



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 13, 2019

Dr. Peter Riccardella, Chairman  
Advisory Committee on Reactor Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

SUBJECT: INTERIM LETTER—CHAPTERS 3, 6, 15, AND 20 OF THE U.S. NUCLEAR REGULATORY COMMISSION STAFF'S SAFETY EVALUATION REPORT WITH OPEN ITEMS RELATED TO THE REVIEW OF THE DESIGN CERTIFICATION APPLICATION FOR THE NUSCALE POWER, LLC, SMALL MODULAR REACTOR

Dear Dr. Riccardella:

Thank you for your letter, dated August 2, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19204A278), providing the Advisory Committee on Reactor Safeguards (ACRS or Committee) views on the U.S. Nuclear Regulatory Commission (NRC) staff's review of the design certification application (DCA) submitted by NuScale Power, LLC (NuScale), specifically Chapter 3, "Design of Structures, Components, Equipment and Systems"; Chapter 6, "Engineered Safety Features"; Chapter 15, "Transient and Accident Analyses"; and Chapter 20, "Mitigation of Beyond-Design-Basis Events," as documented in the safety evaluation report (SER) with open items for these chapters. I appreciate the time and effort the ACRS has devoted to these in-depth reviews, as reflected in meetings held with the ACRS Subcommittee for NuScale between June 18 – 20, 2019, and the ACRS Full Committee on July 9, 2019.

Your letter offered the following conclusions and recommendations:

**Conclusion and Recommendation 1:** The barrier analysis used for turbine missile protection is a different approach than previously accepted. We await the staff's review before commenting.

**Staff Response:** With respect to the barrier analysis used for turbine missile protection, the NRC staff agrees and will document its findings in Chapter 3 of the advanced SER (i.e., the Phase 4 SER with no open items). If requested, the NRC staff can support a discussion at a subsequent public briefing for the ACRS.

**Conclusion and Recommendation 2:** The emergency core cooling system (ECCS) valve test program currently underway is required to provide confidence for valve functionality and performance.

**Staff Response:** With respect to the ECCS valve test program currently underway, the NRC staff agrees and will continue its review of the ECCS valve system design (which includes a main valve, inadvertent actuation block valve, and solenoid trip and reset valves). The NRC staff recently observed sample demonstration test runs of the ECCS

valve design, conducted by NuScale, at the Target Rock facility in New York. This enhances agency confidence in functionality and performance of the ECCS valve system pursuant to Title 10 *Code of Federal Regulations* (10 CFR) 52.47(c)(2) and 50.43(e).

**Conclusion and Recommendation 3:** NuScale's power module (NPM) can experience a return-to-power under accident analysis assumptions but does not violate any specified acceptable fuel design limits. This potential operational condition should be precluded in the long term.

**Staff Response:** With regard to the Chapter 15 return-to-power analyses, whether caused by a stuck rod or non-uniform boron distribution, the NRC staff's review considered the relevant figure of merit to be the specified acceptable fuel design limits, consistent with SECY-18-0099, "NuScale Power Exemption Request from 10 CFR Part 50, Appendix A, General Design Criterion, 27, 'Combined Reactivity Control Systems Capability,'" dated October 9, 2018 (ADAMS Accession No. ML18065A431). The staff is still reviewing these analyses. The staff agrees that the NuScale boron addition systems could be used to eventually bring the reactor to a subcritical state as a longer-term coping strategy. However, in SECY-18-0099, the NRC staff did not identify subcriticality as a required criterion in the longer term for the NuScale design. Although NuScale has not identified the use of a boron addition system to ensure long-term subcriticality, non-safety-related systems relied on during the first 7 days following a design-basis event are subject to special regulatory treatment consistent with the provisions outlined in SECY-96-128, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design," dated June 12, 1996 (ADAMS Accession No. ML003708224), and its associated staff requirements memorandum, dated January 15, 1997. The staff is still reviewing the need for boron addition within the first 7 days following a design-basis event for the NuScale design.

With respect to your observations regarding the acceptance criteria for anticipated operational occurrences and postulated accidents for the NuScale design, the NRC staff notes that NuScale's licensing approach is consistent with its request for exemption from General Design Criterion 27, "Combined Reactivity Control Systems Capability," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic licensing of production and utilization facilities." NuScale has recently clarified its proposed licensing basis by revising DCA, Tier 2, Section 3.1.3.8, "Criterion 27-Combined Reactivity Control Systems Capability," to state that "fuel cladding integrity is maintained for all design basis events, including postulated accidents, such that the effect of a postulated return to power with failed fuel has not been evaluated in the analysis of accident consequences." Therefore, to preclude unanalyzed accident consequences, NuScale's design basis prohibits fuel failures under postulated accident conditions.

The NRC staff acknowledges that the ACRS has not identified any additional major issues at this time for Chapters 3, 6, 15, and 20.

The NRC staff appreciates your review of these SER chapters and the opportunity to respond and looks forward to future interactions with the Committee as part of its NuScale review activities.

Sincerely,

*/RA/*

Frederick D. Brown, Director  
Office of New Reactors

Docket No. 52-048

cc: Chairman Svinicki  
Commissioner Baran  
Commissioner Caputo  
Commissioner Wright  
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EDO

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