459 — 12.03-12.04-25	2	3
RAI 459 — 12.03-12.04-26	4	4

The schedule for technically correct and complete response to the one question is provided below.

Question #	Response Date
RAI 459 — 12.03-12.04-25	June 10, 2011
RAI 459 — 12.03-12.04-26	June 10, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
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Martin.Bryan.ext@areva.com

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, December 21, 2010 11:03 AM
To: ZZ-DL-A-USEPR-DL
Cc: Bernal, Sara; Roach, Edward; Patel, Jay; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 459 (5253), FSAR Ch. 12, New Phase 4 RAI

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 4, 2010, and on December 14, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs, excluding the time period of **December 24, 2010 thru January 3, 2011, to account for the holiday season** as discussed with AREVA NP Inc. For any RAIs that cannot be answered **within 45 days**, it is expected that a date for receipt of this information will be provided to the staff within the 40-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: 2834

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD4104365CFD)

Subject: Response to U.S. EPR Design Certification Application RAI No. 459, FSAR Ch. 12, New Phase 4 RAI, Supplement 1
Sent Date: 4/11/2011 4:18:30 PM
Received Date: 4/11/2011 4:18:33 PM
From: WELLS Russell (AREVA)

Created By: Russell.Wells@areva.com

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Files	**Size**	**Date & Time**
MESSAGE	4406	4/11/2011 4:18:33 PM
RAI 459 Supplement 1 Response US EPR DC - PUBLIC.pdf	193002	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 459, Supplement 1
12/21/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 12.03-12.04 - Radiation Protection Design Features
Application Section: 12.3 Radiation Protection Design Features

QUESTIONS for Health Physics Branch (CHPB)

Question 12.03-12.04-25:

OPEN ITEM

New Phase 4 RAI

GDC 61 states that systems which contain radioactivity during normal and postulated accident conditions shall be designed with suitable shielding for radiation protection.

RG 1.206, Section C.I.12, states that the applicant should provide their shielding methodology including the assumptions, codes and techniques used in their calculations. The NRC has recently identified that the applicant made reductions in shielding wall thicknesses between revisions 0 and 1 of the EPR FSAR. These changes were classified as editorial in the summary of changes document provided with revision 1. Accordingly, no justification for these changes or analysis demonstrating the effects of these changes on occupational worker exposure were provided to NRC staff at the time of revision 1 submittal.

Based on independent calculations using the source term and assumptions outlined in the FSAR, the staff has identified a situation where the dose rates outside of the CPS demineralizer and filter rooms (Figure 12.3-44, room 22) are 4 to 7 times greater than the 2.5 mrem/hr radiation zone currently marked in chapter 12.

The staff requests additional information on the wall thickness reductions and the applicant's methodology as follows:

a. Describe the basis for the reductions in wall thicknesses seen in FSAR revision 1, chapter 12 figures. Discuss the impact of these reductions on the normal operational radiation zones and discuss any actions taken by the applicant to compensate for these impacts, such as assuming an administratively limited source term in shielding calculations, changing radiation zones, etc.

b. List the areas in the plant where an administratively limited source term was used to determine the radiation zone in revision 1 of the FSAR. Include in the listing information such as the dose rate that the source term was assumed to be administratively limited to, and the basis for the administratively limited dose rate (i.e., how was the dose rate chosen or calculated?)

c. Staff's independent calculations using the source term and assumptions outlined in the FSAR, show dose rates outside the CPS demineralizer rooms and the CPS filter rooms (Figure 12.3-44, room 22) which are 4 to 7 times greater than the 2.5 mrem/hr dose rate currently indicated. The NRC staff's calculated contact dose rate for inside the CPS demineralizer rooms is approximately 200 R/hr. This calculated contact dose rate is in agreement with current operational experience for U.S. plants for dose rates in the vicinity of the CPS demineralizers. Because the staff's estimated dose rate value of 200 R/hr inside these rooms is consistent with operational experience, the staff's calculated dose rates for outside these rooms (4 to 7 times greater than the FSAR radiation zone) are likely to also be a good representation of the radiation zone during normal operations. Therefore the staff is concerned that the dose rates directly outside these rooms, as designated in the EPR FSAR, are not in agreement with staff's calculated values. The staff requests that the applicant review and revise the radiation zone designations for the areas around the CPS filters and demineralizers to more accurately

reflect operating dose rates. Alternatively, the applicant can provide a revised methodology to justify the current radiation zones assuming a conservative contact dose rate of 200 R/hr for the CPS filters and demineralizers, or revise the FSAR to include a new COL item that will ask the applicant to commit to maintaining the CPS demineralizers and filter source terms to the administrative dose rate limit.

d. Changes in Chapter 12 figures in each redline/strike-out FSAR revision are indicated by a line on the left hand side of the drawing. Since it is not readily apparent from looking at these revised figures what changes have been made, please provide a summary document describing the changes that have been made to each of the revised Chapter 12 Radiation Zone figures since FSAR Revision 0. This document can show changes by providing marked-up figures or by providing a written description of the change (e.g., Figure 12.3-12.4-xx: rooms x through y, wall and floor thicknesses have been reduced, etc.).

Response to Question 12.03-12.04-25:

Item a:

There were no changes made to the structural wall thicknesses. The wall thicknesses shown on the radiation zone figures in U.S. EPR FSAR Tier 2, Section 12.3 represent the minimum wall thicknesses required to maintain the radiation zone designations. The reduction in the minimum wall thicknesses provided in the U.S. EPR FSAR Tier 2, Section 12.3 figures between Revisions 0 and 1 of the U.S. EPR FSAR is based on the removal of the excessive conservatism which was inadvertently introduced through a series of unit conversions and associated rounding errors in the calculation of minimum wall thickness values in radiation zones.

In some cases, the reductions in the minimum wall thicknesses lead to a change in the zone designation for certain rooms. More details regarding the changes made to the U.S. EPR FSAR Tier 2, Section 12.3 radiation zone figures are provided in the response to Item d of this question. Details about assumed administrative limits are provided in the response to Items b and c of this question.

Item b:

Certain radiation zone areas are designated as a “Green Zone” based on administrative limits imposed on the source term in nearby or adjacent high radiation (“Red Zone”) areas. These administrative limits are based on equipment source term assumptions within the dose analyses to limit the dose rate in certain high radiation locations so that the dose rates in adjacent compartments can be designated as “Green Zone” to permit operators unlimited stay time to maintain equipment as necessary for operation of the plant while maintaining doses as low as reasonably achievable (ALARA). U.S. EPR FSAR Tier 2, Table 12.3-14—Radiation Zone Administrative Limits will be added to provide a list of high radiation areas or very high radiation areas with assumed source term administrative limits. The following COL item will be added to U.S. EPR FSAR Tier 2, Section 12.3.2.3 and Table 1.8-2:

> **“**A COL applicant that references the U.S. EPR design certification will maintain dose rates below the administrative limits shown in Table 12.3-14 or revise nearby or adjacent radiation zone designations as necessary based on site-specific dose analysis for the areas listed in Table 12.3-14.”

Item c:

Dose rates for the coolant purification system (CPS) demineralizers and filters will be limited to much lower than 200 R/hr. U.S. EPR FSAR, Tier 2, Table 12.3-14, added in response to Item (b) of this response, shows that the fuel pool cooling demineralizer and the CPS2 purification demineralizer are administratively limited to 3300 mrem/hr, while the CPS1 demineralizers are administratively limited to 9400 mrem/hr. These administrative limits were determined by back-calculating the maximum allowable exposure rate to maintain the radiation zone designations for the adjoining rooms given the structural wall thicknesses. These limits will be incorporated into the Radiation Protection Program and represent the ALARA practice of changing out filters

and demineralizer resins at appropriate time corresponding to activity build-up in order to maintain occupational doses ALARA.

Item d.

In addition to the reductions in the minimum wall thicknesses mentioned in the response to Item a, the following changes were made to the radiation zone figures provided in U.S. EPR FSAR Tier 2, Section 12.3 between Revision 0 and Revision 1:

- Figure 12.3-8 – The color-coded radiation zone designations and room numbers were added.
- Figure 12.3-21 – The radiation zone designation in room UJH01 001 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-22 – The radiation zone designation in room UJH05 021 was changed from zone 3 (green) to zone 4 (yellow) and room UJH05 001 was changed from zone 4 (yellow) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-23 – The radiation zone designation in rooms UJH10 001 and UJH10 002 changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-24 – The radiation zone designation in rooms 2UJH01 003, 2UJH01 005, 3UJH01 003 and 3UHJ01 005 changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-25 – The radiation zone designation in rooms 2UJH05 005, 2UJH05 010, 2UJH05 012, 3UJH05 005, 3UJH05 010 and 3UJH05 012 changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-27 – The radiation zone designation in room 4UJH01 007 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-28 – The radiation zone designations in room 4UJH05 001 was changed from zone 4 (yellow) to zone 5 (magenta) and room 4UJH05 021 was changed from zone 3 (green) to 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-29 – The floor thicknesses were updated in accordance with the revised minimum wall thickness calculations.
- Figure 12.3-30 – The radiation zone designation in rooms UFA01 006, UFA01 007, UFA01 056, UFA01 057, and UFA01 061 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.

- Figure 12.3-31 – The radiation zone designation in rooms UFA01 011, UFA03 002, UFA03 055, and UFA03 061 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-32 – The radiation zone designation in rooms UFA06 002, UFA06 006, UFA06 011, UFA06 013, UFA06 057, UFA06 061 and UFA06 062 was changed from zone 3 (green) to zone 4 (yellow), UFA06 083 was changed from zone 4 (yellow) to zone 3 (green), and UFA06 039 and UFA06 087 was changed from zone 4 (yellow) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-33 – The radiation zone designation in rooms UFA10 011, UFA10 013, UFA10 013, UFA10 056, UFA10 057, UFA10 061, UFA10 062, and UFA10 063 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-34 – The radiation zone designation in rooms UFA13 080, UFA13 095, UFA15 011, UFA15 013 and UFA15 016 was changed from zone 3 (green) to zone 4 (yellow) and UFA15 096 was changed from zone 7 (red) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-35 – The radiation zone designation in rooms UFA15 011, UFA15 013, UFA17 017, UFA15 012, UFA15 013, and UFA15 096 was revised from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-36 – The radiation zone designation in rooms UFA21 061, UFA21 063, UFA21 064, UFA21 072, UFA21 002, UFA21 011, and UFA21 013 was revised from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-37 – The radiation zone designation in rooms UFA24 056, UFA24 057, UFA24 060, UFA24 086, and UFA24 095 was revised from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-38 – Elevations have been added to this figure.
- Figure 12.3-39 – Elevations have been added to this figure.
- Figure 12.3-40 – There are no substantive changes in this figure - aesthetic changes only.
- Figure 12.3-41 – Elevations have been added to this figure.
- Figure 12.3-42 – The radiation zone designation in rooms UKA01 003, UKA01 018 and UKA01 022 changed from zone 5 (magenta) to zone 4 (yellow) and rooms UKA01 012 and UKA01 077 was changed from zone 3 (green) to 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-44 – The radiation zone designation in room UKA06 077 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.

- Figure 12.3-47 – The radiation zone designation in room UKA17 063 was changed from zone 3 (green) to zone 4 (yellow) and room UKA17 020 was changed from zone 6 (red) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-48 – The radiation zone designation in room UKA20 035 was changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-49 – The radiation zone designation in room UKA25 006 was changed from zone 4 (yellow) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-50 – The radiation zone designation in room UKA25 006 was changed from zone 4 (yellow) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-52 – The radiation zone designation in room UKS01 031 was revised from zone 4 (yellow) to zone 5 (magenta), UKS01 035 was revised from zone 4 (yellow) to zone 3 (green), UKS01 052 was revised from zone 5 (magenta) to zone 3 (green), UKS01 082 was revised from zone 5 (magenta) to zone 4 (yellow), UKS01 086 was revised from zone 4 (yellow) to zone 3 (green), and UKS01 093 was revised from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-53 – The radiation zone designation in room UKS01 074 was revised from zone 3 (green) to zone 4 (yellow), UKS03 035 was revised from zone 4 (yellow) to zone 3 (green), UKS03 042 was revised from zone 3 (green) to zone 4 (yellow), and UKS03 063 was revised from zone 4 (yellow) to zone 3 (green), in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-54 – The radiation zone designation in rooms UKS03 063, 64, 65, and 66 was revised from zone 4 (yellow) to zone 5 (magenta), UKS06 092 was revised from zone 4 (yellow) to zone 3 (green), and UKS03 040 was revised from zone 3 (green) to zone 4 (yellow), in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls. There are seven new items added to the Room Legend.
- Figure 12.3-55 – The radiation zone designation in rooms UKS03 083, 84, 85, and 86 was revised from zone 4 (yellow) to zone 5 (magenta) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-56 – The radiation zone designation in rooms UKS03 083, 84, 85, and 86 was revised from zone 4 (yellow) to zone 5 (magenta) and UKS13 039 changed from zone 3 (green) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-57 –: The radiation zone designation in room UKS17 047 was revised from zone 4 (yellow) to zone 5 (magenta) and UKS17 039 changed from zone 5 (magenta) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.

- Figure 12.3-58 – The radiation zone designation in room UKS17 072 was revised from zone 5 (magenta) to zone 4 (yellow) in accordance with the revised minimum wall thicknesses appearing in the dimension boxes of the walls.
- Figure 12.3-59 – The words “evaporator column equipment hatch” were removed from the figure and replaced with the elevations of the ceilings above rooms 210 and 241.
- Figure 12.3-64 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure.
- Figure 12.3-65 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure. Wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-66 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure. Wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-67 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure. Wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-68 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure. The radiation zone designation in rooms 2UJH05 040 and 3UJH05 040 was revised from zone 3 (green) to zone 4 (yellow), and wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-69 – The radiation zone designation in rooms 2UJH05 024 and 3UJH05 024 was revised from zone 3 (green) to white (no designation) and, in all rooms east of 2UJH10 002 and west of 3UJH10 002, the zone designation was revised from zone 3 (green) to zone 5 (red) and wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-70 – The Maintenance Access Aisle Legend was added and maintenance access spaces were indicated on the figure. The radiation zone designation in room 2UJH05 024 was revised from zone 3 (green) to white (no designation) and wall thickness values were revised in accordance with the updated minimum values.
- Figure 12.3-72 –There are no changes in this figure.
- Figure 12.3-73 –There are no changes in this figure.
- Figure 12.3-74 –There are no changes in this figure.

FSAR Impact:

U.S. EPR FSAR Tier 2 Table 1.8-2 and Section 12.3.2.3 will be revised as described in the response and as indicated on the enclosed markup.

Question 12.03-12.04-26:

OPEN ITEM

Follow-up to RAI 280, Question 12.3-12.4-17

In the RAI 280, Supplement 6, Question 12.3-12.4-17 response, the applicant provided a description of an analysis that was performed and the design changes that resulted from that analysis. This analysis demonstrated that if fuel were dropped near the reactor cavity access room during fuel movement, the radiation levels in the cavity access room and the room adjacent to it would be unacceptably high (VHRA and HRA respectively). The applicant's analysis is acceptable to the staff. The FSAR mark-up provided in response to RAI 280, Question 12.3-12.4-17 item 5 does not clearly state whether the doors shown in the revised Figure 3.8-5 – Reactor Building Plan at Elevation +17 Feet, and Figure 12.3-2 – Reactor Cavity at the Elevation +17 Ft of the Reactor Building, are shielding doors, water tight hatches, or normal steel doors. This is because they are all drawn the same and because no additional detail was incorporated into the FSAR.

GDC 61 requires that the fuel storage and transfer system, in addition to any other system which may contain radioactivity, be designed to ensure adequate safety and shielding, as well as designed to prevent the release of radioactive material during normal and accident conditions.

Based on the above, the staff requests the following:

a. Because the Refueling Machine is not designated as Seismic I or II in Tier 1 of the FSAR, the significant occupational radiation hazard associated with a fuel assembly drop in the reactor cavity adjacent to the cavity access room should be explicitly addressed in the FSAR, specifically by crediting the design changes that were made in order to address this possibility. For example, revise the FSAR to justify the design change to add the two shielding doors between the reactor cavity and the access room at the +17 Ft Elevation of the reactor building. In the FSAR, specify that these shielding doors would reduce radiation dose rates to 1.7 rem/hr in room UJA15-024 and to 32 mrem/hr in UJA15-018 both at a meter from the shielding wall assuming the presence of a dropped maximum burn up spent fuel assembly parallel to the access door, 30 cm away.

b. Organic compounds, such as those used for seals on waterproof doors, have been shown to breakdown when exposed to large integrated doses of radiation. Because of the potential for high radiation levels adjacent to the cavity access door, describe the seals that will be used for the water proof door, and discuss their capacity to maintain their integrity when exposed to the potentially high integrated doses from a dropped fuel assembly adjacent to the cavity access door.

c. Revise the FSAR to include a discussion of how leakage around the cavity access hatch into the access room is contained and removed, in accordance with 10 CFR 20.1406.

Response to Question 12.03-12.04-26:

Item a:

U.S. EPR FSAR Tier 2, Section 12.3.1.8.1 will be revised to include a discussion on the radiation shielding doors used to reduce radiation dose rates in rooms UJA15 018 and UJA15 024 in the event of a dropped fuel assembly. U.S. EPR FSAR Tier 2, Figure 12.3-2 will be revised to show area designations. It is also noted that U.S. EPR Tier 2, Table 3.2.2-1, Sheet 64 of 185 lists the refueling machine (RM) as Seismic Category II. U.S. EPR FSAR Tier 1, Table 2.3.8-1 will be corrected to reflect this designation.

Item b:

Watertight doors are designed to comply with functional requirements such as leak-rate limits, door-closure indication, door-seal aging degradation characteristics, and maintainability. Maintenance requirements are based on manufacturer recommendations, and maintenance procedures are written by COL applicants in accordance with their respective regulatory approved maintenance programs. Refer to U.S.EPR FSAR Tier 2, Section 3.4.1, COL Item 3.4-6.

Item c:

If water leaks into the reactor cavity access room, it will drain into the Reactor Building sump. From the sump, the water is transferred to the Nuclear Auxiliary Building relay sump and then to the liquid waste storage and processing systems described in U.S EPR FSAR Tier 2, Section 11.2.2. The activity of the leakage water would be the same as the water in the reactor cavity. Releases of radioactive effluent via the liquid pathway occur from discharges from the monitoring tanks in the liquid waste storage system, as described in U.S. EPR FSAR Tier 2, Section 11.2.3. This design feature is discussed in U.S. EPR FSAR Tier 2, Sections 12.3.1.9 and 12.3.6.

FSAR Impact:

U.S. EPR FSAR Tier 1, Table 2.3.8-1, Tier 2, Section 12.3.1.8.1 and Figure 12.3-2 will be revised as described in the response and as indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Table 2.2.8-1—FHS Equipment Mechanical Design

Description	Tag Number(1)	Location	ASME Code Section III	Function	Seismic Category
New Fuel Elevator	FCD10	Fuel Building (UFA)	N/A	N/A	N/A
Spent Fuel Machine	FCD01	Fuel Building (UFA)	N/A	N/A	N/A
Transfer Tube and Blind Flange (Fuel Transfer Tube Facility)	FCJ05	Fuel Building (UFA) and Reactor Building (UJA)	Yes	Containment isolation	I
Transfer Tube gate valve and expansion joints	FCJ05	Fuel Building (UFA) and Reactor Building (UJA)	Yes	Leak tightness	I
Mechanism (Fuel Transfer Tube Facility)	FCJ01	Fuel Building (UFA) and Reactor Building (UJA)	N/A	N/A	N/A
Refueling Machine	FCB01	Reactor Building (UJA)	N/A	N/A	~~N/A~~II
Spent Fuel Cask Transfer Facility penetration including loading pit bottom cover.	FCJ12	Fuel Building (UFA)	N/A	Leak tightness	I
New Fuel Storage Racks	FAA01	Fuel Building (UFA)	N/A	Fuel storage	I
Spent Fuel Storage Racks	FAB02	Fuel Building (UFA)	N/A	Fuel storage	I
Transfer Pit Slot Gate	30FAB11 KB001	Fuel Building (UFA)	N/A	Leak tightness	I
Transfer Pit Swivel Gate	30FAB11 KB002	Fuel Building (UFA)	N/A	Leak tightness	I
Loading Pit Slot Gate	30FAB12 KB001	Fuel Building (UFA)	N/A	Leak tightness	I
Loading Pit Swivel Gate	30FAB12 KB002	Fuel Building (UFA)	N/A	Leak tightness	I

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Table 1.8-2—U.S. EPR Combined License Information Items
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Item No.	Description	Section
12.3-2	A COL applicant that references the U.S. EPR design certification will provide site-specific information on estimated annual doses to construction workers in a new unit construction area as a result of radiation from onsite radiation sources from the existing operating plant(s). This information will include bases, models, assumptions, and input parameters associated with these annual doses.	12.3.5.1
12.3-3	A COL applicant that references the U.S. EPR design certification will describe the use of portable instruments, and the associated training and procedures, to accurately determine the airborne iodine concentration within the facility where plant personnel may be present during an accident, in accordance with requirements of 10 CFR 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737. The procedures for locating suspected high-activity areas will be described.	12.3.4.5 12.03 - 12.04-25
12.3-4	A COL applicant that references the U.S. EPR design certification will maintain dose rates below the administrative limits shown in Table 12.3-14 or revise nearby or adjacent radiation zone designations as necessary based on site-specific dose analysis for the areas listed in Table 12.3-14.	12.3.2.3
12.5-1	A COL applicant that references the U.S. EPR design certification will fully describe, at the functional level, elements of the Radiation Protection Program. The purpose of the Radiation Protection Program is to maintain occupational and public doses ALARA. The program description will identify how the program is developed, documented, and implemented through plant procedures that address quality requirements commensurate with the scope and extent of licensed activities. This program will comply with the provisions of 10 CFR Parts 19, 20, 50, 52, and 71 and be consistent with the guidance in RGs 1.206, 1.8, 8.2, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.13, 8.15, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, 8.38, and the consolidated guidance in NUREG-1736.	12.5
13.1-1	A COL applicant that references the U.S. EPR design certification will provide site-specific information for management, technical support, and operating organizations.	13.1
13.2-1	A COL applicant that references the U.S. EPR design certification will provide site-specific information for training programs for plant personnel.	13.2
13.3-1	A COL applicant that references the U.S. EPR design certification will provide a site-specific emergency plan in accordance with 10 CFR 50.47 and 10 CFR 50 Appendix E.	13.3

- The reactor cavity, which is the location for the refueling pool during fuel handling and is a very high radiation area during refueling and during operation. An access room is provided in the design to enable workers to access the reactor vessel head. Double doors to the reactor cavity prevent workers from entering the reactor cavity.

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The access room (UJA15 024) is not a radiological vital area and does not need to be accessed during normal fuel moves or after a fuel handling accident (FHA). The room outside the access room (UJA15 018) is a relatively large area containing the spray lines. To maintain this as an accessible area during refueling operations, there are two 16 cm thick steel radiation protection doors, one between room UJA15 024 and the reactor cavity and one between rooms UJA15 024 and UJA15 018, in addition to the 5 cm thick steel cavity sealing door between UJA15 024 and the reactor cavity (See Figure 12.3-2). These shielding doors are designed to reduce radiation dose rates to 1.7 rem/hr in room UJA 15024 and 32 mrem/hr in UJA15 018 at one meter from the wall in the event of a dropped fuel assembly.

- The core internals storage area, which is a very high radiation area during that portion of the refueling evolution in which the internals are removed from the reactor vessel and stored. This area is flooded with refueling water during this period and is inaccessible.

- The instrument lance storage, which is a very high radiation area during that portion of the refueling evolution in which the instrument lances are removed from the reactor vessel and stored. This area is flooded with refueling water during this period and is inaccessible.

- The transfer pit, which is a very high radiation area during that portion of the refueling evolution in which spent fuel is being moved between the Reactor Building and the Fuel Building. This area is flooded with refueling water during this period and is inaccessible. When not refueling, access is provided through the access room.

- The access area leading to the transfer pit compartment, which is a very high radiation area during that portion of the refueling evolution in which spent fuel is being moved between the Reactor Building and the Fuel Building.

- The annulus area, which is a very high radiation area during that portion of the refueling evolution in which spent fuel is being moved between the Reactor Building and the Fuel Building.

To control access during fuel transfers, access doors or gates are used to limit entry to the above areas. The design features include double locks, local and remote alarms, and video surveillance in compliance with 10 CFR 20.1602. These features also include crash-bars to permit the unimpeded exit of personnel in the affected areas.

The aeroball measurement room is inside the Reactor Building and controlled as a high-radiation area. The room has interlocks which prevent access while the system is

service corridors remain nonradiation areas during operation, thus permitting operators and maintenance technician access while maintaining dose ALARA.

ESF Filters Post-LOCA

ESF filters for the annulus ventilation and safeguard controlled area ventilation systems are located in the Fuel Building at elevations +24 feet and +36 feet, and the MCR ESF filters are located in the Safeguard Building Division 2 and 3 at elevation +69 feet. During a post-LOCA event, these filters become loaded with radioactive material, creating high and very high radiation zones in the immediate surrounding areas. These radiation zones (for the annulus and safeguard filters, a maximum of 28 rem/h at floors above and below the filters and 3 rem/h in adjacent rooms to the filters) are in areas that do not need to be immediately accessed following a LOCA event. The filter loading will decay prior to personnel entry to the area. Access to these areas is addressed as part of the Radiation Protection Program (see Section 12.5). See Table 12.3-12—U.S. EPR Estimated Accident Mission Dose for MCR personnel doses because of direct shine from the MCR filters.

12.3.2.3 Radiation Zoning

Radiation zones for each area are defined by the dose rate in the areas, taking into account sources within each area as well as contributing dose rate from sources in adjacent areas and intervening shielding. Radiation zone categories employed and their descriptions are provided in Table 12.3-2—U.S. EPR Radiation Zone Designation.

Frequently accessed areas, such as corridors, are shielded for Zone 3. Buildings that contain radioactive material are shielded so that the dose rate outside of the external walls of the building are below 1 mrem/hr. The radiation zone maps are included in Figure 12.3-13—Reactor Building Cross-Section Radiation Zones through Figure 12.3-59—Radioactive Waste Building +53 Ft Elevation Radiation Zones. Personnel access paths are indicated on the radiation zone maps.

Additional personnel access paths for upper levels of the Safeguard Building (electrical areas) are included in Figure 12.3-60—Safeguard Buildings 2 and 3 +15 Ft Elevation Access Paths though Figure 12.3-63—Safeguard Buildings 2 and 3 +53 Ft Elevation Access Paths. These figures show the additional routes to access the MCR. The MCR can be accessed from the Access Building at elevation 0 feet by going through Division 4 and into Division 3 of the Safeguard Building. A staircase or elevator leads to elevation +53 feet of Division 3 and into the MCR.

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Certain radiation zone areas are designated as a “Green Zone” based on administrative limits imposed on the source term in nearby or adjacent high radiation (“Red Zone”) areas. These administrative limits are based on equipment source term assumptions in the dose analyses to limit the dose rate in certain high radiation locations so that the

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dose rates in adjacent compartments can be designated as "Green Zone" to permit operators unlimited stay time to maintain equipment as necessary for operation of the plant while maintaining doses ALARA. Table 12.3-14—Radiation Zone Administrative Limits lists high radiation areas (HRA) or very high radiation areas (VHRA) with assumed source term administrative limits. A COL applicant that references the U.S. EPR design certification will maintain dose rates below the administrative limits shown in Table 12.3-14 or revise nearby or adjacent radiation zone designations as necessary based on site-specific dose analysis for the areas listed in Table 12.3-14.

The postaccident radiation zone maps are included in Figure 12.3-64—Safeguard Building 1 -31 Ft Elevation Postaccident Radiation Zones through Figure 12.3-71—Reactor Building Cross-Section Postaccident Radiation Zones.

12.3.3 Ventilation

12.3.3.1 Design Objectives

The U.S. EPR heating, ventilation, air conditioning (HVAC) system design criteria include the following:

- Design features for controlling the intake of radioactive material and maintaining personnel exposures ALARA in accordance with 10 CFR 20.
- Features for maintaining airborne radioactivity concentrations in unrestricted areas in accordance with 10 CFR 20.
- Features to maintain the dose to MCR personnel below the limit specified in 10 CFR 50, Appendix A, GDC 19.

12.3.3.2 HVAC System Description

The HVAC system for each of the following buildings is described in detail in Section 9.4:

- Containment Building (refer to Section 9.4.7).
- Nuclear Auxiliary Building (refer to Section 9.4.3).
- Fuel Building (refer to Section 9.4.2).
- Radioactive Waste Processing Building (refer to Section 9.4.8).
- Access Building (refer to Section 9.4.14).
- Safeguard Building (refer to Section 9.4.5, 9.4.6).

Table 12.3-14—Radiation Zone Administrative Limits

Room or Component	Administrative Limit [1]
Filter Room (Room UKA06-057)	2.5 rem/hr
Fuel Pool Cooling Demineralizer (FAL23 AT002 in Room UKA06-64)	3.3 rem/hr
Coolant Purification System (CPS2) Demineralizer (KBE20 AT001 in Room UKA06-065)	3.3 rem/hr
Coolant Purification System (CPS1) Demineralizers (KBE11 AT001 in Room UKA06-066 and KBE12 AT001 in Room UKS06-067)	9.4 rem/hr
Liquid Waste Storage Tank Rooms (UKS01-073. UKS03-073, UKS03-083 - 086, UKS06-073, UKS06-083 - 086, UKS10-073, UKS10-083 – 086, UKS13-083 - 086)	100 mrem/hr
Concentrate Tank Rooms (UKS01-044, 046, 048, UKS03-044, 046, 048, UKS06-044, 046, 048, 053)	1 rem/hr
Concentrate Buffer Tank Rooms (UKS01-024, UKS03-024)	3 rem/hr (UKS01-024) 1 rem/hr (UKS03-24)
Resin Waste Tank Room (UKS01-006, UKS01-011, UKS03-006, UKS03-011)	100 rem/hr
Resin Proportioning Tank Room (UKS06-024)	15 rem/hr
Evaporator Room (UKS13-047, UKS17-047)	200 mrem/hr (UKS13-047) 100 mrem/hr (UKS17-047)
Sludge Tank Room (UKS01-029)	190 mrem/hr
Side of unshielded waste drum (UKS01-059, 060, 061, 064, 065, 066, 067, UKS03-065)	5 rem/hr
Reactor Coolant Pump (UFA24-085)	143 mrem/hr

Notes:

1. Dose rate is at one foot from the surface of the source.

Figure 12.3-2—Reactor Cavity at the +17 Ft Elevation of the Reactor Building