ArevaEPRDCPEm Resource

From: WELLS Russell (AREVA) [Russell.Wells@areva.com]
Sent: Wednesday, May 18, 2011 4:21 PM
To: Tesfaye, Getachew
Cc: KOWALSKI David (AREVA); WILLIFORD Dennis (AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 5
Attachments: RAI 443 Supplement 5 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the two questions in RAI No. 443 on November 23, 2010. Supplement 1, Supplement 2, Supplement 3 and Supplement 4 responses to RAI No. 443 were sent on January 6, 2011, February 17, 2011, March 17, 2011 and April 12, 2011, respectively, to provide a revised schedule.

The attached file, "RAI 443 Supplement 5 Response US EPR DC.pdf" provides technically correct and complete FINAL responses to the two 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 443 Questions 09.05.01-79 and 09.05.01-80.

The following table indicates the respective pages in the response document, "RAI 443 Supplement 5 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 443 — 09.05.01-79	2	2
RAI 443 — 09.05.01-80	3	3

This concludes the formal AREVA NP response to RAI 443, 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)
434-942-6375 (cell)
Fax: 434-382-3884
Russell.Wells@Areva.com

From: WELLS Russell (RS/NB)
Sent: Tuesday, April 12, 2011 2:13 PM
To: Tesfaye, Getachew
Cc: KOWALSKI David (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 4

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the two questions in RAI No. 443 on November 23, 2010. Supplement 1, Supplement 2 and Supplement 3 responses to RAI No. 443 were sent on January 6, 2011, February 17, 2011 and March 17, 2011, respectively, to provide a revised schedule.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail.

The schedule for technically correct and complete responses to the two questions is provided below.

Question #	Response Date
RAI 443 — 09.05.01-79	May 18, 2011
RAI 443 — 09.05.01-80	May 18, 2011

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)
434-942-6375 (cell)
Fax: 434-382-3884
Russell.Wells@Areva.com

From: WELLS Russell (RS/NB)
Sent: Thursday, March 17, 2011 6:44 AM
To: 'Tesfaye, Getachew'
Cc: KOWALSKI David (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 3

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the two questions in RAI No. 443 on November 23, 2010. Supplement 1 and Supplement 2 responses to RAI No. 443 were sent on January 6, 2011 and February 17, 2011, respectively, to provide a revised schedule.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail.

The schedule for technically correct and complete responses to the two questions is provided below.

Question #	Response Date
RAI 443 — 09.05.01-79	April 14, 2011
RAI 443 — 09.05.01-80	April 14, 2011

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)
434-942-6375 (cell)
Fax: 434-382-3884
Russell.Wells@Areva.com

From: BRYAN Martin (External RS/NB)
Sent: Thursday, February 17, 2011 9:35 AM
To: Tesfaye, Getachew
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the two questions in RAI No. 443 on November 23, 2010. Supplement 1 response to RAI No. 443 was sent on January 6, 2011 to provide a revised schedule.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail.

The schedule for technically correct and complete responses to the two questions is provided below.

Question #	Response Date
RAI 443 — 09.05.01-79	March 17, 2011
RAI 443 — 09.05.01-80	March 17, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Thursday, January 06, 2011 10:07 AM
To: Tesfaye, Getachew
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the two questions in RAI No. 443 on November 23, 2010.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail.

The schedule for technically correct and complete responses to the two questions has been revised as provided below.

Question #	Response Date
RAI 443 — 09.05.01-79	February 17, 2011
RAI 443 — 09.05.01-80	February 17, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Tuesday, November 23, 2010 10:33 AM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 443 Response US EPR DC," provides a schedule since technically correct and complete responses to the two questions are not provided.

The following table indicates the respective pages in the response document, "RAI 443 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 443 — 09.05.01-79	2	2
RAI 443 — 09.05.01-80	3	3

The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 443 — 09.05.01-79	January 6, 2011
RAI 443 — 09.05.01-80	January 6, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, October 25, 2010 9:52 AM
To: ZZ-DL-A-USEPR-DL
Cc: McCann, Edward; Dreisbach, Jason; Lee, Samuel; Segala, John; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 443 (5010), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 14, 2010, and on October 21, 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. 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: 2988

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD410462225D)

Subject: Response to U.S. EPR Design Certification Application RAI No. 443, FSARCh. 9, Supplement 5
Sent Date: 5/18/2011 4:20:57 PM
Received Date: 5/18/2011 4:21:03 PM
From: WELLS Russell (AREVA)

Created By: Russell.Wells@areva.com

Recipients:
"KOWALSKI David (AREVA)" <David.Kowalski@areva.com>
Tracking Status: None
"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>
Tracking Status: None
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

Files	**Size**	**Date & Time**
MESSAGE	9002	5/18/2011 4:21:03 PM
RAI 443 Supplement 5 Response US EPR DC.pdf	242166	

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

Response to

Request for Additional Information No. 443(5010), Supplement 5

10/25/2010

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 Balance of Plant Branch 1 (SBPA)

Question 09.05.01-79:

Descriptions of the Fire Protection System (FPS) and the Fire Protection Program (FPP) in FSAR Sections 9.5.1, 9.5.1.1, 9.5.1.2.1, 9.5.1.6, and 9.5.1.6.2 are not clear in providing descriptions that are in accordance with RG 1.189 Glossary definitions. The FPS should only include fire detection, notification, and suppression systems designed, installed, and maintained in accordance with the applicable nationally recognized codes and standards endorsed by the NRC while the FPP is all encompassing for fire protection activities. FSAR Sections 9.5.1 and 9.5.1.1 confuses the content of the FPS with the content of the FPP. The applicant needs to clarify in accordance with RG 1.189 the functions of and relationship between the FPS and FPP.

Response to Question 09.05.01-79:

U.S. EPR FSAR Tier 2, Sections 9.5.1, 9.5.1.1, 9.5.1.2, 9.5.1.2.1 and 9.5.1.6.3 will be revised so that the descriptions of the fire protection system (FPS) and fire protection program (FPP) are in accordance with the glossary definitions provided in RG 1.189.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 9.5.1, 9.5.1.1, 9.5.1.2, 9.5.1.2.1 and 9.5.1.6.3 will be revised as described in the response and indicated on the enclosed markup.

Question 09.05.01-80:

FSAR Section 9.5.1.2.2, alternative compliance with RG 1.189, does not include all the non-compliance issues listed in FSAR Table 9.5.1-1. FSAR Table 9.5.1-1 RG Sections C.6.1.1.2 (Containment Suppression), C.4.1.3.1 (Cable Design), and C.4.2.3.3 (Fire Stops) alternate compliances are not discussed in FSAR Section 9.5.1.2.2. Applicant needs to include these missing alternate compliance discussions in FSAR Section 9.5.1.2.2, provide a pointer to another FSAR section that discusses the issue, revise Table 9.5.1-1 as applicable, or provide the reasons for not including an issue.

Response to Question 09.05.01-80:

U.S. EPR FSAR Tier 2, Sections 9.5.1.2.1 and 9.5.1.2.2, and Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189 will be revised to include information on alternative compliance with RG 1.189 for Cable Design (C.4.1.3.1), Fire Stops for Cable Routing (C.4.2.3.3), and Containment Fire Suppression (C.6.1.1.2).

U.S. EPR FSAR Tier 2, Table 1.9-2—U.S. EPR Conformance with Regulatory Guides will be revised to reflect that the U.S. EPR design uses an alternative approach to the NRC guidance with respect to complying with regulatory positions in RG 1.189. U.S. EPR FSAR Tier 2, Section 9.5.1 describes the alternative compliance with specific regulatory positions in RG 1.189.

Technical Report ANP-10292, Revision 1, "U.S. EPR Conformance with Standard Review Plan (NUREG-0800)," has been revised to reflect that the U.S. EPR design uses an alternative approach relative to the NRC guidance with respect to complying with regulatory positions in RG 1.189.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 1.9-2, Section 9.5.1.2.1, Section 9.5.1.2.2, and Table 9.5.1-1 will be revised as described in the response and indicated on the enclosed markup.

Technical Report Impact:

ANP-10292 incorporates the changes as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Table 1.9-2—U.S. EPR Conformance with Regulatory Guides
Sheet 15 of 19

RG / Rev	Description	U.S. EPR Assessment	FSAR Section(s)
1.180, R1	Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems	Y	3.11 7.1.2.4
1.181, 09/1999	Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)	N/A-COL	N/A
1.182, 05/2000	Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants	N/A-COL	N/A
1.183, 07/2000	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors	Y	11.1.2.2 12.3.5 15.0.3
1.184, 07/2000	Decommissioning of Nuclear Power Reactors	N/A-COL	N/A
1.185, 07/2000	Standard Format and Content for Post-Shutdown Decommissioning Activities Report	N/A-COL	N/A
1.186, 12/2000	Guidance and Examples for Identifying 10 CFR 50.2 Design Bases	N/A-OTHER	N/A
1.187, 11/2000	Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments	N/A-COL	N/A
1.188, R1	Standard Format and Content for Applications To Renew Nuclear Power Plant Operating Licenses	N/A-COL	N/A
1.189, R01	Fire Protection for Nuclear Power Plants	Y	3.2 7.1 7.4 5.4.1.2.2 9.5.1
	09.05.01-80 →	EXCEPTION (Misc. Regulatory Positions)	9.5.1
1.190, 03/2001	Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence	Y	5.3
1.191, 05/2001	Fire Protection Program for Nuclear Power Plants During Decommissioning and Permanent Shutdown	N/A-COL	N/A
1.192, 06/2003	Operation and Maintenance Code Case Acceptability, ASME OM Code	Y	3.9.6 5.2.1
1.193, R1	ASME Code Cases Not Approved for Use	Y	3.8.2

9.5 Other Auxiliary Systems

9.5.1 Fire Protection ~~System~~

09.05.01-79

The purpose of the fire protection ~~system~~program (FPP~~S~~) is to protect ~~other~~ plant systems and equipment which provide the capability to safely shut down the reactor, maintain it in a safe shutdown condition, control radioactive releases to the environment, and ~~to~~ prevent personnel injury and property damage in the event of a fire.

The FPP~~S~~ consists of fire protection system (FPS) design features, personnel, equipment, and procedures to provide defense-in-depth protection of public health and safety. The program is implemented during station operations by the prevention, detection, annunciation, confinement, and extinguishment of fire. Administrative controls, training, inspection, testing, and quality assurance (QA) provide reasonable assurance of the operability of the program.

The FPP~~S~~, including administrative controls and the fire brigade, are implemented prior to receiving fuel on site for fuel storage areas and for the entire station prior to reactor startup.

9.5.1.1 Design Basis

09.05.01-79

The development and implementation of the FPP~~S~~ is ~~designed~~ in accordance with:

- 10 CFR 50.48 - Fire Protection.
- 10 CFR Part 50, Appendix A, GDC 3 - Fire Protection.
- 10 CFR Part 50, Appendix A, GDC 5 - Sharing of Structures, Systems, and Components.
- 10 CFR Part 50, Appendix A, GDC 19 - Control Room.
- 10 CFR Part 50, Appendix A, GDC 23 - Protection System Failure Modes.
- 10 CFR Part 50, Appendix A, GDC 56 - Primary Containment Isolation.
- NUREG-0800, Standard Review Plan 9.5.1 - Fire Protection Program (Reference 37).
- RG 1.29 - Seismic Design Classification, Revision 4.
- RG 1.189 - Fire Protection for Nuclear Power Plants, Revision 1.

09.05.01-79

The FPP~~S~~ is designed to:

9.5.1.2 ~~System~~Program Description

9.5.1.2.1 General Description

The FP~~P~~S and ~~the~~ design of the FPS comply with applicable codes and standards.

In general, the FP~~P~~S complies with the provisions specified in NFPA 804 (Reference 42) as they relate to the protection of post-fire safe-shutdown capability and the mitigation of a radiological release resulting from a fire. However, the NRC has not formally endorsed NFPA 804, and some the guidance in the NFPA standard may conflict with regulatory requirements. When conflicts occur, the applicable regulatory requirements and guidance will govern.

09.05.01-79

Deviations from NFPA code requirements will be identified and justified by the COL applicant as part of the final Fire Hazards Analysis.

In accordance with SRP 9.5.1, "the standards of record related to the design and installation of fire protection systems and features sufficient to satisfy NRC requirements in all new reactor designs are those NFPA codes and standards in effect 6 months prior to the submittal of the application under 10 CFR Part 50 or 10 CFR Part 52. The codes/standards of record are governed by the DC (within 6 months of the DC document submittal date) for aspects of the FPP described in the DC."

"The COL should use industry codes and standards within 6 months of the COL application date for any aspects of the FPP not covered in the DC."

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189 is a point-by-point description of the conformance of the U.S. EPR Fire Protection Program (FPP) with the guidelines of RG 1.189, including alternative designs.

The FPS detects fires and provides fire extinguishment capability using fixed automatic and manual suppression systems, manual hose streams, and portable fire fighting equipment. The FPS consists of a number of fire detection and fire suppression subsystems, including:

- Detection systems for early detection and notification of a fire.
- A water supply system including storage tanks, fire pumps, yard main, and interior distribution piping headers.
- Fixed automatic and manually-actuated fire suppression systems.
- Manual fire suppression systems and equipment, including hydrants, standpipes, hose stations, and portable fire extinguishers.

The fire detection and suppression systems are described later in this section.

RSS cable floor to the RSS via separate non-combustible cable ducts having a minimum fire resistance rating of three hours.

- Postfire safe shutdown systems in the Fuel Building (FB) are separated by three hour rated structural fire barriers.

- The RB is a combination of the annulus area and the containment. The RB annulus area is used for cable connections between the four SBs and the RB, and for additional routing of mainly non-safety-related cables as well as physical protection of cables to the connected buildings. As such, the annulus area contains cabling allocated to all four safety divisions. The cable connections between SBs 1-4 and the divisional assigned components inside the RB are routed from the cable rooms in SBs via airtight penetrations to the annulus. In the annulus, the cables are routed to the connection boxes on both sides of the containment penetrations. Fire protection for redundant divisions is provided to make sure that one success path of SSC necessary to achieve safe shutdown conditions (i.e., cold shutdown) is free of fire damage. 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.

- Cable trays are constructed of metal. Only metallic tubing is used for conduits. Thin-wall metallic tubing is not used. Flexible metallic tubing is only used in short lengths. Electrical raceways are constructed in accordance with the guidelines specified in SRP 9.5.1 and RG 1.189. Electrical raceways are only used for cables. Safety-related cable trays located outside of containment are separated from redundant divisions and non-safety-related areas by three-hour, fire rated barriers. Cable trays containing safety-related cables located inside containment are enclosed in non-combustible steel or steel composite materials.

09.05.01-80

~~The U.S. EPR utilizes cables throughout the plant that have passed the flame propagation criteria of IEEE Std 1202. Self-ignition of these electrical cables is not considered credible because of the protective devices (e.g., fuses, circuit breakers) provided and analyzed to be properly sized. While these cables are still considered combustible, they will not propagate fire unless subjected to an external fire involving other combustibles in the vicinity of the cable trays. In this case, the fire stops would be of little, if any value in stopping the spread of fire. Fire stops would not stop the spread of fire in the area of influence of the exposure fire (i.e., area of the fire where~~

~~temperatures are high enough to propagate fire along the cable trays) because they are only designed to prevent fire spread in the cable trays. Also, the IEEE Std 1202 qualified cables outside of the area of influence of the exposure fire would keep the fire from propagating and essentially serve the same purpose as the fire stops.~~

09.05.01-80

Fire Safe Shutdown Capability

The U.S. EPR design provides a defense-in-depth postfire safe shutdown capability in accordance with the NRC acceptance criteria specified in NUREG-0800, SRP 9.5.1, Revision 5, including its Appendix A, and RG 1.189, Revision 1.

Implementation of Criteria

With the exception of the containment, the U.S. EPR design accommodates the requirement that all equipment and cables within a fire area are considered rendered inoperable by the assumed fire and that postfire safe shutdown will be achieved via components and systems independent of the fire area under consideration. In addition, postfire re-entry into a fire affected area for repairs or operator manual actions is not permitted.

The advantage of the U.S. EPR design is that redundant systems credited to support post-fire safe shutdown are separated such that a minimum of one success path of structures, systems, and components necessary to achieve hot standby (HSB) and cold shutdown (CSD) is free of fire damage without crediting system repair capabilities. The term "success path" utilized in the design of the U.S. EPR is equivalent to the term "one shutdown division" discussed in SECY 90-016 (Reference 38).

A fire in the MCR may result in the necessity to evacuate the area, either due to loss of equipment control or environmental considerations. In this case, the RSS will be used to achieve postfire safe shutdown.

Inside containment, a combination of separation and fire protection features to the extent practical provide assurance that the required number of shutdown system divisions will be available to support postfire safe shutdown.

The U.S. EPR design provides reasonable assurance that adequate systems and equipment are available to achieve the following objectives:

- Reactor coolant system process variables will be maintained within those predicted for a loss of normal AC power.
- The fission product boundary integrity shall not be affected (i.e., no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary).

important to safety. Cable trays are accessible for manual fire fighting and manual fire protection is provided by hand hose and portable extinguisher capability.

Separation of each safety division from redundant divisions and the four safety divisions make it so that the loss of any one division does not impact safe shutdown capability. At the onset of the postulated fire, all safe shutdown systems (including applicable redundant trains) are assumed operable and available for post-fire safe shutdown. Systems are assumed to be operational with no repairs, maintenance, testing, Limiting Conditions for Operations, etc., in progress. The unit is assumed to be operating at full power under normal conditions and normal lineups. This is consistent with NEI 00-01, "Guidance for Post Fire Safe Shutdown Circuit Analysis" (Ref. 39). There is a high probability that even with a loss of one division from fire an extra division beyond the minimum required for safe shutdown will be available.

The U.S. EPR design utilizes electrical cable construction that has met the acceptance criteria of the IEEE 1202 (Reference 34) test standard (or an equivalent standard) for prevention of flame propagation. IEEE 1202 is a vertical flame propagation test protocol. It is widely recognized that a vertical cable orientation represents a more severe fire test exposure than a horizontal cable orientation. Moreover, the NRC RES Fire Research Branch has stated, "The FT-4 / Vertical Flame Test, included in standard(s) IEEE 1202-1991…is the most rigorous of the 20kW (70000 BTU/hr) tests…What makes this test the most difficult to pass of the 20kW (70000 BTU/hr) tests is its low acceptable damage length of 4.9 ft (1.5m)." Therefore, the ability of cables qualified to the IEEE 1202 test standard (or an equivalent standard) to prevent fire propagation of fire along the length of cables routed in trays located within a given fire area or zone.

09.05.01-80

Cable Design

Cable design generally complies with RG 1.189, Regulatory Position 4.1.3.1. Alternative compliance is provided for instances where special purpose cabling may not be qualified to IEEE 1202.

The U.S. EPR design generally utilizes electrical cable construction that meets the acceptance criteria of IEEE 1202. Instances where special purpose cabling does not comply with IEEE 1202 will be evaluated and justified as part of the final fire hazards analysis (FHA).

Electrical Cabinets

Generally, fire areas comply with RG 1.189, Regulatory Position 4.1.3.6. Alternative compliance is provided due to the lack of a fixed fire suppression system in rooms containing electrical cabinets important to safety and the lack of detection inside cabinets except in the MCR.

The U.S. EPR is a four divisional design. Generally, electrical cabinets for each of the four divisions outside the MCR, RSS and RB are in divisional buildings (i.e., Safeguards and Emergency Diesel Generator Buildings and Essential Service Water Cooling Tower Structures). The buildings are separated from each other and other areas of the plant either by three-hour fire-rated barriers or the buildings are separated by sufficient distance to maintain adequate separation between divisions. Where electrical cabinets for a safety division are located in a redundant divisional building, such as the division 2 MSIV cabinets in the SB 1 or for redundant divisional electrical cabinets in the FB, the electrical cabinets are separated by three-hour fire-rated barriers. Area smoke detection is provided where safety-related electrical cabinets are located and manual fire protection is provided by hand hose and portable extinguisher capability.

Separation of each safety division from redundant cabinets and the four safety divisions make it so that the loss of any one safety division does not impact safe shutdown capability. At the onset of the postulated fire, all safe shutdown systems (including applicable redundant trains) are assumed operable and available for post-fire safe shutdown. Systems are assumed to be operational with no repairs, maintenance, testing, Limiting Conditions for Operations, etc., in progress. The unit is assumed to be operating at full power under normal conditions and normal lineups. This is consistent with NEI 00-01, "Guidance for Post Fire Safe Shutdown Circuit Analysis" (Ref. 39). There is a high probability that even with a loss of one division from fire an extra division beyond the minimum required for safe shutdown will be available.

09.05.01-80

Fire Stops for Cable Routing

The U.S. EPR design does not comply with RG 1.189, Regulatory Position 4.2.3.3, Fire Stops for Cable Routing. Alternative compliance is provided based on the following justification.

The U.S. EPR utilizes cables throughout the plant that have passed the flame propagation criteria of IEEE Std 1202. Self-ignition of these electrical cables is not considered credible because of the protective devices (e.g., fuses, circuit breakers) provided and analyzed to be properly sized. While these cables are still considered combustible, they will not propagate fire unless subjected to an external fire involving other combustibles in the vicinity of the cable trays. In this case, the fire stops would be of little, if any value, in stopping the spread of fire. Fire stops would not stop the spread of fire in the area of influence of the exposure fire (i.e., area of the fire where temperatures are high enough to propagate fire along the cable trays) because they are only designed to prevent fire spread in the cable trays. Also, the IEEE Std 1202 qualified cables outside of the area of influence of the exposure fire would keep the fire from propagating and essentially serve the same purpose as the fire stops.

Containment Fire Suppression

The U.S. EPR design generally complies with RG 1.189, Regulatory Position 6.1.1.2. Alternative compliance is provided for the reactor coolant pump (RCP) spray deluge systems that are manually actuated.

The spray deluge systems that are manually actuated are acceptable due to detection located in the same area as the RCP spray deluge systems being able to alert the main control room (MCR) of a fire at the RCPs so that the spray systems can be actuated without undue delay. Also, having the systems in an automatic mode presents an unacceptable potential source of flooding in containment.

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Cable Spreading Room

Generally, the cable floor where all four safety divisions are routed to the MCR and the RSS complies with RG 1.189, Regulatory Position 6.1.3. Alternative compliance is provided due to the lack of a fixed fire suppression system for the cable floor rooms.

The U.S. EPR does not have cable spreading rooms. Cables to the MCR are routed through the cable floor. The cable floor is a separate fire area from the MCR assigned to Division 2 of the SBs. Safety-related cables from each of the other three Divisions (1, 3, and 4) are routed from the cable floor to the MCR sub-floor area in the MCR via separate non-combustible cable ducts having a minimum fire resistance rating of three hours. Similarly, the RSS is located in its own fire area that is separated from other areas of the plant by floor, walls and ceiling having minimum fire resistance ratings of three hours. The RSS cable floor is its own fire area assigned to Division 3 of the SBs. Safety-related cables from each of the other three Divisions (1, 2, and 4) are also routed from the RSS cable floor to the RSS via separate non-combustible cable ducts having a minimum fire resistance rating of three hours.

Area-wide smoke detection is provided for the cable floor rooms and manual suppression is provided in the form of standpipe and hose and portable fire extinguishers. Combustibles are limited and the quantity of such is much less than anticipated in a cable spreading room because the majority of cables in this area are contained in noncombustible 3 hour fire-rated ducts.

Switchgear Rooms

Generally the plant switchgear rooms comply with RG 1.189 Regulatory Position 6.1.5. Alternative compliance is provided due to the lack of a fixed fire suppression system for these rooms.

The U.S. EPR is a four division design. Each of the four divisional switchgear rooms is located in separate divisional Safeguard Buildings. Switchgear rooms are separated from other areas of the plant and Safeguard Buildings are separated from each other by

Fire Protection System Operation, Testing and Maintenance

Functional groups responsible for FPS operation, maintenance, and testing are qualified by training and experience, and understand functions of the system.

Training of the Fire Brigade

The personnel responsible for the training of the fire brigade are qualified by knowledge, suitable training, and experience.

General Employee Training

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Each nuclear plant employee has a responsibility to prevent, detect, and suppress fires. General site employee training introduces all personnel to the elements of the site-specific FPP, including the responsibilities of the FPPS staff. Training includes information on the types of fires and related extinguishing agents, specific fire hazards at the site, and actions in the event of a fire suppression system actuation. General employee training provides specific instruction to site and contractor personnel on appropriate actions to be taken upon discovering a fire, actions to be taken upon hearing a fire alarm, administrative controls on the use of combustibles and ignition sources, and actions necessary in the event of a combustible liquid spill or gas release or leaks.

Fire Watch Training

Fire watch training provides instruction on fire watch duties, responsibilities, and required actions for both one hour roving and continuous fire watches. Fire watch qualification includes hands-on training in a practice fire with the extinguishing equipment to be used while on fire watch, and includes record keeping requirements.

9.5.1.6.4 Fire Brigade Organization, Training, and Records

The plant fire brigade must have a minimum of five qualified members on-site at all times. The fire brigade shall not include the minimum shift crew necessary for safe shutdown or any personnel required for other essential functions during a fire emergency. The fire brigade consists of a fire brigade leader who is assigned to the fire brigade and is qualified to assume command of a fire emergency and direct fire-fighting activities. The fire brigade also consists of an additional four fire brigade members who are qualified, trained, and equipped to respond to fire related emergencies.

Fire brigade drills are performed in the plant so that the fire brigade can practice as a team. Drills are performed at least quarterly for each shift fire brigade and each fire brigade member participates in at least two drills annually. At least one drill for each shift's fire brigade per year is unannounced. Persons planning and authorizing an unannounced drill must make sure that the responding shift fire brigade members are

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.3.1	Fire Detection		See below.
C.3.1.1	Fire Detection and Alarm Design Objectives and Performance Criteria	Compliance	
C.3.2	Fire Protection Water Supply Systems		See below.
C.3.2.1	Fire Protection Water Supply	Compliance	
C.3.2.2	Fire Pumps	Compliance	
C.3.2.3	Fire Mains	Compliance	
C.3.3	Automatic Suppression Systems	Compliance	
C.3.3.1	Water Based Systems	Compliance	
C.3.3.1.1	Sprinkler and Spray Systems	Compliance	
C.3.3.1.2	Water Mist Systems	N/A	Water mist suppression systems are not provided.
C.3.3.1.3	Foam-Water Sprinkler and Spray Systems	N/A	Foam sprinkler and spray systems are not provided.
C.3.3.2	Gaseous Fire Suppression	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification. ~~A manually actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The MCR is continuously occupied, allowing for prompt identification and response. See Section 9.5.1.2.1, "Automatic Fire Suppression Systems," for details.~~
C.3.3.2.1	Carbon Dioxide (CO_2) Systems	N/A	Carbon dioxide extinguishing systems are not provided.

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.3.3.2.2	Halon	N/A	Halon fire extinguishing systems are not provided.
C.3.3.2.3	Clean Agents	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification. ~~A manually actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The MCR is continuously occupied, allowing for prompt identification and response. See Section 9.5.1.2.1, "Automatic Fire Suppression Systems," for details.~~
C.3.4	Manual Suppression Systems and Equipment	Compliance	
C.3.4.1	Standpipes and Hose Stations	Compliance	
C.3.4.2	Hydrants and Hose Houses	Compliance	
C.3.4.3	Manual Foam	Compliance	
C.3.4.4	Fire Extinguishers	Compliance	
C.3.4.5	Fixed Manual Suppression		

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
	Some fixed fire suppression systems may be manually actuated (e.g., fixed suppression systems provided in accordance with Section III.G.3 of Appendix R to 10 CFR Part 50). Manual actuation is generally limited to water spray systems and should not be used for gaseous suppression systems except when the system provides backup to an automatic water suppression system. Fixed manual suppression systems should be designed in accordance with applicable guidance of the appropriate NFPA standards. A change from an automatic system to a manually actuated system should be supported by an appropriate evaluation.	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification for the gaseous suppression system in the MCR subfloor. ~~A manually actuated gaseous suppression system is provided for the subfloor area of the MCR. The subfloor area is provided with fire detection. The Control Room is continuously occupied allowing for prompt identification and response. See Section 9.5.1.2.1 "Automatic Fire Suppression Systems" for details.~~
C.3.5	Manual Firefighting Capabilities	Compliance	
C.3.5.1	Fire Brigade	Compliance	
C.3.5.1.1	Fire Brigade Staffing	Compliance	
C.3.5.1.2	Equipment	Compliance	
C.3.5.1.3	Procedures and Prefire Plans	Compliance	
C.3.5.1.4	Performance Assessment/Drill Criteria	Compliance	
C.3.5.2	Offsite Manual Firefighting Resources	Compliance	
C.3.5.2.1	Capabilities	Compliance	
C.3.5.2.2	Training	Compliance	
C.3.5.2.3	Agreement/Plant Exercise	Compliance	
C.4	Building Design/Passive Features	Compliance	
C.4.1	General Building and Building System Design	Compliance	
C.4.1.1	Combustibility of Building Components and Features	Compliance	
C.4.1.1.1	Interior Finish	Compliance	

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.4.1.1.2	Testing and Qualification	Compliance	
C.4.1.2	Compartmentalization, Fire Areas, and Zones	Compliance	
C.4.1.2.1	Fire Areas	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.4.1.2.2	Fire Zones	Compliance	
C.4.1.2.3	Access and Egress Design	Compliance	
C.4.1.3	Electrical Cable System Fire Protection Design	Compliance	
C.4.1.3.1	Cable Design	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification. ~~Instances where special purpose cabling may not be qualified to the specified standards, an evaluation of the cabling will be performed.~~
C.4.1.3.2	Raceway/Cable Tray Construction	Compliance	
C.4.1.3.3	Electrical Cable System Fire Detection and Suppression	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.4.1.3.4	Electrical Cable Separation	Compliance	
C.4.1.3.5	Transformers	Compliance	
C.4.1.3.6	Electrical Cabinets	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.4.1.4	HVAC Design	Compliance	
C.4.1.4.1	Combustibility of Filter Media	Compliance	
C.4.1.4.2	Smoke Control/Removal	Compliance	
C.4.1.4.3	Habitability	Compliance	
C.4.1.4.4	Fire Dampers	Compliance	
C.4.1.5	Drainage	Compliance	
C.4.1.6	Emergency Lighting	Compliance	

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.4.1.6.1	Egress Safety	Compliance	
C.4.1.6.2	Post-Fire Safe-Shutdown	Compliance	
C.4.1.7	Communications	Compliance	
C.4.1.8	Explosion Prevention	Compliance	
C.4.2	Passive Fire-Resistive Features	Compliance	
C.4.2.1	Structural Fire Barriers	Compliance	
C.4.2.1.1	Wall, Floor, and Ceiling Assemblies	Compliance	
C.4.2.1.2	Fire Doors	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.4.2.1.3	Fire Dampers	Compliance	
C.4.2.1.4	Penetration Seals	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.4.2.1.5	Testing and Qualification	Compliance	
C.4.2.1.6	Evaluation of Penetration Seal Designs with Limited Testing	Compliance	
C.4.2.2	Structural Steel Protection	Compliance	
C.4.2.3	Fire-Resistive Protection for Electrical Circuits	Compliance	
C.4.2.3.1	Electrical Raceway Fire Barrier Systems	Compliance	
C.4.2.3.2	Fire Rated Cables	N/A	For plants licensed before January 1, 1979.
C.4.2.3.3	Fire Stops for Cable Routing	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification. ~~See Section 9.5.1.2.1 on "Electrical System Design and Electrical Separation" for details of alternate compliance for "fire stops for cable routing."~~

Table 9.5.1-1—Fire Protection Program Compliance with Regulatory Guide 1.189
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R.G. Section	Regulatory Guide 1.189 "C. Regulatory Position"[1]	Compliance[2]	U.S. EPR Comment
C.5.4.3.1	Common Power Source	Compliance	
C.5.4.3.2	Spurious Actuation Circuits	Compliance	
C.5.4.3.3	Common Enclosures	Compliance	
C.5.4.4	Control Room Fires	Compliance	
C.5.5	Post-Fire Safe-Shutdown Procedures	COL Applicant	Note 3
C.5.5.1	Safe-Shutdown Procedures	COL Applicant	Note 3
C.5.5.2	Alternative/Dedicated Shutdown Procedures	COL Applicant	Note 3
C.5.5.3	Repair Procedures	COL Applicant	Note 3
C.5.6	Shutdown/Low-Power Operations	Compliance	See Section 9.5.1.2.1 "Shutdown/Low Power Operations" for details of compliance.
C.6	Fire Protection for Areas Important to Safety		See below.
C.6.1	Areas Related to Power Operation		Compliance Position is as given for each sub-section below.
C.6.1.1	Containment	Compliance	
C.6.1.1.1	Containment Electrical Separation	Compliance	
C.6.1.1.2	Containment Fire Suppression	Alternate Compliance 09.05.01-80	Refer to Section 9.5.1.2.2 for justification. ~~Suppression systems inside containment are manually actuated.~~
C.6.1.1.3	Containment Fire Detection	Compliance	
C.6.1.2	Control Room Complex	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.6.1.2.1	Control Room Fire Suppression	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.
C.6.1.2.2	Control Room Fire Detection	Compliance	
C.6.1.2.3	Control Room Ventilation	Compliance	
C.6.1.3	Cable Spreading Room	Alternate Compliance	Refer to Section 9.5.1.2.2 for justification.

Next File

U.S. EPR Conformance with Standard Review Plan (NUREG-0800) ANP-10292 Technical Report Markups

CHAPTER 9 Auxiliary Systems			
SRP Criterion	**Description** **(AC – Acceptance Criteria Requirement, SAC – Specific SRP Acceptance Criteria)**	**U.S. EPR Assessment**	**FSAR Section(s)**
9.5.1-AC-10	**10 CFR 52.80(a)**, which requires that a COL application contain the proposed inspections, tests, and analyses, including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.	N/A-COL	N/A
9.5.1-AC-11	**10 CFR Part 72**, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," which establishes regulatory requirements applicable to spent nuclear fuel and waste storage.	N/A-COL	N/A
9.5.1-SAC-01	**RG 1.174**, Revision 1, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis," as it applies to the use of PRA in support of changes to the fire protection licensing basis for nuclear power plants. Appropriate techniques for performing a Fire PRA are presented in **NUREG/CR-6850** (EPRI TR-1011989), "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities."	Y	9.5.1.5
9.5.1-SAC-02	**RG 1.188**, Revision 1, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses," as it applies to FPP considerations for license renewal such as equipment aging issues. This RG endorses the guidance in Nuclear Energy Institute (NEI) document, **NEI 95-10**, Revision 6, "Industry Guideline for Implementing the Requirements of **10 CFR Part 54** - The License Renewal Rule."	N/A-COL	N/A
9.5.1-SAC-03	**RG 1.189**, Revision 1, "Fire Protection for Nuclear Power Plants," which	Y	9.5.1

CHAPTER 9 Auxiliary Systems			
SRP Criterion	**Description** **(AC – Acceptance Criteria Requirement, SAC – Specific SRP Acceptance Criteria)**	**U.S. EPR Assessment**	**FSAR Section(s)**
	provides comprehensive staff positions and guidelines on fire protection for nuclear power plants.		Table 9.5.1-1
	09.05.01-80 →	EXCEPTION (Misc. Regulatory Positions)	9.5.1
9.5.1-SAC-04	**RG 1.191**, "Fire Protection Program for Nuclear Power Plants During Decommissioning and Permanent Shutdown," which establishes the fire protection objectives and staff positions for implementing fire protection for those nuclear power plants that have submitted the necessary certifications for license termination under 10 CFR Part 50.82(a).	N/A-COL	N/A
9.5.1-SAC-05	**Regulatory Guide 1.206**, "Combined License Applications for Nuclear Power Plants (LWR Edition)," as it applies to the FPP of any new reactor COL application submitted in accordance with 10 CFR Part 52.	N/A-COL	N/A
9.5.1-SAC-06	Enhanced fire protection criteria for new reactor designs as documented in **SECY 90-016**, **SECY 93-087**, and **SECY 94-084**. SECY 90-016 established enhanced fire protection criteria for evolutionary light water reactors. SECY 93-087 recommended that the enhanced criteria be extended to include passive reactor designs. SECY 90 016 and SECY 93-087 were approved by the Commission in staff requirements memoranda (SRM). SECY 94-084, in part, establishes criteria defining safe-shutdown conditions for passive light water reactor designs.	Y	9.5.1.2.1
9.5.1-SAC-07	For COL reviews, the description of the operational program and proposed implementation milestone(s) for the fire protection program are reviewed in accordance with 10 CFR 50.48. The operational program for fire protection	N/A-COL	N/A