RAIO-0219-64524

February 11, 2019

Docket No. 52-048

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

SUBJECT: NuScale Power, LLC Supplemental Response to NRC Request for Additional Information No. 136 (eRAI No. 8933) on the NuScale Design Certification Application

REFERENCES:
1. U.S. Nuclear Regulatory Commission, "Request for Additional Information No. 136 (eRAI No. 8933)," dated August 05, 2017
2. NuScale Power, LLC Response to NRC "Request for Additional Information No. 136 (eRAI No.8933)," dated October 31, 2018
3. NuScale Power, LLC Supplemental Response to NRC "Request for Additional Information No. 136 (eRAI No. 8933)," dated January 21, 2019

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. 8933:

- 03.07.02-16

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 Marty Bryan at 541-452-7172 or at mbryan@nuscalepower.com.

Sincerely,

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

Distribution: Gregory Cranston, NRC, OWFN-8H12
Samuel Lee, NRC, OWFN-8H12
Marieliz Vera, NRC, OWFN-8H12

Enclosure 1: NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8933

Enclosure 1:

NuScale Supplemental Response to NRC Request for Additional Information eRAI No. 8933

NuScale Power, LLC
1100 NE Circle Blvd., Suite 200 Corvalis, Oregon 97330, Office: 541.360.0500, Fax: 541.207.3928
www.nuscalepower.com

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

eRAI No.: 8933
Date of RAI Issue: 08/05/2017

NRC Question No.: 03.07.02-16

10 CFR 50 Appendix S requires that the safety functions of structures, systems, and components (SSCs) must be assured during and after the vibratory ground motion associated with the Safe Shutdown Earthquake (SSE) through design, testing, or qualification methods.

In FSAR Section 3.7.2.1.2.1, the staff noted that the dry dock is assumed to be full of water and part of the UHS in the seismic analysis. The nominal water level is at EL. 94 ft. In FSAR Section 9.1.3, the staff also noted that the dry dock can be drained partially or completely to support plant operations. In FSAR Section 9.1.3.3.5, the staff further noted that a failure of the dry dock gate while the dry dock is empty could result in a decrease in water level at the UHS pool by about 12 ft. Since the dry dock contains a large body of water, draining of a large mass of water could affect the dynamic characteristics of the SASSI and ANSYS models thereby potentially affecting the seismic demand based on full dry dock assumption. Therefore the applicant is requested to provide a technical basis for not considering different water level conditions for the dry dock in the seismic analysis. In addition, the applicant should address the effect of potential variation in water level of the UHS on the seismic analysis of the Reactor Building (RXB) and NuScale Power Module (NPM) including the analyses conducted in FSAR 3.7.2.9.1 to address the effect of operation with less than the full complements of NPMs. The applicant should also describe in the FSAR the analysis and design criteria to ensure that no adverse seismic interaction occurs between the dry dock gate and adjacent Seismic Category I SSCs.

NuScale Response:

On January 21, 2019, NuScale submitted a supplement to its RAI 8933 Question 03.07.02-16 response and the NRC provided feedback during a public meeting on January 23, 2019. As a result of the feedback, NuScale committed to update the FSAR to compare the in-structure response spectra from an empty dry dock with the in-structure response spectra from a full dry dock. NuScale has updated FSAR Section 3.7.2.1.2, “Effect of an Empty Dry Dock.”

Impact on DCA:

FSAR Section 3.7.2.1.2 has been revised as described in the response above and as shown in the markup provided in this response.

3.7.2.1.2 Effect of an Empty Dry Dock

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A study was performed to determine the effect of an empty dry dock on the response of the RXB. Three separate SASSI models were created for this purpose. The first was the RXB modeled with nominal NPM stiffnesses. The second was an RXB model with NPM stiffnesses multiplied by 1.3, resulting in an approximate +15 percent NPM frequency change in dominant modes. The third model included NPM stiffnesses divided by 1.3, resulting in an approximate -15 percent NPM frequency change in dominant modes. The following parameters were also used in the study:

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- One set of CSDRS-compatible seismic inputs: Capitola.

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- One soil type: Soil Type 7.

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- One concrete condition: cracked.

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- Two structural concrete damping ratios: 4 percent for ISRS generation and lug support reaction calculation and 7 percent structural damping for force and moment calculation.

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The maximum forces and moments in the four RXB exterior walls and in the four walls around the dry dock, the lug support reactions at the 12 NPMs, and forces and moments in one pilaster in the north wall at column line RX-4, were calculated for the empty dry dock condition and compared with the corresponding design capacities based on the full dry dock condition. See Table 3.7.2-59 and Table 3.7.2-60 for a sample of results.

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Comparisons between floor ISRS and ISRS at the Reactor Building crane wheels were also made. These plots can be found in Figure 3.7.2-172 through Figure 3.7.2-175.

RAI 03.07.02-16S1, RAI 03.07.02-16S2

Based on the comparison of the seismic demands and design capacities, the empty dry dock condition is bounded by the RXB design, which is based on the full dry dock condition. In addition, all ISRS from the empty dry dock condition are either bounded by or are within 10 percent of the full dry dock condition.

RAI 03.07.02-16S1

COL Item 3.7-14: A COL applicant that references the NuScale Power Plant design certification will demonstrate that the site-specific seismic demand is bounded by the FSAR capacity for an empty dry dock condition.