RAIO-0219-64619

February 21, 2019

Docket No. 52-048

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 474 (eRAI No. 9507) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 474 (eRAI No. 9507)," dated May 11, 2018
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 474 (eRAI No.9507)," dated July 10, 2018

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

The Enclosure to this letter contains NuScale's supplemental response to the following RAI Question from NRC eRAI No. 9507:

- 15.04.01-5

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 Paul Infanger at 541-452-7351 or at pinfanger@nuscalepower.com.

Sincerely,

Carrie Fosaaen
Supervisor, Licensing
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Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9507

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NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 9507

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

eRAI No.: 9507
Date of RAI Issue: 05/11/2018

NRC Question No.: 15.04.01-5

GDC 10 requires that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that SAFDLs are not exceeded during any condition of normal operation, including the effects of AOOs. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP) Section 15.4.1, "Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low Power Startup Condition," provides the staff guidance in determining compliance with GDC 10 and states that the postulated initial reactor coolant flow, pressure and inlet temperature (i.e., the extremes of postulated conditions) should be consistent with the rod and power configuration to give minimum departure from nucleate boiling ratio (DNBR) conditions.

The staff notes that FSAR Tier 2, Table 15.4-2, "Key Inputs for Limiting MCHFR Case (15.4.1 Uncontrolled CRA Withdrawal from Subcritical or Low Power Condition)," does not list the value of reactor coolant flow assumed for the analysis. In addition, it is unclear whether the nominal pressurizer pressure is limiting because it appears inconsistent with the behavior of critical heat flux as a function of pressure when using the NSP2 correlation, as discussed in TR-0116- 21012-P, "NuScale Power Critical Heat Flux Correlation NSP2." Furthermore, the staff notes that the biased-high pressurizer level listed in Table 15.4-2 is inconsistent with what is specified for the event-specific methodology in TR-0516-49416-P, "Non-Loss-of-Coolant Accident Analysis Methodology." To ensure that the limiting results have been identified:

1. Update Table 15.4-2 to include the RCS flow.
2. Demonstrate the conservatism of the pressurizer pressure and level biases, for instance through sensitivity study results.
3. Address the inconsistency in pressurizer level biasing between Table 15.4-2 and TR-0516-49416-P.
4. Update the FSAR and/or TR-0516-49416-P as appropriate.

NuScale Response:

During a conference call with the NRC and NuScale on January 29, 2019, the NRC stated that the NuScale response provided for the Uncontrolled Control Rod Assembly (CRA) Withdrawal event used the Reactor Coolant System (RCS) flow analytical limit of 1.7 ft^3/s. However, based on an audit of the underlying calculation, it appears the case for limiting Minimum Critical Heat Flux Ratio (MCHFR) was performed at a flow roughly two times the analytical limit. Please clarify the RCS initial flow rate for the limiting case and how determined.

Based on this new information NuScale is providing the following supplemental response. The initial RCS flow rate varies as a function of the initial core power, but must be greater than the minimum flow rate to keep the module protection system from actuating on the low RCS flow analytical limit (1.7 ft^3/s). For the Uncontrolled CRA Withdrawal event, the initial RCS volumetric flow rate of 3.85 ft^3/s corresponds to the unique set of initial conditions that produce the limiting MCHFR case. Final Safety Analysis Report (FSAR) Table 15.4-2 has been updated to reflect this supplemental response.

Impact on DCA:

FSAR Table 15.4-2 has been revised as described in the response above and as shown in the markup provided in this response.

RAI 15.04.01-5S1

Table 15.4-2: Key Inputs for Limiting MCHFR Case (15.4.1 Uncontrolled CRA Withdrawal from Subcritical or Low Power Condition)

Parameter	Nominal	Bias
Initial power	1 MW	N/A[1]
Initial RCS flow rate	3.85 ft^3/s	N/A[2]
Pressurizer pressure	1848 psia	Nominal
Pressurizer level	60%	+8%
Core inlet temperature	425 °F	+80 °F
MTC	+6 pcm/°F	Most positive
FTC	-1.40 pcm/°F	Least negative

[1]A spectrum of initial powers is analyzed, and this value provided the limiting MCHFR results.

[2]The initial RCS flow rate varies as a function of the initial power. This is the initial flow rate for the limiting MCHFR case.