

REQUEST FOR ADDITIONAL INFORMATION 382-2409 REVISION 0

6/8/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling
Application Section: 9.1.1

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

09.01.01-11

The US-APWR Tier 2 DCD, Revision 1, Chapter 9 references MUAP-07032-P (R0), Criticality Analysis for US-APWR New and Spent Fuel Storage Racks (Reference 9.1.7-6 in Chapter 9 of the DCD, Revision 1). The following questions are asked against the MHI technical report MUAP-07032. Answers to these questions are needed to support review of DCD Section 9.1.1 in accordance with SRP Section 9.1.1.

In the event of a hypothetical accident that upsets the orderly rack structure, disrupting the configuration of the stored elements (i.e. seismic event), is there an arrangement of either new or spent fuel assemblies (flooded or dry) that could conceivably be more reactive than that for the orderly configuration imposed by the rack storage?

09.01.01-12

The rack design assumes a 17x17 fuel assembly design with particular fissile, fertile and burnable poison material loadings. Are these limiting requirements? How big a perturbation from the base design can be tolerated before a violation of the regulatory requirements is incurred?

09.01.01-13

Data is given for "flooding and optimum moderation" with regard to reactivity of fresh fuel. How do these results and analyses vary with fuel pin content?

09.01.01-14

Provide a description of the method used to determine which uncertainties and tolerances were included in the analysis.

09.01.01-15

What procedures are in place to assure that the new fuel rack storage pit does not flood, and that the drains are never blocked or flow out of them impeded in any way?

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09.01.01-16

What is the sensitivity of the multiplication factor to water temperature? If the water temperature should drop below room temperature, what is the effect on the multiplication factor?

09.01.01-17

What are the numerical values that go into determining Δk_c , and where do they come from?

09.01.01-18

Burnable poisons are referred to under "Assumptions on Fuel Assembly". What poisons are used? Where are they located? If they are not included in the analysis, what takes their place in the description of the fuel assembly? Was the analysis technique validated for use with poisoned assemblies?

09.01.01-19

How is the boron introduced in the spent fuel storage cooling system? What other accident scenarios are considered besides boron dilution? How are the scenarios determined?

09.01.01-20

Fuel in the Spent Fuel Racks is "assumed to be loaded with fuel of the maximum fuel assembly reactivity". If fuel is discharged at the burnup point when the burnable poison is burned out, what is the contribution of the trans-uranics to the reactivity? How does the reactivity vary with burnup and boron concentration in the water?

09.01.01-21

Why are reflecting boundary conditions used in the series of calculations used to determine the uncertainty associated with fuel assembly placement within the SFR? Would a periodic boundary condition not be more appropriate, and if not why not?