

**REQUEST FOR ADDITIONAL INFORMATION NO. 162-1821 REVISION 0**

1/21/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 16 - Technical Specifications

Application Section: TS Section 3.7

**QUESTIONS for Technical Specification Branch (CTSB)**

16-141

**TS 3.7 EDITORIAL**

The following typographical or editorial errors were noted in US-APWR TS LCO 3.7 and associated BASES:

1. Page 3.7.5-1, LCO REQUIRED ACTION A.1: "A.2" should be assigned to the second action.
2. Page 3.7.5-1, LCO REQUIRED ACTION A.1: The connector "OR" should be underlined and left margin aligned to A.1/A.2 per the Improved Technical Specification Writers Guide, TSTF-GG-05-01.
3. Page 3.7.5-1, LCO REQUIRED ACTION A.2: Align "7 days" with the first line of A.2 statement.
4. Page 3.7.5-2, LCO REQUIRED ACTION B.1: "B.2" should be assigned to the second action.
5. Page 3.7.5-2, LCO REQUIRED ACTION B.1: The connector "OR" should be underlined and left margin aligned to B.1/B.2 per the Improved Technical Specification Writers Guide, TSTF-GG-05-01.
6. Page 3.7.5-2, LCO CONDITION B, and C: The word "required" is not needed in these cases since all "four EFW trains shall be OPERABLE". The word "required" was used in Revision 0 due to additional LCO requirements for Mode 4 (2 out of 4 trains OPERABLE). Mode 4 is deleted from the LCO APPLICABILITY in Revision 1.
7. Page B 3.7.1-1, BACKGROUND, 2nd Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
8. Page B 3.7.1-1, APPLICABLE SAFETY ANALYSES, 2nd Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
9. Page B 3.7.1-4, ACTIONS, 1st and 2nd Paragraph: Insert hard return (space) between paragraphs. The 2nd paragraph starts with :To determine.."

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10. Page B 3.7.1-4, ACTIONS, 3rd Paragraph: The phrase "in the previous page" should be "above".
11. Page B 3.7.2-1, BACKGROUND, 5th Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
12. Page B 3.7.2-1, APPLICABLE SAFETY ANALYSES, 1st Paragraph, 1st and 2nd Sentence: Extraneous word "the" in front of the word "Chapter."
13. Page B 3.7.3-2, BACKGROUND, 2nd Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
14. Page B 3.7.3-2, LCO, 2nd and 3rd Paragraph: Insert hard return (space) between paragraphs. The 3rd paragraph starts with "Failure to meet.."
15. Page B 3.7.3-2, LCO, 3rd Paragraph, 2nd Sentence: The phrase "a safety injection signal" should be "a feedwater isolation signal on high steam generator level".
16. Page B 3.7.4-1, BACKGROUND, 1st Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."  
Page B 3.7.4-1, APPLICABLE SAFETY ANALYSES, 1st Paragraph, last Sentence: The word "generator" should be plural, "generators." The acronym "MSDV" should be plural, "MSDVs."
17. Page B 3.7.4-2, LCO, 1st Paragraph, 2nd Sentence: Insert a space between "four" and "steam" in the word combination "foursteam."
18. Page B 3.7.5-1, BACKGROUND, 5th and 6th Paragraph: Insert hard return (space) between paragraphs. The 6th paragraph starts with "Any two.."
19. Page B 3.7.5-1, BACKGROUND, 6th Paragraph, 1st Sentence: Extraneous word "under" in front of the phrase "the four EFW pumps."
20. Page B 3.7.5-2, BACKGROUND, 3rd Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
21. Page B 3.7.5-2 and B 3.7.5-3, APPLICABLE SAFETY ANALYSES: Remove the hard return between the last Paragraph on page B 3.7.5-2 and the first paragraph on page B 3.7.5-3.
22. Page B 3.7.5-3, APPLICABLE SAFETY ANALYSES, 1st Paragraph, 1st Sentence: The word "faulty" is misspelled as "foulty."
23. Page B 3.7.5-3, APPLICABLE SAFETY ANALYSES, 1st Paragraph, 1st Sentence: The system acronym "RCPS" does not refer to any item on the acronyms and abbreviations list in the DCD and is not introduced anywhere in the technical specification bases. Insert the correct acronym.
24. Page B 3.7.5-3, LCO, 1st and 2nd Paragraph: Insert hard return (space) between paragraphs. The 2nd paragraph starts with "During OLM.."

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25. Page B 3.7.5-3, LCO, 2nd Paragraph, 2nd Sentence: Remove the redundant word "connection" before the phrase "cross-connect line."
26. Page B 3.7.5-3, LCO, 3rd Paragraph: Remove hard return before the last Sentence; "The piping, valves .."
27. Page B 3.7.5-9, SURVEILLANCE REQUIREMENTS, SR 3.7.5.5, last Sentence: The system acronym "CST" should be replaced with "EFW pits."
28. Page B 3.7.8-2, ACTIONS, A.1 and A.2, 4th and 5th Sentences: These sentences regarding ACTION A.2 should follow the basis discussion for A.1.
29. Page B 3.7.10-3, BACKGROUND, 2nd Paragraph, last sentence: Extraneous word "the" in front of the word "Chapter."
30. Page B 3.7.10-3, BACKGROUND, 3rd Paragraph, last Sentence: Extraneous word "the" in front of the word "Chapter."
31. Page B 3.7.10-6, ACTIONS, B.1, 1st Sentence: The word "two" should be "one of the required"
32. Page B 3.7.10-8, ACTIONS, G.1, 1st Sentence: Delete the word "both"
33. Page B 3.7.10-9, SURVEILLANCE REQUIREMENTS, SR 3.7.10.4, 2dn Paragraph, 3rd Sentence: Remove the hard return after the word "air."
34. Page B 3.7.10-10, SURVEILLANCE REQUIREMENTS, SR 3.7.10.4, 2dn Paragraph, 3rd Sentence: Remove the hard return at the end of the sentence
35. Page B 3.7.11-1, BACKGROUND, 2nd paragraph, 2nd Sentence: Add commas to list of major components in each train.
36. Page B 3.7.11-5, SURVEILLANCE REQUIREMENTS, SR 3.7.11.2, 2nd Sentence: The sentence is incomplete.
37. Page B 3.7.12-1, BACKGROUND, 2nd Paragraph, 1st Sentence: Extraneous word "the" in front of the word "Chapter."
38. Page B 3.7.12-1, BACKGROUND, 2nd Paragraph, 1st Sentence: Insert space between "9" and "(Ref. 1)."
39. Page B 3.7.12-1, APPLICABLE SAFETY ANALYSES, 2nd Paragraph, Last Sentence: The phrase "..the analysis assumes that all fuel rods fail, conservatively." Should read "..the analysis conservatively assumes that all fuel rods fail."
40. Page B 3.7.14-1, BACKGROUND, 3rd Paragraph: Extraneous space before "The" to begin the paragraph.

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TS 3.7.1, Main Steam Safety Valves (MSSVs).

Revise Condition A language in the Action Table under LCO 3.7.1 ACTIONS to state exactly the number of steam generators with one or more inoperable MSSVs which requires entry into Table 3.7.1-1 in the US-APWR TS. The current phrase "per steam generator" is vague.

NUREG-1431, Rev. 3.1 TS LCO 3.7.1 Actions Table, Condition B, provides specific language regarding the number of steam generators with a specific number of MSSVs inoperable that subsequently require entry into Table 3.7.1-1 to establish the upper limit on thermal power and the subsequent modification to the reactor trip setpoint. The corresponding LCO Action Table condition in the US-APWR TS specifically includes an entry condition of one or more inoperable MSSVs, but is not precise regarding the number of steam generators affected.

16-143

TS 3.7.1, MSSVs.

Justify excluding the Condition and associated Required Action and Completion Time under LCO 3.7.1 ACTIONS.

The conditions defined in US-APWR TS LCO 3.7.1. ACTIONS are not consistent with NUREG-1431, Rev. 3.1 TS LCO 3.7.1 ACTIONS and do not address potential overpressurization of the steam system with a positive moderator temperature coefficient. NUREG-1431, Rev. 3.1 TS LCO 3.7.1 BASES, APPLICABLE SAFETY ANALYSES section indicates that a positive moderator temperature coefficient combined with inoperable MSSVs may require a reduction in the trip setpoint to prevent overpressurization of the steam system. Conditions A and B from the NUREG-1431, Rev. 3.1 TS LCO 3.7.1 Actions Table, provide the required action for this condition. The US-APWR LCO ACTIONS and BASES for LCO 3.7.1 do not address this issue. The US-APWR BASES for LCO 3.7.1 should explain the lack of concern for overpressurization of the steam system with a positive moderator temperature coefficient in the US-APWR design.

16-144

TS 3.7.1, MSSVs.

Justify the selected tolerance of 3% for the lift settings of MSSVs in Table 3.7.1-2.

The 3% value is discussed in the APWR TS Bases, SR 3.7.1.1 which repeats similar text provided in the STS. However, this 3% value is bracketed in the STS subject to further compliance with ASME Code, Section III, NC 7000 (Subsection NC 7512) which is listed as Reference 2 in both APWR TS bases B 3.7.1 and the STS.

ASME Code Subsection NC 7512 states, in part, "the set pressure tolerance plus or minus shall not exceed the following: 2 psi (15 kPa) for pressures up to and including 70

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psi (500 kPa), 3% for pressures over 70 psi (500 kPa) up to and including 300 psi (2000 kPa), 10 psi (70 kPa) for pressures over 300 psi (2000 kPa) up to and including 1000 psi (7000 kPa), and 1% for pressures over 1000 psi (7000 kPa). The set pressure tolerance shall apply unless a greater tolerance is established as permissible in the Overpressure Protection Report (NC-7200)."

This information is needed to ensure TS requirements are consistent with information provided in the quoted references.

16-145

TS 3.7.10, Main Control Room Ventilation System (MCRVS).

Revise the statement for Condition F and the associated information in the Bases B 3.7.10 to reflect implementation of TSTF-448.

APWR GTS 3.7.10 adopts TSTF-448, Control Room Habitability, to address safety issues identified in Generic Letter 2003-01. The APWR text for Condition F does not clearly define specific equipment deficiencies as presented in the TSTF-448.

This is needed to ensure adequacy and completeness of TS requirements.

16-146

TS 3.7.10, MCRVS.

Justify the bracketed first paragraph regarding the continuous monitoring of air entering the CRE by radiation and toxic gas detectors in the US-APWR TS LCO 3.7.10, BASES, BACKGROUND on page B 3.7.10-3

The comparable paragraph in TSTF-448, Rev 3 is not bracketed. Clarify whether this paragraph represents an open design issue for the US-APWR.

16-147

TS 3.7.10, MCRVS

Discuss the isolation capability and Seismic Category for the Main Control Room Emergency Filtration System (MCREFS).

NUREG-1431, Rev. 3.1 TS LCO 3.7.10 BASES, BACKGROUND includes a discussion of these issues.

The US-APWR TS LCO 3.7.10 BASES omits a statement contained in NUREG-1431, Rev. 3.1 that appears to be applicable, without providing an alternate explanation.

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TS 3.7.10, MCRVS

Justify the exclusion of Modes 5 and 6 from the LCO APPLICABILITY statement for LCO 3.7.10.

NUREG-1431, Rev. 3.1 identifies a need for the Main Control Room HVAC System in MODES 5 and 6 to cope with the release from a rupture of an outside waste tank. Verify that rupture of an outside waste tank, or similar hazard, is not a design consideration for the US-APWR.

16-149

TS 3.7.11, Annulus Emergency Exhaust System.

The Annulus Emergency Exhaust System is the only subsystem of the Engineered Safety Feature (ESF) Ventilation System covered by TS. Justify excluding the other subsystems of the ESF. The ESF Ventilation System includes:

- Annulus Emergency Exhaust System,
- Class 1E Electrical Room HVAC System,
- Safeguard Component Area HVAC System,
- Emergency Feedwater Pump Area HVAC System, and
- Safety Related Component Area HVAC System.

US-APWR FSAR Section 9.4.5.2.2.3 indicates that an ECCS actuation signal will cause standby equipment to start. Any safety-related equipment that starts or realigns with the receipt of an ECCS signal should be discussed in TS. The risk significance of the listed systems is high.

16-150

TS 3.7.12, Fuel Storage Pit Water Level.

Clarify that the term "effective dose" used to replace "thyroid dose" in the US-APWR TS LCO 3.7.12 BASES, APPLICABLE SAFETY ANALYSES on page B 3.7.12-1 refers to Total Effective Dose Equivalent (TEDE).

The justification for the change of phrase supporting revision 1 to the US-APWR FSAR is that the phrase "effective dose" is used in 10 CFR 50.34. However, with reference to the 2-hour dose per person at the exclusion area boundary, 10 CFR 50.34 uses the term TEDE.

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TS 3.7.13, Fuel Storage Pit Boron Concentration.

Revise the TS Bases B 3.7.13, Applicable Safety Analyses section to add a statement which will indicate which criterion of the 10 CFR 50.36 (c)(2)(ii) is satisfied by LCO 3.7.13.

This additional information is needed to ensure completeness of the APWR TS Bases..

16-152

TS 3.7.14, Secondary Specific Activity.

Discuss the secondary coolant specific activity limit in relation to the activity value that might be expected from a 1 gpm tube leak of primary coolant at the limit of 1.0  $\mu\text{Ci/gm}$  in the US-APWR TS LCO 3.7.14 BASES.

The US-APWR TS LCO 3.7.14 BASES state that a limit exists on secondary coolant specific activity during power operation. However, no comparison is made between this limit and the activity value expected from a 1 gpm tube leak of primary coolant at its limit of 1.0  $\mu\text{Ci/gm}$ . NUREG 1431, Rev. 3.1 TS LCO 3.7.18 BASES provides such a comparison.

16-153

TS 3.7.4, Main Steam Depressurization Valves (MSDVs).

Discuss the operability of a main steam depressurization valve (MSDV) when the associated block valve is closed.

For example, NUREG-1431, Rev. 3.1 TS LCO 3.7.4 BASES, LCO section, provides a specific statement regarding the operability of an atmospheric dump valve when the associated block valve is closed, but no comparable statement appears in the US-APWR TS LCO 3.7.4 BASES, LCO section for the functionally equivalent MSDV.

16-154

TS 3.7.5, EFW System.

Confirm that the Note associated with Required Action D.1 in US-APWR TS LCO 3.7.5 is correct.

The Note associated with Required Action D.1 indicates that "LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one EFW train is restored to OPERABLE status." Condition D implies that one of four EFW trains is OPERABLE. Required Action D.1 requires that one train is OPERABLE by calling for an additional EFW train to be restored immediately to provide for 100% decay heat removal capability through safety-related equipment. The concern is that the Note associated

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with Required Action D.1 always applies based on the Condition definition; leaving just one 50% train of EFW available for cooling with safety-related equipment. The comparable Note in NUREG-1431, Rev. 3.1 is utilized where only three trains of AFW are considered in the plant design and no AFW trains are OPERABLE.

16-155

TS 3.7.6, EFW Pit.

Verify the minimum EFWS Pit volume specified in SR 3.7.6.1 and the US-APWR TS LCO 3.7.6 BASES and LCO.

The minimum volume of 204,850 gallons required by US-APWR LCO SR 3.7.6.1 is identical to the maximum usable EFWS Pit volume of 204,850 gallons described in US-APWR FSAR Chapter 10, Section 10.4.9.2.1(D).

SR 3.7.6.1 indicates that water volume for each EFWS Pit shall be 204,850 gallons or greater based on staying in MODE 3 for 8 hours and subsequently cooling down to RHR entry conditions at 50°F/hour. The reference supplied by the BASES is US-APWR FSAR, Chapter 10, Section 10.4.9.3 and the "Safety Evaluation," of the US-APWR FSAR, states that 186,200 gallons per EFWS Pit are sufficient to stay in MODE 3 for 8 hours and subsequently cool down to RHR entry conditions at 50°F/hour. Setting the minimum EFW Pit volume at the maximum usable value of 204,850 gallons in SR 3.7.6.1 would seem to create a situation where LCO Condition A would be entered frequently.

16-156

TS 3.7.4, MSDVs.

Clarify the statement in the TS Bases B 3.7.4, Background fourth paragraph "the MSDVs are OPERABLE with only a DC power source available."

This statement is a repeat of a statement in the STS Bases 3.7.4 for the Atmospheric Dump Valves (ADVs) in the Westinghouse PWR design. The ADVs, however, are air-operated valves with electrical support from DC power sources. In the APWR design, the MSDVs are motor-operated valves and their electrical power sources are not clearly identified in the referenced FSAR Chapter 10.

This is needed to ensure accuracy of the supporting information provided in the TS bases.

16-157

TS 3.7.4, MSDVs.

Revise Completion Time for Required Action C.2 to place the plant in Mode 4 within 12 hours (vice 24 hours). Revise the associated TS bases B 3.7.4, as appropriate.



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A completion time of 12 hours is used throughout the remaining of the APWR GTS for similar actions, which is also consistent with the STS requirements.

This RAI applies also to TS 3.7.5 and TS 3.7.6,