



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

March 8, 2018

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

FROM: Bruce M. Bavol, Project Manager **/RA/**
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: AUDIT PLAN FOR THE NUSCALE POWER, LLC DESIGN
CERTIFICATION APPLICATION FINAL SAFETY ANALYSIS REPORT
SECTIONS 4.2, "FUEL SYSTEMS DESIGN," 4.3, "NUCLEAR
DESIGN," AND SECTION 4.4, "THERMAL AND HYDRAULIC
DESIGN," REGULATORY AUDIT

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

The purpose of this regulatory audit is to: (1) gain a better understanding of the analyses supporting the NuScale reactor design; (2) verify information; (3) identify information that will require docketing to support the basis of the licensing or regulatory decision; and, (4) review related documentation and non-docketed information to evaluate conformance with regulatory guidance.

The audit will take place at the NuScale Offices in Rockville, Maryland, online via NuScale's electronic reading room, and/or at the AREVA NP, Inc., Office in Richland, Washington. The audit entrance will be held on March 19, 2018. The contents of the audit plan is provided as an enclosure.

Docket No. 52-048

Enclosure:
1. Audit Plan

CONTACT: Bruce Bavol, NRO/DNRL
301-415-6715

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

SUBJECT: AUDIT PLAN FOR THE NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION FINAL SAFETY ANALYSIS REPORT SECTIONS 4.2, "FUEL SYSTEMS DESIGN," 4.3, "NUCLEAR DESIGN," AND SECTION 4.4, "THERMAL AND HYDRAULIC DESIGN," REGULATORY AUDIT

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ADAMS Accession No: ML18067A129***via email**

NRO-002

OFFICE	NRO/DNRL/LB1: PM	NRO/DNRL/LB1: LA	NRO/DNRL/LB1
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DATE	3/08/18	2/27/18	3/08/18

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AUDIT PLAN FOR THE NUSCALE POWER, LLC DESIGN CERTIFICATION APPLICATION

FINAL SAFETY ANALYSIS REPORT SECTIONS 4.2, "FUEL SYSTEMS DESIGN," 4.3,

"NUCLEAR DESIGN," AND SECTION 4.4, "THERMAL AND HYDRAULIC DESIGN,"

REGULATORY AUDIT

DOCKET NO. 52-048

AUDIT PLAN

APPLICANT: NuScale Power, LLC (NuScale)

APPLICANT CONTACTS: Darrell Gardner
Steven Mirsky
Jennie Wike

DURATION: March 19, 2018 through April 30, 2018

LOCATIONS: NuScale (Rockville Office)
11333 Woodglen Drive, Suite 205
Rockville, Maryland 20852

Electronic Reading Room (eRR)

AREVA NP, Inc. (AREVA)
2101 Horn Rapids Rd
Richland, WA 99354

AUDIT TEAM: Chris Van Wert (NRO, Audit Lead)
Tim Drzewiecki (NRO)
Nick Klymyshyn (PNNL)
Ken Geelhood (PNNL)
Bruce Bavol (NRO, Project Manager)

BACKGROUND AND OBJECTIVES:

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

Enclosure

To facilitate the NRC staff's evaluation of information supporting the NuScale DCA, and to complete its safety review of the NuScale Final Safety Analysis Report (FSAR) Sections 4.2, "Fuel System Design," 4.3, "Nuclear Design," 4.4, "Thermal and Hydraulic Design" the NRC staff is planning an audit entrance meeting on March 19, 2018, via teleconference. The audit is expected to primarily be performed via the NuScale eRR and, as necessary, at the AREVA Office in Richland, Washington. During this audit, the NRC staff will examine the referenced documents and analyses mentioned, but not specifically cited, to support their statements in the DCD.

The objectives of this audit are for the NRC staff to:

- audit the input data used in the analyses supporting DCD Sections 4.2 and 4.3; and
- identify information that will require docketing to support the basis of the licensing or regulatory decision.

The NRC staff determined efficiency gains would be realized by auditing the documents which support the DCD to inform requests for additional information (RAIs). If the NRC staff determines during the audit and interactions with the applicant that additional information is needed to support a safety finding, a corresponding RAI will be issued at that time, even before the conclusion of the audit.

REGULATORY AUDIT BASIS:

Title 10 of the *Code of Federal Regulations* (CFR), Section 52.47(a)(3)(i) states:

A DC application must contain a final safety analysis report (FSAR) that includes a description of principle design criteria for the facility.

An audit is required to evaluate the safety conclusions that need to be made regarding NuScale DCD Sections 4.2 and 4.3, and identify detailed information related to the applicant's principle design criteria. The NRC staff must have sufficient information to ensure that acceptable risk and reasonable assurance of safety can be documented in the NRC staff's safety evaluation.

This regulatory audit is based on the following regulations:

- 10 CFR 52.47, "Contents of applications; technical information in final safety analysis report."
- General Design Criteria (GDC) 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," as it relates to the structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena without loss of capability to perform their safety functions.
- GDC 10, "Reactor Design," which requires that reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

REGULATORY AUDIT SCOPE:

The specific scope of this audit includes reviewing requested information supporting FSAR Sections 4.2, "Fuel System Design," 4.3, "Nuclear Design," and 4.4, "Thermal and Hydraulic Design."

The calculations (including input data) supporting the technical areas listed above are to be made available to the NRC staff, preferably via the NuScale eRR or onsite at the AREVA Richland Office. Some of the documents that have already been identified by the NRC staff are listed in Attachment A; other documents will be requested by the staff on an as-needed basis (when referenced by a document being audited by the staff, for instance). All documents reviewed will be added to the audit report prepared by the NRC staff following the conclusion of the audit.

In addition to reviewing documentation supporting the FSAR, NRC staff plans to review the table (see NuScale response to RAI 8772, Question 4.3-1, ADAMS Accession No. ML17194B384) that clarifies the limit or methodology used to establish each value in the NuScale Generic Technical Specifications (GTS) that reference the Core Operating Limits Report (COLR). NRC staff wants to determine whether an updated table, capturing the underlying methodology for each GTS value that references the COLR, needs to be included in the FSAR.

SPECIAL REQUESTS:

The NRC staff requests the documents listed in Attachment A be available to the NRC auditors in NuScale's eRR or at the AREVA Richland office. Use of the eRR allows multiple auditors in different geographic locations to examine the same document at the same time which improves the efficiency and reduces the cost of the audit. Additional documents may be identified as the review progresses. When the NRC staff's review of the documents associated with a specific issue is complete the staff will notify either DNRL or NuScale that these documents can be removed from eRR thereby minimizing their residence time in eRR.

In addition to the documentation, NRC staff requests that a subject matter expert be made available to discuss process for capturing changes to GTS values that reference the COLR.

AUDIT ACTIVITIES AND DELIVERABLES:

The NRC audit team is expected to consist of aforementioned individuals covering the technical areas affecting FSAR Sections 4.2, 4.3, and 4.4. 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 from the audit site(s). In order for the NRC staff to focus its review via confirmatory runs, the audit team may copy certain input data for use in the staff's independent confirmatory runs. This data will be properly handled during the audit and then removed from the encrypted hard drive at the completion of the audit.

The audit will initiate on March 19, 2018, and will conclude April 30, 2018.

The audit will assist the NRC staff in the issuance of RAIs (if necessary) for the licensing review of the NuScale DCD Sections identified in the "Regulatory Audit Scope" section in preparation of the NRC staff's safety evaluation.

If necessary, any circumstances related to the conductance of the audit will be communicated to the NRC project manager, Bruce Baval at 301-415-6715 or bruce.baval@nrc.gov.

ATTACHMENT A – DOCUMENT LIST

1. Input decks and calculation package(s) (e.g., calcnotes or analysis packages) and any other documentation supporting the COPENIC analyses used to support DCD Section 4.2.
2. Core plate motion files as identified in the response to RAI 8851 (ADAMS Accession No. ML17213A245).
3. The engineering calculation(s) that support the information provided in FSAR Table 4.3-9, Table 4.3-10, and Table 4.3-11.
4. The CRA worth depletion calculation that supports the statement in FSAR Section 4.3.2.5, "A conservative calculative over a 20 EFPY CRA lifetime demonstrates that less than 2 percent boron in the upper portion of the CRA is lost due to depletion."
5. EC-A010-3204, "RCS Loop CFD"
6. The engineering calculations that support the information provided in FSAR Figure 4.4-9, Figure 4.4-10, and Figure 4.4-11.