

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Saturday, August 19, 2017 8:02 AM
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Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Burkhart, Lawrence; Hart, Michelle; Tabatabai, Omid
Subject: RE: Request for Additional Information No. 193, RAI 9079 (6.4 & 15.0.3.7)
Attachments: Request for Additional Information No. 193 (eRAI No. 9079).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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301-415-0546

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Request for Additional Information No. 193 (eRAI No. 9079)

Issue Date: 08/19/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 06.04 - Control Room Habitability System

Application Section: FSAR 6.4 and 15.0.3.7.1

QUESTIONS

06.04-1

10 CFR 52.47(a)(2) requires that a standard design certification application include a final safety analysis report (FSAR) that describes the design of the facility including the principal design criteria for the facility, for which NuScale used the 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." General Design Criterion (GDC) 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem total effective dose equivalent (TEDE) for the duration of the accident. NuScale design-specific review standard (DSRS) section 15.0.3 provides additional guidance on the evaluation of control room radiological habitability.

NuScale FSAR Tier 2, Section 6.4, "Control Room Habitability," and Section 9.4.1, "Control Room Area Ventilation System," discuss the two non-safety-related ventilation systems that are to be relied upon to meet the requirements of GDC 19, including protection to the control room occupants from radioactive releases during accident conditions. These heating, ventilation and air conditioning (HVAC) systems are the control room habitability system (CRHS) and the normal control room HVAC system (CRVS). FSAR Tier 2, Section 15.0.3 provides a discussion of the design basis accident (DBA) radiological consequence analyses, which includes dose results in the control room.

The NuScale DBA radiological consequence analyses assume that after a 10-minute loss of ac power, or based on reaching the appropriate control room HVAC intake radiation monitor setpoint, the CRHS system is actuated to provide clean air to the control room envelope for 72 hours, after which the CRVS is available to provide filtered outside air for the duration of the accident. When power is available and the CRHS initiation radiation monitor setpoint has not been reached, the CRVS remains in operation and the filtration function is initiated based on reaching a related control room HVAC intake radiation monitor setpoint. The staff has previously audited NuScale's DBA radiological consequence analyses (report not yet issued) and noted that the control room doses were calculated for both the case where the CRHS operates for the first 72 hours and the case where the CRVS remains in operation to provide filtration for the duration of the accident.

FSAR Tier 2, subsection 6.4.4, "Design Evaluation," first paragraph states:

As noted in Section 15.0.0, no operator actions are required or credited to mitigate the consequences of design basis events. As such, the operators perform no safety-related functions, consistent with the definition in 10 CFR 50.2. Therefore, although a habitable control room is provided for the operators, consistent with GDC 19, to perform other important non-safety related functions, the control room envelope and supporting habitability systems and components, including the CRHS, are not safety-related.

FSAR Tier 2, Section 15.0.3 states that the DBAs are analyzed using RG 1.183 guidance, with necessary non-conformances as necessary due to differences in the NuScale design from large light-water reactors. Position 4.2.2 of RG 1.183 states that "[c]redit for engineered safety features that mitigate airborne radioactive material within the control room may be assumed."

Position 5.1.2, "Credit for Engineered Safeguard Features," states:

Credit may be taken for accident mitigation features that are classified as safety-related, are required to be operable by technical specifications, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures. The single active component failure that results in the most limiting radiological consequences should be assumed. Assumptions regarding the occurrence and timing of a loss of offsite power should be selected with the objective of maximizing the postulated radiological consequences.

Because the NuScale design does not classify either the CRHS or the CRVS as safety-related, the staff requests the following additional information to conduct its review of the NuScale control room radiological habitability and compliance with GDC 19:

- a. Considering that the CRHS is not a safety-related system and therefore does not necessarily meet all the engineered safety feature requirements but is relied upon to provide a safe environment for control room operators under accident conditions, how is the reliability of the system ensured to be able to assume that the system will operate as expected and needed under accident conditions?
- b. Considering that the CRVS is not a safety-related system and therefore does not necessarily meet all the engineered safety feature requirements, but is relied upon to provide a safe environment for control room operators under accident conditions how is the reliability of the system ensured to be able to assume that the system will operate as expected and needed under accident conditions?
- c. What are the effects on the control room radiological habitability in the event that the non-safety-related CRHS fails to operate during a DBA?
- d. What are the effects on the control room radiological habitability in the event that the non-safety-related CRVS fails to operate during a DBA?
- e. What are the effects on the control room radiological habitability in the event that both the CRHS and the CRVS fail to operate during a DBA?