

REQUEST FOR ADDITIONAL INFORMATION 649-5123 REVISION 2

10/13/2010

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19.1.5.3

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

19-484

The assumptions in Section 22.2.2 of the US-APWR PRA state that "Flood propagation from the flood areas which are enclosed by water tight doors are considered if the flood water leads to a high water level in the area." Please define the term "high water level" in this assumption and explain how it was implemented in the flooding models.

19-485

The assumptions in Section 22.2.2 of the US-APWR PRA state that "The main control room is assumed to be a water tight compartment". Please describe the fluid-carrying systems in the main control room (i.e. sanitation system, fire suppression), if there are any. Also, demonstrate that no flood scenario is capable of significantly impacting the MCR including propagation through ventilation ducts. In addition, this appears to be a key assumption that should be included in the US-APWR DCD Table 19.1.5.3.1. Please include it in the DCD or explain why it is not a key assumption.

19-486

Table 22.3-1 in Chapter 22 of the US-APWR PRA identifies the internal flooding areas considered in the flooding PRA. The NRC staff finds that flooding areas FA7-201, FA7-202, FA7-203 and FA7-204 are being excluded from the flooding assessment. Please provide explanation for the exclusion or include these flooding areas in the flooding PRA, as appropriate.

19-487

Section 22.4 of the US-APWR PRA indicates that some flooding scenarios were screened out using the qualitative criteria of (a) no flood sources in the flood area and (b) no PRA components in the flood area and propagation areas. The staff cannot find the screened flooding areas (scenarios) as a result of this qualitative screening process. Please identify them and state the basis for screening.

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19-488

US-APWR DCD, Table 19.1-72 shows the risk-significant contributors to the internal flooding CDF based on the RAW importance measure. The staff cannot distinguish between basis events "EPSCF4CBWR4I-ALL," "EPSCF4CBWR4I-124," and "EPSCF4CBWR4I-134" shown in this table since their descriptions are similar. Please provide the appropriate descriptions for these events and revise the US-APWR DCD accordingly.

19-489

The sensitivity analysis discussed in the US-APWR DCD Section 19.1.5.3.2 and Section 22.7.2 of the US-APWR PRA is not clearly presented. This first sensitivity study represents the difficulty of switching to alternate gas turbine generators for power supply to class 1E buses. In this case, loss of offsite power due to flooding in T/B was assumed to occur with a probability of 1.0. The resulting CDF was found to be 2.4E-06/yr. The staff is unable to follow this case and reproduce the values since the presented information is too limited. Please clearly describe in more detail how this sensitivity case was conducted and revise the US-APWR DCD accordingly.

19-490

Section 19.1.5.3.2 of the US-APWR DCD states that "Uncertainties in the evaluation of different flood isolation strategies implicitly involve accounting for uncertainties in spill rate distributions, and the time to reach a critical flood volume." This statement is unclear.

a) Please provide an example of a flood isolation strategy. Does this apply to the entire plant or a specific area?

b) How are flooding isolation strategies applied in the uncertainty analysis? Please explain "spill rate distribution." What distribution is used for the spill rate and the reference used for this distribution?

c) What uncertainties are included when determining the time to reach a critical flood volume?

Please revise the DCD to clearly describe the meaning of this statement based on the responses to items a, b, and c above.

19-491

As discussed in US-APWR DCD Section 19.1.5.3.2 and PRA Section 22.7, only two sensitivity studies were performed related to the internal flooding events. RG 1.206 Section C.I.19.6 states that:

"The objectives of the sensitivity studies are to (1) determine the sensitivity of the estimated risk to potential biases in numerical values, such as initiating event frequencies, failure probabilities, and equipment unavailabilities; (2) determine the impact of potential lack of modeling details on the estimated risk; and (3) determine the sensitivity of the estimated risk to previously raised issues."

To meet the above objectives (i.e., similar to the type of sensitivity studies performed for internal events and internal fires PRA), please perform additional sensitivity studies in conformance with the guidance provided in RG 1.206. Examples of additional sensitivity

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studies would be: (1) assume that the control room is not protected from flooding (e.g., ventilation ducts are not isolated), (2) assume no human actions are taken to protect risk significant flood areas from flooding, (3) etc.