

## Response to SDAA Audit Question

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**Question Number:** A-4.2-2

**Receipt Date:** 04/24/2023

**Question:**

Section 4.2 of the SDAA does not include discussion of fuel structural analysis in response to external forces when the core is in the reactor flange tool. However, COL Item 3.8-1 states, in its entirety “An applicant that references the NuScale Power Plant US460 standard design will provide the design of the reactor flange tool.” Fuel structural analysis in response to external forces in the RFT must be performed once design of the RFT is provided. Please propose markups to this COL item to ensure this analysis is performed by an applicant referencing the NuScale Power Plant US460 standard design.

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**Response:**

Combined operating license (COL) Item 3.8-1 is revised to specify that COL applicants must provide the design and analysis of the reactor flange tool.

Markups of the affected changes, as described in the response, are provided below:

**Table 1.8-1: Combined License Information Items (Continued)**

Item No.	Description of COL Information Item	Section
COL Item 3.7-11:	<p>An applicant that references the NuScale Power Plant US460 standard design will prepare site-specific procedures for seismic instrumentation maintenance and post-earthquake activities. Administrative procedures define the maintenance and repair of the seismic instrumentation to keep the maximum number of instruments in-service during plant operations and shutdown. The procedures for post-earthquake activities must provide sufficient information to determine if the level of earthquake ground motion requiring shutdown has been exceeded and appropriate corrective actions to be taken if needed.</p> <p>Guidance for procedure development is in Regulatory Guide 1.12, "Nuclear Power Plant Instrumentation for Earthquakes," Regulatory Guide 1.166, "Pre-Earthquake Planning, Shutdown, and Restart of a Nuclear Power Plant Following an Earthquake," and EPRI Report 3002005284, "Guidelines for Nuclear Plant Response to an Earthquake" (Reference 3.7.4-1).</p>	3.7
COL Item 3.8-1:	<p>An applicant that references the NuScale Power Plant US460 standard design will provide the design <u>and analysis</u> of the reactor flange tool. <u>In addition to analysis of the reactor flange tool, the applicant will provide structural analysis of the fuel in response to external forces when the reactor vessel is located in the reactor flange tool.</u></p>	3.8
COL Item 3.8-2:	<p>An applicant that references the NuScale Power Plant US460 standard design will describe the site-specific program for monitoring and maintenance of the Seismic Category I structures in accordance with the requirements of 10 CFR 50.65 as discussed in Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Monitoring is to include below grade walls, groundwater chemistry if needed, base settlements, and differential displacements.</p>	3.8
COL Item 3.8-3:	<p>An applicant that references the NuScale Power Plant US460 standard design will identify local stiff and soft spots in the foundation soil and address these in the design, as necessary.</p>	3.8
COL Item 3.9-1:	<p>An applicant that references the NuScale Power Plant US460 standard design will perform a site-specific seismic analysis in accordance with Section 3.7.2. In addition to the requirements of Section 3.7, for sites where the high frequency portion of the site-specific spectrum is not bounded by the certified seismic design response spectra, the standard design of NuScale Power Module components will be shown to have appropriate margin or should be appropriately modified to accommodate the site-specific demand.</p>	3.9
COL Item 3.9-2:	<p>An applicant that references the NuScale Power Plant US460 standard design will complete an assessment of piping systems inside the Reactor Building to determine the portions of piping to be tested for vibration, thermal expansion, and dynamic effects. Piping systems within the scope of this testing include American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section III, Class 1, 2, and 3 piping systems, other high-energy piping systems inside Seismic Category I structures or those whose failure would reduce the functioning of any Seismic Category I plant feature to an unacceptable level, and Seismic Category I portions of moderate-energy piping systems located outside of containment. The applicant may select the portions of piping in the design for which vibration testing is performed while considering the piping system design and analysis, including the vibration screening and analysis results and scope of testing as identified by the Comprehensive Vibration Assessment Program.</p>	3.9
COL Item 3.9-3:	<p>An applicant that references the NuScale Power Plant US460 standard design will verify that evaluations are performed during detailed design of the main steam lines, using acoustic resonance screening criteria and additional calculations as necessary (e.g., Strouhal number) to determine if there is a concern. The methodology in "NuScale Comprehensive Vibration Assessment Program Analysis Technical Report," TR-121353 is acceptable for this purpose. The applicant will update Section 3.9.2.1.1.1 to describe the results of this evaluation.</p>	3.9

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vessel during refueling, maintenance, and inservice inspection activities. The RFT stores and supports the cask during cask loading.

The RFT is shared among all six NPMs.

The RFT supports the lower portion of the reactor vessel, containing the core, during refueling operations.

Items, including welds, in the RFT that constitute the load path for support of the NPM or are credited for seismic restraint are classified as Seismic Category I. Non-load-bearing items that do not provide a seismic restraint function are classified as Seismic Category III.

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COL Item 3.8-1: An applicant that references the NuScale Power Plant US460 standard design will provide the design and analysis of the reactor flange tool. In addition to analysis of the reactor flange tool, the applicant will provide structural analysis of the fuel in response to external forces when the reactor vessel is located in the reactor flange tool.

#### **3.8.4.1.6 Platforms and Miscellaneous Structures**

The RXB and CRB use platforms and miscellaneous structures (e.g., ladders, guard rails, stairs). These components are constructed of steel beams, angles, channels, tubing, and grating. Platforms and miscellaneous structures may be Seismic Category I, II, or III depending on their safety function and potential interaction with Seismic Category I SSC. The seismic analysis includes these SSC as part of the standard floor load.

#### **3.8.4.1.7 Buried Conduit and Duct Banks**

The design has safety-related buried duct bank that goes from the RXB to the CRB. Section 3.7.3 provides additional details for buried SC-I piping and conduits.

#### **3.8.4.1.8 Buried Pipe and Pipe Ducts**

The design does not include buried safety-related pipes or pipe ducts.

#### **3.8.4.1.9 Masonry Walls**

Non-structural and non SC-I masonry walls are used as partition walls in the Reactor Building and in the Control Building. The mass of these walls are included as part of the standard floor load.

#### **3.8.4.1.10 Modular Construction**

Modular construction techniques are used extensively in the nuclear industry. The design of the Seismic Category I RXB structural walls includes steel-plate