

## 17 QUALITY ASSURANCE AND RELIABILITY ASSURANCE

### Introduction

This chapter of the safety evaluation report (SER) documents the U.S. Nuclear Regulatory Commission (NRC) staff's review of Chapter 17, "Quality Assurance and Reliability Assurance," of the NuScale Power, LLC (hereinafter referred to as "NuScale" or "the applicant"), US460 Power Plant Standard Design Approval Application (SDAA), Part 2, "Final Safety Analysis Report (FSAR)." The staff based its regulatory findings documented in this report on Revision 1 of the SDAA, dated October 31, 2023 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML23306A033). The precise parameter values, as reviewed by the staff in this safety evaluation (SE), are provided by the applicant in the SDAA using the English system of measure. Where appropriate, the NRC staff converted these values for presentation in this SE to the International System (SI) units of measure based on the NRC's standard convention. In these cases, the SI converted value is approximate and is presented first, followed by the applicant-provided parameter value in English units within parentheses. If only one value appears in either SI or English units, it is directly quoted from the SDAA and not converted.

FSAR Chapter 17 discusses quality assurance (QA) during the design phase, QA during the construction and operations phases, the reliability assurance program (RAP), and the quality assurance program description (QAPD) for the NuScale Power Plant US460 standard design. It also discusses a program for implementing Title 10 of the *Code of Federal Regulations* (10 CFR) 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants" (the Maintenance Rule), in Section 17.6 "Maintenance Rule." The following sections of FSAR Chapter 17 address different areas of the quality assurance program: Section 17.1, "Quality Assurance During the Design Phase;" Section 17.2, "Quality Assurance During the Construction and Operation Phases;" Section 17.3, "Quality Assurance Program Description;" and Section 17.5, "Quality Assurance Program Description;" these apply to QA during the standard design approval application (SDAA) phase for NuScale standard plant design activities. The reliability assurance program described in Section 17.4 applies to those structures, systems, and components (SSCs) identified as being risk significant or important contributors to plant safety.

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### 17.0 Quality Assurance

Licensing Topical Report (LTR) MN-122626-A, Revision 1, "NuScale Power, LLC Quality Assurance Program Description (QAPD)," dated February 2, 2024 (ML24033A318), describes the applicant's quality assurance program supporting the NuScale US460 Power Plant SDAA. The staff approved this QAPD on December 28, 2023 (ML23361A122). The QAPD is based on the applicable portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and the American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA) Standards NQA-1-2008, "Quality Assurance Requirements For

Nuclear Facility Applications,” and NQA-1a-2009, “Quality Assurance Requirements For Nuclear Facility Applications Addenda 1a.”

### **17.1 Quality Assurance during the Design Phase**

FSAR Section 17.5 addresses the NuScale QAPD for the NuScale Power Plant US460 standard design. The staff reviewed FSAR Section 17.5 in accordance with Section 17.5, Revision 1, “Quality Assurance Program Description—Design Certification, Early Site Permit and New License Applicants,” dated August 2015 (ML15037A441), of NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (SRP). The staff includes that evaluation in Section 17.5 of this report.

### **17.2 Quality Assurance during the Construction and Operations Phases**

The review of QA during the construction and operations phases is not applicable to the SDAA. A combined license (COL) applicant that references the NuScale Power Plant US460 standard design will describe the quality assurance program applicable to site-specific design activities and to the construction and operations phases.

### **17.3 Quality Assurance Program Description**

Section 17.5 of this report addresses the QAPD.

### **17.5 Quality Assurance Program Description—Design Certification, Early Site Permits, and New License Applicants**

#### **17.5.1 Introduction**

MN-122626-A, Revision 1, provides the QAPD for the NuScale SDA. The QAPD incorporates the requirements of ASME NQA-1-2008 and NQA-1a-2009, as endorsed by NRC Regulatory Guide 1.28, Revision 4, “Quality Assurance Program Criteria (Design and Construction),” issued June 2010 (ML100160003).

The QAPD submitted by NuScale addresses the design activities affecting the quality and performance of items and services provided by NuScale supporting the SDA and customer contracts. The NuScale QAPD does not address construction and design QA activities that occur once construction begins. A COL applicant that references the NuScale Power Plant US460 standard design will describe the quality assurance program applicable to these specific activities.

#### **17.5.2 Summary of Application**

FSAR, Chapter 17, Section 17.5, states the following:

The Quality Assurance Program Description (QAPD) for the NuScale Power Plant US460 standard design is provided in the topical report, “NuScale Power, LLC Quality Assurance Program Description.”

**ITAAC:** The applicant did not include any inspections, tests, analyses, and acceptance criteria (ITAAC) for the QAPD.

**Technical Specifications:** There are no technical specifications (TS) for this area of review.

**Topical Reports:** MN-122626-A, Revision 1, "NuScale Power, LLC Quality Assurance Program Description," dated February 2, 2024 (ML24033A318).

### 17.5.3 Regulatory Basis

The following NRC regulations contain the relevant requirements for this review:

- 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion 1, "Quality standards and records," requires that a QAP be established and implemented.
- 10 CFR 52.137(a)(19) requires that an SDA applicant include a QAPD that satisfies the applicable requirements of Appendix B to 10 CFR Part 50.

The guidance in SRP Section 17.5 lists the acceptance criteria adequate to meet the above requirements, as well as review interfaces with other SRP sections.

### 17.5.4 Technical Evaluation

The NRC staff reviewed MN-122626-A, Revision 1. The staff's SE documents the evaluation of the NuScale QAPD. Specifically, the NRC staff evaluated the NuScale QAPD and verified that it meets NRC regulations by following the guidance in SRP Section 17.5. The staff verified that FSAR, Revision 1, Section 17.5, incorporates MN-122626-A, Revision 1, without exception, for the control of activities affecting quality during the development of the NuScale SDA and is therefore acceptable.

### Staff Inspection of NuScale QAPD Implementation

Appendix B to 10 CFR Part 50 sets forth the requirements for quality assurance programs for nuclear power plants. According to 10 CFR 52.137(a)(19), the description of the quality assurance program for a nuclear power plant shall discuss how the applicable requirements of Appendix B to 10 CFR Part 50 were satisfied. NRC Inspection Manual Chapter 2508, "Construction Inspection Program: Design Certification," contains staff guidance on performing a postdocketing quality assurance program inspection. This postdocketing quality assurance program inspection provides the staff with reasonable assurance that the quality assurance program has been adequately implemented. This inspection is consistent with the regulations that govern all stages of the licensing process and allows the staff to verify whether activities affecting quality are conducted under the appropriate provisions of Appendix B to 10 CFR Part 50. Effective implementation of the quality assurance program provides reasonable assurance that SSCs will perform their intended safety function. The NRC staff plans to conduct a postdocketing quality assurance program inspection during the week of February 26, 2024.

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Additional postdocketing quality assurance program inspections might be conducted in fiscal year 2024, as needed.

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#### 17.5.5 Combined License Information Items

The staff notes that FSAR Section 17.5 did not provide any COL information items. However, the NuScale's QAPD (MN-122626-A, Revision 1) does not cover QA for the site-specific design activities and construction and operations phases. Therefore, consistent with 10 CFR 52.79(a)(25), any COL applicant referencing the NuScale Power Plant US460 standard design shall describe the quality assurance program applicable to site-specific design activities and to the construction and operations phases.

#### 17.5.6 Conclusion

As discussed above, the NRC staff completed its review of FSAR Section 17.5. The staff used the requirements of Appendix B to 10 CFR Part 50 and 10 CFR 52.137(a)(19), and the guidance in SRP Section 17.5, as the bases for evaluating the acceptability of NuScale's QAPD (MN-122626-A, Revision 1). The staff concludes that NuScale's QAPD has established an acceptable quality assurance program in accordance with applicable NRC regulations and industry standards for SDA activities. The NRC staff plans to conduct a postdocketing QAP inspection during the week of February 26, 2024. Additional postdocketing quality assurance program inspections might be conducted in fiscal year 2024, as needed, to verify effective implementation of the quality assurance program.

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### 17.6 Maintenance Rule

#### 17.6.1 Introduction

FSAR Section 17.6, "Maintenance Rule," addresses the NuScale Maintenance Rule program.

#### 17.6.2 Summary of Application

**SDAA Part 2 (FSAR):** FSAR Section 17.6 states that this section addresses an operational program that is the responsibility of an applicant and is not applicable to new plant designs.

**ITAAC:** There are no ITAAC for this area of review.

**Technical Specifications:** There are no TS for this area of review.

**Technical Reports:** There are no technical reports for this area of review.

#### 17.6.3 Regulatory Basis

The following NRC regulations contain the relevant requirements for this review:

- 10 CFR 50.65

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- 10 CFR 52.79(a)(15), which requires that a COL FSAR describe the program, and its implementation, for monitoring the effectiveness of maintenance necessary to meet the requirements of 10 CFR 50.65

The guidance in SRP Section 17.6, "Maintenance Rule," lists the acceptance criteria adequate to meet the above requirements, as well as review interfaces with other SRP sections.

#### **17.6.4 Technical Evaluation**

SRP Section 17.6, "Maintenance Rule," addresses the Maintenance Rule program based on the requirements of 10 CFR 50.65 and the guidance in Nuclear Management and Resources Council (NUMARC) 93-01, as endorsed by Regulatory Guide (RG) 1.160.

The staff has reviewed FSAR Section 17.6 in accordance with the guidance in SRP Section 17.6. Per the SRP guidance, the Maintenance Rule program is an operational program addressed in a COL application, and no outstanding information is expected in the SDAA related to this program.

The NRC staff agrees that the plan or process for implementing the Maintenance Rule program and describing that plan or process in the COL FSAR are the responsibilities of the COL applicant referencing the NuScale Power Plant US460 standard design. The COL applicant shall implement the Maintenance Rule program, at the latest by fuel load (i.e., by the time the Commission makes the finding required in 10 CFR 52.103(g)). The applicant may implement an acceptable Maintenance Rule program in advance of the Commission's 10 CFR 52.103(g) finding, with components being monitored or tracked as they become available.

#### **17.6.5 Combined License Information Items**

FSAR Section 17.6 does not contain any COL information items.

#### **17.6.6 Conclusion**

The NRC staff confirmed that the applicant has addressed the information relevant to the Maintenance Rule program at the SDA phase. The NRC staff agrees with the SDA application that the COL applicant is responsible for developing and implementing the Maintenance Rule program (under the requirements of 10 CFR 52.79(a)(15) and 10 CFR 50.65). Thus, the staff concludes that the Maintenance Rule information presented in FSAR Section 17.6 is acceptable.