June 22, 2021 Docket No. 99902078

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Submittal of Presentation Materials Entitled "NRC Public Meeting: Response to Request for Additional Information 9833 for the NuScale Topical Report, 'Building Design and Analysis Methodology for Safety-Related Structures,' TR-0920-71621, Revision 0," PM-103825

REFERENCE: U.S. Nuclear Regulatory Commission, "Final Request for Additional Information No.0002 (eRAI 9833 and 9834)," dated May 10, 2021 (ML21130A563)

NuScale Power, LLC (NuScale) requested a meeting with the NRC technical staff on June 24, 2021, to discuss the response to Request for Additional Information 9833 for the "Building Design and Analysis Methodology for Safety-Related Structures" topical report. The purpose of this submittal is to provide presentation materials to the NRC for use during this meeting.

The enclosure to this letter is the nonproprietary presentation entitled "NRC Public Meeting: Response to Request for Additional Information 9833 for the NuScale Topical Report, 'Building Design and Analysis Methodology for Safety-Related Structures,' TR-0920-71621, Revision 0," PM-103825.

This letter makes no regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions, please contact Liz English at 541-452-7333 or at eenglish@nuscalepower.com.

Sincerely,

Mark W. Shaver

Mark W. Shaver
Manager, Licensing
NuScale Power, LLC

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Enclosure: "NRC Public Meeting: Response to Request for Additional information 9833 for the NuScale Topical Report, 'Building Design Analysis Methodology for Safety-Related Structures,' TR-0920-71621, Revision 0," PM-103825

Enclosure:

"NRC Public Meeting: Response to Request for Additional Information 9833 for the NuScale Topical Report, 'Building Design and Analysis Methodology for Safety-Related Structures,' TR-0920-71621, Revision 0," PM-103825

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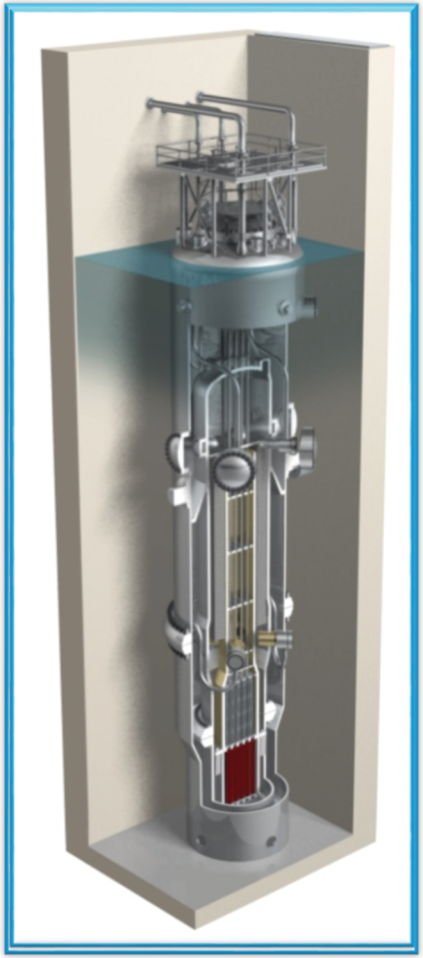
NRC Public Meeting



Response to Request for Additional Information 9833 for the NuScale Topical Report, "Building Design and Analysis Methodology for Safety-Related Structures," TR-0920-71621, Revision 0

June 24, 2021

PM-103825
Revision: 0

Template #: 0000-21727-F01 R6

Presenters

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Meeting Purpose

- Summarize and clarify NuScale RAI 9833 NTR-11 response
- NRC to gain understanding of and provide feedback on RAI 9833 NTR-11 response

RAI 9833 NTR-11

- **Request:** Staff requests the applicant to describe the basis for how to interpret Sections 8.5, 8.5.1 and 8.5.4 in determining the most appropriate section cut length.
- **Response:**
  - Section cuts determined according to the general guidelines of Section 8.5.1 are conservatively assigned a length that is limited to three times the member thickness.
  - Three times (3t) the slab thickness is an effective length of slab that is allowed by design codes to resist concentrated loads (e.g., slab supporting column loads).
  - Section cuts are also determined through finite element stress resultants according to Section 8.5.4. In this case, the section cut lengths can be justified to be longer than but need not be less than three times the member thickness unless the stress resultant changes sign along the cut or it is limited by openings.

RAI 9833 NTR-11, (continued)

- FEA output (forces/moments) is calculated at each node or element.
- Redistribution of forces and moments in a design section, if applicable, is part of post-processing.
- Wall/slab reinforcement design based on element-by-element demands can be overly conservative.
- Averaging FEA output along a path/cut to consider the redistribution of forces and moments from higher stressed regions to less stressed regions (ACI 349).

RAI 9833 NTR-11, (continued)

- Design codes (ACI 318, 349) do not establish rules or guidelines on how to properly average FEA output data.
- The designers are required to develop methodologies to post-process the force/stress output.
- Engineering judgement and interpretation of how to implement the design code is required and it could be challenging.
- ACI 349 implies critical section lengths for specific design conditions. The total force carried by a structural member can be distributed (averaged) over the critical section. The concept of critical section could be used while post-processing the FEA element forces.

RAI 9833 NTR-11, ACI 349-13

Critical section length based on ACI 349-13 and recommended averaging lengths

Demand	Critical Section Length Defined in ACI 349[1]	Relevant Code Provision in ACI 349	Recommended Averaging Length[1]
Axial Force (T_X, T_Y)	Width of bearing plus 4t[2]	Section 14.2.4	3t
OOP Bending Moment (M_X, M_Y)	3t	Section 13.5.3	3t
IP Twisting Moment (M_{XY})	3t	Section 13.5.3	3t
IP Shear Force (T_{XY})	l_w	Section 11.1	l_w
OOP Shear Force / Beam Action (N_X, N_Y)	Entire width, b_w	Section 11.11.1.1	3t
OOP Shear Force / Two-way Action (N_X, N_Y)	Perimeter of the critical section, b_0	Section 11.11.1.2	b_0

[1] t is the thickness of wall/slab, l_w is the horizontal length of wall/slab.
[2] The critical section length is center-to-center distance between two concentrated loads if it is less than width of bearing plus 4t.

RAI 9833 NTR-11, Summary

- 3t is not considered as a fixed value, instead it is used as a vehicle to convey the idea of force redistribution mechanism and the need for averaging design loads to alleviate potentially excessive conservatism.
- It should be recognized that above all, it is incumbent upon the engineer to validate and justify the use of 3t or other averaging lengths in all cases.

Acronyms

ACI	American Concrete Institute
FEA	Finite Element Analysis
NRC	U.S. Nuclear Regulatory Commission
NTR	NuScale Topical Report
RAI	Request for Additional Information
TR	Topical Report

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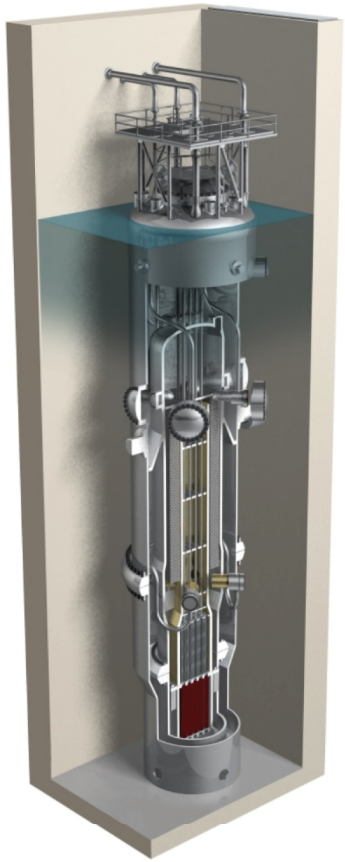

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