**From:** Getachew Tesfaye
**Sent:** Saturday, March 2, 2024 6:34 AM
**To:** Request for Additional Information
**Cc:** Prosanta Chowdhury; Mahmoud -MJ- Jardaneh; Griffith, Thomas; Fairbanks, Elisa; NuScale-SDA-720RAIsPEm Resource
**Subject:** NuScale SDAA Section 3.6.3 - Request for Additional Information No. 016 (RAI-10134-R1)
**Attachments:** SECTION 3.6.3 - RAI-10134-R1-FINAL.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

**Hearing Identifier:** NuScale_SDA720_RAI_Public
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**From:** Getachew Tesfaye

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

**REQUEST FOR ADDITIONAL INFORMATION No. 016 (RAI-10134-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 3.6.3, "LEAK-BEFORE-BREAK EVALUATION PROCEDURES"
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 3.6.3-1

## Regulatory Basis

10 CFR Part 50 Appendix-A GDC 4 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. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

## Issue

FSAR Section 3.6.3 states that Leak-Before-Break (LBB) is not used for SDAA. This is a change from the DCA approach where LBB methodology was used. Specifically, for DCA, Pipe Rupture Hazards Analysis Technical Report, TR-0818-61384-P, Revision 2, utilized LBB methodology while the SDAA Pipe Rupture Hazards Analysis TR-121507-P, Revision 0, does not.

In the DCA, LBB methodology was credited to justify exclusion of high energy line breaks in large-diameter secondary piping, namely main steam system (MSS) and feedwater system (FWS) piping. This was noted in section 2.2.2.1.1 of the DCA Technical Report TR-0818-61384-P, Revision 2. NuScale analyzed MSS and FWS piping for LBB and showed them to meet the criteria in the Section 2.2.5 discussion related to SRP 3.6.3. This was also reflected in Section 3.6.3.2 of the DCA Safety Evaluation. However, in the SDAA NuScale does not use LBB methodology for MSS and FWS piping inside containment. This is a significant change in NuScale's approach.

**Information Requested**

Provide the basis for break exclusion for the high energy piping (and particularly the MSS and FWS piping) inside containment that account for the change in methodology from DCA to SDAA. Discuss changes in design parameters such as pressure, temperature, and flow rate as a result of the power increase from DCA to SDAA, and whether there are any changes in MSS and FWS piping routing inside containment, and how the above are considered in the justification for break exclusion. Provide a summary of maximum stress and its location for MSS and FWS systems for BTP 3-4 stress combination as well as for ASME service levels A, B, C, and D. Discuss whether the leak detection system based on previous LBB approach from DCA remains due to a change in methodology in SDAA.