



May 30, 2018

Docket: PROJ0769

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. 9438 (eRAI No. 9438) on the NuScale Topical Report, "Evaluation Methodology for Stability Analysis of the NuScale Power Module," TR-0516-49417, Revision 0

REFERENCES: 1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 9438 (eRAI No. 9438)," dated April 02, 2018
2. NuScale Topical Report, "Evaluation Methodology for Stability Analysis of the NuScale Power Module," TR-0516-49417, Revision 0, dated July 2016

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

The Enclosures to this letter contain NuScale's response to the following RAI Question from NRC eRAI No. 9438:

- 15.09-5

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 9438 (eRAI No. 9438). 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 Paul Infanger at 541-452-7351 or at pinfanger@nuscalepower.com.

Sincerely,

A handwritten signature in black ink that reads "Jennie Wike".

Jennie Wike
Manager, Licensing
NuScale Power, LLC

Distribution: Gregory Cranston, NRC, OWFN-8G9A
Samuel Lee, NRC, OWFN-8G9A
Bruce Bavol, NRC, OWFN-8G9A



Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9438, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9438, nonproprietary

Enclosure 3: Affidavit of Thomas A. Bergman, AF-0518-60223



RAIO-0518-60222

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9438, proprietary



Enclosure 2:

NuScale Response to NRC Request for Additional Information eRAI No. 9438, nonproprietary

Response to Request for Additional Information Docket: PROJ0769

eRAI No.: 9438

Date of RAI Issue: 04/02/2018

NRC Question No.: 15.09-5

In accordance with 10 CFR 50 Appendix A GDC 10, "Reactor design," 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. Appendix A GDC 12, "Suppression of reactor power oscillations," requires that oscillations be either not possible or reliably detected and suppressed. The SRP 15.0.2 acceptance criteria with respect to evaluation models includes the requirement that the chosen mathematical models and the numerical solution of those models must be able to predict the important physical phenomena reasonably well from both qualitative and quantitative points of view.

The staff reviewed the response to the original RAI, RAI 8870, and found that the response was insufficient for the staff to reach a conclusion regarding the adequacy of the stability analysis methodology. The following supplemental information is therefore requested:

- Provide a summary listing of the numerical results of the sensitivity studies described by the original RAI response. It is acceptable to respond to this request by providing these results as a table that in one column indicates the user input parameter for the subcooled boiling and a second column that provides the decay ratio.
 - Explain how the variation in the input parameter for subcooled boiling covers a sufficient range to account for the impact of bypass flow.
 - Compare the sensitivity of the decay ratio to the decay ratio uncertainty.
-

NuScale Response:

The response to the original RAI 8870 has been expanded in detail in the responses to RAI 9017 and RAI 8944. The basis of these responses has been the effect of subcooled boiling on the oscillations that follow an assumed depressurization transient. It is not possible to discern a decay ratio effect due to subcooled boiling model for perturbations starting from steady state because there is no subcooled boiling in the core except for at high power where the system is most stable.

{{

}}^{2(a),(c)}

Figure 1 Effect of subcooled boiling coefficient on flow

{{

}}^{2(a),(c)}

Figure 2 Effect of subcooled boiling coefficient on core exit void fraction

{{

}}^{2(a),(c)}

Figure 3 Effect of subcooled boiling coefficient on core power

Bullet Item 2

The range of variation of the subcooled boiling coefficient in the presented calculations is much wider than needed to account for core flow bypass. This effect can be scaled using the subcooled boiling inception enthalpy relationship given in the Stability Topical Report as Equation 5-66:

{{

}}^{2(a),(c)}

Considering that the effect of the flow reduction in the core due to bypass is equivalent to the same fractional change in power, this change can be compensated for by the same fractional change in the subcooled boiling coefficient.

For example, a core flow bypass of 10% can be compensated for by decreasing γ by 10%. This order of magnitude is much smaller than the range of γ values in the presented calculations, where the latter is meant to account for other effects such as core power distribution and



assuring conservatism of stability calculations by using the upper value of $\gamma = \{ \dots \}^{2(a),(c)}$.

Bullet Item 3

As presented above, there is no discernible effect of the subcooled boiling on decay ratio under normal operation.

Impact on Topical Report:

There are no impacts to the Topical Report TR-0516-49417, Evaluation Methodology for Stability Analysis of the NuScale Power Module, as a result of this response.



RAIO-0518-60222

Enclosure 3:

Affidavit of Thomas A. Bergman, AF-0518-60223

NuScale Power, LLC
AFFIDAVIT of Thomas A. Bergman

I, Thomas A. Bergman, state as follows:

1. I am the Vice President, 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 stability analysis of the NuScale power module.

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. 9438, eRAI No. 9438. 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 5/30/2018.



Thomas A. Bergman