NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Monday, January 08, 2018 9:26 AM
To: RAI@nuscalepower.com
Cc: NuScaleDCRaisPEm Resource; Lee, Samuel; Chowdhury, Prosanta; Burkhart, Lawrence; Lavera, Ronald; Markley, Anthony
Subject: Request for Additional Information No. 325 RAI No. 9268 (12.2)
Attachments: Request for Additional Information No. 325 (eRAI No. 9268).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

Hearing Identifier: NuScale_SMR_DC_RAI_Public
Email Number: 352

Mail Envelope Properties (CY4PR09MB12870F249374A2EADB9FB6A290130)

Subject: Request for Additional Information No. 325 RAI No. 9268 (12.2)
Sent Date: 1/8/2018 9:26:23 AM
Received Date: 1/8/2018 9:26:27 AM
From: Cranston, Gregory

Created By: Gregory.Cranston@nrc.gov

Recipients:
"NuScaleDCRaisPEm Resource" <NuScaleDCRaisPEm.Resource@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Chowdhury, Prosanta" <Prosanta.Chowdhury@nrc.gov>
Tracking Status: None
"Burkhart, Lawrence" <Lawrence.Burkhart@nrc.gov>
Tracking Status: None
"Lavera, Ronald" <Ronald.LaVera@nrc.gov>
Tracking Status: None
"Markley, Anthony" <Anthony.Markley@nrc.gov>
Tracking Status: None
"RAI@nuscalepower.com" <RAI@nuscalepower.com>
Tracking Status: None

Post Office: CY4PR09MB1287.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**	
MESSAGE	818	1/8/2018 9:26:27 AM	
Request for Additional Information No. 325 (eRAI No. 9268).pdf			92474

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

Request for Additional Information No. 325 (eRAI No. 9268)

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

12.02-11

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) 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. NuScale DSRS section 12.2 "Radiation Source," regarding the identification of isotopes and the methods, models and assumptions used to determine dose rates. 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.

10 CFR 52.47(a)(8) requires that the final safety analysis report provide the information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v).

10 CFR 50.34(f)(2)(vii) requires that applicants perform radiation and shielding design reviews of spaces around systems that may, as a result of an accident, contain accident source term radioactive materials, and design as necessary to permit adequate access to important areas and to protect safety equipment from the radiation environment.

10 CFR 50.34(f)(2)(viii) requires that applicants provide a capability to promptly obtain and analyze samples from the reactor coolant system and containment that may contain accident source term radioactive materials without radiation exposures to any individual exceeding 5 rems to the whole body or 50 rems to the extremities.

10 CFR 50.49 and 10 CFR Part 50, Appendix A, Criterion 4 require that certain components important to safety be designed to withstand environmental conditions, including the effects of radiation, associated with design basis events, including normal operation, anticipated operational occurrences, and design basis accidents.

Background

DCD Tier 2 Revision 0 Section 12.2.1.13 "Post-Accident Sources," discusses post-accident sources and points to several tables in DCD Section 12.2 for additional information. Table 12.2-28: "Post-Accident Source Term Input Assumptions," identifies the assumptions used to derive the post-accident sources of radiation. DCD Table 12.2-29: "Post-Accident Core Inventory Release Fractions," provides a listing of the radionuclide groups and the associated release fractions. DCD Table 12.2-30: "Post-Accident Containment Aerosol Removal Rates," describes how some radionuclides are removed from the contain atmosphere following an accident. DCD Table 12.2-31: "Post-Accident Integrated Energy Deposition and Integrated Dose," provides the Integrated MeV energy deposition, and the integrated dose at specific time intervals during post-accident conditions.

Key Issue:
Because DCD Tier 2 Revision 0 Section 12.2 does not contain a listing of the isotopic inventory (i.e., isotope identification and concentration) during post-accident conditions, the staff is unable to determine how the assumptions listed in Tables 12.2-28 and 12.2-29 have been applied. The post-accident isotopic concentrations in the containment (CNV) air volume liquid are used to determine the post-accident radiation levels in a variety of areas, including but not limited to; areas above the reactor building (RXB) pool due to shine from the air volume in the CNV, the area above the CNV but below the bioshield, areas adjacent to the bioshield subject to radiation penetrating shielding or streaming through opening. The post-accident isotopic concentrations in the reactor coolant system (RCS) liquid are used to determine the post-accident radiation levels in a variety of areas, including but not limited

to; in areas with pipes containing RCS liquids (e.g., chemical and volume control system (CVCS), Plant Sample System (PSS) and liquid radioactive waste system (LWRS).

The staff uses the calculated radiation levels to compare design features described in the DCD to the acceptance criteria in DSRS 12.2, 12.3 and 3.11.

Question

Please provide, as a revision in the DCD (Section 12.2) a listing of radionuclide concentrations in the CNV air volume for post-accident conditions, and provide in the DCD a listing of radionuclide concentrations in the RCS liquid volume for post-accident conditions.

Or,

Provide the specific alternative approaches used and the associated justification.