

May 31, 2017

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

FROM: Marieliz Vera, Project Manager **/RA/**  
Licensing Branch 1  
Division of New Reactor Licensing  
Office of New Reactors

SUBJECT: AUDIT PLAN FOR THE REGULATORY AUDIT OF NUSCALE  
POWER, LLC; COMPONENT DESIGN SPECIFICATIONS

On January 6, 2017, NuScale Power, LLC (NuScale) submitted a design certification (DC) application for a small modular reactor to the U.S. Nuclear Regulatory Commission (NRC) (Agencywide Documents Access and Management System Accession No. ML17013A229). The NRC staff started its detailed technical review of NuScale's DC application on March 15, 2017.

The purpose of the subject audit, to be conducted by the NRC staff, is to: (1) gain a better understanding of the NuScale design; (2) verify information; (3) identify information that may require docketing to support the basis of the licensing or regulatory decision; and (4) review related documentation and non-docketed information to evaluate conformance with regulatory guidance and compliance with NRC regulations.

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 1, 2017, and last for 50 days. The audit plan is enclosed.

Docket No. 52-048

Enclosure:  
Audit Plan

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

CONTACT: Marieliz Vera, NRO/DNRL  
301-415-5861

AUDIT PLAN FOR THE REGULATORY AUDIT OF NUSCALE POWER, LLC FINAL SAFETY ANALYSIS REPORT; OF COMPONENT DESIGN SPECIFICATIONS

DATED: May 31, 2017

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**\*via email**

**NRO-002**

OFFICE	NRO/DNRL/LB1: PM	NRO/DNRL/LB1: LA	NRO/DNRL/LB1
NAME	MVera	MBrown	MVera
DATE	5/30/2017	5/31/2017	5/31/2017

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**U.S. NUCLEAR REGULATORY COMMISSION  
REGULATORY AUDIT OF COMPONENT DESIGN SPECIFICATIONS  
NUSCALE STANDARD PLANT DESIGN CERTIFICATION**

**Docket No. 52-048**

**AUDIT PLAN**

**APPLICANT:** NuScale Power, LLC

**APPLICANT CONTACTS:** Marty Bryan, NuScale Power  
Jennie Wike

**DURATION:** 50 days

**LOCATION:** NuScale Power, LLC (Rockville Office)  
11333 Woodglen Drive, Suite 205  
Rockville, Maryland 20852

Electronic Reading Room (eRR)

**AUDIT TEAM:** Tuan Le, NRO Mechanical Engineer (NRC), Audit Lead  
Cheng-Ih (John) Wu, Mechanical Engineer (NRC)  
Thomas G. Scarbrough, Sr. Mechanical Engineer (NRC)  
James Strnisha, Mechanical Engineer (NRC)  
Jason Huang, Mechanical Engineer (NRC)  
Yuken Wong, Sr. Mechanical Engineer (NRC)  
Yiu Law, Mechanical Engineer (NRC)  
Michael Breach, Mechanical Engineer (NRC)  
Marieliz Vera Amadiz, Project Manager (NRC)

**I. BACKGROUND**

On March 15, 2017, the U.S. Nuclear Regulatory Commission (NRC) accepted the design certification application for docketing for the NuScale Standard Plant Design Certification (DC) Application for a small module reactor (SMR) design submitted by NuScale Power, LLC. (NuScale Power) (Reference 1).

The NRC staff determined that efficiency gains would be realized by auditing the documents supporting the NuScale SMR design presented in the NuScale final safety analysis report (FSAR). The purpose of this audit is to allow the NRC technical staff to gain an understanding of the supporting design specifications and design calculations to better focus the staff's inquiries to the applicant. During the audit and interactions with the applicant, there may be detailed RAIs developed, which would be part of future formal correspondence. To facilitate the NRC staff's evaluation of information supporting the Design Control Document (DCD), and to complete its safety review of the design specification for components the NRC staff is planning the following:

- An audit entrance meeting on June 1, 2017, by teleconference. The initial audit duration is 50 days. The audit is expected to primarily be performed via the NuScale eRR, or if necessary, at NuScale's Rockville office.

## II. PURPOSE

The purpose of the audit is to verify that the component design, qualification and classification in support of the NuScale Standard Plant DC application are being performed in accordance with the methodology and criteria described in the NuScale FSAR.

## III. REGULATORY AUDIT BASIS

The audit basis is to confirm that the NuScale SMR component design, qualification and classification are being performed consistent with the NuScale DC application and American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) and other referenced standards and NRC regulatory guides.

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Section 47, "Contents of Applications; Technical Information," states the following:

*The application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted. The information submitted for a design certification must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the NRC, and procurement specifications and construction and installation specifications by an applicant. The Commission will require, before design certification, that information normally contained in certain procurement specifications and construction and installation specifications be completed and available for audit if the information is necessary for the Commission to make its safety determination.*

In the NRC Standard Review Plan (SRP) Section 3.9.3, "ASME Code Class 1, 2, and 3 Components and Component Supports, and Core Support Structures," Section 7 of Appendix A provides guidance that the NRC staff may request the submission of the Code-required design documents (such as design specifications, design reports, load capacity data sheets, or other related material or portion thereof), in order to establish that the design criteria, analytical methods, and functional capability satisfy the guidance provided by SRP Section 3.9.3. This includes verification that the design information described in the FSAR was adequately translated into documentation for each of the components designed to ASME BPV Code, Section III, Class 1, 2, and 3 requirements. In addition, the NRC staff will review the component design, equipment qualification and classification processes for selected components in support of its review of the following SRP sections:

- Section 3.2.1, "Seismic Classification,"
- Section 3.2.2, "System Quality Group Classification,"
- Section 3.8.2, "Steel Containment,"
- Section 3.9.5, "Reactor Pressure Vessel Internals,"

- Section 3.9.6, “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints,”
- Section 3.10, “Seismic and Dynamic Qualification of Mechanical and Electrical Equipment,” and
- Section 3.11, “Environmental Qualification of Mechanical and Electrical Equipment.”

The NRC staff will conduct this audit in accordance with the guidance provided in NRO-REG-108, “Regulatory Audits” (Reference 2).

#### **IV. REGULATORY AUDIT SCOPE**

The primary scope of this audit is the review of design and equipment qualification for components categorized as ASME BPV Code, Section III, Class 1, 2, and 3 components, component supports, and core supports, to verify that the component design is in accordance with the methodology and criteria described in the NuScale FSAR and ASME BPV Code. The staff will also review the documentation of classification, quality groups, and design processes for plant components of safety significance. The reviewers will focus the audit on the areas shown in the list below:

- The staff reviews classification documents that establish the design basis for safety-related, seismic and quality group classifications pertaining to risk-significant systems, and important to safety and safety-related components.
- The staff reviews the design specifications to confirm that the design of ASME components reflects the NuScale FSAR.
- The staff reviews the design document to confirm that the design documents have been adequately prepared in accordance with the ASME BPV Code, Section III, NCA-3250, for design specifications and other codes and standards needed to satisfy General Design Criterion (GDC) 1 and GDC 2 in 10 CFR Part 50, Appendix A.
- The staff reviews the design document including design specifications and stress calculation packages to confirm that the component design meets the design criteria and that the analytical methods and functional provisions are in accordance with the commitments made in the application.

#### **V. DOCUMENTS/INFORMATION NECESSARY FOR THE AUDIT**

The following documents are to be made available to the NRC staff, in the NuScale eRR:

- The design specifications of ASME BPV Code Class 1, 2, and 3 component, component supports and core supports including safety-related valves; and other pumps, valves, and snubbers determined to have high safety significance.
- The design specifications (or information to be contained in specifications) and design calculations (i.e. stress calculation packages, technical reports) for components and component supports (pressure vessel, pumps, valves, and supports) of the following systems:
  - Reactor Coolant System (RCS)

- Steam generator system (SGS)
  - Decay heat removal system (DHRS)
  - Emergency core cooling system (ECCS)
  - Chemical and Volume Control System (CVCS)
  - Reactor Component Cooling Water System (RCCWS)
  - Containment System (CNTS)
- Design classification documents including processes, procedures of component classifications, and detailed piping and instrumentation diagrams (P&IDs) that include the above listed systems, as well as designation of ASME BPV Code class and quality group, as applicable.
  - The specifications (or information to be contained in specifications) should include environmental qualification of the components as part of the component specification or in a separate environmental qualification specification.
  - Design specification of the containment vessel, including drawings and all reference documents, such as the detailed stress analysis report and the ultimate pressure capacity finite element analysis.

This is not a comprehensive list of documents that the NRC staff will be reviewing as part of the audit, as there may be a need to review additional data and calculations supporting the basis for these documents. The SRP review areas are assigned to the following NRC staff:

- Tuan Le: SRP Section 3.2.1, "Seismic Classification," and SRP Section 3.2.2, "System Quality Group Classification."
- Jason Huang: DSRS Section 3.8.2, "Steel Containment."
- Cheng-Ih (John) Wu: SRP Section 3.9.3, "ASME Code Class 1, 2, and 3 Components and Component Supports, and Core Support Structures."
- Yuken Wong and Yiu Law: SRP Section 3.9.5, "Reactor Pressure Vessel Internals"
- Thomas Scarbrough and James Strnisha: SRP Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," and SRP Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment."
- Michael Breach: SRP Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment."

Appropriate handling and protection of proprietary information shall be acknowledged and observed throughout the audit.

## **VI. SPECIAL REQUESTS**

The NRC staff requests that NuScale provide the technical staff with access to the audit documents. NuScale can upload the requested documents into the NuScale ERR for NRC staff's review. During the audit, the NRC staff will have questions and discussion items for the NuScale subject matter experts. NuScale is requested to provide the NRC staff with telephone access to the NuScale subject matter experts. When the NRC staff's review of the documents associated with a specific issue is complete the staff will notify either the Office of New Reactors, Division of New Reactor Licensing or NuScale that these documents can be removed from eRR thereby minimizing their residence time in eRR.

## **VII. AUDIT ACTIVITIES AND DELIVERABLES**

The NRC audit team review will cover the technical areas identified in Section V of this audit plan. Depending upon the effort needed in a given area, NRC team members may be reassigned to ensure adequate coverage of important technical elements.

The regulatory audit will be scheduled for June 1 through July 20, 2017, from 7:30 AM to 3:30 PM. A follow-up audit will be scheduled, if the NRC staff determines it is needed, after the date that the NRC is notified that any revised design specifications resulting from the June 2017 audit are available for review by the NRC staff at NRC Headquarters.

At the end of the audit, a technical audit summary will be sent by the technical reviewers to the NRC Project Manager (PM) for prompt issuance to the applicant as well as of a public version of the same.

The NRC PM will coordinate with NuScale in advance of audit activities to verify specific documents and identify any changes to the audit schedule and requested documents. The audit entrance/exit meetings and weekly audit meeting are to be scheduled as follows:

- Entrance Meeting: June 1, 2017;
- Exit Meeting: TBD;
- Weekly NRC Audit Team Meeting as needed: Wednesdays 11:00 AM – 12:00 PM EDT.

The NRC will hold bi-weekly (once every two weeks) 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 bi-weekly meetings, NRC will also identify any new emerging information needs as well as documents that can be removed from eRR.

The NRC staff acknowledges the proprietary nature of the information requested. It will be handled 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.

At the completion of the audit, the NRC audit team will issue an audit summary within 90 days that will be declared and entered as an official agency record in the NRC's Agencywide Documents Access and Management System (ADAMS) records management system.

The audit outcome may be used to identify any additional information to be submitted for making regulatory decisions, and it will assist the NRC staff in the issuance of RAIs (if necessary) for the

licensing review of NuScale FSAR Chapter 3 and any related information provided in other chapters, in preparation of the NRC's Safety Evaluation Report.

If necessary, any circumstances related to the conductance of the audit will be communicated to Marieliz Vera Amadiz (NRC) at 301-415-5861 or email: [Marieliz.VeraAmadiz@nrc.gov](mailto:Marieliz.VeraAmadiz@nrc.gov).

### **VIII. REFERENCES**

1. NRC Letter, "NuScale Power, LLC. – Acceptance of an Application for Standard Design Certification of a Small Modular Reactor," ADAMS Accession Number ML17074A087, March 23, 2017.
2. NRO-REG-108, "Regulatory Audits," ADAMS Accession Number ML081910260, April 2, 2009.
3. NuScale Standard Plant Design Certification Application, Revision 0, December 2016.