



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

September 6, 2018

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

FROM: Getachew Tesfaye, Senior Project Manager /RA/
Licensing Branch 1
Division of Licensing, Siting,
and Environmental Analysis
Office of New Reactors

SUBJECT: AUDIT PLAN FOR THE PHASE II REGULATORY AUDIT OF THE
DESIGN BASIS FAILED FUEL FRACTION FOR NUSCALE
POWER, LLC DESIGN CERTIFICATION APPLICATION

NuScale Power, LLC (NuScale), submitted letter dated December 31, 2016, to the U.S. Nuclear Regulatory Commission (NRC) for its Design Certification Application (DCA) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17013A229). The NRC staff started its detailed technical review of NuScale's DCA on March 27, 2017.

The purpose of this audit plan for this focused NRC Phase II Regulatory Audit is for the NRC staff to obtain additional information related to changes made as a result of changing the design basis reactor coolant system source term from an assumed 0.028 percent failed fuel cladding defects (also known as design basis failed fuel fraction value (DBFFF)) to 0.066 percent failed fuel cladding defects, in NuScale Design Control Document Table 11.1-2, "Parameters Used to Calculate Coolant Source Terms." Some of the requests for additional information (RAI) with a nexus to the change in the DBFFF that are under review by the NRC staff include, but are not limited to:

- RAI 8759 – DBFFF Basis;
- RAI 9256 – Liquid waste system granulated activated charcoal (LWS GAC) bed activity;
- RAI 9258 – Resin line activity; RAI 9260 – Reactor Building airborne activity;

CONTACT: Getachew Tesfaye, NRO/DLSE
(301) 415-8013

- RAI 9267 – Spent Resin Storage Tank (SRST) Activity;
- RAI 9269 – High Integrity Container (HIC) Source Terms; and
- RAI 9280 – Dried Drums.

The NRC staff seeks to obtain additional information related to how the changes related to the revised design basis failed fuel fraction impacts the NuScale Standard Plant DCA and to ensure that the applicant made appropriate DCA changes as a result of the revised design basis RCS source term.

In addition, the NRC staff seeks to obtain additional information related to other RAI responses that are impacted by the revised reactor coolant design basis source term. The audit process will allow the NRC staff to access supporting documentation that has been identified as potentially significant to the review, such as radiation zoning diagrams, shielding calculations, airborne radioactivity calculations, ventilation system design, radwaste process and handling system design (including Regulatory Guide (RG) 1.143 system and component design classifications) and equipment qualification, and other non-docketed information in NuScale's Electronic Reading Room (eRR). The document request would include previous versions of associated calculations. This would increase the efficiency of the audit by enabling the NRC staff to easily confirm the updates made by NuScale in implementing change to the DBFFF.

This audit will take place at NuScale's offices, in Rockville, Maryland, and/or via the NRC staff's review of electronic information to which NuScale will grant electronic access via the eRR. The audit is currently scheduled to start on September 18, 2018, with an entrance meeting, and end on October 5, 2018. The audit plan is provided as an enclosure.

Docket No. 52-048

Enclosure:

1. Audit Plan

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

SUBJECT: AUDIT PLAN FOR THE PHASE II REGULATORY AUDIT OF THE DESIGN BASIS
 FAILED FUEL FRACTION FOR NUSCALE POWER, LLC DESIGN
 CERTIFICATION APPLICATION; DATED: September 6, 2018

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NRO-002

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DATE	08/30/2018	09/04/2018	09/6/2018

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U.S. NUCLEAR REGULATORY COMMISSION

**AUDIT PLAN FOR THE PHASE II REGULATORY AUDIT OF THE DESIGN BASIS FAILED
FUEL FRACTION FOR NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION**

DOCKET NO. 52-048

AUDIT PLAN

APPLICANT: NuScale Power, LLC (NuScale)

APPLICANT CONTACTS: Carrie Fosaaen (NuScale)

DURATION: September 18, 2018 through October 5, 2018

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

AUDIT TEAM: Zachary Gran (NRO, Technical Reviewer)
Ronald LaVera (NRO, Technical Reviewer)
Edward Stutzcage (NRO, Technical Reviewer)
Sean Meighan (NRO, Technical Reviewer)
Michael Dudek (NRO/RPAC Branch Chief)
Getachew Tesfaye (NRO, Senior Project Manager)
Supporting NRC Staff (as needed)

I. BACKGROUND

By letter dated December 31, 2016, NuScale Power, LLC (NuScale), submitted a Design Certification Application (DCA) to the U.S. Nuclear Regulatory Commission (NRC) for review (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.

To understand the technical basis for NuScale's use of a design basis value of 0.028 percentage fuel cladding defects (also known as design basis failed fuel fraction value (DBFFF)) as described in DCD Tier 2, Revision 0, without a corresponding technical specification (TS) limit, Request for Additional Information (RAI) No. 8759, Question 12.02-01, was issued April 25, 2017. The NRC staff asked the applicant to describe the basis for this approach and the justification for the determining the adequacy of the design of the NuScale shielding and ventilation systems. In a supplemental RAI response dated March 21, 2018, NuScale provided updated TS pages to revise the design basis value of 0.028 percent to 0.066 percent. The supplemental RAI response did not contain the conforming changes to the kinds and quantities of radioactive material contained in the plant systems and components described in DCA

Enclosure

Chapters 3, 11, and 12; nor did it contain the analysis of the subsequent impacts on the design of plant systems (e.g., shielding and ventilation). Therefore, the NRC seeks to understand how NuScale has accounted for the increase of radioactive material accumulating in systems and components such as waste processing and storage, fuel cooling systems, coolant storage systems, as a result of the change to the DBFFF. The NRC staff also seeks to understand how the changes to the accumulated radioactive material effects the NuScale analysis of and the provision of design features such as shielding, ventilation, radiation monitoring, equipment qualification, and radiation zone designations. As a result, the NRC staff seeks to review calculations and other information related to DCA changes, due to the changes to the design basis reactor coolant system concentrations.

To facilitate the NRC staff's evaluation of information related to the impacts of the DBFFF to the DCA, the NRC staff proposes this audit plan to include:

- A regulatory audit that will commence on September 18, 2018. The audit will take place at NuScale's offices in Rockville, Maryland, and/or via the NRC staff review of electronic information to which NuScale grants access. During this audit the NRC staff will examine information requested and any NuScale document that will facilitate an understanding of the impacts that the calculated DBFFF has on radiological conditions related to the primary coolant, secondary coolant, ultimate heat sink (including spent fuel pool), all solid/liquid/gaseous radioactive waste processing and storage systems, and other systems impacted by the revised reactor coolant source term (e.g., CVCS system).

II. PURPOSE AND REGULATORY BASIS

The purpose of the focused NRC Phase II Regulatory Audit of the DBFF is to:

- Allow the NRC staff to conclude that the current calculated DBFFF is fully and appropriately accounted for as it impacts radiological conditions of the facility and associated systems.

The NRC staff determined efficiency gains would be realized by auditing the information supporting the DCA as well as in the responses to RAIs and would be effective in identifying if further specific information is needed to support its regulatory findings. During the audit and interactions with the applicant additional detailed NRC requests for information may be developed, which could be part of a future formal correspondence.

The NRC staff's acceptance criteria described in the Design Specific Review Standard (DSRS) Section 12.2, "Radiation Sources" (ADAMS Accession No. ML15350A320); DSRS Sections 12.3-12.4, "Radiation Protection Design Features" (ADAMS Accession No. ML15350A339); and DSRS Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment" (ADAMS Accession No. ML15355A455), and the SRP are based on meeting the relevant requirements of the following NRC regulations:

- 10 CFR Part 50, Appendix A GDC 60
- 10 CFR Part 50, Appendix A GDC 61

- 10 CFR Part 50, Appendix A GDC 4
- 10 CFR 52.47(a)(5)
- 10 CFR 52.47(a)(6) in requiring compliance with 10 CFR 20.1406
- 10 CFR 52.47(a)(22)
- 10 CFR 50.49
- 10 CFR 20.1003
- 10 CFR 20.1101(b)
- 10 CFR Part 20 Subpart C—Occupational Dose Limits
- 10 CFR Part 20 Subpart D—Radiation Dose Limits for Individual Members of the Public
- 10 CFR Part 20 Subpart H—Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas

The DSRS and NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (SRP), are not a substitute for NRC regulations and compliance with it is not required. As an alternative, an applicant may identify the differences between a DSRS section and the design features, analytical techniques, and procedural measures proposed in an application and discuss how the proposed alternative provides an acceptable method of complying with NRC regulations that underlie the DSRS acceptance criteria. Where the DCA contents differed from the guidance contained in the DSRS, the NRC staff reviewed the associated analytical techniques, data, and conclusions associated with the proposed alternative.

The NRC staff must have sufficient information to ensure that the applicant’s alternative approach has adequately addressed the regulatory requirements used as the basis for the NuScale DSRS and other relevant guidance.

III. REGULATORY AUDIT SCOPE

This audit will focus on the impact of the revised DBFFF on the associated calculations and basis documents elements of the DCA. This includes, but is not limited to: revised source term calculations; shielding and dose rate calculations; radiation zone maps; Regulatory Guide (RG) 1.143 component classifications; airborne radioactivity and ventilation design calculations, and equipment qualification calculations. The NRC staff will schedule time with NuScale staff to review specific documents at the NuScale Rockville office, as needed.

The NRC staff requests the revised calculation packages be provided on the applicant’s eRR to the extent possible. The NRC staff also requests the associated revised Excel® Workbooks and other supporting information, in native format, be provided to support the review. As necessary, the NRC staff will schedule time with NuScale staff to review specific features of the

information provided by NuScale. The identified documents and associated supporting electronic files are listed below. Note that the listed documents may not be the total list of all required items. Also the audit team would request access to previous versions of the updated calculations, and the associated native format files. This would increase efficiency of the audit by enabling the NRC staff to quickly identify changes to calculations, thereby allowing the audit team to verify changes as opposed to reviewing entire calculations that may have been previously reviewed. During the audit the NRC may request further documentation, such as:

- Realistic Rx Coolant and Secondary Coolant Activity Calculation.pdf, and the associated Excel® Workbook(s) in native format;
- Airborne Source Term Calculation.pdf, and the associated Excel® Workbook(s) in native format;
- Radioactive Waste Source Terms.pdf, and the associated Excel® Workbook(s) in native format;
- Radiation Zone Mapping and associated Excel® Workbook(s), MCNP Input/Output, and other supporting files in native format, as it relates to understanding the rationale for the currently specified radiation zoning, as well as facilitating the staff understanding of seeing a drop in the radiation zone designation for certain areas of the plant between Revision 1 of the design and the currently proposed radiation zoning specified by the applicant.

The NRC staff identified some of the RAIs currently under review that have a nexus to the change in the DBFFF. This includes, but is not limited to:

- RAI 8759 – DBFFF Basis
- RAI 9256 – Liquid waste system granulated activated charcoal (LWS GAC) bed activity
- RAI 9258 – Resin line activity
- RAI 9260 – Reactor Building airborne activity
- RAI 9267 – Spent Resin Storage Tank (SRST) Activity
- RAI 9269 – High Integrity Container (HIC) Source Terms

However, because of the interrelationship between the DBFFF, the system and component source terms, and the implications for the resultant design features required for radiological protection, the NRC staff may also ask additional questions during the course of the audit that are not currently summarized above, as additional information about the effects of change in DBFFF are discussed. The agenda for the audit is presented in Attachment A of this audit plan. If necessary, any circumstances related to the conductance of the audit will be communicated to the NRC project manager, Getachew Tesfaye, at (301) 415-8013 or Getachew.Tesfaye@nrc.gov.

IV. AUDIT TEAM

The following are the NRC audit team members:

Zachary Gran (NRO, Technical Reviewer)
Ronald LaVera (NRO, Technical Reviewer)
Edward Stutzcage (NRO, Technical Reviewer)
Sean Meighan (NRO, Technical Reviewer)
Michael Dudek (NRO/RPAC Branch Chief)
Getachew Tesfaye (NRO, Senior Project Manager)
Supporting staff (as needed)

The following is the applicant contact:

Carrie Fosaaen (NuScale)

V. LOGISTICS

The NRC staff will address in the audit report the technical areas identified in the Regulatory Audit Scope of this audit plan along with presenting the audit outcomes.

Depending on the availability of the applicant's documentation and supporting NRC staff, the audit is planned to be conducted from September 18, 2018 through October 5, 2018. The audit is intended to be conducted from the NRC Headquarters via the applicant's eRR or a local office of the applicant.

A non-public entrance meeting will be conducted the first day of the audit, and a non-public exit meeting will be held at the conclusion of the audit.

The NRC staff acknowledges the proprietary nature of the information requested. It will be handled appropriately throughout the audit. While performing the audit, the NRC staff will take notes that will be marked as proprietary and will not remove hard copies or copy electronic files from the audit site(s).

VI. SPECIAL REQUESTS

To facilitate the preparation of the audit report, the NRC staff request that the documents reviewed during the course of the audit remain available for reference in the eRR and the NuScale office, as appropriate, until November 5, 2018.

If necessary, any circumstances related to the performance of the audit will be communicated to Getachew Tesfaye, NRO/DNRL 301-415-8013 or Getachew.Tesfaye@nrc.gov.

VII. DELIVERABLES

The NRC staff will issue an audit report within 90 days after completion of the audit. The audit outcome may be used to identify any additional information to be submitted for making regulatory decisions, and will assist the NRC staff in the issuance of RAIs (if necessary) in completing its review. With the anticipated exit on October 5, 2018, the audit report is expected to be completed by January 5, 2019, and made publicly available in ADAMS.

ATTACHMENT A

U.S. NUCLEAR REGULATORY COMMISSION

AUDIT PLAN FOR THE PHASE II REGULATORY AUDIT OF THE DESIGN BASIS FAILED

FUEL FRACTION FOR NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION

DOCKET NO. 52-048

AUDIT PLAN AGENDA

September 18, 2018

Entrance Meeting and Start of Audit

October 5, 2018

End of Audit and Exit Meeting to Discuss Audit Observations