

NuScaleTRRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Tuesday, March 20, 2018 10:06 AM
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. 9443 (eRAI No. 9443) Topical Report, Thermal Hydraulic Stability, 15.09, SRSB
Attachments: Request for Additional Information No. 9443 (eRAI No. 9443).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
301-415-164

Hearing Identifier: NuScale_SMR_DC_TR_Public
Email Number: 76

Mail Envelope Properties (DM6PR09MB2618C27C4C9B752C14F052BF9EAB0)

Subject: Request for Additional Information Letter No. 9443 (eRAI No. 9443) Topical Report, Thermal Hydraulic Stability, 15.09, SRSB
Sent Date: 3/20/2018 10:06:21 AM
Received Date: 3/20/2018 10:06:28 AM
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

Post Office: DM6PR09MB2618.namprd09.prod.outlook.com

Files	Size	Date & Time	
MESSAGE	531	3/20/2018 10:06:28 AM	
Request for Additional Information No. 9443 (eRAI No. 9443).pdf			90635

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 9443 (eRAI No. 9443)

Issue Date: 03/20/2018

Application Title: NuScale Topical Report

Operating Company: NuScale

Docket No. PROJ0769

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

Application Section:

QUESTIONS

15.09-3

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, General. Design Criterion (GDC) 10, "Reactor design," states that 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. Title 10 CFR 50.34 requires licensees to submit safety analyses that demonstrate how a given reactor complies with associated safety criteria. According to the standard review plan (SRP) 15.0.2, the reviewer must ensure that the field equations of the evaluation model are adequate to describe the set of physical phenomena that occur in the accident and ensure that the closure relationships are valid over the full range of conditions encountered.

Question 29851 of the original RAI, RAI 8846, was intended to seek clarification with respect to the PIM inputs related to steam generator heat transfer, specifically. The original response appears to address PIM input more globally and does not address the specific question regarding modeling of steam generator heat transfer. The staff reviewed the response to the original RAI and found that the response was insufficient for the staff to reach a conclusion regarding the adequacy of the stability analysis methodology.

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

- Provide the steam generator modeling option used in PIM licensing calculations. This response should clearly state if PIM calculations are performed using the correlations described by the topical report and/or original RAI response or if the heat transfer is calculated according to some other method (e.g., if the user defines the heat transfer through specific user inputs, specify this as well as the method for determining those input specific to the steam generator heat transfer).
- It is not clear from either the topical report or the original RAI response, but it appears as though PIM applies a tuning factor to the total steam generator heat transfer. Describe what tuning factors are applied to the PIM calculations of the heat transfer. The description should provide an explicit step-by-step process that shows

how a tuning factor is determined (either by the user or internally to the code) and then applied in the calculations. Justify the tuning factor method, as applicable.

- If the method is different from a tuning factor – provide a clear description of the method and address any inconsistencies between the topical report, the applied methodology, and the RAI response. Justify the method.
- It is not clear from either the topical report or the original RAI response, but it appears that the steam generator heat removal performance is somehow adjusted by the user during the input generation process such that a desired initial condition of primary side temperature can be established in the calculation methodology. Therefore, the methodology must rely on some source of information that relates parameters such as power level and feedwater temperature to primary side temperature. Provide a clear description of the information that is needed by the user during the input generation process in order to achieve the desired steady-state thermal-hydraulic conditions.
- Describe the source of the information discussed above, for example, clarify if NRELAP5 calculations are performed before the PIM calculations and then somehow interpolated to determine the initial conditions. Justify the application of the associated information for stability analysis, for example, if thermal-hydraulic calculations are performed using another code, defend the suitability of its use in safety analysis.