LO-107953



October 13, 2021

Docket No. 99902078

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

#### **SUBJECT:** NuScale Power, LLC Submittal of Presentation Materials, "SDA Pre-Application Presentation: NuScale SDA Density Wave Oscillation Carve-out Resolution Plan (Open Session)," PM-107891, Revision 0

NuScale Power, LLC (NuScale) has requested a meeting with the NRC technical staff on October 19, 2021, to discuss the density wave oscillation carve-out. The purpose of this submittal is to provide presentation materials to the NRC for use during this meeting.

The enclosure to this letter is the nonproprietary presentation entitled "SDA Pre-Application Presentation: NuScale SDA Density Wave Oscillation Carve-out Resolution Plan (Open Session)."

This letter makes no regulatory commitments and no revisions to any existing regulatory commitments.

If you have any questions, please contact Liz English at 541-452-7333 or at eenglish@nuscalepower.com.

Sincerely,

Mark W. Show

Mark W. Shaver Manager, Licensing NuScale Power, LLC

- Distribution: Michael Dudek, NRC Getachew Tesfaye, NRC Bruce Bavol, NRC
- Enclosure: "SDA Pre-Application Presentation: NuScale SDA Density Wave Oscillation Carve-out Resolution Plan (Open Session)," PM-107891, Revision 0



#### Enclosure:

"SDA Pre-Application Presentation: NuScale SDA Density Wave Oscillation Carve-out Resolution Plan (Open Session)," PM-107891, Revision 0

**NuScale Nonproprietary** 

### SDA Pre-Application Presentation



NuScale SDA Density Wave Oscillation Carve-out Resolution Plan (Open Session)

October 19, 2021



Copyright 2021 by NuScale Power, LLC.

PM-107891 Revision: 0

### **Presenters**

Mark Shaver Manager, Licensing Bob Houser Manager, Testing and Code Development John Fields Licensing Engineer

## Agenda

- Purpose
- Background
  - Comments During DCA Review
  - DCA Outcome
- NRC Engagement



## Purpose

Present the NuScale plan to address the DCA DWO carve-out

Demonstrate a connection between DCA review comments and the NuScale plan

- Describe the DWO evaluation model development activities, including validation testing
- Summarize information that gives NuScale confidence in the plan



# Background

Copyright 2021 by NuScale Power, LLC.



### **Comments During DCA Review**

- Design and performance of SGs not sufficiently validated because of uncertainties associated with unstable DWO on the SG secondary side
  - Resolution: Additional design, analysis, and testing planned
- Stability map from NRC differs greatly from NuScale stability map
  - Resolution: LTR describing stability method and stability map in FSAR
- Accelerated wear of alloy 690TT SG tubing material a potential concern
  - Resolution: Analysis and/or testing to show no accelerated wear that would damage SG tubes or degradation of SGIFR performance







### **Comments During DCA Review**



- Concern that TF-2 is not a prototypical test for NuScale SG design; pump flow is not constant, vertical height difference
  - Resolution: Additional modifications, scaling, testing, and treatment of uncertainties planned
- Concern about reverse flow effects on IFR
  - Resolution: Additional analysis and/or testing (e.g., CVAP)
- Concern about in-phase oscillations
  - Resolution: Explicitly evaluated as part of the stability method LTR



7 PM-107891 Revision: 0

## **DCA Outcome**

- SER
  - NRC did not finalize review of evaluation methodology for analysis of secondary-side instabilities in the SG design
- Created COL Item 3.9-14 to address DWO
  - A COL applicant that references the NuScale Power Plant design certification will develop an evaluation methodology for the analysis of secondary-side instabilities in the steam generator design. This methodology will address the identification of potential density wave oscillations in the steam generator tubes, and qualification of the applicable portions of the reactor coolant system integral reactor pressure vessel and steam generator given the occurrence of density wave oscillations, including the effects of reverse fluid flows within the tubes.



## **DCA Outcome**

- Proposed Rule issued in July 2021
- DWO carve-out resolution needs to demonstrate compliance with 10 CFR 50 Appendix A; GDCs 4 and 31
- FSAR changed to indicate inlet flow restrictor design no longer precludes density wave oscillations in the secondary side of SGs
- Develop a method of analysis to predict the thermalhydraulic conditions of the SG secondary fluid system and resulting loads, stresses, and deformations from density wave oscillations, including reverse flow



# NRC Engagement



Copyright 2021 by NuScale Power, LLC.

# **NRC Engagement**

- NRC Engagement Plan Goal
  - Familiarize NRC with approach and elements of NuScale plan to address concerns that resulted in the DCA DWO carve-out
  - Discuss the plan and approach
- Engagement Plan Elements
  - This meeting introduce overall plan at a high level and cover portions of the plan in more detail
  - SIET visit (1<sup>st</sup> quarter 2022) Give NRC opportunity to observe TF-2 testing and review data
  - LTR focus (3<sup>rd</sup> quarter 2022) Walkthrough of LTR and EM
  - Submit LTR (4<sup>th</sup> quarter 2022)
  - Submit SDAA (late 4<sup>th</sup> quarter 2022) includes FSAR changes for DWO





#### **Portland Office**

6650 SW Redwood Lane, Suite 210 Portland, OR 97224 971.371.1592

### **Corvallis Office**

1100 NE Circle Blvd., Suite 200 Corvallis, OR 97330 541.360.0500

### Rockville Office

11333 Woodglen Ave., Suite 205 Rockville, MD 20852 301.770.0472

#### **Richland Office**

1933 Jadwin Ave., Suite 130 Richland, WA 99354 541.360.0500

### Charlotte Office

2815 Coliseum Centre Drive, Suite 230 Charlotte, NC 28217 980.349.4804

<u>http://www.nuscalepower.com</u> Twitter: @NuScale\_Power





Copyright 2021 by NuScale Power, LLC.

12 PM-107891 Revision: 0