REQUEST FOR ADDITIONAL INFORMATION NO. 161-1812 REVISION 0

1/21/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 16 - Technical Specifications
Application Section: TS Sections 1.0, 3.0, 4.0, and 5.0

QUESTIONS for Technical Specification Branch (CTSB)

16-115

GENERAL EDITORIAL

Improve the references in the US-APWR Bases to clearly define the material being referred within a FSAR Chapter. The US-APWR References listed in the Bases refer simply to "Chapter X" when referencing another chapter in the US-APWR FSAR, where X is the chapter number.

References in the Bases Section of US-APWR FSAR are inexact and do not provide sufficient information for the reader to locate the applicable referred information. References to the chapters and sections from the US-APWR FSAR should be more complete and annotated such as "US-APWR FSAR Rev. n, Chapter X, Section X.Y.Z.". Acceptable guidance on the inclusion of references can be found in TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specificatins."

16-116

GENERAL

Justify in the Bases the frequency of 24 months for many Surveillance Requirements performed during plant outages. The justification presented in the Bases should include additional explanations related to consideration of design reliability and operating experience (refer to GL 91-04 for guidance). The discussion presented in NUREG-1431, Rev 3.1 justifies a frequency of 18 months and is not directly applicable.

The frequency of the Surveillance Requirements conducted during plant outages in the US-APWR TS is 24 months based on the need to perform the Surveillance under conditions that apply during a plant outage. For US-APWR, the plant outages are planned at 24 month intervals. [Examples of these requirements are SR 3.4.14.2, SR 3.4.15.3, SR 3.4.15.4, SR, 3.4.15.5, and 3.8.1.8 through 3.8.1.18]. This is different from NUREG-1431, Rev. 3.1 where such surveillances are conducted at a frequency of 18 months. The justification provided in the Bases in NUREG-1431 addresses two aspects: (a) need to perform the Surveillance under conditions that apply during a plant outage, and (b) consideration of design reliability and operating experience of the equipment. For US-APWR, operating experience with 24 month surveillance frequency is not available. However, the available operating experience with 18 month surveillance can be used to justify a 24 month surveillance frequency. Acceptability of 24 month

surveillance frequency can be presented for design reliability using operating experience data from 18 month surveillance frequency. US-APWR uses the same sentence in NUREG-1431,"The Frequency is acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment." This explanation should be revised based on evaluations performed to justify the 24 month frequency.

16-117

GENERAL

Describe the process used and the results of applying the Criterion 4 of 10 CFR 50.36 (d)(2)(ii) to identify the structures, systems, components, and parameters for which LCOs were include in US-APWR TS.

The application of Criterion 4 of 10 CFR 50.36 (d)(2)(ii) is not discussed in the FSAR. The US-APWR FSAR states that the identification of the structures, systems, components, and parameters for which LCOs have been included in the US-APWR TS was based on screening criteria of 10 CFR 50.36 (d)(2)(ii). The criterion 4 of 10 CFR 50.36 (d)(2)(ii) is as follows: “structures, systems, and components which operating experience or probabilistic safety assessment has shown to be important to public health and safety.” A few instances in the Bases section identify criterion 4 as the basis for the inclusion of the LCO. However, no additional analysis or discussion is provided regarding the application of this criterion. Additional discussion is needed regarding the process used and the results of the evaluations conducted to ensure that all structures, systems, and components which operating experience or probabilistic risk assessment has shown to be important to public health and safety have been included in the LCOs. The response to this information request should include the PRA evaluations used, criteria used to define structures, systems, and components important to public health and safety, and the list of structures, systems, and components identified by the PRA for inclusion in the TS LCO.

16-118

Section 1.1 Definitions: (ACTUATION LOGIC TEST, Page 1.1-1)

Expand the discussion of the term, "ACTUATION LOGIC TEST," to differentiate the two separate applications of the term. Separate the term "ACTUATION LOGIC TEST" into two different terms to distinguish between the application of the test for analog equipment and the application of the test for digital equipment.

The applicant added new material to the term’s definition to reflect the features of the US-APWR using digital equipment. The applicant added the words "For analog equipment" at the beginning of the first paragraph. Thus the applicant is using two different definitions for the same term. Revise the wording into two separate terms to remove any ambiguity.

16-119

Section 1.1, Definitions.

Include the term Risk-Managed Technical Specifications (RMTS), Surveillance Frequency Control Program (SFCP), and other terms associated with RMTS and SFCP to the list of definitions. These associated terms include:
Risk-Informed Completion Time (RICT)
Risk-Management Action Time (RMAT)
Configuration Risk Management (CRM)

Two Risk-Informed Technical Specification Initiatives (4b and 5b) have been accepted by USNRC for the implementation of risk-managed and risk-informed Technical Specifications. These initiatives are discussed in: i) NEI-06-09 (Revision 0), "Risk-Managed Technical Specifications (RMTS) Guidelines," November 2006 and ii) NEI-04-10 (Revision 1), "Risk-Informed Technical Method for Control of Surveillance Frequencies," April 2007. US-APWR TS is adopting these initiatives and accordingly, the associated terms used in the US-APWR TS should be defined. NEI 06-09 and NEI 04-10 contain definition of the terms.

16-120

Section 1.1, Definitions, (CHANNEL CALIBRATION, Page 1.1-2).

Identify, with examples, all of the devices listed in the first paragraph of "CHANNEL CALIBRATION" that are subject to drift. The applicant added new material to the term to reflect the unique features of the US-APWR. The new features include the calibration of devices that are subject to drift between surveillance intervals.

16-121

Section 1.1, Definitions, (CHANNEL CALIBRATION, Page 1.1-2).

Indicate/justify the need for adding two new paragraphs for the definition of the term "CHANNEL CALIBRATION", one for the analog and the other for the binary measurements.

The two new paragraphs are details discussing the confirmation of the accuracy of the measurements, which are not considered part of the definition.

16-122

Section 1.1, Defintions, (CHANNEL OPERATIONAL TEST - Page 1.1-3).

Expand the discussion of the term, "CHANNEL OPERATIONAL TEST," to differentiate the two separate applications of the term. Separate the term "CHANNEL OPERATIONAL TEST" into two different terms to distinguish between the application of the test for analog equipment and the application of the test for digital equipment.

The applicant added new material to the term's definition to reflect the features of the US-APWR using digital equipment. The applicant added the words "For analog equipment" at the beginning of the first paragraph. Thus the applicant is using two different definitions for the same term. Revise the wording into two separate terms to remove any ambiguity.

16-123

Section 1.1, Definitions, (TRIP ACTUATIING DEVICE OPERATING TEST (TADOT) - Page 1.1-8).

Add the TADOT to non-binary adjustable devices.

The applicant replaced "TADOT shall include adjustment" by "TADOT does not include adjustment" to reflect the added new text to the definition for using binary devices. However, unless there are no adjustable non-binary devices, the definition needs to add this possibility to the text, as indicated in the STS.

16-124

Section 1.3, Completion Time, Example 1.3-8.

Revise the discussion in Example 1.3-8 to reflect the format suggested in NEI 06-09 regarding applications of the newly proposed Configuration Risk Management Program (CRMP).

The Risk-Informed Technical Specification Initiatives 4b, NEI-06-09 (Revision 0), "Risk-Managed Technical Specifications (RMTS) Guidelines," November 2006, discusses the requirement to establish a risk management approach for voluntary extensions of completion times for certain LCOs. Table 3-2 of NEI-06-09 (Revision 0) provides an example format for implementation of RMTS. The table is consistent with the format in STS NUREG-1431 and adheres to the human factors principles used in STS.

16-125

TS Section 1.1, Definitions, (STAGGERED TEST BASIS - Page 1.1-7).

Revise the text of this definition by placing the text of "Staggered Test Basis" between brackets.

As stated in TSTF-425, Rev 2, plants that adopt TSTF-425 will no longer use this defined term in the Technical Specifications and should remove it from Section 1.1. As written in Section 1.1 (page 1.1-7) "Staggered Test Basis" is not consistent with the Risk-Informed Technical Specification Initiative 5b in TSTF-425, Rev 2 for the markup to NUREG-1431.

The applicant needs to put the text between brackets, as the definition may need to be altered for those implementing a Surveillance Frequency Control Program (SFCP).

16-126

Section 1.4, Frequency, (New addition).

Explain the implemmetation of a "Surveillance Frequency Control Program (SFCP)" by providing an example to illustrate the application of SFCP, similar to other examples in Section 1.4.

The Risk-Informed Technical Specification Initiatives 5b, NEI-04-10 (Revision 1), "Risk-Informed Technical Method for Control of Surveillance Frequencies," April 2007, discusses the requirement to establish a licensee control of surveillance test frequencies for majority of technical specifications surveillances. The surveillance test requirements (test methods) are not changed and remain in the specification. This methodology uses risk-informed performance based approach for establishment of surveillance frequencies, consistent with NRC RG 1.174. Probabilistic Risk Assessment (PRA) methods are used to determine the risk impact of revised intervals. The use of SFCP involves concepts that are different from the use and application of Frequency requirements presented in Section 1.4. An example explaining the concept used in defining the surveillance frequency and its implementation is necessary.

16-127

TS Section 3.0 (EDITORIAL).

The following typographical error was noted in US-APWR TS 3.0:

1. Page B 3.0-12, SR 3.0.1 BASES: A paragraph break is missing before the first full sentence on this page. The break should be before the word "Upon" for consistency with NUREG-1431 Rev 3.1 SR 3.0.1 BASES.

16-128

LCO 3.0.6

Provide examples of a loss of safety function related to cross train checks in the US-APWR TS LCO 3.0.6 BASES.

NUREG-1431 Rev 3.1 provides several cross train check examples supported by a train/system configuration diagram. NUREG-1431, Rev 3.1 LCO TS 3.0.6 BASES provides additional discussion including a summary of the three conditions for loss of safety function provided in the Safety Function Determination Program, together with examples of each type of loss of safety function. This amplifies understanding of a potential loss of safety function.

16-129

TS Section 4 - EDITORIAL.

The following are editorial notes need attention in US-APWR TS 4.0:

1. Page 4.0-1: Change the expression "24 rodlets" to "24 rods per assembly", as it is used in Table 4.2-2, of the FSAR.

2. Page 4.0-2: add the words "of the FSAR" after using the word, "Chapter 9" in 4.3.1.1a, 4.3.1.2b, and 4.3.1.2c.

3. Page 4.0-2: add the words "as described in Chapter 9 of the FSAR" after the phrase "an allowance for uncertainty" 4.3.1.1c.

16-130

TS Section 5.0 - EDITORIAL.

The following editorial note needs attention in US-APWR TS 5.0:

1. Page 5.6-4, Section 5.6.4b: Add the words "of the FSAR" after the word "Chapter 5" in subsection 5.6.4b. Also change "Chapter 5" by "Section (5.x.y)" to identify the specific location "x.y" of the referred section in the FSAR.

16-131

TS 5.5.19, Surveillance Frequency Control Program (SFCP).

Justify the use of SFCP to define a surveillance frequency in situations where the surveillance frequency is in the range of 24 months or longer.

Application of SFCP for such SRs may imply extending the SF until the next refueling outage, i.e., extending for another 24 months. Such extensions may be difficult to justify given that there is minimal or no experience for the 24 months surveillance frequency.

The US-APWR TS provides the option for using the SFCP for many surveillance requirements where the surveillance frequency is 24 months or 60 months. These surveillances are conducted during refueling outages. In many cases, the 24 months surveillance frequency can be considered an extension of the 18 months surveillance frequency since for this design the refueling interval is 24 months. Significant experience exists for 18 months surveillance frequency, but limited experience is available for the 24 months frequency. Justification for extending another 24 months is considered difficult based on operating experience and component reliability. Also, the risk analyses models may not be detailed enough to assess the risk implication of these surveillances. The surveillances conducted at the interval of 60 months can be considered to have as long a surveillance interval as is desirable for safety purposes. Any additional extension may not be desirable. The US-APWR should discuss the applicable considerations of NEI 04-10 and the analyses to be performed for use of

SFCP for these types of SRs. It should also discuss the justification and need for using SFCP for these SRs.

16-132

TS 5.5.19, Configuration Risk Management Program (CRMP).

Locate the key elements of CRMP in the APWR FSAR.

NEI 06-09 Chapter 2, RMTS Program Requirements, includes Configuration Risk Management Process & Application of Technical Specifications, Documentation, Training, PRA Technical Adequacy, and Configuration Risk Management (CRM) Tools. In Chapter 4, it addresses PRA attributes and CRM Tool Attributes. In addition, it provides guidance for RMTS implementation. These requirements and attributes identified in NEI 06-09 will need to be addressed by the COL applicant implementing RMTS. Examples of some of the aspects that would need to be described in some detail might include, but are not limited to, PRA technical adequacy, development of CRM tool, qualitative/quantitative consideration in Risk Management Action Time (RMAT) and RICT calculations, cumulative risk tracking and uncertainty considerations, documentation and training requirements. These items have not been addressed by MHI in the FSAR.

16-133

TS 5.5.19, Configuration Risk Management Program (CRMP).

Revise/clarify the applicability of Modes for Risk-Managed Technical Specifications (RMTS) to the US-APWR. Plant-specific basis for application of RMTS for Mode 3 is not addressed.

As stated in NEI 06-09, RMTS Guidelines, Nov. 06, "PRAs that support RMTS are typically plant-specific at-power PRAs. Thus, these PRAs are directly applicable to plant configurations during operations in Modes 1 and 2. For PWRs, RMTS may be extended on a plant-specific basis to apply in operating Modes 3 and 4 (with cooling via steam generators) .. However, licensees who want to apply RMTS for plant configurations in these other operational modes shall either have a PRA and configuration risk calculation tool that adequately calculates a Risk-Informed Completion Time (RICT) in these modes for the specific plant configurations or perform sufficient analyses to demonstrate that at-power PRA results provide conservative bounding estimates of risk, and thus can be used to set the RICT. Applicability to these Modes must be justified as part of the license application, and approved by NRC." Table 2-1 of NEI 06-09 summarizes the applicability of the at-power PRA to Plant Operational Modes.

RMTS is implemented in the US-APWR in Sections which apply to Modes 1, 2, and 3. It is not applied in MODE 4 and includes a Note "The Required Action is not applicable in MODE 4." The US-APWR FSAR PRA addresses at-power and shutdown conditions covering internal and external initiators. But, the FSAR does not discuss the use of the PRA models for configuration risk calculations, as needed for implementation of RICT in RMTS, particularly for Mode 3 (Hot Standby). The FSAR did not provide any discussion

of a configuration risk calculation tool that adequately calculates a RICT in Mode 3, considering that the at-power PRA will be used. It did not provide any analyses to demonstrate that the at-power PRA results provide conservative bounding estimates of risk, and thus can be used to set the RICT. Neither did the FSAR discuss the use of a separate or modified PRA for these modes.

16-134

TS 5.5.18, Configuration Risk Management Program (CRMP).

Justify the formatting change of the Risk-Managed Technical Specification (RMTS) in the US-APWR Technical Specifications. The formatting followed is not consistent with the guidance provided in NEI 06-09 and does not adhere to good human factors principles.

NEI 06-09, Risk-Managed Technical Specifications (RMTS) Guideline, November 2006, was accepted by USNRC for implementation of risk-informed Technical Specifications under Risk-Informed Technical Initiatives 4b. Table 3-2 of NEI 06-09 provides an example format for implementation of RMTS. Table 3-2 is consistent with the format in STS NUREG-1431 and adheres to the human factors principles used in STS. Implementation of RMTS in the US-APWR TS in Chapter 16, however, is done differently. The Required Action column in the LCO Actions refers to requirements of the specification under Section 5.5.18 where the requirements are provided in a narrative. For example, in TS Section 3.8.1, LCO ACTIONS, A.2.2 the Required Actions Column states, "Apply the requirements of Section 5.5.18." Section 5.5.18 of the US-APWR TS discusses the Configuration Risk Management Program (CRMP) listing the different requirements for required actions and completion times. The format provided in Table 3.2 of NEI 06-09 is not followed. Justification/discussion are needed for the changes in the specifications defined under the LCO ACTIONS that do not follow the format of Table 3.2 of NEI 06-09.

16-135

Section 4.3, Fuel Storage.

Justify the value [200] ppm added to the borated water (in 4.3.1.1c) for "keff <= 0.95" if fully flooded with borated water.

10 CFR 50.68(4), "Criticality Accident Requirements," specifically states that "K-effective must not exceed 0.95 at a 95% probability and 95% confidence level, if flooded with borated water." The applicant needs to justify, (e.g., by a reference), the 200 ppm value specified for the borated water.

16-136

TS 5.5.11, Ventilation Filter Testing Program (VFTP).

Confirm that the face velocity provided for the MCREFS in TS 5.5.11.c is 2400 fps (feet per second).

The expressed unit for the face velocity in APWR TS is in "fps". The Westinghouse STS shows the face velocity in "fpm". A typical face velocity in current operating filtration units is in the order 500 fpm (feet per minute) or lower. 2400 fps is equivalent to 14400 fpm which appears to be very high.

16-137

TS Section 5.5.11 Ventilation Filter Testing Program (VFTP).

Justify the value (70%) used for the relative humidity (RH) for the ESF ventilation system (Section 5.5.11c, page 5.5.-10).

According to NUREG-1431 - STS, "the use of any standard other than ASTM D3803-1989 to test the charcoal sample may result in an overestimation of the capability of the charcoal to adsorb radioiodine. As a result, the ability of the charcoal filters to perform in a manner consistent with the licensing basis for the facility is indeterminate. ASTM D 3803-1989 is a more stringent testing standard because it does not differentiate between used and new charcoal, it has a longer equilibration period performed at a temperature of 30°C (86°F) and a relative humidity (RH) of 95% (or 70% RH with humidity control), and it has more stringent tolerances that improve repeatability of the test." The applicant needs to justify their choice of 70% RH as specified in the NRC guidance.

16-138

TS Section 5.5.16 Containment Leakage rate Testing Program.

Identify the approved exceptions for the program established, at the end of Section 5.5.16a, page 5.5-16, for the leakage rate testing of the containment.

Following NUREG 1431, Rev.3, page 5.5.-16, the applicant selected OPTION B for the containment leakage rate testing program, as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B. In NUREG-1431, Rev. 3, there is a list of some exceptions for the leakage rate testing program. The applicant deleted those exceptions and left the paragraph unfinished. The applicant needs to specify the approved exceptions for this program. Otherwise, this item needs be considered a COLA open item.

16-139

TS Section 5.6.4 Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR).

1. Identify the quoted reports in Subsection 5.6.4b, as shown in NUREG-1431, Rev.3.

According to NUREG-1431, Revision 3, the applicant is needed to specify in detail each document quoted in this section (e.g., title, date, and type of report or letter) or the section in the FSAR where these reports are specified.

2. The item "LTOP arming" is missing in Subsection 5.6.4.a.

16-140

TS 5.6.3, Core Operating Limits Report (COLR).

Revise TS 5.6.3.c to reflect implementation of TSTF-487.

APWR GTS adopted TSTF-487 requirements as shown in TS 3.4.1 and the associated Bases B 3.4.1. However, a conforming change to TS 5.6.3 was not incorporated regarding the assumed rated thermal power when establishing the core operating limits.

This is required to ensure consistency and completeness of APWR GTS requirements.