



July 09, 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. 469 (eRAI No. 9505) on the NuScale Design Certification Application

**REFERENCE:** U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 469 (eRAI No. 9505)," dated May 10, 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. 9505:

- 15-18

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](mailto:pinfanger@nuscalepower.com).

Sincerely,

A handwritten signature in black ink, appearing to read "Zackary W. Rad".

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

Distribution: Gregory Cranston, NRC, OWFN-8G9A  
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Enclosure 1: NuScale Response to NRC Request for Additional Information eRAI No. 9505



RAIO-0718-60798

**Enclosure 1:**

NuScale Response to NRC Request for Additional Information eRAI No. 9505

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

**eRAI No.:** 9505

**Date of RAI Issue:** 05/10/2018

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### **NRC Question No.:** 15-18

10 CFR 50.12(a)(1) requires that a specific exemption will not present an undue risk to the public health and safety. In part 7 of the NuScale design certification application (DCA), Section 15, the applicant requests an exemption from 10 CFR 50, Appendix A, Criterion 27, Combined Reactivity Control System Capability. In section 15.2.1 of part 7 of the DCA, the applicant states that the a bounding probability for a return to power is calculated to be less than 1E-6 per reactor year, accounting for the reliability of reactivity control systems and the likelihood that the reactor is in a state that can subsequently lead to a return to power. In response to RAI 8999, Question 19-30, the applicant states that the fuel cycle window where the reactor could return to criticality, assuming the worst rod stuck out, is estimated to be 2 to 6 weeks (ML17299A812). During an audit, NRC observed that the long term shutdown capability analysis shows that the reactor would not stay subcritical over most of cycle when the analysis accounts for a stuck control rod (ML18025B026). This observation is causing NRC staff to question the estimated fuel cycle window provided by the applicant in the response to RAI 8999, Question 19-30. Accordingly, NRC staff requests that the applicant provide evidence to demonstrate that the fuel cycle window where the reactor could return to criticality is 2 to 6 weeks, and update the exemption request, as appropriate.

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### **NuScale Response:**

Assuming realistic core operating conditions, the return to power phenomenon can only occur for those events that rely on heat removal using natural circulation flow through the reactor vent valves (RVVs) and reactor recirculation valves (RRVs) at very low power levels as explained in FSAR Section 15.0.6 and further discussed in response to eRAI 9506, in letter RAIO-0618-60716, dated June 29, 2018. This provides the basis for the probabilistic risk assesment (PRA) which assumes that the phenomenon can only occur if decay heat is sufficiently low (~100kW). Analysis for the entire fuel cycle length shows that after nine days of operation, following startup from a refueling outage (or other long duration outage), the decay heat levels will be high enough such that a trip, followed by a failure of reactivity control, will not result in recriticality; negative reactivity feedback will maintain  $k_{eff} < 1$  for at least 72 hours. Therefore, to bound this window and consider uncertainties, the PRA considered a conservative

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range of operating windows (i.e., 2 - 6 weeks). No changes are proposed to the exemption request.

**Impact on DCA:**

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