RAIO-0818-61463

August 20, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Rockville, MD 20852-2738

**SUBJECT:** NuScale Power, LLC Response to NRC Request for Additional Information No. 493 (eRAI No. 8859) on the NuScale Design Certification Application

**REFERENCE:** U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 493 (eRAI No. 8859)," dated June 29, 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. 8859:

- 12.03-61

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
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 8859

**Enclosure 1:**

NuScale Response to NRC Request for Additional Information eRAI No. 8859

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

**eRAI No.:** 8859
**Date of RAI Issue:** 06/29/2018

**NRC Question No.:** 12.03-61
**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 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 12.3-2a,"Radioactive Waste Building Radiation Zone Map - 71' Elevation," shows that the "Class A/B/C HICS Storage Area," (Room 030-034 per DCD Figure 1.2- 28,"Radioactive Waste Building 71'-0" Elevation"), as a Radiation Zone VII. DCD Tier 2 Revision 0 Table 12.3-1,"Normal Operation Radiation Zone Designations," shows that areas designated as radiation zone VII have dose rates ≥ 500 Rad/hr, with no upper limit

specified. DCD Table 12.3-7,"Radioactive Waste Building Shield Wall Geometry," shows that the concrete thickness of interior walls of Room 030-034 are 36 inches, and the concrete thickness of the ceiling of Room 030-034 is 24 inches. DCD Figure 12.3-2a shows the adjacent room (identified on DCD 1.2-28 as room number 030-004, a "Tank Room,") as a radiation zone 1 area. Table 12.3-1 shows that areas designated as radiation zone I have dose rates ≥ 0.05 mrem/hr and ≤ 0.25 mrem/hr. The staff independent analysis of the stated dose rate in room 030- 034, and the attenuation provided by the concrete thickness between rooms 030-034 and 030-004, predicts higher radiation zones than those assigned by the applicant to room 030-004, even without considering any source terms specific to room 030-004.

In addition, on DCD Figure 12.3-2b,"Radioactive Waste Building Radiation Zone Map - 100' Elevation," in the area identified as "Truck Bay," (room 030-103 per DCD Figure 1.2-30, "Radioactive Waste Building 100'-0" Elevation,") is identified as a radiation zone II. Table 12.3-1 shows that areas designated as radiation zone II have dose rates ≥ 0.25 mrem/hr and ≤ 2.5 mrem/hr. The staff independent analysis of the stated dose rate in room 030-034, and the attenuation provided by the concrete thickness between rooms 030-034 and 030-103, predicts higher radiation zones than those assigned by the applicant to room 030-103, even without considering any source terms specific to room 030-103.

Key Issue: The staff needs to understand the methods, models and assumptions used by the applicant to establish radiation zones.

**Question**

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

1. Explain/Justify the methods, models, and assumptions used to calculate the radiation zone designations in the adjacent rooms (030-034 and 030-004 and 030-103),
2. As appropriate, identify other areas of the RXB and RWB where radiation zones are inconsistent with the types and quantities of radiation in the area, due to the use of the previously applied methods, models and assumptions,
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:**

Room #030-004 is not adjacent to the Class A/B/C high intergrity container (HIC) storage area; however, Room #030-006 is adjacent to the Class A/B/C HIC storage area, which is Room #030-034. Therefore, this RAI response assumes the NRC reviewer intended to specify Room #030-006 instead of Room #030-004.

The radiation zone for Room #030-006 accounts for the attenuated dose rates from the sources in Room #030-034 and the dose rates from gaseous radioactive waste system (GRWS) process equipment located in the Room #030-006.

The modeling assumptions used in the shielding calculation for Room #030-034 are described in Tables 12.2-12 and Table 12.2-18. The five HICs and one drum are arranged in two rows in a single-layer centered in the room. These containers are placed in the room using the Radioactive Waste Building (RWB) crane, and therefore it is reasonable to assume that they will be lowered into this storage area near the center of the room to minimize the potential for crane load collisions with the sides of the floor opening.

The RWB truck bay (Room #030-103) radiation zone designation is the result of attenuated dose rates from sources in the liquid radioactive waste (LRW) mobile processing area (Room #030-105), the drum dryer rooms (Room #030-106 and Room #030-107), and the Class A/B/C HIC storage area (Room #030-034). The source modeling assumptions for sources in Rooms #030-105, #030-106, and #030-107 are located in Tables 12.2-14. The shield wall descriptions for these rooms, and additional shielding provided for processing equipment is described in Table 12.3-7, and shield doors modeled are described in Table 12.3-9. Because dose rates depend upon the distance from the radiation source, note the elevation difference between Room #030-034 (71' elevation) and Room #030-106 (100' elevation), as depicted in Figures 12.3-2a and 12.3-2b, and Figures 1.2-28 and 1.2-30. The changes to FSAR Section 12.2.1.7 are included with the NuScale response to RAI 9280 (Q12.3-4).

**Impact on DCA:**

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