RAIO-1118-63585

November 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 Supplemental Response to NRC Request for Additional Information No. 474 (eRAI No. 9507) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 474 (eRAI No. 9507)," dated May 11, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 474 (eRAI No.9507)," dated July 10, 2018

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. 9507:

- 15.04.01-6

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 474 (eRAI No. 9507). 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 Supplemental Response to NRC Request for Additional Information eRAI No. 9507, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9507, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-1118-63586

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9507, proprietary

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

Enclosure 2:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9507, nonproprietary

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

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

eRAI No.: 9507
Date of RAI Issue: 05/11/2018

NRC Question No.: 15.04.01-6

GDC 10 requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that SAFDLs are not exceeded during any condition of normal operation, including the effects of AOOs. SRP Section 15.4.1 provides the staff guidance in determining compliance with GDC 10 and states that the power distribution or peaking factors used in the neutron kinetics and hot pin thermal calculations must provide a conservative representation of the control rod configuration under consideration.

It is not clear from FSAR Section 15.4.1 whether limiting axial and radial power shapes were used in the subchannel analysis for this event. Furthermore, from the staff's audit of {{ }}$^{2(a),(c)}$ which supports the conclusions in FSAR Section 15.4.1, it appears the axial power shape used for the analysis corresponds to the 25% power shape in {{ }}$^{2(a),(c)}$ Justify use of the 25% power shape for this event that initiates at 1 MW, and confirm that the subchannel analysis used the limiting axial and radial power shapes. Update the FSAR as necessary, and include a statement that the limiting axial and radial power shapes were used.

NuScale Response:

This response is a clarification to the response to RAI 9507, question 15.04.01-6, submitted to the NRC in NuScale letter RAIO-0718-60823, dated July 10, 2018.

The following text was included in the original response.

"The limiting axial power shape utilized in the MCHFR evaluation for this event corresponds to a 25% power derived shape. This axial power shape is more limiting than the axial power shapes generated that correspond to power levels less than 25% because it contains axial node peaking values with a higher magnitude in more thermal-hydraulically limiting axial locations. The 25% axial power shape evaluated provides more limiting MCHFR results for a given set of NuScale thermal-hydraulic conditions compared to the other lower power shapes and was thus utilized in this event for conservatism."

This text is modified to read:

The limiting axial power shape utilized in the MCHFR evaluation for this event corresponds to a generic and bounding 25% power derived shape. This limiting generic axial power shape applied for the transient progression is more conservative than the axial power shape corresponding to the event-specific initial condition because it contains axial node peaking values of higher magnitude in more thermal-hydraulically limiting axial locations. The event-specific axial power shape is limiting when evaluated at initial conditions (hot zero power), and is conservative for the entire transient. The MCHFR-limiting, generic axial power shape from 25% power is applied for this event and adds additional conservatism compared to that specified in the subchannel analysis methodology (TR-0915-17564).

This change is made in order to provide additional clarification about the use of a limiting axial power shape and corresponding conditions for the uncontrolled control rod assembly withdrawal from subcritical or lower power event. The radial power shape is applied conservatively in accordance with the methodology.

In addition, a minor change to correct the location of a footnote in Table 15.0-7 of the NuScale FSAR was made as indicated in the markup at the end of this response.

Impact on DCA:

Table 15.0-7 been revised as described in the response above and as shown in the markup provided with this response.

RAI 15.00.02-20, RAI 15.01.01-2, RAI 15.04.01-4, RAI 15.04.01-6S1

Table 15.0-7: Analytical Limits and Time Delays

Signal	Analytical Limit	Basis and Event Type	Actuation Delay
High Power	120%(5) rated thermal power (RTP) (≥ 15% RTP) 25% RTP (<15% RTP)	This signal is designed to protect against exceeding critical heat flux (CHF) limits for reactivity and overcooling events.	2.0 sec
Source and Intermediate Range Log Power Rate	3 decades/min(6)	This signal is designed to protect against exceeding CHF and energy deposition limits during startup power excursions	Variable
High Power Rate	±15% RTP/min	This signal is designed to protect against exceeding CHF limits for reactivity and overcooling events.	2.0 sec
High Startup Range Count Rate	5.0 E+05 counts per second(6)	This signal is designed to protect against exceeding CHF and energy deposition limits during rapid startup power excursions.	3.0 sec
High Subcritical Multiplication	3.2	This signal is designed to detect and mitigate inadvertent subcritical boron dilutions in operating modes 2 and 3.	150.0 sec
High Reactor Coolant System (RCS) Hot Temperature	610°F	This signal is designed to protect against exceeding CHF limits for reactivity and heatup events.	8.0 sec
High Containment Pressure	9.5 psia	This signal is designed to detect and mitigate RCS or secondary leaks above the allowable limits to protect RCS inventory and emergency core cooling system (ECCS) function during these events.	2.0 sec
High Pressurizer Pressure	2000 psia	This signal is designed to protect against exceeding reactor pressure vessel (RPV) pressure limits for reactivity and heatup events.	2.0 sec
High Pressurizer Level	80%	This signal is designed to detect and mitigate chemical and volume control system (CVCS) malfunctions to protect against overfilling the pressurizer.	3.0 sec
Low Pressurizer Pressure	1720 psia(1)	This signal is designed to detect and mitigate primary high energy line break (HELB) outside containment and protect RCS subcooled margin for protection against instability events.	2.0 sec
Low Low Pressurizer Pressure	1600 psia(2)	This signal is designed to detect and mitigate primary HELB outside containment and protect RCS subcooled margin for protection against instability events.	2.0 sec
Low Pressurizer Level	35%	This signal is designed to protect the pressurizer heaters from uncovering and overheating during decrease in RCS inventory events.	3.0 sec
Low Low Pressurizer Level	20%	This signal is designed to detect and mitigate loss-of-coolant accidents (LOCAs) to protect RCS inventory and ECCS functionality during LOCA and primary HELB outside containment events.	3.0 sec
Low Low Main Steam Pressure	100 psia (at ≤15% RTP)	This signal is designed to detect and mitigate secondary HELB outside containment to protect steam generator inventory and decay heat removal system (DHRS) functionality.	2.0 sec
Low Main Steam Pressure	300 psia (at >15% RTP)	This signal is designed to detect and mitigate secondary HELB outside containment to protect steam generator inventory and DHRS functionality.	2.0 sec

Enclosure 3:

Affidavit of Zackary W. Rad, AF-1118-63586

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 safety analysis.

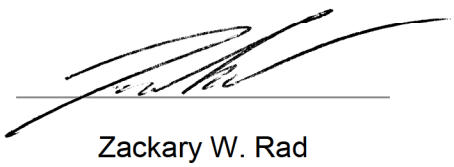
    NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

    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. 474, eRAI No. 9507. 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 November 28, 2018.



Zackary W. Rad