DRAFT REQUEST FOR ADDITIONAL INFORMATION CQVP 478 REVISION 0

June 30, 2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 14.02 - Initial Plant Test Program - Design Certification and New License Applicants

Application Section: 14.2 Initial Plant Test Program

CQVP Branch

QUESTIONS

14.02-***

RG 1.68, App. C.2.a, "Prerequisites for Fuel Loading," includes 15 specific items. US-APWR DCD Section 14.2.10.1 lists 5 of these fuel loading prerequisites but does not address the remaining 10 items. Please expand DCD Section 14.2.10.1 to address the remaining 10 prerequisites for fuel loading.

(BNL RAI 14.2-8)

14.02-***

RG 1.68, App. A.3, "Initial Criticality," states that "A neutron count rate at least ½ count per second should register on the startup channels before startup begins, and the signal-to-noise ratio should be known to be greater than two." US-APWR DCD Section 14.2.10.2 lists the initial criticality prerequisites but does not include the neutron count rate. Please revise DCD Section 14.2.10.2 to address the neutron count rate.

(BNL RAI 14.2-9, 1/2)

14.02-***

RG 1.68, App. A.3, "Initial Criticality," states that "Licensees should conduct the initial approach to criticality in a deliberate and orderly manner using the same rod withdrawal sequences and patterns that will be used during subsequent startups." US-APWR DCD Section 14.2.10.2 does not discuss the use of the same rod withdrawal sequences and patterns in subsequent plant startups. Please revise DCD Section 14.2.10.2 to discuss the use of the same rod withdrawal sequences and patterns in subsequent plant startups.

(BNL RAI 14.2-9, 2/2)

14.02-***

RG 1.68, App. A.4, "Low-Power Testing," states that "low-power tests.... (a) confirm the design and, to the extent practical, validate the analytical models and verify the correctness or conservatism of assumptions used in the safety analyses for the facility, and (b) confirm the operability of plant systems and design features that could not be completely tested during the preoperational test phase because of the lack of an adequate heat source for the reactor coolant and main steam systems." Please augment the discussion in US-APWR DCD Section 14.2.10.3.1 to address Item (b), i.e., "confirm the operability of plant systems and design features that could not be completely tested during the preoperational test phase because of the lack of an adequate heat source for the reactor coolant and main steam systems."

(BNL RAI 14.2-10)

14.02-***

RG 1.68, App. C.2.a, "Prerequisites for Fuel Loading," includes 15 prerequisites for initial fuel load. US-APWR DCD Section 14.2.12.2.1.1.B lists 6 of the 15 prerequisites. Please include the remaining 9 initial fuel load prerequisites in DCD Section 14.2.12.2.1.1.B or discuss the basis for excluding them.

(BNL RAI 14.2-12, 1/3)

14.02-***

RG 1.68, App. C.2.c.(1), "Limitations and Actions," provides considerations for circumstances that would require fuel loading to be stopped. Please include criteria for safe loading that require loading operations to stop immediately in US-APWR DCD Section 14.2.12.2.1.1.

(BNL 14.2-12, 2/3)

14.02-***

US-APWR DCD Section 14.2.12.2.1.3, "Inverse Count Rate Ratio Monitoring for Fuel Loading," DCD Section 14.2.12.2.1.4, "Fuel Loading Instrumentation and Neutron Source Requirements Test," and DCD Section 14.2.12.2.1.11, "RCS Sampling for Fuel Loading," should be added to DCD Section 14.2.12.2.1.1, "Initial Fuel Loading," as prerequisites.

The note contained in DCD Section 14.2.12.2.1.3, "(This monitoring is performed in conjunction with the initial fuel loading.)" should also be added to DCD Section 14.2.12.2.1.4 and DCD Section 14.2.12.2.1.11.

Please revise the referenced DCD sections to incorporate the above recommendations.

(BNL RAI 14.2-12, 3/3)

14.02-***

RG 1.68, Appendix C.3, "Initial Criticality Procedures," notes in part that "Technical Specification Requirements must be met."

US-APWR DCD Section 14.2.12.2.1.2, "Precritical Test Sequence," should be revised to add the prerequisite that SSCs required by Technical Specifications to support a specified operational mode be operational prior to the initiation of precritical testing.

(BNL RAI 14.2-13)

14.02-***

RG 1.68, App. A.2, "Initial Fuel Load and Precritical Tests," states that, "To the extent practical, testing should demonstrate control rod scram times at both hot zero power and cold temperature conditions, with flow and no-flow conditions in the reactor coolant system as required to bound conditions under which scram might be required."

Item A, "Objective," of US-APWR DCD Section 14.2.12.2.1.5, "Rod Drop Time Measurement Test," addresses full-flow and no-flow conditions, but does not mention hot or cold flow conditions. Hot and cold flow conditions are mentioned in Item C, "Test Method," in DCD Section 14.2.12.2.1.5.C.3, but should also be documented in Item A " Objective."

Please revise Item A, "Objective," of US-APWR DCD Section 14.2.12.2.1.5, to discuss hot and cold flow conditions.

(BNL RAI 14.2-14)

14.02-***

RG 1.68, App. A.2.f, "Initial Fuel Loading and Precritical Tests," requires that reactor coolant system flow tests be conducted after the core is fully loaded, including vibration checks, core differential pressure checks, and transient piping effects.

With respect to US-APWR DCD Section 14.2.12.1.7, "Reactor Internals Vibration Test," DCD Table 14A-1 notes that:

"Not applicable for RCS piping vibration test because vibration of RCS due to steady flow and flow-induced transient are very small so that it is not considered that they will cause any structural damage or any malfunction of RCS."

DCD Section 14.2.12.1.1, "RCS Hot Functional Preoperational Test," notes that the RCS hot functional preoperational test will be performed before fuel loading.

Section 3.9.2.3.3, "Quantitative FIV Analysis of the US-APWR," notes in part that: "Thus, in the preoperational test of the prototype plant, the results of vibration measurements

after core loading are bounded by the measurements before core loading and only measurements before core loading will be necessary."

Please revise the DCD to document evidence to justify the exception taken to RG 1.68, App. A.2.f, or revise DCD Section 14.2.12.1.1 to conform to the guidance in RG 1.68, App. A.2.f.

(BNL RAI 14.2-15)

14.02-***

US-APWR DCD Section 14.2.12.2.4.9, "Operational Alignment of Process Temperature Instrumentation Test," addresses process temperature instrumentation in the power ascension test phase. However, Item 1 of Section C, "Test Method," of DCD Section 14.2.12.2.4.9 indicates that certain temperature measurements should be taken at isothermal conditions prior to criticality and at 75% power.

Please include a separate precritical test in the DCD to perform the temperature alignments at isothermal conditions prior to criticality and at approximately 75% power.

(BNL RAI 14.2-16)

14.02-***

US-APWR DCD Table 14A-1 claims an exception for RG 1.68, App A.5.cc, "Demonstrate that gaseous and liquid radioactive waste processing, storage, and release systems operate in accordance with design," based on the results of preoperational testing.

These radioactive waste tests should be conducted at-power per RG 1.68 to show that radioactive waste systems are operating as designed with hot (temperature and radioactive) material. These at-power tests could potentially be simpler and less extensive than the preoperational tests. Please provide evidence to document the assertion in DCD Table 14A-1 that: "Performance of these tests during the power ascension test phase would produce the same results as testing during the preoperational test phase," or revise the DCD to specify that these tests be performed at-power.

(BNL RAI 14.2-17)

14.02-***

RG 1.68.2, "Initial Startup Test Program To Demonstrate Remote Shutdown Capability For Water-Cooled Nuclear Power Plants," provides guidance for startup test program demonstration of remote shutdown capability.

US-APWR DCD Table 1.9.1-1 commits to RG 1.68.2 with no exceptions. However, neither DCD Section 14.2.12.1.76, "Remote Shutdown Preoperational Test," or DCD

Section 14.2.12.2.4.6, "Remote Shutdown Test," references the RG or addresses all aspects of the RG.

In addition, there appears to be an error in DCD Section 14.2.12.1.76 in stating that the cooldown will reduce RCS temperature to 50 °F rather than by 50 °F.

Please revise DCD Section14.2.12.1.76 and DCD Section 14.2.12.2.4.6 to reference RG 1.68.2 or include the necessary information in each test to ensure that all aspects of the RG are addressed.

(BNL RAI 14.2-18)