

November 9, 2022

Docket No. 99902078

U.S. Nuclear Regulatory Commission  
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**SUBJECT:** NuScale Power, LLC Submittal of Presentation Materials Entitled "SDAA: NuScale ECCS Valve Design and OM Code Testing Application," PM-127064, Revision 0 (Open Session)

NuScale Power, LLC (NuScale) has requested a meeting with the NRC technical staff on November 17, 2022, to discuss presentation materials entitled "SDAA: NuScale ECCS Valve Design and OM Code Testing Application."

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 version of the presentation entitled "SDAA: NuScale ECCS Valve Design and OM Code Testing Application."

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](mailto:eenGLISH@nuscalepower.com).

Sincerely,



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Enclosure 1: "SDAA: NuScale ECCS Valve Design and OM Code Testing Application," PM-127064, Revision 0 (Open Session)

**Enclosure 1:**

“SDAA: NuScale ECCS Valve Design and OM Code Testing Application,” PM-127064,  
Revision 0 (Open Session)

NuScale Nonproprietary

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# SDAA Pre-Application Presentation

November 17, 2022

## SDAA: NuScale ECCS Valve Design and OM Code Testing Application

Daniel Lassiter, Mechanical Engineer 5, NSSS Engineering

Gary McGee, Program Manager, Operations Programs

Augi Cardillo, Supervisor, NSSS Mechanical Systems

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Open Session

## Acknowledgement and Disclaimer

This material is based upon work supported by the Department of Energy under Award Number DE-NE0008928.

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## Agenda

- Meeting purpose
- Meeting objective
- Overview of Emergency Core Cooling System (ECCS) valve design
- Valve testing per the American Society of Mechanical Engineers (ASME) Operation and Maintenance Code (OM Code)
- Summary

## Meeting Purpose

- Present the Standard Design Approval Application (SDAA) ECCS valve design
- Discuss valve testing per the ASME OM Code

## Meeting Objective

NRC to gain understanding of

- the SDAA ECCS valve design and
- the SDAA Section 3.9.6 changes on valve testing to reflect changes between the 2012 Edition and 2017 Edition of the ASME OM Code

# Overview of ECCS Valve Design

## ECCS Valve Design Overview

- The ECCS valves perform the same function in the Standard Design Approval (SDA) as the Design Certification Application (DCA)
  - Reactor vent valves (RVVs) open to vent steam to containment, steam condenses on containment vessel (CNV) walls and transfers heat to the ultimate heat sink (UHS)
  - Reactor recirculation valves (RRVs) allow condensate to return to the reactor pressure vessel (RPV)
- Plant and ECCS design modifications made to improve loss-of-coolant accident (LOCA) response
  - Most challenging event for NuScale design was postulated inadvertent opening events of ECCS valves
  - Changes were made to slow down the transients to improve response for inadvertent valve opening events while maintaining sufficient capacity for long term cooling
- Design details in closed session



# Valve Testing per the ASME OM Code

## NuScale License Basis of the ASME OM Code

- DCA based on ASME OM Code, 2012 Edition
  - 10 CFR 50.55a(z) Alternative to codes and standards requirements (Alternate Authorization)
  - Utilized ASME OM Code, 2017 Edition Mandatory Appendix IV for AOVs, HOVs, and ECCS valves
- SDA based on ASME OM Code, 2017 Edition
  - NRC endorsed the use of ASME OM Code, 2017 Edition
  - SDA Section 3.9.6 is updated to fully comply to ASME OM Code, 2017 Edition

### DCA Alternative Authorization:

- Allowed use of the ASME OM Code, 2017 Edition Mandatory Appendix IV with the ASME OM Code, 2012 Edition
- Specified that Mandatory Appendix IV applied to AOVs, HOVs and ECCS valves

GAP: Removing the DCA Alternate Authorization in the SDA removes the ability to use Mandatory Appendix IV for testing HOVs and ECCS valves. Section ISTC specifies AOVs for Mandatory Appendix IV testing.

## ASME OM Code Subsection ISTC and Mandatory Appendix IV

Subsection ISTC – requires active pneumatic operated valves (AOVs) shall meet the requirements of Mandatory Appendix IV for the following requirements:

- ISTC-3100(e), Preservice Testing
- ISTC -3310, Effects of Valve Repair, Replacement, or Maintenance Values
- Exercise Table ISTC-3500-1, Note (3), Category B/C, Ref: ISTC-3510, 3700, 5130
- ISTC-3560, Fail Safe Testing
- ISTC-5130, Specific Testing

ISTC-5110, Power-Operated Relief Valves (PORVs) – ECCS valves are required to meet this subparagraph which requires these valves to meet ISTC-5100 requirements for Category B valves, including:

- ISTC-5111, Valve Testing Requirements
- ISTC-5112, Leak Testing
- ISTC -5113, Valve Stroke Testing
- ISTC -5114, Valve Test Acceptance Criteria
- ISTC-5115, Corrective Action

**ACTION:** Alternate Authorizations are needed for HOVs and ECCS valves to perform testing in accordance with Mandatory Appendix IV (as originally established in the DCA) in lieu of the above Subsection ISTC requirements.

## ASME OM Code Edition Change Impacts

- Specific changes from the OM Code, 2012 Edition to OM Code, 2017 Edition
  - Augmented Component definition better matches 10 CFR 50.55a (see below)
  - Augmented Authorizations to utilize Mandatory Appendix IV for HOV and ECCS valves
- Improvements to safety in the SDA
  - Any component that meets the definition of ISTA-1100 is now included in the IST Program, not the Augmented Test Program, including
    - Non-code components
    - Nonsafety-related components
    - Only BDBE components are included in the Augmented Test Program (four backup CIVs on CVCS)

## Summary

- SDAA ECCS valve design:
  - The ECCS fundamentally operates the same from DCA to SDA
  - Plant and ECCS design modifications made to improve LOCA response
- Valve testing per the ASME OM Code:
  - SDA commits to ASME OM Code, 2017 Edition
  - DCA Alternate Authorization for use of Mandatory Appendix IV was removed
  - New SDA Alternate Authorizations needed to use Mandatory Appendix IV for HOVs and ECCS valves.
  - AOV, HOV, and ECCS valve comprehensive tests specified in 3.9.6.3.2 (3) and Table 3.9-18
  - AOV, HOV, and ECCS valve test frequencies specified in Mandatory Appendix IV
  - Actions to update Section 3.9.6 for HOV/ECCS testing
    - Add Alternative Authorizations for testing HOV and ECCS valves pursuant to Mandatory Appendix IV
    - Clarify language in Subsection 3.9.6.3.2 (3)
    - Add new Table 3.9-18 Note for ECCS to replace Note 16

## Acronyms

AOV	Air-Operated Valve	RPV	Reactor Pressure Vessel
ASME	American Society of Mechanical Engineers	RRV	Reactor Recirculation Valve
BDBE	Beyond Design Basis Event	RVV	Reactor Vent Valve
CIV	Containment Isolation Valve	SDAA	Standard Design Approval Application
CNV	Containment Vessel	SDA	Standard Design Approval
DCA	Design Certification Application	UHS	Ultimate Heat Sink
ECCS	Emergency Core Cooling System		
HOV	Hydraulic-Operated Valve		
IST	Inservice Testing		
LOCA	Loss-of-Coolant Accident		
NRC	Nuclear Regulatory Commission		
OM	ASME Operation and Maintenance Code		
PORV	Power-Operated Relief Valve		