RAIO-0718-60870



July 12, 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. 477 (eRAI No. 9488) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 477 (eRAI No. 9488)," 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. 9488:

• 15-21

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 477 (eRAI No. 9488). 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,

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

Distribution: Gregory Cranston, NRC, OWFN-8G9A Samuel Lee, NRC, OWFN-8G9A Rani Franovich, NRC, OWFN-8G9A



Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9488, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9488, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0718-60871



Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9488, proprietary



Enclosure 2:

NuScale Response to NRC Request for Additional Information eRAI No. 9488, nonproprietary



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

eRAI No.: 9488 Date of RAI Issue: 05/14/2018

NRC Question No.: 15-21

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 General Design Criterion (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 assure that SAFDLs are not exceeded during any condition of normal operation, including the effects of AOOs.

Staff audited the return to power analysis in EE-0000-4820, which supports the results summarized in FSAR 15.0.6, and makes a statement that the event is only analyzed starting from the hot zero power (HZP) condition as the reactor coolant system (RCS) level would drop below the riser thereby reducing the effectiveness of the DHRS driven cooldown if started from a higher initial core power level. {{

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

indicates that a higher initial core power level would still preserve the maximum decay heat removal system (DHRS) cooldown capability while having a more negative moderator temperature coefficient (MTC). The combination of preserving the maximum DHRS cooldown rate with a more negative MTC will likely increase the peak return to power and lead to a lower minimum critical heat flux ratio MCHFR. Therefore, the staff is requesting additional justification as to why the limiting MCHFR return to power analysis is evaluated only starting at HZP or provide additional analysis starting at a bounding initial core power level.



NuScale Response:

The overcooling return to power analysis conservatively applies the moderator temperature coefficient (MTC) associated with zero initial reactor coolant system (RCS) boron concentration thereby removing the power-related boron influence on MTC from the analysis. The core configuration of 0 ppm boron and 420°F would result in greater than zero percent power at all points in the fuel cycle. However, these conditions are conservatively postulated at zero percent power to ensure a bounding result. The reactivity insertion associated with initiating the event from a higher power level and associated higher coolant temperature and then cooling to the hot zero power condition (HZP) is accounted for by meeting the required shutdown margin which accounts for the temperature defect down to HZP. Generation of the MTC for use in the overcooling return to power analysis involves iterating the hot full power core configuration through a temperature range. The analyzed MTC (-15 pcm/°F) is less negative than the hot full power MTC limit (-43 pcm/°F), however, the difference is solely based on the non-linear change in density between the hot full power temperature (545°F) and the HZP temperature (420°F). Additional conservatism is built in by applying constant -15 pcm/°F MTC to the analysis when the MTC actually continues to drop due to the decreased change in moderation from a more constant coolant density at lower temperatures. The actual MTC at the time of the return to power would be less than -10 pcm/°F.

Impact on DCA:

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

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Enclosure 3:

Affidavit of Zackary W. Rad, AF-0718-60871

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.
- 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 profitmaking 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 No. 477, eRAI No. 9488. 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 12, 2018.

Zackary W. Rad