US-APWRRAIsPEm Resource

From: Wunder, George
Sent: Friday, January 12, 2018 3:04 PM
To: us-apwr-rai@mhi.co.jp; US-APWRRAIsPEm Resource; Joe Tapia
Cc: McCoppin, Michael
Subject: REQUEST FOR ADDITIONAL INFORMATION
Attachments: US-APWR Topical Report MUAP -07001-P-Rev6.pdf

MHI,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule 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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m/s T6-D38M
Washington, DC, 20555-0001

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REQUEST FOR ADDITIONAL INFORMATION 1098-9305

Issue Date: 01/12/2018
Application Title: US-APWR Design Certification - Docket Number 52-021
Operating Company: Mitsubishi Heavy Industries
Docket No. 52-021
Review Section: TR MHI Advanced Accumulator, Rev. 6
Application Section:

QUESTIONS

TR MHI Advanced Accumulator, Rev. 6-1

General Design Criterion (GDC) 35, “Emergency Core Cooling,” requires, in part, that a system that would provide abundant emergency core cooling to satisfy the ECCS safety function of transferring heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

10 CFR 50.46, “Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors,” requires, in part, that ECCS must be designed so that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of 10 CFR 50.46. 10 CFR 50.46 also requires that for the realistic analysis of the ECCS cooling performance, the uncertainties in the analysis method and input must be identified and assessed so that the uncertainty in the calculated results can be estimated and accounted for.

In order to make a safety finding on the APWR advanced accumulators (ACCs) Topical Report, Revision 6 submittal (part of the US-APWR ECCS design) to meet GDC 35 and 50.46, the staff needs the following additional information and the Topical Report needs to be revised accordingly.

1. On Page 3-3 of the topical report, it is stated: “Because the outlet piping is above the flow damper, the un-available “dead” water is less than that for an ACC design that has its outlet piping attached under the flow damper due to the need for increased installation space. The ACC main dimensions are shown in Fig. 3.2-1.” From the dimensions given on Figure 3.2-1, the outlet piping is actually below the flow damper. This needs to be restated.
2. On Page 3-5, it is stated: “The equalizing pipe is provided to ensure prevention of a vortex formation during large flow injection.” What is the effect of the equalizing pipe during small flow where the vortex formation is needed to achieve the desired flow rate?
3. Table 3.3-1 provides the bases for all flow damper dimensions except for equalizing pipe. What are the dimensions of the equalizing pipe and what is the basis for these dimensions?
4. On Page 4.2.1-22, it is stated: “the objective of the 1/5-sacle test is was to observe the flow in the flow damper during large and small flow, large to small flow switching, and to confirm the expected behavior of the flow.” What is the basis for not repeating the confirmatory test with a modified vortex chamber with flow equalizer piping?

5. On Page 4.2.1-24, the 1/5-scale **low pressure injection testing method** which was included in Rev 5 as Item b is deleted without explanation anywhere in the document. The results of the low pressure injection test are also deleted on Page 4.2.1-26. What is the basis for the removal of this information?

6. On Page 4.2.2-4, there is no mention of a full-scale test case prior to the modification of the vortex chamber that added the equalizing pipe. If it is not a full-scale test without the equalizing pipe that necessitated the modification, what is the basis for changing the design?

7. In Rev 5, Equations 4-8 and 4-9 were used for flow rate coefficient and cavitation factors, respectively as part of the now deleted 1/5-scale **low pressure injection testing method.** In Rev 6, the same equations were used on Page 4.2.2-6 (Equations 4-7 and 4-8) for full-scale qualification test with the addition of the Nitrogen contribution. What is the reason for inclusion of the Nitrogen contribution in Rev 6?

8. In Rev 6, the correlation equation in the LOCA analysis computer code (Equations 5-9 and 5-10) are slightly different from Rev 5 (Equations 13 and 14). Will the Chapter 15 LOCA analysis be rerun with the new correlation equation? If not, provide a justification as to why the LOCA cases will not be rerun.