



June 28, 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. 464 (eRAI No. 9504) on the NuScale Design Certification Application

**REFERENCE:** U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 464 (eRAI No. 9504)," dated May 03, 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 Enclosures to this letter contain NuScale's response to the following RAI Question from NRC eRAI No. 9504:

- 15.04.07-3

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 464 (eRAI No. 9504). 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](mailto:pinfanger@nuscalepower.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

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. 9504, proprietary



RAIO-0618-60689

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9504,  
nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0618-60690



**Enclosure 1:**

NuScale Response to NRC Request for Additional Information eRAI No. 9504, proprietary



**Enclosure 2:**

NuScale Response to NRC Request for Additional Information eRAI No. 9504, nonproprietary

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

**eRAI No.:** 9504

**Date of RAI Issue:** 05/03/2018

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**NRC Question No.:** 15.04.07-3

General Design Criterion (GDC) 10, "Reactor design," in Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs). GDC 13 requires the provision of instrumentation to monitor variables and systems over their anticipated ranges of normal operation, including the effects of AOOs, and of appropriate controls to maintain listed variables and systems within prescribed operating ranges.

According to TR-0915-17564-P, "Subchannel Analysis Methodology," which is incorporated by reference into the Final Safety Analysis Report (FSAR), the operating boundary conditions that are input into the subchannel analysis must account for measurement uncertainty. The staff understands that if biases are applied to parameters in the transient code input, biases for those parameters need not be applied in the subchannel analysis. However, when considering a steady-state analysis such as the inadvertent loading and operation of a fuel assembly in an improper position, the proper biases should be applied in the subchannel analysis. The staff audited engineering calculation (EC)-0000-2646, "Subchannel Analysis of Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position," which supports the conclusions in FSAR Section 15.4.7, and notes that the applied system pressure bias of {{ }}<sup>2(a),(c)</sup> is not consistent with the 70 psia bias specified in FSAR Tier 2, Table 15.0-6, "Module Initial Conditions Ranges for Design Basis Event Evaluation." Using a bias of the incorrect magnitude could produce non-limiting results for the minimum critical heat flux ratio (MCHFR) or linear heat generation rate evaluation. Therefore, please confirm whether the correct reactor coolant system pressure bias was applied in the subchannel analysis for this event. If it was not, either provide a revised analysis, or justify why the current analysis results remain valid. Update the FSAR as necessary.

In addition, the staff requests clarification of whether the {{ }}<sup>2(a),(c)</sup> bias in core inlet temperature listed in EC-0000-2646 is consistent with a 10°F bias in RCS average temperature, as specified in FSAR Tier 2, Table 15.0-6. If it is not, provide a revised analysis that uses a core inlet temperature bias consistent with a 10°F bias in reactor coolant system average temperature, or justify why the current analysis results remain valid. Update the FSAR as necessary.

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**NuScale Response:**

The subchannel analysis of the inadvertent loading and operation of a fuel assembly in an improper position event described in FSAR Section 15.4.7 was revised to include temperature and pressure biases consistent with FSAR Table 15.0-6. The pressure bias was revised to 70 psia and the core inlet temperature bias was revised to 10 °F and corresponds to the minimum reactor coolant system average temperature range specified in Table 15.0-6. Additionally, NuScale identified a deficiency in the calculation of the limiting radial peaking augmentation factor. Specifically, a methodology simplification resulted in not correctly identifying the limiting augmentation factor. The limiting augmentation factor was updated for the revised calculation of the minimum critical heat flux ratio. The peak linear heat generation rate and the minimum critical heat flux ratio were updated as shown in the markup provided with this response.

**Impact on DCA:**

FSAR Table 15.4-20 has been revised as described in the response above and as shown in the markup provided with this response.

RAI 15.04.07-3

**Table 15.4-20: Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position (15.4.7) - Limiting Analysis Results**

Acceptance Criteria	Limit	Analysis Value
MCHFR	1.284	<del>2.410</del> <u>1.916</u>
Peak LHGR	21.22 kW/ft	<del>7.348</del> <u>7</u> kW/ft



RAIO-0618-60689

**Enclosure 3:**

Affidavit of Zackary W. Rad, AF-0618-60690



**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 accident 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. 464, eRAI 9504. 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 June 28, 2018.



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Zackary W. Rad