

June 12, 2017

MEMORANDUM TO: Samuel Lee, Chief  
Licensing Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

FROM: Rani Franovich, Senior Project Manager **/RA/**  
Licensing Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

SUBJECT: AUDIT PLAN FOR NUSCALE POWER, LLC, FINAL SAFETY  
ANALYSIS REPORT CHAPTER 15, "TRANSIENT AND ACCIDENT  
ANALYSES"

NuScale Power, LLC (NuScale) submitted by letter dated December 31, 2016, to the U.S. Nuclear Regulatory Commission (NRC), a Design Control Document for its Design Certification (DC) application of the NuScale design (Agencywide Documents Access and Management System Accession No. ML17013A229). The NRC staff started its detailed technical review of NuScale's DC application on March 27, 2017.

The purpose of the NRC's regulatory audit of reactor systems is to: (1) gain a better understanding or confirm the staff's understanding of the detailed calculations, analyses, and bases underlying the NuScale FSAR Chapter 15, (2) verify information in the DCA and evaluate its conformance with the SRP or technical guidance, and (3) identify any information needed on the docket to support the basis of a reasonable assurance finding.

The audit will take place at NuScale's offices, in Rockville, Maryland, and/or online via NuScale's electronic reading room. The audit is currently scheduled to start on June 15, 2017, and last for approximately 180 days. The audit plan is provided as an enclosure.

Docket No. 52-048

Enclosure:

1. Regulatory Audit NuScale Reactor Systems

cc w/encl.: DC NuScale Power, LLC Listserv

CONTACT: Rani Franovich, NRO/DNRL  
301-415-7334

S. Lee

2

AUDIT PLAN FOR THE REGULATORY AUDIT OF REACTOR SYSTEMS FOR NUSCALE  
POWER, LLC

DATED: June 12, 2017

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**ADAMS Accession No: ML17157B592 \*via email** NRO-002

OFFICE	NRO/DNRL/LB1: PM	NRO/DNRL/LB1: LA	NRO/DNRL/LB1
NAME	RFranovich	MBrown	RFranovich (signed)
DATE	5/8/2017	6/8/17	6/12/17

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**UNITED STATES NUCLEAR REGULATORY COMMISSION  
AUDIT PLAN FOR THE REGULATORY AUDIT OF  
NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION  
CHAPTER 15, “TRANSIENT AND ACCIDENT ANALYSES”**

Docket No. 52-048

AUDIT PLAN

APPLICANT: NuScale Power, LLC (NuScale)

APPLICANT CONTACTS: Marty Bryan  
Darrell Gardner  
Steven Mirsky  
Jennie Wilke

DURATION: 180 days  
Phase 1: June 15, 2017, through September 15, 2017  
Phase 2: September 18, 2017 through December 18, 2017

LOCATION: **U.S. Nuclear Regulatory Commission Headquarters  
(via NuScale’s electronic reading room (eRR))**  
Two White Flint North  
11545 Rockville Pike  
Rockville, MD 20852-2738

**NuScale, (Rockville)**  
11333 Woodglen Drive.  
Suite 205  
Rockville, MD 20852

AUDIT TEAM: Jeff Schmidt (NRO, Audit Lead)  
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Jason Thompson (NRO)  
Rani Franovich (NRO, Project Manager)

## I. BACKGROUND AND OBJECTIVES

NuScale submitted by a letter dated December 31, 2016, to the U.S. Nuclear Regulatory Commission (NRC) a Final Safety Analysis Report (FSAR) for its Design Certification (DC) application of the NuScale design (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17013A229). The NRC staff initiated this DC review on March 27, 2017.

To facilitate the NRC staff's evaluation of information supporting the FSAR, and to complete its safety review of portions of FSAR Chapter 15, "Transient and Accident Analyses," pertaining to reactor systems, the NRC staff is planning the following:

- An audit entrance meeting on June 15<sup>t</sup>, 2017, at NuScale's Rockville office. The initial audit duration is 180 days, which includes audit phases 1 and 2 as noted above in the "DURATION" section. The audit is expected to primarily be performed via the NuScale eRR or, if necessary, at NuScale's Rockville office. During this audit, the NRC staff will examine the documents referenced and analyses mentioned in the FSAR, but not specifically cited, to support the applicant's statements in the FSAR.

The objectives of this audit are for the NRC staff to:

- gain a better understanding of the detailed calculations, analyses, and bases underlying the NuScale FSAR Chapter 15 and confirm the staff's understanding;
- better understand if the methodology meets NRC regulations and conforms to regulatory guidance; and
- develop requests for additional information (RAI).

The NRC staff determined efficiency gains would be realized by auditing documents that support the analysis presented in the FSAR to inform RAIs. During the audit and interactions with the applicant, the NRC staff may may issue detailed RAIs separate from, but informed by, the audit.

## II. REGULATORY AUDIT BASIS

Title 10 of the *Code of Federal Regulations* (CFR), Section 52.47(a)(4) states that a DC application must contain an FSAR that includes:

*An analysis and evaluation of structures, systems, and components with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.*

An audit is needed to confirm the basis for the safety conclusions made in the applicant's Chapter 15 transient and accident analyses.

### **III. REGULATORY AUDIT SCOPE**

The scope of this audit includes information, documents, and supporting calculations related to the FSAR Chapter 15 transient and safety analyses. In addition to the initial set of audit documents and information requested in Attachment A, the NRR staff may request other information to as needed to achieve audit objectives. These documents will be listed as references in the audit report prepared by the staff following the conclusion of the audit.

### **IV. SPECIAL REQUESTS**

The NRC staff requests the documents listed in Attachment A be available to the NRC auditors in NuScale's eRR. Use of the eRR allows multiple auditors in different geographic locations to examine the same document at the same time, which improves the efficiency and reduces the cost of the audit. Additional documents may be identified as the review progresses. When the staff's review of the documents associated with a specific issue is complete, the staff will notify either the NRC's Division of New Reactor Licensing (DNRL) or NuScale that these documents can be removed from eRR, thereby minimizing their residence time in eRR.

In addition, the NRC staff may request in-person audit meetings with NuScale personnel to facilitate the staff's understanding of material to be audited. Such meetings will be scheduled based on mutual availability. The NRC staff requests that document titles identified by the NRC staff that are germane to an in-person audit meeting be made available in the eRR prior to any scheduled in-person audit meeting.

### **V. AUDIT ACTIVITIES AND DELIVERABLES**

The NRC audit team is expected to consist of aforementioned individuals covering the technical areas affecting Chapter 15 FSAR Sections covered by the requests in Attachment A. The NRC staff will conduct this audit in accordance with the guidance provided in NRO-REG-108, "Regulatory Audits" (Reference 2). The NRC staff acknowledges the proprietary nature of the information requested and will handle it appropriately throughout the audit. While the NRC staff will take notes, the NRC staff will not remove hard copies or electronic files from the audit site(s).

The audit will initiate on June 15, 2017. The audit is scheduled for a period of 180 days and will consist of two stages, each approximately 90 days. The review of the majority of the Attachment A documents is expected to be complete by the end of Stage 1. The documents needed for Stage 2 will be identified at the end of Stage 1.

Stage 2 is expected to result in the closure of the remaining audit items and may include additional items related to RAI responses, as necessary. If additional items are identified late in Stage 2, which could include items related to RAI responses or design changes, the audit plan may be revised to include additional stages to address these specific identified items, or a new audit plan may be generated. Audit reports will be generated upon completion of each stage and will be published in the NRC's ADAMS.

During each stage, the NRC will hold monthly audit calls and/or meetings with NuScale to identify issues that have been closed or will be resolved by another mechanism, such

as RAIs or public meetings. In the monthly meetings, NRC will also identify any new emerging information needs as well as documents that can be removed from eRR.

The audit will assist the NRC staff in the issuance of RAIs (if necessary) for the licensing review of the FSAR Sections identified above in preparation of the NRC staff's safety evaluation.

If necessary, any concerns related to the conduct of the audit will be communicated to Rani Franovich (NRC) at 301-415-7334 or [Rani.Franovich@nrc.gov](mailto:Rani.Franovich@nrc.gov).

## **REFERENCES**

1. Letter from NuScale Power, LLC, "NuScale Power, LLC Submittal of the NuScale Standard Plant Design Certification Application," December 31, 2016 ADAMS Accession No. ML17013A229.
2. NRO-REG-108, "Regulatory Audits," April 2, 2009, ADAMS Accession Number ML081910260.

## Attachment A – Requested Documents

1. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.0.6, "Evaluation of a Return to Power."
2. Calculational Package(s) (e.g., calcnotes or analysis packages) and any other documentation (specifically detailed drawings, diagrams, and P&IDs) which supports the development of the limiting steam line break in FSAR Tier 2, Section 15.1.5, "Steam Piping Failures Inside and Outside of Containment."
3. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.1.6, "Loss of Containment Vacuum/Containment Flooding," Table 15.1-10, and Figure 15.1-47 through Figure 15.1-52.
4. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the assertion that, "no single failures were found to have adverse impact on the primary or secondary peak pressure or the MCHFR," in FSAR Tier 2, Section 15.2.7.2, "Sequence of Events and Systems Operation."
5. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of the two limiting loss of feedwater cases discussed in FSAR Tier 2, Section 15.2.7.3.3, "Results."
6. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation (specifically detailed drawings, diagrams, and P&IDs) which supports the development of the limiting feedwater line break cases discussed in FSAR Tier 2, Section 15.2.8, "Feedwater System Pipe Breaks Inside and Outside of Containment."
7. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.4.2, "Uncontrolled Control Rod Assembly Withdrawal at Power," and Table 15.4-3, Table 15.4-4, and Figure 15.4-6 through Figure 15.4-12.
8. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the assertion that the minimum possible rod worth produces the most severe transient in FSAR Subsection 15.4.3.5, "Control Rod Assembly Drop Analysis."
9. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.4.3.5, "Control Rod Assembly Drop Analysis," Table 15.4-7, Table 15.4-8, and Figure 15.4-21 through 15.4-27.
10. Calculational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.4.6, "Inadvertent Decrease in Boron Concentration in the Reactor Coolant System," Table 15.4-9 through Table 15.4-13.
11. Documentation which supports the basis and development of FSAR Tier 2, Section

15.4.6, "Inadvertent Decrease in Boron Concentration in the Reactor Coolant System," Table 15.4-9.

12. Computational package(s) (e.g., calcnotes or analysis packages) and any other documentation (specifically detailed drawings, diagrams, and P&IDs) which supports the development of the most limiting failure of lines carrying primary coolant outside containment, as discussed in FSAR Tier 2, Section 15.6.2, "Failure of Small Lines Carrying Primary Coolant Outside Containment."
13. Computational package(s) (e.g., calcnotes or analysis packages) and any other documentation which supports the development of FSAR Tier 2, Section 15.6.3, "Steam Generator Tube Failure (Thermal Hydraulic)," Table 15.6-6 through Table 15.6-11 and Figure 15.6-16 through Figure 15.6-40.
14. Computational package(s) (e.g., calcnotes or analysis packages) and any other documents which supports the development of the limiting ECCS actuation case with respect to the minimum CHF ratio, as discussed in FSAR Tier 2, Section 15.6.6, "Inadvertent Operation of Emergency Core Cooling System."