REQUEST FOR ADDITIONAL INFORMATION NO. 197-1800 REVISION 0

2/9/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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

QUESTIONS for PRA Licensing, Operations Support and Maintenance Branch 2 (ESBWR/ABWR Projects) (SPLB)

19-300

Please provide the Findings and Observations for the large release frequency (LE) Main and Supporting Requirements from the ASME PRA standard (ASME RA-Sb-2005) Peer Review. Please discuss any requirements that were not met at Capability Levels II or III and the reasons why these were not met.

19-301

Please provide the discussion of the quantification of the CPET, particularly the levels of uncertainty associated with the qualitative evaluations and the assignment of quantitative probabilities to qualitative failure attributes.

19-302

Please provide a summary of the effects of the severe accident containment environment conditions on the CPET and the CSET, including a discussion of the effects of including emergency and SAMG operator actions in both parts of the CET.

19-303

Please explain the methodology and results of the evaluation of induced steam generator tube ruptures, given failure to depressurize. Also, provide the discussion of the results of scenarios where the steam generators are also depressurized. In addition, please justify the assumption of zero break areas for hot leg creep rupture and temperature-induced steam generator tube rupture.

19-304

Please describe and justify the criteria that would be used to manually depressurize the reactor coolant system during a high-pressure severe accident.

For sequences AM001 and AM002 on the effectiveness of RCS depressurization for a small-break LOCA and a main steam line break outside containment,

respectively, leading to a severe accident, RCS depressurization was enabled 10 minutes after core melt. What are your definitions of core damage and core melt? At the times of core damage and core melt, what are the core outlet temperatures, the amounts of hydrogen generated, and the damage fractions for the hot leg and steam generator tubes for each sequence? For each sequence, please provide plots, from the start of the sequence until the time of vessel failure, of the core-to-upper plenum natural circulation, the natural circulation between the upper plenum and the steam generators, and the countercurrent natural circulation flow rates in the hot legs and in the steam generators.

Please verify that the study of the effectiveness of RCS depressurization features in Section 15.6.2 of the PRA is based on these two sequences. Note that, in Section 15.6.2, it is stated that the depressurization valves are assumed to be manually opened 10 minutes after core damage.

Since the large release frequency (LRF) in existing reactors is dominated by high-pressure sequences where the secondary side has been depressurized, please provide analyses of variations of the two cases described above, in which one or more steam generators have been depressurized prior to the onset of zircaloy oxidation. Provide the same results requested above for comparison, and report when the hot leg and/or the steam generator tubes would fail from creep rupture.

19-305

It is important to assure containment integrity for at least 24 hours after accident initiation. Chapter 14 of the PRA presents results of accident sequences AM003, AM004, AM005, AM006, and AM007 to evaluate the ability of alternative containment cooling and/or cavity flooding to avert overpressurization, basemat meltthrough, or failure of RPV support. Please run a similar scenario, in which there are no containment sprays, no fan coolers, and no fire water injection. Please provide results in the format of Table 14.5 for comparison.