

REQUEST FOR ADDITIONAL INFORMATION 599-4756 REVISION 2

6/15/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 14.03.07 - Plant Systems - Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: Tier 1 Section 2.7.1.1

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

14.03.07-51

Tier 1 Section 2.7.1.1 establishes inspections, tests, analyses, and acceptance criteria for the turbine-generator based on limiting the probability of missile generation to less than 1×10^{-5} per year. This value is specified by SRP Section 3.5.1.3 for turbines that are not favorably oriented. However, it is the staff's understanding that the turbine for USAPWR is favorably oriented, in which case the probability of missile generation should be limited to 1×10^{-4} per year. Consequently, additional information is needed to explain this apparent inconsistency. Also, as indicated in the fifth bullet of next question of this RAI, the description and proposed ITAAC for this item should be revised to focus on turbine material and other considerations that are necessary to satisfy the Turbine Missile Probability Analysis.

14.03.07-52

The review procedures in SRP Section 14.3.7 provide guidance for determining the acceptability of proposed inspections, tests, analyses, and acceptance criteria (ITAAC). The SRP guidance specifies in part that all Tier 1 information is consistent with Tier 2 information and that plant systems are clearly described in Tier 1, including key performance characteristics (among other things). Tier 1 Section 2.7.1.1 establishes ITAAC for the turbine generator. However, the staff found the descriptive information and corresponding ITAAC in this section to be inadequate in this regard. In particular, additional information is needed to address the following items:

- 1) A functional arrangement drawing should be provided to show the relative locations of major components. The description of the functional arrangement that is provided is not sufficient to reflect important design attributes such as double valve isolation for satisfying single failure considerations, and placement of extraction non-return valves necessary to prevent turbine overspeed. The ITAAC as currently provided does not provide sufficient detail to establish unambiguous acceptance criteria for the functional arrangement.
- 2) An ITAAC is needed to confirm turbine orientation consistent with the description provided for key design features.
- 3) The description of alarms, displays, and controls should identify specific components such as in a table, and an ITAAC is needed to confirm that these components are included in the design.

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- 4) While ITAAC are established for the electrical and mechanical turbine overspeed trip systems, an ITAAC is not specified for the manual (remote in the control room and locally at the turbine) turbine overspeed trip functions. Consequently, Tier 1 Section 2.7.1.1 should be revised to recognize that these manual turbine trip functions exist and corresponding ITAAC should be established accordingly.
- 5) The design commitment for Item 2.a is not consistent with the corresponding acceptance criteria, and the acceptance criteria are incomplete for this item. Consequently, the design commitment for this item should be changed to specify: “The as-built turbine material properties, turbine rotor and blade designs, pre-service inspection and testing results, and in-service testing and inspection requirements meet the requirements defined in the Turbine Missile Probability Analysis.” Consistent with this approach, the inspections, tests, and analyses for this item should be revised to state: “An inspection of the as-built turbine material properties, turbine rotor and blade designs, pre-service inspection and testing results, and in-service testing and inspection requirements will be conducted.” Finally, for completeness, the acceptance criteria for this item should be revised to state: “The as-built turbine material properties, turbine rotor and blade designs, pre-service inspection and testing results and in-service inspection and testing requirements meet the requirements of the Turbine Missile Probability Analysis.”
- 6) Item 2.b in Tier 1 Table 2.7.1.1-1 should be revised to clearly specify that both the mechanical and electrical turbine trip systems need to be tested, and the acceptance criteria should specify what actions need to occur upon a turbine trip (e.g., turbine stop, control, reheat stop, intercept, and extraction non-return valves go closed); and Item 2.c is not needed since it is addressed by Item 2.b.
- 7) The acceptance criteria for Item 3 in Tier 1 Table 2.7.1.1-1 should be revised to specify what actions need to occur upon a turbine trip (e.g., turbine stop, control, reheat stop, intercept, and extraction non-return valves go closed). Also, Tier 2 Section 10.2 does not describe how the turbine control system functions to trip the turbine upon a reactor trip. Therefore, Tier 2 Section 10.2 should be revised accordingly.