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Sent: Tuesday, August 19, 2008 1:48 PM
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Subject: US-APWR Design Certification Application RAI No.50-329
Attachments: US-APWR DC RAI 50 SPCV 329.pdf

MHI,

Attached please find the subject request for additional information (RAI). This RAI was sent to you in draft form. The schedule we established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. Please submit your RAI response to the NRC Document Control Desk.

Thanks,

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REQUEST FOR ADDITIONAL INFORMATION NO. 50-329 REVISION 0

8/19/2008

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 06.02.06 - Containment Leakage Testing

Application Section: 6.2.6

SPCV Branch

QUESTIONS

06.02.06-1

(6.2.6-1)
Provide correct reference to the ANSI standard endorsed by RG 1.163, or Justify why the referenced standard is an acceptable alternative.

DCD, Section 6.2.6.4 and reference 6.2-31, refer to ANSI/ANS 56.8-2002. TS Bases Section B3.6.1 Reference #5 is also ANSI/ANS 56.8-2002. The forward to ANSI/ANS 56.8-2002 states that it was issued as an update to the 1994 version of the ANS standard and that its intended purpose is to consolidate the guidance from RG 1.163, NEI 94-01, and ANS 56.8-1994 into one document that could be referenced in the Tech Specs. The NRC has not yet reviewed and accepted the 2002 version.

Submit ANSI/ANS 56.8-2002 for formal NRC review and approval and provide an explanation of how it comports with RG 1.163, NEI 94-01, and ANS 56.8-1994, or modify the DCD to reference ANS 56.8-1994.

06.02.06-2

(6.2.6-2) Please clarify what aspects of the containment leak rate testing (CLRT) program are to be certified as part of design certification of the US-APWR and what are to be left for the COL Applicant (COLA). Proposed COL item 6.2(8) states that essentially the entire program is the responsibility of the COLA. However, there is a commitment to RG 1.163 (and thus, by reference, to NEI 94-01 and ANSI/ANS 56.8-1994) and a CLRT program in the Technical Specifications (TS) sections 3.6.1 and 5.5.16. Further, there seem to be implied exceptions to RG 1.163 (e. g., not Type C testing all containment isolation valves (CIVs); not testing all CIVs with pressure applied in the correct direction; insufficient test, vent and drain valves to properly test the CIVs; and not committing to the version of ANS referenced in RG 1.163). If there are exceptions to the standards and regulatory guidance, please specifically identify them.

06.02.06-3

(6.2.6-3) App. J, Option B, Section V.B.3 requires justification, including supporting analyses if a licensee (applicant) chooses to deviate from methods endorsed in the RG. As noted in the above questions, there appear to be implied exceptions. Further, TS Bases Section B 3.6.1 states "... comply with 10CFR50, Appendix J, Option B..., as modified by approved exemptions." TS Section 5.5.16 has similar words related to RG 1.163. Please provide a list of any requested deviations or exemptions from App. J or RG 1.163 along with justification and supporting analyses.

06.02.06-4

(6.2.6-4)
A. DCD Section 6.2.6.2 briefly discusses the Type B testing of containment penetrations and mentions Type B tests of personnel airlocks, the equipment hatch, and electrical penetrations. The Figures showing the airlock (6.2.4-1 -sheet 49 and 3.8.1-7) and the equipment hatch (6.2.4-1-sheet 50 and 3.8.1-6) do not show any leak test connections or the seal arrangements. In addition, the fuel transfer tube in Figure 6.2.4-1 -sheet 39 does not show test connections. Please provide this information.

B. Although Section 6.2.6.2 refers to Figure 6.2.4-1 for electrical penetrations, there does not appear to be a sheet for them. Figure 3.8.1-8 provides a drawing of a typical electrical penetration, but doesn't show any test connections. If some of the electrical penetrations to be used are not fully sealed, they may require leak test provisions. Are the penetrations fully sealed or do they use flexible seals? Are there leak test provisions? Please clarify this situation and supply the documentation as necessary. If they are not to be subject to leak rate testing please explain/justify.

06.02.06-5

(6.2.6-5) Option B, RG 1.163 endorses NEI 94-01, Rev. 0 (with certain exceptions), which prescribes methods for conducting the containment isolation valve leakage rate tests in Sections 8.0 and 10.0. These sections reference ANSI/ANS 56.8-1994. Section 6.2 of this document provides guidance on the proper direction to apply test pressure for type C leakage rate tests.

Section 6.2.6.3 of the DCD states that Table 6.2.4-3 lists the type of leakage test to be performed on all CIVs and that Figure 6.2.4-1 depicts each penetration and its test connection. SRP 6.2.6 and ANS-56.8 (section 6.2) specify that all CIVs are to be tested so that the test pressure is applied in the same direction that would occur in a DBA, unless such testing would give equivalent or more conservative results. A review of the configurations depicted in Fig. 6.2.4-1 showed that many of the valve configurations (e. g., Sheets 3 & 6) result in local testing of at least one CIV in a direction opposite to that which would occur during design basis accident (DBA) conditions.

Further, many containment penetration configurations did not depict the leakage rate testing connections needed to test all CIVs associated with the penetration in accordance with GDC 54 (e.g., Sheets 2 and 5). For example, many penetrations had test connections only between the two CIVs, leaving it unclear as to how the inboard CIV could be tested in the correct direction.

In order for NRC staff to ensure compliance with this guidance, Please provide (or indicate where in the DCD application it is provided):

1) A list of those containment isolation valves that will be locally (Type C) leakage rate tested with the test pressure applied in a direction opposite to that which would occur in a DBA.

2) For each isolation valve identified in 1), above, please justify that any type C containment leakage test results conducted in such manner will result in equivalent or more conservative test results

3) Also, provide Figures that are complete and meet the Type C test requirements and guidance related to test direction or provide the required exemption requests and justification.

06.02.06-6

(6.2.6-6) DCD Table 6.2.4-3 lists containment penetrations and CIVs along with related information such as whether a Type C test is planned. Not all valves listed will have Type C tests performed. However, SRP 6.2.6, RG 1.163 and ANS 58.6, Section 3.3.1, list certain exceptions. Using this guidance, please provide justification for each valve that is proposed to be excluded from the Type C leak rate test program.

06.02.06-7

(6.2.6-7) ANSI/ANS 56.8, Section 6.3 discusses draining water from CIVs for Type C testing. Also, venting the downstream side of the valve under test to ensure a ΔP of P_a across the valve is discussed in Section 3.2.5. These vent and drain connections are important to ensure accurate test results, but are not shown on Figure 6.2.4-1 or the system P&IDs in the DCD. Some current operating plant designs are not designed with adequate vent and drains connections thus creating problems for the CLRT program. Please provide Figures showing the appropriate vent and drain connections for all CIVs that must be Type C tested.

06.02.06-8

(6.2.6-8) DCD Section 6.2.6.3 states that "The provisions for testing the individual isolation valves (e.g., test connections and drains) are shown in Figure 6.2.4-1 and individual system piping and instrumentation diagrams (P&IDs)." During review of DCD Chapter 6 Figure 6.2.4.1 and associated system P&IDs, NRC staff noted that some test connections are shown in the Figure 6.2.4.1 but omitted in the associated P&ID. For example, valve CAS-VLV-004 is shown on Figure 6.2.4-1, Sheet 35, but is not shown on Figure 9.3.1-1. Please note the concerns in RAIs 6.2.6-5 and -7 above and clarify the completeness of the various drawings and figures in the DCD.

06.02.06-9

(6.2.6-9) DCD table 6.2.4-1, Row 5, lists "Isolation Valve Seal Systems." Please clarify where these systems are used in the US-APWR and describe the leak test procedures for determining the effectiveness (following postulated accidents) of any isolation valve seal systems and fluid-filled systems that serve as seal systems.

06.02.06-10

(6.2.6-10)
A. DCD Section 14.2.12.1.62 and .63 address pre-operational leak rate testing and reference Appendix J for the test methods. Please provide the details associated with test methods or provide an appropriate reference (e.g., RG 1.163).

B. The acceptance criteria cited for the pre-operational leak rate test in DCD Section 14.2.12.1.62 and .63 refer to TS surveillance requirements and bases, but these do not provide the necessary criteria. Please provide the acceptance criteria associated with the surveillance requirements or provide an appropriate reference (e.g., RG 1.163).

06.02.06-11

(6.2.6-12) There is no information in the DCD on what system, if any, is providing cooling to the "hot" penetrations for the main steam, blow down, feed water, RHR, CVCS, or any other system piping where the internal temperature exceeds 150°F. In Chapter 3 of the DCD, on Figure 3.8.1-8, Sheets 12, 13, and 14 depict the containment penetrations for main steam, feed water, and blow down piping, respectively. These drawings show insulation around the pipes passing through the respective penetrations. However, the shell of each penetration is welded to the wall of the penetrating pipe and the penetration itself has gussets imbedded in the containment concrete. Demonstrate, by providing a heat transfer calculation, how the high temperature of these pipes is dissipated such that the containment concrete does not exceed the 200°F limit locally around the penetration as stated in DCD section 3.8.1.5.3, "Acceptance Criteria with respect to concrete temperatures", or specify how cooling is provided to these penetrations and depict the penetration cooling connections on appropriate diagrams of Figure 6.2.4-1, since the location of the penetration cooling connections may have a bearing on testing configurations for the penetrations.

06.02.06-12

(6.2.6-13)
A. DCD Tier 1, Table 2.11.1-1 is "Key Containment Design and Performance Characteristics." The last row states that the "Leak rate of containment during LOCA [0-24 hours] (%/day)" is 0.15. This may more correctly be stated as the "Assumed leak rate of containment during LOCA analyses [0-24 hours] (%/day)" is 0.15, since the actual leak rate during a LOCA is very likely much less than 0.15. Please clarify or explain.

B. DCD Tier 1, Section 2.11.2, "Containment Isolation System" provides the system purpose and function as well as the key design features of the Containment Isolation System (CIS), but does not mention leak tightness at all in the section. Please address.

06.02.06-13

(6.2.6-14)
The Tier 1 DCD, ITAAC Table 2.2-4, Row 4 addresses the Type A CILRT and specifies that the test is performed per 10 CFR 50, Appendix J and that leak rate is less than allowable per Appendix J.

A. DCD Tier 1, ITAAC Table 2.11.2-2, Row 9 addresses systems penetrating containment and requires as-built leakage testing of the CIVs and that the valve leakage be within design limits. However. there is no reference to test method or to the design limits. Please address.

B. DCD Tier 1, Section 2.11.2 contains tables with ITAAC for containment leakage testing however there are no ITAAC in these sections for testing of Type B penetrations. Please address.