

# REQUEST FOR ADDITIONAL INFORMATION 306-2333 REVISION 1

4/2/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 15.03.01-15.03.02 - Loss of Forced Reactor Coolant Flow Including Trip of Pump Motor and Flow Controller Malfunctions  
Application Section: 15.3.1-15.3.2

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

15.03.01-15.03.02-1

**Question 15.3.1-1**

SRP Sections 15.3.1-2 and 15.3.3-4 state, "For new applications, LOOP should not be considered a single failure; [all AOOs] should be analyzed with and without LOOP in combination with a single active failure." In compliance with this requirement, provide the results of calculations that include the occurrence of a LOOP unless otherwise exempted by the NRC staff. If exempted by the NRC, provide documentation of the exemption.

15.03.01-15.03.02-2

**Question 15.3.1-2**

In DCD Section 15.3.1.1, Partial Loss of Forced Reactor Coolant Flow, it is assumed in the analysis that two of the four RCPs trip at the same time to initiate the RCS coolant flow transient. Which two pumps are assumed to trip, pumps in adjacent loops or pumps in opposite loops? Are the calculated results for minimum DNBR sensitive to this parameter? Is the minimum DNBR sensitive to the mixing factors FMXI and FMXO assumed for this transient? What values for FMXI and FMXO were used in the calculations? When does the LOOP occur and when do the other two RCPs trip?

15.03.01-15.03.02-3

**Question 15.3.1-3**

In DCD Section 15.3.1.2, Complete Loss of Forced Reactor Coolant Flow, can the minimum DNBR be influenced by the mixing factors FMXI and FMXO assumed for this transient, or is the calculation insensitive to these parameters due to the symmetry of the flow transient in the core? What values for FMXI and FMXO were used in the calculations?

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15.03.01-15.03.02-4

### **Question 15.3.1-4**

Provide the transient curve for Steam Generator Pressure verses time in the analysis for Loss of Flow event in Section 15.3.1.

15.03.01-15.03.02-5

### **Question 15.3.1-5**

Confirm that the transient curve for RCS total flow verses time In FSAR Section 15.3.1 (Figure 15.3.1.2-1) is consistent with the RCP coast down characteristics.

15.03.01-15.03.02-6

### **Question 15.3.1-6**

Provide the RCP coast-down flow characteristics used for determining the mass flow rate in the primary reactor coolant recirculation loops for the reactor transients in Sections 15.3.1 through 15.3.4. Discuss how those characteristics were determined and explain any assumptions made.

15.03.01-15.03.02-7

### **Question 15.3.1-7**

Plot the peak fuel centerline temperature as a function of time for the reactor transients in Sections 15.3.1 through 15.3.4 and explain the associated safety limit.

15.03.01-15.03.02-8

### **Question 15.3.1-8**

For the three events analyzed in DCD Section 15.3, the "Time Sequence of Events" tables provide the timing of the event initiation, low flow/speed limit, reactor trip, and minimum DNBR or maximum clad temperature. It is not made clear if the reactor trip is accompanied by a turbine trip and a LOOP. Please clarify the event timings for these three events.