

NuScaleDCRaisPEm Resource

From: Chowdhury, Prosanta
Sent: Thursday, May 10, 2018 4:00 PM
To: Request for Additional Information
Cc: Lee, Samuel; Cranston, Gregory; Markley, Anthony; Cusumano, Victor; Drzewiecki, Timothy; NuScaleDCRaisPEm Resource
Subject: Request for Additional Information No. 472 eRAI No. 9496 (16)
Attachments: Request for Additional Information No. 472 (eRAI No. 9445).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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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. 472 (eRAI No. 9445)

Issue Date: 05/10/2018

Application Title: NuScale Standard Design Certification - 52-048

Operating Company: NuScale Power, LLC

Docket No. 52-048

Review Section: 16 - Technical Specifications

Application Section:

QUESTIONS

16-42

10 CFR 50.36(c)(2)(ii)(B) requires that a technical specification limiting condition for operation (LCO) be established for a "process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." FSAR, Tier 2, Section 4.3.2.2.1 states that a limit on the heat flux hot channel factor (F_Q) is used to ensure that none of the fuel design criteria are exceeded. However, the currently proposed NuScale generic technical specifications (GTS) do not include an LCO for F_Q . The NRC staff relies upon such an LCO to establish a finding that each NuScale Power MODULE will be operated within the bounds of the safety analyses. Accordingly, NRC staff requests that NuScale either (1) update GTS to include an LCO for F_Q , or (2) update TR-1116-52011, "Technical Specifications Regulatory Conformance and Development," to provide justification for not including F_Q as an LCO in the NuScale GTS.

16-43

10 CFR 50.36(c)(2)(ii)(B) requires that a technical specification limiting condition for operation (LCO) be established for a "process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." NuScale generic technical specifications (GTS) contain several LCO subsections that reference limits specified in the CORE OPERATING LIMITS REPORT (COLR), which is a defined term in GTS Section 1.1, "Definitions," and which is specified in GTS Subsection 5.6.3.

By letter dated July 13, 2017 (ML17194B384), NuScale provided a response to RAI 8772, Question 4.3-1 that stated the methodologies and/or values that set the limits in GTS are contained in several locations in DCD Tier 2 (the FSAR). However, there is no direct connection provided in GTS Subsection 5.6.3 to these methodologies and/or values. The NRC staff relies upon the LCOs to establish a finding that the plant will be operated within the bounds of the safety analyses. However, the staff cannot make this finding because GTS Subsection 5.6.3 has insufficient information for the staff to determine which specific methodology is used to set each limit specified by the GTS LCO subsections listed in paragraph a of GTS Subsection 5.6.3.

Accordingly, the NRC staff requests that NuScale revise the DCA in accordance with one of the following options:

- 1) Revise GTS Subsection 5.6.3, paragraph b, by replacing the proposed bracketed general reference to staff approved topical reports with a list of documents (including FSAR subsections) describing the NRC staff approved analytical methods used to establish the core operating limits; each document should state its revision number and the date of the revision.

The GTS LCO subsections, which are listed in GTS Subsection 5.6.3, paragraph a, specify these limits in accordance with Criterion 2 of 10 CFR 50.36(c)(2)(ii) by referencing the COLR. The listing of each document should therefore list all LCO subsections that specify limits derived using the analytical method described in the document.

This option requires NRC staff prior review and approval of all analytical methods used by NuScale to establish the core operating limits, as described in documents submitted as part of the NuScale design certification application (DCA). The NRC staff would need to confirm that the limits derived using the approved analytical methods are bounded by the accident analyses, and therefore, conclude that the NuScale design provides adequate protection.

To reduce the administrative burden on a COL applicant, designate these documents as a COL action item by bracketing each listed method document (or FSAR reference). In addition, the staff understands that a specific document addressing steps of a core reload analysis is not included in the DCA. Accordingly, the document list should also include a bracketed placeholder for the "reload analytical method."

In order to make clear the meaning of the brackets in this document list, please include a Reviewer's Note in Subsection 5.6.3 for use by a COL applicant to guide its completion of the COL action item. For example (ignore any double line spacing):

-
- b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

[-----REVIEWER'S NOTE-----]

The COL applicant shall confirm the validity of each listed document and the listed Specifications for the associated core operating limits, or state the valid NRC approved analytical method document and list of associated Specifications.

The COL applicant shall state the valid core reload analysis methodology document and list of associated Specifications.

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1. [Analytical method document A, Revision number, date.

(Methodology for Specifications 3.1.3 – Moderator Temperature Coefficient, 3.1.4 – Rod Group Alignment Limits, 3.1.5 - Shutdown

Group Insertion Limits, 3.1.6 - Regulating Group Insertion Limits, and 3.1.9 – Boron Dilution Control.)]

2. [Analytical method document B, Revision number, date.

(Methodology for Specifications 3.1.1 – SDM, 3.2.1 - Enthalpy Rise Hot Channel Factor, 3.2.2 – AXIAL OFFSET, 3.4.1 - RCS Pressure, Temperature, and Flow Resistance Critical Heat Flux Limits, and 3.5.3 - Ultimate Heat Sink.)]

3. [Core Reload Analysis Methodology document, Revision #, date.

(Methodology for Specifications...]

With this option, a COL applicant or COL holder would be able to change the limits in the COLR in accordance with the specified approved analytical methods without prior NRC approval.

- 2) Remove GTS Subsection 5.6.3 and revise each GTS LCO subsection that references the COLR by replacing each reference to the COLR with the numerical values specified for each limit, including any figures for limits presented as curves, such as control rod assembly (CRA) group power dependent insertion limits (PDILs), Moderator Temperature Coefficient (MTC), and Axial Offset (AO). This option requires stating core operating limit values and curves in the GTS LCO subsections that now reference a COLR, since GTS Section 5.6 would no longer specify a COLR. This option also requires NRC staff prior review and approval of all specified core operating limit values and curves. Conforming changes to the Bases of the affected GTS LCO subsections would likely be needed. Note that the NRC staff would review the analytical methods used by NuScale to derive the proposed core operating limit values and curves to the degree needed to confirm that the limits are bounded by the accident analyses, and therefore, that the NuScale design provides adequate protection.

With this option, a change in the core operating limits would require a COL applicant or COL holder to seek prior NRC approval by utilizing the applicable regulatory process for changing the GTS and Bases.

16-44

10 CFR 50.36(c)(1)(i)(A) requires that technical specifications include safety limits for nuclear reactors that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity.

In a letter dated December 8, 2017 (ML17342B343), the applicant updated DCA Part 2, FSAR Chapters 1, 2, and 15, and Part 4, Technical Specifications (TS), with conforming changes to reflect Revision 1 of Licensing Topical Report, NuScale Power Critical Heat Flux Correlations

TR-0116-21012, which adopts a new critical heat flux (CHF) correlation, NSP4. The letter stated in part:

Note that the Technical Specification Safety Limits affected by the implementation of the NSP4 correlation were also modified to relocate the critical heat flux correlation values from the Safety Limit to the Core Operating Limits Report (COLR). The requirement for and contents of the COLR are described in Technical Specification 5.6.3. This relocation is consistent with similar approved Technical Specification changes implemented at the Farley nuclear plant (ML013400451).

The staff reviewed the safety evaluation for Amendment No. 151 to Facility Operating License No. NPF-2 and Amendment No. 143 to Facility Operating License No. NPF-8, for the Joseph M. Farley Nuclear Plant, Units 1 and 2, respectively, which were issued on December 4, 2001. The amendments included a change to plant-specific TS Subsection 2.1.1, "Reactor Core SLs," that moved the curves depicting departure from nucleate boiling (DNB) criterion correlation limits to the Core Operating Limits Report (COLR), a report specified by plant-specific TS Subsection 5.6.5. This relocation was based on Generic Letter (GL) 88-16, "Removal of Cycle-Specific Parameter Limits from TS," dated October 4, 1988 (ML031200485). The Farley amendments were also based on a topical report WCAP-14483-A, approved January 19, 1999 (ML020430092). The NRC staff safety evaluation for WCAP-14483 states, "Safety limits, however, may not be placed in the COLR."

Accordingly, the staff does not accept the proposed relocation of reactor core SL critical heat flux correlation values from GTS SL 2.1.1.1 to the COLR. The applicant is requested to restore these SL values to SL 2.1.1.1 and make conforming changes to the associated Bases in Subsection B 2.1.1 and the list of specifications, which reference the COLR, in Subsection 5.6.3, paragraph a.