

NuScaleDCRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Friday, May 11, 2018 12:48 PM
To: Request for Additional Information
Cc: Lee, Samuel; Cranston, Gregory; Tabatabai, Omid; Mitchell, Matthew; McMurray, Nicholas; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 475 eRAI No. 9437 (06.02.01)
Attachments: Request for Additional Information No. 475 (eRAI No. 9437).pdf

Attached please find NRC staff's request for additional information (RAI) 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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Licensing Branch 1 (NuScale)
Division of New Reactor Licensing
Office of New Reactors
U.S. Nuclear Regulatory Commission
301-415-1647

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Request for Additional Information No. 475 (eRAI No. 9437)

Issue Date: 05/11/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 06.02.01 - Containment Functional Design

Application Section:

QUESTIONS

06.02.01-6

Regulatory Basis:

Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," General Design Criteria (GDC) 4 requires that SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents (LOCAs).

GDC 16 requires that the reactor containment and associated systems shall be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated accident conditions require.

10 CFR 52.47(4) requires an applicant for a standard design certification to include, "An analysis and evaluation of the design and performance of structures, systems, and components with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility."

Below is a follow-up RAI to NuScale's letter, "NuScale Power, LLC Response to NRC Request for Additional Information No. 263 (eRAI No. 9210) on the NuScale Design Certification Application," Question 06.02.01-3.

The staff agrees that the revisions made to the Design Control Document (DCD) describe the locations where threaded inserts are used in the containment vessel (CNV) and specify that the welding and inspections procedures will be in accordance with American Society of Mechanical Engineers (ASME) Code Sections III and XI.

Question

The NuScale response states that the welding procedures and inspections will be in accordance with ASME Sections III and XI as described in DCD Tier 2, Final Safety Analysis Report (FSAR), Sections 5.3.1.4 and 5.2.3.4. The staff reviewed DCD Tier 2, FSAR, Sections 5.3.1.4 and 5.2.3.4, and while the information in the FSAR describes the welding controls, the FSAR does not describe the specific inspections that will be performed on the threaded inserts. The

staff also reviewed ASME Sections III and XI and determined that the ASME Code construction and fabrication inspection requirements are unclear on their applicability to the threaded inserts, including the seal weld.

In order to support the staff's safety finding related to the integrity of the CNV, the staff requests that the information related to the threaded insert construction and preservice inspections that will be performed in accordance with ASME Sections III and XI be specified in the DCD. If NuScale finds that the ASME Code is not applicable to threaded inserts, then provide augmented requirements to provide a similar level of assurance based on the safety significance of the CNV.

06.02.01-7

NuScale's response contained a general description of the threaded insert design and stated that the threads will carry the mechanical loads during normal and off-normal operations, including Emergency Core Cooling System (ECCS) actuation. In order to maintain the CNV, the threaded inserts need to be designed to withstand the design stresses of the CNV. As written, the FSAR does not describe the general design of the threaded inserts or their design requirements.

In order to support the staff's safety finding on the design of the CNV, the staff requests that the general description as well as the design requirements of the threaded inserts be included in the DCD. For example, a statement describing that the threaded inserts are externally and internally threaded, as well as a statement that the threaded inserts are designed to meet the mechanical loads during normal and off-normal operations, including ECCS actuation.

06.02.01-8

NuScale's response stated that the external threads of the threaded inserts are subject to the same loads as the internal threads and associated bolting. Therefore, the stress analysis of the threaded inserts is different than the analysis of the associated bolting. The threads and thickness of the threaded insert impact their strength. During the staff's review, there is no information provided related to the stress analysis of the threaded inserts themselves.

In order to support the staff's safety finding related to the integrity of the CNV, the staff requests the stress analysis showing that the design of the various sized threaded inserts can meet the design requirements of the CNV. This analysis should also include information related to the installation of the threaded inserts to ensure that they are not over or under torqued. This information may be provided in the electronic reading room.

06.02.01-9

The staff reviewed **proprietary** technical report, TR-0917-56119-P, "CNV Ultimate Pressure Integrity," Revision 0. In the report, the following assumptions are made regarding the modeling of the threaded inserts:

Parent material, cladding and threaded inserts were modeled as separate material properties with shared boundaries. Other bolting components were modeled as separate parts.

Bonded contacts, which allow no separation or sliding are applied to the following connections:

- Outer diameter (OD) of studs to inner diameter (ID) of nuts and to threaded inserts/bolt holes

These assumptions show that the threaded insert properties were modeled. However, there are no analyses demonstrating that the threaded insert design can withstand the mechanical loads calculated in the technical report. The staff requests the analyses showing that the design of the threaded inserts can meet the pressures calculated from the methodologies used in the technical report. This information may be provided in the electronic reading room.

Lastly, the report states that the cladding material properties (SA-240, Type 304L) were applied to the threaded inserts (SA-479, Type 316). However, the FSAR states that the threaded inserts will be manufactured out of SA-479 Type 304/304L. Therefore, the staff requests that this inconsistency be corrected in the analysis.