January 12, 2022 Docket No. 99902078

U.S. Nuclear Regulatory Commission
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One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: NuScale Power, LLC Submittal of Presentation Materials Entitled "ACRS Subcommittee Meeting: NuScale Building Design and Analysis Methodology for Safety-Related Structures (Open Session)," PM-111761, Revision 0

The purpose of this submittal is to provide presentation materials to the NRC for use during the upcoming Advisory Committee on Reactor Safeguards (ACRS) Subcommittee Meeting on January 19, 2022. The materials support NuScale's presentation of the topical report "NuScale Building Design and Analysis Methodology for Safety-Related Structures," TR-0920-71621, Revision 1.

The enclosure to this letter is the nonproprietary presentation entitled "ACRS Subcommittee Meeting: NuScale Building Design and Analysis Methodology for Safety-Related Structures (Open Session)," PM-111761, Revision 0.

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. Shaver

Mark W. Shaver
Manager, Licensing
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Enclosure: "ACRS Subcommittee Meeting: NuScale Building Design and Analysis Methodology for Safety-Related Structures (Open Session)," PM-111761, Revision 0

Enclosure:

"ACRS Subcommittee Meeting: NuScale Building Design and Analysis Methodology for Safety-Related Structures (Open Session)," PM-111761, Revision 0

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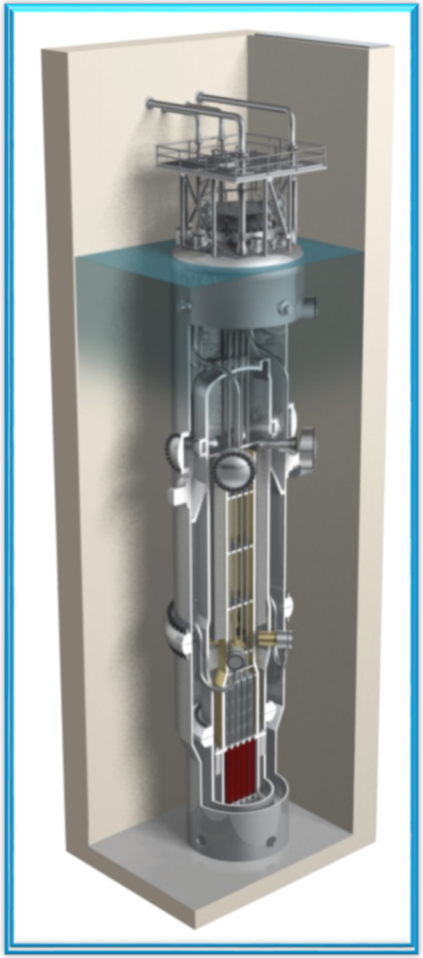
ACRS Subcommittee Meeting



NuScale Building Design and Analysis Methodology for Safety-Related Structures

January 19, 2022

(Open Session)

PM-111761
Revision:0

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Presenters

Fehmida Mesania, Ph.D., P.E.
Licensing Engineer

Evren Ulku, Ph.D., P.E.
Supervisor, Civil Structural

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Agenda

- Purpose
- Introduction
  - Steel-plate composite (SC) Walls
  - Reinforced concrete (RC) members
  - In-structure response spectra (ISRS)
  - Effective stiffness modeling approach

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Purpose

- Present technical content of topical report TR-0920-71621
- Provide a general understanding of building design and analysis methodology for seismic Category I and II nuclear safety-related reinforced concrete (RC) and steel-plate composite (SC) structures applicable to NuScale design

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Introduction – Timeline

- NuScale submitted topical report TR-0920-71621, Revision 0, “Building Design and Analysis Methodology for Safety-Related Structures,” – December, 2020 (ADAMS Accession No. ML20353A404)
- NRC accepted the topical report for review – February, 2021
- NRC completed detailed technical review via RAIs -9833, -9834 and -9860, October, 2021
- NuScale issued topical report Revision 1 - October, 2021(ADAMS Accession No. ML21279A336)
- NRC issued draft Safety Evaluation Report (SER) - November, 2021

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Introduction – Topical Report

- Topical report presents a design methodology implementing new industry standards for nuclear facilities
- Applicable to new generation SMR designs
- Complies with reinforced concrete and SC walls requirements
- Defines design methodologies to account for the interaction of SC walls with traditionally constructed RC members such as basemats, slabs, and roofs
- Implements the soil library methodology for complex structures as per NuScale topical report, “Improvements in Frequency Domain Soil-Structure-Fluid Interaction Analysis”, TR-0118-58005-P-A, Revision 2
- Topical report information will be used as part of SDAA submittal

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Introduction - Building Design

Evren Ulku, Ph.D., P.E.
Supervisor, Civil Structural

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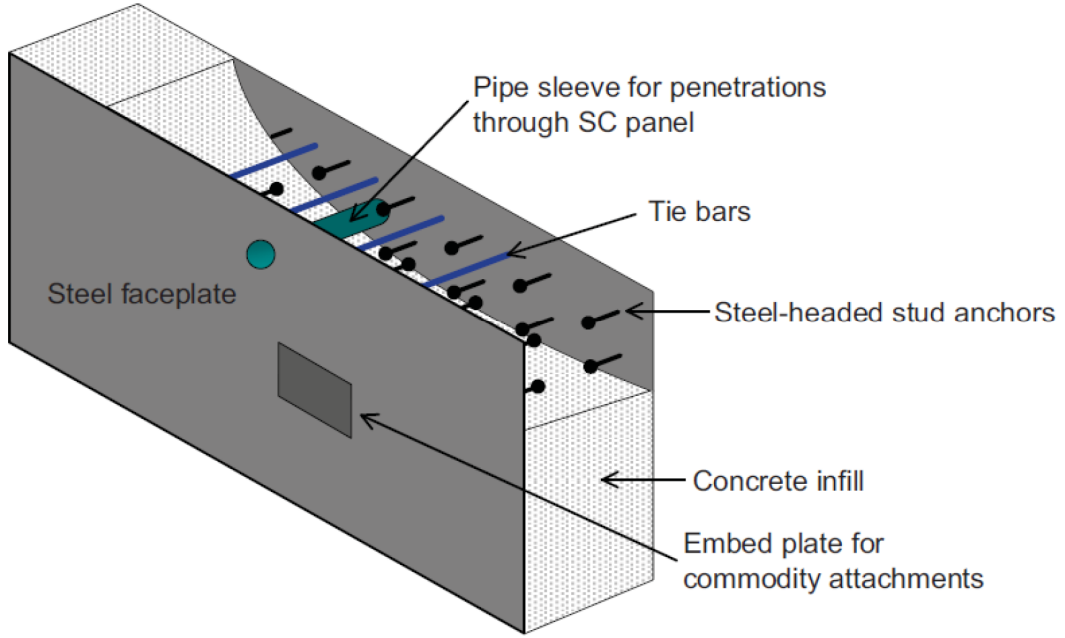
Steel-Composite Walls

- Steel-Plate Composite Walls
  - Steel faceplates with concrete core
  - Anchors to ensure composite behavior
  - Ties to ensure integrity



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SC Walls – Insight

- Advantages
  - ✓ Higher resistance to blast and earthquake, higher ultimate strength
  - ✓ Modular construction➔ reduction in fabrication and erection time
    - Use of several common module layouts repeated throughout elevation
    - Smaller, lighter modules that are more easily transportable
- Areas requiring special attention
  - ➢ Connection with reinforced concrete (RC) elements (i.e., basemat and floors)
  - ➢ Requires below grade mitigation of corrosion effects

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Reinforced Concrete

- RC design methodology is based on the requirements of American Concrete Institute, ACI 349-13 *"Code Requirements for Nuclear Safety-Related Concrete Structures"* and ACI 318-08 *"Building Code Requirements for Structural Concrete."*
- RC members include:
  - Basemat
  - Floor slabs
  - Roof slab

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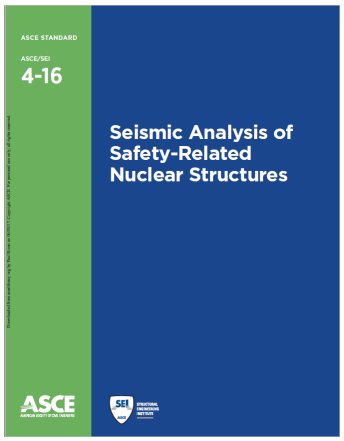
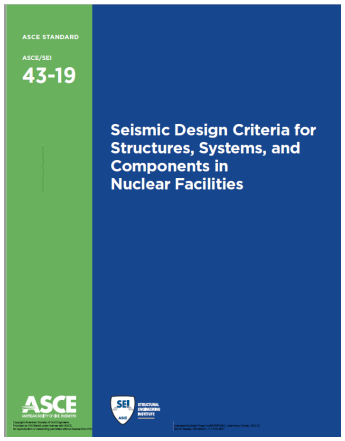
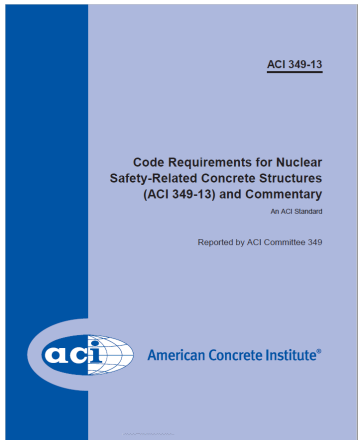
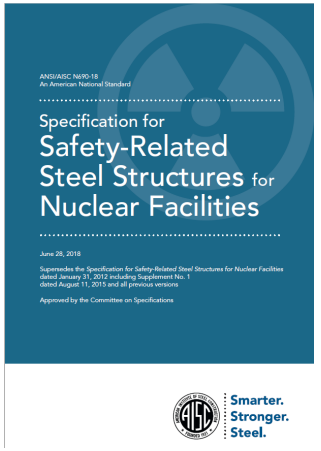
ISRS & Design Methodology

- Implements NuScale Topical Report “Improvements in Frequency Domain Soil-Structure-Fluid Interaction Analysis,” (TR-0118-58005-P-A, Rev 2), to obtain ISRS for subsystem design and member forces for design of Seismic Category I/II structures, systems, and components (SSC)
- Provides analytical models for complex structures with damping values and stiffness properties based on the actual stress state of members under the most critical seismic load combination
- Consistent with latest safety-related codes and standards:









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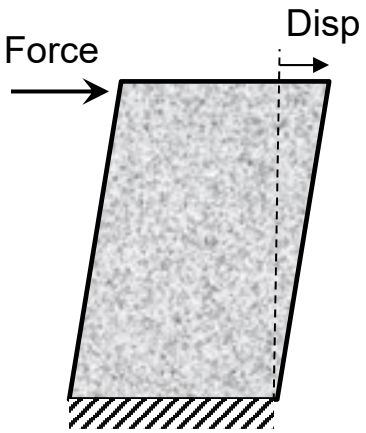
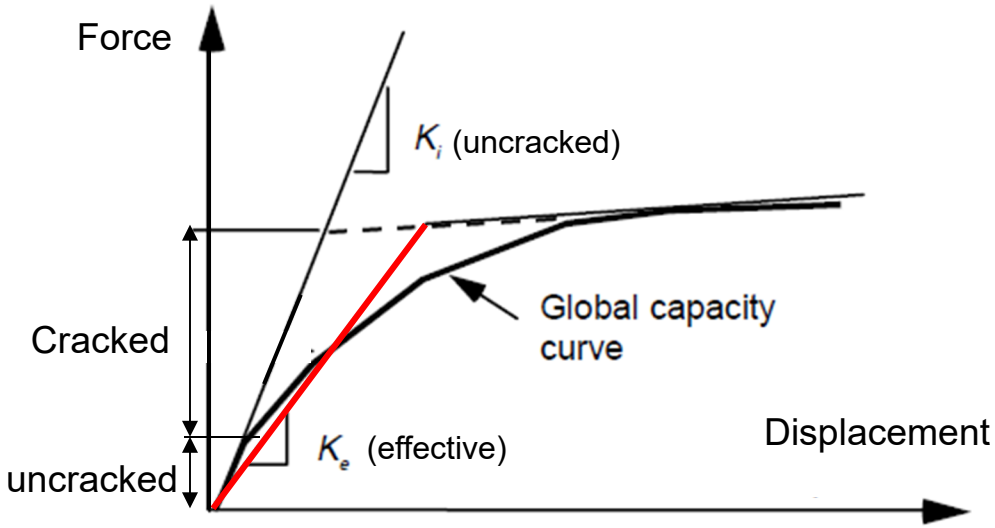
Effective Stiffness

- Describes modeling approach to represent effective stiffness for RC wall/slab members and for SC walls for Seismic Category I/II structures
- Effective stiffness values are taken from codes and standards





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Acronyms

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ISRS	In-structure Response Spectra
NRC	Nuclear Regulatory Commission
RAI	Request for Additional Information
RC	Reinforced Concrete
SC	Steel-plate Composite
SDAA	Standard Design Approval Application
SMR	Small Modular Reactor
SER	Safety Evaluation Report
SSC	Structures, Systems and Components

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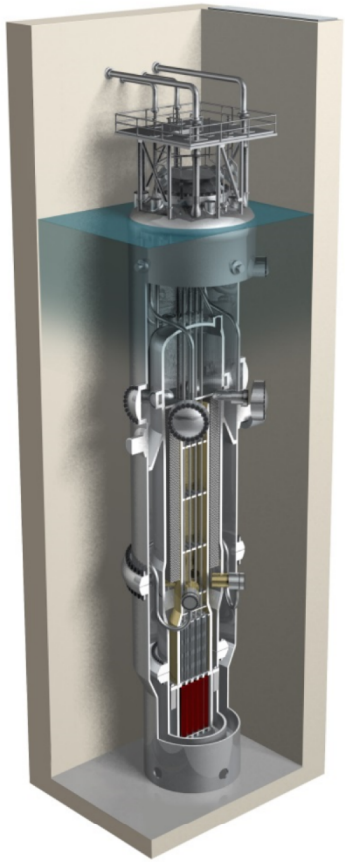

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