



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

December 21, 2021

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

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

SUBJECT: REVISED PLAN FOR THE REGULATORY AUDIT OF  
NUSCALE POWER, LLC, TOPICAL REPORT TR-0915-17772,  
"METHODOLOGY FOR ESTABLISHING THE TECHNICAL  
BASIS FOR PLUME EXPOSURE EMERGENCY PLANNING  
ZONES," REVISION 2

By letter dated August 4, 2020, NuScale Power, LCC, (NuScale) submitted Topical Report (TR)-0915-17772, "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," Revision 2 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20217L422) for the U.S. Nuclear Regulatory Commission (NRC) staff's review.

Docket No. 99902043

Enclosure: Revised Audit Plan

cc w/encl.: DC NuScale Power LLC Listserv

CONTACT: Alina Schiller, NRR/DNRL  
(301) 415-8177

The NRC staff and NuScale agreed to a regulatory audit to discuss technical details related to the remaining issues involving the NRC Request for Additional Information (RAI) 9828 (ADAMS Accession No. ML21116A110). This audit commenced on November 29, 2021. During the audit discussions on December 7, 2021, the NRC staff summarized four viable options to resolve the remaining issues and close-out RAI 9828:

1. 5E-7/year annual exceedance frequency (AEF), with associated conditions on use.
2. 1E-6/year AEF for NuScale's design only, with associated conditions on use.
3. 1E-7/year sequence core damage frequency.
4. Site- and design-specific threshold, with associated conditions on use, justified by an applicant using the TR at construction and operating license (COL) stage using a technically defensible approach.

At the audit discussion on December 9, 2021, NuScale identified the need to extend the regulatory audit, which was originally scheduled to end on December 17, 2021 (memorandum and plan for the regulatory audit at ADAMS Accession No. ML21327A209), to March 31, 2022. NuScale communicated that the extension was necessary to evaluate the four options summarized by the NRC staff, and to develop the corresponding technical justification. NuScale stated that it would be ready to resume the audit in the last week of January 2022 by providing the path forward and its technical basis.

At NuScale's request, this revised schedule will allow NuScale to support resolution of the remaining issues involving the RAI 9828. The revised audit plan is provided as an enclosure.

SUBJECT: REVISED PLAN FOR THE REGULATORY AUDIT OF NUSCALE POWER, LLC,  
TOPICAL REPORT TR-0915-17772, "METHODOLOGY FOR ESTABLISHING  
THE TECHNICAL BASIS FOR PLUME EXPOSURE EMERGENCY PLANNING  
ZONES," REVISION 2  
DATED: DECEMBER 21, 2021

**DISTRIBUTION:**

PUBLIC	SRosenberg, NRR	RidsEdoMailCenter
GTesfaye, NRR	JQuichocho, NSIR	RidsOgcMailCenter
MDudek, NRR	KHsueh, NRR	RidsAcrcMailCenter
SGreen, NRR	ASchiller, NRR	
MPohida, NRR	KCompton, RES	
SVasavada, NRR	TSmith, NSIR	
MBiro, NRR	RHoffman, NSIR	
EDickson, NRR		

**ADAMS Accession No: ML21349A368****\*via e-mail****NRR-106**

OFFICE	DNRL/NRLB: PM	DNRL/NRLB: LA	DNRL/NRLB: PM	DNRL/NRLB: PM
NAME	ASchiller	SGreen*	GTesfaye*	ASchiller
DATE	12/15/2021	12/15/2021	12/15/2021	12/21/2021

**OFFICIAL RECORD COPY**

**U.S. NUCLEAR REGULATORY COMMISSION  
REVISED PLAN FOR THE REGULATORY AUDIT OF NUSCALE POWER, LLC, TOPICAL  
REPORT TR-0915-17772, "METHODOLOGY FOR ESTABLISHING THE TECHNICAL  
BASIS FOR PLUME EXPOSURE EMERGENCY PLANNING ZONES," REVISION 2**

**APPLICANT:** NuScale Power, LLC

**APPLICANT CONTACT:** Liz English  
Ross Snuggerud  
Mark Shaver  
Jeremiah Doyle  
Brandon Haley  
Amea Gurr

**DATE:** November 29, 2021–March 31, 2022

**LOCATION:** Remote Audit (via NuScale's Electronic Reading Room (eRR))

**AUDIT TEAM:** Marie Pohida (NRR/DRA/APLC), Team Lead  
Shilp Vasavada (NRR/DRA/APLC)  
Mihaela Biro (NRR/DRA/APLA)  
Elijah Dickson (NRR/DRA/ARCB)  
Keith Compton (RES/DSA/AAB)  
Todd Smith (NSIR/DPR)  
Raymond Hoffman (NSIR/DPR/RLB)

**PROJECT MANAGER:** Getachew Tesfaye/Alina Schiller (NRR/DNRL/NRLB)

**BACKGROUND AND PURPOSE**

The purpose of this regulatory audit is for the U.S. Nuclear Regulatory Commission (NRC) staff to exchange information with, review, and provide clarifying feedback on NuScale's preliminary (back-of-the-envelope) dose-distance relationship calculation for an example small modular nuclear power plant in support of staff's review of NuScale's Topical Report (TR)-0915-17772, "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," Revision 2 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20217L422).

The NRC staff, following a request for additional information (RAI), has engaged with NuScale to justify the proposed seismic screening criteria in the TR. An integrated team of NRC staff experts developed an approach for seismic sequence screening for emergency planning zone (EPZ) sizing purposes for light-water (LW) small modular reactors (SMRs). The NRC staff communicated options to resolve technical issues, including alternative seismic screening criteria, based on this approach at public meetings on October 27, 2021 and November 4, 2021 (meetings summary at ADAMS Accession No. ML21316A115). The four options proposed are:

1. 5E-7/year annual exceedance frequency (AEF), with associated conditions on use.
2. 1E-6/year AEF for NuScale's design only, with associated conditions on use.
3. 1E-7/year sequence core damage frequency.

Enclosure

4. Site- and design-specific threshold, with associated conditions on use, justified by an applicant using the TR at construction and operating license (COL) stage using a technically defensible approach.

The NRC will specifically audit NuScale's preliminary calculations associated with the seismic screening frequency applicability at an example nuclear power plant in support of staff's review of TR-0915-17772.

## **REGULATORY BASES**

This regulatory audit is based on the following:

- Title 10 of the *Code of Federal Regulations* (CFR) 50.47, "Emergency plans"
- 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities"
- NUREG-0396/EPA 520/1-78-016, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," (ADAMS Accession No. ML051390356)
- Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 3 (ADAMS Accession No. ML17317A256)
- U.S. Nuclear Regulatory Commission, "Use of Probabilistic Risk Assessment Methods in Nuclear Activities: Final Policy Statement," Federal Register (60 FR 42622)
- The Staff Requirements Memorandum (SRM) to SECY-04-0118, "Plan for the Implementation of the Commission's Phased Approach to Probabilistic Risk Assessment Quality"
- NUREG-1855, Revision 1: "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decisionmaking, Final Report," (ADAMS Accession No. ML17062A466)

## **REGULATORY AUDIT SCOPE**

The audit team will review NuScale's preliminary dose-distance relationship calculation for an example small modular nuclear power plant using the methodology in NuScale's TR-0915-17772. The staff's review will focus on providing clarifying feedback on the calculation.

The NRC staff will provide clarification on its approach on screening seismic events based on an occurrence frequency threshold for EPZ sizing purposes for LW SMRs discussed in the public meeting on October 27, 2021.

## **INFORMATION AND OTHER MATERIAL NECESSARY FOR THE REGULATORY AUDIT**

To support the regulatory audit, NRC staff requests relevant material to discuss the following:

## Topic 1: NuScale's Preliminary (Back-of-the-Envelope) Dose-Distance Relationship Calculation

1. Details of the NuScale's preliminary dose-distance relationship calculation for an example nuclear power plant using the methodology in NuScale's TR-0915-17772, including answers to the following questions:
  - a. Whether the example nuclear power plant is an operational U.S. LW reactor or a SMR? Provide details of the example plant, including location, the nuclear steam supply system, and containment type.
  - b. What assumptions were made in performing the preliminary dose-distance relationship calculation?
  - c. What was the source term used for the calculation and what is the basis for using the selected source term (e.g., the accident sequence or scenario or scenario class used to define the source term)?
  - d. Is the source term consistent with the release category(ies) in the NuScale Severe Accident Mitigation Design Alternatives report (ADAMS Accession No. ML20224A512)? If not, provide the basis for choosing a different source term?
  - e. What were the meteorological parameters used for the calculation and what was the basis for using the selected parameters?
  - f. What is the dose limit used for the calculation and how was it determined to be either "more severe" or "less severe" consistent with the methodology in NuScale's TR-0915-17772?
  - g. What is the occurrence frequency of the sequence or scenario or class of scenarios that provided the source term used in the preliminary calculation?
  - h. What is the release frequency used in the calculation and how was it determined? What is its relationship to the selected source term?
  - i. What is the approach and basis for calculating the probability of exceedance of the selected dose acceptance criteria?
  - j. What potential analytical margins exist in the source term? Are there other inputs that can impact the dose-distance calculation?

## Topic 2: Screening of Seismic Events

- a. Is the seismic screening threshold based on the approach developed by the NRC staff expected to be limited to only NuScale-specific seismic design characteristics (such as the certified design response spectrum and plant-level fragility)?
- b. Is a design- and site-specific seismic screening threshold based on the approach developed by the NRC being considered as an option?

### Topic 3: Appendix A, Appendix B, and Appendix C

- a) Please provide the appropriate source term (MELCOR) and dose (MACCS) output files supporting the example calculations.

### **LOGISTICS**

The audit will be conducted using NuScale's eRR. The audit entrance meeting was held on November 29, 2021. The audit, scheduled to begin on November 29, 2021, and end by December 17, 2021, is extended until March 31, 2022. The general format of the audit will include reviewing documents and discussions with the NuScale staff. The audit exit meeting will be scheduled at a later date.

### **SPECIAL REQUESTS**

On December 9, 2021, NuScale requested an extension of the audit to evaluate the four options to resolve the remaining issues involving RAI 9828 that were summarized by the NRC staff during the audit discussions on December 7, 2021, and to develop the corresponding technical justification.

### **DELIVERABLES**

The NRC audit team will issue a regulatory audit summary report within 90 days after the completion of the audit that will be placed on the docket and in ADAMS. The audit outcome could also identify any additional information to be reviewed in a follow-up audit or submitted separately for making regulatory decisions. If the audit outcome identifies additional needed information, the NRC will identify the need for RAIs or schedule a follow-up audit by March 31, 2022.

### **REFERENCES**

1. Letter from NuScale Power, LLC, "NuScale Power, LLC Submittal of "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," TR-0915-17772, Revision 2, August 4, 2020, ADAMS Accession No. ML20217L422.
2. LIC-111, "Regulatory Audits," October 31, 2019, ADAMS Accession No. ML19226A274.
3. Plan for the Regulatory Audit of NuScale Power, LLC, Topical Report TR-0915-17772, "Methodology for Establishing the Technical Basis for Plume Exposure Emergency Planning Zones," Revision 2, November 23, 2021, ADAMS Accession No. ML21327A209.