REQUEST FOR ADDITIONAL INFORMATION 479-3871 REVISION 1

10/26/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19.1.6

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 1 (AP1000/EPR Projects) (SPLA)

19-402

(Follow-up to Question 19-397) In RAI 443, Question 19-397, the staff requested a discussion of how guidance related to temperature indication in Generic Letter (GL) 88-17 has been applied to the US-APWR. The revision provided in the October 2, 2009, response addresses only temperature measurement when the residual heat removal (RHR) heat exchanger function degrades.

a. Please discuss how the US-APWR temperature sensors provide indication representative of core exit conditions during mid-loop when the head is on the vessel.

b. Please discuss how this instrumentation continues to reflect vessel temperature following a loss of RHR flow.

c. Please discuss the controls (e.g., technical specifications (TS)) that ensure this indication is continuously available.

d. Please clarify the statement in the response to Question 19-397 that “core exit temperature instruments are located in the flow path during RHR operation.” Does this statement refer to core exit thermocouples, which would reflect in-vessel temperatures?

19-403

(Follow-up to Question 19-395) The response to RAI 443, Question 19-395 lists three specifications that a temporary water level sensor (installed to provide accurate level indication when the reactor coolant system (RCS) is vented at a high elevation) will meet. Please document these assumed specifications in the Design Control Document (DCD) where the temporary sensor is suggested.

19-404

(Follow-up to Question 19-392) The response to RAI 443, Question 19-392, describes several operational assumptions (e.g., frequent operability checks of instrumentation and control (I&C) systems during shutdown) that support the applicant’s conclusion that I&C hardware failures are unlikely during shutdown.

a. Because these assumptions are important to achieving low shutdown risk, please revise the DCD to include them.

b. The response suggests that the risk achievement worth (RAW) values for I&C hardware common-cause failures (CCF) would be similar to those for software. However, software and sensor failures are still being incorporated in the model, as stated in the response to RAI 369, Question 19-342, so these values are not available to the staff. Please discuss whether any I&C hardware not currently included in the RAP would be expected to be important during shutdown. Please discuss how the list of risk-important equipment was modified to account for any such omissions.

19-405

(Follow-up to Question 19-394) The response to RAI 443, Question 19-394, addresses the ability of operators to recover RHR after a loss of offsite power (LOOP).

a. RHR recovery may not be achievable before boiling occurs following a station blackout. A core damage frequency (CDF) increase of less than one percent is estimated “[i]f the model has been changed,” but the response does not clearly state whether the model will be revised. Please discuss whether the model will be updated to reflect the insufficient time available to perform this action, and update the DCD (including the event tree in Figure 19.1-20) accordingly.

b. In addition, the description of this action in the table attached to the response states that “[s]aturated boiling will not occur within 10 minutes even if the event has occurred at the beginning of POS [plant operating state] 4-1.” No reference to calculations (e.g., those in the probabilistic risk assessment (PRA) report) is provided. Please provide the results of calculations that support the ability in all POS to recover RHR after a LOOP before boiling disables the function.

19-406

(Follow-up to Question 19-391) The response to RAI 443, Question 19-391, states that automatic safety injection (SI) during shutdown can reduce shutdown risk, but that spurious actuation of the pumps would be a threat to workers in containment. Worker safety is clearly a primary concern during shutdown; however, the staff requests further justification for manual-only actuation of SI.

a. Please discuss the likelihood of spurious actuation of SI, with reference to the likelihood that an operator error causes SI to actuate.

b. Please discuss whether measures could be incorporated in the design to reduce the likelihood of spurious actuation or bypass the function when it would create a hazard for workers.

c. Please describe the process for evaluating potential design changes based on their risk benefit and how it was applied in this scenario.