From:	Getachew Tesfaye
Sent:	Saturday, March 2, 2024 7:27 AM
To:	Request for Additional Information
Cc:	Prosanta Chowdhury; Mahmoud -MJ- Jardaneh; Griffith, Thomas; Fairbanks, Elisa; NuScale-SDA-720RAIsPEm Resource
Subject:	NuScale SDAA Section 3.6.2.7 - Request for Additional Information No. 017 (RAI-10135-R1)
Attachments:	SECTION 3.6.2.7 - RAI-10135-R1-FINAL (1).pdf

Attached please find NRC staff's request for additional information (RAI) concerning the review of NuScale Standard Design Approval Application for its US460 standard plant design (Agencywide Documents Access and Management System (ADAMS) Accession No. ML222339A066).

Please submit your technically correct and complete response by the agreed upon date to the NRC Document Control Desk.

If you have any questions, please do not hesitate to contact me.

Thank you,

Getachew Tesfaye (He/Him)
Senior Project Manager
NRC/NRR/DNRL/NRLB
301-415-8013

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

REQUEST FOR ADDITIONAL INFORMATION No. 017 (RAI-10135-R1)
BY THE OFFICE OF NUCLEAR REACTOR REGULATION
NUSCALE STANDARD DESIGN APPROVAL APPLICATION
DOCKET NO. 05200050
CHAPTER 3, "DESIGN OF STRUCTURES, SYSTEMS, COMPONENTS AND EQUIPMENT"
SECTION 3.6.2.7, "IMPLEMENTATION OF CRITERIA DEALING WITH SPECIAL FEATURES"
ISSUE DATE: 03/02/2024

Background:

By letter dated October 31, 2023, NuScale Power, LLC (NuScale or the applicant) submitted Part 2, Final Safety Analysis Report (FSAR), Chapter 3, "Design of Structures, Systems, Components and Equipment," Revision 1 (Agencywide Documents Access and Management System Accession No. ML23304A321), of the NuScale Standard Design Approval Application (SDAA) for its US460 standard plant design. The applicant submitted the US460 standard plant SDAA in accordance with the requirements of Title 10 *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Subpart E, "Standard Design Approvals." The NRC staff has reviewed the information in FSAR Chapter 3 of the SDAA and determined that additional information is required to complete its review.

Question 3.6.2.7-2

Regulatory Basis

- GDC 4, "Environmental and Dynamic Effects Design Bases," states that structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit.
- GDC 14, "Reactor coolant pressure boundary," states that the reactor coolant pressure boundary shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.
- GDC 30, "Quality of reactor coolant pressure boundary," states that the components which are part of the reactor coolant pressure boundary shall be designed, fabricated, erected, and tested to the highest quality standards practical.
- 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," describes, in part, that ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated.

Issue

In NuScale response to Design Certification Application (DCA) RAI (E1902227t034905-RAIO-0219-64694, Supplemental RAI No 340, eRAI9358; ML19058A670), it was stated in part that containment leakage monitoring systems are sensitive to a leak rate as low as 0.01 lbm per minute (or ~0.001 gallon per minute). Whereas, in SDAA FSAR section 3.6.2.7, it was stated in part that containment leakage monitoring systems are sensitive to a leak rate as low as 0.05 gallons per minute.

There is a significant change in the leakage system sensitivity, It is not clear whether the role of the leakage detection system is used for GDC 4 dynamic effects exclusion or LOCA break exclusion or both. It is also not clear whether each of the bolted connection to RV has its own dedicated leakage detection system and a limit for action.

Requested Information

A. For bolted connections and piping inside CNV

The sensitivity of the containment leak detection system is increased from 0.001 gallons per minute (gpm) in DCA to 0.05 gpm in SDAA. To support the staff's evaluation of the reduction in sensitivity, provide the following information:

(1) Clarification of the role of leakage detection system(s) for areas seeking exclusion of dynamic effects (i.e., GDC-4) and/or LOCA break exclusion, including the bolted connections of the RVV, RRV, CRDMs, I&C penetrations, etc.

(2) Explanation of the acceptable leakage limits and the ability of the leakage detection system to detect those leakage limits. Include a discussion of the leakage levels from the ECCS RRV and RVV, CRDM and other bolted flange connections, and leakage limits on piping systems, and whether there are different limits for a plant shutdown or additional inspection at the next opportunity.

(3) Explanation of how the allowed leakage limits ensure remedial actions are taken before unacceptable degradation occurs in the flanged joints or piping systems.

(4) Discussion of whether the bolted connections to the RV, including those for the RRVs, RVVs, and CRDMs, I&C penetrations, etc. will have dedicated leakage detection systems and associated actions to preempt significant degradation of these locations, or discuss other considerations (design, inspection) that address the potential for leakage to degrade the bolted connections.

B. For connections and piping outside CNV

NuScale is requesting approval for GDC break exclusion for areas outside containment such as within the containment isolation system (CNV nozzle safe-end to containment isolation valve connection). To support the staff's evaluation of this request, provide the following information:

(1) Clarification of the role of leakage detection system(s) for areas seeking exclusion of dynamic effects (i.e., GDC-4) outside containment.

(2) Explanation of the sensitivity of the leakage detection system and how this sensitivity supports detecting the leakage that ensures remedial actions are taken before unacceptable degradation occurs at CNV Nozzle safe end to containment isolation valve connections.

(3) Discussion of whether these connections to the CNV will have dedicated leakage detection systems and associated actions to preempt significant degradation of these locations, or if other considerations exist (design, inspection) that address the potential for leakage to degrade the connections.

In your response, include a markup of the relevant sections of the FSAR pertaining to leakage detection (including section A.2) of SDAA document TR-121507-P incorporating this information.