Draft

Request for Additional Information No. 80(1208), Revision 0

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U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.06.01 - Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment
Application Section: FSAR 3.6.1
SBPB Branch

QUESTIONS

03.06.01-1

SRP Section 3.6.1, Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment, Review Procedures, Item 1 states that a review of the information presented in the FSAR identifying all high and moderate energy fluid systems should be performed, as well as verification of individual system temperatures and pressures to ensure that they have been correctly identified.

The staff could not independently confirm the proper classification of systems provided in Tier 2 FSAR Table 3.6.1-1. In order to complete this review, the staff requests the applicant to provide the following information:

a) Design temperatures and pressures for the systems listed in Table 3.6.1-1.
b) Maximum operating temperatures and pressures for the systems listed in Table 3.6.1-1.

In addition, Tier 2 FSAR Section 10.4.3, “Turbine Gland Sealing System,” states that at times turbine sealing steam is provided by an auxiliary steam system.

c) The staff requests the applicant to clarify what system provides heating to the Nuclear Island and identify any auxiliary steam or heating steam systems used in areas containing safety-related SSCs?

03.06.01-2

Tier 2 FSAR Section 3.4.3.1, “Internal Flooding Events,” states that “an internal flooding analysis was performed for Seismic Category I structures to determine the adequacy of the design to protect safety-related SSCs. Sources of flooding considered include high and moderate energy line rupture.”

Tier 2 FSAR Tables 3.6.1-2 and 3.6.1-3 presents the results of evaluations performed to identify high energy systems, break locations, targets, and protection requirements for areas containing safety-related SSCs.

However, Tier 2 FSAR Section 3.6.1 states that the pipe break hazards analysis and the reconciliation of deviations between the as-designed and the as-built configuration will be performed by the COL Holder.

a) The staff requests the applicant to justify in the FSAR why the pipe break hazards analysis cannot be completed at the design certification stage; what portions have been completed; and which specific portions are within the scope of responsibility of the COL Holder.

b) Additionally, the staff requests the applicant to provide in the FSAR a listing of the blowdown flow-rates used in the flooding analysis corresponding to the systems listed in Tier 2 Table 3.6.1-1, indicate what discharge coefficients were assumed in determining break flowrates resulting from critical cracks in piping and provide justification for the use of any discharge coefficient less than 1.0.

03.06.01-3

Tier 2 FSAR Table 3.6.1-1 states that the safety-related portions of the component cooling water (CCW) system are considered high energy. Safety-related CCW pumps are located in each of the four safeguards buildings. Tier 2 FSAR Table 3.6.1-2 lists CCW high energy break locations at the heat exchanger nozzles, pump nozzles, and surge tank nozzles but only for locations in safeguard building 4 which is where the non-safety related severe accident heat removal system (SAHR) supplied portion of the CCW system resides. It appears as though the high energy portion may be associated with the non-safety related portion of the system which is contrary to what is stated in Table 3.6.1-1.

The staff requests the applicant to clarify in the FSAR why the CCW system or portions of it are considered high-energy, and clarify whether these break locations are listed in Tier 2 FSAR Table 3.6.1.2.

03.06.01-4

Standard Review Plan Section 3.6.1, Review Procedure 1, states that the reviewer should evaluate for adequacy the system descriptions of the high and moderate energy piping runs and by reviewing the appropriate system arrangement and piping drawings, examines the plant arrangement measures taken to ensure protection form the effects of pipe breaks.

The staff requests the applicant to update the FSAR to:

a) include detailed design descriptions specifying how the piping systems listed in Tier 2 FSAR Table 3.6.1-1 are routed with respect to nuclear island buildings and safety-related SSCs,
b) provide arrangement drawings depicting the specific locations of high energy lines out-side of containment, and
c) provide supporting design information relative to the determination of the terminal end locations for high energy lines contained in Tier 2 FSAR Table 3.6.1-2.

03.06.01-5

SRP Section 3.6.1, Review Procedures, states that reviewers need to determine that high and moderate energy fluid systems are separated from essential systems and components.

Tier 2 FSAR Tables 3.6-2 and 3.6-3 only addresses high energy systems and do not include all the equipment that needs to be protected against moderate piping failures.

The staff requests the applicant to update the FSAR and justify, why the evaluation and protection for moderate energy line breaks is not addressed in FSAR 3.6.1, or to update the FSAR with information that identify:

a) the energy line break locations,
b) the primary means of protection for each of these line ruptures (e.g., separation, enclosure, special means, etc.), and
c) a listing of SSCs in each area requiring protection.

03.06.01-6

Tier 2 FSAR Section 3.6.1.2.1 states that the use of separation and redundancy, and barriers and shields, are used to protect SSCs. This section further states that in some cases special protection considerations are necessary to protect essential equipment.

Table 3.6.1-3 lists jet shields and whip restraints as special protection features, but it is not clear to the staff if there are any other type of special protection devices used in the design of the U.S. EPR.

The staff requests the applicant to update the FSAR to include a complete list of the special protection devices credited for pipe rupture mitigation, and to provide a listing of the locations where enclosures are the primary means for protection against pipe rupture.

03.06.01-7

As stated in SRP Section 3.6.1, the application of General Design Criteria 2 in this section is to incorporate environmental effects of full-circumferential ruptures of non-seismic moderate-energy piping in areas where effects are not already bounded by failures of high-energy piping.

No detailed design description or table of results was identified in Tier 2 FSAR Section 3.6.1, describing the results of the failure of non-seismic piping. The staff requests the applicant to update the FSAR to address the environmental effects of full-circumferential ruptures of non-seismic moderate energy piping in areas containing SSCs.

The RAI response should address the following items

a. What non-seismically designed systems were or will be evaluated as part of the hazards analyses?
b. Are any of these systems located in two or more of the Safeguards buildings? If so, what are the primary means for protecting multiple divisions?

c. Describe the extent to which floor drains are credited for removal of resulting flooding associated with moderate energy line breaks. Describe also how they would be maintained to ensure their availability.
d. Are any floor drain system components credited in analyses to provide building separation for failures of non-seismic lines or other moderate energy line breaks? If so, describe how they would be maintained to ensure their availability.

03.06.01-8

The U.S. EPR utilizes a shield building that encloses the containment building with an annulus between these two structures. Tier 2 FSAR Section 3.6.1.2.2 states that high energy piping penetrating these two structures is enclosed within guard pipes such that the annulus is not affected by pipe ruptures inside or outside containment.

The staff requests the applicant to update the FSAR to specify whether moderate energy lines are enclosed with guard pipes and whether leakage cracks are postulated in these areas. If these lines are not enclosed with guard pipes, provide the limiting moderate energy line break location and flowrate, and describe the means for detection and mitigation of such an event and consequences on SSCs.

03.06.01-9

It is expected that the final pipe design may not be completed by the time of COLA review. The applicant has proposed to create a COL holder item that would instruct the license holder to complete the pipe hazards analysis. The staff believes that the pipe hazards analysis should be addressed by an ITAAC that will require the COL holder to complete the pipe hazards analysis. This ITAAC should have sufficient details about the assumptions and the method of developing the analysis that the staff will have confidence that the license holder will be able to properly address all of the staff concerns related to the pipe hazards analysis. The completion and submittal of this report should provide the staff with sufficient time to evaluate the report before the start of the construction phase.

The staff requests the applicant to justify why they have not created an ITAAC that requires the completion of the pipe hazards analysis before the start of the construction of the plant.

03.06.01-10

During the construction of the plant, it is expected that some SSCs may be located, or routed in areas other than originally planned. The staff reviewed the applicant's proposed ITAACs and determined that the applicant has not proposed an ITAAC that would complete an as-constructed pipe hazards analysis. This analysis should verify the final position of all SSCs addressed in the pipe hazards analysis, and verify that all assumptions and conclusions of the final pipe hazards analysis are still valid.

The staff requests the applicant to justify why there is no ITAAC that would instruct the COL Holder to complete an as-constructed pipe hazards analysis.