

NuScaleDCRaisPEm Resource

From: Cranston, Gregory
Sent: Saturday, August 05, 2017 12:57 PM
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Subject: Request for Additional Information No. 143, RAI 8957 (3.9.6)
Attachments: Request for Additional Information No. 143 (eRAI No. 8957).pdf

Attached please find NRC staff's request for additional information concerning review of the NuScale Design Certification Application.

Please submit your technically correct and complete response within 60 days of the date of this RAI to the NRC Document Control Desk.

If you have any questions, please contact me.

Thank you.

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Request for Additional Information No. 143 (eRAI No. 8957)

Issue Date: 08/05/2017

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints

Application Section: 3.9.6

QUESTIONS

03.09.06-6

The NRC regulations in 10 CFR 50.55a require that nuclear power plant applicants and licensees satisfy the ASME OM Code and ASME *Boiler and Pressure Vessel Code* (BPV Code) incorporated by reference with specified conditions for overpressure protection. The following questions relate to safety and relief valves in satisfying the applicable ASME Code:

A. NuScale FSAR Tier 2, Section 5.2.2.2.2, "Low Temperature Overpressure Protection System," includes COL Item 5.2-2 that states that a COL applicant that references the NuScale Power Plant design certification will provide a certified Overpressure Protection Report in compliance with the ASME BPV Code, Section III, Subarticles NB-7200 and NC-7200 to demonstrate that the reactor coolant pressure boundary (RCPB) and secondary system are designed with adequate overpressure protection features.

With this COL item specified as part of the low temperature overpressure protection (LTOP) discussion, revise the COL item to include the capacity of the applicable safety and relief valves to perform their safety functions over the full range of fluid flow, differential pressure, and temperature conditions (including steam, liquid, and fluid transition conditions).

03.09.06-7

B. NuScale FSAR Tier 2, Section 5.2.2.4.1, "Reactor Safety Valves," states that the two reactor safety valves (RSVs) are pilot operated relief valves designed to maintain pressure below 110% of design pressure, 2310 pounds per square inch absolute (psia), with each RSV sized to provide 100% of the required relief capacity. NuScale FSAR Tier 2, Section 5.2.2.9, "System Reliability," asserts that the RSVs are considered passive devices.

Describe the justification for the classification of the RSVs as passive devices based on their design and operating experience.

03.09.06-8

C. The NRC regulations in 10 CFR 50.55a incorporate by reference the ASME BPV Code with regulatory conditions for the construction and in-service inspection (ISI) of components in nuclear power plants. NuScale FSAR Tier 2, Section 5.2.2.4.1 states that the RSVs are safety-related, Seismic Category I, Quality Group A, components. NuScale FSAR Tier 2, Section 5.2.2.6, "Applicable Codes and Classification," states that the RSVs are designed in accordance with ASME BPV Code, Section III, Subarticle NB-3500; and function to satisfy the overpressure protection criteria described in ASME BPV Code, Section III, Article NB-7000. NuScale FSAR Tier 2, Section 5.2.2.4.1 indicates that the RSVs are a pilot operated valve design with general drawings provided in Figure 5.2-1, "Reactor Safety Valve Simplified Diagram," and Figure 5.2-2, "Reactor Safety Valve Pilot Valve Assembly Simplified Diagram."

In light of this limited design description, describe the detailed design of the RSVs sufficient to satisfy the requirements in the ASME BPV Code of record as incorporated by reference in 10 CFR 50.55a with regulatory conditions. Among the specific design aspects to address are the capacity certification for the various fluid conditions (such as steam, liquid, and steam-water transitions) that will be experienced by the RSVs over their full range of operating conditions up to and including design-basis accident conditions.

03.09.06-9

D. NuScale FSAR Tier 2, Section 5.2.2.4.1 states that the blowdown of each RSV is set greater than 5% below set pressure and is a deviation from the ASME BPV Code, Section III, Subparagraph NB-7522.6. Section 5.2.2.4.1 states that the basis for this deviation is to minimize successive number of lifts. NuScale FSAR Tier 2, Section 5.2.2.6 states that the RSVs are designed in accordance with ASME BPV Code, Section III, Subarticle NB-3500, and function to satisfy the overpressure protection criteria described in ASME BPV Code, Section III, Article NB-7000. The NRC regulations in 10 CFR 50.55a require that a nuclear power plant applicant or licensee satisfy the provisions of the applicable edition and addenda of the ASME BPV Code, Section III, as incorporated by reference in 10 CFR 50.55a unless relief from or an alternative to the ASME BPV Code is granted by the NRC pursuant to 10 CFR 50.55a(z). NuScale FSAR Tier 2, Section 5.2.2.4.1 does not request relief from or an alternative to the provisions of the ASME BPV Code for RSV blowdown, nor does Section 5.2.2.4.1 provide justification for such relief from or an alternative to the applicable requirements in the ASME BPV Code for RSV blowdown.

Provide a request with appropriate justification for relief from or an alternative to the applicable requirements of the ASME BPV Code as incorporated by reference in 10 CFR 50.55a for RSV blowdown.

03.09.06-10

E. NuScale FSAR Tier 2, Section 5.2.2.9 lists specific tests that will be performed on an RSV prototype to verify RSV performance and reliability. According to NuScale Tier 2, Sections 5.2.2 and 3.9.6.1, the RSVs will satisfy the provisions of the ASME BPV Code and ASME Standard QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants." The specific tests listed in NuScale Tier 2, Section 5.2.2.9 do not fully address the provisions of the ASME BPV Code and ASME QME-1-2007.

Describe the test plans for the RSVs to satisfy the provisions of the ASME BPV Code as incorporated by reference in 10 CFR 50.55a, and ASME QME-1-2007 as accepted in NRC Regulatory Guide (RG) 1.100 (Revision 3), "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants."

03.09.06-11

F. NuScale FSAR Tier 2, Section 5.2.2.10, "Testing and Inspection," states that testing and inspection of overpressure protection equipment is conducted in accordance with accepted industry standards including Sections III and XI of the ASME BPV Code, Mandatory Appendix I of the ASME OM Code, and the requirements of 10 CFR 50.34(f)(2)(x) promulgating Three Mile Island action plan recommendation item II.D.1. Section 5.2.2.10 also provides a summary of planned testing of each RSV to be performed by the supplier. The summary of planned RSV testing in NuScale FSAR Tier 2, Section 5.2.2.10 does not address ASME Standard QME-1-2007, or include all ASME BPV Code testing requirements to demonstrate the functional capability of the RSVs for their full range of operating conditions and their required capacity. In addition, some of the planned RSV testing provisions do not appear consistent with accepted practice for safety valve qualification testing and production testing and seat tightness.

Describe the basis for the summary of the RSV testing provided in the NuScale FSAR. Describe the plans for the RSVs to satisfy 10 CFR 50.34(f)(2)(x) that requires, in part, an application to provide a test program and associated model development and conduct tests to qualify the reactor coolant system relief and safety valves for all fluid conditions expected under operating conditions, transients, and accidents, including consideration of anticipated transients without scram (ATWS) conditions.