



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

March 5, 2018

Mr. Thomas Bergman
Vice President, Regulatory Affairs
NuScale Power, LLC
1100 NE Circle Boulevard, Suite 200
Corvallis, OR 97330

SUBJECT: AUDIT PLAN FOR REVIEW OF INFORMATION SUPPORTING SPECIFIC RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION RELATED TO PROBABILISTIC RISK ASSESSMENT, SEVERE ACCIDENT EVALUATION, AND THE RELIABILITY ASSURANCE PROGRAM AS PART OF THE NUSCALE POWER, LLC, DESIGN CERTIFICATION APPLICATION

Dear Mr. Bergman:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared an audit plan related to the review of Chapters 17, "Reliability Assurance Program," and 19, "Probabilistic Risk Assessment (PRA) and Severe Accident Evaluation," of the NuScale Power, LLC (NuScale), design certification application. The audit plan describes the scope and purpose of the audit, identifies the audit team, and describes the types of documents (listed by topic area) that should be made available to the NRC staff. The audit plan is enclosed.

The audit will be conducted over a four-week period, beginning March 6, 2018, at the NuScale Rockville Office located at 11333 Woodglen Drive, Suite 205, Rockville, Maryland 20852, with access to members of the NuScale Corvallis Office (via video teleconference from the NuScale Rockville Office) as needed to support audit objectives.

If you have any questions, please contact the Project Manager, Rani Franovich, at (301) 415-7334 or Rani.Franovich@nrc.gov.

Sincerely,

/RA/

Samuel S. Lee, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-048

Enclosure:

1. Audit Plan

cc: NuScale listserv

SUBJECT: AUDIT PLAN FOR REVIEW OF INFORMATION SUPPORTING SPECIFIC RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION RELATED TO PROBABILISTIC RISK ASSESSMENT, SEVERE ACCIDENT EVALUATION, AND RELIABILITY ASSURANCE PROGRAM AS PART OF THE NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION DATED MARCH 5, 2018

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NRO-002

OFFICE	DNRL/LB1:PM	DNRL/LB1: LA	DNRL/LB1:PM	DSRA/SPRA:BC	DNRL/LB1:BC
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DATE	3/5/18	2/23/18	3/5/18	3/2/18	3/5/18

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U.S. NUCLEAR REGULATORY COMMISSION
REGULATORY AUDIT OF INFORMATION SUPPORTING SPECIFIC REQUEST FOR
ADDITIONAL INFORMATION RESPONSES RELATED TO PROBABILISTIC RISK
ASSESSMENT, SEVERE ACCIDENT EVALUATION, AND THE RELIABILITY ASSURANCE
PROGRAM AS PART OF THE NUSCALE POWER, LLC DESIGN CERTIFICATION
APPLICATION

DOCKET NO. 52-048

AUDIT PLAN

APPLICANT: NuScale Power, LLC (NuScale)

APPLICANT CONTACTS: Darrell Gardner (NuScale)
Jim Curry (NuScale)

DURATION: The audit duration is from March 6, 2018 until April 3, 2018. During this time the U.S. Nuclear Regulatory Commission (NRC) staff from the Office of New Reactors (NRO) and the Office of Nuclear Regulatory Research (RES) will examine specific documents which support responses to several NRC requests for additional information (RAIs) regarding review of Chapters 17. "Reliability Assurance Program" and 19, Probabilistic Risk Assessment (PRA) and Severe Accident Evaluation" of the NuScale design certification application (DCA) final safety analysis report (FSAR).

LOCATION: NuScale Rockville Office
11333 Woodglen Drive, Suite 205
Rockville, MD 20852

AUDIT TEAM: Mark Caruso (NRO, Audit Lead)
Michelle Hayes (NRO/Acting Branch Chief)
Jason Schaperow (NRO)
Tony Nakanishi (NRO)
Marie Pohida (NRO)
Alissa Neuhausen (NRO)
Greg Makar (NRO)
Leslie Terry (NRO)
Brad Harvey (NRO)
Hossein Esmaili (RES)

Shawn Campbell (RES)
Keith Compton (RES)
Rani Franovich (NRO, Project Manager)

I. BACKGROUND

On January 6, 2017, NuScale, submitted a DCA for the NuScale design to the NRC for review and approval (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17013A229). On March 15, 2017, the NRC staff accepted the DCA for docketing and initiated its technical review. As part of its safety review of the DCA, the NRC staff performed an audit of the information supporting Chapters 19 and 17.4 of the FSAR submitted with the application. The audit commenced on April 3, 2017, and ended on August 17, 2017. The results of the audit are documented in an audit report dated November 3, 2017 (ADAMS Accession No. ML17305A024).

The NRC staff will conduct a second audit commencing on March 6, 2018, and ending on April 3, 2018. During this audit, the NRC staff will focus its examination on specific documents that support responses to several NRC RAIs pertaining to its review of Chapter 19 and Chapter 17.4 of the FSAR. During this audit, the NRC staff will examine documented analyses that support the severe accident evaluation, thermal-hydraulic accident simulations that support the PRA level 1 accident sequence analysis, documented analyses that support the seismic margins analysis, and documentation of information considered by members of the design reliability assurance program expert panel to establish risk significance of selected structures, systems and components (SSC).

The audit will be conducted in NuScale's Rockville Office and via the NuScale electronic reading room (ERR) when available. In light of uncertainty in the amount of documentation that will need to be reviewed during the audit and limited availability of some audit team members, the NRC staff has established a bounding time period for the audit of one month; however, the audit may not take a month to complete. The NRC staff will endeavor to complete the audit as expeditiously as possible. An exit meeting will be held at the end of the audit to report the overall results.

II. PURPOSE AND REGULATORY BASIS

Purpose of Audit

The purpose of this audit is for the NRC staff to examine and evaluate documents that support responses to the RAIs below. This examination and evaluation will inform the NRC staff's review of the responses to the RAIs. The pertinent RAI responses are listed below in Table 1 of Section III.

Regulatory Basis for Audit

Title 10 of the *Code of Federal Regulation* (10 CFR), Section 52.47(a)(27) states that a DCA must contain an FSAR that includes a description of the design-specific PRA and its results. 10 CFR 52.47(a)(23) states that a DC application must contain an FSAR that includes, for light-water reactor designs, a description and analysis of design features for the prevention and mitigation of severe accidents (SAs) (e.g., challenges to containment integrity caused by core-concrete interaction, steam explosion, high-pressure core melt ejection, hydrogen combustion,

and containment bypass).

The NRC staff must have sufficient information to ensure that the applicant has adequately considered SAs and the use of PRA in the design and operation of facilities under review as outlined in Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” Section C.I.19.2.

III. REGULATORY AUDIT SCOPE

The specific scope of this audit is described below in Table 1, “Audit Scope”:

Table 1: Audit Scope

NRC RAI	NuScale letter responding to the RAI	ADAMS Accession No.	FSAR Section	Topic
8882	RAIO-0817-55372, August 17, 2017	ML17222A683	19.2	Reactor pool decontamination factor.
8903	RAIO-0917-55876, August 10, 2017	ML17251B163	19.2	Gravity-driven reflood of reactor pressure vessel (RPV) through open reactor recirculation valves (RRVs).
8977	RAIO-1017-56550, October 11, 2017	ML17284A652	19.2	Large release definition.
9043	RAIO-1017-56516, October 10, 2017	ML17283A413	19.2	In-vessel retention analyses.
8879	RAIO-0817-55698, August 28, 2017	ML17241A139	17.4	Expert panel decision-making process.
8899	RAIO-0118-58237, January 18, 2018	ML18018B375	19.1.5	Fragility calculations for reactor bay wall, reactor building (RBX) exterior wall, and RXB roof. Bases for screening SSCs with fragilities below the plant-level high confidence of low probability of failure (HCLPF).
8926	RAIO-0917-56321, September 29, 2017	ML17272B031	19.1.6	Dropped module consequence analysis.
8840	RAIO-0717-55003, July 19, 2017	ML17262B215	19.1.4	Containment isolation for loss of coolant accidents (LOCAs) inside containment.

In addition, the NRC staff has completed its MELCOR confirmatory analyses and will be comparing the results to NuScale’s analytical results. The purpose of this comparison is to identify and understand any modeling differences.

IV. DOCUMENTS/INFORMATION NECESSARY FOR THE AUDIT

NuScale should make available all documents providing technical information in support of the responses to the NRC RAIs listed above in Table 1.

V. SPECIAL REQUESTS

The NRC staff requests the documents associated with topic areas listed above be available to NRC auditors in the ERR to the extent possible. Use of the ERR allows multiple auditors to examine the same document at the same time, which improves the efficiency of the audit.

VI. AUDIT ACTIVITIES AND DELIVERABLES

The NRC audit team is expected to consist of 11 individuals covering the technical topics identified above in Section III. The task assignments are shown in Table 2, “Reviewer Assignments.”

Table 2: Reviewer Assignments

Reviewer	Technical Topic
Mark Caruso	Risk-significance classification for chemical volume and control injection function and containment flood and drain system
Jason Schaperow Hossein Esmaili Shawn Campbell Marie Pohida Greg Makar Leslie Terry Brad Harvey Keith Compton	Assumed reactor pool decontamination factor. Gravity-driven re-flood of RPV through open RRVs. Large release definition. Analysis of In-vessel retention. MELCOR confirmatory analyses. Thermally induced steam generator tube failure probability
Alissa Neuhausen	Calculations supporting fragility evaluations for reactor bay wall, RBX exterior wall, and RXB roof.
Mark Caruso	Screening analysis for SSCs with fragilities below the plant-level HCLPF; Application of 14 hazard bins in establishing cutsets for determining plant-level HCLPF.
Marie Pohida Jason Schaperow	Dropped module consequence analysis
Tony Nakanishi Marie Pohida	Assessment of decay heat removal system performance during LOCAs inside containment with containment evacuation line containment isolation failure with consideration to the Passive System Reliability Report. Consideration of additional heat generation during anticipate transient without scram (ATWS).

The NRC staff acknowledges the proprietary nature of the information requested and will handle the information appropriately throughout the audit. While the NRC staff will take notes, the NRC staff will not remove hard copy or electronic files from the audit site(s).

A non-public entrance meeting will be conducted on March 6, 2018, and a non-public exit meeting will be held in early April 2018 after the audit is completed to present audit results to

NuScale representatives. During the audit, the NRC staff will communicate with the NuScale staff in person and via teleconference, as necessary. These communications may consist of requests for additional materials to be placed in the ERR, if needed; discussions for the purpose of clarifying information the NRC staff has audited; and any other technical matters that arise during the audit. The NRC staff will provide its questions to the NuScale staff in writing via email prior to teleconferences to allow the NuScale staff to prepare for the discussion. Teleconferences will be held as needed during the course of the audit. A minimum of one teleconference will be held each week to ensure communication is regular and issues are identified in a timely manner. An audit report will be prepared within 90 days of the exit meeting to document the results of the audit. This report will be made publicly available in ADAMS.

If necessary, any questions related to the conduct of the audit will be communicated to the NRC project manager, Rani Franovich, at 301-415-7334 or rani.franovich@nrc.gov.