

June 29, 2017

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

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

SUBJECT: AUDIT PLAN FOR THE REGULATORY AUDIT OF NUSCALE  
POWER, LLC DESIGN CERTIFICATION APPLICATION,  
DESIGN CONTROL DOCUMENT, TIER 2, CHAPTER 5,  
SECTION 5.4.1, "STEAM GENERATORS"

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

The NRC staff has identified a need to conduct a regulatory audit on the topic of steam generator tube integrity in Tier 2, Section 5.4.1 of the NuScale DCD. The purpose of the audit is to: (1) gain a better understanding of information underlying the application in the area of steam generator tube integrity, (2) identify information that will require docketing to support the basis of the licensing or regulatory decision; and (3) develop an understanding of the topics to support issuing clear requests for additional information.

The audit will take place at NuScale's offices in Rockville, Maryland, and online via NuScale's electronic reading room. The audit entrance meeting will be held July 10, 2017. The content of the audit plan is provided as an enclosure.

Docket No.: 52-048

Enclosure:  
Audit Plan

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

CONTACT: Bruce M. Baval, NRO/DNRL  
301-415-6715

SUBJECT: AUDIT PLAN FOR THE REGULATORY AUDIT OF NUSCALE POWER, LLC  
DESIGN CERTIFICATION APPLICATION, DESIGN CONTROL DOCUMENT, TIER  
2, CHAPTER 5, SECTION 5.4.1, "STEAM GENERATORS" DATE: 6/29/2017

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NRO-002

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DATE	6/29/2017	6/26/2017	6/29/2017

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**AUDIT PLAN FOR THE REGULATORY AUDIT OF NUSCALE POWER, LLC DESIGN  
CERTIFICATION APPLICATION, DESIGN CONTROL DOCUMENT, TIER 2, CHAPTER 5,  
SECTION 5.4.1, "STEAM GENERATORS" AUDIT PLAN  
DOCKET NO. 52-048**

**APPLICANT:**

NuScale Power, LLC (NuScale)

**APPLICANT CONTACTS:**

Marty Bryan  
Darrell Gardner  
Steven Mirsky  
Jennie Wike

**DURATION:**

36 days  
July 10, 2017 through August 15, 2017

**LOCATIONS:**

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

Electronic Reading Room (eRR)

**AUDIT TEAM:**

Gregory L. Makar (NRO/MCB Materials Engineer, Audit Lead)  
Leslie S. Terry (NRO/MCB Materials Engineer)  
Matthew A. Mitchell (NRO/MCB, Branch Chief)  
Bruce M. Bovol (NRO, Project Manager)  
Supporting staff (as needed)

**BACKGROUND AND OBJECTIVES**

NuScale submitted by a letter dated December 31, 2016, to the U.S. Nuclear Regulatory Commission (NRC) a Design Control Document (DCD) for its Design Certification (DC) application of the NuScale reactor design (Agencywide Documents Access and Management System Accession No. ML17013A229). The NRC staff initiated this DC review on March 27, 2017.

Enclosure

The design and inspection of the steam generators (SGs) for the NuScale design are described mainly in DCD Tier 2, Chapter 5, "Reactor Coolant System and Connecting Systems"; and Tier 2, Chapter 16 (also Part 4 of the application), "Technical Specifications." The design of the SGs is significantly different than that of operating light-water reactors and proposed light-water reactors. For example, the NuScale SGs have helical tubes, secondary coolant rather than primary coolant inside the tubes, and a unique support structure.

Given the novel features of the NuScale SG design, the NRC staff determined it would be advantageous to audit information supporting the SG design. Specifically, the staff intends to audit information related to the SG degradation and tube integrity assessments, qualification of tube cleaning and inspection methods, and the determination of the tube plugging criterion. The staff will conduct this audit in accordance with the guidance in NRO-REG-108, "Regulatory Audits."

The audit will begin with an entrance meeting on July 10, 2017, via conference call. The audit may be performed via the NuScale electronic reading room or at NuScale's Rockville office. During this audit, the NRC staff will examine the referenced documents and analyses listed in this audit plan. These documents and analyses are not incorporated by reference into the design but support information in the DCD.

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

- Gain a better understanding of information underlying the application in the area of SG tube integrity; and
- Identify information that will require docketing to support the basis of the licensing or regulatory decision.

### **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 examine detailed information related to the applicant's principle design criteria, and reach a safety conclusion on the NuScale application sections in the scope of this audit plan. 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) 4 of Appendix A to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed to accommodate the effects of and to be compatible with the environmental conditions during normal plant operation as well as during postulated accidents.

- GDC 14 requires that the reactor coolant pressure boundary (RCPB) be designed with sufficient margin to assure that the design conditions are not exceeded during normal operation, including anticipated operational occurrences.
- GDC 32, requires that the RCPB be designed to permit periodic inspection and testing to assess structural and leakage integrity.
- 10 CFR 50.36, as it relates to the Steam Generator Program in the technical specifications.
- 10 CFR 50.55a(g) requires that inservice inspection programs meet the applicable inspection requirements in Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.
- 10 CFR 50.65 requires that licensees be able to monitor the condition of the SG tubes to provide reasonable assurance that the tubes are capable of fulfilling their intended functions.
- Appendix B to 10 CFR Part 50 applies to implementation of the Steam Generator Program.

### **REGULATORY AUDIT SCOPE**

The specific scope of this audit is information related to the SG degradation and tube integrity assessments, qualification of tube cleaning and inspection methods, and the determination of the tube plugging criterion. This information supports mainly the following DCD Sections:

- Tier 2, Section 5.4.1, "Steam Generators"
- Tier 2, Chapter 16, Technical Specifications 3.4.5, "RCS Operational Leakage," 3.4.9, "Steam Generator (SG) Tube Integrity," and 5.5.4, "Steam Generator (SG) Program"

The documents supporting the technical areas listed above are to be made available to the NRC staff in the NuScale eRR or at the NuScale office in Rockville, Maryland. The documents already identified by the staff are listed below. Additional documents will be requested by the staff as needed (when referenced by a document being audited by the staff, for instance), and these documents will be added to the audit report prepared by the staff following the conclusion of the audit.

### **Documents Requested**

1. ER-A014-3354, "Steam Generator Tube Plugging Criterion and Structural Integrity Performance Criteria"
2. EC-A014-3224, "SG Tube Structural Integrity Performance Criterion Calculation"
3. ER-A014-3060, "Steam Generator Degradation Assessment"
4. EQ-A011-1775, "ASME Design Specification for Reactor Pressure Vessel"

5. SD-A030-1929, Qualification of steam generator cleaning method(s)
6. SD-A014-4027, Revision 0, Sections 2.3.8 and 2.3.9, Qualification of steam generator tube inspection procedures (\*2807, \*2658, \*2000, and \*2689 are also referenced in these sections of the document)

### **SPECIAL REQUESTS**

The NRC staff asks that the requested documents be available to the NRC auditors in NuScale's eRR. 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 staff's review of the documents associated with a specific issue is complete the staff will notify either the Division of New Reactor Licensing or NuScale that these documents can be removed from eRR. The staff also requests that NuScale personnel knowledgeable in the audit topics be available to the NRC staff (with reasonable notification). Finally, the staff requests that a conference room with a speaker phone be available when auditing at the NuScale office.

### **AUDIT ACTIVITIES AND DELIVERABLES**

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, they will not remove hard copy or electronic files from the audit site(s). Any NRC contractors participating in the audit will be evaluated and approved through standard NRC processes for handling sensitive material.

Near the midpoint of the audit, or as mutually agreed to, the NRC will hold a status call and/or meeting with NuScale to identify issues that have been closed or will be resolved by another mechanism, such as requests for additional information or public meetings. In the status meeting NRC will also identify any emerging information needs as well as documents that can be removed from eRR. The NRC will hold a conference call or meeting to exit the audit.

If necessary, any circumstances related to the conduct of the audit will be communicated to the NRC project manager, Bruce Baval at 301-415-6715 or [bruce.baval@nrc.gov](mailto:bruce.baval@nrc.gov).