



June 04, 2018

Docket No. 52-048

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

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 408 (eRAI No. 9325) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 408 (eRAI No. 9325)," dated April 05, 2018

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9325:

- 15.00.02-1

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Paul Infanger at 541-452-7351 or at pinfanger@nuscalepower.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad".

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9325



Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9325

Response to Request for Additional Information Docket No. 52-048

eRAI No.: 9325

Date of RAI Issue: 04/05/2018

NRC Question No.: 15.00.02-1

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Section 47 (a)(2) states, “A description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.” Likewise, 10 CFR Part 50, Appendix K, II.4 – Required Documentation, requires that, “To the extent practicable, predictions of the evaluation model, or portions thereof, shall be compared with applicable experimental information.” Additionally, GDC-10 Reactor design states 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.

As stated in RG 1.203, an evaluation model (EM) is the calculational framework for evaluating the behavior of the reactor system during a postulated transient or design-basis accident. As such, the EM may include one or more computer programs, special models, and all other information needed to apply the calculational framework to a specific event, as illustrated by the following examples:

1. Procedures for treating the input and output information (particularly the code input arising from the plant geometry and the assumed plant state at transient initiation).
2. Specification of those portions of the analysis not included in the computer programs for which alternative approaches are used.
3. All other information needed to specify the calculational procedure.

The entirety of an EM ultimately determines whether the results are in compliance with applicable regulations. Therefore, the development, assessment, and review processes must consider the entire EM.

NRELAP5 code and input models used are key components of FSAR 15.0.2 "Review of Transient and Accident Analyses" results. The staff noted that NRELAP5 models that support the Chapter 15 accident analysis (including NRELAP5 analyses for FSAR Chapters 15.1.1



through 15.6.6) are built from a base model, EC-A010-1782 "NuScale NRELAP5 Module Basemodel," rev. 0, that did not address a large number of small changes in NuScale Power Module (NPM) geometry as contained in EC-A010-1507, rev 3 "Transient Model Input Parameters." It appears that the base model, EC-A010-1782, was built from EC-A010-1507, rev 0. NRC staff understands that the NuScale engineering change notice (ECNs) are designed to account for each NRELAP5 model document modification needed as changes or errors are identified that affect that document's inputs or results, however, it appears to NRC staff that many document changes are without ECNs. NRC staff is trying to understand (1) how the applicant plans to reconcile the changes made in the NPM design to the NRELAP5 analyses for FSAR Chapters 15.1.1 through 15.6.6 and (2) how NRC staff can determine that the analysis model results remain valid such that margins are understood and protected.

Please provide a description of all NRELAP5 analyses that support FSAR Chapters 6 and 15 and confirm that the geometry inputs used and results obtained include adequate margin per applicable requirements of GDC-10 and 10 CFR 52.47. Additionally, please provide a list of changes in NPM geometry, or other design changes, since EC-A010-1507, rev. 0 (which is bases of EC-A010-1782) to current Rev. 3 (including any later updates) so staff can better understand the design changes made.

NuScale Response:

NuScale has established and implements a process to control the design and design changes of items that are subject to the provisions of TR-1010-859-NP-A, Quality Assurance Program Description (QAPD), revision 3. The QAPD governs the development, procurement, testing, maintenance, and use of computer application and digital equipment software when used in safety-related applications and designated nonsafety-related applications. Computer program acceptability is pre-verified or the results verified with the design analysis for each application. Pre-verified computer programs are controlled using a software configuration management process.

The QAPD also governs the NuScale design process. The NuScale design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces within NuScale and with suppliers. These provisions assure that design inputs (such as design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions) so that the final design output can be related to the design input in sufficient detail to permit verification. Design change processes and the division of responsibilities for design-related activities are detailed in NuScale and supplier procedures. The design control program includes interface controls necessary to control the development, verification, approval, release, status, distribution, and revision of design inputs and outputs. Design documents are reviewed by individuals knowledgeable and qualified in Quality Assurance (QA) through education, experience, and training to ensure the documents contain



the necessary QA requirements. Design changes are reviewed and approved by the NuScale design organization or by other organizations so authorized by NuScale.

The NuScale QAPD, revision 3, was approved by the NRC in a letter and safety evaluation dated September 22, 2016 (ADAMS Accession No. ML16196A391).

The NRELAP5 model has undergone design changes from the original base model. EC-A010-1782, *Reactor Module NRELAP5 Model*, has been updated to Revision 1, dated August 31, 2017. This revision included geometry updates, flow loss updates, revised nodalization and other calculational modeling and assumption changes. EC-A010-1507, *System Transient Model Input Parameters Calculation*, remains at Revision 3, dated May 30, 2017. EC-A010-1782, Revision 1, includes the revised input from EC-A010-1507, Revision 3. Both of these documents are available for NRC inspection and audit.

The NuScale Power Module (NPM) design is evolving due to design changes, corrective action program changes, responses to NRC RAIs and other sources of change. To identify a specific list of changes in this RAI response is impractical as it would only be a snapshot in time that would be outdated in a short time. Because many elements of the design and analyses incur small changes, looking at any single change or group of changes is not representative of the overall impact to the NPM design. If NuScale determines that a change impacts the design or analysis results in a manner that will impact the NRC safety determination, then notification to the NRC is made.

The NuScale DCA FSAR is periodically updated based on NuScale RAI responses, corrections, clarifications, reanalysis and other design changes. NuScale is currently planning revisions to the FSAR Chapter 15 in fourth quarter 2018 and early 2019 that will provide confirmation that the cumulative effect of all design and analysis changes have no significant impact on the review acceptance criteria.

Impact on DCA:

There are no impacts to the DCA as a result of this response.