

## NuScaleDCRaisPEm Resource

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**From:** Cranston, Gregory  
**Sent:** Wednesday, January 03, 2018 11:01 AM  
**To:** RAI@nuscalepower.com  
**Cc:** NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Thomas, Vaughn; Park, Sunwoo; Vera Amadiz, Marieliz  
**Subject:** Request for Additional Information No. 317 RAI No. 9254 (3.7.2)  
**Attachments:** Request for Additional Information No. 317 (eRAI No. 9254).pdf

Attached please find NRC staff's request for additional information 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.

The NRC Staff recognizes that NuScale has preliminarily identified that the response to the question in this RAI is likely to require greater than 60 days.

NuScale is expected to provide a schedule for the RAI response by email within 14 days.

If you have any questions, please contact me.

Thank you.

Gregory Cranston, Senior Project Manager  
Licensing Branch 1 (NuScale)  
Division of New Reactor Licensing  
Office of New Reactors  
U.S. Nuclear Regulatory Commission  
301-415-0546

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**From:** Cranston, Gregory

**Created By:** Gregory.Cranston@nrc.gov

**Recipients:**

"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>  
Tracking Status: None  
"Lee, Samuel" <Samuel.Lee@nrc.gov>  
Tracking Status: None  
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>  
Tracking Status: None  
"Thomas, Vaughn" <Vaughn.Thomas@nrc.gov>  
Tracking Status: None  
"Park, Sunwoo" <Sunwoo.Park@nrc.gov>  
Tracking Status: None  
"Vera Amadiz, Marieliz" <Marieliz.VeraAmadiz@nrc.gov>  
Tracking Status: None  
"RAI@nuscalepower.com" <RAI@nuscalepower.com>  
Tracking Status: None

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## Request for Additional Information No. 317 (eRAI No. 9254)

Issue Date: 01/03/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 03.07.02 - Seismic System Analysis

Application Section: 03.07.02

### QUESTIONS

03.07.02-33

10 CFR 52.47(a)(20) requires that an application for Design Certification must include the information necessary to demonstrate that the standard plant complies with the earthquake engineering criteria in Appendix S to 10 CFR 50 that the required safety functions of structures, systems, and components (SSCs) must be assured during and after the vibratory ground motion associated with the Safe Shutdown Earthquake (SSE) through design, testing, or qualification methods.

In RAI 8936 Question 03.07.02-9, the staff requested the applicant to provide justification for the use of Eq. 3.7-17 in the NuScale DCD, Revision 0, in view of the guidance in DSRS Section 3.7.2 on accidental torsion. DCD Eq. 3.7-17 represents a methodology chosen by the applicant to account for the effect of accidental torsion. In its response, dated October 03, 2017 (ML17276B886), the applicant stated that (1) the methodology chosen to account for accidental torsion was to increase the maximum horizontal element forces by 5% and combine them with the maximum vertical forces by means of the square root of the sum of the squares (SRSS), and (2) because torsion is the product of force and distance, increasing the seismic forces by 5% is equivalent to increasing the eccentricity by 5%.

The staff reviewed the applicant's approach to addressing accidental torsion by increasing the horizontal element forces by 5% in lieu of increasing the eccentricity by 5%. The staff is unable to determine the validity of the applicant's approach that involves a uniform increase of horizontal element forces by 5% in contrast to the DSRS methodology that involves an increase of 5% torsional eccentricity on a floor level. DSRS 3.7.2, Acceptance Criteria II.11 specifies that, to account for accidental torsion, an additional eccentricity of plus or minus 5% of the maximum building dimension should be assumed for both horizontal directions and that the magnitude and location of the two eccentricities are determined separately for each floor elevation. The staff also notes that similar guidance on accounting for accidental torsion is available in industry standards; e.g., ASCE 4-16 specifies that the effect of accidental torsion be calculated at each floor level by static analysis assuming a torsional moment equal to the product of the story shear and 5% of the plan dimension perpendicular to the direction of motion of the structure at that level.

The staff finds that the applicant has not demonstrated that an eccentricity of 5% of the building dimension is equivalent to a 5% increase in the elemental horizontal forces. Therefore, the applicant is requested to provide additional information that provides the requested technical justification to demonstrate the equivalency to the DSRS methodology or conservatism in the method used by the applicant. Compliance with the DSRS is not a requirement; however, the applicant should identify differences between the analytical methods used for its design and the DSRS acceptance criteria and evaluate the technical acceptability of its methods. The applicant may choose to use a smaller model to illustrate the comparison of the results from the two approaches.