RAIO-0718-61064

July 24, 2018

Docket: PROJ0769

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. 9374 (eRAI No. 9374) on the NuScale Topical Report, "Non-Loss of Coolant Accident Analysis Methodology," TR-0516-49416, Revision 1

REFERENCES:

1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 9374 (eRAI No. 9374)," dated May 09, 2018
2. NuScale Topical Report, "Non-Loss of Coolant Accident Analysis Methodology," TR-0516-49416, Revision 1, dated August 2017
3. NuScale Power, LLC Response to NRC "Request for Additional Information No. 9374 (eRAI No. 9374)," dated July 9, 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. 9374:

- 15.00.02-28

The response schedule for the remaining questions of RAI No. 9374, eRAI 9374 were provided in emails to NRC (Greg Cranston) dated June 19 and July 9, 2018.

Enclosure 1 is the proprietary version of the NuScale Response to NRC RAI No. 9374 (eRAI No. 9374). 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. 9374, proprietary

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9374, nonproprietary

Enclosure 3: Affidavit of Zackary W. Rad, AF-0718-61065

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9374, 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 Response to NRC Request for Additional Information eRAI No. 9374, nonproprietary

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

NuScale Power™

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

eRAI No.: 9374
Date of RAI Issue: 05/09/2018

NRC Question No.: 15.00.02-28

TR-0516-49416-P supports the conclusions in the NuScale FSAR, which under 10 CFR 52.47 must describe the facility, present the design bases and the limits on its operation, and present a safety analysis of the structures, systems, and components and of the facility as a whole.

RG 1.203 describes the EMDAP, which the NRC staff considers acceptable for use in developing and assessing EMs used to analyze transient and accident behavior. Step 18 of the EMDAP discusses the preparation of input and performing of calculations to assess system interactions:

> *The ability of the EM to model system interactions should also be evaluated in this step, and plant input decks should be prepared for the target applications. Sufficient analyses should be performed to determine parameter ranges expected in the nuclear power plant.*

TR-0516-49416-P, Table 7-29 provides the NRELAP5 MCHFR results of parametric sensitivity studies for the loss of containment vacuum and containment flooding events:

- Rows 1 and 2 present the loss of containment vacuum sensitivity to initial containment pressure, {{ }}$^{2(a),(c)}$ Row 3 presents a containment flooding case that was performed for many of the same conditions as the loss of containment vacuum cases. Differences in the initial containment pressure and pool temperature for the Row 3 case preclude concluding that the loss of containment vacuum is not limiting.

- Rows 4 and 5 demonstrate the effect of different RCCW leakage flow rates on the MCHFR, {{ }}$^{2(a),(c)}$ It would be expected that a higher leakage rate would alter the containment atmosphere sufficiently to result in an increased magnitude of energy removal from the RCS compared to the lower leakage rate. TR Section 7.2.5.1 states:

  The potential CNV flooding sources considered are pipe ruptures inside the CNV.

{{

}}2(a),(c)

{{

}}2(a),(c)

It is not clear how different the reactor trip time would be for the higher leakage rate. At the higher leakage rate with the higher energy transfer, even with an earlier reactor trip time, it is not clear why {{

}}2(a),(c)

- Rows 7 and 8 present the effect of a change in the pressurizer pressure bias from HIGH to LOW, {{ }}2(a),(c) Rows 8 and 9 show the effect of a loss of power at reactor trip, {{

}}2(a),(c)

Based upon the results presented, the initial conditions and limiting bias conditions are not clear.

Information Requested:

a. Describe how the results in Row 3 of Table 7-29 would change with the initial CNV pressure and pool temperature biased LOW.

b. Provide a physical description of the transient difference between the low and high leakage rate cases (Table 7-29, Rows 4 and 5), explaining {{

}}2(a),(c)

c. Explain what physical transient response contributes to {{ }}2(a),(c) for the higher RCCW temperature (Table 7-29, Rows 5 and 6), and discuss how the reactor trip times and the integrated RCS energy transfer to the containment atmosphere at reactor trip differs for cases with lower RCCW temperatures.

d. Explain the transient response that contributes to {{ }}2(a),(c) for a lower pool temperature, and discuss how the reactor trip times and the integrated RCS energy transfer from the containment to the pool at reactor trip would differ for cases with a higher pool temperature.

e. Describe why the MCHFR for a containment flooding case similar to case 6 in TR Table 7- 29, but with pressurizer pressure biased LOW, would not be more limiting.

f. While the loss of containment vacuum cases (rows 1 and 2) which used the minimum containment pressure {{ }}$^{2(a),(c)}$, justify using the nominal containment pressure {{ }}$^{2(a),(c)}$ instead of the minimum for the containment flooding cases.

g. Update TR-0516-49416-P as necessary.

NuScale Response:

Response to request a):

The representative containment flooding cases presented in Non-Loss-of-Coolant Accident Analysis Methodology Topical Report (TR-0516-49416-P) Table 7-29 that were biased for Minimum Critical Heat Flux Ratio (MCHFR) (cases 4-10 or rows 4-10 in Table 7-29), consistent with the methodology described in Table 7-28, showed {{

}}$^{2(a)(c)}$ This phenomenon is evidenced by Figure 1 and Figure 2 below, which present the RPV heat loss and the reactor power response for cases 3-6 (Table 7-29), respectively. {{

}}$^{2(a)(c)}$ Therefore, a minimum initial CNV pressure bias would not appreciably change the transient results.

{{

Figure 1 Maximum RPV heat transfer }}2(a)(c)

{{

Figure 2 Maximum Reactor Power }}[2(a)(c)]

Response to request b) :

The only significant transient difference between cases 4 and 5 is that the {{

}}2(a)(c)

Response to request c) :

As described in the response to RAI request of part a), {{

}}2(a)(c)

Response to request d) :

As described in the response to RAI request c, {{

}}2(a)(c)

Response to request e) :

The differences in cases 7 and 8 are due to {{

}}2(a)(c)

Response to request f) :

As noted in the response to part a) of this request, {{

}}2(a)(c)

Response to request g) :

Since it was determined that the cases chosen with their associated combination of biases were sufficiently comprehensive and their transient progressions are well understood, no changes to TR-0516-49416-P were necessary.

Impact on DCA:

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

Enclosure 3:

Affidavit of Zackary W. Rad, AF-0718-61065

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

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 non-loss of coolant accident analysis methodology .

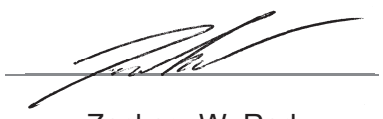
    NuScale has performed significant research and evaluation to develop a basis for this method and has invested significant resources, including the expenditure of a considerable sum of money.

    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. 9374, eRAI 9374. 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 24, 2018.



Zackary W. Rad