

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Monday, January 08, 2018 1:53 PM
To: RAI@nuscalepower.com
Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Burkhart, Lawrence; Lavera, Ronald; Markley, Anthony
Subject: RE: Request for Additional Information No. 330 RAI No. 9271 (12.2)
Attachments: Request for Additional Information No. 330 (eRAI No. 9271).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.

If you have any questions, please contact me.

Thank you.

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Division of New Reactor Licensing
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301-415-0546

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Request for Additional Information No. 330 (eRAI No. 9271)

Issue Date: 01/08/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 12.02 - Radiation Sources

Application Section: 12.2

QUESTIONS

12.02-21

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.

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 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. 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.

Background

NuScale DCD Tier 2, Revision 0 DCD Section 11.4.2.5.1 "Tanks," regarding the Phase Separator Tanks (PSTs), states that there are two permanently installed PSTs that are provided to receive spent resins from the liquid radioactive waste (LRW) demineralizers and the chemical and volume control system (CVCS) deborating demineralizers.

DCD Tier 2, Revision 0 subsection 12.2.1.7, "Solid Radioactive Waste System," states that the assumed values used to develop the solid radioactive waste system (SRWS) source terms are listed in Table 12.2-18. NuScale DCD Tier 2, Revision 0 Table 12.2-18: "Solid Radioactive Waste System Component Source Term Inputs," list the dimensions of the Phase Separator Tanks (PST), including the height of 16.46'. DCD Table 12.2-19, "Solid Radioactive Waste System Component Source Terms – Radionuclide Content," lists the radionuclide inventory of the PST. DCD Table 12.2-20: "Solid Radioactive Waste System Component Source Terms – Source Strengths," provides the Phase Separator Tank (PST) gamma emission rate in photon/s. DCD Section 12.2 does not appear to contain any other information about the amount of radioactive material that can be present in the PST, and the sources of that material.

Based on information made available to the staff during the RPAC Chapter 12 Audit, the volume of radioactive material in the PST occupies less than 1/10th of the height of the tank, as stated in the DCD. In addition, the model of the PST contained in the analytical package reviewed by the staff appears to be significantly different than the model described in DCD Table 12.2-18.

Key Issue 1:

The radionuclide concentrations listed in DCD subsection 12.2 are the basis of the information used to establish plant source terms. NuScale DSRS 12.2 Acceptance Criteria, states that all of the sources of radiation exposure to workers and members of the public (from contained sources) are to be identified, characterized, and considered in the design and operation of the facility. This section of the DSRS also states that unless described within other sections of the FSAR, source descriptions should include the methods, models, and assumptions used as the bases for all values provided in FSAR Section 12.2.

Question 1:

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

- Describe the sources of radioactive material contained in the PST, including the addition rate, source component and specific activity,
- Explain/justify the sources of material in the PST, as it relates to the volume and photon emission rates used in the analytical package,,
- Provide the methods, models and assumptions, used to develop the assumed radionuclide concentrations, and associated basis,
- As necessary, revise DCD Section 12.2 to include the information needed to describe the source contained in the tank,

OR

Provide the specific alternative approaches used and the associated justification.

12.02-22

The Regulatory Basis and Background are in RAI-9271 Question 31003

Key Issue 2:

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 source size, magnitude and configuration are elements of the model used to establish the effects of the contained sources on areas adjacent to the contained source. Because the geometry of the source described in the DCD does not appear to model the analytical method used to evaluate the radiation effects, the staff is unable to assess the validity of the radiation zone designations.

Question 2:

To facilitate staff understanding of the application information sufficient to make appropriate regulatory conclusions, with respect to the descriptions of the sources of radiation present in the facility and the resultant radiation zone designations, the staff requests that the applicant:

- Explain/justify the parameters of the dose rate calculation model used to describe the PST,
- As necessary, revise DCD Section Table 12.2-18 to include the information needed to describe the tank,
- As necessary, revise DCD Section 12.3-12.4 radiation zone figures,

OR

Provide the specific alternative approaches used and the associated justification.