



December 21, 2017

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. 225 (eRAI No. 9058) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 225 (eRAI No. 9058)," dated September 14, 2017

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 Questions from NRC eRAI No. 9058:

- 10.02.03-1
- 10.02.03-2

As described in each of the enclosed responses, NuScale has determined that the use of shielding and barriers represents a more straightforward approach to safeguarding essential SSCs from turbine missiles than the probabilistic approach currently described in the DCA. NuScale anticipates providing revised FSAR sections for NRC staff review during the second quarter of 2018.

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 Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

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

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

Distribution: Gregory Cranston, NRC, OWFN-8G9A
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9058



RAIO-1217-57779

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9058

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

eRAI No.: 9058

Date of RAI Issue: 09/14/2017

NRC Question No.: 10.02.03-1

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 4, “Environmental and dynamic effects design bases,” states in part that structures, systems, and components important to safety shall be protected against environmental and dynamic effects, including the effects of missiles, that may result from equipment failure. Because turbine rotors rotate at relatively high speeds during normal reactor operation, failure of a rotor may result in the generation of high- energy missiles. To satisfy GDC 4, turbine rotor integrity must be maintained to minimize the probability of turbine rotor failure. Turbine rotor integrity is provided by the integrated combination of material selection, rotor design, fracture toughness requirements, tests, and inspections. This combination results in a low probability of rotor failure and generation of a turbine missile.

In order for the staff to determine whether the NuScale design meets these criteria with regard to effects of turbine missiles on components important to safety, the staff is requesting the following information.

NuScale FSAR, Tier 2, Section 10.2.4 states that “ITAAC are addressed in Section 14.3.”

However there are no Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) related to turbine rotor integrity/turbine missiles in Section 14.3 of the NuScale FSAR. The ITAAC are necessary since Nuscale FSAR Section 3.5.2 states the “RXB and CRB [Control Room Building] have not been credited to withstand turbine missiles.” The staff requests the NuScale FSAR, Tier 1 be revised to include ITAAC related to turbine rotor integrity/turbine missiles, consistent with other design certification such as in Appendix E to 10 CFR Part 52, as it relates to:

- Turbine rotor inspection program and turbine valve in-service inspection program which includes the scope, frequency, methods, acceptance and technical basis for inspection frequency.
- Turbine missile probability analysis meeting the applicable acceptance criteria
- As-built turbine material properties, turbine rotor and blade designs, preservice inspection and testing results and in- service testing and in-service inspection requirements meeting



the turbine missile probability analysis.

Or, provide adequate justification for why this information is not being provided in compliance with NRC regulations.

NuScale Response:

Since the issuance of this RAI, NuScale evaluated the method for complying with GDC 4 and determined that the use of shielding and barriers represents a more straightforward approach to safeguarding essential SSCs from turbine missiles. Consequently, the need for the ITAAC related to turbine rotor integrity is not applicable.

Regulatory Guide 1.115, Revision 2, Section B, "Protection against Turbine Missiles," cites turbine shielding as one of the principal means of safeguarding against turbine missiles.

Section C.2.d of Regulatory Guide 1.115 details the requirements for the use of barriers. It is NuScale's intent to utilize this methodology to safeguard essential SSCs. The FSAR will be revised to remove the probabilistic approach to turbine missile protection and updated to reflect compliance with the use of shielding and barriers.

Impact on DCA:

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

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

eRAI No.: 9058

Date of RAI Issue: 09/14/2017

NRC Question No.: 10.02.03-2

NuScale FSAR, Tier 2, Section 10.2.3.5 states “The inservice inspection and maintenance program for the turbine assembly complies with the manufacturer’s recommendations.” In addition, NuScale FSAR, Tier 2, Section 3.5.1.3 states “The turbine rotor inspection program along with the low probability of turbine missile generation provides assurance that safety related and risk significant SCCs are protected from the adverse effects of turbine missiles, consistent with GDC 4.” The turbine inspection and testing program is based on the turbine missile probability analysis that will be provided by a COL applicant. Therefore, to ensure that the turbine inspection and valve testing program meets the criteria of the turbine missile probability analysis, the staff requests that a COL Item regarding the turbine inspection and testing program for this specific turbine design be included in the NuScale FSAR that addresses:

- the submittal of a description of the turbine rotor inspection program and turbine valve testing program for the plant specific turbine that meets the criteria of the turbine missile probability analysis. It is noted that the turbine inspection and testing program is an operational program, and is subjected to reporting and implementation requirements, and therefore is usually not addressed in a bounding turbine missile probability analysis. The current COL Item 10.2-3 provides all the necessary information to be addressed in the analysis, taking into consideration assumption of the inspection and testing program. A separate COL Item should be included that addresses the operational program, which is the turbine maintenance inspection and testing program. An example of a COL Item for an operational program, used in other applications could look like the following:

Turbine Maintenance Inspection and Testing Program. The COL applicant shall provide the site-specific turbine rotor inservice inspection program, including the inspection interval, and the turbine valve test and inspection program, including the test and inspection frequency consistent with the manufacturer’s turbine missile probability analysis.

NuScale Response:

Since the issuance of this RAI, NuScale evaluated the method for complying with GDC 4 and determined that the use of shielding and barriers represents a more straightforward approach to safeguarding essential SSCs from turbine missiles. Consequently, the need for a turbine inspection and valve testing program related to turbine rotor integrity is not applicable.

Regulatory Guide 1.115, Revision 2, Section B, “Protection against Turbine Missiles,” cites turbine shielding as one of the principal means of safeguarding against turbine missiles.

Section C.2.d of Regulatory Guide 1.115 details the requirements for the use of barriers. It is NuScale’s intent to utilize this methodology to safeguard essential SSCs. The FSAR will be revised to remove the probabilistic approach to turbine missile protection and updated to reflect compliance with the use of shielding and barriers.

Impact on DCA:

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