

Enclosure 5
Nuclear Island System Design Update
(Redacted)

generation

mPower

***Nuclear Island System Design Update
(Redacted Version)***

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Agenda

- Objectives
- Nuclear Island (NI) Systems Overview
 - Safety Strategy
- Auxiliary Condenser (CNX)
 - Functions
 - Major Components
 - Safety Classification
- Reactor Coolant Inventory and Purification (RCI)
 - Functions
 - Major Components
 - Safety Classification
- Emergency Core Cooling (ECC)
 - Functions
 - Major Components
 - Safety Classification
- Discussion



Objectives

- Provide an update on key NI systems design and functions
- Review systems safety strategy and defense in depth



NI Systems Safety Strategy

Strategy	Design
Minimize the probability and impact of design basis accidents	<ul style="list-style-type: none">• Large integral NSSS• Small penetrations –[•
Promote defense-in-depth	<ul style="list-style-type: none">••
Rely upon simple, passive safety features and capabilities	<ul style="list-style-type: none">••
Provide protection from severe accidents	<ul style="list-style-type: none">•••]



NI Systems Safety Strategy

- Reactor Coolant System (RCS) design minimizes both the probability and impact of design basis accidents
- CNX and RCI maintain RCS within safe operating envelope as first line of defense (defense-in-depth)
- A simple, passive safety system protects the reactor core in the event that conditions in RCS leave safe operating envelope
- Simple, passive features protect the lower vessel and containment in the event of a severe accident
- []

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Robust Approach to Safety



Auxiliary Condenser System (CNX)



CNX – System Overview

- High pressure decay heat removal
 - []
 - []
- Controlled decay heat removal
 - Hot standby condition []
 - Safe shutdown conditions []



CNX System Functions

- Safety related functions

- []

- Non-safety functions

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Major Components

- Containment isolation valves

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- Air-cooled condenser

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CNX- Aux Condenser System

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Reactor Coolant Inventory and Purification System (RCI)



RCI – System Overview

- RCS purification - filtration, demineralization, degasification, and chemical addition
- RCS inventory control
- []
- Decay heat removal
 - Normal shutdown residual heat removal
 - Post 72- hr residual heat removal
 - High pressure decay heat removal initiates with []



RCI System Functions

- Safety related functions

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- Non-safety functions

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RCI Major Components

- Containment isolation valves
- LTOP valves
- Circulation pumps
- Charging pumps
- Regenerative and non-regenerative HXs
- Filters
- Demineralizers
- Degasification – gas transfer membrane
- Tanks – [], RCS Makeup
- CRDM accumulator



RCI – Normal Operation

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RCI – Inventory Control

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RCI – RHR Operation

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RCI – []

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Emergency Core Cooling System (ECC)



ECC – System Overview

- Passive safety system
- Designed to provide core cooling supply for all design basis accidents
- Enhanced reliability of support systems (defense in depth) reduces the probability of actuating ECC
- Reduced number of safety-related components required to perform required functions versus current designs
- []
- []



ECC Safety-Related Functions

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ECC Major Components

- Refueling Water Storage Tank (RWST)
 - [] tank filled with demineralized water
- High-Pressure Automatic Depressurization Valves (ADV)s
 - Two sets of series MOVs actuated on []
- Low-Pressure ADVs
 - Four sets of series MOVs actuated on []
- Intermediate Pressure Injection Tank (IPIT)
 - [] filled with demineralized water



ECC Flow Diagram

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Discussion