

#### UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555-0001

November 28, 2018

Mr. Thomas Bergman Vice President, Regulatory Affairs NuScale Power, LLC 1100 Circle Boulevard, Suite 200 Corvallis, OR 97330

# SUBJECT: ACCEPTANCE LETTER FOR THE REVIEW OF TOPICAL REPORT TR-0118-58005, "IMPROVEMENTS IN FREQUENCY DOMAIN SOIL-STRUCTURE-FLUID INTERACTION ANALYSIS," REVISION 0 (Docket No. 99902043)

Dear Mr. Bergman:

By letter dated July 26, 2018, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18208A361), NuScale Power, LLC (NuScale), submitted Topical Report (TR) TR-0118-58005, Revision 0, "Improvements in Frequency Domain Soil-Structure-Fluid Interaction Analysis," to the U.S. Nuclear Regulatory Commission (NRC) staff for review. In the letter, you indicated that the TR describes a frequency domain soil-structure-fluid interaction seismic analysis methodology using the Soil Library concept described in the TR. Furthermore, you also requested the NRC staff to review and approve this methodology.

The purpose of this letter is to inform you that TR-0118-58005 provides sufficient technical information for the NRC staff to conduct a detailed technical review. However, the NRC staff identified a number of areas that need further clarification and/or augmentation in the TR, which are identified in Enclosure 1. When the review commences, the NRC staff will hold a public meeting to discuss the areas described in Enclosure 1. If the NRC staff needs additional information to complete its review, it will issue formal requests for additional information (RAI) by separate correspondence.

Based on the time needed to hold the public meeting and review any feedback from that meeting, the NRC staff expects to issue its RAIs by April 30, 2019. If NuScale satisfactorily responds to the RAIs and resolves issues identified during the review process in a timely manner, the NRC staff expects to issue its advanced safety evaluation report on December 15, 2019. The NRC staff estimates that the review will require approximately 3,070 hours including technical staff, project management, and contractor support time.

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Section 170.21, "Schedule of fees for production or utilization facilities, review of standard referenced design approvals, special projects, inspections, and import and export licenses," of Title 10 of the *Code of Federal Regulations* requires that TRs are subject to fees based on the full cost of the review. You did not request a fee waiver; therefore, NRC staff hours will be billed accordingly.

If you have any questions, please contact the Project Manager, William Ward, at (301) 415-7038 or <u>William.Ward@nrc.gov</u>.

Sincerely,

/**RA**/

Samuel Lee, Chief Licensing Branch 1 Division of Licensing, Siting, and Environmental Analysis Office of New Reactors

Docket No. 99902043

Enclosure:

1. Acceptance Review Comments

cc: NuScale DC ListServ

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# U.S. NUCLEAR REGULATORY COMMISSION ACCEPTANCE LETTER FOR THE REVIEW OF TOPICAL REPORT TR-0118-58005, "IMPROVEMENTS IN FREQUENCY DOMAIN SOIL-STRUCTURE-FLUID INTERACTION ANALYSIS," REVISION 0 (99902043)

## **Acceptance Review Comments**

Based on its acceptance review, the U.S. Nuclear Regulatory Commission (NRC) staff identified a number of areas as needing further clarification and/or augmentation in Topical Report, TR-0118-58005, "Improvements in Frequency Domain Soil-Structure-Fluid Interaction Analysis," as follows:

- More detailed descriptions of the demonstration problems covered in the report, including details with respect to input time histories, soil profiles, structural models, *and analysis frequencies.*
- Augmentation of the set of demonstration/benchmark problems. Appropriately selected benchmark problems would allow for detection of technical issues or errors in software development. The applicant should prepare to engage in discussions of these topics such as bases for benchmark selections, key characteristics of soil-structure interaction (SSI) and fluid-structure interaction (FSI) to be validated in the computation through benchmarks, and the integration of SSI and FSI manifested in a real-world application. For example, the set of demonstration/benchmark should be augmented to include cases that are more representative of small modular reactor (SMR) designs; that use time history inputs compatible with, "Design Response Spectra for Seismic Design of Nuclear Power Plants," Regulatory Guide 1.60-like spectra; and that compare results from traditional lumped-mass System for Analysis of Soil-Structure Interaction (SASSI) analysis with consideration of fluid masses and results from the proposed Soil-Structure-Fluid Interaction (SSFI) approach, amongst others.
- Augmentation of the basis for the proposed frequency spacing and respective total number of frequencies and clarification of their scope of applicability.
- Clarifications with respect to the approach for addressing operating loads, thermal loads, and other concurrent loads consistent with the applicable codes and standards, and nonlinear seismic response effects such as those related to the nuclear plant module (NPM) seismic analysis.
- As the implementation process involves multiple standalone modules interfacing with one another, the staff expects it will need more information to understand the configuration management and quality controls which are in-place at the interface connections. The NRC staff may request that the applicant provide input decks and macros that are used for the implementation related to both SASSI and ANSYS computer codes sufficient to allow for the staff to perform an independent confirmatory check of benchmark analyses.