



August 21, 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. 480 (eRAI No. 9297) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 480 (eRAI No. 9297)," dated May 14, 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. 9297:

- 12.03-59

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 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. 9297

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NuScale Response to NRC Request for Additional Information eRAI No. 9297

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

eRAI No.: 9297

Date of RAI Issue: 05/14/2018

NRC Question No.: 12.03-59

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) and 10 CFR 20.1003, require the use of engineering controls to maintain exposures to radiation as far below the dose limits in 10 CFR Part 20 as is practical. NuScale DSRS section 12.3 "Radiation Protection Design Feature," 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, subsection 12.3.2.4.1, "NuScale Power Module," states that the bioshield design is described in (DCD Tier 2) Section 3.7.3. DCD Tier 2 Revision 0, Table 3.7.3-12, "Bioshield Face Plate Self-Weight," in conjunction with DCD Tier 2 Revision 0 Figure 3.7.3-2, "Conceptual Bioshield Vertical Face Plate," depict the Bioshield Face plate as a hollow space covered by two, $\frac{1}{4}$ inch steel plates. The $\frac{1}{2}$ inch of steel plating described in table 3.7.3-12 appears to represent a limited amount of neutron, or gamma, shielding material.

NuScale DCA Tier 2 Revision 0, Table 3C-6: "Normal Operating Environmental Conditions,"

states that the 60 Years Integrated N Dose (Rads) for the area outside of the containment vessel and under the bioshield is 1.85E6 rads (3.7 rads/hour). Figure 12.3-1g depicts the areas under the bioshield as a radiation zone VI (dose rates ≥ 1 Rad/hr and ≤ 500 Rad/hr from Table 12.3-1). Because there is a minimal amount of radiation attenuating material between the Radiation Zone VI located under the Bioshield area and the area above the reactor pool area (Room 10-22,) the staff is challenged to understand the applicant's basis for designation of this area (Room 010-022) as a radiation zone II.

DCD Tier 2, Revision 0 subsection 12.3.2.3 "Calculation Methods," states that the primary computer program used to evaluate shielding and for dose rate determinations is MCNP6.

The dose rates and radiation zones listed in DCD subsection 12.3 are the basis of the information used to establish plant radiation protection design features, described in NuScale DSRS 12.3 "Acceptance Criteria." The DSRS Acceptance Criteria are used by the staff to check that the applicant's method for performing shield design calculations, including shield and source geometries, are realistic and consistent with the assumed source term. The acceptance criteria of DSRS 12.3 are consistent with the relevant requirements of 10 CFR Part 20 and 10 CFR Part 50 and 10 CFR Part 52.

Key Issue: In light of the specific examples noted above, the staff is concerned that radiation zones that are identified in the DCD may be inconsistent with sources of radiation that may emanate from adjacent areas. This could result in radiation zone definitions that do not reflect the maximum dose rate in the zone.

Question

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

- Explain/justify the methods, models, and assumptions, used to determine the aforementioned radiation zoning assignment.
- 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:

FSAR Figures 12.3-1a through 12.3-1i have been updated to provide radiation zone designations to locations with personnel access and areas used for equipment qualification. Room #010-022



does not meet either condition and the radiation zone designation has been removed.

As described in RAI 9281, the shielding calculations were revised using the methods described in FSAR Section 12.3.2.3. The updates to the Reactor Building radiation zone maps (FSAR Figures 12.3-1a through 12.3-1i) are provided with the NuScale response to RAI 9281 (Q12.03-56).

Impact on DCA:

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