

Request for Additional Information No. 25, Revision 0

8/12/2008

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

09.05.01-37

The U.S. EPR FSAR states that "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. Separation of safety-related divisions is provided by a combination of spatial separation and the use of non-combustible, fire resistive structural barriers consisting of wall and ceiling elements." RG 1.189 Regulatory Position 6.1.1.1 states that, for secondary containment Regulatory Position 4.1.3.3 guidance should be used, which states that "Redundant cable systems important to safety outside the cable spreading room should be separated from each other and from potential fire exposure hazards in nonsafety-related areas by fire barriers with a minimum fire rating of 3 hours to the extent feasible." The U.S. EPR FSAR should state what the fire ratings of these non-combustible, fire resistive structural barriers consisting of wall and ceiling elements 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 barriers. The U.S. EPR FSAR should add a COL information item to provide specific design and certification testing details for these barriers in accordance with NFPA 251, ASTM E-119, and the guidance in RG 1.189.

09.05.01-38

The U.S. EPR FSAR states that, "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." The U.S. EPR FSAR is not clear how RG 1.189 Regulatory Position 6.1.1.1 for inside non-inerted containments is met as per FSAR Table 9.5.1-1. The U.S. EPR FSAR should provide specific details of where and how each type of protection is provided or provide the design criteria for the crediting each type of protection and a COL information

item for the COL applicant to provide details of the specific applications of each type of protection.

09.05.01-39

The U.S. EPR FSAR states that, "Alternative shutdown capability accommodates postfire conditions where offsite power is available and where offsite power is not available for 72 hours. In evaluating safe shutdown circuits, including associated circuits the availability of uninterrupted power (i.e., offsite power available) may impact the ability to control the safe shutdown of the plant by increasing the potential for associated circuit interactions resulting from fire damage to energized power and control circuits. Intentional station blackout (SBO) is not relied upon to mitigate potential fire damage to safe shutdown systems or associated circuits." The U.S. EPR FSAR does not define what an associated circuit is. The U.S. EPR FSAR should define that an associated circuit be any circuit whose fire-induced failure could prevent safe shutdown.

09.05.01-40

U.S. EPR FSAR Table 9.5.1-1 states that, "Suppression systems inside containment are manually actuated" with no other details given in FSAR Section 9.5.1. The U.S. EPR should briefly describe this manually actuated suppression system in FSAR Section 9.5.1.2.1, Electrical System Design and Electrical Separation, and include if containment access is required to manually operate suppression systems and state if this suppression is being credited for containment separation and how this manually actuated suppression ties in with containment separation guidance given in RG 1.189 Regulatory Position 6.1.1.1.

09.05.01-41

The U.S. EPR FSAR states that, "A smoke confinement system (SCS) Nuclear Island (NI) is provided to make sure habitability of the access and egress pathways throughout the facility. See Section 9.4.13 for a detail description and operation of the SCS. The design of the smoke removal systems complies with NFPA 92A and NFPA 204." The U.S. EPR FSAR should change "smoke removal systems" to "smoke confinement systems" to be consistent with the rest of text.

09.05.01-42

The U.S. EPR FSAR provides a Fire Protection Analysis (FPA), which includes the safe-shutdown analysis, for the areas of the plant included in the scope of the FSAR. A final fire hazards analysis, including a post-fire safe-shutdown circuit analysis must be performed based on the final as-built configuration of the plant and the as-purchased equipment. The fire hazards analysis should be performed in accordance with Regulatory Positions 1.2 and 1.3 of RG 1.189 and fully documented. NEI 00-01 provides guidance for performing and documenting a post-fire safe-shutdown circuit analysis that is acceptable to the NRC. The final fire hazards analysis, including the circuit analysis, must be maintained by each licensee for the life of the plant to reflect any changes to the plant. The U.S. EPR FSAR should address how and when these final analyses will be completed and

how it will be documented. If appropriate, a COL information item should be included for the final detailed analyses.

#### 09.05.01-43

The U.S. EPR FSAR states that, "Conduits are sealed at the barrier with a fire-rated seal, if accessible. Alternatively, conduits are provided with a non-fire-rated smoke and hot gas seal at the first break in the conduit on both sides of the barrier. The fire resistance rating for internal conduit seals is consistent with the designated fire rating of the fire barrier." The U.S. EPR FSAR should clarify that this paragraph is addressing openings inside conduit. RG 1.189 Regulatory Position 4.2.1.4 states that, "Openings inside conduit larger than 102 mm (4 in.) in diameter should be sealed at the fire barrier penetration. Openings inside conduit 102 mm (4 in.) or less in diameter should be sealed at the fire barrier unless the conduit extends at least 1.5 m (5 ft) on each side of the fire barrier and is sealed either at both ends or at the fire barrier with material to prevent the passage of smoke and hot gases. Fire barrier penetrations that maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions." The U.S. EPR Table 9.5.1-1 states that RG 1.189 Section C.4.2.1.4 is in compliance while the FSAR has no size or distance away from barrier restriction. The U.S. EPR FSAR should clarify the internal conduit seal requirements and state if the design actually is in compliance with RG 1.189 and if not what is the justification for the non-compliance? Additionally, fire barrier penetrations that maintain environmental isolation or pressure differentials have not been addressed. The U.S. EPR FSAR should address these barriers.

#### 09.05.01-44

The U.S. EPR states that "Exceptions include:

- Where approved full-scale fire tests demonstrate that internal conduit seals are not necessary, internal conduit seals are not required.
- Where specialty doors or closure devices are provided because of design considerations other than fire (e.g., flood, pressure or radiation mitigation), such components are not required to be listed or fire-rated. Additionally, where specialty components are used in lieu of fire-rated penetration seals, such as containment penetration assemblies; these components are not required to be fire-rated." The U.S. EPR Table 9.5.1-1 confirms compliance with RG 1.189 Section C.4.2.1.4. However, the FSAR allows using tests that allow having no internal conduit seal. The U.S. EPR FSAR should clarify the internal conduit seal requirements and state if the design actually is in compliance with RG 1.189 and if not what is the justification for the non-compliance? The U.S. EPR FSAR should state if specialty doors or closure devices are part of a fire barrier, and if so, how is the component qualified as a fire barrier? U.S. EPR FSAR should state if specialty components used in lieu of fire-rated seals are part of a fire barrier and if so how is the component qualified as a fire barrier?

09.05.01-45

The U.S. EPR states that, "The classification system uses the same category and naming hierarchy as NFPA 13 (Reference 5) for classification of building occupancies. However, as used herein, these classifications are only intended to be a simplified reflection of the positive correlation between fire severity and the quantity of fuel available to support combustion and the thermal properties (e.g., HRR) of the fuel. The HRR values shown for each fire area hazard classification are only intended to represent the level of intensity that would generally be expected for a fire of this type. These HRR values are not used as a basis for determining worst-case fire scenarios." The U.S. EPR also states that, "Based on compartmentation of the plant by three hour rated structural fire barriers, additional fire protection features (e.g., fire detection system capability, fixed fire suppression system capability, electrical raceway fire barrier systems) are generally not required in order to provide adequate separation of redundant trains of safe shutdown systems, components, and cables. Therefore, provision of such fire protection features are based on factors such as regulatory requirements, regulatory guidance, the magnitude of the hazards within the fire area, insights from the probabilistic fire risk assessment and plant damage business interruption considerations). Regulatory requirements and regulatory guidance takes precedent over the other considerations." The U.S. EPR FSAR FPA should clarify how Heat Potential (BTU/sq ft) including localized high heat load effects, Fire Severity, PRA, and business interruption is determined and used and how detection, and suppression requirements are determined. Additionally, what is the source of the information given in Table 9A-1 and how is it used?

09.05.01-46

RG 1.189 Regulatory Position 2.1.3 states that, "Systems important to safety should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are EDG fuel oil day tanks, turbine-generator oil and hydraulic control fluid systems, and RCP lube oil systems." RG 1.189 Regulatory Position 7.2, Turbine /Generator Building, states that, "Considering the severity of the fire hazards, defense-in-depth may dictate additional protection to ensure barrier integrity and the potential effect of a major turbine building fire on the ability to maintain operator control of the plant and safely shut down should be evaluated." The U.S. EPR FSAR Section 9.5.1.6.1 does not include suppression for the turbine lubrication oil system. As stated in RG 1.189 Regulatory Position 7.2 Turbine building fires can be severe and make it difficult to control the plant and ensure barrier integrity and, therefore, automatic suppression for the turbine lubrication oil system should be part of the U.S. EPR design or provide a justification for not having automatic suppression.

09.05.01-47

RG 1.189 Regulatory Position 2.1.3 states that, "Systems important to safety should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are EDG fuel oil day tanks, turbine-generator oil and hydraulic control fluid systems, and RCP lube oil systems." Considering the severity of the fire hazards associated with outdoor oil-filled transformers and the adverse affects of an unsuppressed severe oil fire that could damage nearby buildings that contain systems important to safety, defense-in-depth may dictate additional protection to ensure barrier integrity. The U.S. EPR FSAR should provide either an additional barrier between the transformer and any effected buildings or automatic suppression. If not providing this additional protection, the U.S. EPR FSAR should provide a justification.

09.05.01-48

RG 1.189 Regulatory Position 7.3 states that, "Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings." The U.S. EPR FSAR does not state that either of these features is provided. The U.S. EPR FSAR should include oil spill confinement features or drainage away from the buildings for outdoor oil-filled transformers.

09.05.01-49

RG 1.189 Regulatory Position 7.4 states that, "Diesel fuel oil tanks with a capacity greater than 4,164 L (1,100 gallons) should not be located inside buildings containing equipment important to safety." The U.S. EPR FSAR Section 9.5.1.6.1 states that, "The diesel fuel oil main storage tanks and the diesel fuel oil service (i.e., day) tanks associated with the EDGs are located within the EPGBs that they serve." The U.S. EPR FSAR should state the capacity of the diesel fuel oil tanks, and if greater than 1,100 gallons, provide a justification for the diesel fuel oil tanks being in an area with safe-shutdown equipment and revise Table 9.5.1-1 as appropriate.

09.05.01-50

RG 1.189 Regulatory Position 3.5.1.4 states that, "A sufficient number of these drills, but not less than one for each shift's fire brigade per year, should be unannounced to determine the firefighting readiness of the plant's fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill should ensure that the responding shift fire brigade members are not aware that a drill is being planned until it has begun. At least one drill per year should be performed on a "back shift" for each shift's fire brigade." The U.S. EPR FSAR Section 9.5.1.6.3 does not address unannounced drills. The U.S. EPR FSAR should address unannounced drills as per RG 1.189.

09.05.01-51

The U.S. EPR FSAR Section 9.5.1.2, Fire Water Supply System, states that, "Threads compatible with those used by local fire departments are used on fire hydrants hose couplings and standpipe system risers." The U.S. EPR FSAR should add an ITAAC to ensure threads compatible with those used by local fire departments are used on fire hydrants hose couplings and standpipe system risers.

09.05.01-52

U.S. EPR FSAR Section 9.5.1.6.1 for Portable fire extinguishers states that, "For dry chemical extinguishers, due consideration is given to possible adverse effects on equipment important to safety in the area." RG 1.189 Regulatory Position 3.4.4 states that, "Fire extinguishers should be provided in areas that contain or could present a fire exposure hazard to equipment important to safety. Extinguishers should be installed with due consideration given to possible adverse effects on equipment important to safety installed in the area." The U.S. EPR FSAR should be reworded to agree with RG 1.189 since dry chemical extinguishers are not the only type of extinguishers that could have adverse effects on equipment.

09.05.01-53

U.S. EPR FSAR states that, "Provisions are made to supply water at least to standpipes and hose systems for manual fire suppression capability in all plant areas containing systems and components required for safe plant shutdown in the event of an SSE. The piping system serving these hose stations are analyzed for SSE loading and are provided with supports to provide reasonable assurance of system pressure boundary integrity. The piping and valves for the portion of the standpipe and hose systems affected by this functional requirement, as a minimum, satisfy ASME B31.1 (Reference 32) and are capable of providing flow to at least two hose stations (approximately 75 gpm per hose station)." RG 1.189 Regulatory Position 3.2.1.j adds that, "The water supply for this condition may be obtained by manual operator actuation of valves in a connection to the hose standpipe header from a normal seismic Category I water system such as the essential service water system." U.S. EPR FSAR Figure 9.5.1-1 shows that the seismic portion of the fire water distribution system SSCs are seismic class (category) II. How does the U.S. EPR design using seismic class (category) II pumps, water storage tanks and distribution piping provide reasonable assurance that an adequate water supply will continue to be provided to plant areas containing equipment required for safe plant shutdown during and following an SSE? Basis: RG 1.189 Regulatory Positions 3.2.1, 3.2.2.