



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

March 4, 2019

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 4 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 Number ML17013A229). The NRC staff started its detailed technical review of NuScale's DC application on March 15, 2017.

The purpose of the Phase 4 subject audit is to examine NuScale's comprehensive vibration assessment program (CVAP) analysis specifically regarding the leakage flow instability analysis of reactor internals components in order to resolve the open item related to request for additional information (RAI) 9408, Question 03.09.02-76. The audit will take place online via NuScale's electronic reading room. The audit is currently scheduled to start March 4, 2019. 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: PHASE 4 AUDIT PLAN FOR THE AUDIT OF NUSCALE POWER, LLC.,
DOCUMENTS RELATED TO REACTOR INTERNALS COMPREHENSIVE
VIBRATION ASSESSMENT PROGRAM
DATED: March 4, 2019

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NRO-002

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DATE	02/28/2019	03/04/2019	03/04/2019

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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: March 4, 2019, to March 29, 2019

LOCATION: NuScale Electronic Reading Room (eRR)

AUDIT TEAM: Yuken Wong (NRO, Audit Lead)
Timothy Lupold (NRO/MEB Branch Chief)
Stephen Hambric (NRC Consultant)
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).

This audit plan describes the NRC staff's plans for conducting Phase 4 of the audit of NuScale's documents related to the reactor internals Comprehensive Vibration Assessment Program (CVAP) leakage flow instability (LFI) analysis.

II. PURPOSE

NuScale responded to request for additional information (RAI) 9408, Question 03.09.02-76, with letter RAIO-0219-64485 dated February 8, 2019 (ML19038A194) (Reference 3). The response includes a markup of a revision to TR-0716-50439, "NuScale Comprehensive Vibration Assessment Program Technical Report." The technical report revision includes details of NuScale's quantitative screening of several reactor internals for LFI which might experience gap flow through a narrow adjacent annulus. NuScale used experimentally validated methods documented by Inada and Hayama in peer-reviewed technical journals. However, it is not clear to the staff in the RAI response how specifically NuScale applied the Inada methods to the analyses. The purpose of this audit is for the staff to better understand these details to support closing the RAI. To expedite access to the information, the NRC will examine the NuScale LFI calculations via NuScale's electronic reading room (eRR).

Enclosure

III. REGULATORY AUDIT BASIS

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, “Domestic Licensing of Production and Utilization Facilities,” Appendix A, “General Design Criteria for Nuclear Power Plants,” General Design Criterion 4, “Environmental and dynamic effects design bases” states the following:

Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These 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.

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 4 audit will focus on reviewing the NuScale’s CVAP analysis specifically regarding the LFI analysis for the reactor internals components in order to resolve the open item related to the response to RAI 9408, Question 03.09.02-76. The NRC staff will examine NuScale’s LFI calculations to understand how NuScale applied the Inada methods to the analyses.

V. DOCUMENTS/INFORMATION NECESSARY FOR THE AUDIT

The NRC staff requests NuScale to make reactor internals LFI analysis documents available to the NRC staff in the NuScale eRR. A NuScale engineer familiar with these materials should be available during the audit if a teleconference is needed to answer any questions.

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 should upload the requested documents onto the NuScale eRR for the NRC staff’s review. During the audit, the NRC staff may 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 Licensing, Siting, and Environmental Analysis project manager, or the NuScale contact 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, the NRC team members may be reassigned to ensure adequate coverage of important technical elements.

The regulatory audit is currently scheduled for March 4, 2019. If the NRC staff determines that the resolution of open items requires additional effort and time, a follow-up audit will be scheduled, or this audit will be extended.

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: March 4, 2019.
- Exit Meeting: March 29, 2019.

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 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 conduct of the audit will be communicated to Marieliz Vera (NRC) at 301-415-5861, or email: 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," ML17074A087, issued March 23, 2017.
2. NuScale Standard Plant DCA, Revision 0, issued December 2016.
3. NuScale Power, LLC., Response to NRC Request for Additional Information No. 427 (eRAI No. 9408) on the NuScale Design Certification Application, issued February 8, 2019 (ML19038A194).
4. NRO-REG-108, "Regulatory Audits," ML081910260, issued April 2, 2009.