

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Friday, August 31, 2018 2:09 PM
To: Request for Additional Information
Cc: Lee, Samuel; Lupold, Timothy; Wong, Yuken; Vera Amadiz, Marieliz; Chowdhury, Prosanta; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 502 eRAI No. 9546 (3.9.2)
Attachments: Request for Additional Information No. 502 (eRAI No. 9546).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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Request for Additional Information No. 502 (eRAI No. 9546)

Issue Date: 08/31/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 03.09.02 - Dynamic Testing and Analysis of Systems Structures and Components

Application Section: 3.9.2

QUESTIONS

03.09.02-78

10 CFR 52.47 requires the design certification applicant to include a description and analysis of the structures, systems, and components (SSCs) sufficient to permit understanding of the system designs. 10 CFR 50, Appendix A, GDC 2 requires systems, structures, and components important to safety be designed to withstand appropriate combinations of the effects of normal and accident conditions with the effects of natural phenomena including earthquake. TR-1016-51669-P, "NuScale Power Module Short-Term Transient Analysis," Rev. 0, Section 3.2.3.2, "Flow Acceleration at Break Locations" states that the acoustic elements representing the fluid inside the pipe in the ANSYS blowdown and asymmetric cavity pressurization models and the flow acceleration is applied as a body force to the acoustic element nodes on the break face. The staff needs to ensure that the input loading is appropriately captured in the blowdown and asymmetric cavity pressurization models, and the description is insufficient for staff to reach a safety finding. Explain how the flow acceleration is converted to body force at the acoustic element nodes on the break face for liquid and steam so that the staff can understand the input loading is appropriately captured in the analysis model.

Include the requested information in the NPM Short-Term Transient Analysis Report or other appropriate documentation in the design certification application.

03.09.02-79

10 CFR 52.47 requires the design certification applicant to include a description and analysis of the structures, systems, and components (SSCs) sufficient to permit understanding of the system designs. 10 CFR 50, Appendix A, GDC 2 requires systems, structures, and components important to safety be designed to withstand appropriate combinations of the effects of normal and accident conditions with the effects of natural phenomena including earthquake. TR-1016-51669-P, "NuScale Power Module Short-Term Transient Analysis," Rev. 0, Table 6-3, "Case Numbers with Valve Opening or Break Locations" contains seven cases of the axisymmetric pressurization and blowdown analysis. However, no discussion of analysis results is provided in the technical report. SRP 3.9.2 states that staff review of dynamic system analysis covers the methods of analysis, the considerations in defining the mathematical models, the descriptions of the forcing functions, the calculation scheme, the acceptance criteria, and the interpretation of analysis results. The technical report lacks interpretation of analysis results and only provides the bounding values of forces and moments in Table 6-5, "Maximum Forces and Moments at Component Interfaces" and Table 6-6, "Maximum Forces and Moments on Containment Vessel, Reactor Pressure Vessel, Riser, and Core Barrel Assembly" for all the seven pipe break and valve opening cases. The description is insufficient for staff to reach a safety finding. The applicant is requested to identify which are the dominant valve opening cases that attribute to the bounding values of forces and moments in Tables 6-5 and 6-6. Explain why they are the dominant cases. The RCS injection line terminates in the riser, break of RCS injection line will result in a pressure wave traveling internally to the risers. Provide the maximum blowdown loads in the risers due to break of the RCS injection line.

Include the requested information in the NPM Short-Term Transient Analysis Report or other appropriate documentation in the design certification application.