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NRC Meeting:
SMR-300 ISET Scaling Overview

Sept 19th, 2024

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Meeting Agenda

- Purpose
- Introduction
- Background – SMR-300 Configuration
- Scaling Analysis Methodology
- IET and SET Scaling Criteria
- IET/SET Experiment Program
- Summary

Purpose and Outcome

- To provide a high-level overview of the scaling and distortion analysis methodologies used to develop the SMR-300 Integral and Separate Effects Test Facilities

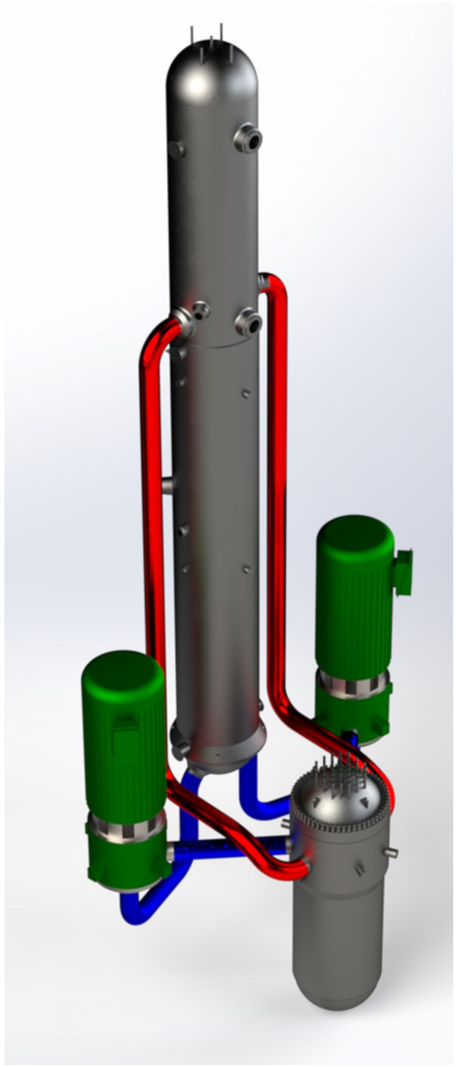
- To identify any areas of concern with the methodologies used or areas for future NRC engagement

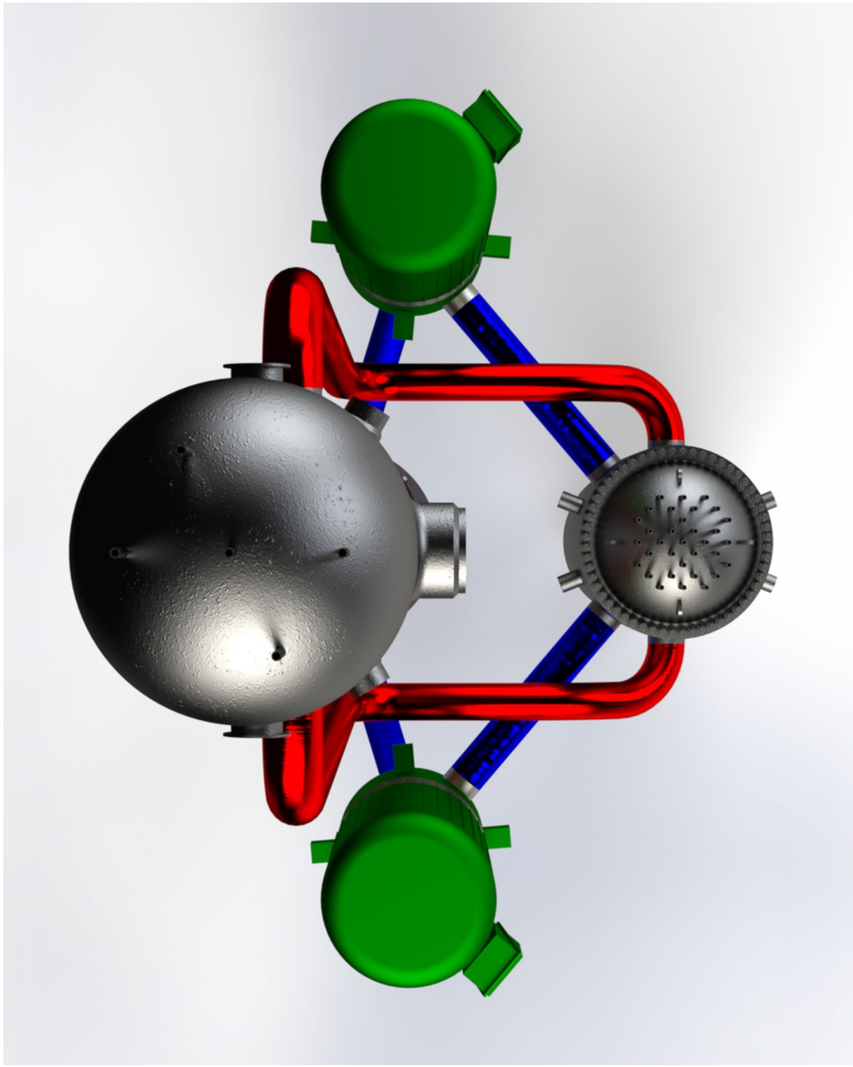
Introduction

- Holtec is developing 300 MW PWR with passive safety systems
  - Will utilize SRP for safety analysis bases
  - Will utilize Reg guide 1.203 for EMDAP process
- First step – Phenomena Identification and Ranking Tables for Events
  - LBLOCA, SBLOCA and Non-LOCA PIRT providing high ranking phenomena.
  - Existing integral and separate effects experiment database provides knowledge base for the large number of phenomena
- Holtec is constructing Integral and Separate Effects Test facilities
  - Support design bases testing
  - Obtain test data for validating computer codes
  - Important phenomena will be represented in the IET/SET as applicable.
- Characterization, separate effects, integral effects tests will be performed

SMR-300 Configuration

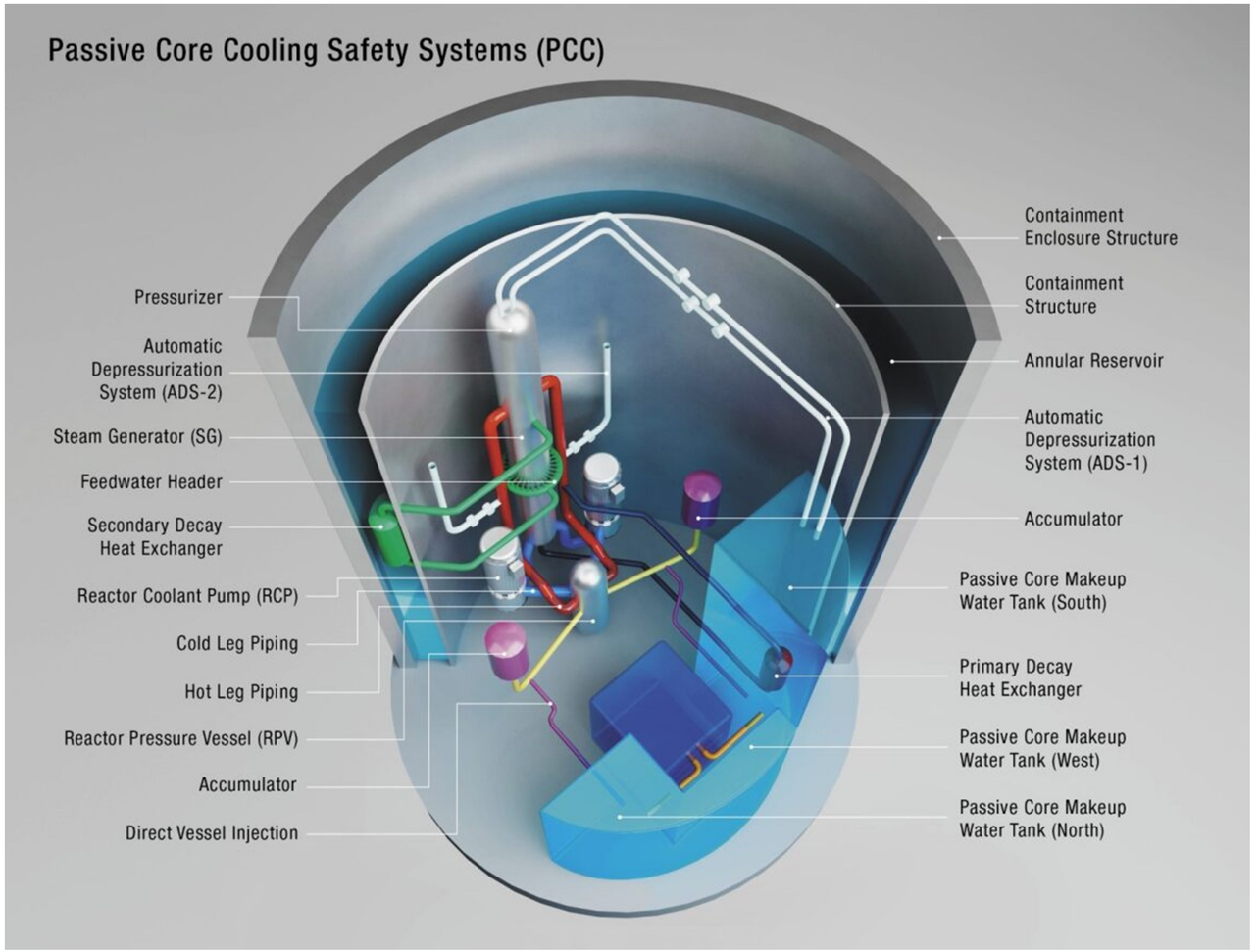
- Once-through SG with integral PZR
- Two centrifugal RCPs
  - ✓ Limited leakage mechanical shaft seals
  - ✓ Flywheel for coast down
- Two cold legs and two hot legs connect RPV to OTSG





SMR-300 ECCS and Safety Systems

- All systems are passive
- Primary Decay Heat (PDH) removal system
- Secondary Decay Heat (SDH) removal system
- Automatic Depressurization System (ADS)
- Passive Core Makeup (PCM) water system
  - ✔ Accumulators
  - ✔ Passive Core Makeup Water Tank (PCMWT)
- Passive Containment Heat (PCH) removal system



SMR-300 Once-Through Steam Generator

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Scaling Analysis Background

- Reg guide 1.203 - EMDAP Element 2 - “Develop Assessment Base” is basis for Scaling Analysis

Requirements	Method of Fulfillment
Specify objectives of assessment base	PIRTs and Standard Review Plan provides events, high ranking phenomena, and experimental needs
Perform scaling analysis & identify similarity criteria	[[ ]]
Identify existing IET/SET data sets	Validation base from different sources provides the data set for important phenomena
Evaluate IET/SET distortions	[[ ]]
Determine experimental uncertainties	Post Experimentation Activity, Code V&V

Scaling Methodology

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Scaling Methodology

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Scaling Ratios

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IET system similarity criteria

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IET Facility – Scaling Approach

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IET Facility – Distortion Analysis

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IET Experiments

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SG SET Facility

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SET Facility – Scaling Approach

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Summary

- PIRT process provides the high-ranking phenomena, and existing experimental database is used to identify the gaps/needs for the IET/SET facility design and testing.
- Well-established methodologies are used to perform scaling analysis for IET/SET
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- Scaling distortions will be accounted for in the safety analysis methodology as appropriate