

Request for Additional Information No. 129 (1282), Revision 0

11/18/2008

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: 5.4.7

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

05.04.07-5

FSAR Tier 2 Section 5.4.7 describes the functional, isolation, pressure relief, pump protection, and test requirements applicable to the RHRS. In order for the staff to complete its review of the RHRS and confirm conformity with the requirements of GDC 34 and the acceptance criteria of Branch Technical Position BTP 5-4, additional information is required.

- a. BTP 5-4 requires that the RHRS be protected against accidental pressurization when in operation and connected to the RCS. FSAR Section 5.4.7.2 states that the RHRS safety-relief valve setpoints and capacities limit the piping to 110 percent of its design pressure. In FSAR Section 5.4.7.2.2, it is stated that the RHRS beyond the second isolation valve is designed so that the ultimate rupture strength exceeds that of the full RCS operating pressure. FSAR Tier 2 Figure 6.3-2 shows RHRS design pressure to be 2540 psig up to the second isolation valve and 930 psig immediately downstream of the second isolation valve. Clarify the FSAR statement that the RHRS beyond the second isolation valve is designed so that the ultimate rupture strength exceeds that of the full RCS operating pressure, and describe how the over-pressurization protection requirements of BTP 5-4 are met.
- b. Inspection and testing requirements are addressed in FSAR Section 5.4.7.4. Describe the testing that will be performed to confirm adequate mixing of borated water that may be added before or during cooldown under natural circulation conditions.

05.04.07-6

FSAR Tier 2 Section 5.4.7.2 describes a mini-flow and test line. The staff requires the following additional information be provided relative to the mini-flow and test line in order to ensure compliance with the in-service inspection requirements of 10 CFR 55 a (g) pertaining to RHRS pump testing and the guidelines of Generic Letters BL 88-04 and GL 89-04:

- a. Confirm that the mini-flow and test line is shown in FSAR Tier 2 Figure 6.3-2 as the 8-inch line connected from downstream of the LHSI heat exchanger and upstream of the outboard isolation valve to the hot leg RHRS letdown line.
- b. Confirm adequate sizing of the line and presence of an installed flow measurement device; and describe the design function of the installed flow restrictor to preclude pump damage during testing.
- c. Address whether a single failure can result in conditions causing a “dead-head” no flow condition of the LHSI pumps during mini-flow operation.

This information is needed in order to ensure that potential generic deficiency associated with in-service testing of pumps utilizing minimum flow lines as described in Generic Letter 89-04 has been adequately addressed.

05.04.07-7

FSAR Tier 2 Section 5.4.7.2.1 describes the design features pertaining to mid-loop operation. The following additional information is requested by the staff in order to ensure that the RHRS design meets the system design requirements of GDC 34 and GDC 19:

- a. Confirm the availability of the redundant hot leg temperature indications in the main control room and describe the use of the core exit thermocouples for monitoring temperature during mid-loop operation.
- b. Provide additional detail about the level sensor that is used to monitor reactor vessel level during an outage, including sensor design and RCS connection location, redundancy, availability of level indication and alarms in the main control room, and procedures for ensuring reliable level indication at the junction of the RHRS line and reactor vessel, for example under conditions of low flow.
- c. Describe the communications equipment available to the main control room operator and field personnel during mid-loop operations.

This information is needed in order for the staff to complete its evaluation of the RHRS design features pertaining to mid-loop operation as per the recommendations contained in NRC Generic letter GL 88-17.

05.04.07-8

Section 5.4.7.3.2 addresses RCS cooldown for a two train SIS/RHR operation with offsite power available. The FSAR states that “In Figure 5.4.4, two RHR trains (with full flow through the LHSI HXs) are able to cool the plant down from approximately 250°F to 200°F in around 10 hours.”

Based on Figure 5.4-4, the temperature of 250°F is reached approximately in 7.3 hours and the temperature of 200°F is reached at approximately 10 hours. Therefore, the cooldown from 250°F to 200°F occurs in approximately 2.7 hours. Please explain the difference between the FSAR statement and Figure 5.4-4.