



March 13, 2019

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 Supplemental Response to NRC Request for Additional Information No. 202 (eRAI No. 8911) on the NuScale Design Certification Application

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 202 (eRAI No. 8911)," dated August 25, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 202 (eRAI No.8911)," dated January 31, 2019

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

The Enclosures to this letter contain NuScale's supplemental response to the following RAI Question from NRC eRAI No. 8911:

- 03.09.02-45

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 202 (eRAI No. 8911). NuScale requests that the proprietary version be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 3) supports this request. Enclosure 2 is the nonproprietary version of the NuScale response.

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

If you have any questions on this response, please contact Marty Bryan at 541-452-7172 or at mbryan@nuscalepower.com.

Sincerely,

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

Distribution: Gregory Cranston, NRC, OWFN-8H12
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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8911, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8911, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0319-64839



Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8911,
proprietary



Enclosure 2:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8911,
nonproprietary

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

eRAI No.: 8911

Date of RAI Issue: 08/25/2017

NRC Question No.: 03.09.02-45

10 CFR 50, Appendix A, GDC 2 requires systems, structures, and components important to safety be designed to withstand appropriate combinations of the effects of normal and accident conditions with the effects of natural phenomena including earthquake. TR-0916-51502-P, Rev. 0, Appendix C, Table C-1 (Summary of NuScale Power Module Component Interfaces) states that the reflector blocks and lower core plate are stacked and restrained in the horizontal direction with alignment pins. The reflector blocks and lower core plate are not restrained in the vertical direction other than by gravity. Tolerances and deformation between the mating parts allow some sliding to take place between parts. On the interface between the upper riser and lower riser, Table C-1 states that the lower riser conical section seats within the upper riser conical section. There are tolerances between the two interfacing components allowing them to pitch slightly. The upper riser is not restrained in the vertical direction other than by gravity and compression of the bellows which keeps the interface closed. The description is insufficient for staff to reach a safety finding. The applicant is requested to provide the following information:

1. Figure B-18 (vertical ISRS at top of the lower core plate) indicates that the maximum vertical acceleration at top of the lower core plate is about 1.6 g (i.e., spectral acceleration at the high frequency end of the ISRS) that exceeds gravity acceleration. Provide a discussion on the possibility of uplift between the reflector blocks as well as between the reflector blocks and the lower core plate under the maximum vertical acceleration and their consequence.
2. Provide the vertical ISRS and the maximum vertical acceleration at the interface between the upper riser and the lower riser. Provide a discussion on the possibility of uplift of the upper riser from the lower riser under the maximum vertical acceleration and their consequence.



Include the requested information in the NPM Seismic Report.

NuScale Response:

The response to RAI 8911 Question 03.09.02-45 was submitted by NuScale letter RAIO-0119-64380, dated January 31, 2019. In a subsequent followup public meeting with NRC on February 27, 2019, it was asked that the four questions below be addressed with a supplemental RAI response.

This information supplements that provided in the response to RAI 8911 Question 03.09.02-45.

Question 1) The RAI markup stated that forces due to Coulomb friction do not occur because uplift of the blocks is not sufficient to close the vertical gap above the reflector blocks. Provide the total uplifts of the blocks and the vertical gap above the reflector blocks.

NuScale response -

The distance between lower and upper core plates is $\{\{ \quad \quad \quad \}\}^{2(a),(c)}$. The height of the reflector blocks is nominally:

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 6)

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 5)

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 4)

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 3)

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 2)

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$ (height of block 1)

= $\{\{ \quad \quad \quad \}\}^{2(a),(c)}$

Therefore the vertical gap between the top of the reflector blocks and the bottom of the upper core plate is nominally:

$\{\{ \quad \quad \quad \}\}^{2(a),(c)}$

The closure of this gap is taken as the sum of the maximum enveloped uplifts of each reflector block from the block beneath it for the twelve seismic cases analyzed (the uplifts listed below do not occur at the same time in the transient run, therefore this summation is conservative):

$$\begin{aligned}
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 6 from block 5)} \\
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 5 from block 4)} \\
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 4 from block 3)} \\
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 3 from block 2)} \\
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 2 from block 1)} \\
 & \{ \{ \} \}^{2(a),(c)} \text{ (uplift of block 1 from lower core plate)} \\
 & = \{ \{ \} \}^{2(a),(c)}
 \end{aligned}$$

Accordingly, the $\{ \{ \} \}^{2(a),(c)}$ inch vertical gap above block 6 and below the upper core plate does not close.

Question 2) Confirm that the reflector block uplift distance and impact force on the fuel are the bounding values of the 12 seismic runs considering 130% NPM stiffness and Fourier node coupling between the core barrel and reflectors.

NuScale response -

Confirmed. The reflector block uplift distance and impact force on the fuel are the bounding values of the 12 seismic runs, four of which consider 130% NPM stiffness, and all of which use Fourier node coupling between the core barrel and reflectors.

Question 3) Which method is used in the contact analysis (e.g., Augmented Lagrangian or Penalty function)?

NuScale response -

The Augmented Lagrangian method is used in the contact formulation for the reflector blocks.

Question 4) Explain the meaning of reflector block rough contact surfaces in Figure 4-11 “Lower RVI to Reflector Contacts and Contact Mesh” and how they are considered in the impact analysis.

NuScale response -

The reflector block rough contact surfaces as discussed in revised Section 4.1.3.3 and as shown in Figure 4-11 “Lower RVI to Reflector Contacts and Contact Mesh” of TR-0916-51502 are the CONTA174 and TARG170 elements created on the mating surfaces of the reflector blocks. The contact formulation is specified as “rough” in ANSYS in order to disallow lateral sliding in the analysis. The contact surfaces are physically constrained by the raised edges of the reflector blocks and by the pins between the lower core plate to the bottom reflector block.

Impact on DCA:

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



RAIO-0319-64838

Enclosure 3:

Affidavit of Zackary W. Rad, AF-0319-64839

NuScale Power, LLC
AFFIDAVIT of Zackary W. Rad

I, Zackary W. Rad, state as follows:

1. I am the Director, Regulatory Affairs of NuScale Power, LLC (NuScale), and as such, I have been specifically delegated the function of reviewing the information described in this Affidavit that NuScale seeks to have withheld from public disclosure, and am authorized to apply for its withholding on behalf of NuScale.
2. I am knowledgeable of the criteria and procedures used by NuScale in designating information as a trade secret, privileged, or as confidential commercial or financial information. This request to withhold information from public disclosure is driven by one or more of the following:
 - a. The information requested to be withheld reveals distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by NuScale competitors, without a license from NuScale, would constitute a competitive economic disadvantage to NuScale.
 - b. The information requested to be withheld consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), and the application of the data secures a competitive economic advantage, as described more fully in paragraph 3 of this Affidavit.
 - c. Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.
 - d. The information requested to be withheld reveals cost or price information, production capabilities, budget levels, or commercial strategies of NuScale.
 - e. The information requested to be withheld consists of patentable ideas.
3. Public disclosure of the information sought to be withheld is likely to cause substantial harm to NuScale's competitive position and foreclose or reduce the availability of profit-making opportunities. The accompanying Request for Additional Information response reveals distinguishing aspects about the method by which NuScale develops its power module seismic analysis.

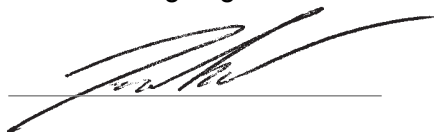
NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

The precise financial value of the information is difficult to quantify, but it is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.

If the information were disclosed to the public, NuScale's competitors would have access to the information without purchasing the right to use it or having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, and would deprive NuScale of the opportunity to exercise its competitive advantage to seek an adequate return on its investment.

4. The information sought to be withheld is in the enclosed response to NRC Request for Additional Information No. 202, eRAI 8911. The enclosure contains the designation "Proprietary" at the top of each page containing proprietary information. The information considered by NuScale to be proprietary is identified within double braces, "{{ }}" in the document.
5. The basis for proposing that the information be withheld is that NuScale treats the information as a trade secret, privileged, or as confidential commercial or financial information. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).
6. Pursuant to the provisions set forth in 10 CFR § 2.390(b)(4), the following is provided for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld:
 - a. The information sought to be withheld is owned and has been held in confidence by NuScale.
 - b. The information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or contractual agreements to maintain confidentiality.
 - c. The information is being transmitted to and received by the NRC in confidence.
 - d. No public disclosure of the information has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or contractual agreements that provide for maintenance of the information in confidence.
 - e. Public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 13, 2019.



Zackary W. Rad