



July 13, 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. 476 (eRAI No. 9489) on the NuScale Design Certification Application

**REFERENCE:** U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 476 (eRAI No. 9489)," dated May 14, 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. 9489:

- 15-20

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 476 (eRAI No. 9489). 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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RAIO-0718-60858

Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9489, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9489, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0718-60883

NuScale Power, LLC

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RAIO-0718-60858

**Enclosure 1:**

NuScale Response to NRC Request for Additional Information eRAI No. 9489, proprietary



**Enclosure 2:**

NuScale Response to NRC Request for Additional Information eRAI No. 9489, nonproprietary

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

eRAI No.: 9489

Date of RAI Issue: 05/14/2018

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### NRC Question No.: 15-20

Title 10 of the Code of Federal Regulations (10 CFR) Part 52, Section 47 require a final safety analysis report (FSAR) to analyze the design and performance of the structures, systems, and components (SSCs). Safety evaluations, performed to support the FSAR, include accident analyses to (1) demonstrate that specified acceptable fuel design limits (SAFDLs) are not exceeded during normal operation, including the effects of anticipated operational occurrences (AOOs), and (2) determine the number of fuel failures associated with critical heat flux (CHF) that need to be included in the radiological consequences for postulated accidents.

As the return to power analysis in FSAR 15.0.6 can occur, assuming a stuck rod, within a few hours from either an AOO or postulated accident initiating event, the AOO acceptance criteria of GDC 10 applies. GDC 10, Reactor design, requires that the reactor core and associated coolant, control, and protection systems be designed with appropriate margin to ensure that SAFDLs are not exceeded during any condition of normal operation, including the effects of AOOs.

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}}<sup>2(a),(c)</sup>.

Therefore, the staff is requesting additional information such as which terms in the CHF correlation are responsible for the sensitivity of MCHFR to the valve actuation timing in order to confirm that the acceptance criteria are met.

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### NuScale Response:

The sensitivity study performed in the original analysis has been expanded from 3 to 500 cases to more clearly identify the impact Emergency Core Cooling System (ECCS) actuation timing has on minimum critical heat flux ratio (MCHFR). It is noted that several unrelated changes are also applied. As identified in the response to RAI 9487, Question 15-5, letter number RAIO-0718-60857, dated July 13, 2018, a top peaked axial power shape is more limiting for the return to power MCHFR evaluation and is applied in the results below. Additionally, an error in the implementation of the maximum radial peaking factor was corrected. Finally, the NRELAP5 time



step was reduced around the time of ECCS actuation. Results are presented in Figure 1 which plots MCHFR for each sensitivity case against ECCS actuation time. For reference, peak power occurs at 7897 seconds when no ECCS actuation is modeled.

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}}<sup>2(a),(c)</sup>

Figure 1 shows that the limiting ECCS actuation timing occurs nearly simultaneous to the power peak. It is noted that variations in MCHFR are observed for minor changes in ECCS actuation time. This is attributed to small differences in the NRELAP5 solution between these cases.

Overall, these variations are minor with less than {{ }}<sup>2(a),(c)</sup> difference in MCHFR for cases near the time of the power peak. These variations are considered acceptable as the broader trend clearly identifies the limiting ECCS actuation timing near the power peak and the variation in MCHFR is small relative to the overall margin to the design acceptance limit. This sensitivity study coupled with the calculated CHF margin, is used to support the conclusion that actuating ECCS near the time of the temperature driven power peak will produce a sufficiently limiting calculation result.

Further description of the Extended Hench Levy CHF correlation can be found in Section 6.11 of the Loss-of-Coolant Accident Evaluation Model (TR-0516-49422-P).



**Impact on DCA:**

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



RAIO-0718-60858

**Enclosure 3:**

Affidavit of Zackary W. Rad, AF-0718-60883

**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 process and method by which NuScale develops its safety analysis of the NuScale Power Module.

NuScale has performed significant research and evaluation to develop a basis for this process and 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 RAI No. 476, eRAI No. 9489. 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 July 13, 2018.



Zackary W. Rad