



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

March 22, 2023

MEMORANDUM TO: Michael I. Dudek, Chief
New Reactor Licensing Branch
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

FROM: Getachew Tesfaye, Senior Project Manager **/RA/**
New Reactor Licensing Branch
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

SUBJECT: AUDIT PLAN FOR U.S. NUCLEAR REGULATORY
COMMISSION REQUESTS FOR SUPPLEMENTAL
INFORMATION IDENTIFICATION OF SPECIFIC INFORMATION
REQUIREMENTS – NUSACLE STANDARD DESIGN APPROVAL
APPLICATION

By letter dated December 31, 2022 (electronically submitted on January 1, 2023), NuScale Power, LLC (NuScale) transmitted the last part of the required staged submittal of the Standard Design Approval (SDA) application. The submitted documents can be found at Agencywide Documents Access and Management System (ADAMS) Accession No. ML22339A066. The staff completed the acceptance review of the SDA application and issued the acceptance review letter on March 17, 2023 (ML23058A160).

Based on its review, the U.S. Nuclear Regulatory Commission (NRC) staff has identified technical sufficiency issues in the SDA application related to density wave oscillation (DWO), with impacts on some parts of the SDA application Part 2, Final Safety Analysis Report (FSAR) Chapters 3, 5, 6, 15 and 19, and the following associated licensing topical reports (LTRs): (1) TR-0516-49422, "Loss-of-Coolant Accident [LOCA] Evaluation Model," Revision 3 (ML23008A002); (2) TR-0516-49416, "Non-Loss-of-Coolant Accident Analysis Methodology," Revision 4 (ML23005A305); (3) TR-124587, "Extended Passive Cooling and Reactivity Control Methodology," Revision 0 (ML23005A308); and (4) TR-131981, "Methodology for the Determination of the Onset of Density Wave Oscillations (DWO)," Revision 0 (ML22364A332). As a result, the NRC staff has concluded that supplemental information on this topic is required before the NRC staff can accept the SDA application for docketing and conduct a detailed technical review of all aspects of the application.

Enclosure 1 of the March 17, 2023, NRC letter outlined, at a high-level, the missing DWO-related information. As stated in that letter, the purpose of this audit is to resolve and close-out the staff's identified questions about DWO so that the application can be adequately remedied and then found acceptable for docketing.

CONTACT: Getachew Tesfaye, NRR/DNRL
(301-415-8013)

The audit will start on March 27, 2023, and will exit on or about August 22, 2023; or earlier if the staff completes its review and all of the needed undocketed SDA application supporting documents associated with DWO, identified in Enclosure 1 of the March 17, 2023, NRC letter, have been provided. The audit will be conducted primarily via NuScale Electronic Reading Room and/or at NuScale's offices in either Rockville, Maryland or Corvallis, Oregon. The contents of the audit plan are provided as an enclosure.

Docket No. 05200050

Enclosure:
Audit Plan

cc w/enclosure: NuScale Power, LLC Listserv

SUBJECT: AUDIT PLAN FOR U.S. NUCLEAR REGULATORY COMMISSION REQUESTS FOR SUPPLEMENTAL INFORMATION IDENTIFICATION OF SPECIFIC INFORMATION REQUIREMENTS – NUSACLE STANDARD DESIGN APPROVAL APPLICATION. DATED: MARCH 22, 2023

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ADAMS Accession No: ML23067A298 *via email NRR-106

OFFICE	DNRL/NRLB:PM	DNRL/NLIB:LA	DNRL/NRLB:BC	DNRL/NRLB:PM
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UNITED STATES NUCLEAR REGULATORY COMMISSION
AUDIT PLAN FOR THE STAFF ACCEPTANCE REVIEW OF THE NUSCALE POWER, LLC
STANDARD DESIGN APPROVAL AND REQUESTS FOR SUPPLEMENTAL INFORMATION

DOCKET NO. 05200050

AUDIT PLAN

APPLICANT:

NuScale Power, LLC (NuScale)

CONTACTS:

Manager: Thomas Griffith

Supervisors: Thomas Griffith, Jim Osborn, Stephanie Terwilliger, Shane Scanlon,
Wren Fowler

DURATION:

Audit Entrance - March 27, 2023

Audit Exit – August 22, 2023

LOCATION:

**U.S. Nuclear Regulatory Commission (NRC) Headquarters
(via NuScale’s Electronic Reading Room (eRR))**

One White Flint North
11545 Rockville Pike
Rockville, Maryland 20852-2738

NuScale

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Rockville, Maryland 20852

NuScale

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Corvallis, OR 97330

AUDIT TEAM (Project Managers):

Getachew Tesfaye (Project Lead)	Thomas Hayden
David Drucker	Bruce Baval
Stacy Joseph	Joseph Colaccino (Technical Advisor)
Ricky Vivanco	

AUDIT TEAM (Technical Branch):

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I. BACKGROUND AND OBJECTIVES

By letter dated December 31, 2022 (electronically submitted on January 1, 2023), NuScale Power, LLC (NuScale) transmitted the last part of the required staged submittal of the Standard Design Approval (SDA) application. The submitted documents can be found at Agencywide Documents Access and Management System (ADAMS) Accession No. ML22339A066. The staff completed the acceptance review of the SDA application and issued the acceptance review letter on March 17, 2023 (ML23058A160).

Based on its review, the NRC staff has identified technical sufficiency issues in the SDA application related to density wave oscillation (DWO), with impacts on some parts of the SDA application Part 2, Final Safety Analysis Report (FSAR) Chapters 3, 5, 6, 15 and 19, and the following associated licensing topical reports (LTRs): (1) TR-0516-49422, "Loss-of-Coolant Accident [LOCA] Evaluation Model," Revision 3 (ML23008A002); (2) TR-0516-49416, "Non-Loss-of-Coolant Accident Analysis Methodology," Revision 4 (ML23005A305); (3) TR-124587, "Extended Passive Cooling and Reactivity Control Methodology," Revision 0 (ML23005A308); and (4) TR-131981, "Methodology for the Determination of the Onset of Density Wave Oscillations (DWO)," Revision 0 (ML22364A332). As a result, the NRC staff has concluded that supplemental information on this topic is required before the NRC staff can accept the SDA application for docketing and conduct a detailed technical review of all aspects of the application.

Enclosure 1 of the March 17, 2023, NRC letter outlined, at a high-level, the missing DWO-related information. As stated in that letter, the purpose of this audit is to resolve and close-out the staff's identified questions for DWO so that the application can be adequately remedied and then found acceptable for docketing.

The audit will start on March 27, 2023, and will exit on or about August 22, 2023, or earlier if the staff completes its review of all undocketed SDA application supporting documents and identifies the specific information required by the requests for supplemental information (RSI). The audit will be conducted primarily via NuScale eRR and/or at NuScale's offices in either Rockville, Maryland or Corvallis, Oregon. The contents of the audit plan are provided as an enclosure.

II. REGULATORY AUDIT BASIS

This regulatory audit is based on the submittal of the FSAR documents for its SDA application of the NuScale design (ML22339A066). The bases for the submittal follow the regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

- 10 CFR Subpart E - Standard Design Approvals
 - § 52.131 Scope of subpart.
 - § 52.133 Relationship to other subparts.
 - § 52.135 Filing of applications.
 - § 52.136 Contents of applications; general information.
 - § 52.137 Contents of applications; technical information.
 - § 52.139 Standards for review of applications.
 - § 52.141 Referral to the Advisory Committee on Reactor Safeguards (ACRS).
 - § 52.143 Staff approval of design.
 - § 52.145 Finality of standard design approvals; information requests.
 - § 52.147 Duration of design approval.

III. REGULATORY AUDIT SCOPE

The audit covers parts of the NuScale SDA application (ML22339A066) impacted by technical sufficiency issues related to density wave oscillation (DWO). This include parts of SDA application Part 2, Final Safety Analysis Report (FSAR) Chapters 3, 5, 6, 15 and 19, and parts of the following associated licensing topical reports (LTRs): (1) TR-0516-49422, "Loss-of-Coolant Accident [LOCA] Evaluation Model," Revision 3 (ML23008A002); (2) TR-0516-49416, "Non-Loss-of-Coolant Accident Analysis Methodology," Revision 4 (ML23005A305); (3) TR-124587, "Extended Passive Cooling and Reactivity Control Methodology," Revision 0 (ML23005A308); and (4) TR-131981, "Methodology for the Determination of the Onset of Density Wave Oscillations (DWO)," Revision 0 (ML22364A332).

In particular, the audit scope covers the following missing information needed for technical sufficiency for the NuScale SDA application and applicable LTRs:

- Scope of the methodology for calculating DWO and the full applicability range, conditions, and figures of merit;
- Testing that was performed including test results and test data;
- Comparisons of test data to the analysis models and justification for the applicability of the models for evaluation of the SDA application design; and
- Evaluations for the effect of DWO or other flow instability phenomena on steam generator and decay heat removal system performance SDA application Section 5.4.3 and 6.3) during all operating conditions including normal operation, LOCAs, Non-LOCAs, and extended passive cooling.

IV. INFORMATION AND OTHER MATERIAL NECCSSARY FOR THE REGULATORY AUDIT

NuScale should be prepared to provide documents, reports, calculations, computer code verification, and other material, as applicable, supporting the identification and resolution of RSIs. The NRC staff may request that NuScale make these materials available in the eRR and/or as a computer disc for review.

V SPECIAL REQUESTS

NuScale and NRC have discussed and agreed upon the following audit logistics:

- NuScale creates Certrec eRR locations for document viewing.
 - NuScale to set up access for NRC participants once Staff emails are communicated.
- Weekly schedule for audit activities
 - Friday – NRC PMs submits audit RSI items (via email)
 - Monday – NuScale addresses RSI items
 - Tuesday/Wednesday/Thursday – standing audit meetings
 - Thursday/Friday – NuScale posts RSI items feedback in eRR
- During the standing audit meetings NuScale and NRC staff will:
 - Clarify audit RSI items
 - Discuss audit potential RSI items resolutions
 - Discuss additional document needs
- NRC to track status of audit RSI items (internal spreadsheet).
 - NRC to provide NuScale a copy of the current tracker on Fridays.
 - Ensure mutual alignment during weekly standing meetings
- NRC PMs will be notified via email when new material is posted in eRR

VI DELIVERABLES

The NRC audit team will identify and communicate to NuScale the specific RSI items that are required to be submitted as soon as practicable, but no later than September 15, 2023; which is 6-months after the issuance of the acceptance review letter (March 17, 2023). Receiving this information in a timely manner will ensure that the SDA application can and will be accepted for detailed technical review. The NRC staff acknowledges the proprietary nature of the information reviewed in eRR 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 NRC will inform NuScale of emerging information needs as well as documents that can be removed from eRR following completion of staff review.

An audit report will be generated at the completion of the audit. If necessary, any circumstances related to the conduct of the audit will be communicated to Getachew Tesfaye, at 301-415-8013 or Getachew.tesfaye@nrc.gov.