RAIO-1118-63606

November 29, 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. 456 (eRAI No. 9478) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 456 (eRAI No. 9478)," dated May 01, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 456 (eRAI No.9478)," dated June 29, 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. 9478:

- 15.01.05-2

Enclosure 1 is the proprietary version of the NuScale Supplemental Response to NRC RAI No. 456 (eRAI No. 9478). 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.

The technical report TR-0516-49416 “Non-Loss-of-Coolant Accident Analysis Methodology" contained export controlled information. The markup page in the enclosed RAI response for TR-0516-4916 is therefore labeled “Export Controlled,” although the markup page does not contain any export controlled information.

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. 9478, proprietary

Enclosure 2: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9478, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-1118-63607

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9478, proprietary

Enclosure 2:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9478, nonproprietary

Response to Request for Additional Information
Docket: PROJ0769

eRAI No.: 9478
Date of RAI Issue: 05/01/2018

NRC Question No.: 15.01.05-2

In accordance with 10 CFR 52.47(a)(2)(iv)(A) and 10 CFR 52.47(a)(2)(iv)(B), an evaluation and analysis of the postulated fission product release events must demonstrate that a dose to an individual at any point on the boundary of the exclusion area for any 2-hour period following the onset of the postulated fission product release will not exceed 25 roentgen equivalent man (rem) total effective dose equivalent (TEDE), and that a dose to an individual at any point on the outer boundary of the low population zone (LPZ) shall not exceed 25 rem TEDE from exposure to the radioactive cloud resulting from the postulated fission product release.

To meet the requirements mentioned above, as they relate to the steam system piping failure events, the accident analysis should assume initial conditions and input parameters that maximize the severity of the accident by maximizing the mass and energy release out of the break.

In Final Safety Analysis Report (FSAR) Tier 2, Section 15.1.5.3.2, "Input Parameters and Initial Conditions," under the "[steam line break (SLB)] Cases Resulting in Limiting Radiological Consequences" heading, the applicant states that, for the two limiting radiological consequences cases it analyzed, nominal intial conditions are used. The staff understands that biasing certain initial conditions, within their uncertainty ranges and tolerances, can exacerbate the severity of the event. Based on the docketed information, the staff cannot understand why the applicant's current assumptions (i.e. nominal initial conditions) make the event limiting with respect to maximizing the mass and energy release through the break. The staff requests the applicant to justify in the FSAR its current assumptions of using nominal initial conditions as opposed to using conservatively biased initial conditions for the limiting radiological consequences SLB case. If justification cannot be provided, the staff requests the applicant to provide in the FSAR the results of a limiting radiological consequences SLB case that utilizes

conservatively biased initial conditions and input parameters. The staff requests the applicant to make changes to the FSAR as necessary.

NuScale Response:

On October 30, 2018, NuScale and the NRC held a conference call to discuss NuScale's responses to RAI 9478 - 15.01.05-2. In that conference call NuScale stated its intention to supplement the response to this RAI response with the following information:

a. Describe the biases used for determination of the maximum radiological dose for the steam line break event and ensure that the Non-loss of coolant accident (Non-LOCA) licensing topical report (LTR) and the Final Safety Analysis Report (FSAR) are consistent in their description. From the discussion it appears that the LTR uses a high biased SG pressure, whereas the FSAR uses a nominal SG Pressure.
b. Clarify that a spectrum of steam line breaks are analyzed to determine limiting break size. Add information that describes that maximum dose occurs when the time between reactor trip and containment isolation is longer and that biasing maximum mass loss rate (i.e. larger break size) may not be limiting.

Each issue is addressed separately below:

a. NuScale has determined that the Non-LOCA LTR requires revision to clarify the discussion concerning biases used for the steam line break (SLB) event. Specifically, the LTR had identified high steam pressure and high RCS temperature as conservative biases for maximizing the break mass flowrate in Table 7-24 of the LTR. The sensitivity calculations supporting FSAR had identified that smaller breaks resulted in a larger integral mass release which is worse from a radiological release perspective. The Non-LOCA LTR has been modified to specify that steam pressures and RCS temperatures are varied rather than specifying a specific conservative bias direction, to maximize mass release and to ensure consistency with the limiting cases presented in the FSAR.

b. The first paragraph of Section 7.2.4.1 of the non-LOCA LTR states:

The steam line break event ranges from small breaks to double ended ruptures of a main steam line causing an increase in steam flow and an over cooling of the RCS.

In addition, Table 7-25 provides results from a spectrum of SLB sizes consistent with this definition of the analysis scope. Of the two cases presented in the FSAR, one (7.5% SLB) is identified as the maximum iodine spiking event where the time between reactor trip and CNV isolation is maximized. The other case (5% SLB) is the maximum break size that is undetectable, similar but more severe than the 2% case presented in Table 7-25 of the LTR. Identification of these two radiological cases of interest is described in Section 4.3.6 of the LTR. Therefore, NuScale has verified that a spectrum of steam line breaks were analyzed to determine limiting break size. Consistent with the LTR the limiting cases were presented in the FSAR.

The following markups to the Non-LOCA TR ensure consistency between the LTR and the calculations supporting the FSAR.

Impact on Topical Report:

Topical Report TR-0516-49417, Evaluation Methodology for Stability Analysis of the NuScale Power Module, Table 7-24 has been revised as described in the response above and as shown in the markup provided in this response.

Table 7-24 Initial conditions, biases, and conservatisms – steam line break

Parameter	Bias / Conservatism	Basis
Initial reactor power	Biased upwards to account for measurement uncertainty.	{{ }}2(a)(c)
Initial RCS average temperature	~~Biased to the high condition~~Varied.	{{ }}2(a)(c)
Initial RCS flow rate	Biased to the low condition.	{{ }}2(a)(c)
Initial PZR pressure	Varied	{{ }}2(a)(c)
Initial PZR level	Varied	{{ }}2(a)(c)
Initial feedwater temperature	Varied.	{{ }}2(a)(c)
Initial fuel temperature	Biased to the low condition.	{{ }}2(a)(c)
~~Moderator temperature coefficient~~MTC	Both EOC and BOC conditions.	{{ }}2(a)(c)
Kinetics	Both EOC and BOC conditions.	{{ }}2(a)(c)
~~Automatic rod control~~	~~Enabled or disabled~~	~~{{~~ ~~}}2(a)(c)~~
Decay heat	Both high and low conditions	{{ }}2(a)(c)
Initial SG pressure(1)	~~Biased to the high condition~~Varied.	{{ }}2(a)(c)
SG heat transfer	Varied.	{{ }}2(a)(c)

Enclosure 3:

Affidavit of Zackary W. Rad, AF-1118-63607

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 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. 456, eRAI 9478. 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 29, 2018.

Zackary W. Rad