

## NuScaleDCRaisPEm Resource

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**From:** Cranston, Gregory  
**Sent:** Thursday, January 04, 2018 9:09 AM  
**To:** RAI@nuscalepower.com  
**Cc:** NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Burkhart, Lawrence; Lavera, Ronald; Markley, Anthony  
**Subject:** Request for Additional Information No. 320 RAI No. 9280 (12.3)  
**Attachments:** Request for Additional Information No. 320 (eRAI No. 9280).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

The NRC Staff recognizes that NuScale has preliminarily identified that the response to one or more questions in this RAI is likely to require greater than 60 days. NuScale is expected to provide a schedule for the RAI response by email within 14 days.

If you have any questions, please contact me.

Thank you.

Gregory Cranston, Senior Project Manager  
Licensing Branch 1 (NuScale)  
Division of New Reactor Licensing  
Office of New Reactors  
U.S. Nuclear Regulatory Commission  
301-415-0546

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## **Request for Additional Information No. 320 (eRAI No. 9280)**

Issue Date: 01/04/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 12.03-12.04 - Radiation Protection Design Features

Application Section: 12.2, 12.3

### **QUESTIONS**

12.03-4

#### **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 set forth in 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. The DSRS Acceptance Criteria of DSRS Section 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.

#### **Background**

In RAI-8860 Question 12.02-2 issued June 7 2017, regarding the radiation zone classification of the "Class A/B/C HICS Storage Area," (shown on DCD Tier 2 Revision 0, Figure 1.2-30, "Radioactive Waste Building 100'-0" Elevation" as Room 030-034), the staff asked the applicant to identify whether drums from the drum dryer facility were allowed to be stored within the Class A/B/C HICS Storage Area. The applicant's response to RAI-8860 Question 12.02-2, dated July 10 2017, stated that drums from the drum dryer facility are not stored in the Class A/B/C HIC Storage Area, but rather are stored in the Mixed/Chemical Waste Drum Storage Area (DCD Figure 1.2-30 Room 030-007).

DCD Tier 2 Revision 0 subsection 11.2, "Liquid Waste Management Systems," notes that the drum dryer consists of a system designed to pump water into a 55 gallon drum (nominally 7.4 ft<sup>3</sup>) which is heated and evacuated, to rapidly evaporate the liquid in the drum until only solid material remains in the drum. The remaining concentrate contains all of the non-volatile radioactive material added to the drum, which in turn serves as the basis for establishing the dose rates near the drums. DCD Table 12.2-13b, "Liquid Radioactive Waste System Component Source Terms - Radionuclide Content," lists the quantities of the isotopes expected to be present in a drum. Using information made available to the staff during the RPAC Chapter 12 Audit, the staff's analysis of the radioactive material content of a dried drum was consistent with the information provided in DCD Table 12.2-13b.

DCD Table 12.3-1, "Normal Operation Radiation Zone Designations," states that an area defined as a radiation zone 3, has dose rates  $\geq 2.5$  mrem/hr and  $\leq 5$  mrem/hr. DCD Tier 2 Revision 0, Figure 1.2-28, "Radioactive Waste Building 71'-0" Elevation," shows the Drum Storage Area (room number 030-007) in the radioactive waste building. DCD Figure 12.3-2a "Radioactive Waste Building Radiation Zone Map - 71' Elevation," shows that the area labeled as the "Mixed/Chemical Waste Storage Area," corresponding to the Drum Storage Area on Figure 1.2-28 room 030-007, as a radiation zone III (3) (i.e., dose rates  $\geq 2.5$  mrem/hr and  $\leq 5$  mrem/hr).

DSRS section 12.3-12.4 states that the specific acceptance criteria for radiation zone designations, are based on the maximum dose rate defined for each zone. The source of radiation within the Drum Storage Area is the concentrated material contained within the dried drums. Since 10 CFR 20.1003 states that a High radiation area is defined at 30 centimeters (cm) (0.984 ft.) from the radiation source, a distance of 1 ft. from the source (the drum) is used by the staff for assessing radiation zone designations in the application. The staff analysis indicated that the dose rate on a drum of dried liquid containing the amount of radioactive material listed in Table 12.2-13b, may exceed the indicated radiation zone depicted on Figure 12.3-2a, "Radioactive Waste Building Radiation Zone Map - 71' Elevation," for the Drum Storage Area by several orders of magnitude.

#### **Key Issue 1**

DCD Tier 2 Section 12.2.1.7, "Solid Radioactive Waste System," does not identify where the facility drums of radioactive waste resulting from the operation of the drum driers will be stored.

#### Question 1

To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions, with respect to the designation of radiation zones in the facility, the staff requests that the applicant:

- Revise as necessary, DCD Section 12.2.1.7 to include a description of where radioactive waste resulting from the operation of the drum driers will be stored,
- OR
- Provide the specific alternative approaches used and the associated justification.

#### 12.03-5

The Regulatory Basis and Background are in RAI-9280 Question 31029

#### Key Issue 2

The radiation zones for the drum storage room depicted in DCD Figure 12.3-2a does not appear to be consistent with the radioactive material content of a dried drum as described in DCD Table 12.2-13b.

#### Question 2

To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions, with respect to the designation of radiation zones in the facility, the staff requests that the applicant:

- Explain/Justify the radiation zone designation for Drum Storage Room, to reflect the dose rate from the number of drums allowed to be stored in the drum storage room zone,
  - Revise as necessary, DCD Figure 12.3-2a to reflect the maximum dose rate in the area,
- OR
- Provide the specific alternative approaches used and the associated justification.

#### 12.03-6

The Regulatory Basis and Background are in RAI-9280 Question 31029

#### Key Issue 3

DCD Table 12.2-12 does not describe the bounding source term in the drum storage room (i.e., the number of drums assumed to be stored in the drum storage room) potentially resulting in a non-conservative estimate of the maximum dose rate in the zone.

#### Question 3

To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions, the staff requests that the applicant:

- Provide the methods, models and assumptions used to establish radiation shielding and zoning for the Drum Storage Room,
- Revise as necessary, DCD Table 12.2-12 to describe the basis for the shielding and radiation zoning of the Drum Storage Room.

OR

Provide the specific alternative approaches used and the associated justification.