

NuScaleTRRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Tuesday, April 3, 2018 4:30 PM
To: Request for Additional Information
Cc: Lee, Samuel; Cranston, Gregory; Karas, Rebecca; Skarda, Raymond; Bovol, Bruce; NuScaleTRRaisPEm Resource
Subject: Request for Additional Information Letter No. 9441 (eRAI No. 9441) Topical Report, Thermal Hydraulic Stability, 15.09, SRSB
Attachments: Request for Additional Information No. 9441 (eRAI No. 9441).pdf

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

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.

Prosanta Chowdhury, Project Manager
Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
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From: Chowdhury, Prosanta

Created By: Prosanta.Chowdhury@nrc.gov

Recipients:

"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Cranston, Gregory" <Gregory.Cranston@nrc.gov>
Tracking Status: None
"Karas, Rebecca" <Rebecca.Karas@nrc.gov>
Tracking Status: None
"Skarda, Raymond" <Raymond.Skarda@nrc.gov>
Tracking Status: None
"Bavol, Bruce" <Bruce.Bavol@nrc.gov>
Tracking Status: None
"NuScaleTRRaisPEm Resource" <NuScaleTRRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Request for Additional Information" <RAI@nuscalepower.com>
Tracking Status: None

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Request for Additional Information No. 9441 (eRAI No. 9441)

Issue Date: 04/03/2018

Application Title: NuScale Topical Report

Operating Company: NuScale

Docket No. PROJ0769

Review Section: 15.09 - A.DSRS NuScale Thermal Hydraulic Stability

Application Section:

QUESTIONS

15.09-7

In accordance with Title 10 of CFR Part 50 Appendix A, GDC 10, "Reactor design," the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. Title 10 of CFR, Part 50, Appendix A, GDC 12, "Suppression of reactor power oscillations," requires that instabilities that could challenge thermal limits either be detected and suppressed or excluded. The Standard Review Plan (SRP) 15.0.2 acceptance criteria with respect to evaluation models specifies that the chosen mathematical models and the numerical solution of those models must be able to predict the important physical phenomena reasonably well from both qualitative and quantitative points of view.

NuScale Topical Report TR-0516-49417, "Evaluation Methodology for Stability Analysis of the NuScale Power Module," includes a Phenomena Identification and Ranking Table that provides the importance ranking of phenomena and parameters affecting the NuScale stability analysis. In RAI 8869, the staff requested additional information regarding the rationale for the importance ranking of the heat transfer of the steam generator. In the response to RAI 8869, the applicant states heat transfer in the steam generator is not highly important because the stability characteristics are insensitive to variations in steam generator heat transfer because such variations would be compensated by changes in the primary side temperature. Primary side temperature is an important parameter affecting the prevalence of void formation in the core and it also affects the margins available to riser flashing and riser voiding; all of which could affect stability margins. The staff reviewed the response to the original RAI, RAI 8869, and found that the response was insufficient for the staff to reach a conclusion regarding the importance of the steam generator heat transfer phenomenon.

In order to make an affirmative finding with regard to the above regulatory requirement important to safety, the NRC staff requests the following supplemental information:

- Provide additional rationale explaining the importance ranking for this phenomenon given that the heat transfer affects subcooling margin in the riser. It is acceptable to formulate this rationale using the example provided in the original RAI response (i.e., fouling). This discussion should address the impact of AOOs.
- Provide a description of any limits that apply to primary side temperature either through technical specifications or other operational, physical, or plant design limitations. In this description consider operational parameters that could affect steam generator heat transfer such as fouling, instrumentation and control system bias and uncertainty, and steam generator tube plugging.

- Justify the initial conditions assumed in the AOO calculations presented in the topical report. Provide an explanation for each event discussed in Section 8.2 of the topical report that evaluates the impact regarding steam generator heat transfer. If a higher initial temperature would produce a more adverse response from the standpoint of stability performance or margin compared to the reference results, provide calculation results using the limiting temperature to demonstrate the impact. The response should provide a level of detail regarding these calculations consistent with the detail presented in the topical report.
- If more limiting initial conditions or AOO scenarios are identified as a result of this RAI, revise the topical report accordingly to ensure that analysis of such conditions and scenarios is reflected in the analysis methodology.