

Request for Additional Information No. 20, Revision 0

7/28/2008

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
SFPT Branch

QUESTIONS

09.05.01-1

EPR FSAR Section 9.5.1.6.1 states that procedures and practices related to the physical modification of the plant contain provisions that provide reasonable assurance that the modification process will not have adverse affects on the fire protection of the plant SSC important to safety and during the implementation of the modification, an adequate fire protection impairment program is in place. As noted in Regulatory Position 1.8.1 of RG 1.189, Rev.1, this criterion should not be applied to new reactor plants. The change process for new reactor fire protection programs should be the same as that for the rest of the plant, i.e., in accordance with 10 CFR 52.98(c). Basis: RG 1.189, Regulatory Position 1.8.1.

09.05.01-2

The EPR FSAR should include a COL information item that directs the applicant to identify and evaluate deviations between the certified design and the as-purchased, as-built plant for the Fire Protection System. This COL information item should direct the applicant to perform a Final Fire Hazards and Safe Shutdown Analyses which includes the final plant cable routing, fire barrier ratings, combustible loading, ignition sources, purchased equipment, equipment arrangement, and includes a review against the assumptions and requirements stated in the FSAR Fire Hazards and Safe Shutdown Analysis. The final FHA and Safe Shutdown Analysis should also include a detailed post-fire safe-shutdown circuit analysis performed and documented using a methodology similar to that described in NEI guidance document, NEI 00-01, "Guidance for Post-Fire Safe-Shutdown Circuit Analysis." This COL information item should direct the applicant to describe how this as-built analyses will be performed and documented, and how will the NRC be made aware of deviations from the FSAR, if any? Basis: RG 1.189 Regulatory Position 1.2 and 1.3; RG 1.206 Section C.III.1, Chapter 9, Section C.I.9.5.1.1(4); and 10 CFR 52.98(c).

09.05.01-3

The EPR FSAR should include a COL information item to provide the Fire Hazards and Safe Shutdown Analyses for site-specific areas of the plant not analyzed by the FSAR. Basis: Completeness of application.

09.05.01-4

The FHA analysis results for the control room complex Table 9A-2 column 16 states that this area has Manual Fixed Fire Suppression, which gives the impression that the whole area may have this suppression. Section 9.5.1.2.1 states that the main control room sub-floor areas are protected with a manually-actuated clean agent fire extinguishing system. Table 9A-2 should be specific as to exactly where in the fire area the fixed suppression is being used and also should describe the type of fixed fire suppression as stated in Section 9.5.1.2.1. A total review of Table 9A-2 should also be performed to find any additional fire areas where suppression or detection coverage or type is not specific enough to avoid misapplying table. Basis: Clarification of design.

09.05.01-5

Effects of Fire and Smoke on Digital I&C System Components – How does the EPR design ensure that fire and smoke in the fire area will not cause spurious actuations to be initiated by the digital equipment in the fire area that would prevent safe shutdown? Will digital equipment be designed and tested to prevent spurious actuations caused by the effects of fire and/or will potential spurious actuations resulting from these effects be analyzed to demonstrate that they will not prevent safe shutdown? Basis: SECY-90-016 and SECY-93-087.

09.05.01-6

Multiple Spurious Actuations – As noted in RG 1.189, Rev 1, the one-at-a-time assumption for spurious actuations may not adequately address the potential risk attributed to fire. Additionally, NEI 00-01, Rev 1 also does not fully address multiple spurious actuations (Draft Rev 2 of NEI 00-01 is currently being developed to address multiple spurious actuations). What assumptions and methodologies will be used by the applicant to identify, assess, and resolve the potential for multiple spurious actuations that may prevent post-fire safe shutdown? Basis: RG 1.189, Regulatory Position 5.3.4.

09.05.01-7

The EPR FSAR should add a COL information item to provide specific design and certification testing details for fire barriers in accordance with NFPA 251, ASTM E-119, and the guidance in RG 1.189. Basis: RG 1.189, Regulatory Position 4.2.

09.05.01-8

Smoke, hot gases, and fire suppressant migration between redundant trains – SECYs-93-087/90-016 include the criteria that the design should ensure that smoke, hot gases or fire suppressant will not migrate into other fire areas to the extent that safe shutdown could be adversely affected. Provide a description of the plant features that will provide this assurance, including acceptance criteria for fire barrier penetration seals, as well as the use and qualification of smoke dampers. The EPR FSAR should verify that fire dampers that do not close on smoke detection will not be relied upon to prevent the migration of smoke from one redundant train area to another. Also describe

how the fire hazards analysis will evaluate the potential for the migration of smoke, hot gases or fire suppressant to prevent safe shutdown, including any impact on the ability to access a fire area for manual suppression or, in the case of a control room evacuation, any impact on the ability to access and operate the remote shutdown panel. The EPR FSAR allows for the use of portable smoke exhaust fan systems. The EPR FSAR should add a COL information item to establish provisions for manual smoke control by manual actions of the fire brigade for all plant areas. Basis: SECYs-93-087/90-016

09.05.01-9

The EPR FSAR should add a COL information item to provide simplified FPS piping and instrumentation diagrams showing complete site-specific systems. Nuclear Island definition is different in Figure 9.5.1-1 then in Tier 1 Section 2.1.1. Modify FSAR accordingly. Basis: Completeness of application.

09.05.01-10

The EPR FSAR Section 9.5.1.6.2 provides the FPP organization functions in accordance with RG 1.189. Section 9.5.1.6.2 states, "The COL applicant is responsible for determining the individual position responsible for the organizational functions described herein." This section should reference Section 13.1, since it contains the applicable COL information item 13.1-1. Additionally, not all the fire protection engineer responsibilities are listed in Section 9.5.1.6.2 and, therefore, suggest adding "but not limited to" after "including" in the fire protection engineer responsibility paragraph.

Basis: RG 1.189, Regulatory Position 1.1

09.05.01-11

The FSAR takes exception to RG 1.189 guidance to provide automatic suppression in the rooms adjacent to the main control room. The basis for this exception is that manual fire suppression is provided for the control room complex. Piles of paper on desktops and paper in open bookcases contribute to the combustible loading in a room and ignition sources such as electrical appliances may be present. The EPR FSAR should provide a COL information item that would direct the applicant to describe its program to control the fire hazard presented by paper or other combustible materials, as well as potential ignition sources (e.g., coffee makers) to justify not having automatic suppression in the rooms adjacent to the main control room. Basis: RG 1.189, Regulatory Position 6.1.2

09.05.01-12

The FSAR takes exception to RG 1.189 guidance to provide smoke detectors in the control room cabinets and consoles. The EPR FSAR should provide for a COL information item that directs the applicant to describe the cabinet design features that will facilitate the rapid identification of the specific cabinet/console that is on fire and facilitate rapid access to the cabinets/consoles for fire fighting. Basis: RG 1.189, Regulatory Position 6.1.2.2.

09.05.01-13

RG 1.189 states that fire water supplies should be filtered and treated as necessary to prevent or control biofouling or microbiologically induced corrosion of fire water systems. The EPR FSAR should direct the applicant to describe the program to monitor and maintain an acceptable level of quality of their fire water sources. Basis: RG 1.189, Regulatory Position 3.2.1

09.05.01-14

RG 1.189 states that the communication system design should provide effective communication between plant personnel in all vital areas during fire conditions under maximum potential noise levels. The EPR FSAR should provide a brief description in Section 9.5.1.3 of the communication systems available, refer to Section 9.5.2, include a statement similar to 9A-2 Note 11, and include any exceptions to Note 11 as given in Section 9.5.2.1. The EPR FSAR should provide a COL information item or modify COL information item 9.5-1 that directs the applicant to verify that for a fire in any one fire area that disables a communication system or systems such as a loss of a repeater that creates a dead spot that those areas in the plant that require communication will have it. COL information item 9.5-1 only addresses normal and accident conditions. Basis: RG 1.189 Regulatory Position 4.1.7; RG 1.206, Section C.III.1, Chapter 9, Section C.I.9.5.2

09.05.01-15

QA Program: RG 1.206, Regulatory Position C.III.1, Section C.I.9.5.1.1 identifies that the COL applicant should provide information on the fire protection operational program and procedures. RG 1.189 states that there are two options: 1) either include the FP program in the plant's overall QA program under Appendix B or 2) provide a description of the FP QA program. The EPR FSAR Section 17.5 refers to Topical Report ANP-10266A, Rev 1. ANP-10266A, Rev 1, Section 3.2 states that for non-safety related fire protection components RG 1.189 Regulatory Position 1.7, April 2001 will be used as guidance. The EPR FSAR should clarify that the QA program for non-safety related fire protection components will not be under Appendix B in Section 9.5.1.6.5. Additionally, RG 1.189, Rev 1 should be used for the QA rather than Rev 0 as stated in the topical report. COL Information items 9.5-2, 3, and 4 only address RG 1.189, Sections 1.7.1, 2, and 3 and not the whole of Section 1.7. The EPR FSAR should include a COL information item or modify COL information items 9.5-2, 3, and 4 that direct the applicant to provide details of the fire protection QA program. Basis: RG 1.189 Reg Position 1.7; RG 1.206, Section C.III.1, Chapter 9, Section C.I.9.5.1.189 Section 1.7.

09.05.01-16

RG 1.189 Position 3.5.1.2 gives guidance for the equipment that should be provided for the fire brigade. The EPR FSAR should describe this equipment as per RG 1.189 or an appropriate COL information item should be included in the FSAR. Basis: RG 1.189 Regulatory Position 3.5.1.2; RG 1.206, Section C.III.1, Chapter 9, Section C.I.9.5.1.1.

09.05.01-17

Storage of Hazmat Chemicals: RG 1.206, Regulatory Position C.III.1, Section C.I.9.5.1.1 identifies that the COL applicant should provide information on the fire protection operational program and procedures. RG 1.189 Position 2.1.1.b states that hazmat chemicals should not be stored in areas that contain or expose equipment important to safety; however, the EPR FSAR does not directly address hazardous chemicals. The EPR FSAR should state that hazmat chemicals should not be stored in areas that contain or expose equipment important to safety. Basis: RG 1.189 Regulatory Position 2.1.1.b; RG 1.206 Section C.III.1, Chapter 9, Section C.I.9.5.1.1

09.05.01-18

RG 1.189 Position 2.1.1.a states that unused ion exchange resins should not be stored in areas that contain or expose equipment important to safety; however, the EPR FSAR does not address storage of unused ion exchange resins. The EPR FSAR should state that unused ion exchange resins should not be stored in areas that contain or expose equipment important to safety. Basis: RG 1.189, Regulatory Position 2.1.1.

09.05.01-19

The EPR FSAR Section 9.5.1.6 describes the FP program requirements. This section states that “Implementation of the site-specific FPP described herein is the responsibility of the COL applicant.” This section should reference Section 13.4, since it contains the applicable COL information Item 13.4-1. Additionally, not all the operational aspects of the FP program are discussed in the U.S. EPR FSAR and, therefore, the FSAR should direct the applicant to develop a fire protection program in accordance with RG 1.189. The U.S. EPR Section 9.5.1.6 should be revised to read “Implementation of the site-specific FPP described, in part, herein is to be in accordance with RG 1.189 and is the responsibility of the COL applicant.” Basis: RG 1.189, Regulatory Position 1.1.

09.05.01-20

RG 1.189 states that “Emergency lighting should be provided throughout the plant as necessary to support fire suppression actions and safe-shutdown operations, including access and egress pathways to safe-shutdown areas during a fire event. Fixed, self-contained lighting consisting of fluorescent or sealed-beam units with individual eight-hour minimum battery power supplies should be provided in areas needed for operation of safe-shutdown equipment and for access and egress routes thereto.” Based on the description in EPR FSAR Sections 9.5.1 and 9.5.3, it is unclear how emergency lights are used for fire scenarios. EPR FSAR Section 9.5.1.3 should describe how the various types of emergency lights are used for fire scenarios, and why it is acceptable not to rely on the guidance given in RG 1.189 to use eight-hour battery pack emergency lights. Section 9.5.1.3 should refer to Section 9.5.3 for emergency lighting details. In Table 9A-2, which contains the FHA results, Note 10 for emergency lighting does not provide any detail of what type of lighting is being provided and why it is acceptable if the lighting is not eight-hour battery-backed

and, therefore, the FHA analysis is incomplete. The EPR FSAR should provide emergency lighting details as described above and update Table 9A-2 as applicable. The EPR FSAR should provide a COL information item that directs the applicant to verify that emergency lighting is available throughout the plant as necessary to support fire suppression actions and safe-shutdown operations, including access and egress pathways to safe-shutdown areas during a fire event as per RG 1.189. Basis: RG 1.189 Regulatory Position 4.1.6; RG 1.206 Section C.III.1, Chapter 9, Section C.I.9.5.3

09.05.01-21

EPR FSAR Section 8.3.1.1.1 states "The divisional pair functional independence and physical separation are in accordance with IEEE Std 603-1998 (Reference 1) for safety-related system independence. This is accomplished by the separation of safety-related components between divisional pairs. A single failure or internal hazard, or both, in one divisional pair can only affect that one divisional pair. Therefore, during design basis accidents coincident with a single failure to any electrical component in a divisional pair, the second divisional pair supports safety-related function completion in accordance with single-failure criteria IEEE Std 379-2000 (Reference 2), as endorsed by RG 1.53." EPR FSAR Section 9.5.1.2.1, Electrical System Design and Electrical Separation, should explain how fire effects on divisional pairs affect fire safe shutdown and how safe shutdown is achieved? EPR FSAR Section 9.5.1.2.1 should explain how excerpts from SECY-90-016 that concern one shutdown division free of fire damage pertains to the EPR divisional pair design. EPR FSAR Section 9.5.1.2.1 uses the term success path for safe shutdown. EPR FSAR should define what a success path is related to divisional pairs. Basis: RG 1.189 Regulatory Position 1.3 and 5; RG 1.206 Section C.III.1, Chapter 9, Section C.I.9.5.1.1(5)

09.05.01-22

EPR FSAR Section 9.5.1.2.1, Electrical System Design and Electrical Separation, states that "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, fire resistive cable ducts. 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, fire resistive cable ducts." The EPR FSAR should state what the fire ratings of these non-combustible, fire resistive cable ducts are and if they are not three-hour rated what are the additional features in these areas that would justify not having three-hour rated ducts. The EPR FSAR should add a COL information item to provide specific design and certification testing details for these ducts in accordance with NFPA 251, ASTM E-119, and the guidance in RG 1.189. Basis: RG 1.189, Regulatory Position 4.2 and 4.3.

09.05.01-24

The EPR FSAR states that “Operator manual actions associated with the credited shutdown success path are not required to achieve and maintain HSB.” The EPR FSAR should clarify what constitutes a success path. For example, does the success path include flow diversion paths directly connected to the main shutdown train and systems/components that are not part of the primary shutdown train but whose spurious actuation could adversely impact the ability of the primary shutdown train to perform its required post-fire safe-shutdown function? Basis: RG 1.189 Regulatory Position 5.

09.05.01-25

The applicant should develop ITAAC to verify that, under seismic loads, the fire protection standpipe systems will remain functional in areas containing safety-related SSCs. The EPR FSAR should add an ITAAC for verification that the fire protection standpipe systems will withstand seismic loads.

Basis: RG 1.206 Section C.II.1.2.2 and Appendix C.II.1-A, Fluid Systems, Section II.F, page C.II.1-A-6

09.05.01-26

The applicant should develop ITAAC to verify separation and independence of redundant electrical equipment, circuits, and cabling for post fire safe shutdown. The ITAAC should include analyses to verify equipment short-circuit capability and breaker coordination, and the relevant sections of the COL application should describe those analyses. The EPR FSAR should add an ITAAC for verification of post fire safe shutdown separation, isolation, and electrical coordination. The EPR FSAR should also add an ITAAC for the remote shutdown station (RSS) being electrically isolated from the MCR. Basis: RG 1.206 Section C.II.1.2.6, Appendix C.II.1-A, Electrical Systems, Section II.B, page C.II.1-A-21, and Appendix C.II.1-A, Electrical Systems, Section II.D, page C.II.1-A-22.

09.05.01-27

The applicant should develop ITAAC to require as-built plant reports for reconciliation with post-fire safe shutdown analyses to ensure consistency with design requirements of SSCs for fire protection and mitigation (e.g., fire detection and alarm systems, fire suppression systems, fire barriers). EPR FSAR should add an ITAAC as stated above for verification of as-built fire detection systems and fire suppression systems. The EPR FSAR should also add an ITAAC for the fire pumps that verifies that each pump is 100 percent capacity.

Basis: RG 1.206 Section C.II.1.2.7

09.05.01-28

Hazard Protection Features - EPR FSAR should add an ITAAC for combustible liquid spill mitigation barriers such as curbs or walls. EPR FSAR should add an ITAAC for Emergency Light Battery Pack. EPR FSAR should add an ITAAC for the RCP Oil Collection System. Basis: RG 1.206 Appendix C.II.1-A, Fluid Systems, Section I.A.(3) page C.II.1-A-2.

09.05.01-29

EPR FSAR should add an ITAAC for verification of fully automatic closure of fire dampers in ductwork that penetrates fire barriers that are required to protect SSCs that are important to safety. Basis: RG 1.206 Appendix C.II.1-A, Fluid Systems, Section II.M, page C.II.1-A-7

09.05.01-30

The FSAR should identify any post-fire safe-shutdown operator manual actions credited by design and state whether the COL applicant will have the option of crediting operator manual actions that are not identified in the FSAR. If operator manual actions are permitted by the COL applicant, the acceptance criteria for the actions should be stated in the FSAR. If operator manual actions are credited for post-fire safe-shutdown for the certified design, an ITAAC item should be included to verify the feasibility and reliability of the actions.
Basis: RG 1.206 Appendix C.II.1-A, Electrical Systems, Section II.D, page C.II.1-A-22.

09.05.01-31

Fire barriers - The design descriptions should include the fire ratings of divisional walls, floors, doors, and penetrations. EPR FSAR should add an ITAAC to verify that fire barrier testing, qualification and installation, including penetration closures, meet the design. Bases: RG 1.206 Appendix C.II.1-A, Building Structures, Section II.C, page C.II.1-A-23, and Appendix C.II.1-A, Building Structures, Section II.E, page C.II.1-A-23 and RG 1.189 Regulatory Position 4.1.3.3

09.05.01-32

EPR FSAR FHA (Appendix 9A) does not indicate when automatic detection or suppression is provided. EPR FSAR FHA should provide the conditions when automatic detection or suppression is required. Basis: Clarification of design.

09.05.01-33

EPR FSAR Section 9.5.1.2.1, Fire Detection and Alarm System, Fire Water Supply System, Automatic Fire Suppression Systems, and Manual Fire Suppression Systems subsections contain a statement that deviations from the requirements of these standards are justified. The EPR FSAR should summarize these deviations and provide the justification for these deviations in Section 9.5.1.2.1. Basis: Clarification of design.

09.05.01-34

EPR FSAR Section 9.5.1.5 states that "The fire PRA results are used as input to the FPA to screen or rank plant fire areas based on the risk significance (i.e., net affect on CDF / LERF) of fire-induced consequences within the area under consideration." The EPR FSAR should describe how these results are used in the FHA (e.g., what is the criteria for screening, are any fire protection features

eliminated based on the PRA results, were any high risk significant areas identified and what, if any, changes were made to reduce the risk significance to an acceptable level, etc.). Basis: Clarification of design.

09.05.01-35

EPR FSAR Table 9.5.1-1, Fire Protection Program Compliance with Regulatory Guide 1.189, for RG Sections C.4.1.2.1, C.4.1.3.3, C.4.1.3.4, C.4.1.3.6, C.6.1.3, C.6.1.4, and C.6.1.5 indicate an alternate compliance, but do not provide a summary of these compliance issues for review. EPR FSAR should summarize these deviations and provide the justification for these deviations in Section 9.5.1.2.1. Basis: Clarification of design.

09.05.01-36

EPR FSAR Section 9.5.1.2.1 states that "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." What fire stops does the EPR design provide for? What are the fire tests that support not using fire stops are per RG 1.189 especially in vertical runs of cable? Bases: RG 1.189 Regulatory Position 4.2.3.3