

NuScaleDCRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Thursday, May 10, 2018 10:38 AM
To: Request for Additional Information
Cc: Lee, Samuel; Cranston, Gregory; Franovich, Rani; Karas, Rebecca; Schmidt, Jeffrey; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 471 eRAI No. 9496 (15)
Attachments: Request for Additional Information No. 471 (eRAI No. 9496).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. 471 (eRAI 9496)

Issue Date: 05/10/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 15 - Introduction - Transient and Accident Analyses

Application Section:

QUESTIONS

15-19

10 CFR 50, Appendix A, General Design Criteria (GDC) for Nuclear Power Plants, states:

Under the provisions of § 50.34, an application for a construction permit must include the principal design criteria for a proposed facility. Under the provisions of 10 CFR 52.47, 52.79, 52.137, and 52.157, an application for a design certification, combined license, design approval, or manufacturing license, respectively, must include the principal design criteria for a proposed facility. The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety; that is, structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.

These General Design Criteria establish minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in design and location to plants for which construction permits have been issued by the Commission. The General Design Criteria are also considered to be generally applicable to other types of nuclear power units and are intended to provide guidance in establishing the principal design criteria for such other units.

As the return to power analysis in the Final Safety Analysis Report (FSAR), Section 15.0.6, can occur, assuming a stuck rod, within a few hours from either an anticipated operational occurrence (AOO) or a postulated accident initiating event, the AOO acceptance criteria of GDC 10 apply. GDC 10, "Reactor design," requires that the reactor core and associated coolant, control, and protection systems be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of AOOs.

Primary Design Criterion (PDC) 27 in FSAR Section 3.1.3.8 states:

The reactivity control systems shall be designed to have a combined capability of reliably controlling reactivity changes to assure that under postulated accident conditions and with appropriate margin for stuck rods the capability to cool the core is maintained

Following a postulated accident, the control rods shall be capable of holding the reactor core subcritical under cold conditions, without margin for stuck rods provided the specified acceptable fuel design limits for critical heat flux would not be exceeded by the return to power.

The meaning of first paragraph is unclear with regard to a combined capability of reliably controlling reactivity when only one safety-related means of controlling reactivity is available. Further, the meaning of "specified acceptable design limits for critical heat flux would not be exceeded by the return to power" is given in the second paragraph, but is attributed to the situation where there is no stuck rod, when instead it should refer to the situation where there is a stuck rod. Please clearly separate those two situations such that the design criteria are consistent with the evaluated conditions.

Further, the staff notes that all fuel SAFDLs, of which minimum critical heat flux ratio (MCHFR) is but one, should not be exceeded on a return to power consistent with GDC 10. Based on staff review of FSAR Section 15.0.6 it appears that only the MCHFR SAFDL has been evaluated during a return to power. The staff is requesting additional information regarding the evaluation of other SAFDLs, such as rod internal pressure criteria, to ensure that all relevant SAFDLs have been met consistent with GDC 10 and the wording of PDC 27 be modified to enhance its clarity.

The staff also notes that FSAR Section 3.1.3.8, Criterion 27 - Combined Reactivity Control Systems Capability, Implementation in the NuScale Power Plant, states:

The CVCS, with boron addition, and CRDS are designed for a combined capability of controlling reactivity changes that assures the capability to cool the core under postulated accident conditions with margin for stuck rods as explained in Section 4.3.1.5.

The staff notes that the NuScale chemical and volume control system (CVCS) is not credited to mitigate any Chapter 15 event and is unclear on the basis for including it to demonstrate the combined reactivity. The staff is requesting that the FSAR Section 3.1.3.8 clearly delineate the role of the CVCS in the NuScale in the design.