

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Tuesday, August 21, 2018 12:19 PM
To: Request for Additional Information
Cc: Lee, Samuel; Mitchell, Matthew; Makar, Gregory; Baval, Bruce; Chowdhury, Prosanta; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 498 eRAI No. 9572 (5.4.2.2)
Attachments: Request for Additional Information No. 498 (eRAI No. 9572).pdf

Attached please find NRC staff's request for additional information (RAI) concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Hearing Identifier: NuScale_SMR_DC_RAI_Public
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Subject: Request for Additional Information No. 498 eRAI No. 9572 (5.4.2.2)
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Request for Additional Information No. 498 (eRAI No. 9572)

Issue Date: 08/21/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 05.04.02.02 - Steam Generator Program

Application Section: 5.4.1.6

QUESTIONS

05.04.02.02-1

NuScale steam generator (SG) design includes a 40 percent through-wall plugging criterion for meeting the structural integrity performance criterion with a safety factor of 3 for the normal operating pressure differential (NOPD) of 1350 psi. The plugging criterion and performance criteria are included as requirements in Technical Specification (TS) 5.5.4, "Steam Generator (SG) Program." The plugging criterion is used to determine if tube integrity was maintained, in accordance with the TSs, over the most recent operating cycle (condition monitoring), and whether tubes need to be plugged in order to maintain integrity over the next operating cycle (operational assessment). As stated in the response to Question 05.04.02.01-1.e in Request for Additional Information (RAI) 9273 (ADAMS Accession No. ML18093B542), the 40 percent plugging criterion is intended to be bounding, but it is currently enclosed within brackets in the TSs. Enclosing a value in brackets in the TSs means a combined license applicant must provide a plant-specific value (confirm 40 percent or justify an alternative).

The proposed 40 percent through-wall plugging limit is based on degradation from wear, with a length of degradation equivalent to the length of a tube support tab (0.5 inch).

The NRC staff has the following observations based on its independent calculations to evaluate the proposed plugging limit:

- For the 0.5 inch long wear flaw, the safety factor against collapse for NOPD is approximately 3.1.
- To maintain the safety factor of 3 for NOPD, the maximum allowable length of a 40 percent deep wear flaw would be approximately 0.7 inch.
- To maintain the safety factor of 3 for NOPD for a wear flaw of any length, the maximum allowable depth of the flaw would be approximately 24 percent.
- The NRC staff's safety factor calculations as a function of flaw depth and length do not include nondestructive examination uncertainty.

To conform to Regulatory Position C.2.b in Regulatory Guide (RG) 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes," the plugging criteria should include a thickness allowance for degradation. To conform to Regulatory Position C.3.f in RG 1.121, this operational degradation allowance should identify the method and data used to predict degradation and the measurement error in the eddy current tube inspections.

The response to Questions 05.04.02.01-1.b and e in RAI 9273 indicates that industry guidance was used to determine the uncertainty from eddy current testing and flaw sizing uncertainty.

The NRC staff observations listed above indicate that a plugging criterion of 40 percent through-wall may be adequate only if the length is limited, and it may not include a realistic assumption about the degradation rate since there is no operating experience. In addition, the response to Question 05.04.02.01-1.e in RAI 9273 states that when eddy current systems are qualified for NuScale tube inspections, the measurement uncertainties may be different than what was assumed based on the systems used for the current fleet.

In order to ensure that the site-specific SG tube plugging criterion submitted by a combined license (COL) applicant is determined according to RG 1.121, including margin for operational degradation and measurement uncertainty, the NRC staff requests that a COL item be added to Chapter 5 of the Final Safety Analysis Report specifically for resolving the bracketed plugging criterion in the TS. The COL item should state that the SG tube plugging criterion submitted by the COL applicant for review will be determined according to the guidance in RG 1.121 at the time of the application.