

# New & Advanced Reactors: Codes and Standards

Natrium Project Perspective  
April 4, 2024



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# Overview

- The Natrium project is demonstrating the ability to design, license, construct, startup and operate a Natrium reactor.
- The project features a 345 MWe sodium-cooled fast reactor with a molten salt-based energy storage system. The storage technology can boost the system's output to 500 MW of power when needed, which is equivalent to the energy required to power around 400,000 homes. The energy storage capability allows the plant to integrate with grids that have a high penetration of renewable resources.



# Nuclear and Energy Island Separation

- The Energy Island is physically connected to the Nuclear Island by the Nuclear Island Salt System that transports heat between the islands and stores excess thermal energy, providing a buffer that allows steam generation and thermal energy storage operations (e.g., ramp rates) to be independent from reactor power operations.
- The primary authority having jurisdiction (AHJ) for the Nuclear Island is the Nuclear Regulatory Commission.
- The primary AHJ for the Energy Island is the State of Wyoming.



This presentation focuses on codes and standards applied to the Nuclear Island.

# Sources of NRC Acceptance of Codes and Standards

## Regulations

Examples include:

- ASME OM Code
- ASME NQA-1-2015
- IEEE 603-1991

## NRC Regulatory Guides

Examples include:

- ANSI/AISC N690-18, 2016 from Regulatory Guide 1.243 Rev. 0
- IEEE 497, 2016 from Regulatory Guide 1.97 Rev. 5

# Selection of NRC Regulatory Guides

A multi-discipline effort was established to determine what Regulatory Guides are applicable to the design of the Natrium Project. Regulatory Guides were classified as follows:

- Full Conformance
- Partial Conformance
- Not Applicable



# Elicitation of Standards from Reg. Guides

- Conformance statements have been developed for Regulatory Guides that impose design requirements.
- A list of endorsed and referenced codes and standards was elicited from applicable Regulatory Guides.



Additional efforts are being performed for Regulatory Guides that do not contain design requirements.

# Evaluation of Elicited List of Endorsed and Referenced Standards

Some codes and standards have multiple editions/revisions listed in different Regulatory Guides. Examples include:

- ASME BPVC Section IX is referenced in RG 1.34, 1.44, 1.50, 1.70 and 1.143.
- ANSI N42.14 is referenced in RG 1.21, 4.1, and 4.15.
- IEEE 323 is referenced in RG 1.189 and 1.211.

# Evaluation of Elicited List of Endorsed and Referenced Standards

Two approaches have been used to evaluate different code revisions/editions.

- In most instances, the newest endorsed/referenced code or standard is identified in licensing basis documents.
- In certain instances, specific sections of an earlier endorsed/referenced code are included in licensing basis documents in addition to the newest endorsed/referenced code or standard.
  - For example, IEEE 323-2016 is augmented by specific sections of IEEE 323-2003.



# Additional Selection of Codes and Standards

- Additional codes and standards have been selected to provide additional assurances.
- These additional codes and standards are identified in the PSAR. Examples include:
  - IEEE 142, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
  - SMACNA 1108, Accepted Industry Practice for Industrial Duct Construction



# THANK YOU

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