



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

August 28, 2018

MEMORANDUM TO: Samuel S. Lee, Chief  
Licensing Branch 1  
Division Licensing, Siting, and  
Environmental Analysis  
Office of New Reactors

FROM: Marieliz Vera, Project Manager */RA/*  
Licensing Branch 1  
Division Licensing, Siting, and  
Environmental Analysis  
Office of New Reactors

SUBJECT: PHASE 2 AUDIT PLAN FOR THE AUDIT OF NUSCALE POWER,  
LLC DOCUMENTS RELATED TO REACTOR INTERNALS  
COMPREHENSIVE VIBRATION ASSESSMENT PROGRAM

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 (ADAMS) Accession No. ML17013A229). The NRC staff started its detailed technical review of NuScale's DC application on March 15, 2017. In May 2017, the NRC staff completed the Phase 1 regulatory audit of NuScale Final Safety Analysis Report Section 3.9.2, "Dynamic Testing and Analysis of Systems, Components, and Equipment," and issued the Phase 1 audit report (ADAMS Accession No. ML18023A091) which summarizes the NRC staff's Phase 1 audit findings.

The purpose of the Phase 2 subject audit is to examine NuScale's updated design documentation pursuant to the NRC staff's Phase 1 audit findings. 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 for September 5, 2018, through October 4, 2018. The audit plan is enclosed.

Docket No. 52-048

Enclosure:  
Audit Plan

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

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

SUBJECT: AUDIT PLAN FOR THE PHASE 2 AUDIT OF NUSCALE POWER, LLC  
 DOCUMENTS RELATED TO REACTOR INTERNALS COMPREHENSIVE  
 VIBRATION ASSESSMENT PROGRAM DATED: August 28, 2018

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**U.S. NUCLEAR REGULATORY COMMISSION**

**PHASE 2 AUDIT OF NUSCALE POWER, LLC REACTOR INTERNALS COMPREHENSIVE**

**VIBRATION ASSESSMENT PROGRAM**

**DOCKET NO. 52-048**

**AUDIT PLAN**

**APPLICANT:** NuScale Power, LLC (NuScale)

**APPLICANT CONTACT:** Marty Bryan

**DURATION:** September 5, 2018 – October 4, 2018

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

NuScale Electronic Reading Room (eRR)

**AUDIT TEAM:** Yuken Wong (NRO, Audit Lead)  
Timothy Lupold (NRO/MEB Branch Chief)  
Stephen Hambric (NRC Consultant)  
Supporting staff (As needed)  
Marieliz Vera (NRO, Project Manager)

**I. BACKGROUND**

On March 15, 2017, the U.S. Nuclear Regulatory Commission (NRC) accepted and docketed a standard design certification application (DCA) (Reference 1) submitted by NuScale Power, LLC (NuScale), to certify its small module reactor design (Reference 2).

Between May 16, 2017 and November 2, 2017, the NRC staff completed Phase 1 of the subject audit that included review and examination of NuScale's design documents, drawings, test plans, and test reports related to the reactor internals comprehensive vibration assessment program (CVAP) and NuScale power module (NPM) analysis for Service Level D (seismic in combination with pipe break events). The NRC staff's Phase 1 audit summary report is available in Agencywide Documents Access and Management System (ADAMS) under Accession No. ML18023A091 (Reference 3).

This audit plan describes the NRC staff's plans for conducting Phase 2 of the audit of NuScale's documents related to the reactor internals CVAP testing and analysis.

Enclosure

## II. PURPOSE

The purpose of the audit is to verify that the appropriate updates have been made to the reactor internals vibration analysis and testing documents that were identified and summarized in the NRC staff's Phase 1 audit report. The NRC staff will also review the vibration analyses and testing data to resolve the outstanding request for additional information (RAI) issues including the steam generator (SG) tubes, SG inlet flow restrictors (SGIFR), and initial startup testing. NuScale is planning to send to the NRC the SG tube testing reports from TF-1 and TF-2 tests and also the SGIFR test reports that led to the final design of the SGIFR. However, to expedite access to the information, both NuScale and the NRC agreed that an audit would be the most expedient way to review the material.

## III. REGULATORY AUDIT BASIS

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.*

The NRC staff will conduct this audit in accordance with the guidance provided in the Office of New Reactors (NRO)-REG-108, "Regulatory Audits" (Reference 4).

## IV. REGULATORY AUDIT SCOPE

The scope of the NRC staff's Phase 2 audit will focus on:

- Reactor internals CVAP, including:
  - Confirming the updated analysis and modelling resolve issues identified in phase 1 of the audit.
  - Review and confirm the applicability of the testing results related to SG tubes (TF1 and TF2) and SGIFRs to final design of the components and demonstrate the various flow induced vibration phenomenon are not present, or will not cause damage to the components.
  - Review separate effects testing plan related to SG tubes (TF3) to determine if the testing will support making a safety finding that the tubes are not subject to

flow induced vibration phenomenon.

- Review initial startup measurement and inspection plan to confirm the plan will demonstrate that adverse flow effects will not cause unanticipated flow-induced vibrations of significant magnitude or structural damage.

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

The NRC staff requests NuScale to make documents available to the NRC staff in the NuScale eRR related to the reactor internals CVAP.

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 onto the NuScale eRR for the NRC staff's review. During the audit, the NRC staff will have questions and discussion items for the NuScale subject matter experts (SME). NuScale is requested to provide the NRC staff with telephone access to the NuScale SMEs. When the NRC staff's review of the documents associated with a specific issue is complete, the staff will notify either the NRO, Division of Division Licensing, Siting, and Environmental Analysis, or NuScale that these documents can be removed from the eRR.

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

The NRC audit team will review the technical areas identified in Section IV 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 is currently scheduled to begin on September 5, 2018, and end on October 4, 2018. If the NRC staff determines the resolution of open items requires additional effort and time, a follow-up audit will be scheduled.

Within 90 days from the conclusion of the audit, the audit team will issue a publicly available audit summary report to the applicant.

The NRC project manager 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: September 5, 2018;
- Exit Meeting: TBD; and
- Weekly Audit Telephone Conference (as needed):

The NRC will hold weekly audit teleconferences 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 teleconferences, NRC will also identify any new emerging information needs as well as documents that can be removed from the 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.

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 Final Safety Analysis Report, 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 (NRC) at 301-415-5861, or email: [Marieliz.Vera@nrc.gov](mailto:Marieliz.Vera@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 No. ML17074A087, March 23, 2017.
2. NuScale Standard Plant DCA, Revision 0, December 2016.
3. Audit Summary Report of NuScale Reactor Internals Comprehensive Vibration Assessment Program and Seismic Analysis, ML18023A091, February 5, 2018.
4. NRO-REG-108, "Regulatory Audits," ADAMS Accession No. ML081910260, April 2, 2009.