## ArevaEPRDCPEm Resource

**From:** WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
**Sent:** Tuesday, August 30, 2011 3:56 PM
**To:** Tesfaye, Getachew
**Cc:** BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); KOWALSKI David (AREVA)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 482 (5611), FSAR Ch. 9, Supplement 2
**Attachments:** RAI 482 Supplement 2 Response US EPR DC - PUBLIC.pdf

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the four questions in RAI No. 482 on May 27, 2011. Supplement 1 response to RAI No. 482 was sent on July 29, 2011 and provided responses to Questions 09.05.01-82 and 09.05.01-83.

The attached file, "RAI 482 Supplement 2 Response US EPR DC - PUBLIC.pdf" provides technically correct and complete FINAL responses to the remaining questions (Questions 09.05.01-84 and 09.05.01-85). 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 e-mail and attached file do not contain any security-related information. An unredacted SUNSI version is provided under separate e-mail.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the responses to RAI 482 Questions 09.05.01-84 and 09.05.01-85.

The following table indicates the respective pages in the response document, "RAI 482 Supplement 2 Response US EPR DC - PUBLIC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|
| RAI 482 — 09.05.01-84 | 2 | 4 |
| RAI 482 — 09.05.01-85 | 5 | 5 |

This concludes the formal AREVA NP response to RAI 482, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

***Dennis Williford, P.E.***
***U.S. EPR Design Certification Licensing Manager***
**AREVA NP Inc.**
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

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**From:** WELLS Russell (RS/NB)
**Sent:** Friday, July 29, 2011 5:28 PM
**To:** Tesfaye, Getachew
**Cc:** ROMINE Judy (RS/NB); KOWALSKI David (RS/NB); WILLIFORD Dennis (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); RYAN Tom (RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 482 (5611), FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the four questions in RAI No. 482 on May 27, 2011.

The attached file, "RAI 482 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete final responses to two of the four questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the responses to RAI 482 Questions 09.05.01-82 and 09.05.01-83.

The following table indicates the respective pages in the response document, "RAI 482 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|
| RAI 482 — 09.05.01-82 | 2 | 2 |
| RAI 482 — 09.05.01-83 | 3 | 3 |

The schedule for technically correct and complete responses to the remaining two questions has been changed and is provided below:

| Question # | Response Date |
|---|---|
| RAI 482 — 09.05.01-84 | August 31, 2011 |
| RAI 482 — 09.05.01-85 | August 31, 2011 |

Sincerely,

*Russ Wells for*
***Dennis Williford, P.E.***
***U.S. EPR Design Certification Licensing Manager***
**AREVA NP Inc.**
7207 IBM Drive, Mail Code CLT 2B
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**From:** WILLIFORD Dennis (RS/NB)
**Sent:** Friday, May 27, 2011 11:39 AM
**To:** Tesfaye, Getachew
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 482 (5611), FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 482 Response US EPR DC.pdf," provides a schedule since a technically correct and complete response to the 4 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 482 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|

| | | |
|---|---|---|
| RAI 482 — 09.05.01-82 | 2 | 2 |
| RAI 482 — 09.05.01-83 | 3 | 3 |
| RAI 482 — 09.05.01-84 | 4 | 4 |
| RAI 482 — 09.05.01-85 | 5 | 5 |

A complete answer is not provided for the 4 questions. The schedule for a technically correct and complete response to these questions is provided below.

| Question # | Response Date |
|---|---|
| RAI 482 — 09.05.01-82 | July 29, 2011 |
| RAI 482 — 09.05.01-83 | July 29, 2011 |
| RAI 482 — 09.05.01-84 | July 29, 2011 |
| RAI 482 — 09.05.01-85 | July 29, 2011 |

Sincerely,

***Dennis Williford, P.E.***
***U.S. EPR Design Certification Licensing Manager***
**AREVA NP Inc.**
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**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
**Sent:** Wednesday, April 27, 2011 3:13 PM
**To:** ZZ-DL-A-USEPR-DL
**Cc:** McCann, Edward; Dreisbach, Jason; Hearn, Peter; Clark,Phyllis; Colaccino, Joseph; ArevaEPRDCPEm Resource
**Subject:** U.S. EPR Design Certification Application RAI No. 482 (5611), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 11, 2011, and discussed with your staff on April 26, 2011. Draft RAI Question 09.05.01-81 was deleted 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:** 3370

**Mail Envelope Properties** (2FBE1051AEB2E748A0F98DF9EEE5A5D486D425)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 482 (5611), FSAR Ch. 9, Supplement 2
**Sent Date:** 8/30/2011 3:56:26 PM
**Received Date:** 8/30/2011 3:57:29 PM
**From:** WILLIFORD Dennis (AREVA)

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| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 6268 | 8/30/2011 3:57:29 PM |
| RAI 482 Supplement 2 Response US EPR DC - PUBLIC.pdf | 573684 | |

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

**Response to**

**Request for Additional Information No. 482(5611), Supplement 2**

**4/27/2011**

**U.S. EPR Standard Design Certification**
**AREVA NP Inc.**
**Docket No. 52-020**
**SRP Section: 09.05.01 - Fire Protection Program**
**Application Section: 9.5.1**

**QUESTIONS for Fire Protection Team (SFPT)**

**Question 09.05.01-84:**

The staff reviewed U.S. EPR FSAR Tier 1 Table 2.1.1-8, Reactor Building ITAAC, and finds the following ITAAC Issues:

a. There is no ITAAC identified for the separation of the RCB from the RBA for fire. This ITAAC needs to address a fire protection analysis. The fire protection analysis includes barriers, doors, dampers, and penetrations separating the RCB from the RBA and internal features of the RCB, an as-built inspection of barriers, doors, dampers, and penetrations separating the RCB from the RBA and of the internal features of the RCB, testing of dampers, and a post-fire safe shutdown analysis that indicates that at least one success path for safe shutdown is available including the internal aspects of the RCB. The applicant needs to develop an ITAAC for the RCB and update Table 2.1.1-8 as needed or provide the justification for not providing the ITAAC.

b. ITAAC # 2.7 for the separation of the RBA from the SBs and FB does not address the mitigation of the propagation of smoke. Furthermore, it is unclear if the ITAAC item for post-fire safe shutdown analysis includes internal separation aspects of the RBA. It is also unclear if the ITAAC item for fire protection analysis includes internal fire protection features of the RBA. The applicant needs to revise this ITAAC for the separation of the RBA from the SBs and FB and update Table 2.1.1-8 as needed or provide the justification for not updating the ITAAC.

**Response to Question 09.05.01-84:**

Parts a and b

U.S. EPR FSAR Tier 1, Section 2.1.1.1 and Table 2.1.1-8—Reactor Building ITAAC will be revised to address the separation of the Reactor Containment Building (RCB) from the Reactor Building Annulus (RBA) for fire effects, and to address the fire protection analysis within the RBA and internal separation features in the RCB.

ITAAC Items 2.24 and 2.25 will be added to U.S. EPR FSAR Tier 1, Table 2.1.1-8, to address fire protection and separation features within the RBA and RCB, respectively.

ITAAC Item 2.7 in U.S. EPR FSAR Tier 1, Table 2.1.1-8, will be revised to clarify the separation of the RBA from the Safeguard Buildings and Fuel Building, and address fire protection features between the RBA and RCB.

ITAAC Items 2.7 and 2.24 in U.S. EPR FSAR Tier 1, Table 2.1.1-8, will be revised to address the mitigation of the propagation of smoke by requiring that a smoke effects analysis be performed.

ITAAC Item 2.7 in U.S. EPR FSAR Tier 1, Table 2.1.1-8, will be revised to change the phrase “minimum 3-hour fire rating” to “adequate fire rating.” The phrase “adequate fire rating” will also be used in the new ITAAC items 2.24 and 2.25, which is consistent with U.S. EPR FSAR Tier 2, Section 9.5.1, which states:

> “Train separation in the annulus is provided by three hour rated fire barriers or a combination of spatial separation and defense-in-depth fire protection features such as fire barriers, fire rated cable, fire detection, fire suppression, and administrative controls

to prevent storage of transient combustibles in the annulus. The containment contains all four divisions of electrical equipment and cabling. Train separation is provided by a combination of spatial separation, physical barriers, and defense-in-depth fire protection features such as fire detection and suppression systems. Fire protection for redundant divisions is provided to provide reasonable assurance that one success path of SSC necessary to achieve safe shutdown conditions (i.e., cold shutdown) is free of fire damage. To comply with the criteria of RG 1.189, separation inside the RB is based on separation as previously described or separation of cables and equipment and associated non-safety-related circuits of redundant success paths is provided by a non-combustible radiant energy shield having a minimum fire rating of 30 minutes."

Therefore, adequate separation is provided by a combination of other fire protection methods other than three-hour fire-rated barriers.

The following U.S. EPR FSAR Tier 2 items will be revised to address the separation of the RCB from the RBA for fire effects, address the fire protection analysis within the RBA and address the mitigation of smoke within the RBA:

- Section 9A.3.1.
- Table 9A-2—Fire Area Parameters.
- Figure 9A-40—Fire Zone Layouts-Reactor Building, -20 Feet.
- Figure 9A-41—Fire Zone Layouts-Reactor Building, -8 Feet.
- Figure 9A-42—Fire Zone Layouts-Reactor Building, +5 Feet.
- Figure 9A-43—Fire Zone Layouts-Reactor Building, +17 Feet.
- Figure 9A-44—Fire Zone Layouts-Reactor Building, +29 Feet.
- Figure 9A-45—Fire Zone Layouts-Reactor Building, +45 Feet.
- Figure 9A-46—Fire Zone Layouts-Reactor Building, +64 Feet.
- Figure 9A-47—Fire Zone Layouts-Reactor Building, +79 Feet.
- Figure 9A-48—Fire Zone Layouts-Reactor Building, +94 Feet.
- Figure 9A-49—Fire Zone Layouts-Reactor Building, Section A-A.
- Figure 9A-50—Fire Zone Layouts-Reactor Building, Section B-B.
- Figure 9A-51—Fire Zone Layouts-Reactor Building, Section C-C.

**FSAR Impact:**

U.S. EPR FSAR Tier 1, Section 2.1.1.1 and Table 2.1.1-8, will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 9A.3.1, Table 9A-2 and Figures 9A-40 through 9A-51, will be revised as described in the response and indicated on the enclosed markup.

**Question 09.05.01-85:**

U.S. EPR FSAR Section 9.5.1.2.1 Subsection, Shutdown/Low Power Operations, states that "The U.S. EPR design provides reasonable assurance that fuel integrity is protected by permanent plant systems during refueling operations or maintenance outages. The primary fuel cooling systems are spent fuel cooling and the residual heat removal system." RG 1.189 Regulatory Position 5.6 states that " During shutdown operations (i.e., maintenance or refueling outages), fire risk may increase significantly as a result of work activities. In addition, redundant systems important to safety may not be available as allowed by plant technical specifications and plant procedures. The FPP should be reviewed to verify that fire protection systems, features, and procedures will minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the unacceptable release of radioactive materials, under the differing conditions that may be present during shutdown operations." U.S. EPR FSAR Section 9.5.1.2.1 Subsection, Shutdown/Low Power Operations, does not provide any FPP systems, features, and procedures that would minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the unacceptable release of radioactive materials, under the differing conditions that may be present during shutdown operations. The applicant needs to revise the FSAR to include any FPP systems, features, and procedures that would minimize the potential for fire events to impact safety functions (e.g., reactivity control, reactor decay heat removal, spent fuel pool cooling) or result in the unacceptable release of radioactive materials, under the differing conditions that may be present during shutdown operations.

**Response to Question 09.05.01-85:**

U.S. EPR FSAR Tier 2, Section 9.5.1.2.1, will be revised to include the following statement:

> “For the U.S. EPR plant, shutdown operations are defined as refueling or maintenance outages. The primary fuel cooling systems are spent fuel pool cooling and residual heat removal systems. One or both of these systems are used depending on the location of the fuel. The U.S. EPR FPP consists of FPS design features, personnel, equipment and procedures that minimize the potential for fire events to affect the fuel integrity safety functions of reactivity control, decay heat removal, and spent fuel pool cooling or result in an unacceptable release of radioactive material under the different conditions that may be present during shutdown operations.”

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Section 9.5.1.2.1 will be revised as described in the response and indicated on the enclosed markup.

# U.S. EPR Final Safety Analysis Report Markups

relief device" for their respective compartments. The doors provide this pressure relief function by swinging open or by use of a pressure balance aperture (blowout panel) in the door.

## 2.0 Key Design Features

2.1 Six rib support structures, provided at the bottom of the reactor cavity, as shown on Figure 2.1.1-9, limit lower reactor pressure vessel head deformation due to thermal expansion and creep during severe accident mitigation.

2.2 As shown on Figure 2.1.1-4, a flooding barrier is provided to prevent ingress of water into the core melt spreading area.

2.3 Core melt cannot relocate to the upper containment due to the existence of concrete barriers, as shown on Figure 2.1.1-9.

2.4 The RB structures are Seismic Category I and are designed and constructed to withstand design basis loads without loss of structural integrity and safety-related functions. The design basis loads are those loads associated with:

- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, equipment loads, hydrostatic, hydrodynamic, and temperature loads).
- Internal events (including internal flood loads, accident pressure loads, accident thermal loads, accident pipe reactions, and pipe break loads, including reaction loads, jet impingement loads, and missile impact loads).
- External events (including rain, snow, flood, tornado, tornado-generated missiles and earthquake).

2.5 The RCB, including the liner plate and penetration assemblies, maintains its pressure boundary integrity at the design pressure.

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2.6 The RCB is post-tensioned, pre-stressed concrete structure.

2.7 The RBA is separated from the SBs and the FB and the RBA is separated from the RCB by ~~an~~ internal hazard protection barriers that haves an adequate ~~minimum 3-hour~~ fire rating, as indicated on Figure 2.1.1-20.

2.8 The following are provided for water flow to the in-containment refueling water storage tank (IRWST):

- As shown on Figure 2.1.1-4, RCB rooms which are adjacent to the IRWST contain wall openings slightly above the floor to allow water flow into the IRWST.
- As shown on Figure 2.1.1-5, RCB rooms which are directly above the IRWST, contain trapezoidal-shaped openings in the floor to allow water flow into the IRWST. The floor openings are protected by weirs and trash racks to provide a barrier against material transport into the IRWST.

2.9 RBA penetrations that contain high-energy pipelines, as described in Table 2.1.1 7, have guard pipes.

2.10 Essential equipment required for plant shutdown located in the RB and RBA is located above the internal flood level.

2.11 The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation.

2.12 The RB structures have key dimensions that are confirmed after construction.

2.13 The RCB has a minimum containment free volume that is confirmed after construction.

2.14 The RCB and RB internal structures have a minimum containment heat sink surface area value.

2.15 The integrated leak rate from the RCB does not exceed the maximum allowable leakage rate.

2.16 The location of the doors and blowout panels is as listed in Table 2.1.1-6(a).

2.17 Seismic Category I doors and blowout panels can withstand seismic design basis loads without a loss of the function.

2.18 Doors and blowout panels provide pressure relief.

2.19 Doors with blowout panels are provided with missile restraint.

2.20 Vent path areas provide room (compartment) pressure relief.

2.21 The RCB has a maximum volume of Microtherm insulation within the Zone of Influence.

2.22 The coatings in the RCB are qualified.

2.23 RCB coatings in the zone of influence areas have a maximum thickness.

2.24 Fire protection features provide separation within the RBA.

2.25 Fire protection features provide separation within the RCB.

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## 3.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.1-8 lists the RB ITAAC.

**Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| | | e. Pre-service Inspections on the RCB post-tensioned, pre-stressed concrete structure has been performed in accordance with ASME Code Section III. | e. ASME Code Section III Data Reports exist and concludes that Pre-Service Inspections on the RCB post-tensioned, pre-stressed concrete structure meets ASME Section III. |
| 2.7 | The RBA is separated from the SBs and the FB and the RBA is separated from the RCB by ~~an~~ internal hazard protection barriers ~~as shown on Figure 2.1.1-20~~ that haves an adequate ~~minimum 3-hour~~ fire rating as indicated on Figure 2.1.1-20~~.~~. | a. A fire protection analysis will be performed. | a. Completion of fire protection analysis ~~that~~ concludes that features such as barriers, doors, dampers, and penetrations that separates the RBA from the SBs and FB, and the RBA from the RCB, have an adequate ~~minimum 3-hour~~ fire rating. |
| | | b. Inspection of as-built conditions of features such as barriers, doors, dampers, and penetrations, which separate the RBA from the SBs and FB, and the RBA is separated from the RCB versus construction drawings of barriers, doors, dampers and penetrations as determined in the part (a) analysis will be performed. | b. The as-built configuration of fire barriers, doors, dampers, and penetrations that separate the RBA from the SBs and FB and the RBA from the RCB (as shown on Figure 2.1.1-20) agrees with the construction drawings. |
| | | c. Testing of dampers that separate the RBA from the SBs and FB and the RBA is separated from the RCB will be performed. | c. Dampers that separate the RBA from the SBs and FB and the RBA from the RCB are operable under air flow conditions. ~~close on receipt of signal.~~ |
| | | d. A post-fire safe shutdown analysis will be performed. | d. Completion of the post-fire safe shutdown analysis concludes that at least one success path comprised of the minimum set of SSC is available for safe shutdown. |

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**Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| | | e. A smoke effects analysis will be performed. | e. The smoke effects analysis concludes that smoke and other products of combustion do not migrate through the credited barriers and adversely affect safe shutdown. |
| 2.8 | The following provisions are provided for water flow to the IRWST:<br>• As shown on Figure 2.1.1-4, RCB rooms which are adjacent to the IRWST contain wall openings slightly above the floor to allow water flow into the IRWST.<br>• As shown on Figure 2.1.1-5, RCB rooms which are directly above the IRWST, contain trapezoidal-shaped openings in the floor to allow water flow into the IRWST. The floor openings are protected by weirs and trash racks to provide a barrier against material transport into the IRWST. | Inspection of the RCB will be performed. | The as-built RCB configuration includes the following provisions:<br>• As shown on Figure 2.1.1-4, the two rooms labeled Areas for MHSI, LHSI & SAHRS pipe penetrations contain wall openings slightly above the floor to allow water flow into the IRWST.<br>• As shown on Figure 2.1.1-5 the rooms labeled RCP Oil Collection Tank Areas for each loop contain trapezoidal-shaped openings in the floor and are provided with weirs and trash racks. |
| 2.9 | RBA penetrations that contain high-energy pipelines, as described in Table 2.1.1-7, have guard pipes. | Inspection of the RBA will be performed. | RBA penetrations that contain high-energy pipelines, as described in Table 2.1.1-7, have guard pipes. |
| 2.10 | Essential equipment required for plant shutdown located in the RCB and RBA is located above the internal flood level. | a. An internal flood analysis for the RCB and RBA will be performed. | a. Completion of the internal flood analysis for the RCB and RBA concludes essential equipment required for plant shutdown is located above the internal flood level. |

**Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 2.19 | Doors with blowout panels are provided with missile restraint. | An inspection will be performed to verify that the doors with blowout panels are provided with a missile restraint. | The doors with blowout panels listed in Table 2.1.1-6(a) have a missile restraint. |
| 2.20 | Vent path areas provide room (compartment) pressure relief. | An inspection will be performed to verify the total vent path area. | The minimum total vent path area is greater than or equal to the value listed in Table 2.1.1-6(b) for the rooms (compartments) listed. |
| 2.21 | The RCB has a maximum volume of Microtherm insulation within the zone of influence. | An inspection of the as-built components and piping in the zone of influence will be performed. | The as-built components and piping in the zone of influence will have less than or equal to 1 $ft^3$ of Microtherm insulation. |
| 2.22 | The coatings in the RCB are qualified. | An inspection for the existence of a report for the as-built coatings used in the RCB. | A report exists and confirms the as-built coatings used in the RCB are design basis accident qualified. |
| 2.23 | RCB coatings in the zone of influence areas have a maximum thickness. | a. An inspection for the existence of a report that defines the zone of influence will be conducted.<br>b. An inspection for the existence of a report for the as-built coatings thickness used in the RCB within the zone of influence. | a. A report exists that defines the zone of influence inside the RCB.<br>b. A report exists and confirms the maximum thickness of the as-built coatings in the RCB within the zone of influence. |
| 2.24 | Fire protection features provide separation within the RBA. | a. A fire protection analysis will be performed. | a. The fire protection analysis concludes that features such as barriers, doors, dampers, and penetrations that provide separations within the RBA have an adequate fire rating. |

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**Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| | | b. Inspection of fire protection features credited in the fire protection analysis versus construction drawings will be performed. Deviations will be reconciled with the analysis. | b. The as-built features credited in the analysis provide adequate fire protection. |
| | | c. Testing of dampers that provide separation within the RBA will be performed. | c. Dampers that provide separation within the RBA are operable under air flow conditions. |
| | | d. A post-fire safe shutdown analysis will be performed. | d. The post-fire safe shutdown analysis concludes that at least one success path is available for safe shutdown. |
| | | e. A smoke effects analysis will be performed. | e. The smoke effects analysis concludes that smoke and other products of combustion do not migrate through the credited barriers and adversely affect safe shutdown. |
| 2.25 | Fire protection features provide separation within the RCB. | a. A fire protection analysis will be performed. | a. The fire protection analysis concludes that features such as barriers, doors, dampers, and penetrations that provide separation within the RBA have an adequate fire rating. |
| | | b. Inspection of fire protection features credited in the fire protection analysis versus construction drawings will be performed. Deviations will be reconciled with the analysis. | b. The as-built features credited in the analysis provide adequate fire protection. |
| | | c. Testing of dampers that provide separation within the RCB will be performed. | c. Dampers that provide separation within the RCB are operable under air flow conditions. |

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**Table 2.1.1-8—Reactor Building ITAAC (6 Sheets)**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| | | d. A post-fire safe shutdown analysis will be performed. | d. The post-fire safe shutdown analysis concludes that at least one success path is available for safe shutdown. |

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00 01 via Regulatory Issue Summary 2005 30 as providing an acceptable deterministic analytical methodology to address spurious actuations. Consequently, these documents provide the basis and assumptions considered for spurious actuations for the U.S. EPR design.

*Operator Manual Actions*

For the U.S. EPR Plant, an operator manual action is defined as an action that takes place outside of the MCR in support of achieving and maintaining HSB from within the MCR. Operator manual actions associated with the credited shutdown success path are not required to achieve and maintain HSB.

*Associated Circuits of Concern*

Associated circuits of concern are those circuits containing cables that do not meet separation requirements and:

- Share a common power source with shutdown equipment that is not electrically protected from the circuit of concern by coordinated breakers, fuses or similar devices.
- Are directly connected to circuits of equipment that would adversely affect the shutdown capability if spuriously operated.
- Share a common enclosure with the shutdown cables that (1) is not electrically protected by circuit breakers, fuses or similar devices; or (2) will allow propagation of fire into the common enclosure.

The U.S. EPR plant provides circuit coordination for non safe shutdown loads on shared buses and load centers. Cable installed in the plant complies with IEEE Std 1202, or equivalent, to preclude the potential for fire propagation. Non shutdown cables that share a common enclosure with shutdown cables are electrically protected to provide reasonable assurance that faults are interrupted prior to cable damage. By virtue of this provision, the U.S. EPR plant design provides reasonable assurance that secondary fires do not occur as a result of fire induced faults.

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*Shutdown/Low Power Operations*

~~Per RG 1.189, Revision 1, Section 5.6~~For the U.S. EPR plant, shutdown operations are defined as refueling or maintenance outages. ~~The U.S. EPR design provides reasonable assurance that fuel integrity is protected by permanent plant systems during refueling operations or maintenance outages.~~ The primary fuel cooling systems are spent fuel pool cooling and ~~the~~ residual heat removal systems. One or both systems are used depending on the location of fuel. The U.S. EPR FPP consists of FPS design features, personnel, equipment, and procedures that minimize the potential for fire events to affect the fuel integrity safety functions of reactivity control, decay heat removal, and

spent fuel pool cooling or result in an unacceptable release of radioactive material under the different conditions that may be present during shutdown operations.

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For the U.S. EPR, low power operations is considered to be startup. For the purposes of analysis, startup operation is considered the same as power operation. Therefore, the analysis for postfire shutdown is the same for both modes of operation.

### Communications

For the purposes of fire fighting and operational post fire safe shutdown activities, the U.S. EPR plant relies on the portable wireless communication system described in Section 9.5.2.2.1 The system is multi channeled and is capable of interfacing with the public address and digital telephone systems. Use of the portable wireless communication system does not interfere with the communications capabilities of the plant security force. Fixed components of the portable wireless communication system are protected as necessary from fire damage to provide effective communication capability in all vital plant areas. It is not anticipated, with the use of low power portable radios, that the exclusion zones will be wide enough to compromise effective communications within any vital area. In the event that specific exclusion zones are identified, an alternative means of communications via one of the fixed communication systems is provided. The type and location of the required communication system devices for use in the exclusion zones is determined on an as needed basis so that these are free of fire effects for any fire area that requires communication. The intent of RG 1.189, Regulatory Position 4.1.7(b) guidance will be met in all vital areas. Section 9.5.2.2.1 addresses capabilities of the portable wireless communication system and potential EMI/RFI effects.

RG 1.189, Regulatory Position 4.1.7 considers the portable radio communication system to be separate from the fixed emergency communication systems. The public address communication system fulfills the requirement for a fixed emergency communication system per Regulatory Position 4.1.7.a. This regulatory position does not require a fixed emergency communication system to be dedicated to fire protection. The fixed emergency communication system only needs to be independent of the normal plant communication system. Sections 9.5.2.1 and 9.5.2.2 address the public address communication system design and capabilities. The public address communication system is installed at preselected locations and is independent of the normal fixed digital communication system. As independent, separate, and not dedicated to fire protection, the public address communication system does not need to meet the electrical separation requirements in RG 1.189, Regulatory Position 5.3, with regard to other communication systems.

### Emergency Lighting

Section 9.5.3 contains design information for the U.S. EPR lighting system.

- Nuclear Auxiliary Building (UKA).
- Radioactive Waste Processing Building (UKS).
- Emergency Power Generating Buildings (1 4 UBP).
- Essential Service Water Pump Structures (1 4 UQB) and Cooling Tower Structures (1 4 URB).
- Access Building (UKE).

## 9A.3.1 Reactor Building

### 9A.3.1.1 Fire area FA-UJA-01 (Table 9A-2, Column 1)

Fire area FA UJA 01 is the entire Reactor Containment Building ~~including the Reactor annulus~~ from elevation 20 feet through elevation +94 feet.

Partial area automatic smoke and/or heat detection is provided ~~within the annulus area,~~ over the reactor coolant pumps (RCP) and at the elevator lobby. Manual fire alarm stations are provided at the access to the exit stairwell.

A manually operated fixed water spray/deluge system is provided on the reactor coolant pumps.

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The adequacy of the fire protection features provided is sufficient to prevent a fire originating within fire area FA UJA 01 from affecting adjacent fire areas.

This fire area is not normally occupied during normal plant operations. The egress route from this area in the event of a fire is via the access to personnel airlock [

]

### 9A.3.1.2 Fire Area FA-UJB-01 (Table 9A-2, Column 1A)

Fire Area FA UJB 01 is the entire reactor annulus from elevation 20 feet through elevation +94 feet. The fire area is further subdivided into four fire zones, each zone containing one of the four divisions of cabling required for post fire safe shutdown.

Partial area automatic smoke detection is provided.

The adequacy of the fire protection features provided is sufficient to prevent a fire originating in one of the fire zones from affecting adjacent fire zones in FA UJB 01 or adjacent fire areas.

This fire area is not normally occupied during normal plant operations. The egress route from this area, in the event of a fire, is via the access to personnel airlock [ located along the southwest wall of the Reactor Building at elevation +5 feet. ]

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**Table 9A-2—Fire Area Parameters**
**Sheet 1 of 44**

| Column | 1 | 1A | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Fire Area | FA UJA 01 | FA UJB 01 | FA 1UJH 01 | FA 1UJH 02 | FA 1UJH 03 | FA 1UJH 04 |
| Building | UJA/UJB | UJB | UJH/UJK | UJH/UJK | UJH/UJK | UJH/UJK |
| Figures | 09.APP.9A 40 thru 09.APP.9A 51 | 09.APP.9A 40 thru 09.APP.9A 51 | 09.APP.9A 6 thru 09.APP.9A 16 | 09.APP.9A 6 thru 09.APP.9A 16 | 09.APP.9A 6 thru 09.APP.9A 16 | 09.APP.9A 6 thru 09.APP.9A 16, 09.APP9A 22, and 09.APP.9A 27 |
| Fire Barriers (Notes 3,4,5,6) | See Figures | See Figures | See Figures | See Figures | See Figures | See Figures |
| SSC: safety related | Yes | Yes | Yes | None | Yes | Yes |
| SCC: post fire safe shutdown | Yes | Yes | None | None | Yes | Yes |
| In situ Loading (Note 1) | a, b, c, d, e, g | a, g | a, b, c | a, b, c, d | a, b, c, d, e, g, r, o | a, b, c, e, g |
| Transient Fire Loading | THL 1 | THL 1 | THL 1 | THL 1 | THL 2 | THL 2 |
| Common Ignition Source (Note 2a) | a, b, c, d, m, o | a | b, n | b, c, n | a, b, c, d, o | b, n |
| Atypical Ignition Sources (Note 2b) | aa | aa | None | None | aa | aa |
| Hazard Classification (Note 12) | OH Group 2 | OH Group 2 | Light Hazard | Light Hazard | OH Group 1 | OH Group 1 |
| Automatic Fire Detection (Note 13) | Partial | Partial | None | Area Wide | Area Wide | Area Wide |
| Manual Fire Alarms | Yes | Yes | Yes | Yes | Yes | Yes |
| Automatic Fixed Fire Suppression (Note 14) | None | None | None | None | None | None |

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**Table 9A-2—Fire Area Parameters**
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| Column | 1 | 1A | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Manual Fixed Fire Suppression (Note 14) | Partial | None | None | None | None | None |
| Standpipe and Hose System (Note 7) | Yes | Yes | Yes | Yes | Yes | Yes |
| Portable Fire Extinguishers (Note 8) | Yes | Yes | Yes | Yes | Yes | Yes |
| Suppression Effects | None | None | None | None | None | None |
| Plant Drains | Yes | Yes | Yes | Yes | Yes | Yes |
| Radiological Effects (Note 15) | Yes | Yes | None | None | None | None |
| HVAC (Note 9) | f | f | e | e | e | e |
| Emergency Lighting (Note 10) | aa | aa | aa | None | aa | aa |
| Communication (Note 11) | Yes | Yes | Yes | Yes | Yes | Yes |
| Engineering Evaluations | None | None | None | None | None | None |

Figure 9A-40—Fire Zone Layouts-Reactor Building, -20 Feet

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Figure 9A-41—Fire Zone Layouts-Reactor Building, -8 Feet

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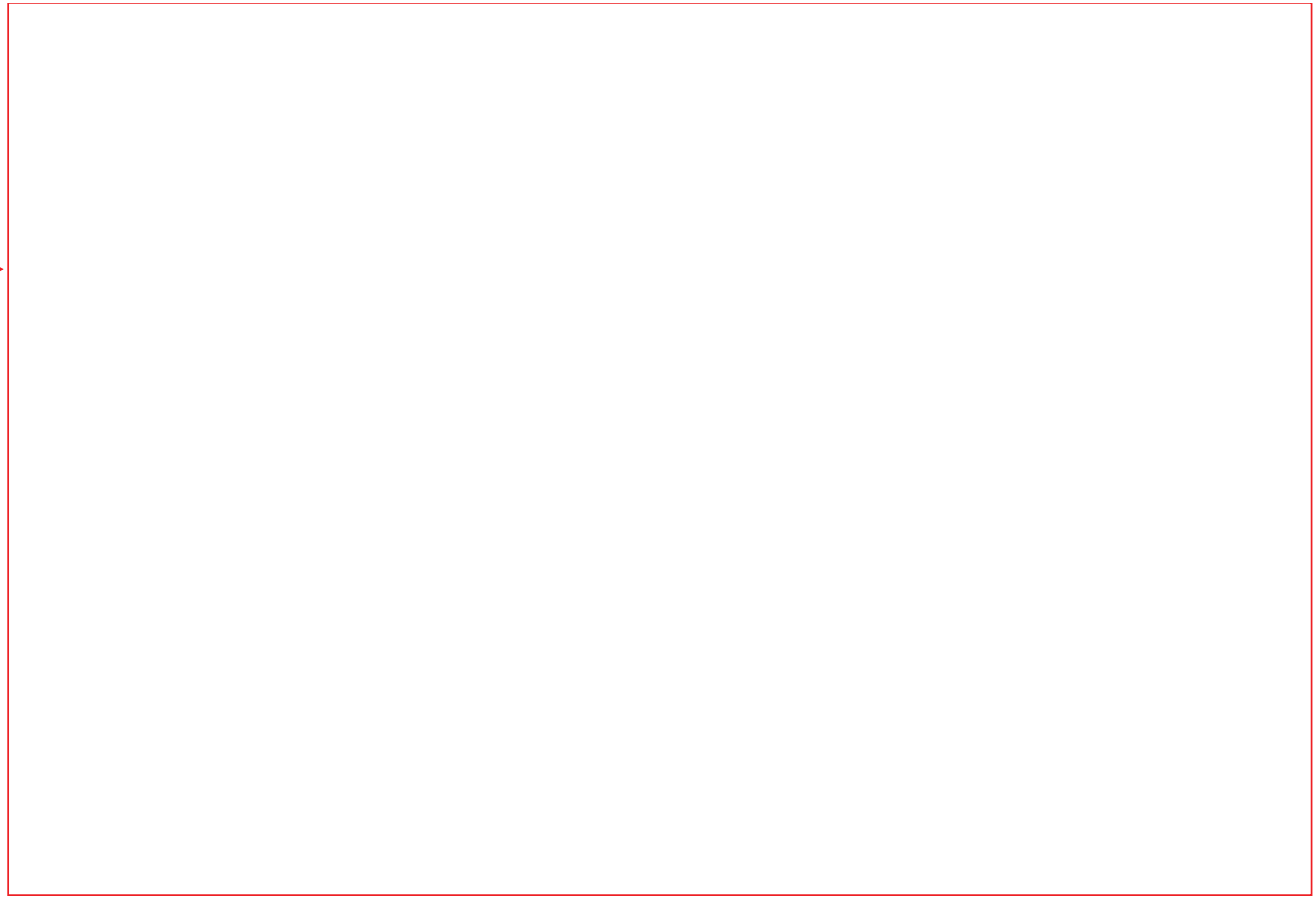

Figure 9A-42—Fire Zone Layouts-Reactor Building, +5 Feet

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Figure 9A-43—Fire Zone Layouts-Reactor Building, +17 Feet

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Figure 9A-44—Fire Zone Layouts-Reactor Building, +29 Feet

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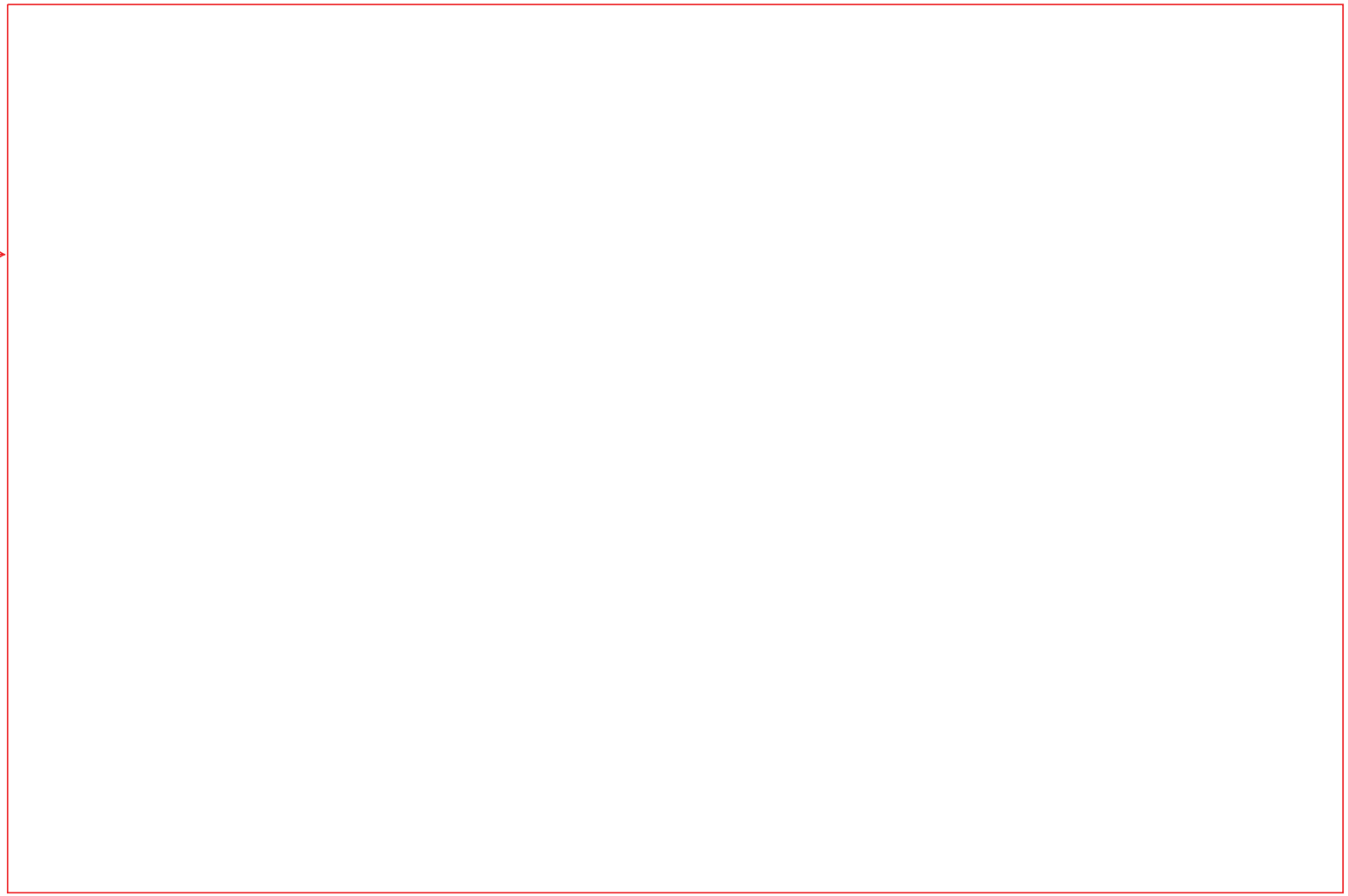

Figure 9A-45—Fire Zone Layouts-Reactor Building, +45 Feet

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Figure 9A-46—Fire Zone Layouts-Reactor Building, +64 Feet

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Figure 9A-47—Fire Zone Layouts-Reactor Building, +79 Feet

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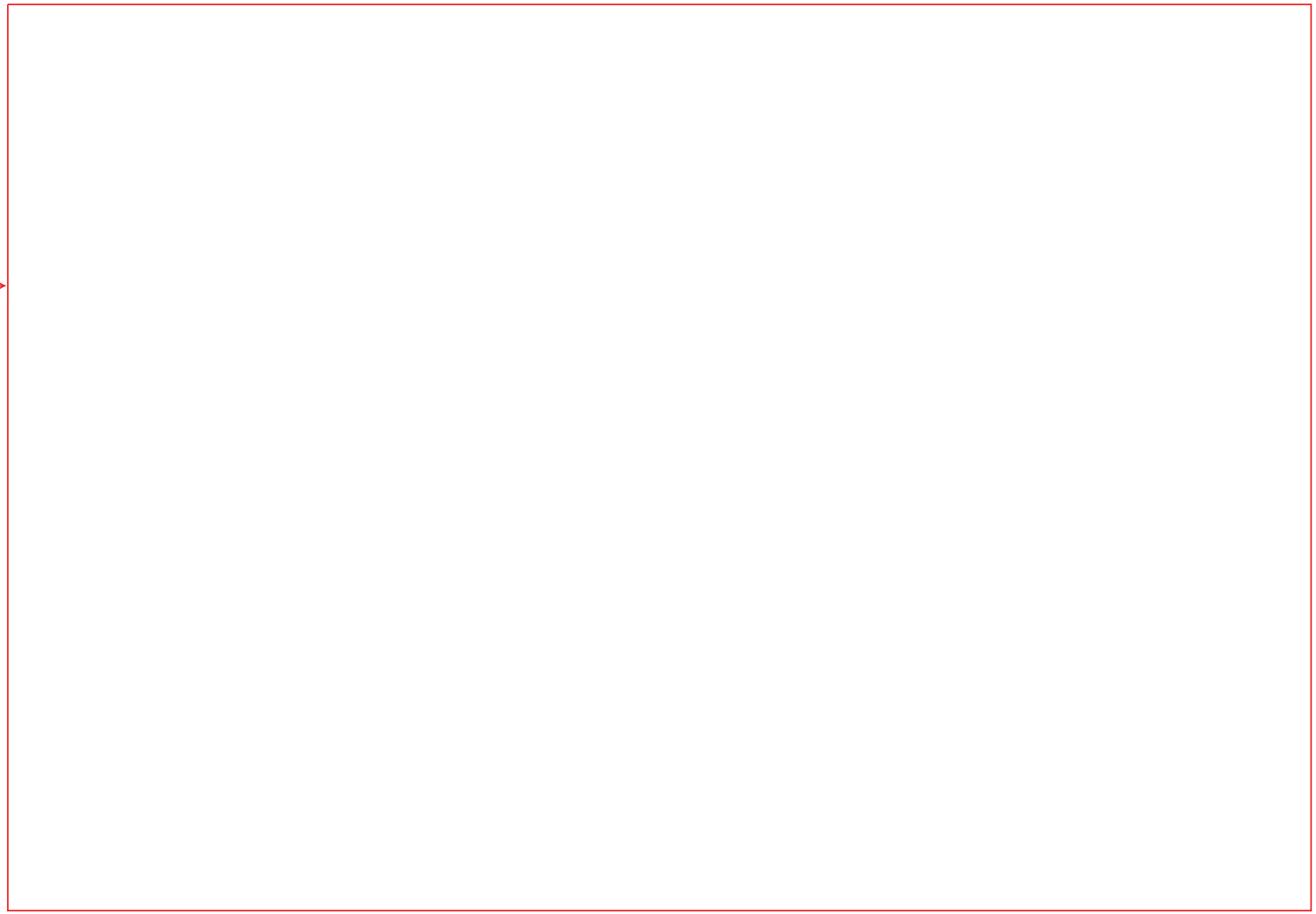

Figure 9A-48—Fire Zone Layouts-Reactor Building, +94 Feet

Figure 9A-49—Fire Zone Layouts-Reactor Building, Section A-A

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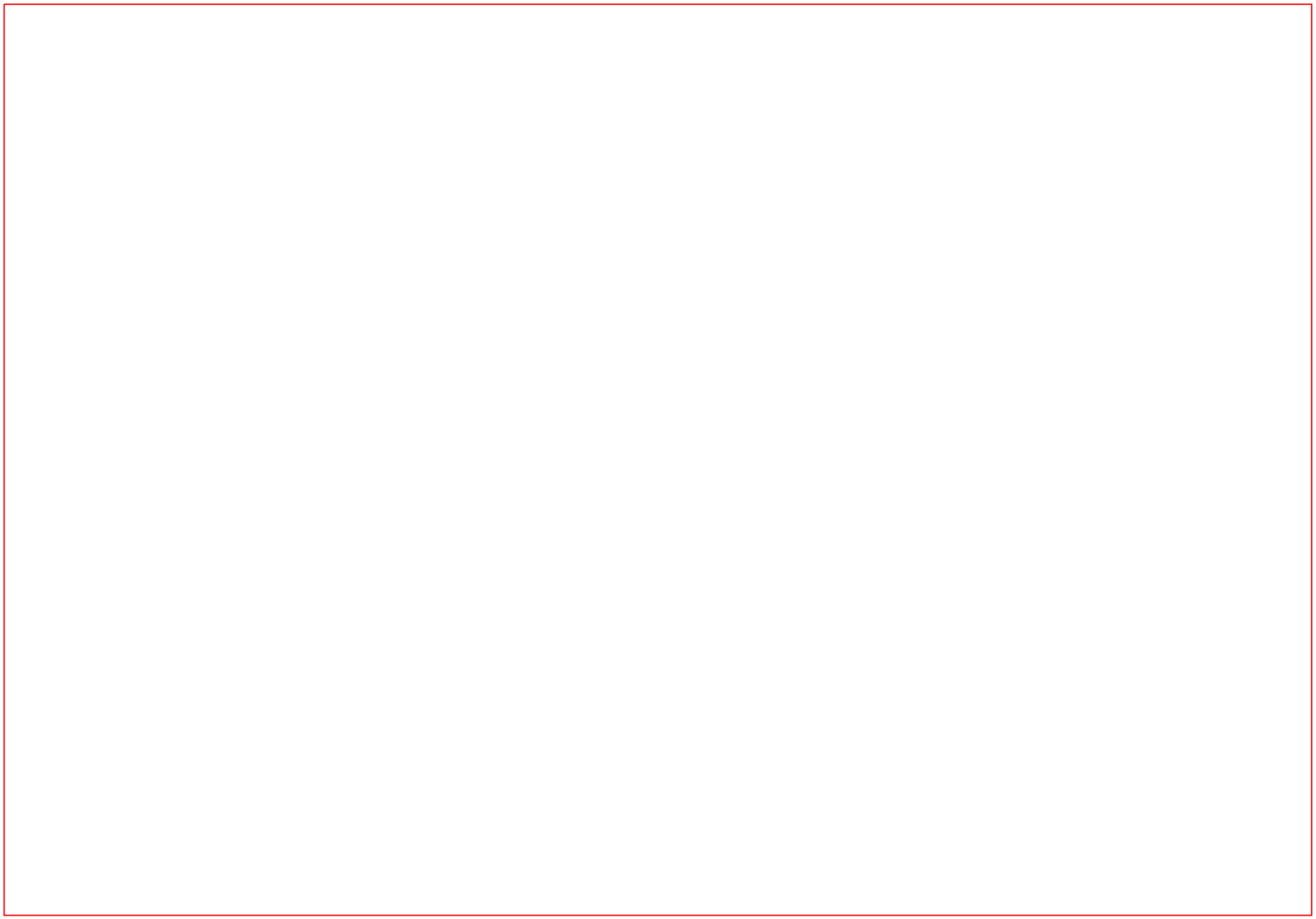

Figure 9A-50—Fire Zone Layouts-Reactor Building, Section B-B

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Figure 9A-51—Fire Zone Layouts-Reactor Building, Section C-C

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