

NuScaleDCRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Thursday, March 29, 2018 5:44 PM
To: Request for Additional Information
Cc: Lee, Samuel; Cranston, Gregory; Baval, Bruce; Mitchell, Matthew; McMurray, Nicholas; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 404 eRAI No. 9436 (05.03.01)
Attachments: Request for Additional Information No. 404 (eRAI No. 9436).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. 404 (eRAI No. 9436)

Issue Date: 03/29/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 05.03.01 - Reactor Vessel Materials

Application Section:

QUESTIONS

05.03.01-5

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) 1 requires that structures, systems, and components (SSCs) important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

GDC 4 requires that system structures and components (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 14 requires that the reactor coolant pressure boundary (RCPB) shall be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture.

GDC 30 requires that components which are part of the RCPB shall be designed, fabricated, erected, and tested to the highest quality standards practical. Means shall be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage.

GDC 31 requires that the RCPB shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a nonbrittle manner and (2) the probability of rapidly propagating fracture is minimized.

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. 251 (eRAI No. 9188) on the NuScale Design Certification Application," Question 05.03.01-3 (ADAMS Accession No. ML17346A519).

The staff agrees that the revisions made to the Design Control Document (DCD) describe the locations where threaded inserts are used in the RCPB.

Question

The NuScale response states that the welding procedures and inspections will be in accordance with American Society of Mechanical Engineers (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 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 RCPB, 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 RCPB.

05.03.01-6

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 RCPB, the threaded inserts need to be designed to withstand the design stresses of the RCPB. 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 RCPB, 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 from during normal and off-normal operations, including ECCS actuation.

05.03.01-7

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 RCPB, the staff requests the stress analysis showing that the design of the various sized threaded inserts can meet the design requirements of the RCPB. 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.