



June 11, 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. 486 (eRAI No. 9296) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 486 (eRAI No. 9296)," dated June 01, 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 Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9296:

- 12.03-60

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Steven Mirsky at 240-833-3001 or at smirsky@nuscalepower.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad".

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

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9296



Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9296

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

eRAI No.: 9296

Date of RAI Issue: 06/01/2018

NRC Question No.: 12.03-60

Regulatory Basis

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 of 10 CFR Part 20.

Appendix A to Part 50—General Design Criteria for Nuclear Power Plants, Criterion 61—"Fuel storage and handling and radioactivity control," requires systems which may contain radioactivity to be designed with suitable shielding for radiation protection and with appropriate containment, confinement, and filtering systems.

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."

NuScale DSRS Section 12.3, "Radiation Protection Design Features," states in the specific acceptance criteria that areas inside the plant structures should be subdivided into radiation zones, with maximum design dose rate zones and the criteria used in selecting maximum dose rates identified.

Background

NuScale DCD Tier 2, Revision 0 Figure 12.3-1g, "Reactor Building Radiation Zone Map - 100' Elevation," shows that the area above the reactor pool area (Room 010-022 per DCD Figure 1.2-216, "Reactor Building 100'-0" Elevation"), as a Radiation Zone II. DCD Tier 2 Revision 0



Table 12.3-1, "Normal Operation Radiation Zone Designations," shows that areas designated as radiation zone II have dose rates ≥ 0.25 mrem/hr and ≤ 2.5 mrem/hr.

DCD Tier 2, Revision 0 Table 12.2-10, "Reactor Pool Cooling, Spent Fuel Pool Cooling, Pool Cleanup and Pool Surge Control System Component Source Terms - Radionuclide Content," provides the radionuclides concentration in the reactor pool water. Independent calculations of the dose rate from the ultimate heat sink pool water using the radionuclide concentrations listed in Table 12.2-10 column "Reactor Pool Water ($\mu\text{Ci}/\text{gram}$)," performed by the staff resulted in radiation zone designations higher than the radiation zone assigned to room 010-022 in DCD Figure 12.3-1 by the applicant.

Key Issue: The staff needs to understand the methods, models and assumptions used by the applicant to calculate the radiation zones depicted in DCD Chapter 12.3.

Question

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

1. Explain/justify the methods, models, and assumptions used to determine the aforementioned radiation zoning assignment.
2. As appropriate, identify other areas of the Reactor Building where the previous methods, models and assumptions, have been applied
3. As necessary, revise and update Section 12.3 of the NuScale DCD to accurately reflect plant radiation zones,

OR

Provide the specific alternative approaches used and the associated justification

NuScale Response:

To determine the maximum dose rate in the area above the reactor pool and spent fuel pool water using MCNP, a detector is placed 1 meter above the center of the pool, and determined that the dose rate is less than 5 mR/hr (per the EPRI PWR Primary Water Chemistry Guidelines, Volume 2; Section 3.5), but this area is normally inaccessible by plant personnel. To determine the maximum pool area dose rate in areas that are accessible by plant personnel, another detector is placed on the ledge of the spent fuel pool, and determined that the exposure rate is less than 2.5 mrem/hr (but, greater than 0.25 mrem/hr). The radiation zone designation for Room # 010-022 was based on the value developed for this accessible location.

In addition, an analysis was performed for an operator standing on the refueling bridge, and determined that the operator would be exposed to a dose rate less than 2.5 mrem/hr (per



ANSI/ANS 57.1-1992, Section 6.3.4.1.5; and ANSI/ANS 57.2-1983, Section 5.3.7).

Therefore, the selection of Radiation Zone II is appropriate for the air space above the spent fuel and reactor pools (Room # 010-022).

Impact on DCA:

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