REQUEST FOR ADDITIONAL INFORMATION NO. 165-1967 REVISION 1

1/23/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 05.02.05 - Reactor Coolant Pressure Boundary Leakage Detection
Application Section: DCD Tier 2, Section 5.2.5

QUESTIONS for Balance of Plant Branch 2 (ESBWR/ABWR) (SBPB)

05.02.05-1

RAI 05.02.05-1

The applicant has not provided adequate Tier 1 ITAAC information to verify the compliance with the design criteria required by GDCs 2 and 30. Because the reactor coolant system (RCS) is a safety-related system, the reactor coolant pressure boundary (RCPB) is a safety-related issue. 10 CFR 52.47(b) (1) requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification, the provisions of the Atomic Energy Act, and NRC regulations. The ITAAC should address the sensitivity, response time, and alarm limit for the RCPB leakage detection instrument. The staff requests the applicant to provide ITAAC for this system in the DCD Tier 1.

05.02.05-2

RAI 05.02.05-2

In Section 5.2.5 of Revision 1 to the DCD Tier 2, the applicant indicates its gaseous radiation monitor can detect one gpm leakage within one hour and the applicant includes the use of a gaseous radiation monitor in the Technical Specifications. However, operating experience (NRC Information Notice 2005-24) indicates that this response time of one gpm within one hour may be a non-conservative estimate for the gaseous radiation monitor based on the assumption of non-realistic radioactive concentration in the RCS. The RCS source terms used in DCD Tier 2, Section 5.2.5 for evaluating the response time may not be sufficiently conservative because of improved fuel performance and RCS chemistry control. The actual RCS source term may be orders of magnitude smaller than that assumed by the applicant to arrive at the sensitivity and response time capability of the radiation monitor. The staff requests the applicant to reevaluate the sensitivity and response time of the radiation monitors (gaseous and particulate) using a realistic radioactive concentration in the RCS. If the response time is much longer than one hour for one gpm leakage, the applicant should reevaluate the appropriateness of keeping theses monitors in the Technical Specifications (TS) and determine that the remaining leakage detection monitors in the TS are still acceptable in terms of “diversity”. In Revision 1 of RG 1.45, as opposed to Revision 0 of RG 1.45, the gaseous radiation monitor is no longer required in the TS for RCS leakage detection.

The applicant needs to provide the changes, if any, in the DCD and provide a markup in the response.

05.02.05-3

RAI 05.02.05-3

Section 5.2.5.6 of the DCD Tier 2 states that “procedures for converting various indications to a common leakage equivalent will be available to operating personnel.” However, the staff could not find the procedures anywhere in the DCD that are promised for the operator to convert the instrument indications of various leakage detection (e.g., containment radioactivity monitors, containment sump level monitor, containment air cooler condensate flow rate monitor) into common leakage rate (gpm). Therefore, the staff requests the applicant to provide the following information.

- Identify a combined license (COL) information item in the DCD to require the COL applicant provide operators the procedures that permit rapid conversion of instrument indications of various leakage detection instruments into common leak rate (gpm).

- Define the alarm setpoints and demonstrate the setpoints are sufficiently low to provide an early warning for operator actions prior to Technical Specification (TS) limits.

05.02.05-4

RAI 05.02.05-4

The operating experience at Davis Besse indicated that prolonged low-level unidentified leakage inside containment could cause material degradation such that it could potentially compromise the integrity of a system leading to the gross rupture of the reactor coolant pressure boundary. The DC applicant does not indicate that sufficient procedures for identifying, monitoring, and trending prolonged low-level leakage are to be developed and provided to the operators. Reliance only on leak rate alarms set at the TS limits is not acceptable without proper compensatory measures. Guidance and Regulatory Positions about developing procedures for ensuring effective management of leakage, including low-level leakage, is available in RG 1.45, Revision 1. The staff requests the applicant to provide a COL information item that requires a COL applicant to establish procedures that specify operator actions in response to prolonged low leakage conditions that exist above normal leakage rates and below the TS limit to provide the operator sufficient time to take actions before the TS limit is reached. Please include this information in the DCD and provide a markup in your response.

05.02.05-5

RAI 05.02.05-5

Applicants for standard plant design approval must provide plans for preoperational testing and initial operations in accordance with 10 CFR 50.34(b) (6) (iii) requirements. SRP Section 14.2, Subsection II, “Acceptance Criteria”, states that the DC applicant can meet the above requirements by conforming to the criteria stated in Regulatory Guide (RG) 1.68.
The staff reviewed Chapter 14 of Tier 2 of the US-APWR DCD to ensure the applicant conformed to Initial Plant Test requirements. Chapter 14, “Verification Programs”, of the US-APWR DCD lists Section 14.2.12.1.71, “RCS Leak Rate Preoperational Test,” and Section 14.2.12.2.1.10, “RCS Final Leak Test.” However, the staff was not able to find the sensitivity, response time, alarm limit of the leak detection systems being included in the above tests. The applicant is request to identify the tests to demonstrate the sensitivity, response time, and alarm limit of the leak detection systems.

05.02.05-6

RAI 05.02.05-6

In Section 5.2.5.4.1.2 of the DCD Tier 2, Revision 1, fourth paragraph, there is a list: (Na- 24,Cr-51,Zr-65,Mn-54,56, Co-58,60, Fe-55,59). There is no Zr-65. The staff compared it with DCD Section 11.1 and found that it might be an error to type Zn-65 into Zr-65. The applicant is request to verify the above error and revise the DCD accordingly.