RAIO-0818-61527

August 23, 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. 446 (eRAI No. 9281) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 446 (eRAI No. 9281)," dated April 30, 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. 9281:

- 12.03-56

NuScale requests that the security-related information in Enclosure 1 be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. Enclosure 2 contains a public 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 Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

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

Distribution: Gregory Cranston, NRC, OWFN-8G9A
Samuel Lee, NRC, OWFN-8G9A
Getachew Tesfaye, NRC, OWFN-8H12

Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9281, nonpublic

Enclosure 2: NuScale Response to NRC Request for Additional Information eRAI No. 9281, public

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 Response to NRC Request for Additional Information eRAI No. 9281, nonpublic Security-Related Information - Withhold Under 10 CFR §2.390

Enclosure 2:

NuScale Response to NRC Request for Additional Information eRAI No. 9281, public

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

eRAI No.: 9281
Date of RAI Issue: 04/30/2018

NRC Question No.: 12.03-56

Regulatory Bases

10 CFR 52.47(a)(5) requires applicants to identify the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radiation exposures within the limits set forth in 10 CFR Part 20.

10 CFR 20.1101(b) states that "the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)." 10 CFR 20.1003 states that ALARA "means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest."

The DSRS Acceptance Criteria 12.3-12.4, "Radiation Protection Design Features," states that the areas inside the plant structures, as well as in the general plant yard, should be subdivided into radiation zones, with maximum design dose rate zones and the criteria used in selecting maximum dose rates identified. The DSRS Acceptance Criteria section of NuScale DSRS Section 12.2, "Radiation Sources," states that the applications should contain the methods, models, and assumptions used as the bases for all sources described in DCD Section 12.2.

Background

DCD Tier 2 Revision 0, Section 12.2.1.4, "Reactor Pool Cooling, Spent Fuel Pool Cooling and Pool Cleanup Systems," states that the pool cleanup system (PCUS) draws water from either the Spent Fuel Pool Cooling System (SFPCS) or the reactor pool cooling system (RPCS) and removes impurities to reduce radiation exposures and to maintain water chemistry and clarity. The DCA states that the RPCS and SFPCS heat exchangers are conservatively assumed to be

filled with reactor pool water even though the shell side is normally filled with site cooling water.

DCD Tier 2 Revision 0, Figure 12.3-1f, "Reactor Building Radiation Zone Map - 86' Elevation," shows the radiation zone for Spent Fuel Pool Heat Exchanger (SFPHX) as a radiation zone 0. DCD Table 12.3-1 shows that areas designated as radiation zone 0 have dose rates ≤ 0.05 mrem/hr.

However, the results of the independent analysis performed by the staff that included radiation contributions to the dose rate in the heat exchanger room from isotopes such as I-131, Cs-134, Cs-137, and Co-60 described in the application, and information made available to the staff as part of the staff's application review and the Chapter 12 Audit, appeared to differ by about a factor of 10. Therefore, the staff was unable to determine the bases for the designated radiation zone.

Key Issue

The staff is unable to determine that the information provided in DCA Subsection 12.2.1.4, and DCD Figure 12.3-1f, provides conservative estimates of the dose rates from components handling water containing the UHS pool source term.

Question

To facilitate staff understanding of the application information in support of its reasonable assurance review regarding radiation exposures, the staff requests that the applicant:

- Justify/explain the radiation zone designation of the SFPHX room,
- Provide/describe the methods, models, and assumptions used to develop the assumed dose rate used as the bases for the radiation zone designation,
- As necessary, revise DCD 12.2.14 and the associated radiation zone figures provided in DCD Section 12.3,

OR
Provide the specific alternative approaches used and the associated justification.

NuScale Response:

NuScale revised the shielding calculations, using the methods described in FSAR Section 12.3.2.3, which resulted in a revision to the radiation zone maps. The spent fuel pool heat exchangers are located in the Reactor Building on the 50' elevation (Room # 010-106), which is depicted in FSAR Figure 12.3-1c. The heat exchanger source term information is provided in FSAR Table 12.2-9. The heat exchangers were modeled assuming the internal volume is filled

with reactor pool water and not crediting the presence of site cooling water or internal metal components, such as the tubing. The area around the spent fuel pool heat exchangers is categorized as a radiation zone II, except during spent resin transfers, during which the area is categorized as a radiation zone IV.

Impact on DCA:

FSAR Figures 12.3-1a through 12.3-1i have been revised as described in the response above and as shown in the markup provided with this response.

RAI 12.03-56

Figure 12.3-1a: Reactor Building Radiation Zone Map - 24' Elevation

{{ Withheld - See Part 9 }}

RAI 12.03-56

Figure 12.3-1b: Reactor Building Radiation Zone Map - 35'-8" Elevation

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RAI 12.03-56

Figure 12.3-1c: Reactor Building Radiation Zone Map - 50' Elevation

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RAI 12.03-56

Figure 12.3-1d: Reactor Building Radiation Zone Map - 62' Elevation

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RAI 12.03-56

Figure 12.3-1e: Reactor Building Radiation Zone Map - 75' Elevation

{{ Withheld - See Part 9 }}

RAI 12.03-56

Figure 12.3-1f: Reactor Building Radiation Zone Map - 86' Elevation

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Figure 12.3-1g: Reactor Building Radiation Zone Map - 100' Elevation

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Figure 12.3-1h: Reactor Building Radiation Zone Map - 126' Elevation

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RAI 12.03-56

Figure 12.3-1i: Reactor Building Radiation Zone Map - 146' Elevation

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