NuScaleDCRaisPEm Resource

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Sent:	Wednesday, May 03, 2017 1:12 PM
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Subject:	Request for Additional Information No. 15 (eRAI No. 8745) Section 05.04.07 (SRSB)
Attachments:	Request for Additional Information No. 15 (eRAI No. 8745).pdf

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

Please submit your 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. 15 (eRAI No. 8745)

Issue Date: 05/03/2017
Application Title: NuScale Standard Design Certification - 52-048
Operating Company: NuScale Power, LLC
Docket No. 52-048
Review Section: 05.04.07 - Residual Heat Removal (RHR) System
Application Section: 5.4.3

QUESTIONS

05.04.07-1

10 CFR Part 50, Appendix A, GDC 34 requires in part that a system have the capability to transfer decay heat and other residual heat from the reactor such that fuel and pressure boundary design limits are not exceeded. For the NuScale design, the decay heat removal system (DHRS) serves this function.

DSRS Section 5.4.7 stipulates that in order to make a safety finding regarding the ability of the DHRS to meet GDC 34, staff should be able to verify the cooling capacity of the DHRS HX (heat exchanger) using limiting reactor building pool water temperature. In order to make this determination, the staff evaluates component performance specifications of the DHRS (e.g., tube plugging, fouling, heat removal as a function of flow and temperature on the shell/tube sides of the heat exchanger, expected range of flow rates, condenser performance characteristics).

Based on the information provided in the FSAR, staff is unable to verify the maximum cooling capacity of the DHRS HX. Nor can the staff verify the system characteristics perform as depicted in the cooldown analyses in Figures 5.4-11 through 5.4-15 in the FSAR. Provide, in the FSAR, the necessary selection of parameters (including, but not necessarily limited to: the number and area of tubes in the condenser HX, the design maximum flow rate, heat transfer and corresponding condenser inlet and outlet temperature values) such that the staff can evaluate the DHRS system performance during the design basis limiting transient.

05.04.07-2

10 CFR Part 50, Appendix A, GDC 34 requires in part that a system have the capability to transfer decay heat and other residual heat from the reactor such that fuel and pressure boundary design limits are not exceeded, and that suitable redundancy exist such that these functions can be accomplished in the event of a single failure. For the NuScale design, the decay heat removal system (DHRS) serves this function.

No failure modes and effects analysis (FMEA) or similar analysis is provided for components that (although not classified in the FSAR as belonging to the DHRS, are connected to DHRS components with no intervening isolation, such as main steam system components, like the thermal relief valves or MSIVs) could impact the functionality of the DHRS. Provide, in the FSAR, either an FMEA for the DHRS or a description of the potential single failures either in or directly impacting the DHRS, and why these failures do not impact the system's performance capability. This FMEA should consider separately both a transient that credits the DHRS without actuating ECCS as well as a potential SG tube leak or rupture.

05.04.07-3

10 CFR Part 50, Appendix A, GDC 34 requires in part that a system have the capability to transfer decay heat and other residual heat from the reactor such that fuel and pressure boundary design limits are not exceeded. For the NuScale design, the decay heat removal system (DHRS) serves this function.

In order to evaluate the capability of the DHRS to meet GDC 34, staff must determine that the system is capable of performing its design function for the full spectrum of transients that rely on the DHRS. No discussion of what constitutes the limiting design basis transient for the DHRS exists in the DCD, although figures are provided for single train operation of the DHRS with both high and

low inventory. Provide in the DCD either: (a) a discussion of why the figures included in Chapter 5 of the DCD represent bounding conditions for all transients relying on the DHRS or (b) update the DCD to include a demonstration of DHRS performance under conditions that constitute the limiting design basis transient(s) for the DHRS cooldown performance.