RAIO-1018-62126

October 15, 2018

Docket No. 52-048

U.S. Nuclear Regulatory Commission
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Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Response to NRC Request for Additional Information No. 497 (eRAI No. 9570) on the NuScale Design Certification Application

REFERENCE: U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 497 (eRAI No. 9570)," dated August 13, 2018

The purpose of this letter is to provide the NuScale Power, LLC (NuScale) response to the referenced NRC Request for Additional Information (RAI).

The Enclosure to this letter contains NuScale's response to the following RAI Question from NRC eRAI No. 9570:

- 05.04.07-7

This letter and the enclosed response make no new regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions on this response, please contact Carrie Fosaaen at 541-452-7126 or at cfosaaen@nuscalepower.com.

Sincerely,

Zackary W. Rad
Director, Regulatory Affairs
NuScale Power, LLC

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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9570

Enclosure 1:

NuScale Response to NRC Request for Additional Information eRAI No. 9570

Response to Request for Additional Information
Docket No. 52-048

eRAI No.: 9570
Date of RAI Issue: 08/14/2018

NRC Question No.: 05.04.07-7

10 CFR Part 50, Appendix A, GDC 34 requires in part that a system to remove residual heat shall be provided, the safety function of which shall be to transfer fission product decay heat and other residual heat from the reactor core at a rate such that design limits and conditions are not exceeded. NuScale has adopted a PDC that uses identical language to the GDC with the exception of the power provisions, which are not pertinent to this question. In order to satisfy GDC 34, NuScale states the DHRS design ensures the RCS average temperature is below 420 degrees F within 36 hours after an initiating event without challenging the RCPB or uncovering the core. While the analytical performance of the system is documented in the FSAR, the staff requires additional information to confirm that the decay heat removal function of the as-built system as a whole will perform in accordance with the analytical assumptions.

As part of the response to RAI 8817, Question 14.3-1, NuScale provided no information related to testing of the DHRS as part of ITAAC 02.08.08 that would demonstrate how the as-built DHRS thermal performance will exceed its design assumptions. While staff recognizes prototype and legacy testing play a large part in showing adequate system performance from a design perspective, staff believes it to be important to demonstrate adequate performance of the as-built system before it is called on to perform its safety function given the relative importance of the system.

As such, staff requests that NuScale include a test or a commitment to perform a test (either supplementing an existing test or a new one) that involves operating the DHRS valves with a heated system (not necessarily full temperature and pressure) such that natural circulation flow removes heat from the loop and the thermal performance of the system can be measured. The test, if not run at design basis conditions, should then be compared against a limiting analysis using the tool of record (NRELAP) for the test conditions to show that the as-built performance

meets or exceeds analytical assumptions. This approach corresponds to that used for previous novel decay heat removal systems.

NuScale Response:

NuScale has reviewed the NRC request for additional information and determined that a one-time (first NuScale Power Module only) in-situ test of the decay heat removal system (DHRS) will be performed as a first-of-a-kind demonstration of the DHRS function. An overview of the proposed DHRS in-situ test is described below:

The DHRS System Level Test #63-6 described in Final Safety Analysis Report (FSAR) Table 14.2-63 provides a set of initial plant conditions from which to perform the DHRS in-situ testing that is being proposed. The one-time DHRS in-situ test will be performed in conjunction with the hot functional conditions indicated in test #63-6 as this test demonstrates operating the DHRS valves and natural circulation through the DHRS with a heated reactor coolant system (RCS). The RCS will be heated to normal operating pressure and the highest temperature obtainable using the module heating system (MHS). When DHRS actuation valves are opened, the DHRS in-situ test will demonstrate that natural circulation flow removes heat from the RCS loop by monitoring a decrease in RCS temperature. The DHRS in-situ test results, will be compared against the DHRS design basis analysis using the analysis method of record adjusted for the test conditions to show that the as-built performance meets or exceeds analytical results.

The DHRS in-situ test along with the testing performed under Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) 02.08.08 and DHRS System Level Test #63-6 will provide the necessary assurance that the DHRS meets the analytical models described in the NuScale FSAR.

As part of the DHRS in-situ test development, NuScale needs to develop acceptance criteria to demonstrate satisfactory testing results. Currently, NuScale plans to perform additional analyses, using the expected plant conditions during System Level Test #63-6, that would support development of the acceptance criteria for the DHRS in-situ test. Once the acceptance criteria is developed the FSAR will be updated with a complete test description that can be provided to the NRC in the future.

Impact on DCA:

There are no impacts to the DCA as a result of this response.