REQUEST FOR ADDITIONAL INFORMATION NO. 132-1538 REVISION 1

12/18/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.01.02 - New and Spent Fuel Storage
Application Section: 9.1.2

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

09.01.02-1

[9.1.2-1]
The staff requests the applicant to update the DCD in order to clarify these apparent editorial errors.

a) On page 9.1-8 of DCD Tier 2, Figure 9.1.2.2-1 is referenced. This figure does not exist. The NRC staff requests the applicant to provide this figure.
b) On page 2.7-188 of the Tier 1 DCD, the text refers to the new fuel storage and the referenced table discusses the spent fuel storage.

09.01.02-2

[9.1.2-2] SRP Section 9.1.2, Section III.1 states that "Low-densitystorage should be used, at a minimum, for the most recently discharged fuel to enhance the capability to cool it." In Section 9.1.2.1 of the DCD it is stated that "The spent fuel rack is designed as a moderate density storage arrangement which provides adequate natural coolant circulation to remove the residual decay heat from spent fuel stored in the spent fuel rack…"

The staff requests the applicant to include in the DCD justification for this deviation from the guidelines presented in the SRP.

09.01.02-3

[9.1.2-3] SRP Section 9.1.2, Section III.2.L states that a dry new fuel storage vault drain should be sized to handle the maximum flow from the rupture of the largest water pipe in the area. The staff requests the applicant to include in the DCD the sizing criteria for the NFP drains and to discuss how the design of these drains meet the design criteria discussed in SRP Section 9.1.2 Section III.2.L.

09.01.02-4

[9.1.2-4] SRP Section 9.1.2, Section III.2.L states that"Backflow into the [dry new fuel] vault through the drain system should be prevented." In the DCD Section 9.1.2.2.1 the applicant states that the design of the manually operated drain piping system prevents backflow into the new fuel pit storage area through the drain system. It is unclear to the

staff how the manually operated drain piping system will be able to provide flooding and backflow protection at the same time. The staff requests the applicant to include in the DCD:

a) an explanation as to how the manually operated drain piping system will be able to provide flooding protection and backflow protection at the same time,

b) justify why no automatic backflow protection devise (for example, a check valve) is needed, and

c) explain why there is no ITAAC requiring the testing of the proper function of the backflow protection measures.

09.01.02-5

[9.1.2-5] SRP Section 9.1.2, Section III.2.J states that the dry new fuel storage racks should be designed with openings at the bottom to facilitate drainage if intended for dry storage or flooding if intended for wet storage. These design considerations were not discussed within the DCD, and the drawings of the new fuel storage rack are not of sufficient detail to determine if these design criteria are met.

The staff requests the applicant to include in the DCD additional design considerations for the sizing of the openings on the bottom of the new fuel rack.

09.01.02-6

[9.1.2-6]
SRP Section 9.1.2, Section II, subsection Technical Rationale, paragraph 4 states that "Provisions for inspection and testing are necessary to verify that there is no corrosion of the spent fuel pool liner or new and spent fuel storage racks, no buildup of crud or debris that may obstruct coolant flow in wet storage facilities, and no degradation of any strong fixed neutron absorbers." The applicant has not established an inspection program for the spent fuel storage racks and spent fuel pool liner. The staff requests the applicant to include in the DCD a description of the inspection program (including testing interval) for the spent fuel storage racks and spent fuel pool liner.

09.01.02-7

[9.1.2-7] SRP Section 9.1.2, Section III.2.H.i states thatthe bottoms of any transfer gate should be above the top of the fuel assemblies, and that the volume of the adjacent fuel-handling areas should be limited so that leakage into these areas would not reduce the coolant inventory to less than 3 meters (10 feet) above the top of the fuel assemblies. The DCD does not provide enough detail to evaluate if the bottoms of the gates are above the top of the fuel assembly. It is also unclear if the volumes of the adjacent fuel-handling areas are small enough so that leakage past the gates would not reduce the coolant inventory to less than 10 feet above the top of the fuel assemblies.

The staff requests the applicant to:

a) specify in the DCD that the bottom of the fuel transfer gate is located above the stored fuel assemblies,

b) justify why there is no need for an ITAAC to verify that the bottom of the fuel transfer gate is located above the stored fuel assemblies, and

c) determine the impact of any transfer gate failure on the SFP water level (water level drop), and to include in these results in the DCD.

09.01.02-8

[9.1.2-8] The applicant stated that the pipes that discharge into the SFP are designed with anti-siphon devices to prevent the unanticipated draining of the SFP. This design feature is consistent with the recommendations of SRP Section 9.1.2. The staff also determined that the applicant has not proposed an ITAAC to verify the proper construction and operation of the anti-siphon devices.

The staff requests the applicant to create an ITAAC to verify the proper construction and operation of the anti-siphon devices.

09.01.02-9

[9.1.2-9] SRP Section 9.1.2, Section III.2.I states that the applicant should show that "The thermal-hydraulic analysis of the flow through the spent fuel racks is adequate for decay heat removal from the spent fuel assemblies during all anticipated operating and accident conditions. Furthermore, the analysis should show adequate natural circulation of the coolant during all anticipated operating conditions, including full core-offloads during refueling, to prevent nucleate boiling for all fuel assemblies." The staff requests that the applicant provide information in the DCD that demonstrates the ability to cool spent fuel assemblies. This analysis should be conservative in its assumptions of thermal load and environmental conditions. The applicant should also demonstrate that sufficient openings exist within the racks to allow the coolant to flow freely. The DCD should include a description of the assumptions, inputs, and conclusions of the thermal analysis.

09.01.02-10

[9.1.2-10] SRP Section 9.1.2, Section III.2.B states that improper loading of fuel elements should be avoided. It is unclear how the accidental loading of a fuel assembly into an improper location is avoided in the US-APWR design. Improper loading can result in accidental criticality and reduced cooling. The staff requests that the applicant provide information in the DCD on how improper loading of both new and spent fuel assemblies will be prevented.

09.01.02-11

[9.1.2-11]

SRP Section 9.1.2 Section III.3.B states that, if the spent fuel pool liner plate is not designed and constructed to seismic Category I requirements, the spent fuel pool liner plate is reviewed for whether a failure of the liner plate as a result of an SSE will not cause any of the following:

- Significant releases of radioactivity due to mechanical damage to the fuel.
- Significant loss of water from the pool which could uncover the fuel and lead to release of radioactivity due to heat-up.
- Loss of ability to cool the fuel due to flow blockage caused by a complete section or portion of the liner plate falling on the fuel racks.
- Damage to safety-related equipment as a result of pool leakage.
- Uncontrolled release of significant quantities or radioactive fluids to the environs.

The staff has not been able to determine if the SFP liner was designed as a seismic Category I structure. The staff also noted that the applicant has not proposed an ITAAC to verify the proper construction of the SFP liner. The staff requests the applicant to clarify in the DCD that the SFP liner was designed as a seismic Category I structure or to include in the DCD a justification (that addresses all the elements mention above) that justifies why the SFP liner is not designed as a seismic Category I structure. The staff also requests the applicant to justify why there is no ITAAC to verify the proper construction of the SFP liner (leak tight).

09.01.02-12

[9.1.2-12] SRP Section 9.1.2, Section III.2.A states that the spent fuel pool liner should be designed to withstand all design basis loads. The staff determined that the DCD has not addressed this design recommendation. This design goal is also not listed as an ITAAC design feature to be verified in Tier 1 Section 2.7.6.2. The staff requests the applicant to discuss in the DCD the SFP liner capacity to withstand all design basis loads.

09.01.02-13

[9.1.2-13] SRP Section 9.1.2, Section III.2.K states that “Detection and collectionof spent fuel pool liner leaks incorporated into the design with capability to collect pool liner leaks (e.g. drains and sumps) to prevent uncontrolled releases of radioactive material to the environment and to keep radiation exposure as low as reasonably achievable for personnel.” In the DCD Section 9.1.2.2.2 the applicant states that a leakage collection system is monitored to determine whether leakage is occurring. The applicant has not defined a monitoring schedule, nor has the applicant defined the capacity of the collection system. The staff also noted that the applicant has not proposed an ITAAC to test the proper operation of the SFP leakage collection system. It is unclear what will happen if the collection system overflows or if overflow generates an alarm.

The staff requests the applicant to include in the DCD a detailed description of the SFP liner leakage collection system monitoring schedule, system capacity, how is the system operability evaluated, and what are the testing intervals. The staff also requests the applicant to justify why there is no need for an ITAAC to test the proper operation of the SFP leakage collection system.

09.01.02-14

[9.1.2-14] SRP Section 9.1.2, Section III.2.O states that "For spent fuel storage, monitoring systems should detect pool water levels, pool temperatures, and pool building radiation levels. Alarms should be both local and in a continuously manned location." In the DCD Section 9.1.2.2.2 the applicant states that SFP water level and temperature gauges, and an area radiation monitor in the fuel handling area are provided with alarms to the main control room (MCR). Additionally, the applicant stated in Tier 1 Section 2.7.6.2, "Spent Fuel Storage," that the SFP liner leakage collection system is provided with a leak detection capability. There are no other alarms, displays, or controls associated with the spent fuel storage facilities.

The staff finds these two statements to be contradictory and neither of these two statements is in accordance with the recommendations given by SRP Section 9.1.2. The staff requests the applicant to clarify in the DCD what are the monitoring requirements for the SFP and to justify in the DCD why the USAPWR design is not in accordance with the recommendations of SRP Section 9.1.2.

09.01.02-15

[9.1.2-15] The staff evaluation of Tier 1 Section 2.7.6.1 determined that the applicant has not provided sufficient design details in order to develop proper ITAACs to verify the construction and operation of the NFP components that are important to safety. The staff requests the applicant to include in Tier 1 Section 2.7.6.1 a more detailed description of the components and functions that ITAAC Table 2.7.6.1-1 will be verifying.

09.01.02-16

[9.1.2-16] The staff evaluation of Tier 1 Section 2.7.6.2 determined that the applicant has not provided sufficient design details in order to develop proper ITAACs to verify the construction and operation of the SFP components that are important to safety. The staff requests the applicant to include in Tier 1 Section 2.7.6.2 a more detailed description of the components and functions that ITAAC Table 2.7.6.2-1 will be verifying.

09.01.02-17

[9.1.2-17] DCD Tier 2 Chapter 16 provides the technical specifications for the plant. Technical Specification 3.7.12 involves maintaining an adequate water depth in the spent fuel pool to allow safe movement of spent fuel elements. The frequency of Surveillance Requirement 3.7.12.1 is stated to be 7 days. This is adequate for normal conditions, but is not sufficient for all times. SRP Section 9.1.2 items I.7 and I.9 discuss the need for adequate SFP depth and the monitoring of the SFP depth. The most critical time to assure that the water depth is sufficient is while fuel is being moved. The staff requests the applicant to justify in the DCD why the frequency of surveillance should not be modified to "every 7 days and at the start of any spent fuel movement campaign."