

## Response to SDAA Audit Question

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**Question Number:** A-3.9.2-7

**Receipt Date:** 04/03/2023

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**Question:**

In TR-121354-P, Rev. 0, NuScale summarizes the planned flow-induced vibration testing in the SIET TF-3 facility. Among the important data to be acquired are (a) high flow rate steam generator tube vibration to demonstrate margin against strong response due to vortex shedding (VS) and/or Flow-Elastic Instability (FEI) and (b) benchmarking data to support the sole use of a limited array of pressure sensors for monitoring unexpected strong FIV behavior within the prototype NPM-20 initial startup testing.

NuScale should provide the following TF-3 information for audit by the staff:

1. Complete test plans for the TF-3 testing, including acceptance criteria and equivalent margins against VS and FEI for the actual NPM-20 (similar to those provided in the DCA measurement and inspection report). Include details on how to account for the differences between the TF-3 and NPM-20 steam generator tube support systems.
  2. In the event the TF-3 VS and/or FEI acceptance criteria are violated provide detailed plans on how the violations will be addressed in the NPM-20 SG tube, tube support, or other related design aspects.
  3. The current TF-3 testing schedule.
  4. All pressure transducer detailed locations, how those locations “map” to the options projected for installation in the NPM-20 prototype for initial startup testing, plans for assessing measurement noise floors, and details on how the TF-3 data will “inform the development of acceptance criteria for the dynamic pressure sensor output during the initial startup testing program.”
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**Response:**

This audit response supersedes the response submitted on 6/23/2023 with an update to Item 1.

**Item 1**

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}}<sup>2(a),(c),ECI</sup>

The following calculation is added to the eRR to provide the requested information. {{

}}<sup>2(a),(c),ECI</sup>

**Item 2**

The purpose of the TF-3 testing is for validation of the design analysis methods, therefore if the TF-3 results are outside of the allowable acceptance criteria, further evaluation of the Vortex Shedding (VS) and Flow-Elastic Instability (FEI) design analysis methodologies will be needed. As required for closure of ITAAC Item #1 in Part 8, Table 2.1-1, an ASME Code Section III Design Report must conclude that the ASME Code Class 1, 2, and 3 as-built components, which includes the steam generator tubes, meet the requirements of ASME Code Section III. If the VS and FEI design analyses cannot ensure that the SG tubes will comply with ASME Code Section III requirements, then a design change may be needed. The resulting design change would be specific to the issue identified.

In general terms, {{

}}<sup>2(a),(c),ECI</sup> In this report, the differences between the expected and measured experimental results are either resolved or confirmed to be in the analytically predicted allowable ranges.

### Item 3

The current TF-3 test schedule is outlined below. The timing of testing is subject to change based on the sequencing of activities, test facility availability, and possible facility delays. The TF-3 test results will be included in a post-test technical report that will be provided for review separate from the SDA.

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}}<sup>2(a),(c),ECI</sup>

### Item 4

{{ }}<sup>2(a),(c),ECI</sup> Multiple  
options provide future NPM owners flexibility to manage the tradeoffs in design and manufacturing between the options. Selections of a specific instrumentation arrangement and the detailed location of those instruments will be submitted for review as part of the test procedures described in COL Item 3.9-4. Test procedures will estimate the instrument noise floor as well as the turbulent noise to understand the sensitivity of the sensors to component vibrations. A proof of concept analysis is provided in {{

}}<sup>2(a),(c),ECI</sup>

This analysis {{

}}<sup>2(a),(c),ECI</sup>

No changes to the SDAA are necessary.