NuScaleDCRaisPEm Resource

From:	Cranston, Gregory
Sent:	Friday, June 15, 2018 10:13 AM
To:	Request for Additional Information
Cc:	Lee, Samuel; Dudek, Michael; Hart, Michelle; Tabatabai, Omid; Chowdhury, Prosanta; NuScaleDCRaisPEm Resource
Subject:	Request for Additional Information No. 489 eRAI No. 9534 (6.4)
Attachments:	Request for Additional Information No. 489 (eRAI No. 9534).pdf

Attached please find NRC staff's request for additional information (RAI) concerning review of the NuScale Design Certification Application. Password will be sent separately.

Please submit your technically correct and complete response within 60 days of the date of this RAI, or provide an alternate date within 14 days, to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

Hearing Identifier: NuScale_SMR_DC_RAI_Public
Email Number: 516

Mail Envelope Properties (BN3PR09MB03556F5E42DD2104E4C1D0D1907C0)

Subject: Request for Additional Information No. 489 eRAI No. 9534 (6.4)
Sent Date: 6/15/2018 10:13:11 AM
Received Date: 6/15/2018 10:13:17 AM
From: Cranston, Gregory

Created By: Gregory.Cranston@nrc.gov

Recipients:
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Dudek, Michael" <Michael.Dudek@nrc.gov>
Tracking Status: None
"Hart, Michelle" <Michelle.Hart@nrc.gov>
Tracking Status: None
"Tabatabai, Omid" <Omid.Tabatabai-Yazdi@nrc.gov>
Tracking Status: None
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>
Tracking Status: None
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Request for Additional Information" <RAI@nuscalepower.com>
Tracking Status: None

Post Office: BN3PR09MB0355.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**
MESSAGE	443	6/15/2018 10:13:17 AM
Request for Additional Information No. 489 (eRAI No. 9534).pdf	92440	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 489 (eRAI No. 9534)

Issue Date: 06/15/2018
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

QUESTIONS

06.04-4

Regulatory Basis:

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 0.05 Sv (5 rem) total effective dose equivalent (TEDE) for the duration of the accident.

Question:

The applicant's response to request for information (RAI) 9079 discusses the basis for the dose analysis modeling assumption that after 72 hours (after the control room habitability system (CRHS) is exhausted) the normal control room heating ventilation and air conditioning system (CRVS) is assumed to operate in supplemental filtration mode. The discussion of the CRVS reliability and operability is mainly focused on isolation and filtration component capabilities and backup power. The RAI response did not discuss augmented quality with respect to the capability to recover the CRVS for reasons other than loss of power. NuScale does not consider failure of the CRVS to operate post-72 hours concurrent with a design basis accident (DBA) to be within the design basis for evaluation of the radiological consequences of DBAs. However, if recovery of the CRVS supplemental filtration mode capability within 72 hours is not sufficiently and reliably shown to be ensured for accident conditions, then the FSAR Chapter 15 dose analysis assumptions on filtration and removal of radioactive material in the control room ventilation intake are not justified and the dose results may exceed the dose criterion of GDC 19.

Considering that the NuScale FSAR does not include technical specifications for the CRVS, specific testing and inspection requirements for the CRVS are left to the combined license (COL) applicant (COL Item 9.4-1), and the CRVS is not classified as Seismic Category I except for the components that isolate the control room, the staff requires additional information regarding the CRVS supplemental filtration

capability to limit dose to control room operators under accident conditions. Specifically, the staff requests the following information in order to complete its review by fully evaluating the importance of the post-72 hours operation of the CRVS supplemental filtration mode on the NuScale design ability to meet the requirements of GDC 19:

> Provide a sensitivity analysis, including both a qualitative and quantitative assessment, evaluating the effect on the control room operator dose for DBAs for the case where after the CRHS is exhausted, the CRVS supplemental filtration mode is not recovered within 72 hours as assumed in the DBA control room dose analyses described in FSAR Chapter 15.0.3. Describe the analysis assumptions and inputs, as well as the dose results. For this sensitivity case, would the GDC 19 dose criterion of 5 rem TEDE be met for all DBAs without credit for CRVS filtration after the CRHS is exhausted?

06.04-5

Regulatory Basis:

10 CFR 52.47(a)(2) requires that a standard design certification application include an 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 0.05 Sv (5 rem) TEDE for the duration of the accident.

10 CFR Part 20 Subpart C "Occupational Dose Limits," states in part that the licensee shall control the occupational dose to individual adults, except for planned special exposures under § 20.1206, to the following dose limits. (1) An annual limit, which is the more limiting of:

- The total effective dose equivalent being equal to 5 rems (0.05 Sv); or
- The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 Sv).

10 CFR Part 20 Subpart C "Occupational Dose Limits," requires consideration dose resulting from external radiation sources and dose due to the inhalation of radionuclides.

10 CFR Part 20 Subpart H "Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas," states that if the licensee assigns or permits the use of respiratory protection equipment to limit the intake of radioactive material, that

the licensee will implement a respiratory protection program that includes the following elements:

- Supervision and training of respirator users;
- Fit testing;
- Determination by a physician that the individual user is medically fit to use respiratory protection equipment:
    - Before the initial fitting of a face sealing respirator;
    - Either every 12 months thereafter, or periodically at a frequency determined by a physician.

Question :

In response to RAI 9079, question (e), the applicant states that as added protection against radiation overexposure, if the area radiation monitor radiation level exceeds a limit (to be set by the licensee), the operators would trip any operating reactors, initiate decay heat removal and containment isolation, and vacate the control room. In their application, NuScale has also identified that the presence of toxic gas may result in a condition where the Main Control Room (MCR) operators may need to vacate the MCR.

In implementing its statutory authority under the Atomic Energy Act, the NRC preempts the application of the Occupational Safety and Health Act for working conditions that involve radioactive materials. That is, the training, medical, fit test, etc. requirements are provided by the NRC in 10 CFR Part 20 Subpart H. However, a Memorandum of Understanding (MOU) between the Occupational Safety and Health Administration and the NRC, states that if an NRC licensee is using respiratory protection to protect workers against non-radiological hazards (i.e., toxic gas), the OSHA requirements apply.

Since the action of the operators to leave the confines of the MCR would potentially expose the operators to concentrations of radiological contaminants or toxic gases, that could result in the operators exceeding the regulatory limits in the short time required to reach the alternate safe location for the MCR operators, the MCR operators need to be able to wear the appropriate respiratory protection device. The applicant has identified in COL item 6.4-1 that the COL applicant has the responsibility to ensure that the MCR operators are able to use respiratory protection equipment, which should include consideration of radiological contaminants as well as toxic gases. The NuScale FSAR does not state that respiratory protection equipment (e.g., self-contained breathing apparatus (SCBA)) would be staged in the control room as a backup if the control room becomes uninhabitable. COL item 6.4-1 tells the COL applicant to comply with RG 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," to evaluate control room habitability for hazardous chemical releases. RG 1.78 discusses use of respiratory protection equipment for hazardous chemical releases, but does not explicitly discuss respiratory protection for radiological releases. Therefore, the staff requires the following information in order to complete its review:

Provide a COL Item requiring the applicant to provide a storage location for SCBAs that allows the MCR operators to access, don, place the facility in a safe condition and move to a safe location without exceeding the radiation exposure limits of 10 CFR Part 20, and the exposure to toxic substance guidance in RG 1.78, in the event that both MCR ventilation systems do not function. Or provide reasoning (1) why an alternative method would be acceptable, or (2) why SCBA would not be needed.