Response to

Request for Additional Information No. 31, Revision 0

7/18/2008
U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 05.04.07 - Residual Heat Removal (RHR) System
Application Section: FSAR Ch 5
SRSB Branch

Question 05.04.07-1:

Two valves were identified from the RHRS on the P&ID schematic which were not included in Table 2.2.3-1 and/or Figure 2.2.3-1. The valves should be part of ITAAC because they are in the primary flow path or support the safety related functionality of the RHR system. The valves identified are 30JNA*0 AA006 & 30JNA*0AA191 (where * = trains 1 through 4).

Please provide the justification to exclude the two valves from the ITAAC program (Table 2.2.3-3); if not, include the valves in Table 2.2.3-1 and Figure 2.2.3-1.

Response to Question 05.04.07-1:

Check valves 30JNA30 AA006 and 30JNA40 AA006 are only on divisions 3 and 4 and are located in the low pressure purification line to the chemical and volume control system (CVCS). This line is not the primary flow path for the residual heat removal system (RHRS); therefore, these valves are not included in the U.S. EPR FSAR Tier 1.

Relief valves 30JNA*0 AA191 (where * = divisions 1 through 4) are provided to protect equipment. As described in U.S. EPR FSAR Tier 2 Section 14.3.2, “features provided solely for equipment protection are not included in Tier 1 material.” Therefore, these relief valves are not included in the U.S. EPR FSAR Tier 1.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 05.04.07-2:

In FSAR 5.4.7.1 it is stated that pump suction lines are self venting. No loop seals are expected to occur; however, it appears that there will be loop seals in both LHSI and MHSI suction lines and that venting capability may be needed. Please justify why a venting capability for the suction lines was not included. If venting will be added, modify the FSAR and provide isometric layout drawings.

Response to Question 05.04.07-2:

The low head safety injection (LHSI) and medium head safety injection (MHSI) pump suction lines will be self-venting by either a continuous downward slope or continuous vent lines.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 05.04.07-3:

FSAR p. 5.4-32: SIS/RHRS evaluation makes a reference to Table 6.3-6 SIS piping, which do not contain piping data. Please provide the correct reference.

Response to Question 05.04.07-3:

The reference to Table 6.3-6 in U.S. EPR FSAR Tier 2 Section 5.4.7.3 is an incorrect reference and will be deleted.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 5.4.7.3 will be revised as described in the response and as shown on the enclosed FSAR markup.

Question 05.04.07-4:

In FSAR 5.4.7.2, p. 5.4-30 it is stated that the SIS/RHRS trains are qualified to appropriate seismic qualification criteria. Please provide reference to the appropriate section of the FSAR that describes the qualification.

Response to Question 05.04.07-4:

Seismic classifications for the safety injection system (SIS)/residual heat removal system (RHRS) are provided in U.S. EPR FSAR Tier 2 Figure 6.3-2. Seismic classification category I is described in U.S. EPR FSAR Tier 2 Section 3.2.1.1, and the qualification of mechanical and electrical equipment is described in U.S. EPR FSAR Tier 2 Section 3.10.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

U.S. EPR Final Safety Analysis Report Markups

5.4.7.3 Performance Evaluation

The SIS/RHRS was evaluated using heat balance calculations incorporating component performance data presented in Table 6.3-2—Low Head Safety Injection Pumps Design and Operating Parameters and Table 6.3-5—LHSI Heat Exchanger Design and Operating Parameters~~, Table 6.3-6—SIS Piping, Valves, and Fitting Design Parameters~~. The evaluation was performed for the following cases:

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- All SIS/RHRS components are operable. Four SIS/RHRS trains are available to remove residual heat.
- The most limiting single failure has occurred in the SIS/RHRS, with offsite power available. Two SIS/RHRS trains are available to remove residual heat, assuming one train is unavailable due to system maintenance and a second train is lost due to the single failure.
- The most limiting single failure has occurred in the SIS/RHRS, with only onsite power available. Two SIS/RHRS trains are available to remove residual heat, assuming one train is unavailable due to system maintenance and a second train is lost due to the single failure.

5.4.7.3.1 Performance Evaluation with All Components Operable

In a normal cooldown, the reactor decreases in power by insertion of the rod cluster control assemblies (RCCA). The cooldown of the RCS must not exceed 90°F/hr, while the cooldown of the pressurizer must not exceed 212°F/hr. From power operation to the hot standby mode, all four reactor coolant pumps (RCPs) are in operation for mixing of the coolant in the RCS, the pressurizer level is automatically controlled by controlling the CVCS letdown flow, the primary pressure is automatically adjusted by the main spray flow and the pressurizer heaters, and the residual heat is being removed by the steam generators. The steam generators levels are controlled by the main feedwater system (refer to Section 10.4.7).

Automatic cooldown of the RCS by the secondary systems from the hot standby mode to SIS/RHRS connection point is accomplished in parallel with the automatic RCS depressurization via the pressurizer. In this phase, the reactor coolant make-up is performed using the CVCS, pressurizer level is automatically controlled by the CVCS letdown line, while the steam generators levels are controlled by the startup and shutdown system.

In the analysis performed, two RCPs are tripped when the RCS temperature decreases to 250°F, another RCP is tripped when the RCS temperature decreases to 158°F, and the last RCP is tripped when the RCS temperature decreases to 122°F.

Two trains of the SIS/RHRS are normally placed in service for residual heat removal when the RCS pressure and temperature decreases below approximately 390 psia and