Browns Ferry Chiller Cross-tie License Amendment Request

June 2021

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Agenda

Background

Current Configuration

Proposed Configuration

Licensing Basis Change

Proposed One-time Use Allowed Outage Time Extension

Discussion

Background

- On July 14, 2015, both Unit 1/2 Control Bay Chillers were inoperable
  - Shutdown was initiated
  - Both chillers were returned to operable status and the plant was returned to power
  - The failure of Unit 1/2 Control Bay Chiller A was caused by fouled condenser coils
  - The Unit 1/2 Control Bay Chiller B was inoperable because of planned maintenance
- Again, on September 9, 2017, both Unit 1/2 Control Bay Chillers were inoperable
  - The NRC granted a Notice of Enforcement Discretion on September 10, 2017
  - The Unit 1/2 CB CHLR A failure was caused by a thermistor failure
  - The Unit 1/2 CB CHLR B failed to start because of a capacitor failing to hold its charge
- A previous presubmittal meeting was held on February 15, 2018

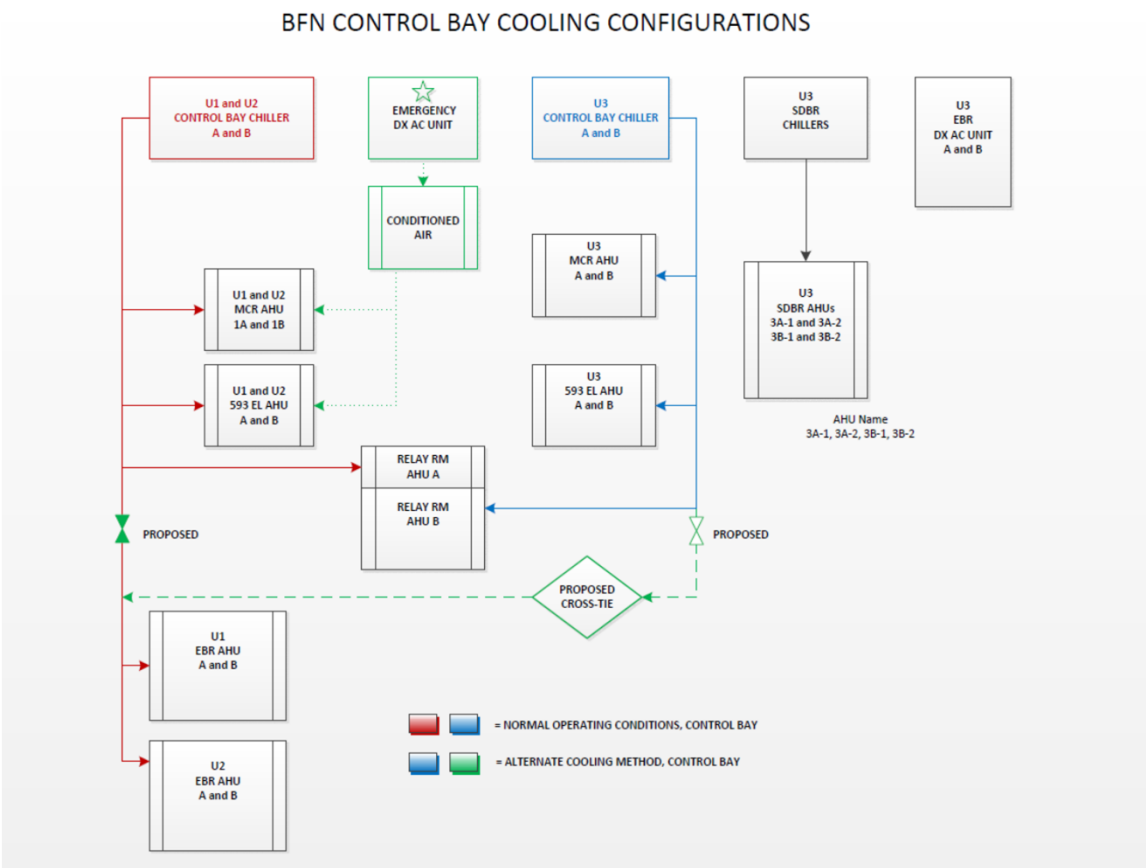
Current Configuration

- The Unit 1/2 Control Bay Chilled Water System (2 100% capacity trains) serves nine area air handling units (AHU)
  - Unit 1 EBRs – 2 units @ 100% capacity
  - Unit 2 EBRs – 2 units @ 100% capacity
  - Units 1 and 2 Control Room – 2 units @ 100% capacity
  - Units 1 and 2 Safety Related Equipment Rooms on EL 593 – 2 units @ 100% capacity
  - Common Switchyard Relay Room EL 617 – 1 unit @ 100% capacity
- The Unit 3 Control Bay Chilled Water System (2 100% capacity trains) serves five AHUs
  - Unit 3 Safety Related Equipment Rooms on EL 593 – 2 units @ 100% capacity
  - Unit 3 Control Room & office spaces, EL 617 – 2 units @ 100% capacity
  - Common Switchyard Relay Room, EL 617 – 1 unit @ 100% capacity

Cross-tie, Proposed Alternative Configuration

- ~~The Unit 1/2 Control Bay Chilled Water System (2 100% capacity trains) serves nine area air handling units (AHU)~~ **NOT AVAILABLE**
  - Unit 1 EBRs – 2 units @ 100% capacity **– Supplied by Unit 3 Control Bay Chilled Water System**
  - Unit 2 EBRs – 2 units @ 100% capacity **– Supplied by Unit 3 Control Bay Chilled Water System**
  - Units 1 and 2 Control Room – 2 units @ 100% capacity **– Supplied by Emergency Direct Expansion Unit**
  - Units 1 and 2 Safety Related Equipment Rooms on EL 593 – 2 units @ 100% capacity **– Supplied by Emergency Direct Expansion Unit**
  - Common Switchyard Relay Room EL 617 – 1 unit @ 100% capacity **– Can already be supplied by Unit 3**
- The Unit 3 Control Bay Chilled Water System (2 100% capacity trains) serves five AHUs
  - Unit 3 Safety Related Equipment Rooms on EL 593 – 2 units @ 100% capacity
  - Unit 3 Control Room & office spaces, EL 617 – 2 units @ 100% capacity
  - Common Switchyard Relay Room, EL 617 – 1 unit @ 100% capacity

Graphical Representation of the Cross-tie



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GDC Criterion 5
Sharing of structures, systems, and component

Design Criterion:

Structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

Cross-tie, Proposed Alternative Configuration:

- Powered by Class 1E source
- Redundant trains of chilled water
- Capacity to supply all required loads
- Cross-tie piping will be isolable and will maintain the same seismic qualification as the current chilled water system piping

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Changes to the Licensing Basis Documents

- The Technical Requirements Manual (TRM) will be updated to reflect the use of the Unit 3 Chilled Water System as an alternate method of cooling the Unit 1 and Unit 2 EBRs

- The Updated Final Safety Analysis Report (FSAR) Chapter 10 will be updated to reflect the cross-tie between the units for the Control Bay Chillers

- The FSAR, Appendix F, will be updated to reflect the sharing of the Unit 3 Chilled Water with Units 1 and 2.

Installation of the Cross-tie

- Connecting the Unit 3 chilled water to the Units 1 and 2 EBR chilled water requires temporarily isolating the Unit 1 and Unit 2 EBRs from the Unit 1/2 Chilled Water System.
- During the evolution, the Unit 1/2 Chilled Water System will remain operating and operable, providing cooling to the Unit 1/2 Main Control Room and EL 593' AHUs
- Completing the Cross-tie connections to the Unit 1/2 EBR AHUs may take up to 20 hours, while maintaining the ability to restore pressure boundary and regain Unit 1/2 EBR cooling within 10 hours.
- Current analysis concludes the most limiting EBR takes approximately 24 hours to heat up to 104°F during a design-basis accident with no cooling provided to the rooms
- BFN will take compensatory measures similar to the 2017 Notice of Enforcement Discretion

Flow-balancing Cross-tie

- Flow-balancing the Unit 3 Control Bay Chilled Water system with the Cross-tie aligned to the Units 1 and 2 EBR AHUs is expected to require 7 days to complete
  - During flow-balancing, the applicable Unit 3 Control Bay Chiller train is available, though not operable.
  - The Standby Unit 3 Control Bay Chiller is isolated from the Cross-tie and is operable.
  - During the flow-balancing evolution, Unit 3 enters LCO 3.7.4 Condition A (30-day LCO)
  - Normal cooling is available to Relay Room via Unit 1/2 Control Bay Chiller

Technical Specifications Changes Under Consideration

- Add Note to LCO 3.0.6 for all three units
  - An evaluation in accordance with Specification 5.5.11, “Safety Function Determination Program,” is not required when the LCO is not met solely due to the 34-hour installation and the 7-day testing and flow-balancing of the Unit 1/2 and Unit 3 Control Bay Chillers crosstie.
- Add Note to Applicability section of LCO 3.8.7, “Distribution Systems – Operating” for all three units
  - The Required Actions below are not required when this LCO is not met solely due to the 34-hour installation and the 7-day testing and flow-balancing of the Unit 1/2 and Unit 3 Control Bay Chillers crosstie.
- Conforming changes to TRM Requirement 3.7.6, “Electric Board Room AC System”


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